

**ORDINANCES
AND OUTLINES OF TESTS,
SYLLABI AND COURSES OF READING**

FOR

**BCA- MCA DUAL DEGREE (5 YRS) PROGRAMME
(1st, 2nd, 3rd, 4th,5th & 6th Semester Examinations)**

MRSPTU, BATHINDA

MRSPTU BCA-MCA DUAL DEGREE (5 YRS.) PROGRAMME 2018 BATCH ONWARDS

Course: BCA- MCA Dual Degree Programme

Duration: 5 Years

Eligibility: Passed 10+2 Examination from any Board recognized or established by Central/State Government through a legislation.

Mode of admission:

1. Online Counselling based on 10+2 examination marks.
2. Manual counselling for left over seats after Online Counselling.

MRSPTU BCA-MCA DUAL DEGREE (5 YRS.) PROGRAMME 2018 BATCH ONWARDS

Semester 1 st		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
HUM0-101	Communicative English	3	1	0	40	60	100	4
BCMC-101	Introduction to Information Technology	3	1	0	40	60	100	4
BCMC-102	Computer Organization	3	1	0	40	60	100	4
BCMC-103	Programming in C Language	3	1	0	40	60	100	4
HUM0-102	Human Value & Professional Ethics	3	1	0	40	60	100	4
BCMC-104	Software Lab.-I (Based on BCMC-101)	0	0	4	60	40	100	2
BCMC-105	Software Lab.-II (Based on BCMC-103)	0	0	4	60	40	100	2
Total		15	5	8	320	380	700	24

Semester 2 nd		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC -206	Database Management System	3	1	0	40	60	100	4
BCMC -207	Computer Network	3	1	0	40	60	100	4
BCMC -208	Management Information System	3	1	0	40	60	100	4
BCMC -209	Object Oriented Programming Language in C++	3	1	0	40	60	100	4
BCMC -210	Operating System	3	0	0	40	60	100	3
BCMC -211	Software Lab.-III (Based on BCMC-206)	0	0	4	60	40	100	2
BCMC -212	Software Lab.-IV (Based on BCMC-209)	0	0	4	60	40	100	2
Total		15	4	8	320	380	700	23

MRSPTU BCA-MCA DUAL DEGREE (5 YRS.) PROGRAMME 2018 BATCH ONWARDS

Semester 3 rd		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC-313	Software Engineering	3	1	0	40	60	100	4
BCMC-314	Data Structure	3	1	0	40	60	100	4
BCMC -315	Latest Trends in Information Technology	3	1	0	40	60	100	4
BCMC -316	Programming in Java	3	1	0	40	60	100	4
BCMC -317	Environmental Studies and Disaster Management	3	1	0	60	40	100	4
BCMC -318	Software Lab.-V (Based on BCMC-314)	0	0	4	60	40	100	2
BCMC-319	Software Lab.-VI (Based on BCMC-316)	0	0	4	40	60	100	2
Total		15	5	8	320	380	700	24

Semester 4 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC-420	Programming with Python	3	1	0	40	60	100	4
BCMC -421	Software Project Management	3	1	0	40	60	100	4
BCMC-422	Linux Operating System	3	1	0	40	60	100	4
BCMC -423	System Programming	3	1	0	40	60	100	4
BCMC-424	Software Lab.-VII (Based on BCMC-420)	0	0	4	60	40	100	2
BCMC-425	Software Lab.-VIII (Based on BCMC-422)	0	0	4	60	40	100	2
Total		12	4	8	280	320	600	20

MRSPTU BCA-MCA DUAL DEGREE (5 YRS.) PROGRAMME 2018 BATCH ONWARDS

Semester 5 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC-526	Data Analytics	3	1	0	40	60	100	4
BCMC-527	Artificial Intelligence	3	1	0	40	60	100	4
BCMC-528	Object Oriented Analysis and Design using UML	3	1	0	40	60	100	4
BCMC-529	Web Application Development	3	1	0	40	60	100	4
BCMC-530	Software Lab.-IX (Based on BCMC-528)	0	0	4	60	40	100	2
BCMC-531	Software Lab.-X (Based on BCMC-529)	0	0	4	60	40	100	2
Total		12	4	8	280	320	600	20

Semester 6 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BCMC-632	Computer Graphics and Multimedia Animation	3	1	0	40	60	100	4
BCMC-633	Network Security	3	1	0	40	60	100	4
BCMC-634	Mobile Applications	3	1	0	40	60	100	4
BCMC-635	Software Lab- XI (Based on BCMC-632)	0	0	4	60	40	100	2
BCMC-636	Software Lab-XII (Based on BCMC-634)	0	0	4	60	40	100	2
BCMC-637	Software Project Development	0	0	8	60	40	100	4
Total		9	3	16	300	300	600	20

COMMUNICATIVE ENGLISH

Subject Code:HUM0-101

L T P C
3 1 0 4

Durations: 45Hrs.

Objectives and Expected Outcomes: The objectives of this course are to make students understand that both oral & written communications are equally important. The students should be comfortable with both verbal & written communications.

UNIT-I (10 Hrs.)

English Language: Sentence, Parts of speech, Tenses, Active passive voice, Direct Indirect speech, Creative writing & vocabulary, Comprehension passage, reading of biographies of at least 10 IT business personalities (can be a home assignment or classroom reading).

UNIT-II (13 Hrs.)

Business Communications: Types, Medias, Objectives, Modals, Process, Importance Understanding Barriers to communication & ways to handle and improve barriers.

UNIT-III (12 Hrs.)

Presentation Skills: Its Purpose in business world, how to find material for presentation, how to sequence the speech with proper introduction and conclusion, how to Prepare PPT & Complete set of required body language while delivering presentation.

Reading & Writing Skills: Importance of reading and writing, improving writing skills through understanding and practicing Notice, E-mail, Tenders, Advertisement, formal letter.

UNIT-IV (10 Hrs.)

Listening Skills: Its importance as individual and as a leader or as a worker, its types, barriers to listening & remedies to improve listening barriers.

Non-verbal Communication: understanding what is called non-verbal communication, its importance as an individual, as a student, as a worker and as a leader, its types.

Recommended Books:

1. M.V. Rodriguez, 'Effective Business Communication', 2003.
2. Meenakshi Raman, Parkash Singh, 'Business Communication' Paperback Edition, Oxford University Press, 2012.

INTRODUCTION TO INFORMATION TECHNOLOGY

Subject Code: BCMC-101

L T P C
3 1 0 4

Durations: 45 Hrs.

Objectives and Expected Outcomes: This course will enable the student to gain an understanding of the core concepts and technologies which constitute Information Technology. The intention is for the student to be able to articulate and demonstrate a basic understanding of the fundamental concepts of Information Technology.

UNIT- I (10 Hrs.)

Computer Fundamentals: Block structure of a computer, characteristics of computers, problem solving with computers, generations of computers, and classification of computers on the basis of capacity, purpose, and generation.

Number System: Bit, byte, binary, decimal, hexadecimal, and octal systems, conversion from one system to the other, representation of characters, integers and fractions.

Binary Arithmetic: Addition, subtraction and multiplication.

UNIT-II (13 Hrs.)

Memory Types: Magnetic core, RAM, ROM, Secondary, Cache, Bubble Memory.

Input and Output Units: Keyboard, Mouse, Monitor (CRT and LCD): Light pen, joystick, Mouse, Touch screen; OCR, OMR, MICR

Overview of storage devices: Floppy disk, hard disk, compact disk, tape. Printers: Impact, non-impact, working mechanism of Drum printer, Dot Matrix printer, Inkjet printer and Laser printer.

Computer Languages: Machine language, assembly language, higher level language, 4GL. Introduction to Compiler, Interpreter, Assembler, Assembling, System Software, Application Software.

UNIT- III (12 Hrs.)

Operating System: Batch, multi-programming, time sharing, network operating system, on-line and real time operating system, Distributed operating system, multi-processor, Multi-tasking.

Graphical OS: Fundamentals of windows, types of windows, anatomy of windows, windows explorer, customizing windows, control panel, taskbar setting, Network Neighborhood.

Word processing: Editing features, formatting features, saving, printing, table handling, page settings, spell-checking, macros, mail-merge, equation editors.

Spreadsheet: Workbook, worksheets, data types, operators, cell formats, freeze panes, editing features, formatting features, creating formulas, using formulas, cell references, replication, sorting, filtering, functions, Charts & Graphs.

Presentation Graphics Software: Templates, views, formatting slide, slides with graphs, animation, using special features, presenting slide shows.

UNIT –IV (10 Hrs.)

Computer Network and Communication: Network types, network topologies, network communication devices, physical communication media.

Internet and its Applications: E-mail, TELNET, FTP, World Wide Web, Internet chatting; Intranet, Extranet, Gopher, Mosaic, WAIS.

Recommended Books:

1. D. H. Sanders, 'Computers Today', 4thEdn., McGraw Hill, 1988.
2. V. Rajaraman, 'Fundamentals of Computers', 2ndEdn., Prentice Hall of India, New Delhi, 1996.
3. Satish Jain, 'Information Technology', BPB, Paperback Edn., 1999.
4. David Cyganski, John A. Orr, 'Information Technology Inside and Outside', Pearson Education, Paperback Edn., 2002.
5. B. Ram, 'Computer Fundamentals', 3rdEdn., Wiley, 1997.
6. ChetanSrivastva, 'Fundamentals of Information Technology', 3rdEdn., KalayaniPublishers.
7. Larry long & Nancy long, 'Computers', 12thEdn., PrenticeHall, 1999.

COMPUTER ORGANIZATION

Subject Code: BCMC-102

L T P C
3 1 0 4

Durations: 45Hrs.

UNIT-I (10 Hrs.)

Components of a Computer: Processor, Memory, Input-Output Unit, Historical Computer Architecture: First, Second, Third, Fourth Generation and Beyond, Difference between Organization and Architecture, Hardware Software Interaction.

UNIT-II (13 Hrs.)

Instruction Types: Three-address, Two-address, One-address, Zero-address; Addressing Modes, Interrupts. **Digital Logic Circuits:** Design of Combinational Circuits: Half Adder, Full Adder.

UNIT-III (12 Hrs.)

Sequential Circuits: SR, JK, D, T Flip-Flop, Excitation Tables, State Diagram, State Table, Binary Counter

Memory: Hierarchical Memory Structure, RAM, ROM, Cache, Auxiliary Memory

UNIT-IV (10 Hrs.)

CPU Architecture: Processor, Register Organization, ALU, CU, Memory, Input/Output; Instruction Implementation: Instruction Cycle, Fetch-Execute Cycle, Instruction codes, op-codes, Timing and Control, Memory reference instructions.

Recommended Books:

1. JyotsnaSengupta, 'Fundamentals of Computer Organization and Architecture', Nu TechBooks, Deep and Deep Publications, New Delhi, 2009,
2. M. Morris Mano, 'Digital Logic and Computer Design', Prentice Hall of India, 2006.
3. J.P. Hayes, 'Computer Organization and Architecture', Tata McGrawHill, 1999.
4. William Stallings, 'Computer System Architecture', PHI, 2010.

PROGRAMMING IN C LANGUAGE

Subject Code: BCMC-103

L T P C
3 1 0 4

Duration: 45 Hrs.

Objectives and Expected Outcomes: The objective of this course is to help the students in finding solutions to various real life problems and converting the solutions into computer program using C language (structured programming). Students will learn to write algorithm for solutions to various real-life problems. Converting the algorithms into computer programs using C language.

UNIT-I (10 Hrs.)

Algorithm and Programming Development: Steps in development of a program, Flow charts, Algorithm Development, Program Debugging, Compilation and Execution.

Fundamentals of 'C': I/O statements, Assignment Statements, Constants, Variables, Operators and Expressions, Standards and Formatted statements, Keywords, Data Types and Identifiers.

UNIT-II (13 Hrs.)

Control Structures: Introduction, Decision making with if – statement, if-else and Nested if, while and do-while, for loop. Jump statements: break, continue, goto, switch Statement

Functions: Introduction to Functions, Function Declaration, Function Categories, Standard Functions, Parameters and Parameter Passing, Call – by value/reference, Recursion, Global and Local Variables, Storage classes.

UNIT- III (12 Hrs.)

Arrays: Introduction to Arrays, Array Declaration, Single and Multidimensional Array, Memory Representation, Matrices, Strings, String handling functions.

Structure and Union: Declaration of structure, Accessing structure members, Structure Initialization, Arrays of structure, nested structures, Unions.

UNIT-IV (10 Hrs.)

Pointers: Introduction to Pointers, Address operator and pointers, Declaring and Initializing pointers, Assignment through pointers, Pointers and Arrays

Files: Introduction, creating a data file, opening and closing a data file, processing a data file.

Preprocessor Directives: Introduction and Use, Macros, Conditional Preprocessors, Header Files.

Recommended Books:

1. Yashvant P. Kanetkar, ‘Let us C’, 7thEdn., BPB Publications, NewDelhi, 2010.
2. E. Balagurusami, ‘Programming in ANSI C’, 4thEdn., Tata McGrawHill, 2007.
3. Byron S. Gottfried, ‘Programming in C’, 2ndEdn., McGrawHills, 1998.
4. Kernighan & Richie, ‘The C Programming Language’, 2ndEdn., PHIPublication, 1988.
5. R. Lafore, ‘Object Oriented Programming’, 3rdEdn., GalgotiaPublications, 1999.
6. R.S. Salaria, ‘Problem Solving and Programming in C’, 2ndEdn, 2015.

HUMAN VALUES AND PROFESSIONAL ETHICS

Subject Code: HUM0-102

L T P C
3 1 0 4

Durations: 45Hrs.

Objectives and Expected Outcomes: To help the students to discriminate between valuable and superficial in the life. To help develop the critical ability to distinguish between essence and form, or between what is of value and what is superficial, in life – this ability is to be developed not for a narrow area or field of study, but for everyday situations in life, covering the widest possible canvas. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief. It is not sufficient to develop the discrimination ability; it is important to act on such discrimination in a given situation. Knowingly or unknowingly, our education system has focused on the skill aspects (learning and doing)-it concentrates on providing “How to do” things. The aspects of understanding “What to do” or “Why something should be done” is assumed. No significant cogent material on understanding is included as a part of curriculum. A result of this is the production of graduates who tend to join into a blind race for wealth, position and jobs. Often it leads to misuse of the skills; and confusion and wealth that breeds chaos in family, problems in society, and imbalance in nature. This course encourages students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and superficial in real situations in their life.

It has been experimented at IITH, IITK and UPTU on a large scale with significant results.

UNIT-I (10 Hrs.)

Course Introduction-Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration– what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self- exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT-II (13 Hrs.)

Understanding Harmony in the Human Being – Harmony in Myself! Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’. Understanding the needs of Self (‘I’) and ‘Body’ – *Sukhand Suvidha*. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer). Understanding the characteristics and activities of ‘I’ and harmony in ‘I’. Understanding the harmony of I with the Body: *Sanyamand Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure *Sanyamand Swasthya*.

Understanding Harmony in the Family and Society-Harmony in Human- Human Relationship: Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship. Understanding the meaning of *Vishwas*; Difference between intention and competence. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): *Samadhan, Samridhi, Abhay, Sah-astitva* as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!

UNIT- III (12 Hrs.)

Understanding Harmony in the Nature and Existence – Whole existence as Co-existence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT-IV (10 Hrs.)

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics. Ability to utilize the professional competence for augmenting universal human order. Ability to identify the scope and characteristics of people-friendly and eco- friendly production systems. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers at the level of society: as mutually enriching institutions and organizations.

Recommended Books:

1. A. Nagraj, 'JeevanVidyaekParichay', Divya Path Sansthan, Amarkantak,1998.
2. Sussan George, 1976, 'How the Other Half Dies', Penguin Press,1976, Reprinted 1986,1991.
3. P.L. Dhar, R.R. Gaur, 'Science and Humanism', Commonwealth Purblishers,1990.
4. A.N. Tripathy, 'Human Values', New Age International Publishers,2003.
5. SubhasPalekar, 'How to Practice Natural Farming', Pracheen (Vaidik) KrishiTantraShodh, Amravati,2000.
6. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 'Limits to Growth – Club of Rome's Report', Universe Books,1972.
7. E.G. Seebauer& Robert L. Berry, 'Fundamentals of Ethics for Scientists & Engineers', Oxford University Press,2000.
8. M. Govindrajran, S. Natrajan& V.S. Senthil Kumar, 'Engineering Ethics (includingHuman Values)', Prentice Hall of India Ltd, Eastern EconomyEdn.
9. B.P. Banerjee, 'Foundations of Ethics and Management', Excel Books,2005.
10. B.L. Bajpai, 'Indian Ethos and Modern Management', New Royal Book Co. Lucknow. Reprinted, 2004, 2008.

SOFTWARE LAB-II (BASED ONBCMC-103)

Subject Code: BCMC-105

**L T P C
0 0 4 2**

Objectives and Expected Outcomes: The objective of this course is to help the students in finding solutions to various real life problems and converting the solutions into computer program using C language (structured programming). Students will learn to write programs for solving various real- life problems.

1. **Input-Output Statements:** formatted and non-formattedstatements.
2. **Decision Making:** switch, if-else, nested if, else-if ladder, break, continue, goto.
3. **Loops:** while, do-while, for.
4. **Functions:** definition, declaration, variable scope, parameterized functions, return statement, call by value, call by reference, recursivefunctions.
5. **Arrays:** Array declarations, Single and multi-dimensional, memory limits, strings and string functions.
6. **Files:** Creation and editing of various types of files, closing a file (using functions and without functions).

DATABASE MANAGEMENT SYSTEM

Subject Code: BCMC-206

**L T P C
3 1 0 4**

Durations: 45 Hrs.

UNIT-I (10 Hrs.)

Introduction to Data, Field, Record, File, Database, Database management system. Structure of database system, Advantage and disadvantage, levels of database system, Relational model, hierarchical model, network model, comparison of these models, E–R diagram, different keys used in a relational system, SQL.

UNIT-II (13 Hrs.)

DBA, responsibilities of DBA, Relational form like INF, 2NF, 3NF, BCNF, 4NF, 5NF, DBTG, concurrency control and its management, protection, security, recovery of database.

UNIT-III (12 Hrs.)

SQL: Introduction to SQL–DDL, DML, DCL, join methods & sub query, Union Intersection, Minus, Tree Walking, Built in Functions, views.

UNIT- IV (10 Hrs.)

Security amongst users, Sequences, Indexing Cursors– Implicit & Explicit, Procedures, Functions & Packages Database Triggers. Big Data: Introduction to Big Data and Analytics, Introduction to NoSQL.

Recommended Books:

1. C.J. Date, ‘Introduction to Database System’, 2003.
2. B.C. Desai, ‘Database Management System’.
3. Korth, ‘Database Concept’.
4. Database System Concepts & Oracle (SQL/PLSQ) – APPublishers, 2005.

COMPUTER NETWORK

Subject Code: BCMC-207

L T P C
3 1 0 4

Durations: 45 Hrs.

UNIT-I (10 Hrs.)

Introduction to Computer networks: Applications, Network hardware and Software (protocol hierarchies, design issues for layers.

Interfaces and services: connection oriented and connection less), Network structure and architecture– point to point, multicast, broadcast, Classification of networks-LAN, MAN and WAN.

UNIT-II (13 Hrs.)

Reference models: The OSI reference model, TCP / IP reference model. Comparison between OSI and TCP / IP models.

Data Link Layer: Design issues, Services to network layer, Framing, Error control, Flow control.

UNIT-III (12 Hrs.)

Network layer: Design issues, Services to the transport layer, Routing algorithms- Static/ non-adaptive and dynamic/adaptive algorithms.

Transport layer: Design issues, connection management–addressing, establishing and releasing connection, transport layer protocols- TCP, UDP.

UNIT-IV (10 Hrs.)

Application layer: The DNS Name Space, Electronic Mail, The World Wide Web.

Network Security: Introduction to cryptography.

Recommended Books:

1. Computer Networks, Tanenbaum, Andrew, Fifth Edition, PHI, 2011.
2. Data Communication and Networking, Behrouz A. Forouzan, Fourth Edition, 2007.
3. Computer Today, S.K. Basandra, First Edition, Galgotia.
4. Data Communication System, Black, Ulysse, Third Edition, PHI.
5. Data and Computer Communications, Stalling, Ninth Edition, PHI, 2011.

MANAGEMENT INFORMATION SYSTEM

Subject Code: BCMC-208

**L T PC
3 1 0 4**

Durations: 45Hrs.

UNIT- I (10 Hrs.)

Management Information System: Meaning and definition, Role of information system, Nature and scope of MIS.

Information and System Concepts: Definition and types of information, Information quality, dimensions of information, value of information, general model of human as an information processor. System related concepts, elements of a system, and types of system.

UNIT- II (13 Hrs.)

Role and Importance of Management: Introduction, levels and functions of management. Structure and classification of MIS, Components of MIS, Framework for understanding MIS: Robert Anthony's hierarchy of management activity, Information requirements and levels of management.

UNIT- III (12 Hrs.)

Decision making concept, types of decisions, methods of choosing among alternatives, Role of MIS in decision making.

Simon's model of decision making, Structured and unstructured decisions.

UNIT- IV (10 Hrs.)

Development of MIS: Stages in the development of MIS, System development approaches: Waterfall model, Prototyping, Iterative enhancement model, Spiral model.

Applications of information systems in Functional areas: Marketing MIS, Financial MIS, Production MIS, Personnel MIS.

Decision Support Systems: Definition and characteristics, MIS versus DSS, Tools and Models for decision support.

Recommended Books:

1. D.P. Goyal, 'Management Information Systems: Managerial Perspectives', Macmillan India Ltd, 2006.
2. Robert G. Murdick, Joel E. Ross, James R. Claggett, 'Information Systems for Modern Management', Prentice Hall of India Pvt. Ltd, 1984.
3. Gordon B. Davis, M.H. Olson, 'Management Information Systems: Conceptual Foundations, Structure & Development', McGraw Hill Book Co, 1974.
4. W.S. Jawadekar, 'Management Information Systems', Tata McGraw Hill Publishing Co, **1998.**

OBJECT ORIENTED PROGRAMMING USING C++

Subject Code:BCMC-209

L T P C

Duration: 45 Hrs.

3 1 0 4

UNIT- I (10 Hrs.)

Characteristics of Object Oriented Programming: Abstraction, Encapsulation, Data hiding, Inheritance, Polymorphism, Code Extensibility and Reusability, User defined Data Types.

Introduction to C++: Identifier, Keywords, Constants, And Operators: Arithmetic, relational, logical, And conditional and assignment. Size of operator, Operator precedence and associativity.

UNIT- II (13 Hrs.)

Classes and Objects: Class Declaration and Class Definition, defining member functions, making functions inline, nesting of member functions, Members access control. this pointer.

Objects: Object as function arguments, array of objects, functions returning objects, Const member functions.

Destructors: Properties, Virtual destructors. Destroying objects. Rules for constructors and destructors. Array of objects. Dynamic memory allocation using new and delete operators, Nested and container classes.

UNIT- III (12 Hrs.)

Static data members and Static member functions. Friend functions and Friend classes.

Constructors: properties, types of constructors (Default, parameterized and copy), Dynamic constructors, multiple constructors in classes.

Inheritance: Defining derived classes, inheriting private members, single inheritance, types of derivation, function redefining, constructors in derived class.

Types of Inheritance: Single, Multiple, Multilevel and Hybrid. Types of base classes: Direct, Indirect, Virtual, Abstract. Code Reusability.

UNIT- IV (10 Hrs.)

Polymorphism: Methods of achieving polymorphic behavior.

Operator overloading: overloading binary operator, overloading unary operators, rules for operator overloading, operator overloading using friend function.

Function overloading: Early binding, Polymorphism with pointers, virtual functions, late binding, pure virtual functions and abstract base class. Introduction to File Handling.

Recommended Books:

1. E. Balagurusamy, 'Object Oriented Programming with C++', Tata McGrawHill, 2008.
2. Deitel and Deitel, 'C++ How to Program', Pearson Education, 2012.
3. Herbert Schildt, 'The Complete Reference C++', Tata McGrawHill, 2003.
4. Robert Lafore, 'Object Oriented Programming in C++', Galgotia Publications, 2002.
5. Bjarne Strastrup, 'The C++ Programming Language', Addition-Wesley Publication Co, 1986.
6. Stanley B. Lippman, Josee Lajoie, 'C++ Primer', Pearson Education, 2002.

OPERATING SYSTEM

Subject Code: BCMC-210

L T P C
3 0 0 3

Durations: 45Hrs.

UNIT- I (10 Hrs.)

Introduction: Definition, Early Systems, Simple Batch system, Multi programmed Batch. Time Sharing Systems, Personal Computer System, Parallel Systems, Distributed Systems, and Real-time Systems.

UNIT- II (13 Hrs.)

Processes: Process concepts, Process Scheduling, Threads.

CPU-Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Algorithm Evaluation. **Process Synchronization:** Critical – section problem, semaphores, classical problem of synchronization.

UNIT- III (12 Hrs.)

Memory Management: Background, Logical v/s Physical address space, swapping, continuous allocation, paging, segmentation.

Virtual Memory: Background, demand paging, performance of demand paging, page replacement, page replacement algorithms, allocation of frames, thrashing.

UNIT- IV (10 Hrs.)

Secondary Storage Structures: Disk structures, Disk scheduling, Disk Reliability.

Deadlocks: System Model, Deadlock characterization, methods for handling deadlocks, Deadlocks Prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock, combined approach to deadlock handling.

Recommended Books:

1. Silberschatz Galvin, ‘Operating System Concepts’, 4thEdn., AddisonWesley, 1993.
2. Crowley, ‘Operating Systems, A Design Oriented Approach’, Tata McGrawHill, 2012.
3. Dietel, ‘Operating Systems’, 2ndEdn., AddisonWesley, 2003.

SOFTWARE LAB.-III (BASED ON BCMC-206)

Subject Code: BCMC-211

L T P C
0 0 4 2

Operational Knowledge and Implementation of Database using SQL.

SOFTWARE LAB-IV (BASED ON BCMC-209)

Subject Code: BCMC-212

L T P C
0 0 4 2

Operational Knowledge and Implementation of numerical methods & statistical Techniques using C++ Language.

SOFTWARE ENGINEERING

Subject Code: BCMC-313

L T P C
3 1 0 4

Duration: 45 Hrs.

Course Objective: To apply principles of software development and evolution. To specify, abstract, verify, validate, plan, develop and manage large software and learn emerging trends in software engineering.

UNIT-I (10 Hrs.)

Introduction to Software: Definition, Software characteristics, Software components, Software Applications.

Introduction to Software Engineering: Definition, Software Engineering Paradigms, Waterfall Model, Prototyping Model, Interactive Enhancement Model, the Spiral Model.

UNIT- II (13 Hrs.)

Software Metrics: Role of Metrics and Measurement, Metrics for software productivity and quality, Measurement software, size-oriented metrics, function oriented metrics, Metrics for software quality.

Software Requirement Specification (SRS): Problem analysis, structuring information, Data flow diagram and data dictionary, structured analysis, Characteristics and component of (SRS).

UNIT- III (12 Hrs.)

Planning a Software Project: Cost estimation, uncertainties in cost estimation, Single variable model, COCOMO model, Project scheduling and milestones, Software & Personal Planning, Verification & Validation (V & V), inspection & review.

System Design: Design Objectives, Design Principles, problem, Partitioning, Abstraction, Top Down and Bottom-up techniques, Structure Design, Structure Charts, Design Methodology.

UNIT- IV (10 Hrs.)

Coding: Coding by Top-down and Bottom-up, Structured Programming, Information Hiding, Programming style, Internal Documentation.

Testing: Level of testing, Test cases and test criteria, Functional Testing, Structural Testing.

Recommended Books:

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach ", Sixth Edition, McGraw Hill, **2010**.
2. R.E. Fairley, "Software Engineering Concepts", Paperback Edition, McGraw Hill, **2004**.
3. Pankaj Jalote, "An Integrated Approach to Software Engineering", Third Edition, Narosa Publishing House, **2016**.

DATA STRUCTURES

Subject Code: BCMC-314

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I (10 Hrs.)

Basic Concepts: Introduction to Complexity, Data Structure and Data Structure operations. Applications of Data Structure, Basic data Structures.

Arrays: Introduction, Types of Array, Memory representation, Applications and operations.

Stacks: Introduction, memory representation, Applications and operations.

UNIT- II (13 Hrs.)

Linked List: Operations like traversing, searching, inserting, deleting, operations on header-linked list, circular linked list, doubly linked list, memory representation.

Queue: Introduction, Operations on EnQueue and Dequeue, Memory Representation and Applications.

UNIT- III (12 Hrs.)

Trees – Definition and Basic concepts, Representation in Contiguous Storage, Binary Tree, Binary Tree Traversal, Searching, Insertion and deletion in Binary trees, Binary Search tree.

UNIT- IV (10 Hrs.)

Searching: Binary and Linear Search.

Sorting: Bubble sort, Insertion sort, Selection sort, Merge Sort, Quick sort.

Recommended Books:

1. Data Structures, Lipschutz Seymour, Second Edition, TMH, 2003.
2. Algorithm + Data Structures = Programs, Niclus Wirth, Prentice Hall.
3. Data Structures, Tanenbaum, Paperback Edition.
4. An Introduction to Data Structures Applications, Trembley&Soreson, Second Edition, 2001.

LATEST TRENDS IN INFORMATION TECHNOLOGY

Subject Code: BCMC-315

L T P C
3 1 0 4

Duration: 45 Hrs.

Course Objectives

After completion of this course, the students would be able to

- 1 Recognise the concepts of emerging technologies.
- 2 Analyse the components of cloud computing.
- 3 Critically analyse case studies to derive the best practice model to apply when developing and deploying parallel, distributed, cloud and IoT based applications.

UNIT-I (10 Hrs.)

Introduction to Computing-Emerging Trends in Computing like Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Utility Computing, Cloud Computing, High Performance Computing, Autonomic Computing.

UNIT-II (13 Hrs.)

Cloud Computing-Introduction, Cloud Types, Uses of Cloud, Components of Cloud Computing - Software as a Service, Platform as a Service, Infrastructure as a Service, Virtualization in Cloud Computing, Concept of Green Clouds.

UNIT-III (12 Hrs.)

Soft Computing-Soft Computing VS Hard Computing; Introduction to Neural Networks – Intelligence, Neurons, Artificial Neural Networks, Application Scope of Neural Network, Brain VS Computer.

UNIT-IV (10 Hrs.)

IoT and Fog Computing-Topologies, Edge Routers, Client-Server Architecture, P2P, M2M, Introduction to Fog Computing, Benefits of Fog Computing.

Recommended Books:

- 1 Joshy Joseph, Craig Fellenstein, 'Grid Computing', 1st Edn. Prentice Hall Professional, **2004**.
- 2 RajkumarBuyaa, James Broberg, Andrzej Goscinski, 'Cloud Computing Principles and Paradigms', 1st Edn., Wiley, **2011**.
- 3 Tettamanzi, Andrea, Tomassini and Macro, 'Soft Computing', Springer, **2001**.
- 4 RajkumarBuyaa, Vecchiola, Selvi, 'Mastering Cloud Computing', first Edn. McGraw Hill, **2013**.
- 5 ArshdeepBahga, Vijay Madiseti, 'Internet of Things (A Hands -on- Approach)', first Edn. VPT, **2014**.

PROGRAMMING IN JAVA

Subject Code: BCMC-316

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT- I (10 Hrs.)

Introduction to Java: evolution, features, comparison with C and C++; Java program structure; tokens, keywords, constants, variables, data types, type casting, statements.

Operators and expressions: arithmetic, relational, logical, assignment, increment, decrement, conditional, bitwise and special operators. Operator precedence & associativity rules.

UNIT- II (13 Hrs.)

Control statements: if else, switch case, for, while, do while, break, continue, labeled loops.

Class: syntax, instance variable, class variables, methods, constructors, overloading of constructors and methods.

UNIT- III (12 Hrs.)

Inheritance: types of inheritance, use of super, method overriding, final class, abstract class, wrapper classes. Arrays, Strings and Vectors, Packages and Interfaces, visibility controls.

UNIT- IV (10 Hrs.)

Errors and Exceptions: Types of errors, Exception classes, Exception handling in java, use of try, catch, finally, throw and throws. Taking user input, Command line arguments.

Multithreaded Programming: Creating Threads, Life cycle of thread, Thread priority, Thread synchronization, Inter-thread communication.

Recommended Books:

1. Programming in Java, E-Balagurusami, Fourth Edition, Tata McGraw Hill, 2013.
2. Mastering Java, Second Edition, BPB Publications, 1998.
3. Advance Java, Ivan Bayross, BPB Publications, 2000.

ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT

Subject Code: BCMC-317

L T P C

Duration: 45 Hrs.

3 1 0 4

UNIT-I (10 Hrs)

The Multidisciplinary nature of environmental studies Natural Resources Renewable and non-renewable resources: Natural resources and associated problems a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

UNIT-II (13 Hrs)

Introduction, types, characteristic features, Structure and function of an ecosystem., Concept of an ecosystem. Ecosystems the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT- III (12Hrs)

Environmental Pollution: Air pollution; Water pollution; Soil pollution.

Natural Resources: Natural Resources and associated problems, use and over exploitation, case studies of forest resources and water resources.

UNIT- IV (10Hrs)

Social Issues : Environment From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

Recommended Books (Latest edition):

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clarendon Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd. 8. Down of Earth, Centre for Science and Environment.

SOFTWARE LAB V (BASED ON BCMC -314 DATA STRUCTURES)

Subject Code: BCMC-318

L T P C
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BCMC: 314 Data Structures. Students are required to develop programs in C/C++ language. Few programs are listed below:

1. Program to insert an element from an array.
2. Program to delete an element from an array.
3. Program to apply various operations on stack.
4. Program for parenthesis matching using stack
5. Program for String reversal using stack.
6. Program to insert and delete nodes in a queue.
7. Program to traverse 2-way linked list.
8. Program to insert and delete nodes in a linked list.
9. Program to search a node in a linked list.
10. Program to insert or delete node in a binary tree.
11. Program to traverse binary tree
12. Program for implementing linear search.
13. Program for implementing binary search.
14. Program for implementing Bubble sort.
15. Program for implementing Selection sort.

SOFTWARE LAB VI (BASED ON BCMC-316 JAVA PROGRAMMING)

Subject Code: BCMC-319

L T P C
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BCMC: -316 Java Programming. Students are required to develop programs in JAVA programming language. Few programs are listed below:

1. Write a ***Class Date*** that takes day, month, and year while creating an object of this class. Find a new date when the number of days is given.
2. Write a program to Add, Subtract, multiply two matrices using switch statement. The program must also validate the sizes of two matrices before performing any operation and should raise exception in case the operation cannot be performed.
3. Write a program to find the ***area of all types of triangles*** using the principle of ***constructor overloading and Inheritance*** depending on the number of dimensions given in the input parameter list using ***super*** to call the super class constructor.
4. Write a program to find the ***area of rectangle*** using an ***abstract super*** class figure and also ***override*** method use to compute the area of the rectangle.
5. Write a program to implement grow able and shrinkable ***Stack*** that can support operations like- push, pop, and view the top item with concept of dynamic allocation using ***finalize ()*** method. The program should also incorporate the concepts of ***private and public*** access methods to avoid accidental manipulations of stack.

6. Write a program to demonstrate *static variables, methods and blocks*.
7. Write a program to swap two items belonging to an object using *returning of object* by a function.
8. Write a program to count the frequency of each vowel in a given string.
9. Demonstrate the use of *static and non static nested* classes.
10. Create a package containing a class to print your (name, roll no, marks) and use this package in another program using *import* statement.

PROGRAMMING WITH PYTHON

Subject Code: BCMC-420

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I (10 Hrs.)

Introduction to Python: Python Installation and Working with Python Understanding Python Variables Python Basic Operators, Understanding python blocks.

Data Types: Declaring and using Numeric data types: int, float, complex using string data type and string operations, Use of Tuple data type.

UNIT- II (13 Hrs.)

Program Flow Control: Conditional blocks using if, else and elif, loops in python programming, continue, break statements in python.

UNIT- III (12 Hrs.)

Functions Modules and Packages: Organizing python codes using functions, organizing python projects into modules, Importing own module as well as external modules.

String List and Dictionary Manipulations: Building blocks of python programs, understanding string in build methods, List manipulation using in build methods, Dictionary manipulation Programming using string, list and dictionary in build functions.

UNIT- IV (10 Hrs.)

File Operation: Reading config files in python Writing log files in python Understanding read functions, read (), read line () and read lines () Understanding write functions, write () and writelines () Manipulating file pointer using seek Programming using file operations.

Recommended Books:

1. Downey, Allen B. Think Python: How to Think Like a Computer Scientist (Version 1.6.6 Ed.), **2012**.
2. Hamilton, Naomi. "The A-Z of Programming Languages: Python", **2008**.
3. Lutz, Mark Learning Python (5th ed.). O'Reilly Media, **2013**.
4. Pilgrim, Mark Dive into Python 3. Apress, **2009**.

SOFTWARE PROJECT MANAGEMENT

Subject Code: BCMC-421

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT- I (10 Hrs.)

Introduction to Software Project Management: Project and characteristic of project, Project Management, Software Project Management, Activities of software project management, Plans, methods and methodologies, stakeholders, objectives and sub-objectives, Project success and failure.

UNIT- II (13 Hrs.)

Selection of Project approach and effort estimation Project: Build or buy. Choosing Methodologies and technologies, Project Development Models: Waterfall Model, Spiral Model and Software prototyping,

UNIT- III (12 Hrs.)

Dynamic System Development Model: Effort estimation: Introduction, stages of estimation, over and under estimation, basis for software estimating, software effort estimation techniques.

Activity Planning: Overview and objective of activity planning, when to plan, Project schedules, Project and activities,

UNIT- IV (10 Hrs.)

Risk Management: WBS, Adding the time dimension using forward pass and backward pass, Risk identification, risk assessment, risk planning, risk management.

Monitoring, Control and contracts: Creating the framework, collecting the data, visualizing progress, cost monitoring, prioritizing monitoring.

Recommended Books:

1. Robert K. Wysocki “Effective Software Project Management” – Wiley Publication, **2011**.
2. Walker Royce: “Software Project Management”- Addison-Wesley, **1998**.
3. Gopaldaswamy Ramesh, “Managing Global Software Projects” – McGraw Hill Education (India), Fourteenth Reprint **2013**.

LINUX OPERATING SYSTEM

Subject Code: BCMC-422

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT- I (10 Hrs.)

Introduction to Operating Systems: its needs and services, Simple batch Systems, Multi- programmed batched systems, Time sharing systems, Parallel systems, Distributed systems and Real-time systems. Introduction to process, Process States.

Structure of LINUX: Kernel, Shell. LINUX Directory system.

UNIT- II (13 Hrs.)

LINUX Commands:User Access and UserID Commands, Directory commands, Editors Commands, File Manipulation Commands, Security and Protection Commands, Inter-User and Inter-Machine Communication, Process Management Commands, I/O Redirection and Piping Commands, Vi editor, File Handling commands, and Introduction to Regular Expressions and Grep.

UNIT- III (12 Hrs.)

Administering LINUX System: Introduction to System Administration, Functional activities of System Administration - Starting up the system, Maintaining the Super User Login, shutting down the system, recovering from system crash, taking backups, managing disk space, Mounting and Un-mounting file system, Adding and removing users, Changing groups and password.

UNIT- IV (10 Hrs.)

Shell Programming: Executing a shell program, Study of shell programming as a Language; Wild card characters, Type of statements and Reserved Words, Special Shell parameters. The AWK pattern scanning

and processing language: Operators, Control Statements and arrays.

Recommended Books:

1. J. Goerzen- Linux Programming Bible, IDG Books, New Delhi- 2001.
2. N. Mathew&R. Stones- Beginning Linux Programming Wiley Publishing India, 2004.

SYSTEM PROGRAMMING

Subject Code: BCMC-423

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I (10 Hrs.)

Introduction: Definition of system software, types of system software, features of system programming, system programming vs. application programming.

Language Processors: Introduction, Language processing activates, Fundamentals of Language Processing.

UNIT- II (13 Hrs.)

Assembler: Elements of Assembly Language Processing, a simple Assembly scheme, pass structure of Assemblers, Design of a two-pass assembler. A brief overview of single pass assembly and problem of forward references.

UNIT- III (12 Hrs.)

Linkers and Loaders: Definition of linker and loader, Design of Absolute Loader, Re-locatable Loader, Direct-linking loader.

UNIT- IV (10 Hrs.)

Compilers: - Overview of compilation process, Lexical analysis, Syntax analysis, Semantic analysis, Intermediate code generation and Code optimization techniques, Compiler vs. Interpreter.

Recommended Books:

1. Donovan J.J., "Systems Programming", New York, Mc-Graw Hill, 1972.
2. Dhamdhare, D.M., "Introduction to Systems Software", Tata Mc-Graw Hill, 1996.
3. Aho A.V. and J.D. Ullman," Principles of compiler Design" Addison Wesley/ Narosa 1985.
4. Kenneth C. Louden," Compiler Construction", Cengage Learning, 1997.

SOFTWARE LAB VII (BASED ON BCMC-420 PROGRAMMING WITH PYTHON)

Subject Code: BCMC-424

L T P C
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BCMC: 420 Programming with Python. Students are required to develop programs in python language. Few programs are listed below:

- 1 To Exchange the Values of Two Numbers Without Using a Temporary Variable.
- 2 To Check if a Number is a Palindrome.
- 3 To Print all Integers that Aren't Divisible by Either 2 or 3 and Lie between 1 and 50.
- 4 To Print Table of a Given Number.
- 5 To Print Sum of Negative Numbers, Positive Even Numbers and Positive Odd numbers in a List.

- 6 To Print Numbers in a Range (1, upper) Without Using any Loops.
- 7 To Find the Sum of Sine Series.
- 8 To Find the Sum of First N Natural Numbers.
- 9 To Search the Number of Times a Particular Number Occurs in a List.
- 10 To Find the Largest Number in a List.
- 11 To Find the Second Largest Number in a List.
- 12 To Find the Second Largest Number in a List Using Bubble Sort.
- 13 To Sort a List According to the Length of the Elements.
- 14 To Sort a List of Tuples in Increasing Order by the Last Element in Each Tuple.
- 15 To Swap the First and Last Value of a List.
- 16 To remove the ith Occurrence of the Given Word in a List where Words can repeat.

SOFTWARE LAB VIII (BASED ON BCMC-422 LINUX OPERATING SYSTEM)

Subject Code: BCMC-425

L T P C
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BCMC: 422 Linux Operating System. Students are required to develop programs in Linux.

DATA ANALYTICS

Subject Code: BCMC-526

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I (10 Hrs.)

Introduction: Collection of data- Secondary data, primary data, Internal data, presentation of data, Classification of data: Mean, Median Mode, Harmonic Mean, Deometric mean.

UNIT- II (13 Hrs.)

Measures of Variations: Significance of measuring variation, good properties of measuring variations, average deviation and standard deviation.

Regression & ANOVA: Regression ANOVA(Analysis of Variance).

UNIT- III (12 Hrs.)

Machine Learning: Introduction and Concepts Differentiating algorithmic and model based frameworks
Regression : Ordinary Least Squares, Ridge Regression, Lasso Regression, K Nearest Neighbours Regression & Classification.

UNIT- IV (10 Hrs.)

Supervised Learning with Regression and Classification techniques -1 Bias-Variance Dichotomy Model ,Validation Approaches Logistic Regression, Linear Discriminant Analysis, Quadratic Discriminant Analysis, Regression and Classification Trees Support, Vector Machines.

Recommended Books:

1. Hastie, Trevor, et al. The elements of statistical learning. Vol. 2. No. 1. New York: springer, 2009.
2. Montgomery, Douglas C., and George C. Runger. Applied statistics and probability for engineers. John Wiley & Sons, 2010.

ARTIFICIAL INTELLEGE

Subject Code: BCMC-527

L T P C
3 1 0 4

Duration: 45 Hrs.

Course Objectives After completion of this course the student will be able to understand the:

1. Different types of AI agents.
2. Various AI search algorithms.
3. The fundamentals of knowledge representation.

UNIT-I (10 Hrs.)

Basics of AI - What is Artificial Intelligence, what is an AI technique, Criteria for success, Problems, Problem spaces and search, Production system, Problem characteristics, Hillclimbing, Best-First search, AO algorithm, Constraint satisfaction.

UNIT-II (13 Hrs.)

Natural Language Processing - Introduction, Overview of linguistics, Grammars and language, Basic Parsing techniques, Semantic analysis and representation, Structure, Natural Language generation, Natural Language systems.

UNIT-III (12 Hrs.)

Knowledge Representation - Issues, Approaches to knowledge Representation, Representing simple facts in logic, Computable functions and predicates, Procedural vs declarative knowledge, Forward vs Backward Reasoning matching, Control knowledge.

UNIT-IV (10 Hrs.)

Expert Systems - Rule-Based system architecture, Non-production system Architecture, dealing with uncertainty, Knowledge acquisition and validation, Knowledge system Building tools.

Recommended Books

1. Elaine Rich and Kevin Knight, 'Artificial Intelligence', 5 th Edn., Tata McGraw Hill, **2014**.
2. Dan. W. Patterson, 'Introduction to Artificial Intelligence and Expert Systems', 1 st Edn., Prentice Hall India, **2015**.
3. Eugene Charniak and Drew McDermott, 'Introduction to Artificial Intelligence', 1 st Edn., Pearson Education, **2002**.

OBJECT ORIENTED ANALYSIS AND DESIGN USING UML

Subject Code: BCMC-528

L T P C
3 1 0 4

Duration: 45 Hrs.

Course Objectives: The student is made to learn:

1. Learn the basis of OO analysis and design skills.
2. Learn the UML design diagrams.
3. Learn to map design to code.
4. Be exposed to various design techniques.

UNIT-I (10 Hrs.)

UML Diagrams: Introduction to OOAD- Unified Process, UML diagrams, Use Case, Class Diagrams, Interaction Diagrams, State Diagrams, Activity Diagrams, Package, Component and Deployment Diagrams.

UNIT-II (13 Hrs.)

GRASP: Designing objects with responsibilities, Creator, Information Expert, Low Coupling, High Cohesion, Controller, Design Patterns, Creational, Factory method, structural, bridge, adapter, behavioural, strategy, observer.

UNIT-III (12 Hrs.)

Applying design patterns: System sequence diagrams, Relationship between sequence diagrams and use cases logical architecture and UML package diagrams, logical architecture refinement, UML class diagrams, UML interaction diagrams, applying GoF design patterns.

UNIT-IV (10 Hrs.)

Coding and Testing: Mapping design to code, testing issues in OO testing, class testing, OO integration testing, GUI testing, OO system testing.

Recommended Books:

1. Simon Bennett, Steve Mc Robb and Ray Farmar, "Object Oriented System Analysis and Design using UML", Forth Edition, Mc- Graw Hill Education, 2010.
2. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, " Design Patterns: Elements of Reusable Object Oriented Software", Addison Wesley, 1995.
3. Martin Fowler, " UML Distilled: A Brief Guide to the standard Object Modeling Language", Third Edition, Addison Wesley, 2003.
4. Paul C. Jorgensen, " Software Testing:- A Craftsman Approach," Third Edition, Auerbach Publications, Taylor and Francis Group, 2008.

WEB APPLICATION AND DEVELOPMENT

Subject Code: BCMC-529

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I (10 Hrs.)

Web programming and HTML5: Introduction to web programming, client server architecture, DNS, latest trends, static and dynamic content, WWW3C standards, difference between HTML & HTML5. Basics of HTML5, understanding document tags.

HTML5 formatting: Formatting tags e.g. font, Bold, italic, super script, subscript, delete, mark etc.

UNIT-II (13 Hrs.)

HTML5 Quotations: q tag, blockquote, Code, abbreviation, address, cite, bi-directional override tag, header, footer and output Tag, meta data and meta tag.

Lists: Ordered, Unordered, Definition List.

Introduction to LINK: anchor element, internal linking and external linking, attribute of anchor tag.

Images: image basics, image tag, Image alignment, image map and all the attributes of image and map.

UNIT-III (12 Hrs.)

Table: Table tag with attributes like width, alignment, cell spacing, cell padding, cell alignment, borders rules, rows, cells, rowspan, colspan, header, footer, body sections, captions and background images.

HTML Frames: Introduction to frameset tag, frame tag, iframes and respective attributes.

Form: Creating form, add labels, text box, check box, radio buttons, password, pull down menus and button to a form ,Use of clickable image as a submit button, pass information between forms (action ,method).

UNIT-IV (10 Hrs.)

DHTML and CSS: Introduction to DHTML, introduction to CSS3, ways to Insert CSS in HTML document (External Style Sheet, Internal Style Sheet, Inline Styles), CSS id and class, div and span tag.

CSS background: background color, background image (repeat horizontally or vertically, set position and no-repeat), **CSS Text:** text color, text alignment, text decoration, **CSS Font:** style, family, Size CSS lists, CSS Links **CSS Tables:** Table borders, collapse borders, table width and height ,table text alignment, table padding, table color, **CSS border:** style, width, color, **CSS margin:** margin, padding.

Recommended Books:

1. Kogent Learning Solutions Inc., " HTML 5 in simple steps",Dreamtech Press.
2. Murray,Tom/Lynchburg," Creating a Web Page and Web Site",College,2002.
3. Steven M. Schafer," HTML, XHTML, and CSS Bible, 5ed",Wiley India.

SOFTWARE LAB IX(BASED ON BCMC 528)

Subject Code: BCMC-530

L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper BCMC: 528 Object oriented analysis and design using UML.

SOFTWARE LAB X(BASED ON BCMC 529)

Subject Code: BCMC-531

L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper BCMC: 529 Web application and development.

COMPUTER GRAPHICS & MULTIMEDIA ANIMATION

Subject Code: BCMC-632

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I (11 Hrs.)

Introduction to computer graphics & graphics systems: Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup table.

Devices: storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software.

UNIT-II (12 Hrs.)

Scan conversion Points & lines: Line drawing algorithms; DDA algorithm, Bresenham's line algorithm,.

Scan conversion -2: Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

2D transformation Basic transformations: translation , rotation, scaling ; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines , parallel lines, intersecting lines.

UNIT-III (11 Hrs.)

2D Viewing: Viewing pipeline, Window to viewport Co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles , polygons & ellipse.

Introduction - Overview of multimedia computing, Definitions, terms, terminologies, characteristics and requirements of different media, Components of multimedia systems.

UNIT-IV (11 Hrs.)

Human's Visual and Audio System - Characteristics of human visual system, Light and visible light, Human retina structure and functions, Non-perceptual uniform color models and perceptual uniform color models, Characteristics of human's audio system, Frequency response and Magnitude range.

Multimedia Coding and Compression - Coding requirements, Compression principles, Entropy and hybrid coding, Compression standards: JPEG and MPEG.

Recommended Books:

1. D. Hearn and M.P. Baker, 'Computer Graphics', 2nd Edn., Pearson, **2002**.
2. Andries van Dam, F. Hughes John, James D. Foley; Steven K. Feiner, 'Computer Graphics Principles and Practice in C', 2nd Edn., Pearson, **2002**.
3. Roy A. Plastock, 'Computer Graphics', 2nd Edn., McGraw Hill, **2000**.
4. F.S. Hill, 'Computer Graphics using OpenGL', 3rd Edn., PHI, **2009**.
5. Jeffrey McConnell, 'Computer Graphics: Theory into Practice', 1st Edn., Jones and Bartlett Publishers, **2005**.
6. William M. Newman, 'Principles of Interactive Computer Graphics', 2nd Edn., McGraw Hill, **2001**.
7. John F. Koegele Buford, 'Multimedia Systems', 1st Edn., Pearson, **2002**.
8. Ralf Steinmetz and Klara Nahrstedt, 'Multimedia: Computing, Communications and Applications', 1st Edn., Pearson, **2002**.

NETWORK SECURITY

Subject Code: BCMC-633

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I (10 Hrs.)

Introduction: Attack, Services and Mechanism, Model for Internetwork Security. Cryptography: Notion of Plain Text, Encryption, Key, Cipher Text, Decryption and cryptanalysis; Public Key Encryption, digital Signatures and Authentication.

UNIT-II (13 Hrs.)

Network Security: Authentication Application: Kerveros, X.509, Directory Authentication Service, Pretty Good Privacy, S/Mime.

IP security Architecture: Overview, Authentication header, Encapsulating Security Pay Load combining

Security Associations, Key Management.

UNIT–III (12 Hrs.)

Web Security: Requirement, Secure Socket Layer, Transport Layer Security, and Secure Electronic Transactions.

Network Management Security: Overview of SNMP Architecture-SMMPV11 Communication Facility, SNMPV3.

UNIT–IV (10 Hrs.)

System Security: Intruders, Viruses and Related Threats, Firewall Design Principles. Comprehensive examples using available software platforms/case tools, Configuration Management.

Recommended Books:

1. W Stallings, "Networks Security Essentials: Application & Standards", Pearson Education, 2000.
2. W.Stallings, "Cryptography and Network Security, Principles and Practice", Pearson Education, 2000.

MOBILE APPLICATIONS

Subject Code: BCMC-634

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT–I (10 Hrs.)

Introduction: Android versions and its feature set The various Android devices on the market , The Android Market application store ,Android Development Environment - System Requirements, Android SDK, Installing Java, and ADT bundle - Eclipse Integrated Development Environment (IDE), Creating Android Virtual Devices (AVDs), Understanding Java SE and the Dalvik Virtual Machine , The Directory Structure of an Android Project , Common Default Resources Folders , The Values Folder , Leveraging Android XML, Screen Sizes , Launching Your Application: The AndroidManifest.xml File, Creating Your First Android Application.

UNIT–II (13 Hrs.)

Android Architecture Overview and Creating an Example Android Application: The Android Software Stack, The Linux Kernel, Android Runtime - Dalvik Virtual Machine, Android Runtime – Core Libraries, Dalvik VM Specific Libraries, Java Interoperability Libraries, Android Libraries, Application Framework, Creating a New Android Project ,Defining the Project Name and SDK Settings, Project Configuration Settings, Configuring the Launcher Icon, Creating an Activity, Running the Application in the AVD, Stopping a Running Application, Modifying the Example Application, Reviewing the Layout and Resource Files

UNIT–III (12 Hrs.)

Android Framework Overview: Android Application Components, Android Activities: Defining the UI, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications Content Providers: Data Management, Android Intent Objects: Messaging for Components,Android Manifest XML: Declaring Your Components

UNIT–IV (10 Hrs.)

Understanding Android Views, View Groups, Layouts and Intents:Designing for Different Android Devices, Views and View Groups, Android Layout Managers, The View Hierarchy, Designing an Android User Interface using the Graphical Layout Tool, Intent Overview, Implicit Intents, Creating the Implicit Intent

Example Project, Explicit Intents, Creating the Explicit Intent Example Application, Intents with Activities, Intents with Broadcast Receivers

Recommended Books:

1. Jonathan Mccalister, "Mobile Apps Made Simple", 2nd Edition, **2017**.
2. Scott Gowell, "Professional Mobile Application Development", 3rd Edition, **2012**.

SOFTWARE LAB XI (BASED ON BCMC 632)

Subject Code: BCMC-635

L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper BCMC: 632 Computer Graphics and Multimedia.

SOFTWARE LAB XII (BASED ON BCMC 634)

Subject Code: BCMC-636

L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper BCMC: 634 Mobile Applications.

**ORDINANCES
AND OUTLINES OF TESTS,
REVISED SYLLABI AND COURSES OF READING**

FOR

**BCA- MCA DUAL DEGREE (5 YRS) PROGRAMME
(1st, 2nd, 3rd, 4th, 5th & 6th Semester Examinations)**

MRSPTU, BATHINDA

MRSPTU BCA-MCA DUAL DEGREE (5 YRS.) PROGRAMME 2019 BATCH ONWARDS

Course: BCA- MCA Dual Degree Programme

Duration: 5 Years

Eligibility: Passed 10+2 Examination from any Board recognized or established by Central/State Government through a legislation.

Mode of admission:

1. Online Counselling based on 10+2 examination marks.
2. Manual counselling for left over seats after Online Counselling.

MRSPTU BCA-MCA DUAL DEGREE (5 YRS.) PROGRAMME 2019 BATCH ONWARDS

Semester 1 st		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BMCAS1-101	Communicative English	3	1	0	40	60	100	4
BMCAS1-102	Introduction to Information Technology	3	1	0	40	60	100	4
BMCAS1-103	Computer Organization	3	1	0	40	60	100	4
BMCAS1-104	Programming in C Language	3	1	0	40	60	100	4
BHUMA0-003	Human Value & Professional Ethics	3	1	0	40	60	100	4
BMCAS1-105	Software Lab.-I (Based on BMCAS1--101)	0	0	4	60	40	100	2
BMCAS1-106	Software Lab.-II (Based on BMCAS1--103)	0	0	4	60	40	100	2
Total		15	5	8	320	380	700	24

Semester 2 nd		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BMCAS1 -201	Database Management System	3	1	0	40	60	100	4
BMCAS1 -202	Computer Network	3	1	0	40	60	100	4
BMCAS1 -203	Management Information System	3	1	0	40	60	100	4
BMCAS1 -204	Object Oriented Programming Language in C++	3	1	0	40	60	100	4
BMCAS1 -205	Operating System	3	0	0	40	60	100	3
BMCAS1 -206	Software Lab.-III (Based on BMCAS1--206)	0	0	4	60	40	100	2
BMCAS1 -207	Software Lab.-IV (Based on BMCAS1--209)	0	0	4	60	40	100	2
Total		15	4	8	320	380	700	23

MRSPTU BCA-MCA DUAL DEGREE (5 YRS.) PROGRAMME 2019 BATCH ONWARDS

Semester 3 rd		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BMCAS1-301	Software Engineering	3	1	0	40	60	100	4
BMCAS1-302	Data Structure	3	1	0	40	60	100	4
BMCAS1-303	Fundamentals of Mathematics	3	1	0	40	60	100	4
BMCAS1-304	Programming in Java	3	1	0	40	60	100	4
BHUMA0-004	Drug Abuse: Problem, Management and Prevention	3	1	0	60	40	100	4
BMCAS1-305	Software Lab.-V (Based on BMCAS1--314)	0	0	4	60	40	100	2
BMCAS1-306	Software Lab.-VI (Based on BMCAS1--316)	0	0	4	40	60	100	2
Total		15	5	8	320	380	700	24

Semester 4 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BMCAS1-401	Android Application Development	3	1	0	40	60	100	4
BMCAS1 -402	Software Project Management	3	1	0	40	60	100	4
BMCAS1-403	Linux Operating System	3	1	0	40	60	100	4
BMCAS1 -404	Discrete Structures	3	1	0	40	60	100	4
BMCAS1-405	Software Lab.-VII (Based on BMCAS1--420)	0	0	4	60	40	100	2
BMCAS1-406	Software Lab.-VIII (Based on BMCAS1--422)	0	0	4	60	40	100	2
Total		12	4	8	280	320	600	20

MRSPTU BCA-MCA DUAL DEGREE (5 YRS.) PROGRAMME 2019 BATCH ONWARDS

Semester 5 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BMCAS1-501	Latest Trends in IT	3	1	0	40	60	100	4
BMCAS1-502	Artificial Intelligence	3	1	0	40	60	100	4
BMCAS1-503	Object Oriented Analysis and Design using UML	3	1	0	40	60	100	4
BMCAS1-504	Web Application Development	3	1	0	40	60	100	4
BMCAS1-505	Software Lab.-IX (Based on BMCAS1--528)	0	0	4	60	40	100	2
BMCAS1-506	Software Lab.-X (Based on BMCAS1--529)	0	0	4	60	40	100	2
Total		12	4	8	280	320	600	20

Semester 6 th		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BMCAS1-601	Computer Graphics	3	1	0	40	60	100	4
BMCAS1-602	Network Security	3	1	0	40	60	100	4
BMCAS1-603	Soft Computing	3	1	0	40	60	100	4
BMCAS1-604	Software Lab- XI (Based on BMCAS1--632)	0	0	4	60	40	100	2
BMCAS1-605	Software Lab-XII (Based on BMCAS1--634)	0	0	4	60	40	100	2
BMCAS1-606	Software Project Development	0	0	8	60	40	100	4
Total		9	3	16	300	300	600	20

COMMUNICATIVE ENGLISH

Subject Code: BMCAS1-101

L T P C
3 1 0 4

Durations: 45 Hrs.

Objectives and Expected Outcomes: The objectives of this course are to make students understand that both oral & written communications are equally important. The students should be comfortable with both verbal & written communications.

UNIT-I (10 Hrs.)

English Language: Sentence, Parts of speech, Tenses, Active passive voice, Direct Indirect speech, Creative writing & vocabulary, Comprehension passage, reading of biographies of at least 10 IT business personalities (can be a home assignment or classroom reading).

UNIT-II (13 Hrs.)

Business Communications: Types, Medias, Objectives, Modals, Process, Importance Understanding Barriers to communication & ways to handle and improve barriers.

UNIT-III (12 Hrs.)

Presentation Skills: Its Purpose in business world, how to find material for presentation, how to sequence the speech with proper introduction and conclusion, how to Prepare PPT & Complete set of required body language while delivering presentation.

Reading & Writing Skills: Importance of reading and writing, improving writing skills through understanding and practicing Notice, E-mail, Tenders, Advertisement, formal letter.

UNIT-IV (10 Hrs.)

Listening Skills: Its importance as individual and as a leader or as a worker, its types, barriers to listening & remedies to improve listening barriers.

Non-verbal Communication: understanding what is called non-verbal communication, its importance as an individual, as a student, as a worker and as a leader, its types.

Recommended Books:

1. M.V. Rodriguez, 'Effective Business Communication', 2003.
2. Meenakshi Raman, Parkash Singh, 'Business Communication' Paperback Edition, Oxford University Press, 2012.

INTRODUCTION TO INFORMATION TECHNOLOGY

Subject Code: BMCAS1--102

L T P C
3 1 0 4

Durations: 45 Hrs.

Objectives and Expected Outcomes: This course will enable the student to gain an understanding of the core concepts and technologies which constitute Information Technology. The intention is for the student to be able to articulate and demonstrate a basic understanding of the fundamental concepts of Information Technology.

UNIT- I (10 Hrs.)

Computer Fundamentals: Block structure of a computer, characteristics of computers, problem solving with computers, generations of computers, and classification of computers on the basis of capacity, purpose, and generation.

Number System: Bit, byte, binary, decimal, hexadecimal, and octal systems, conversion from one system to the other, representation of characters, integers and fractions.

Binary Arithmetic: Addition, subtraction and multiplication.

UNIT-II (13 Hrs.)

Memory Types: Magnetic core, RAM, ROM, Secondary, Cache, Bubble Memory.

Input and Output Units: Keyboard, Mouse, Monitor (CRT and LCD): Light pen, joystick, Mouse, Touch screen; OCR, OMR, MICR

Overview of storage devices: Floppy disk, hard disk, compact disk, tape. Printers: Impact, non-impact, working mechanism of Drum printer, Dot Matrix printer, Inkjet printer and Laser printer.

Computer Languages: Machine language, assembly language, higher level language, 4GL. Introduction to Compiler, Interpreter, Assembler, Assembling, System Software, Application Software.

UNIT- III (12 Hrs.)

Operating System: Batch, multi-programming, time sharing, network operating system, on-line and real time operating system, Distributed operating system, multi-processor, Multi-tasking.

Graphical OS: Fundamentals of windows, types of windows, anatomy of windows, windows explorer, customizing windows, control panel, taskbar setting, Network Neighborhood.

Word processing: Editing features, formatting features, saving, printing, table handling, page settings, spell-checking, macros, mail-merge, equation editors.

Spreadsheet: Workbook, worksheets, data types, operators, cell formats, freeze panes, editing features, formatting features, creating formulas, using formulas, cell references, replication, sorting, filtering, functions, Charts & Graphs.

Presentation Graphics Software: Templates, views, formatting slide, slides with graphs, animation, using special features, presenting slide shows.

UNIT –IV (10 Hrs.)

Computer Network and Communication: Network types, network topologies, network communication devices, physical communication media.

Internet and its Applications: E-mail, TELNET, FTP, World Wide Web, Internet chatting; Intranet, Extranet, Gopher, Mosaic, WAIS.

Recommended Books:

1. D. H. Sanders, 'Computers Today', 4thEdn., McGraw Hill, 1988.
2. V. Rajaraman, 'Fundamentals of Computers', 2ndEdn., Prentice Hall of India, New Delhi, 1996.
3. Satish Jain, 'Information Technology', BPB, Paperback Edn., 1999.
4. David Cyganski, John A. Orr, 'Information Technology Inside and Outside', Pearson Education, Paperback Edn., 2002.
5. B. Ram, 'Computer Fundamentals', 3rdEdn., Wiley, 1997.
6. ChetanSrivastva, 'Fundamentals of Information Technology', 3rdEdn., KalayaniPublishers.
7. Larry long & Nancy long, 'Computers', 12thEdn., PrenticeHall, 1999.

COMPUTER ORGANIZATION

Subject Code: BMCAS1--103

L T P C
3 1 0 4

Durations: 45 Hrs.

UNIT-I (10 Hrs.)

Components of a Computer: Processor, Memory, Input-Output Unit, Historical Computer Architecture: First, Second, Third, Fourth Generation and Beyond, Difference between Organization and Architecture, Hardware Software Interaction.

UNIT-II (13 Hrs.)

Instruction Types: Three-address, Two-address, One-address, Zero-address; Addressing Modes, Interrupts. **Digital Logic Circuits:** Design of Combinational Circuits: Half Adder, Full Adder.

UNIT-III (12 Hrs.)

Sequential Circuits: SR, JK, D, T Flip-Flop, Excitation Tables, State Diagram, State Table, Binary Counter

Memory: Hierarchical Memory Structure, RAM, ROM, Cache, Auxiliary Memory.

UNIT-IV (10 Hrs.)

CPU Architecture: Processor, Register Organization, ALU, CU, Memory, Input/Output; Instruction Implementation: Instruction Cycle, Fetch-Execute Cycle, Instruction codes, op-codes, Timing and Control, Memory reference instructions.

Recommended Books:

1. Jyotsna Sengupta, 'Fundamentals of Computer Organization and Architecture', Nu TechBooks, Deep and Deep Publications, New Delhi, 2009,
2. M. Morris Mano, 'Digital Logic and Computer Design', Prentice Hall of India, 2006.
3. J.P. Hayes, 'Computer Organization and Architecture', Tata McGrawHill, 1999.
4. William Stallings, 'Computer System Architecture', PHI, 2010.

PROGRAMMING IN C LANGUAGE

Subject Code: BMCAS1--104

L T P C
3 1 0 4

Duration: 45 Hrs.

Objectives and Expected Outcomes: The objective of this course is to help the students in finding solutions to various real life problems and converting the solutions into computer program using C language (structured programming). Students will learn to write algorithm for solutions to various real-life problems. Converting the algorithms into computer programs using C language.

UNIT-I (10 Hrs.)

Algorithm and Programming Development: Steps in development of a program, Flow charts, Algorithm Development, Program Debugging, Compilation and Execution.

Fundamentals of 'C': I/O statements, Assignment Statements, Constants, Variables, Operators and Expressions, Standards and Formatted statements, Keywords, Data Types and Identifiers.

UNIT-II (13 Hrs.)

Control Structures: Introduction, Decision making with if – statement, if-else and Nested if, while and do-while, for loop. Jump statements: break, continue, goto, switch Statement

Functions: Introduction to Functions, Function Declaration, Function Categories, Standard Functions, Parameters and Parameter Passing, Call – by value/reference, Recursion, Global and Local Variables, Storage classes.

UNIT- III (12 Hrs.)

Arrays: Introduction to Arrays, Array Declaration, Single and Multidimensional Array, Memory Representation, Matrices, Strings, String handling functions.

Structure and Union: Declaration of structure, Accessing structure members, Structure Initialization, Arrays of structure, nested structures, Unions.

UNIT-IV (10 Hrs.)

Pointers: Introduction to Pointers, Address operator and pointers, Declaring and Initializing pointers, Assignment through pointers, Pointers and Arrays

Files: Introduction, creating a data file, opening and closing a data file, processing a data file.

Preprocessor Directives: Introduction and Use, Macros, Conditional Preprocessors, Header Files.

Recommended Books:

1. Yashvant P. Kanetkar, ‘Let us C’, 7thEdn., BPB Publications, NewDelhi, 2010.
2. E. Balagurusami, ‘Programming in ANSI C’, 4thEdn., Tata McGrawHill, 2007.
3. Byron S. Gottfried, ‘Programming in C’, 2ndEdn., McGrawHills, 1998.
4. Kernighan & Richie, ‘The C Programming Language’, 2ndEdn., PHIPublication, 1988.
5. R. Lafore, ‘Object Oriented Programming’, 3rdEdn., GalgotiaPublications, 1999.
6. R.S. Salaria, ‘Problem Solving and Programming in C’, 2ndEdn, **2015.**

HUMAN VALUES AND PROFESSIONAL ETHICS

Subject Code: BHUMA0-003

**L T P C
3 1 0 4**

Durations: 45Hrs.

Objectives and Expected Outcomes: To help the students to discriminate between valuable and superficial in the life. To help develop the critical ability to distinguish between essence and form, or between what is of value and what is superficial, in life – this ability is to be developed not for a narrow area or field of study, but for everyday situations in life, covering the widest possible canvas. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief. It is not sufficient to develop the discrimination ability; it is important to act on such discrimination in a given situation. Knowingly or unknowingly, our education system has focused on the skill aspects (learning and doing)-it concentrates on providing “How to do” things. The aspects of understanding “What to do” or “Why something should be done” is assumed. No significant cogent material on understanding is included as a part of curriculum. A result of this is the production of graduates who tend to join into a blind race for wealth, position and jobs. Often it leads to misuse of the skills; and confusion and wealth that breeds chaos in family, problems in society, and imbalance in nature. This course encourages students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and superficial in real situations in their life.

It has been experimented at IITH, IITK and UPTU on a large scale with significant results.

UNIT-I (10 Hrs.)

Course Introduction-Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration– what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self- exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT-II (13 Hrs.)

Understanding Harmony in the Human Being – Harmony in Myself! Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’. Understanding the needs of Self (‘I’) and ‘Body’ – *Sukhand Suvidha*. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer). Understanding the characteristics and activities of ‘I’ and harmony in ‘I’. Understanding the harmony of I with the Body: *Sanyamand Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure *Sanyamand Swasthya*.

Understanding Harmony in the Family and Society-Harmony in Human- Human Relationship: Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship. Understanding the meaning of *Vishwas*; Difference between intention and competence. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): *Samadhan, Samridhi, Abhay, Sah-astitvaas* comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!

UNIT- III (12 Hrs.)

Understanding Harmony in the Nature and Existence – Whole existence as Co-existence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT-IV (10 Hrs.)

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics. Ability to utilize the professional competence for augmenting universal human order. Ability to identify the scope and characteristics of people-friendly and eco- friendly production systems. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers at the level of society: as mutually enriching institutions and organizations.

Recommended Books:

1. A. Nagraj, 'JeevanVidyaekParichay', Divya Path Sansthan, Amarkantak,1998.
2. Sussan George, 1976, 'How the Other Half Dies', Penguin Press,1976, Reprinted 1986,1991.
3. P.L. Dhar, R.R. Gaur, 'Science and Humanism', Commonwealth Purblishers,1990.
4. A.N. Tripathy, 'Human Values', New Age International Publishers,2003.
5. SubhasPalekar, 'How to Practice Natural Farming', Pracheen (Vaidik) KrishiTantraShodh, Amravati,2000.
6. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 'Limits to Growth – Club of Rome's Report', Universe Books,1972.
7. E.G. Seebauer& Robert L. Berry, 'Fundamentals of Ethics for Scientists & Engineers', Oxford University Press,2000.
8. M. Govindrajran, S. Natrajan& V.S. Senthil Kumar, 'Engineering Ethics (includingHuman Values)', Prentice Hall of India Ltd, Eastern EconomyEdn.
9. B.P. Banerjee, 'Foundations of Ethics and Management', Excel Books,2005.
10. B.L. Bajpai, 'Indian Ethos and Modern Management', New Royal Book Co. Lucknow. Reprinted, 2004, 2008.

SOFTWARE LAB-I (BASED ON BMCAS1--101)

Subject Code: BMCAS1--105

L T P C

0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper BMCAS1--101 Introduction to Information Technology. The students will do the following sequece of practicals:

1. Familiarizing with PC and WINDOWS commands,
2. File creation,
3. Editing
4. Directory creation.
5. Mastery of DOS internal & external commands.
6. Learning to use MS Office: MS WORD, MS EXCEL & MS PowerPoint

SOFTWARE LAB-II (BASED ON BMCAS1--103)

Subject Code: BMCAS1--106

L T P C

0 0 4 2

Objectives and Expected Outcomes: The objective of this course is to help the students in finding solutions to various real life problems and converting the solutions into computer program using C language (structured programming). Students will learn to write programs for solving various real- life problems.

1. **Input-Output Statements:** formatted and non-formatted statements.
2. **Decision Making:** switch, if-else, nested if, else-if ladder, break, continue, goto.
3. **Loops:** while, do-while, for.
4. **Functions:** definition, declaration, variable scope, parameterized functions, return statement, call by value, call by reference, recursive functions.
5. **Arrays:** Array declarations, Single and multi-dimensional, memory limits, strings and string functions.
6. **Files:** Creation and editing of various types of files, closing a file (using functions and without functions).

DATABASE MANAGEMENT SYSTEM

Subject Code: BMCAS1--201

L T P C
3 1 0 4

Durations: 45 Hrs.

UNIT-I (10 Hrs.)

Introduction to Data, Field, Record, File, Database, Database management system. Structure of database system, Advantage and disadvantage, levels of database system, Relational model, hierarchical model, network model, comparison of these models, E-R diagram, different keys used in a relational system, SQL

UNIT-II (13 Hrs.)

DBA, responsibilities of DBA, Relational form like 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, DBTG, concurrency control and its management, protection, security, recovery of database.

UNIT-III (12 Hrs.)

SQL: Introduction to SQL-DDL, DML, DCL, join methods & sub query, Union Intersection, Minus, Tree Walking, Built in Functions, views.

UNIT- IV (10 Hrs.)

Security amongst users, Sequences, Indexing Cursors- Implicit & Explicit, Procedures, Functions & Packages Database Triggers. Big Data: Introduction to Big Data and Analytics, Introduction to NoSQL.

Recommended Books:

1. Henry F. Korth, Abraham, "Database System Concepts", Tata McGraw Hill.
2. Naveen Prakash, Introduction to Database Management", TMH, 1993.
3. C.J. Date, "An Introduction to Data Base Systems", Pearson Education India.

COMPUTER NETWORK

Subject Code: BMCAS1--202

L T P C
3 1 0 4

Durations: 45 Hrs.

UNIT-I (10 Hrs.)

Introduction to Computer networks: Applications, Network hardware and Software (protocol hierarchies, design issues for layers.

Interfaces and services: connection oriented and connection less), Network structure and architecture-point to point, multicast, broadcast, Classification of networks-LAN, MAN and WAN.

UNIT-II (13 Hrs.)

Reference models: The OSI reference model, TCP / IP reference model. Comparison between OSI and TCP / IP models.

Data Link Layer: Design issues, Services to network layer, Framing, Error control, Flow control.

UNIT-III (12 Hrs.)

Network layer: Design issues, Services to the transport layer, Routing algorithms- Static/ non-adaptive and dynamic/adaptive algorithms.

Transport layer: Design issues, connection management-addressing, establishing and releasing connection, transport layer protocols- TCP, UDP.

UNIT-IV (10 Hrs.)

Application layer: The DNS Name Space, Electronic Mail, The World Wide Web.

Network Security: Introduction to cryptography.

Recommended Books:

1. Computer Networks, Tanenbaum, Andrew, Fifth Edition, PHI.
2. Data Communication and Networking, Behrouz A. Forouzan, Fourth Edition.
3. Computer Today, S.K. Basandra, First Edition, Galgotia.
4. Data Communication System, Black, Ulysse, Third Edition, PHI.
5. Data and Computer Communications, Stalling, Ninth Edition, PHI.

MANAGEMENT INFORMATION SYSTEM

Subject Code: BMCAS1--203

L T P C
3 1 0 4

Durations: 45Hrs.

UNIT- I (10 Hrs.)

Management Information System: Meaning and definition, Role of information system, Nature and scope of MIS.

Information and System Concepts: Definition and types of information, Information quality, dimensions of information, value of information, general model of human as an information processor. System related concepts, elements of a system, and types of system.

UNIT- II (13 Hrs.)

Role and Importance of Management: Introduction, levels and functions of management. Structure and classification of MIS, Components of MIS, Framework for understanding MIS: Robert Anthony's hierarchy of management activity, Information requirements and levels of management.

UNIT- III (12 Hrs.)

Decision making concept: Types of decisions, methods of choosing among alternatives, Role of MIS in decision making.

Simon's model of decision making, Structured and unstructured decisions.

UNIT- IV (10 Hrs.)

Development of MIS: Stages in the development of MIS, System development approaches: Waterfall model, Prototyping, Iterative enhancement model, Spiral model.

Applications of information systems in Functional areas: Marketing MIS, Financial MIS, Production MIS, Personnel MIS.

Decision Support Systems: Definition and characteristics, MIS versus DSS, Tools and Models for decision support.

Recommended Books:

1. D.P. Goyal, 'Management Information Systems: Managerial Perspectives', Macmillan India Ltd.
2. Robert G. Murdick, Joel E. Ross, James R. Claggett, 'Information Systems for Modern Management', Prentice Hall of India Pvt. Ltd.
3. Gordon B. Davis, M.H. Olson, 'Management Information Systems: Conceptual Foundations, Structure & Development', McGraw Hill Book Co.
4. W.S. Jawadekar, 'Management Information Systems', Tata McGraw Hill Publishing Co.

OBJECT ORIENTED PROGRAMMING USING C++

Subject Code: BMCAS1--204

L T P C

Duration: 45 Hrs.

3 1 0 4

UNIT- I (10 Hrs.)

Characteristics of Object Oriented Programming: Abstraction, Encapsulation, Data hiding, Inheritance, Polymorphism, Code Extensibility and Reusability, User defined Data Types. Introduction to C++: Identifier, Keywords, Constants, And Operators: Arithmetic, relational, logical, And conditional and assignment. Size of operator, Operator precedence and associativity.

UNIT- II (13 Hrs.)

Classes and Objects: Class Declaration and Class Definition, defining member functions, making functions inline, nesting of member functions, Members access control. this pointer.

Objects: Object as function arguments, array of objects, functions returning objects, Const member functions.

Destructors: Properties, Virtual destructors. Destroying objects. Rules for constructors and destructors. Array of objects. Dynamic memory allocation using new and delete operators, Nested and container classes.

UNIT- III (12 Hrs.)

Static data members and Static member functions. Friend functions and Friend classes.

Constructors: properties, types of constructors (Default, parameterized and copy), Dynamic constructors, multiple constructors in classes.

Inheritance: Defining derived classes, inheriting private members, single inheritance, types of derivation, function redefining, constructors in derived class.

Types of Inheritance: Single, Multiple, Multilevel and Hybrid. Types of base classes: Direct, Indirect, Virtual, Abstract. Code Reusability.

UNIT- IV (10 Hrs.)

Polymorphism: Methods of achieving polymorphic behavior.

Operator overloading: overloading binary operator, overloading unary operators, rules for operator overloading, operator overloading using friend function.

Function overloading: Early binding, Polymorphism with pointers, virtual functions, late binding, pure virtual functions and abstract base class. Introduction to File Handling.

Recommended Books:

1. E. Balagurusamy, 'Object Oriented Programming with C++', Tata McGrawHill, 2008.
2. Deitel and Deitel, 'C++ How to Program', Pearson Education, 2012.
3. Herbert Schildt, 'The Complete Reference C++', Tata McGrawHill, 2003.
4. Robert Lafore, 'Object Oriented Programming in C++', Galgotia Publications, 2002.
5. Bjarne Strastrup, 'The C++ Programming Language', Addition-Wesley Publication Co, 1986.
6. Stanley B. Lippman, Josee Lajoie, 'C++ Primer', Pearson Education, 2002.

OPERATING SYSTEM

Subject Code: BMCAS1--205

L T P C
3 0 0 3

Durations: 45 Hrs.

UNIT- I (10 Hrs.)

Introduction: Definition, Early Systems, Simple Batch system, Multi programmed Batch. Time Sharing Systems, Personal Computer System, Parallel Systems, Distributed Systems, and Real-time Systems.

UNIT- II (13 Hrs.)

Processes: Process concepts, Process Scheduling, Threads.

CPU-Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Algorithm Evaluation. **Process Synchronization:** Critical – section problem, semaphores, classical problem of synchronization.

UNIT- III (12 Hrs.)

Memory Management: Background, Logical v/s Physical address space, swapping, continuous allocation, paging, segmentation.

Virtual Memory: Background, demand paging, performance of demand paging, page replacement, page replacement algorithms, allocation of frames, thrashing.

UNIT- IV (10 Hrs.)

Secondary Storage Structures: Disk structures, Disk scheduling, Disk Reliability.

Deadlocks: System Model, Deadlock characterization, methods for handling deadlocks, Deadlocks Prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock, combined approach to deadlock handling.

Recommended Books:

1. Silberschatz Galvin, ‘Operating System Concepts’, 4thEdn., Addison Wesley, 1993.
2. Crowley, ‘Operating Systems, A Design Oriented Approach’, Tata McGrawHill, 2012.
3. Harvey. M. Dietel, ‘Operating Systems’, 2ndEdn., Addison Wesley, 2003.

SOFTWARE LAB-III (BASED ON BMCAS1--206)

Subject Code: BMCAS1--206

L T P C
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BMCAS1-: 206 Database Management System .Student will be provided with Operational Knowledge and Implementation of Database using SQL.

SOFTWARE LAB-IV (BASED ON BMCAS1--209)

Subject Code: BMCAS1--207

L T P C
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BMCAS1-: 209 Object oriented Programming Usng C++ .Student will be provided with Operational Knowledge and Implementation of numerical methods & statistical Techniques using C++ Language.

SOFTWARE ENGINEERING

Subject Code: BMCAS1--301

L T P C
3 1 0 4

Duration: 45 Hrs.

Course Objective: To apply principles of software development and evolution. To specify, abstract, verify, validate, plan, develop and manage large software and learn emerging trends in software engineering.

UNIT-I (10 Hrs.)

Introduction to Software: Definition, Software characteristics, Software components, Software Applications.

Introduction to Software Engineering: Definition, Software Engineering Paradigms, Waterfall Model, Prototyping Model, Interactive Enhancement Model, the Spiral Model.

UNIT- II (13 Hrs.)

Software Metrics: Role of Metrics and Measurement, Metrics for software productivity and quality, Measurement software, size-oriented metrics, function oriented metrics, Metrics for software quality.

Software Requirement Specification (SRS): Problem analysis, structuring information, Data flow diagram and data dictionary, structured analysis, Characteristics and component of (SRS).

UNIT- III (12 Hrs.)

Planning a Software Project: Cost estimation, uncertainties in cost estimation, Single variable model, COCOMO model, Project scheduling and milestones, Software & Personal Planning, Verification & Validation (V & V), inspection & review.

System Design: Design Objectives, Design Principles, problem, Partitioning, Abstraction, Top Down and Bottom-up techniques, Structure Design, Structure Charts, Design Methodology.

UNIT- IV (10 Hrs.)

Coding: Coding by Top-down and Bottom-up, Structured Programming, Information Hiding, Programming style, Internal Documentation.

Testing: Level of testing, Test cases and test criteria, Functional Testing, Structural Testing.

Recommended Books:

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach ", Sixth Edition, McGraw Hill.
2. R.E. Fairley, "Software Engineering Concepts", Paperback Edition, McGraw Hill.
3. Jalota, "An Integrated Approach to Software Engineering", Third Edition, Narosa Publishing House.

DATA STRUCTURES

Subject Code: BMCAS1--302

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I(10 Hrs.)

Basic Concepts: Introduction to Complexity, Data Structure and Data Structure operations. Applications of Data Structure, Basic data Structures.

Arrays: Introduction, Types of Array, Memory representation, Applications and operations.

Stacks: Introduction, memory representation, Applications and operations.

UNIT- II (13 Hrs.)

Linked List: Operations like traversing, searching, inserting, deleting, operations on header-linked list, circular linked list, doubly linked list, memory representation.

Queue: Introduction, Operations on EnQueue and Dequeue, Memory Representation and Applications.

UNIT- III (12 Hrs.)

Trees – Definition and Basic concepts, Representation in Contiguous Storage, Binary Tree, Binary Tree Traversal, Searching, Insertion and deletion in Binary trees, Binary Search tree.

UNIT- IV (10 Hrs.)

Searching: Binary and Linear Search.

Sorting: Bubble sort, Insertion sort, Selection sort, Merge Sort, Quick sort.

Recommended Books:

1. Tenenbaum, Y. Lanhghsam and A. J. Augenstein, “Data Structures Using C and C++”, Prentice Hall of India.
2. Seymour Lipschutz “Theory & Practice of Data Structures”, McGraw Hill..

FUNDAMENTALS OF MATHEMATICS

Subject Code: BMCAS1--303

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT - I (10 Hrs.)

Matrix Algebra - Matrices, types of matrices, operations on matrices, determinants, inverse of a matrix, Elementary transformations, Rank of a matrix, solution of simultaneous linear equations using Cramer’s rule and matrix inversion method. Consistency of linear equations by Rank Method.

UNIT - II (13 Hrs.)

Statistics - Introduction to statistics, measures of central tendency - Mean, Median and Mode, measures of dispersion, mean deviation, standard deviation and coefficient of Variation, correlation and regression analysis. Definition of probability, Addition and Multiplication Laws. Simple problems.

UNIT - III (12 Hrs.)

Differential Calculus - Introduction to differentiation, Differentiation of standard functions including trigonometric functions. Differentiation by method of substitution, maxima and minima.

UNIT - IV (10 Hrs.)

Integral Calculus - Indefinite Integral, Integration by substitution, Integration by parts, Integration by partial Fractions, Definite Integral. Numerical Integration: Trapezoidal rule, Simpson's 1/3 rules, Simpson's 3/8 rule.

Recommended Books

1. D.C. Sancheti and V.K. Kapoor, 'Business Mathematics', 11th Edn., Sultan Chand & Sons.
2. B.S. Grewal, 'Higher Engineering Mathematics', 43rd Edn., Khanna Publishers.
3. B.S. Grewal, 'Numerical Methods in Engineering & Science', Khanna Publishers, 10th Edn..
4. Rajaraman, 'Computer Oriented Numerical Methods', 3rd Edn., PHI Publications.

PROGRAMMING IN JAVA

Subject Code: BMCAS1--304

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT- I (10 Hrs.)

Introduction to Java: evolution, features, comparison with C and C++; Java program structure; tokens, keywords, constants, variables, data types, type casting, statements.

Operators and expressions: arithmetic, relational, logical, assignment, increment, decrement, conditional, bitwise and special operators. Operator precedence & associativity rules.

UNIT- II (13 Hrs.)

Control statements: if else, switch case, for, while, do while, break, continue, labeled loops.

Class: syntax, instance variable, class variables, methods, constructors, overloading of constructors and methods.

UNIT- III (12 Hrs.)

Inheritance: types of inheritance, use of super, method overriding, final class, abstract class, wrapper classes. Arrays, Strings and Vectors, Packages and Interfaces, visibility controls.

UNIT- IV (10 Hrs.)

Errors and Exceptions: Types of errors, Exception classes, Exception handling in java, use of try, catch, finally, throw and throws. Taking user input, Command line arguments.

Multithreaded Programming: Creating Threads, Life cycle of thread, Thread priority, Thread synchronization, Inter-thread communication.

Recommended Books:

1. Programming in Java, E-Balagurusami, Fourth Edition, Tata McGraw Hill.
2. Herbert Schildt, "Java the Complete Reference", Oracle Press, Tenth Edition.

DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION

Subject Code: BHUMA0--004

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I(10 Hrs.)

Meaning of Drug Abuse: Meaning: Drug abuse, Drug dependence and Drug addiction. Nature and extent of drug abuse in India and Punjab.

UNIT - II (13 Hrs.)

Consequences of Drug Abuse: Individual: Education, Employment, Income. Family: Violence. Society: Crime. Nation: Law and Order problem.

UNIT - III (12 Hrs.)

Prevention of Drug Abuse: Role of Family: Parent-child relationship, Family support, supervision, shipping values, active scrutiny. School: Counselling, Teacher as role-model, Parent-teacher-health professional coordination, Random testing on students.

UNIT- IV (10 Hrs.)

Treatment and Control of Drug Abuse: Medical Management: Medication for treatment and to reduce withdrawal effects. Psychological Management: Counselling, Behavioural and Cognitive therapy. Social Management: Family, Group therapy and Environmental intervention. Treatment: Medical, Psychological and Social Management. Control: Role of Media and Legislation.

Recommended Books

1. Ram Ahuja, 'Social Problems in India', Rawat Publications, Jaipur, 2003.
2. 'Extent, Pattern and Trend of Drug Use in India', Ministry of Social Justice and Empowerment, Govt. of India, 2004.
3. J.A. Inciardi, 'The Drug Crime Connection', Sage Publications, Beverly Hills, 1981.
4. T. Kapoor, 'Drug Epidemic among Indian Youth', Mittal Publications, New Delhi, 1985.
5. Kessel, Neil and Henry Walton, 'Alcoholism, Harmond Worth', Penguin Books, 1982.
6. Ishwar Modi and Shalini Modi, 'Addiction and Prevention', Rawat Publications, Jaipur, 1997.
7. 'National Household Survey of Alcohol and Drug Abuse', Clinical Epidemiological Unit, All India Institute of Medical Sciences, New Delhi, 2003 & 2004.
8. Ross Coomber and Others, 'Key Concept in Drugs and Society', Sage Publications, New Delhi, 2013.
9. Bhim Sain, 'Drug Addiction Alcoholism, Smoking Obscenity', Mittal Publications, New Delhi, 1991.
10. Ranvinder Singh Sandhu, 'Drug Addiction in Punjab: A Sociological Study', Guru Nanak Dev University, Amritsar, 2009.
11. Chandra Paul Singh, 'Alcohol and Dependence among Industrial Workers', Shipra, Delhi, 2000.

SOFTWARE LAB V (BASED ON BCMC -314 DATA STRUCTURES)

Subject Code: BMCAS1--305

L T P C
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BMCAS1-: 314 Data Structures. Students are required to develop programs in C/C++ language. Few programs are listed below:

1. Program to insert an element from an array.
2. Program to delete an element from an array.
3. Program to apply various operations on stack.
4. Program for parenthesis matching using stack
5. Program for String reversal using stack.
6. Program to insert and delete nodes in a queue.
7. Program to traverse 2-way linked list.
8. Program to insert and delete nodes in a linked list.
9. Program to search a node in a linked list.
10. Program to insert or delete node in a binary tree.
11. Program to traverse binary tree
12. Program for implementing linear search.
13. Program for implementing binary search.
14. Program for implementing Bubble sort.
15. Program for implementing Selection sort.

SOFTWARE LAB VI (BASED ON BCMC-316 JAVA PROGRAMMING)

Subject Code: BMCAS1--306

L T P C
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BMCAS1-: -316 Java Programming. Students are required to develop programs in JAVA programming language. Few programs are listed below:

1. Write a ***Class Date*** that takes day, month, and year while creating an object of this class. Find a new date when the number of days is given.
2. Write a program to Add, Subtract, multiply two matrices using switch statement. The program must also validate the sizes of two matrices before performing any operation and should raise exception in case the operation cannot be performed.
3. Write a program to find the ***area of all types of triangles*** using the principle of ***constructor overloading and Inheritance*** depending on the number of dimensions given in the input parameter list using ***super*** to call the super class constructor.
4. Write a program to find the ***area of rectangle*** using an ***abstract super*** class figure and also ***override*** method use to compute the area of the rectangle.
5. Write a program to implement grow able and shrinkable ***Stack*** that can support operations like- push, pop, and view the top item with concept of dynamic allocation using ***finalize ()*** method. The program should also incorporate the concepts of ***private and public*** access methods to avoid accidental manipulations of stack.

6. Write a program to demonstrate *static variables, methods and blocks*.
7. Write a program to swap two items belonging to an object using *returning of object* by a function.
8. Write a program to count the frequency of each vowel in a given string.
9. Demonstrate the use of *static and non static nested* classes.
10. Create a package containing a class to print your (name, roll no, marks) and use this package in another program using *import* statement.

ANDROID APPLICATION DEVELOPMENT

Subject Code: BMCAS1--401

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I (12 Hrs.)

Introduction to Android - Installing Android Studio, Layouts, Views and Resources, Scrolling Views, Working with TextView Elements. Activities and Intents - Create and Start Activities, Lifecycle and State Callbacks, Testing and Debugging, and Backwards Compatibility: Debugging and Testing app, Support libraries.

UNIT-II (9 Hrs.)

User Interaction and Navigation - User Input Controls: Use Keyboards, Input Controls, Alerts, and Pickers, Menus and Radio Buttons, Screen Navigation. Themes and Styles: Theme, Custom Styles, Drawables.

UNIT-III (13 Hrs.)

Connect to the Internet -Google APIs Explorer, JSON, Use AsyncTaskLoader, Triggering, Scheduling, and Optimizing, Background Tasks: Alarm Manager.

UNIT- IV (11 Hrs.)

Data Saving, Retrieving, Loading - Storing Data using SQLite, Sharing Data: Implement a Content Provider, Loading Data using Loaders, Publishing app: Permissions and Libraries, Making and publishing APKs.

Recommended Books:

1. Jeff Mcwherter, Scott Gowell, 'Professional Mobile Application Development', 1st Edn., Wrox Publisher.
2. Lauren Darcy and Shane Conder 'Teach Yourself Android Application Development in 24 Hrs', 1st Edn., Sams publications.
3. Himanshu Dwivedi, Chris Clark, David Thiel, 'Mobile Application Security', 1st Edn., Tata McGraw Hill.

SOFTWARE PROJECT MANAGEMENT

Subject Code: BMCAS1--402

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT- I (10 Hrs.)

Introduction to Software Project Management: Project and characteristic of project, Project Management, Software Project Management, Activities of software project management, Plans, methods and methodologies, stakeholders, objectives and sub-objectives, Project success and failure.

UNIT- II (13 Hrs.)

Selection of Project approach and effort estimation Project: Build or buy. Choosing Methodologies and technologies, Project Development Models: Waterfall Model, Spiral Model and Software prototyping,

UNIT- III (12 Hrs.)

Dynamic System Development Model: Effort estimation: Introduction, stages of estimation, over and under estimation, basis for software estimating, software effort estimation techniques.

Activity Planning: Overview and objective of activity planning, when to plan, Project schedules, Project and activities,

UNIT- IV (10 Hrs.)

Risk Management: WBS, Adding the time dimension using forward pass and backward pass, Risk identification, risk assessment, risk planning, risk management.

Monitoring, Control and contracts: Creating the framework, collecting the data, visualizing progress, cost monitoring, prioritizing monitoring.

Recommended Books:

1. Robert K. Wysocki “Effective Software Project Management” – Wiley Publication.
2. Walker Royce: “Software Project Management”- Addison-Wesley.
3. Gopaldaswamy Ramesh, “Managing Global Software Projects” – McGraw Hill Education (India), Fourteenth Reprint.

LINUX OPERATING SYSTEM

Subject Code: BMCAS1--403

**L T P C
3 1 0 4**

Duration: 45 Hrs.

UNIT- I (10 Hrs.)

Introduction to Operating Systems: its needs and services, Simple batch Systems, Multi- programmed batched systems, Time sharing systems, Parallel systems, Distributed systems and Real-time systems. Introduction to process, Process States.

Structure of LINUX: Kernel, Shell. LINUX Directory system.

UNIT- II (13 Hrs.)

LINUX Commands:User Access and UserID Commands, Directory commands, Editors Commands, File Manipulation Commands, Security and Protection Commands, Inter-User and Inter-Machine Communication, Process Management Commands, I/O Redirection and Piping Commands, Vi editor, File Handling commands, and Introduction to Regular Expressions and Grep.

UNIT- III (12 Hrs.)

Administering LINUX System: Introduction to System Administration, Functional activities of System Administration - Starting up the system, Maintaining the Super User Login, shutting down the system, recovering from system crash, taking backups, managing disk space, Mounting and Un-mounting file system, Adding and removing users, Changing groups and password.

UNIT- IV (10 Hrs.)

Shell Programming: Executing a shell program, Study of shell programming as a Language; Wild card characters, Type of statements and Reserved Words, Special Shell parameters. The AWK pattern scanning

and processing language: Operators, Control Statements and arrays.

Recommended Books:

1. J. Goerzen, "Linux Programming Bible", IDG Books, New Delhi.
2. N. Mathew & R. Stones, "Beginning Linux Programming", Wiley Publishing India.

DISCRETE MATHEMATICS

Subject Code: BMCAS1--404

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I (10 Hrs.)

Mathematical Logic - Connectives, well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, predicates, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theory Proving.

UNIT-II (11 Hrs.)

Set Theory - Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram, Functions, Inverse functions, Composition of functions, Recursive functions, Lattice and its properties.

UNIT-III (12 Hrs.)

Graph Theory - Definition, Representation, path Matrix Warshalls. Algorithm, MINIMA Algorithm, Isomorphism, sub graphs, connected components, cyclic graph, Bipartite graph, Planar graph, Euler's formula, Euler circuit, Hamiltonian Graph, Chromatic number, Trees, Spanning tree of a Graph, Breadth – First & Depth – First Spanning trees, Binary Tree, Conversion of a tree to binary tree. Tree traversals, Representation of Expressions by Binary tree, Forest, Binary search trees.

UNIT-IV (11 Hrs.)

Combinatorics & Recurrence Relations - Disjunctive & Sequential counting, Combinations & Permutations, Enumeration without repetition Recurrence relation, Fibonacci relation, solving recurrence relation by substitution, solving non-linear recurrence relation by conversion to linear recurrence relation.

Recommended Books

1. J.P. Trembly, P. Manohar, 'Discrete Mathematical Structures with Applications to Computer Science', McGraw Hill.
2. J.L. Mott, A. Kandel, T.P. Baker, 'Discrete Maths for Computer Scientists & Mathematicians', Prentice Hall.

SOFTWARE LAB VII (BASED ON BCMC-420 PROGRAMMING WITH PYTHON)

Subject Code: BMCAS1--405

L T P C
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BMCAS1:- 420 Programming with Python. Students are required to develop programs in python language. Few programs are listed below:

- 1 To Exchange the Values of Two Numbers Without Using a Temporary Variable.
- 2 To Check if a Number is a Palindrome
- 3 To Print all Integers that Aren't Divisible by Either 2 or 3 and Lie between 1 and 50
- 4 To Print Table of a Given Number
- 5 To Print Sum of Negative Numbers, Positive Even Numbers and Positive Odd numbers in a List
- 6 To Print Numbers in a Range (1, upper) Without Using any Loops
- 7 To Find the Sum of Sine Series
- 8 To Find the Sum of First N Natural Numbers
- 9 To Search the Number of Times a Particular Number Occurs in a List
- 10 To Find the Largest Number in a List
- 11 To Find the Second Largest Number in a List
- 12 To Find the Second Largest Number in a List Using Bubble Sort
- 13 To Sort a List According to the Length of the Elements
- 14 To Sort a List of Tuples in Increasing Order by the Last Element in Each Tuple.
- 15 To Swap the First and Last Value of a List.
- 16 To remove the ith Occurrence of the Given Word in a List where Words can repeat.

SOFTWARE LAB VIII (BASED ON BCMC-422 LINUX OPERATING SYSTEM)

Subject Code: BMCAS1--406

L T P C
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper BMCAS1:-422 Linux Operating System. Students are required to develop programs in Linux.

LATEST TRENDS IN IT

Subject Code: BMCAS1--501

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I (10 Hrs.)

Introduction to Computing-Emerging Trends in Computing like Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Utility Computing, Cloud Computing, High Performance Computing, Autonomic Computing.

UNIT-II (11 Hrs.)

Cloud Computing-Introduction, Cloud Types, Uses of Cloud, Components of Cloud Computing - Software as a Service, Platform as a Service, Infrastructure as a Service, Virtualization in Cloud Computing, Concept of Green Clouds.

UNIT-III (12 Hrs.)

Soft Computing-Soft Computing VS Hard Computing; Introduction to Neural Networks – Intelligence, Neurons, Artificial Neural Networks, Application Scope of Neural Network, Brain VS Computer

UNIT-IV (12 Hrs.)

IoT and Fog Computing-Topologies, Edge Routers, Client-Server Architecture, P2P, M2M, Introduction to Fog Computing, Benefits of Fog Computing.

Recommended Books

1. Joshy Joseph, Craig Fellenstein, 'Grid Computing', 1st Edn., Prentice Hall Professional.
2. Rajkumar Buyaa, James Broberg, Andrzej Goscinski, 'Cloud Computing Principles and Paradigms', 1st Edn., Wiley.
3. Tettamanzi, Andrea, Tomassini and Macro, 'Soft Computing', Springer.
4. Rajkumar Buyaa, Vecchiola, Selvi, 'Mastering Cloud Computing', 1st Edn., McGraw Hill.
5. Arshdeep Bahga, Vijay Madiseti, 'Internet of Things (A Hands -on- Approach)', 1st Edn., VPT.

ARTIFICIAL INTELLEGEANCE

Subject Code: BMCAS1--502

L T P C
3 1 0 4

Duration: 45 Hrs.

Course Objectives After completion of this course the student will be able to understand the:

1. Different types of AI agents.
2. Various AI search algorithms.
3. The fundamentals of knowledge representation.

UNIT-I (11 Hrs.)

Basics of AI - What is Artificial Intelligence, what is an AI technique, Criteria for success, Problems, Problem spaces and search, Production system, Problem characteristics, Hillclimbing, Best-First search, AO algorithm, Constraint satisfaction.

UNIT-II (12 Hrs.)

Natural Language Processing - Introduction, Overview of linguistics, Grammars and language, Basic Parsing techniques, Semantic analysis and representation, Structure, Natural Language generation, Natural Language systems.

UNIT-III (11 Hrs.)

Knowledge Representation - Issues, Approaches to knowledge Representation, Representing simple facts in logic, Computable functions and predicates, Procedural vs declarative knowledge, Forward vs Backward Reasoning matching, Control knowledge.

UNIT-IV (11 Hrs.)

Expert Systems - Rule-Based system architecture, Non-production system Architecture, dealing with uncertainty, Knowledge acquisition and validation, Knowledge system Building tools.

Recommended Books

1. Elaine Rich and Kevin Knight, 'Artificial Intelligence', 5th Edn., Tata McGraw Hill, 2014.
2. Dan. W. Patterson, 'Introduction to Artificial Intelligence and Expert Systems', 1st Edn., Prentice Hall India, 2015.
3. Eugene Charniak and Drew McDermott, 'Introduction to Artificial Intelligence', 1st Edn., Pearson Education, 2002.

OBJECT ORIENTED ANALYSIS AND DESIGN USING UML

Subject Code: BMCAS1--503

L T P C
3 1 0 4

Duration: 45 Hrs.

Course Objectives: The student is made to learn:

1. Learn the basis of OO analysis and design skills.
2. Learn the UML design diagrams.
3. Learn to map design to code.
4. Be exposed to various design techniques.

UNIT-I (11 Hrs.)

UML Diagrams: Introduction to OOAD- Unified Process, UML diagrams, Use Case, Class Diagrams, Interaction Diagrams, State Diagrams, Activity Diagrams, Package, Component and Deployment Diagrams.

UNIT-II (12 Hrs.)

GRASP: Designing objects with responsibilities, Creator, Information Expert, Low Coupling, High Cohesion, Controller, Design Patterns, Creational, Factory method, structural, bridge, adapter, behavioural, strategy, observer.

UNIT-III (11 Hrs.)

Applying design patterns: System sequence diagrams, Relationship between sequence diagrams and use cases logical architecture and UML package diagrams, logical architecture refinement, UML class diagrams, UML interaction diagrams, applying GoF design patterns.

UNIT-IV (11 Hrs.)

Coding and Testing: Mapping design to code, testing issues in OO testing, class testing, OO integration testing, GUI testing, OO system testing.

Recommended Books:

1. Simmon Bennett, Steve Mc Robb and Ray Farmar, "Object Oriented System Analysis and Design using UML", Forth Edition, Mc- Graw Hill Education, **2010**.
2. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, " Design Patterns: Elements of Reusable Object Oriented Software", Addison Wesley, **1995**.
3. Martin Fowler, " UML Distilled: A Brief Guide to the standard Object Modeling Language", Third Edition, Addison Wesley, **2003**.
4. Paul C. Jorgensen, " Software Testing:- A Craftsman Approach," Third Edition, Auerbach Publications, Taylor and Francis Group, **2008**.

WEB APPLICATION DEVELOPMENT

Subject Code: BMCAS1--504

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I (11 Hrs.)

Web programming and HTML5: Introduction to web programming, client server architecture, DNS, latest

trends, static and dynamic content, WWW3C standards, difference between HTML & HTML5. Basics of HTML5, understanding document tags.

HTML5 formatting: Formatting tags e.g. font, Bold, italic, super script, subscript, delete, mark etc.

UNIT-II (12 Hrs.)

HTML5 Quotations: q tag, blockquote, Code, abbreviation, address, cite, bi-directional override tag, header, footer and output Tag, meta data and meta tag.

Lists: Ordered, Unordered, Definition List.

Introduction to LINK: anchor element, internal linking and external linking, attribute of anchor tag.

Images: image basics, image tag, Image alignment, image map and all the attributes of image and map.

UNIT-III (11 Hrs.)

Table: Table tag with attributes like width, alignment, cell spacing, cell padding, cell alignment, borders rules, rows, cells, rowspan, colspan, header, footer, body sections, captions and background images.

HTML Frames: Introduction to frameset tag, frame tag, iframes and respective attributes.

Form: Creating form, add labels, text box, check box, radio buttons, password, pull down menus and button to a form ,Use of clickable image as a submit button, pass information between forms (action ,method).

UNIT-IV (11 Hrs.)

DHTML and CSS: Introduction to DHTML, introduction to CSS3, ways to Insert CSS in HTML document (External Style Sheet, Internal Style Sheet, Inline Styles), CSS id and class, div and span tag.

CSS background: background color, background image (repeat horizontally or vertically, set position and no-repeat), **CSS Text:** text color, text alignment, text decoration, **CSS Font:** style, family, Size CSS lists, CSS Links **CSS Tables:** Table borders, collapse borders, table width and height ,table text alignment, table padding, table color, **CSS border:** style, width, color, **CSS margin:** margin, padding.

Recommended Books:

1. Kogent Learning Solutions Inc., " HTML 5 in simple steps",Dreamtech Press.
2. Murray,Tom/Lynchburg," Creating a Web Page and Web Site",2002.
3. Steven M. Schafer," HTML, XHTML, and CSS Bible, 5ed",Wiley India.

SOFTWARE LAB IX(BASED ON BCMC 528)

Subject Code: BMCAS1--505

L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper BMCAS1:- 528 Object oriented analysis and design using UML.

SOFTWARE LAB X(BASED ON BCMC 529)

Subject Code: BMCAS1--506

L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper BMCAS1:- 529 Web application and development.

COMPUTER GRAPHICS

Subject Code: BMCAS1--601

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I (11 Hrs.)

Introduction to computer graphics & graphics systems: Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup table.

Devices: storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software.

UNIT-II (12 Hrs.)

Scan conversion Points & lines: Line drawing algorithms; DDA algorithm, Bresenham's line algorithm,.

Scan conversion -2: Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

2D transformation Basic transformations: translation , rotation, scaling ; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines , parallel lines, intersecting lines.

UNIT-III (11 Hrs.)

2D Viewing: Viewing pipeline, Window to viewport Co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles , polygons & ellipse.

3-Dimensional Graphics- 3D Cartesian and Homogeneous co-ordinate system, Geometric transformations (translation, Scaling, Rotation, Reflection), Composite transformations. Mathematics of Projections – Perspective Projections, Anomalies of perspective projections, Parallel Projections, Introduction to 3D viewing pipeline and clipping.

UNIT-IV (11 Hrs.)

Hidden Line and Surface Elimination Algorithms- Z-buffer, scan-line, Painter's algorithm. Illumination Models- Diffuse reflection, Specular reflection, refracted light, texture surface patterns, Half toning, Dithering.

Recommended Books:

1. D. Hearn and M.P. Baker, 'Computer Graphics', 2nd Edn., Pearson.
2. Andries van Dam, F. Hughes John, James D. Foley; Steven K. Feiner, 'Computer Graphics Principles and Practice in C', 2nd Edn., Pearson.
3. Roy A. Plastock, 'Computer Graphics', 2nd Edn., McGraw Hill.
4. F.S. Hill, 'Computer Graphics using OpenGL', 3rd Edn., PHI.
5. Jeffrey McConnell, 'Computer Graphics: Theory into Practice', 1st Edn., Jones and Bartlett Publishers.
6. William M. Newman, 'Principles of Interactive Computer Graphics', 2nd Edn., McGraw Hill.

NETWORK SECURITY

Subject Code: BMCAS1--602

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT-I (11 Hrs.)

Introduction: Attack, Services and Mechanism, Model for Internetwork Security. Cryptography: Notion of Plain Text, Encryption, Key, Cipher Text, Decryption and cryptanalysis; Public Key Encryption, digital Signatures and Authentication.

UNIT-II (12 Hrs.)

Network Security: Authentication Application: Kerveros, X.509, Directory Authentication Service, Pretty Good Privacy, S/Mime.

IP security Architecture: Overview, Authentication header, Encapsulating Security Pay Load combining Security Associations, Key Management.

UNIT-III (11 Hrs.)

Web Security: Requirement, Secure Socket Layer, Transport Layer Security, and Secure Electronic Transactions.

Network Management Security: Overview of SNMP Architecutre-SMMPVII Communication Facility, SNMPV3.

UNIT-IV (11 Hrs.)

System Security: Intruders, Viruses and Relate Threats, Firewall Design Principles. Comprehensive examples using available software platforms/case tools, Configuration Management.

Recommended Books:

1. W Stallings, "Networks Security Essentials: Application & Standards", Pearson Education, **2000**.
2. W.Stallings, "Cryptography and Network Security, Principles and Practice", Pearson Education, **2000**.

SOFT COMPUTING

Subject Code: BMCAS1--603

L T P C
3 1 0 4

Duration: 45 Hrs.

Course Objectives

1. To know about the basics of soft computing techniques and also their use in some real life situations
2. To learn the key aspects of Soft computing
3. To understand the features of neural network and its applications

UNIT-I (11 Hrs.)

Introduction - Introduction to Soft Computing, Introduction to biological and artificial neural network, Introduction to fuzzy sets and fuzzy logic systems, Introduction to Genetic Algorithm, Genetic Operators and Parameters, Genetic Algorithms in Problem Solving, Theoretical Foundations of Genetic Algorithms, Implementation Issues.

UNIT-II (11 Hrs.)

Artificial Neural Networks - Different artificial neural network models, Course in artificial neural networks, Neural network applications in control systems, Neural Nets and applications of Neural Network.

UNIT-III (12 Hrs.)

Fuzzy Systems - Fuzzy sets, Fuzzy reasoning, Fuzzy inference systems, Fuzzy control, Fuzzy clustering, Applications of fuzzy systems, Neuro-fuzzy systems, Neuro-fuzzy modeling, Neuro-fuzzy control.

UNIT-IV (11 Hrs.)

Applications - Pattern Recognitions, Image Processing, Biological Sequence Alignment and Drug Design, Robotics and Sensors, Information Retrieval Systems, Share Market Analysis, Natural Language Processing.

Recommended Books

1. S. Rajasekaran and G.A. Vijaylakshmi Pai, 'Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications', 1 st Edn., Prentice Hall India, **2007**.
2. J.S.R. Jang, C.T. Sun and E. Mizutani, 'Neuro-Fuzzy and Soft Computing', 1 st Edn., Pearson Education.
3. Timothy J. Ross, 'Fuzzy Logic with Engineering Applications', 3rd Edn., Wiley, **2011**.

SOFTWARE LAB XI (BASED ON BCMC 632)

Subject Code: BMCAS1--604

L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper BMCAS1:- 632 Computer Graphics.

SOFTWARE LAB XII (BASED ON BCMC 634)

Subject Code: BMCAS1--605

L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper BMCAS1:- 634 Soft Computing.

M.Sc. (COMPUTER SCIENCE) 1ST SEM.

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
MCAP3- 101	Information Management	4	1	0	40	60	100	5
MCAP3- 102	Object Oriented Programming Using C++	4	1	0	40	60	100	5
MCAP3- 103	Computer Organization and Assembly Language	4	1	0	40	60	100	5
MCAP3- 104	Operating System	4	1	0	40	60	100	5
MCAP3- 105	Professional Communication	3	1	0	40	60	100	4
MCAP3- 106	Software Lab. – I (Based on MCAP3-102)	0	0	4	60	40	100	2
MCAP3- 107	Software Lab. – II (Based on MCAP3-104)	0	0	4	60	40	100	2
Total		15	5	8	320	380	700	28

M.Sc. (COMPUTER SCIENCE) 2ND SEM.

Course		Contact Hrs.			Mark s			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
MCAP3- 208	Data Communication and Networks	4	1	0	40	60	100	5
MCAP3- 209	Relational Database Management System	4	1	0	40	60	100	5
MCAP3- 210	Data Structures and Algorithms	4	1	0	40	60	100	5
MCAP3- 211	Web Technologies	4	1	0	40	60	100	5
MCAP3- 212	Software Lab – III (Based on MCAP3-209)	0	0	4	60	40	100	2
MCAP3- 213	Software Lab – IV (Based MCAP3-210)	0	0	4	60	40	100	2
MCAP3- 214	Software Lab – V (Based on MCAP3-211)	0	0	4	60	40	100	2
Total		16	4	12	340	360	700	26

M.Sc. (COMPUTER SCIENCE) 3RD SEM.

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
MCAP3- 315	Computer Graphics	4	1	0	40	60	100	5
MCAP3- 316	Software Engineering	4	1	0	40	60	100	5
MCAP3- 317	OOPs Using JAVA Programming	4	1	0	40	60	100	5
MCAP3- 318	Data Analytics	4	1	0	40	60	100	5
MCAP3- 319	Software Lab – VI (Based on MCAP3-315)	0	0	4	60	40	100	2
MCAP3- 320	Software Lab – VII (Based on MCAP3-317)	0	0	4	60	40	100	2
MCAP3- 321	Minor Project	0	0	8	60	40	100	4
Total		16	4	16	340	360	700	28

M.Sc. (COMPUTER SCIENCE) 4TH SEM.

Course		Contact Hrs.			Mark s			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
MCAP3-422	Programming with Python	4	1	0	40	60	100	5
MCAP3-423	Information Security	4	1	0	40	60	100	5
MCAP3-424	Theory of Computation	4	1	0	40	60	100	5
MCAP3-425	Data Warehousing & Mining	4	1	0	40	60	100	5
MCAP3-426	Software Lab – VIII (Based on MCAP3-422)	0	0	4	60	40	100	2
MCAP3-427	Major Project	0	0	8	120	80	200	4
Total		16	4	12	340	360	700	26

Total Credits: 28 + 26 + 28+ 26 = 108

INFORMATION MANAGEMENT

Subject Code: MCAP3-101

L T P C
4 1 0 5

Duration: 55 Hrs.

Unit-I (12 Hrs.)

Introduction to Information Technology: Definition, Applications in various sectors, Different types of software, Generations of Computers, Input and output Devices, Various storage devices like HDD, Optical Disks, Flash Drives. Different Types of data file formats: Types and Applications.

Unit-II (15 Hrs.)

IT Infrastructure in India: Telecommunication, Internet research and Broadband Data Collection and Data Management, Data Models, Information vs. Knowledge, Various techniques to derive information, Information Management.

Unit-III (15 Hrs.)

Management Information System: Definition, Strategic Management of Information, Decision Making, Development Process of MIS, Strategic Design of MIS, Business Process Reengineering.

Unit-IV (13 Hrs.)

Understanding Knowledge Management: Designing a Knowledge Management System, Nature and Scope of Business Intelligence, Information Security- Meaning and Importance, Organizational Security Policy and Planning, Access Control and Operations Security. Office Automation (Word processing, Spreadsheet, Presentation, E-Mail Clients), Content Management System and Architecture.

Recommended Books:

1. Turban, Efraim, Rex Kelly Rainer and Richard E. Potter, 'Introduction to Information Technology', John Wiley & Sons, New York, NY, 2001.
2. Ponniah, Paulraj, 'Data Warehousing Fundamentals: A Comprehensive Guide for IT Professionals', John Wiley & Sons, 2004.
3. Schou, Corey and Daniel Paul Shoemaker, 'Information Assurance for the Enterprise: A Roadmap to Information Security', McGraw Hill, Inc., 2006.
4. Jawadekar, Waman S. 'Management Information Systems: Text and Cases: A Global Digital Enterprise Perspective', Tata McGraw Hill Education, 2013.

OBJECT ORIENTED PROGRAMMING USING C++

Subject Code: MCAP3-102

L T P C
4 1 0 5

Duration: 55 Hrs.

Unit-I (13 Hrs.)

Evolution of OOP, OOP Paradigm, advantages of OOP, Comparison between functional programming and OOP Approach, Characteristics of object oriented language- objects, classes, inheritance, reusability, user defined data types, polymorphism, overloading. Introduction to C++, Identifier and keywords, constants, C++ operators, type conversion, Variable declaration, statements, expressions, features of iostream.h and iomanip.h input and output, conditional expression loop statements, breaking control statements.

Unit-II (15 Hrs.)

Defining function, types of functions, storage class specifiers, recursion, preprocessor, header files and standard functions, Arrays, pointer arithmetic's, structures, pointers and structures, unions, bit fields typed, enumerations, Passing array as an argument to function.

Unit-III (15 Hrs.)

Classes, member functions, objects, arrays of class objects, pointers and classes, nested classes, constructors, destructors, inline member functions, static class member, friend functions, dynamic memory allocation. Inheritance, single inheritance, types of base classes, types of derivations, multiple inheritance, container classes, member access control.

Unit-IV (12 Hrs.)

Function overloading, operator overloading, polymorphism, early binding, polymorphism with pointers, virtual functions, virtual destructors, late binding, pure virtual functions, opening and closing of files, stream state member functions, binary file operations, structures and file operations, classes and file operations, random access file processing. Exception Handling.

Recommended Books:

1. Lafore, Robert. 'Object-Oriented Programming in Turbo C++'. Galgotia Publications, 2001.
2. Stroustrup, Bjarne. 'The design and evolution of C++', Pearson Education India, 1994.
3. Balagurusamy, Entrepreneurial. 'Object Oriented Programming with C++', 6th Edn., Tata McGraw Hill Education, 2001.
4. S. Hallada and M. Wiebel, 'Object Oriented Software Engineering', BPB Publications, 1995.

COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE

Subject Code: MCAP3-103

**L T P C
4 1 0 5**

Duration: 55 Hrs.

Objectives: The objective of the course is to provide students with a solid foundation in computer design. Examine the operation of the major building blocks of a computer system. To introduce students to the design and organization of modern digital computers & basic assembly language.

Unit-I (13 Hrs.)

Computer Organization: Basic Computer Organization, Bus & Memory Transfer, Stored Program Organization, Computer Registers, Computer Instructions, Timing and Control, Hardwired based design of Control Unit, Instruction Cycle, Formats of Various types of Instructions- Memory Reference Instructions, Register Reference Instructions & I/O Instructions, General Register Organization-Control word, Design of Adder & Logic Unit, Stack Organization-Register Stack, Memory Stack, Reverse Polish Notation Addressing Modes, RISC vs CISC Architectures, Interrupts & types.

Unit-II (15 Hrs.)

Pipeline & Vector Processing: Parallel Processing, Pipelining-Arithmetic & Instruction Pipeline, Vector Processing-Vector operations, Memory Interleaving, Array Processors. Input – Output Organization: Input-Output Interface- I/O vs Memory Bus, Isolated vs Memory mapped I/O, Synchronous Data Transfer, Asynchronous Data Transfer-Strobe Control, Handshaking, Asynchronous Communication Interface, Modes of Transfer-Programmed I/O, Interrupt Initiated I/O, Interrupt Cycle, Priority Interrupt Controller, and DMA Controller & DMA Transfer.

Unit-III (14 Hrs.)

Memory Organization: Main Memory-Memory Address Map, Memory connection to CPU, Associative Memory-Hardware organization, Match Logic, Cache Memory-Levels of Cache, Associative Mapping, Direct Mapping, Set-Associative Mapping, writing into Cache, Cache coherence, Virtual Memory-Address space & Memory space, Address mapping using pages, Associative memory page table, Page replacement, Memory Management Hardware – Segmented page mapping, Multiport memory, Memory protection.

Unit-IV (13 Hrs.)

Multiprocessors: Characteristics of Multiprocessors, Interconnection Structures-Time Shared Common Bus, Crossbar switch, Multistage Switching Network, Hypercube interconnection, Interprocessor communication & synchronization.

Assembly Language Programming: Example of a typical 8-bit processor (8085 microprocessor)-Registers, addressing modes, Instruction Set-Data Transfer Instructions, Arithmetic Instructions, Logical Instructions, Program Control Instructions, Machine Control Instructions, Use of an Assembly Language for specific programmes: Simple numeric manipulations, sorting of a list and use of I/O instructions.

Recommended Books:

1. Car Hamacher, Zvonks Vranesic, Safwat Zaky 'Computer Organization', 5th Edn., McGraw Hill.
2. M.M. Mano, 'Computer System Architecture', Prentice Hall of India, 1986.
3. John Paul Hayes, 'Computer Architecture and Organization', McGraw Hill International Edn.
4. A.S. Tanenbaum, 'Structured Computer Organization', Prentice Hall of India.

OPERATING SYSTEM

Subject Code: MCAP3-104

L T P C
4 1 0 5

Duration: 55 Hrs.

Unit-I (13 Hrs.)

Basics of Operating Systems: Definition, Types of Operating Systems: Mainframe, Desktop, Multiprocessor, Distributed, Clustered, Real time, Embedded and Time sharing. Simple, Layered, Monolithic and Microkernel Operating Systems. Virtual systems.

Operating System Components: Process Management, Memory Management component, I/O Management, File Management, Protection System and Network management.

Operating System Services: Process Execution, I/O operations, File manipulations, Communications, Error detection and recovery, Resource allocation, Accounting, System, Protection, System Calls and System Call Execution; API.

Unit-II (15 Hrs.)

Process: Definition, Process Relationships, Process states, Process State transitions, Process Control Block, Context switching. Threads - Concept, Types and advantages of Multithreads.

Process Scheduling: Definition, Scheduling objectives, Types of Schedulers, Scheduling criteria, CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time, Scheduling algorithms - Pre-emptive and Non pre-emptive, FCFS, SJF and RR. Multiprocessor schedulers. Performance evaluation of schedulers.

Inter-process Communication and Synchronization: Definition, Shared Memory System, Message passing, Critical section, Mutual Exclusion, Semaphores.

Deadlocks: Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance, Deadlock detection and Recovery.

Unit-III (14 Hrs.)

Basic Memory Management: Definition, Logical and Physical address map, Memory allocation, Contiguous, Fixed and variable partition. Internal and External fragmentation and Compaction; Paging - Principle of operation, Page allocation, Hardware support, Protection and sharing; Segmentation, Segmentation with Paging.

Virtual Memory Management: Basics of Virtual Memory, Hardware and control structures, Locality of reference, Page fault, Working Set, Dirty page/Dirty bit; Demand paging, Page replacement policies - Optimal (OPT), First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

Unit-IV (13 Hrs.)

Device Management: Hardware I/O organization, I/O control, Port and memory mapped I/O, DMA. Buffering and Caching. Device Drivers.

Disk Management: Disk Structure, Disk Formatting, Disk Scheduling and its algorithms, RAID.

Security: Authentication; Types of Threats, Detection, Prevention and correction of Threats.

File Management: File concept, File attributes - Name, Identifier, Type, Location, Size, Time, Date, user identification, File Operations, Directory Structure - Single level, two level, Tree Structure. Disk space allocation methods - Contiguous, Linked, Indexed. Access Methods - Sequential, Indexed, Random access, File system structure, Byte sequence, Record sequence and Tree-based. Disk formatting.

Security and Protection: Security threats, Security Policies and Mechanisms, Authentications.

Recommended Books:

1. William Stallings, 'Operating System Internals and Design Principle', 6th Edn., Pearson Education, India, 2009.
2. Peterbears Galvin, 'Operating System Principle', 7th Edn., Wiley India, 2009.
3. J. Harris, 'Operating System SCHAUM'S OUTLINE', Tata McGraw Hill, Special Indian Edn., 2008.
4. Pramod Chandra, 'An Introduction to Operating System', 3rd Edn., PHI, 2010.

PROFESSIONAL COMMUNICATION

Subject Code: MCAP3-105

L T P C
3 1 0 4

Duration: 45 Hrs.

Unit-I (10 Hrs.)

Basics of Technical Communication: Functions of Communication-Internal & External Functions, Models-Shannon & Weaver's model of communication, Flow, Networks and importance, Barriers to Communication, Essential of effective communication (7 C's and other principles), Non-verbal Communication.

Unit-II (13 Hrs.)

Basic Technical Writing: Paragraph writing (descriptive, Imaginative etc.), precise writing, reading and comprehension, Letters – Format & various types.

Unit-II (12 Hrs.)

Advanced Technical Writing: Memos, Reports, E-Mails & Net etiquettes, Circulars, Press Release, Newsletters, Notices. Resume Writing, Technical Proposals, Research Papers, Dissertation and Thesis, Technical Reports, Instruction Manuals and Technical Descriptions, Creating Indexes, List of References and Bibliography.

Unit-IV (10 Hrs.)

Verbal Communication: Presentation Techniques, Interviews, Group Discussions, Extempore, Meetings and Conferences.

Technical Communication: MS-Word, Adobe Frame maker and ROBO Help.

Recommended Books:

1. Vandana R. Singh, 'The Written Word', Oxford University Press, New Delhi.
2. K.K. Ramchandran, et al, 'Business Communication', Macmillan, New Delhi.
3. Swati Samantaray, 'Business Communication and Communicative English', Sultan Chand, New Delhi.
4. S.P. Dhanavel, 'English and Communication Skills for Students of Science and Engineering (with audio CD)'.

SOFTWARE LAB.-I (BASED ON MCAP3-102)

Subject Code: MCAP3-106

L T P C

0 0 4 2

Note: Program should be fully documented with simple I/O data. Flow charts should be developed wherever necessary.

Write program in 'C++' language:

Using input and output statements using control statements.

Using functions.

Using array

Using Classes and implementation of Constructor and Destructor. Using files.

Using OOP's Concepts (Inheritance, Polymorphism, Encapsulation, Friend and Static Functions)

SOFTWARE LAB.-II (BASED ON MCAP3-104)

Subject Code: MCAP3-107

L T P C

0 0 4 2

This laboratory course will mainly comprise of exercises of the Course MCAP-104.

DATA COMMUNICATION AND NETWORKS

Subject Code: MCAP3-208

L T P C

4 1 0 5

Duration: 55 Hrs.

Objectives: As part of this course, students will be introduced to Computer Networks and Data Communication paradigms, about Network models and standards, Network protocols and their use, wireless technologies.

UNIT-I (13 Hrs.)

Introduction to Data Communication: Components of Data Communication, Data Representation, Transmission Impairments, Switching, Modulation, Multiplexing. **Review of Network Hardware:** LAN, MAN, WAN, Wireless networks, Internetworks. **Review of Network Software:** Layer, Protocols, Interfaces and Services. **Review of Reference Models:** OSI, TCP/IP and their comparison.

Physical Layer

Transmission Media: Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (Radio, Microwave, Infrared). Introduction to ATM, ISDN, Cellular Radio and Communication Satellites.

UNIT-II (15 Hrs.)

Services provided by DLL: FRAMING, ERROR CONTROL, FLOW CONTROL, MEDIUM ACCESS

Medium Access Sub Layer: Channel Allocation, MAC protocols – ALOHA, CSMA protocols, Collision free protocols, Limited Contention Protocols, Wireless LAN protocols, IEEE 802.3, 802.4, 802.5 standards and their comparison.

UNIT-III (15 Hrs.)

Network Layer: Design Issues, Routing Algorithms (Shortest Path, Flooding, Distance Vector, Hierarchical, Broadcast, Multicast). Congestion Control Algorithms (Leaky bucket, Token bucket, Load shedding), Internetworking, IP Protocol, ARP, RARP.

Network Trouble Shooting: Using Ping, Traceroute, IPconfig, Netstat, nslookup.

Application Layer: Domain name system, E-mail, File transfer protocol, HTTP, HTTPS, World Wide Web.

Recommended Books:

1. Tanenbaum, Andrew S., 'Computer Networks', 4th Edn., PHI, 2009.
2. B.A. Forouzan, 'Data Communications and Networking', 4th Edn., Tata McGraw Hill, 2009.
3. Douglas E. Comer, 'Internetworking with TCP/IP (Vol.1, 4th Edition)', CPE 2004.
4. Stallings, William, 'Data and Computer Communications', 8th Edn., PHI, 2008.
5. Nance, Bary, 'Introduction to Networking', 4th Edn., PHI, 1997.

RELATIONAL DATABASE MANAGEMENT SYSTEMS

Subject Code: MCAP3-209

L T P C
4 1 0 5

Duration: 55 Hrs.

Unit-I (14 Hrs.)

Review of DBMS: Basic DBMS terminology; Architecture of a DBMS: Data Independence - Physical and Logical Independence, Degree of Data Abstraction, Initial Study of the Database, Database Design, Implementation and Loading, Testing and Evaluation, Operation, Maintenance and Evaluation.

Conceptual Model: Entity Relationship Model, Importance of ERD, Symbols (Entity: Types of Entities, weak Entity, Composite Entity, Strong Entity, Attribute: Types of Attribute, Relationship: Type of relationship, Connectivity, Cardinality).

Unit-II (12 Hrs.)

Database Models and Normalization: Comparison of Network, Hierarchical and Relational Models, Object Oriented Database, Object Relational Database, Comparison of OOD & ORD; Normalization and its various forms, De- Normalization, Functional Dependencies, Multi-valued Dependencies, Database Integrity: Domain, Entity, Referential Integrity Constraints.

Transaction Management and Concurrency Control: Client/ Server Architecture and implementation issues, Transaction: Properties, Transaction Management with SQL, Concurrency; Concurrency Control: Locking Methods: (Lock Granularity, Lock Types, Two Phase Locking, Deadlocks), Time Stamping Method, Optimistic Method, Database Recovery Management.

Unit-III (15 Hrs.)

Distributed Databases: Centralized Verses Decentralized Design; Distributed Database Management Systems (DDBMS): Advantage and Disadvantages; Characteristics, Distributed Database Structure, Components, Distributed Database Design, Homogeneous and Heterogeneous DBMS.

Levels of Data and Process Distribution: SPSD (Single-Site Processing, Single-Site Data), MPSD (Multiple-Site Processing, Single Site Data), MPMD (Multiple -Site Processing, Multiple-Site Data), Distributed Database Transaction Features, Transaction Transparency, Client/ Server Vs DDBMS.

Unit-IV (14 Hrs.)

Business Intelligence and Decision Support System: The need for Data Analysis, Business Intelligence, Operational Data vs. Decision Support Data, DSS Database properties and importance, DSS Database Requirements.

OLAP and Database Administration: Introduction to Online Analytical Processing (OLAP), OLAP Architecture Relational, Star Schemas, Database Security, Database administration tools, developing a Data Administration Strategy.

Recommended Books:

1. Peter Rob Carlos Coronel, 'Data Base Systems', 8th Edn., Cengage Learning.
2. Henry F. Korth, Abraham, 'Database System Concepts', 4th Edn., McGraw Hill,
3. C.J. Date, 'An Introduction to Database Systems', 8th Edn., Pearson Education.
4. Ullman, 'Principles of Database Systems', 3rd Edn., Galgotia Publication.
5. Bipin C. Desai, 'An Introduction to Database Systems', Galgotia Publication.

DATA STRUCTURES

Subject Code: MCAP3-210

L T P C
4 1 0 5

Duration: 55 Hrs.

Unit-I (13 Hrs.)

Introduction to Data Structure: Concept of data, problem analysis, data structures and data structure operations, notations, mathematical notation and functions, algorithmic complexity, Big-O Notation and time space trade off.

Overview of Arrays, Recursion, Pointers, Pointer Arithmetic, Array of pointers, Arrays in terms of pointers, Static and Dynamic Memory Management, Garbage Collection. Understanding and Implementation of various Data Structures with applications.

Stack: Operations like push, pop and various applications like conversion from infix to postfix and prefix expressions, evaluation of postfix expression using stacks.

Queues: Operations like enqueue, dequeue on simple, circular and priority queues. Linked Lists: operations like creations, insertion, deletion, retrieval and traversal on single, circular and doubly linked list.

Unit-II (15 Hrs.)

Trees Definitions and Concepts: Root, Node, Leaf Node, Level, Degree, Height and Tree representation using Linked List and Array

Types of Trees: Binary trees, Binary search tree, Height balanced (AVL) tree, B- trees, B+ Tree.

Tree Operations: Creation, insertion, deletion and traversals (Preorder, In-order, Post-ordered) and searching on various types of trees.

Heap: Definition, Structure, Algorithms and applications.

Unit-III (15 Hrs.)

Graph definitions and Concepts: Edge, Vertices and Graph representation using Adjacency matrix, Adjacency lists.

Types of Graphs: Weighted, Unweighted, Directed, Undirected Graphs.

Graph Operations: Creation, insertion, deletion, traversals and searching (depth-first, breadth-first) of various types of graphs and Dijkstra's algorithm for shortest distance calculation.

Unit-IV (12 Hrs.)

Searching: Concept and efficiency of linear and binary search algorithms.

Sorting: Concepts, Order, Stability, Efficiency of various algorithms (Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort, Radix Sort).

Hashing: Definition, Implementation and applications.

Note: Programs are to be implemented in C++.

Recommended Books:

1. Gilberg and Forouzan, 'Data Structures - A Pseudo Code Approach with C++', Cengage.
2. Hubbard John R., 'Schaum's Outline of Data Structures with C++', Tata McGraw Hill.
3. Langsam, Augenstein, Tanenbaum, 'Data Structures Using C and C++', Pearson Education.

WEB TECHNOLOGIES

Subject Code: MCAP3-211

L T P C
4 1 0 5

Duration: 55 Hrs.

Unit-I (15 Hrs.)

Internet and World Wide Web: Introduction, Internet Addressing, ISP, types of Internet Connections, Introduction to WWW, WEB Browsers, WEB Servers, URLs, HTTP, WEB Applications, Tools for web site creation.

HTML5: Introduction to HTML5, Lists, adding graphics to HTML5 page, creating tables, linking documents, forms, frames, Cascading Style sheets.

Unit-II (13 Hrs.)

Java Script: Introduction, programming constructs: variables, operators and expressions, conditional checking, functions and dialog boxes, JavaScript DOM, creating forms, introduction to Cookies, JQuery.

Unit-III (15 Hrs.)

AJAX: Introduction, HTTP Request, XML Http Request, AJAX Server Script.

Unit-IV (12 Hrs.)

PHP: Introduction, syntax, statements, operators, PHP and MySQL, PHP and AJAX.

Recommended Books:

1. Deitel, Deitel, Nieto, Lin and Sadhu, 'XML How to Program', Pearson Education.
2. Ivan Bayross, 'Web Enabled Commercial Application Development using HTML, DHTML, JavaScript, Perl CGI', BPB.
3. Steven M. Schafer, 'HTML, CSS, JavaScript, Perl, Python and PHP', Wiley India.
4. Paul S. Wang, G. Keller, S. Katila, 'An Introduction to Web Design + Programming', Cengage Learning.
5. Jeffery C. Jackson, 'Web Technologies: A Computer Science Perspective', Pearson Education.
6. Robin Nixon, 'Learning PHP, MySQL and JavaScript', Shroff/O'Reilly.

SOFTWARE LAB. -III (BASED ON MCAP3-209)

Subject Code: MCAP3-212

L T P C
0 0 4 2

1. Comparative study of various Database Management Systems.
2. Data Definition Language (DDL), Data Manipulation Language (DML) and Data Control Language (DCL).
3. How to apply constraints at various levels?
4. View data in the required form using Operators, Functions and Joins.
5. Creating different types of Views for tailored presentation of data.
6. How to apply Conditional Controls in PL/SQL.
7. Error Handling using Internal Exceptions and External Exceptions.

8. Using various types of Cursors.
9. How to run Stored Procedures and Functions.
10. Creating Packages and applying Triggers.
11. Creating Arrays and Nested Tables.

SOFTWARE LAB. – IV (BASED ON MCAP3-210)

Subject Code: MCAP3-213 **L T P C**
0 0 4 2

1. Selecting suitable Data Structures for specific tasks.
2. Understanding various traversing techniques on various data structures.
3. Inserting and deleting elements in required data structures.
4. Searching data stored within various data structure using various search techniques.
5. Understanding memory-space trade off.
6. Sorting various data structures using different techniques.

SOFTWARE LAB. –V (BASED ON MCAP3-211)

Subject Code: MCAP3-214 **L T P C**
0 0 4 2

1. Creation of Web pages using HTML5.
2. Creation of Web pages using JavaScript.
3. Creation of Web pages using AJAX.
4. Creating web pages using PHP.

COMPUTER GRAPHICS

Subject Code: MCAP3-315 **L T P C** **Duration: 55 Hrs.**
4 1 0 5

Course Objectives: At the end of the course, the students should be able to:

1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
3. Use of geometric transformations on graphics objects and their application in composite form.

UNIT–I (11 Hrs.)

Computer Graphics- Introduction, Applications of computer graphics, Components of Computer Graphics System. Input & Output Devices- Keyboard, Touch panel, Light pens, Graphic tablets, Joysticks, Trackball, Data glove, Digitizer, Image scanner, Mouse, Voice Systems, Impact and nonimpact printers. Video Display Devices- CRT systems, Random and Raster Scan Systems, Direct view storage tube.

Flat panel displays – Emissive vs Non-Emissive displays, LCD displays, Plasma Panel displays, 3-D viewing devices, Virtual Reality.

UNIT-II (12 Hrs.)

Scan Conversion- DDA and Bresenham line algorithms, Midpoint circle algorithm, Midpoint ellipse algorithm, Area filling techniques (Boundary fill, Flood fill, scan line area fill algorithm), character generation, limitations of scan conversion.

2-Dimensional Graphics- 2D Cartesian and Homogeneous co-ordinate system, Geometric transformations (translation, Scaling, Rotation, Reflection, Shearing), Composite transformations, two dimensional viewing transformation and clipping (Cohen –Sutherland, Sutherland-Hodge man algorithms).

UNIT-III (11 Hrs.)

3-Dimensional Graphics- 3D Cartesian and Homogeneous co-ordinate system, Geometric transformations (translation, Scaling, Rotation, Reflection), Composite transformations. Mathematics of Projections – Perspective Projections, Anomalies of perspective projections, Parallel Projections, Introduction to 3D viewing pipeline and clipping.

UNIT-IV (11 Hrs.)

Hidden Line and Surface Elimination Algorithms- Z-buffer, scan-line, Painter's algorithm. Illumination Models- Diffuse reflection, Specular reflection, refracted light, texture surface patterns, Half toning, Dithering.

Recommended Books:

1. D. Hearn and M.P. Baker, 'Computer Graphics', 2nd Edn., Pearson, **2002**.
2. Andries van Dam, F. Hughes John, James D. Foley; Steven K. Feiner, 'Computer Graphics Principles and Practice in C', 2nd Edn., Pearson, **2002**.
3. Roy A. Plastock, 'Computer Graphics', 2nd Edn., McGraw Hill, **2000**.
4. F.S. Hill, 'Computer Graphics using OpenGL', 3rd Edn., PHI, **2009**.
5. Jeffrey McConnell, 'Computer Graphics: Theory into Practice', 1st Edn., Jones and Bartlett Publishers, **2005**.
6. William M. Newman, 'Principles of Interactive Computer Graphics', 2nd Edn., McGraw Hill, **2001**.

SOFTWARE ENGINEERING

Subject Code: MCAP3-316

L T P C
4 1 0 5

Duration: 55 Hrs.

UNIT-I (11 Hrs.)

Introduction to Software Engineering: Evolution and impact of Software engineering, software life cycle models: Waterfall, prototyping, Evolutionary, and Spiral models. Feasibility study, Functional and Non-functional requirements, Requirements gathering, Requirements analysis and specification.

UNIT-II (12 Hrs.)

Basic issues in Software Design: modularity, cohesion, coupling and layering, function-oriented software design: DFD and Structure chart, object modeling using UML, Object-oriented software development, user interface design. Coding standards and Code review techniques.

UNIT-III (11 Hrs.)

Fundamentals of Testing: White-box, and black-box testing, Test coverage analysis and test case design techniques, mutation testing, Static and dynamic analysis, Software reliability metrics, reliability growth modeling.

UNIT-IV (11 Hrs.)

Software Project Management: Project planning and control, cost estimation, project scheduling using PERT and GANTT charts, cost-time relations: Rayleigh-Norden results, quality management, ISO and SEI CMMI, PSP and Six Sigma. Computer aided software engineering, software maintenance, software reuse, Component-based software development.

Recommended Books:

1. Roger Pressman, "Software Engineering: A Practitioners Approach,(6th Edition), McGraw Hill, **1997**.
2. Sommerville,"Software Engineering, 7th edition", Adison Wesley, **1996**.
3. Watts Humphrey,"Managing software process", Pearson education, **2003**.
4. James F. Peters and Witold Pedrycz, " Software Engineering – An Engineering Approach", Wiley, **1999**.

OOPS USING JAVA PROGRAMMING

Subject Code: MCAP3-317

L T P C
4 1 0 5

Duration: 55 Hrs.

UNIT-I (11 Hrs.)

Object-Oriented Programming Concepts - Introduction, comparison between procedural programming paradigm and object-oriented programming paradigm, basic concepts of object oriented programming — concepts of an object and a class, interface and implementation of a class, operations on objects, relationship among objects, abstraction, encapsulation, data hiding, inheritance, overloading, polymorphism, messaging.

UNIT-II (12 Hrs.)

Classes and Objects - Specifying a class, creating class objects, accessing class members, access specifiers, static members, use of const keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes.

UNIT-III (11 Hrs.)

Applets- Introduction to Applets, Types of Applets, Using Applet Applications, Passing Parameters to Applets. Introduction to Graphic Programming- Applying 2-D transformations on Objects, Event Handling, Layouts, Frames, Panels, JDBC.

UNIT-IV (11 Hrs.)

Interfaces & Packages- Introduction, implementing multiple inheritance through Interfaces, Packages, Multithreaded Programming.

Exception Handling- Introduction, Handling System defined Exceptions, Creating and handling user defined exceptions.

Recommended Books

1. Y. Daniel Liang, 'Introduction to Java Programming', 9th Edn., Pearson, **2011**.
2. E. Balagurusamy, 'Object Oriented Programming with C++', Tata McGraw Hill.
3. Herbet Schildt, 'Java 2: The Complete Reference', 5 th Edn., McGraw Hill, **2002**.
4. Gary Cornell and Cay S. Horstmann, 'Core Java, Volume 2- Advanced Features', 8th Edn., Pearson, **2008**. . Ed Roman, Rima Patel and Gerald Brose, 'Mastering Enterprise Java Beans', 3rd Edn., John Wiley & Sons Inc., **2004**.

DATA ANALYTICS

Subject Code: MCAP3-318

L T P C
4 1 0 5

Duration: 55 Hrs.

UNIT-I (10 Hrs.)

Introduction: Collection of data- Secondary data, primary data, Internal data, presentation of data, Classification of data: Mean, Median Mode, Harmonic Mean, Deometric mean.

UNIT- II (13 Hrs.)

Measures of Variations: Significance of measuring variation, good properties of measuring variations, average deviation and standard deviation.

Regression & ANOVA: Regression ANOVA(Analysis of Variance).

UNIT- III (12 Hrs.)

Machine Learning: Introduction and Concepts Differentiating algorithmic and model based frameworks Regression : Ordinary Least Squares, Ridge Regression, Lasso Regression, K Nearest Neighbours Regression & Classification.

UNIT- IV (10 Hrs.)

Supervised Learning with Regression and Classification techniques -1 Bias-Variance Dichotomy Model ,Validation Approaches Logistic Regression, Linear Discriminant Analysis, Quadratic Discriminant Analysis, Regression and Classification Trees Support, Vector Machines.

Recommended Books:

1. Hastie, Trevor, et al.The elements of statistical learning. Vol. 2. No. 1. New York: springer, 2009.
2. Montgomery, Douglas C., and George C. Runger.Applied statistics and probability for engineers. John Wiley & Sons, 2010.

SOFTWARE LAB VI (BASED ON MCAP3-315)

Subject Code: MCAP3-319

L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper MCAP3-315.

SOFTWARE LAB VII (BASED ON MCAP3-317)

Subject Code: MCAP3-320

L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper MCAP3-317 Java Programming. Students are required to develop programs in JAVA programming language. Few programs are listed below:

1. Write a ***Class Date*** that takes day, month, and year while creating an object of this class. Find a new date when the number of days is given.
2. Write a program to Add, Subtract, multiply two matrices using switch statement. The program must also validate the sizes of two matrices before performing any operation and should raise exception in case the operation cannot be performed.
3. Write a program to find the ***area of all types of triangles*** using the principle of ***constructor overloading and Inheritance*** depending on the number of dimensions given in the input parameter list using ***super*** to call the super class constructor.
4. Write a program to find the ***area of rectangle*** using an ***abstract super*** class figure and also ***override*** method use to compute the area of the rectangle.
5. Write a program to implement grow able and shrinkable ***Stack*** that can support operations like- push, pop, and view the top item with concept of dynamic allocation using ***finalize ()*** method. The program should also incorporate the concepts of ***private and public*** access methods to avoid accidental manipulations of stack.
6. Write a program to demonstrate ***static variables, methods and blocks***.
7. Write a program to swap two items belonging to an object using ***returning of object*** by a function.
8. Write a program to count the frequency of each vowel in a given string.
9. Demonstrate the use of ***static and non static nested*** classes.
10. Create a package containing a class to print your (name, roll no, marks) and use this package in another program using ***import*** statement.

PROGRAMMING WITH PYTHON

Subject Code: MCAP3-422

L T P C
4 1 0 5

Duration: 55 Hrs.

UNIT-I (10 Hrs.)

Introduction to Python: Python Installation and Working with Python Understanding Python Variables Python Basic Operators, Understanding python blocks.

Data Types: Declaring and using Numeric data types: int, float, complex using string data type and string operations, Use of Tuple data type.

UNIT- II (13 Hrs.)

Program Flow Control: Conditional blocks using if, else and elif, loops in python programming, continue, break statements in python.

UNIT- III (12 Hrs.)

Functions Modules and Packages: Organizing python codes using functions, organizing python projects into modules, Importing own module as well as external modules.

String List and Dictionary Manipulations: Building blocks of python programs, understanding string in build methods, List manipulation using in build methods, Dictionary manipulation Programming using string, list and dictionary in build functions.

UNIT- IV (10 Hrs.)

File Operation: Reading config files in python Writing log files in python Understanding read functions, read (), read line () and read lines () Understanding write functions, write () and writelines () Manipulating file pointer using seek Programming using file operations.

Recommended Books:

1. Downey, Allen B. Think Python: How to Think Like a Computer Scientist (Version 1.6.6 Ed.), 2012.
2. Hamilton, Naomi. "The A-Z of Programming Languages: Python", 2008.
3. Lutz, Mark Learning Python (5th ed.). O'Reilly Media, 2013.
4. Pilgrim, Mark Dive into Python 3. Apress, 2009.

INFORMATION SECURITY

Subject Code: MCAP3-423

L T P C
4 1 0 5

Duration: 55 Hrs.

Course Objectives

After completion of this course, the students would be able to:

1. Identify common network security vulnerabilities and attacks and explain the foundations of Cryptography and network security.
2. Impart knowledge on Encryption techniques, Design Principles and Modes of operation.
3. Be familiar with Firewall Design Principles and network security designs using available secure solutions.

UNIT-I (10 Hrs.)

Introduction - Security Attacks (Passive & Active Attacks), Security Services, Security Mechanisms, Model for Internetwork Security, Man in the middle attack, Conventional Encryption Principles, Monoalphabetic ciphers, Playfair Ciphers, Transposition Ciphers, Cipher block chaining mode, Approaches of message authentication.

UNIT-II (11 Hrs.)

Public Key Cryptography - Public Key Cryptography Principles, RSA algorithm, Digital Signatures, Digital Certificates, Certificate Authority and Key management Kerberos, X.509 Directory Authentication Service.

UNIT-III (12 Hrs.)

IP Security - Security Problems of IP, Security Objectives, IP Security Protocol Modes, Authentication Header, Security Payload. Firewall Characteristics, Types of Firewalls and their practical use, NAT.

UNIT-IV (12 Hrs.)

Email and Web Security - PGP, S/MIME, Security Socket Layer, Transport Layer Security, Secure Electronic Transaction.

Recommended Books:

1. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, 'Handbook of Applied Cryptography', Jaypee Medical, **1996**.
2. Bart Preneel, Christof Paar and Jan Pelzl , 'Understanding Cryptography', 1st Edn., Springer, **2010**.
3. Bernard Menezes, 'Network Security and Cryptography', 1st Edn., Cengage, **2010**.
4. William Stallings, 'Network Security Essentials Applications and Standards', 5th Edn., Pearson, **2013**.

THEORY OF COMPUTATION

Subject Code: MCAP3-424

L T P C
4 1 0 5

Duration: 55 Hrs.

Course Objectives :

After completion of this course, the students would be able to:

1. Design a finite automaton to recognize a given regular language and transform a language into regular expression or finite automaton or transition graph.
2. Define deterministic and nondeterministic finite automata and prove properties of regular languages and their classification.
3. Build a context-free grammar for pushdown automata.
4. Design Turing machine and Post machine for a given language.

UNIT-I (10 Hrs.)

Finite Automata - Formal language, need for formal computational models, Non computational models, Deterministic finite Automata, Non deterministic finite Automata, Equivalence of NFA and DFA, 2-Way Finite Automata, Moore and Mealy Machine.

UNIT-II (10 Hrs.)

Regular Expression and Languages - Regular expression, Equivalence of finite Automata and Regular expressions, Conversion between regular expressions and finite Automata, Application of Regular Expressions, Lexical analysis, Finding pattern in text.

UNIT-III (12 Hrs.)

Regular Languages and Regular Sets - Pumping lemma for regular sets, Applications of pumping lemma. Closure properties of regular language, Minimization of finite Automata. Pushdown Automata - Pushdown Automata, Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context free grammar.

UNIT-IV (13 Hrs.)

Context Free Grammar and Languages - Context free Grammars, Derivation Trees, Leftmost and rightmost derivations, Ambiguity, Parsing techniques for parsing of general CFG's, Properties of Context free Languages, Normal forms for context free grammars, The

Pumping Lemna for context free Languages, Closure properties of context free languages.
Turing Machine (TM) - One Tape, multi-tape.

Recommended Books:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, 'Introduction to Automata Theory, Languages and Computation', 3rd Edn., Pearson, **2006**.
2. Daniel I.A. Cohen, 'Introduction to Computer Theory', 2 nd Edn., Wiley, **2011**.
3. Adesh K. Pandey, 'Theory of Automata and Computation', S.K. Kataria & Sons, **2013**.
4. K.L.P. Mishra, 'Theory of Computer Science: Automata, Languages and Computation', 3rd Edn., Prentice Hall India Course Private Limited, **2006**.

DATA WAREHOUSING AND DATA MINING

Subject Code: MCAP3-425

L T P C
4 1 0 5

Duration: 55 Hrs.

Course Objectives :

After completion of this course, the students would be able to:

1. Understand operational database, data ware housing, need of database to meet industrial needs.
2. Identify the components in typical data warehouse Architecture and understand the multidimensional schemas for data warehouse.
3. Understand the knowledge about data mining, decision tree, generic algorithms and Fuzzy set approach.

UNIT – I (10 Hrs.)

Review of Data Warehouse- Need for strategic information, Decision support system, Knowledge discovery & decision making, need for data warehouse, Data warehousing and data mining, common characteristics of Data warehouse, Data Marts, Metadata, Operational versus analytical databases, trends and planning of Data warehousing.

UNIT - II (11 Hrs.)

Schemas and Architecture of Data warehouse- Multidimensional data model, Data cubes, Schemas for Multidimensional Database: stars, snowflakes and fact constellations. Data warehouse process & architecture, OLTP vs. OLAP, ROLAP vs. MOLAP, types of OLAP servers, 3-Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager.

UNIT – III (12 Hrs.)

Introduction to Data Mining- Data Mining definition & task, Data mining query languages, data specification, specifying knowledge, hierarchy specification, pattern presentation & visualization specification. Data Mining Techniques - Association rules, Clustering techniques, Decision tree knowledge discovery through neural.

UNIT – IV (12 Hrs.)

Data Mining Classification- Rough Sets, Support Vector Machines and Fuzzy techniques. Mining Complex data objects, Spatial databases.

Recommended Books:

1. Jiawei Han, Micheline Kamber, Jian Pei, 'Data Mining: Concepts and Techniques', 3rd Edn., Morgan Kaufmann, **2011**.
2. George M. Marakas, 'Modern Data Warehousing, Mining, and Visualization', 1st Edn., Prentice Hall, **2001**.

3. Elzbieta Malinowski and Esteban Zimanyi, 'Advanced Data Warehouse Design: From Conventional to Spatial and Temporal Applications (Data-Centric Systems and Applications)', 1 st Edn., Springer, **2008**.
4. Matteo Golfarelli and Stefano Rizzi, 'Data Warehouse Design: Modern Principles and Methodologies', 1st Edn., McGra Hill Education, **2009**.
5. Alex Berson and Stephen J. Smith, 'Data Warehousing, Data Mining, & OLAP', 1st Edn., Tata McGraw Hill, **1997**.

SOFTWARE LAB VIII (BASED ON MCAP3-422)

Subject Code: MCAP3-426

L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper MCAP3-422 Programming with Python. Students are required to develop programs in python language. Few programs are listed below:

1. To Exchange the Values of Two Numbers Without Using a Temporary Variable.
2. To Check if a Number is a Palindrome.
3. To Print all Integers that Aren't Divisible by Either 2 or 3 and Lie between 1 and 50.
4. To Print Table of a Given Number.
5. To Print Sum of Negative Numbers, Positive Even Numbers and Positive Odd numbers in a List.
6. To Print Numbers in a Range (1, upper) Without Using any Loops.
7. To Find the Sum of Sine Series.
8. To Find the Sum of First N Natural Numbers.
9. To Search the Number of Times a Particular Number Occurs in a List.
10. To Find the Largest Number in a List.
11. To Find the Second Largest Number in a List.
12. To Find the Second Largest Number in a List Using Bubble Sort.
13. To Sort a List According to the Length of the Elements.
14. To Sort a List of Tuples in Increasing Order by the Last Element in Each Tuple.
15. To Swap the First and Last Value of a List.
16. To remove the ith Occurrence of the Given Word in a List where Words can repeat.

M.Sc. (COMPUTER SCIENCE) 1ST SEM.

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
MSCCS1-101	Professional Communication	4	1	0	40	60	100	5
MSCCS1-102	Discrete Structures	4	1	0	40	60	100	5
MSCCS1-103	Database Management System	4	1	0	40	60	100	5
MSCCS1-104	Programming Using C	4	1	0	40	60	100	5
MSCCS1-105	Software Lab I(Based on MCAP3-104)	0	0	4	60	40	100	2
MSCCS1-106	Software Lab II(Based on MCAP3-103)	0	0	4	60	40	100	2
Total		16	4	8	280	320	600	24

M.Sc. (COMPUTER SCIENCE) 2ND SEM.

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
MSCCS1-201	Computer Organization and Assembly Language	4	1	0	40	60	100	5
MSCCS1-202	Operating System	4	1	0	40	60	100	5
MSCCS1-203	Software Engineering	4	1	0	40	60	100	5
MSCCS1-204	Data Structures Using C++	4	1	0	40	60	100	5
MSCCS1-205	Software Lab III(Based on MCAP3-208)	0	0	4	60	40	100	2
MSCCS1-206	Software Lab IV(Based on MCAP3-210)	0	0	4	60	40	100	2
Total		16	4	8	280	320	600	24

M.Sc. (COMPUTER SCIENCE) 3RD SEM.

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
MSCCS1-301	Computer Graphics	4	1	0	40	60	100	5
MSCCS1-302	Theory of Computation	4	1	0	40	60	100	5
MSCCS1-303	Research Methodology	4	1	0	40	60	100	5
MSCCS1-304	Web Technology	4	1	0	40	60	100	5
MSCCS1-305	Software Lab V(Based on MCAP3-313)	0	0	4	60	40	100	2
MSCCS1-306	Software Lab VI(Based on MCAP3-316)	0	0	4	60	40	100	2
Total		16	4	8	280	320	600	24

M.Sc. (COMPUTER SCIENCE) 4TH SEM.

Course		Contact Hrs.			Mark s			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
MSCCS1-401	Data Communication and Networks	4	1	0	40	60	100	5
MSCCS1-402	Artificial Intelligence	4	1	0	40	60	100	5
MSCCS1-403	Programming with Python	4	1	0	40	60	100	5
MSCCS1-404	Data Analytics	4	1	0	40	60	100	5
MSCCS1-405	Software Lab VII(Based on MCAP3-421)	0	0	4	60	40	100	2
MSCCS1-406	Major Project	0	0	8	40	60	100	4
Total		16	4	12	280	320	600	26

Total Credits: 24 + 24 + 24+ 26 = 98

PROFESSIONAL COMMUNICATION

Subject Code:- MSCCS1-101

L T P C
4 1 0 5

Duration: 55 Hrs.

Unit-I (12 Hrs.)

Basics of Technical Communication: Functions of Communication-Internal & External Functions, Models-Shannon & Weaver's model of communication, Flow, Networks and importance, Barriers to Communication, Essential of effective communication (7 C's and other principles), Non-verbal Communication.

Unit-II (15 Hrs.)

Basic Technical Writing: Paragraph writing (descriptive, Imaginative etc.), precise writing, reading and comprehension, Letters – Format & various types.

Unit-II (15 Hrs.)

Advanced Technical Writing: Memos, Reports, E-Mails & Net etiquettes, Circulars, Press Release, Newsletters, Notices. Resume Writing, Technical Proposals, Research Papers, Dissertation and Thesis, Technical Reports, Instruction Manuals and Technical Descriptions, Creating Indexes, List of References and Bibliography.

Unit-IV (13 Hrs.)

Verbal Communication: Presentation Techniques, Interviews, Group Discussions, Extempore, Meetings and Conferences.

Technical Communication: MS-Word, Adobe Frame maker and ROBO Help.

Recommended Books:

1. Vandana R. Singh, 'The Written Word', Oxford University Press, New Delhi.
2. K.K. Ramchandran, et al, 'Business Communication', Macmillan, New Delhi.
3. Swati Samantaray, 'Business Communication and Communicative English', Sultan Chand, New Delhi.
4. S.P. Dhanavel, 'English and Communication Skills for Students of Science and Engineering (with audio CD)'.

DISCRETE STRUCTURES

Subject Code:- MSCCS1-102

L T P C
4 1 0 5

Duration: 55 Hrs.

UNIT-I (12 Hrs.)

Mathematical Logic - Connectives, well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, predicates, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theory Proving.

UNIT-II (15 Hrs.)

Set Theory - Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram, Functions, Inverse functions, Composition of functions, Recursive functions, Lattice and its properties.

UNIT-III (15 Hrs.)

Graph Theory - Definition, Representation, path Matrix Warshalls. Algorithm, MINIMA Algorithm, Isomorphism, sub graphs, connected components, cyclic graph, Bipartite graph, Planar graph, Euler's formula, Euler circuit, Hamiltonian Graph, Chromatic number, Trees, Spanning tree of a Graph, Breadth – First & Depth – First Spanning trees, Binary Tree, Conversion of a tree to binary tree. Tree traversals, Representation of Expressions by Binary tree, Forest, Binary search trees.

UNIT-IV (13 Hrs.)

Combinatorics & Recurrence Relations - Disjunctive & Sequential counting, Combinations & Permutations, Enumeration without repetition Recurrence relation, Fibonacci relation, solving recurrence relation by substitution, solving non-linear recurrence relation by conversion to linear recurrence relation.

Recommended Books

1. J.P. Trembly, P. Manohar, 'Discrete Mathematical Structures with Applications to Computer Science', McGraw Hill.
2. J.L. Mott, A. Kandel, T.P. Baker, 'Discrete Maths for Computer Scientists & Mathematicians', Prentice Hall.

DATABASE MANAGEMENT SYSTEM

Subject Code:- MSCCS1-103

L T P C
4 1 0 5

Duration: 55 Hrs.

UNIT-I (12 Hrs.)

Introduction to Data, Field, Record, File, Database, Database management system. Structure of database system, Advantage and disadvantage, levels of database system, Relational model, hierarchical model, network model, comparison of these models, E-R diagram, different keys used in a relational system, SQL

UNIT-II (15 Hrs.)

DBA, responsibilities of DBA, Relational form like 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, DBTG, concurrency control and its management, protection, security, recovery of database.

UNIT-III (15 Hrs.)

SQL: Introduction to SQL-DDL, DML, DCL, join methods & sub query, Union Intersection, Minus, Tree Walking, Built in Functions, views.

UNIT- IV (13 Hrs.)

Security:- amongst users, Sequences, Indexing Cursors- Implicit & Explicit, Procedures, Functions & Packages Database Triggers. Big Data: Introduction to Big Data and Analytics, Introduction to NoSQL.

Recommended Books:

1. C.J. Date, 'Introduction to DatabaseSystem'.
2. B.C. Desai, 'Database ManagementSystem'.
3. Korth, 'DatabaseConcept'.

PROGRAMMING USING C

Subject Code:- MSCCS1-104

L T P C
4 1 0 5

Duration: 55 Hrs.

UNIT-I (12 Hrs.)

Algorithm and Programming Development: Steps in development of a program, Flow charts, Algorithm Development, Program Debugging, Compilation and Execution.

Fundamentals of 'C': I/O statements, Assignment Statements, Constants, Variables, Operators and Expressions, standard and formatted statements, Keywords, Data types and Identifiers.

UNIT-II (15 Hrs.)

Control Structures: Introduction, Decision making with if – statement, if-else and Nested if, while and do-while, for loop. Jump statements: break, continue, goto, switch Statement

Functions: Introduction to Functions, Function Declaration, Function Categories, Standard Functions, Parameters and Parameter Passing, Call – by value/reference, Recursion, Global and Local Variables, Storage classes.

UNIT-III (15 Hrs.)

Arrays: Introduction to Arrays, Array Declaration, Single and Multidimensional Array, Memory Representation, Matrices, Strings, String handling functions.

Structure and Union: Declaration of structure, Accessing structure members, Structure Initialization, Arrays of structure, nested structures, Unions.

UNIT- IV (13 Hrs.)

Pointers: Introduction to Pointers, Address operator and pointers, Declaring and Initializing pointers, Assignment through pointers, Pointers and Arrays

Files: Introduction, creating a data file, opening and closing a data file, processing a data file.

Preprocessor Directives: Introduction and Use, Macros, Conditional Preprocessors, Header Files.

Recommended Books:

1. Yashvant P. Kanetkar, 'Let us C', 7thEdn., BPB Publications, NewDelhi.
2. E. Balagurusami, 'Programming in ANSI C', 4thEdn., Tata McGrawHill.
3. Byron S. Gottfried, 'Programming in C', 2ndEdn., McGrawHill.
4. Kernighan & Richie, 'The C Programming Language', 2ndEdn., PHIPublication.
5. R. Lafore, 'Object Oriented Programming', 3rdEdn., GalgotiaPublications.
6. R.S. Salaria, 'Problem Solving and Programming in C', 2ndEdn.

SOFTWARE LAB I(BASED ON MCAP3-104)

Subject Code:- MSCCS1-105 **L T P C**
0 0 4 2

Objectives and Expected Outcomes: The objective of this course is to help the students in finding solutions to various real life problems and converting the solutions into computer program using C language (structured programming). Students will learn to write programs for solving various real- life problems.

1. **Input-Output Statements:** formatted and non-formatted statements.
2. **Decision Making:** switch, if-else, nested if, else-if ladder, break, continue, goto.
3. **Loops:** while, do-while, for.
4. **Functions:** definition, declaration, variable scope, parameterized functions, return statement, call by value, call by reference, recursive functions.
5. **Arrays:** Array declarations, Single and multi-dimensional, memory limits, strings and string functions.
6. **Files:** Creation and editing of various types of files, closing a file (using functions and without functions).

SOFTWARE LAB II(BASED ON MCAP3-103)

Subject Code:- MSCCS1-106 **L T P C**
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP3- 103 providing Operational Knowledge and Implementation of Database using SQL.

COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE

Subject Code:- MSCCS1-201

L T P C

Duration: 55 Hrs.

4 1 0 5

Objectives: The objective of the course is to provide students with a solid foundation in computer design. Examine the operation of the major building blocks of a computer system. To introduce students to the design and organization of modern digital computers & basic assembly language.

Unit-I (13 Hrs.)

Computer Organization: Basic Computer Organization, Bus & Memory Transfer, Stored Program Organization, Computer Registers, Computer Instructions, Timing and Control, Hardwired based design of Control Unit, Instruction Cycle, Formats of Various types of Instructions- Memory Reference Instructions, Register Reference Instructions & I/O Instructions, General Register Organization-Control word, Design of Adder & Logic Unit, Stack Organization-Register Stack, Memory Stack, Reverse Polish Notation Addressing Modes, RISC vs CISC Architectures, Interrupts & types.

Unit-II (15 Hrs.)

Pipeline & Vector Processing: Parallel Processing, Pipelining-Arithmetic & Instruction Pipeline, Vector Processing-Vector operations, Memory Interleaving, Array Processors. Input – Output Organization: Input-Output Interface- I/O vs Memory Bus, Isolated vs Memory mapped I/O, Synchronous Data Transfer, Asynchronous Data Transfer-Strobe Control, Handshaking, Asynchronous Communication Interface, Modes of Transfer-Programmed I/O, Interrupt Initiated I/O, Interrupt Cycle, Priority Interrupt Controller, and DMA Controller & DMA Transfer.

Unit-III (15 Hrs.)

Memory Organization: Main Memory-Memory Address Map, Memory connection to CPU, Associative Memory-Hardware organization, Match Logic, Cache Memory-Levels of Cache, Associative Mapping, Direct Mapping, Set-Associative Mapping, writing into Cache, Cache coherence, Virtual Memory-Address space & Memory space, Address mapping using pages, Associative memory page table, Page replacement, Memory Management Hardware – Segmented page mapping, Multiport memory, Memory protection.

Unit-IV (13 Hrs.)

Multiprocessors: Characteristics of Multiprocessors, Interconnection Structures-Time Shared Common Bus, Crossbar switch, Multistage Switching Network, Hypercube interconnection, Interprocessor communication & synchronization.

Assembly Language Programming: Example of a typical 8-bit processor (8085 microprocessor)-Registers, addressing modes, Instruction Set-Data Transfer Instructions, Arithmetic Instructions, Logical Instructions, Program Control Instructions, Machine Control Instructions, Use of an Assembly Language for specific programmes: Simple numeric manipulations, sorting of a list and use of I/O instructions.

Recommended Books:

1. Car Hamacher, Zvonks Vranesic, Safwat Zaky ‘Computer Organization’, 5th Edn., McGraw Hill.
2. M.M. Mano, ‘Computer System Architecture’, Prentice Hall of India, 1986.
3. John Paul Hayes, ‘Computer Architecture and Organization’, McGraw Hill International Edn.
4. A.S. Tanenbaum, ‘Structured Computer Organization’, Prentice Hall of India.

OPERATING SYSTEM

Subject Code:- MSCCS1-202

L T P C
4 1 0 5

Duration: 55 Hrs.

UNIT-I (13 Hrs.)

Basics of Operating Systems: Definition, Types of Operating Systems: Mainframe, Desktop, Multiprocessor, Distributed, Clustered, Real time, Embedded and Time sharing. Simple, Layered, Monolithic and Microkernel Operating Systems. Virtual systems.

Operating System Components: Process Management, Memory Management component, I/O Management, File Management, Protection System and Network management.

Operating System Services: Process Execution, I/O operations, File manipulations, Communications, Error detection and recovery, Resource allocation, Accounting, System, Protection, System Calls and System Call Execution; API.

UNIT-II (15 Hrs.)

Process: Definition, Process Relationships, Process states, Process State transitions, Process Control Block, Context switching. Threads - Concept, Types and advantages of Multithreads.

Process Scheduling: Definition, Scheduling objectives, Types of Schedulers, Scheduling criteria, CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time, Scheduling algorithms - Pre-emptive and Non pre-emptive, FCFS, SJF and RR. Multiprocessor schedulers. Performance evaluation of schedulers.

Inter-process Communication and Synchronization: Definition, Shared Memory System, Message passing, Critical section, Mutual Exclusion, Semaphores.

Deadlocks: Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance, Deadlock detection and Recovery.

UNIT-III (15 Hrs.)

Basic Memory Management: Definition, Logical and Physical address map, Memory allocation, Contiguous, Fixed and variable partition. Internal and External fragmentation and Compaction; Paging - Principle of operation, Page allocation, Hardware support, Protection and sharing; Segmentation, Segmentation with Paging.

Virtual Memory Management: Basics of Virtual Memory, Hardware and control structures, Locality of reference, Page fault, Working Set, Dirty page/Dirty bit; Demand paging, Page replacement policies - Optimal (OPT), First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

UNIT-IV (13 Hrs.)

Device Management: Hardware I/O organization, I/O control, Port and memory mapped I/O, DMA. Buffering and Caching. Device Drivers.

Disk Management: Disk Structure, Disk Formatting, Disk Scheduling and its algorithms, RAID.

Security: Authentication; Types of Threats, Detection, Prevention and correction of Threats.

File Management: File concept, File attributes - Name, Identifier, Type, Location, Size, Time, Date, user identification, File Operations, Directory Structure - Single level, two level, Tree Structure. Disk space allocation methods - Contiguous, Linked, Indexed. Access Methods - Sequential, Indexed, Random access, File system structure, Byte sequence, Record sequence and Tree-based. Disk formatting.

Security and Protection: Security threats, Security Policies and Mechanisms, Authentications.

Recommended Books:

1. William Stalling, 'Operating System Internals and Design Principle', 6th Edn., Pearson Education, India, 2009.
2. Peterbears Galvin, 'Operating System Principle', 7th Edn., Wiley India, 2009.
3. J. Harris, 'Operating System SCHAUM'S OUTLINE', Tata McGraw Hill, Special Indian Edn., 2008.
4. Pramod Chandra, 'An Introduction to Operating System', 3rd Edn., PHI, 2010.

SOFTWARE ENGINEERING

Subject Code:- MSCCS1-203

**L T P C
4 1 0 5**

Duration: 55 Hrs.

Course Objective: To apply principles of software development and evolution. To specify, abstract, verify, validate, plan, develop and manage large software and learn emerging trends in software engineering.

UNIT-I (12 Hrs.)

Introduction to Software: Definition, Software characteristics, Software components, Software Applications.

Introduction to Software Engineering: Definition, Software Engineering Paradigms, Waterfall Model, Prototyping Model, Interactive Enhancement Model, the Spiral Model.

UNIT- II (15 Hrs.)

Software Metrics: Role of Metrics and Measurement, Metrics for software productivity and quality, Measurement software, size-oriented metrics, function oriented metrics, Metrics for software quality.

Software Requirement Specification (SRS): Problem analysis, structuring information, Data flow diagram and data dictionary, structured analysis, Characteristics and component of (SRS).

UNIT- III (15 Hrs.)

Planning a Software Project: Cost estimation, uncertainties in cost estimation, Single variable model, COCOMO model, Project scheduling and milestones, Software & Personal Planning, Verification & Validation (V & V), inspection & review.

System Design: Design Objectives, Design Principles, problem, Partitioning, Abstraction, Top Down and Bottom-up techniques, Structure Design, Structure Charts, Design Methodology.

UNIT- IV (13 Hrs.)

Coding: Coding by Top-down and Bottom-up, Structured Programming, Information Hiding, Programming style, Internal Documentation.

Testing: Level of testing, Test cases and test criteria, Functional Testing, Structural Testing.

Recommended Books:

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Sixth Edition, McGraw Hill.
2. R.E. Fairley, "Software Engineering Concepts", Paperback Edition, McGraw Hill.
3. Pankaj Jalote, "An Integrated Approach to Software Engineering", Third Edition, Narosa Publishing House.

DATA STRUCTURES USING C++

Subject Code:- MSCCS1-204

**L T P C
4 1 0 5**

Duration: 55 Hrs.

UNIT-I (12 Hrs.)

Basic Concepts: Introduction to Complexity, Data Structure and Data Structure operations. Applications of Data Structure, Basic data Structures.

Arrays: Introduction, Types of Array, Memory representation, Applications and operations.

Stacks: Introduction, memory representation, Applications and operations.

UNIT- II (15 Hrs.)

Linked List: Operations like traversing, searching, inserting, deleting, operations on header-linked list, circular linked list, doubly linked list, memory representation.

Queue: Introduction, Operations on EnQueue and Dequeue, Memory Representation and Applications.

UNIT- III (15 Hrs.)

Trees – Definition and Basic concepts, Representation in Contiguous Storage, Binary Tree, Binary Tree Traversal, Searching, Insertion and deletion in Binary trees, Binary Search tree.

UNIT- IV (13 Hrs.)

Searching: Binary and Linear Search.

Sorting: Bubble sort, Insertion sort, Selection sort, Merge Sort, Quick sort.

Recommended Books:

1.Tenenbaum, Y. Lanhghsam and A. J. Augenstein, “Data Structures Using C and C++”, Prentice Hall of India.

2.Seymour Lipschutz “Theory & Practice of Data Structures”, McGraw Hill.

SOFTWARE LAB III(BASED ON MCAP3-208)

Subject Code:- MSCCS1-205 **L T P C**
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper MCAP3-208 Operating System.

SOFTWARE LAB IV(BASED ON MCAP3-210)

Subject Code:- MSCCS1-206 **L T P C**
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper MCAP3-210 Data structures Using C++.

COMPUTER GRAPHICS

Subject Code:- MSCCS1-301

L T P C
4 1 0 5

Duration: 55 Hrs.

Course Objectives: At the end of the course, the students should be able to:

1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
3. Use of geometric transformations on graphics objects and their application in composite form.

UNIT–I (11 Hrs.)

Computer Graphics- Introduction, Applications of computer graphics, Components of Computer Graphics System. Input & Output Devices- Keyboard, Touch panel, Light pens, Graphic tablets, Joysticks, Trackball, Data glove, Digitizer, Image scanner, Mouse, Voice Systems, Impact and nonimpact printers. Video Display Devices- CRT systems, Random and Raster Scan Systems, Direct view storage tube.

Flat panel displays – Emissive vs Non-Emissive displays, LCD displays, Plasma Panel displays, 3-D viewing devices, Virtual Reality.

UNIT–II (12 Hrs.)

Scan Conversion- DDA and Bresenham line algorithms, Midpoint circle algorithm, Midpoint ellipse algorithm, Area filling techniques (Boundary fill, Flood fill, scan line area fill algorithm), character generation, limitations of scan conversion.

2-Dimensional Graphics- 2D Cartesian and Homogeneous co-ordinate system, Geometric transformations (translation, Scaling, Rotation, Reflection, Shearing), Composite transformations, two dimensional viewing transformation and clipping (Cohen –Sutherland, Sutherland-Hodge man algorithms).

UNIT–III (11 Hrs.)

3-Dimensional Graphics- 3D Cartesian and Homogeneous co-ordinate system, Geometric transformations (translation, Scaling, Rotation, Reflection), Composite transformations. Mathematics of Projections – Perspective Projections, Anomalies of perspective projections, Parallel Projections, Introduction to 3D viewing pipeline and clipping.

UNIT–IV (11 Hrs.)

Hidden Line and Surface Elimination Algorithms- Z-buffer, scan-line, Painter's algorithm. Illumination Models- Diffuse reflection, Specular reflection, refracted light, texture surface patterns, Half toning, Dithering.

Recommended Books:

1. D. Hearn and M.P. Baker, 'Computer Graphics', 2nd Edn., Pearson, **2002**.
2. Andries van Dam, F. Hughes John, James D. Foley; Steven K. Feiner, 'Computer Graphics Principles and Practice in C', 2nd Edn., Pearson, **2002**.
3. Roy A. Plastock, 'Computer Graphics', 2nd Edn., McGraw Hill, **2000**.
4. F.S. Hill, 'Computer Graphics using OpenGL', 3rd Edn., PHI, **2009**.
5. Jeffrey McConnell, 'Computer Graphics: Theory into Practice', 1st Edn., Jones and Bartlett Publishers, **2005**.
6. William M. Newman, 'Principles of Interactive Computer Graphics', 2nd Edn., McGraw Hill, 2001.

THEORY OF COMPUTATION**Subject Code:- MSCCS1-302****L T P C
4 1 0 5****Duration: 55 Hrs.****Course Objectives :**

After completion of this course, the students would be able to:

1. Design a finite automaton to recognize a given regular language and transform a language into regular expression or finite automaton or transition graph.
2. Define deterministic and nondeterministic finite automata and prove properties of regular languages and their classification.
3. Build a context-free grammar for pushdown automata.
4. Design Turing machine and Post machine for a given language.

UNIT-I (10 Hrs.)

Finite Automata - Formal language, need for formal computational models, Non computational models, Deterministic finite Automata, Non deterministic finite Automata, Equivalence of NFA and DFA, 2-Way Finite Automata, Moore and Mealy Machine.

UNIT-II (10 Hrs.)

Regular Expression and Languages - Regular expression, Equivalence of finite Automata and Regular expressions, Conversion between regular expressions and finite Automata, Application of Regular Expressions, Lexical analysis, Finding pattern in text.

UNIT-III (12 Hrs.)

Regular Languages and Regular Sets - Pumping lemma for regular sets, Applications of pumping lemma. Closure properties of regular language, Minimization of finite Automata. Pushdown Automata - Pushdown Automata, Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context free grammar.

UNIT-IV (13 Hrs.)

Context Free Grammar and Languages - Context free Grammars, Derivation Trees, Leftmost and rightmost derivations, Ambiguity, Parsing techniques for parsing of general CFG's, Properties of Context free Languages, Normal forms for context free grammars, The Pumping Lemna for context free Languages, Closure properties of context free languages. Turing Machine (TM) - One Tape, multi-tape.

Recommended Books:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, 'Introduction to Automata Theory, Languages and Computation', 3rd Edn., Pearson, **2006**.
2. Daniel I.A. Cohen, 'Introduction to Computer Theory', 2 nd Edn., Wiley, **2011**.
3. Adesh K. Pandey, 'Theory of Automata and Computation', S.K. Kataria & Sons, **2013**.
4. K.L.P. Mishra, 'Theory of Computer Science: Automata, Languages and Computation', 3rd Edn., Prentice Hall India Course Private Limited, **2006**.

RESEARCH METHODOLOGIES**Subject Code:- MSCCS1-303****L T P C
4 1 0 5****Duration: 55 Hrs.****UNIT-I (11 Hrs.)**

Introduction to Research: Meaning, Definition, Objective and Process Research Design: Meaning, Types - Historical, Descriptive, Exploratory and Experimental Research Problem: Necessity of Defined Problem, Problem Formulation, Understanding of Problem, Review of Literature Design of Experiment: Basic Principal of Experimental Design, Randomized Block,

Completely Randomized Block, Latin Square, Factorial Design. Hypothesis: Types, Formulation of Hypothesis, Feasibility, Preparation and Presentation of Research Proposal

UNIT-II (10 Hrs.)

Sources of Data: Primary and Secondary, Validation of Data Data Collection Methods: Questionnaire Designing, Construction Sampling Design & Techniques – Probability Sampling and Non Probability Sampling Scaling Techniques: Meaning & Types Reliability: Test – Retest Reliability, Alternative Form Reliability, Internal Comparison Reliability and Scorer Reliability Validity: Content Validity, Criterion Related Validity and Construct Validity

UNIT-III (13 Hrs.)

Data Process Operations: Editing, Sorting, Coding, Classification and Tabulation Analysis of Data: Statistical Measure and Their Significance, Central Tendency, Dispersion, Correlation: Linear and Partial, Regression: Simple and Multiple Regression, Skewness, Time series Analysis, Index Number Testing of Hypothesis: T-test, Z- test, Chi Square, F-test, ANOVA

UNIT – IV (11 Hrs.)

Multivariate Analysis: Factor Analysis, Discriminant Analysis, Cluster Analysis, Conjoint Analysis, Multi-Dimensional Scaling Report Writing: Essentials of Report Writing, Report Format Statistical Software: Application of Statistical Softwares like SPSS, MS Excel, Mini Tab or MATLAB Software in Data Analysis *Each Student has to Prepare Mini Research Project on Topic/ Area of their Choice and Make Presentation. The Report Should Consists of Applications of Tests and Techniques Mentioned in The Above UNITS.

Recommended Books:

1. R.I. Levin and D.S. Rubin, ‘Statistics for Management’, 7 th Edn., Pearson Education New Delhi.
2. N.K. Malhotra, ‘Marketing Research–An Applied Orientation’, 4 th Edn., Pearson Education New Delhi.
3. Donald Cooper, ‘Business Research Methods’, Tata McGraw Hill, New Delhi.
4. Sadhu Singh, ‘Research Methodology in Social Sciences’, Himalaya Publishers.

WEB TECHNOLOGIES

Subject Code:- MSCCS1-304

**L T P C
4 10 5**

Duration: 55 Hrs.

UNIT-I (15 Hrs.)

Internet and World Wide Web: Introduction, Internet Addressing, ISP, types of Internet Connections, Introduction to WWW, WEB Browsers, WEB Servers, URLs, HTTP, WEB Applications, Tools for web site creation.

HTML5: Introduction to HTML5, Lists, adding graphics to HTML5 page, creating tables, linking documents, forms, frames, Cascading Style sheets.

UNIT-II (13 Hrs.)

Java Script: Introduction, programming constructs: variables, operators and expressions, conditional checking, functions and dialog boxes, JavaScript DOM, creating forms, introduction to Cookies, JQuery.

UNIT-III (15 Hrs.)

AJAX: Introduction, HTTP Request, XML Http Request, AJAX Server Script.

UNIT-IV (12 Hrs.)

PHP: Introduction, syntax, statements, operators, PHP and MySQL, PHP and AJAX.

Recommended Books:

1. Ivan Bayross, 'Web Enabled Commercial Application Development using HTML, DHTML, JavaScript, Perl CGI', BPB.
2. Steven M. Schafer, 'HTML, CSS, JavaScript, Perl, Python and PHP', Wiley India.
3. Paul S. Wang, G. Keller, S. Katila, 'An Introduction to Web Design + Programming', Cengage Learning.
4. Jeffery C. Jackson, 'Web Technologies: A Computer Science Perspective', Pearson Education.
5. Robin Nixon, 'Learning PHP, MySQL and JavaScript', Shroff/O'Reilly.

SOFTWARE LAB V(BASED ON MCAP3-313)

Subject Code:- MSCCS1-305 L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper MCAP3-313 Computer Graphics.

SOFTWARE LAB VI(BASED ON MCAP3-316)

Subject Code:- MSCCS1-306 L T P C
0 0 4 2

This laboratory course will comprise an exercises to supplement what is learnt under paper MCAP3-316 Web application and development.

DATA COMMUNICATION AND NETWORKS

Subject Code:- MSCCS1-401 L T P C Duration: 55 Hrs.
4 1 0 5

Objectives: As part of this course, students will be introduced to Computer Networks and Data Communication paradigms, about Network models and standards, Network protocols and their use, wireless technologies.

UNIT-I (13 Hrs.)

Introduction to Data Communication: Components of Data Communication, Data Representation, Transmission Impairments, Switching, Modulation, Multiplexing. **Review of Network Hardware:** LAN, MAN, WAN, Wireless networks, Internetworks. **Review of Network Software:** Layer, Protocols, Interfaces and Services. **Review of Reference Models:** OSI, TCP/IP and their comparison.

Physical Layer

Transmission Media: Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (Radio, Microwave, Infrared). Introduction to ATM, ISDN, Cellular Radio and Communication Satellites.

UNIT-II (15 Hrs.)

Data Link Layer Services provided by DLL: FRAMING, ERROR CONTROL, FLOW CONTROL, MEDIUM ACCESS.

Medium Access Sub Layer: Channel Allocation, MAC protocols – ALOHA, CSMA protocols, Collision free protocols, Limited Contention Protocols, Wireless LAN protocols, IEEE 802.3, 802.4, 802.5 standards and their comparison.

UNIT-III (15 Hrs.)

Network Layer: Design Issues, Routing Algorithms (Shortest Path, Flooding, Distance Vector, Hierarchical, Broadcast, Multicast). Congestion Control Algorithms (Leaky bucket, Token bucket, Load shedding), Internetworking, IP Protocol, ARP, RARP.

Network Trouble Shooting: Using Ping, Traceroute, IPconfig, Netstat, nslookup.

UNIT-IV (12 Hrs.)

Transport Layer :Addressing, Establishing and Releasing Connection, Flow Control, Buffering, Internet Transport Protocol (TCP and UDP).

Application Layer: Domain name system, E-mail, File transfer protocol, HTTP, HTTPS, World Wide Web.

Recommended Books:

1. Tanenbaum, Andrew S., 'Computer Networks', 4th Edn., PHI, 2009.
2. B.A. Forouzan, 'Data Communications and Networking', 4th Edn., Tata McGraw Hill, 2009.
3. Douglas E. Comer, 'Internetworking with TCP/IP (Vol.1, 4thEdition)', CPE 2004.
4. Stallings, William, 'Data and Computer Communications', 8th Edn., PHI, 2008.
5. Nance, Bary, 'Introduction to Networking', 4th Edn., PHI, 1997.

ARTIFICIAL INTELLIGENCE

Subject Code:- MSCCS1-402

L T P C
4 1 0 5

Duration: 55 Hrs.

UNIT-I (11 Hrs.)

Basics of AI - What is Artificial Intelligence, what is an AI technique, Criteria for success, Problems, Problem spaces and search, Production system, Problem characteristics, Hillclimbing, Best-First search, AO algorithm, Constraint satisfaction.

UNIT-II (12 Hrs.)

Natural Language Processing - Introduction, Overview of linguistics, Grammars and language, Basic Parsing techniques, Semantic analysis and representation, Structure, Natural Language generation, Natural Language systems.

UNIT-III (11 Hrs.)

Knowledge Representation - Issues, Approaches to knowledge Representation, Representing simple facts in logic, Computable functions and predicates, Procedural vs declarative knowledge, Forward vs Backward Reasoning matching, Control knowledge.

UNIT-IV (11 Hrs.)

Expert Systems - Rule-Based system architecture, Non-production system Architecture, dealing with uncertainty, Knowledge acquisition and validation, Knowledge system Building tools.

Recommended Books

1. Elaine Rich and Kevin Knight, 'Artificial Intelligence', 5 th Edn., Tata McGraw Hill, 2014.
2. Dan. W. Patterson, 'Introduction to Artificial Intelligence and Expert Systems', 1st Edn., Prentice Hall India, 2015.
3. Eugene Charniak and Drew McDermott, 'Introduction to Artificial Intelligence', 1st Edn., Pearson Education, 2002.

PROGRAMMING WITH PYTHON

Subject Code:- MSCCS1-403

L T P C
4 1 0 5

Duration: 55 Hrs.

UNIT-I (10 Hrs.)

Introduction to Python: Python Installation and Working with Python Understanding Python Variables Python Basic Operators, Understanding python blocks.

Data Types: Declaring and using Numeric data types: int, float, complex using string data type and string operations, Use of Tuple data type.

UNIT- II (13 Hrs.)

Program Flow Control: Conditional blocks using if, else and elif, loops in python programming, continue, break statements in python.

UNIT- III (12 Hrs.)

Functions Modules and Packages: Organizing python codes using functions, organizing python projects into modules, Importing own module as well as external modules.

String List and Dictionary Manipulations: Building blocks of python programs, understanding string in build methods, List manipulation using in build methods, Dictionary manipulation Programming using string, list and dictionary in build functions.

UNIT- IV (10 Hrs.)

File Operation: Reading config files in python Writing log files in python Understanding read functions, read (), read line () and read lines () Understanding write functions, write () and writelines () Manipulating file pointer using seek Programming using file operations.

Recommended Books:

1. Sheetal Taneja Naveen Kumar," Python Programming: A Modular Approach, by Pearson, **2017**.
2. Downey, Allen B. Think Python: How to Think Like a Computer Scientist (Version 1.6.6 Ed.), **2012**.
3. Hamilton, Naomi. "The A-Z of Programming Languages: Python", **2008**.
4. Lutz, Mark Learning Python (5th ed.). O'Reilly Media, **2013**.
5. Pilgrim, Mark Dive into Python 3. Apress, **2009**.

DATA ANALYTICS

Subject Code:- MSCCS1-404

L T P C
4 1 0 5

Duration: 55 Hrs.

UNIT-I (10 Hrs.)

Descriptive Statistics: Introduction to the course Descriptive Statistics, Probability Distributions.

Inferential Statistics: Inferential Statistics through hypothesis tests, Permutation & Randomization Test.

UNIT- II (13 Hrs.)

Regression & ANOVA: Regression ANOVA (Analysis of Variance)

Machine Learning: Introduction and Concepts Differentiating algorithmic and model based frameworks Regression : Ordinary Least Squares, Ridge Regression, Lasso Regression, K Nearest Neighbours Regression & Classification.

UNIT- III (12 Hrs.)

Supervised Learning with Regression and Classification techniques -1 Bias-Variance Dichotomy Model ,Validation Approaches Logistic Regression, Linear Discriminant Analysis, Quadratic Discriminant Analysis, Regression and Classification Trees Support, Vector Machines.

Supervised Learning with Regression and Classification techniques -2 Ensemble Methods: Random Forest ,Neural Networks, Deep learning.

UNIT- IV (10 Hrs.)

Unsupervised Learning and Challenges for Big Data Analytics: Clustering Associative, Rule Mining ,Challenges for big data analytics.

Prescriptive analytics: Creating data for analytics through designed experiments ,Creating data for analytics through Active learning ,Creating data for analytics through Reinforcement learning.

Recommended Books:

1. Hastie, Trevor, et al.The elements of statistical learning. Vol. 2. No. 1. New York: springer, 2009.
2. Montgomery, Douglas C., and George C. Runger.Applied statistics and probability for engineers. John Wiley & Sons, 2010.

SOFTWARE LAB VII (BASED ON MCAP3-421)

Subject Code:- MSCCS1-405

L T P C

0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper MCAP3- 421 Programming with Python. Students are required to develop programs in python language. Few programs are listed below:

1. To Exchange the Values of Two Numbers Without Using a Temporary Variable.
2. To Check if a Number is a Palindrome
3. To Print all Integers that Aren't Divisible by Either 2 or 3 and Lie between 1 and 50
4. To Print Table of a Given Number
5. To Print Sum of Negative Numbers, Positive Even Numbers and Positive Odd numbers in a List
6. To Print Numbers in a Range (1, upper) Without Using any Loops
7. To Find the Sum of Sine Series
8. To Find the Sum of First N Natural Numbers
9. To Search the Number of Times a Particular Number Occurs in a List
10. To Find the Largest Number in a List
11. To Find the Second Largest Number in a List
12. To Find the Second Largest Number in a List Using Bubble Sort
13. To Sort a List According to the Length of the Elements
14. To Sort a List of Tuples in Increasing Order by the Last Element in Each Tuple.
15. To Swap the First and Last Value of a List.
16. To remove the ith Occurrence of the Given Word in a List where Words can repeat.

**ORDINANCES
AND OUTLINES OF TESTS,
SYLLABI AND COURSES OF READING**

FOR

POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS

(First and Second Semester Examinations)

MRSPTU, BATHINDA

Eligibility: Three Year Bachelor Degree from a University recognized by UGC, in any discipline.

Duration: 1 Year/ 2 Semesters

Mode of admission:

1. Online Counselling based on merit in qualifying examination.
2. Manual counselling for left over seats after Online Counselling.

Semester 1 st		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
PGCAS1-101	Fundamentals of Information Technology	3	1	0	40	60	100	4
PGCAS1-102	Operating System	3	1	0	40	60	100	4
PGCAS1-103	Programming Fundamentals using C	3	1	0	40	60	100	4
PGCAS1-104	Computer organization and Architecture	3	1	0	40	60	100	4
PGCAS1-105	Software lab I Office Automation (Based on PGCAS1-101)	0	0	4	60	40	100	2
PGCAS1-106	Software Lab II (Based on PGCAS1-103)	0	0	4	60	40	100	2
Total		12	4	8	280	320	600	20

Semester 2 nd		Contact Hrs.			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
PGCAS1-201	Data Structures	3	1	0	40	60	100	4
PGCAS1-202	Object Oriented programming Using C++	3	1	0	40	60	100	4
PGCAS1-203	Database Management System	3	1	0	40	60	100	4
PGCAS1-204	Fundamentals of Computer Networks, Internet and Scripting Languages	3	1	0	40	60	100	4
PGCAS1-205	Software Lab III Data Structures using C++(Based on PGCAS1-201)	0	0	4	60	40	100	2
PGCAS1-206	Software Lab IV (Based on PGCAS1-204)	0	0	4	60	40	100	2
Total		12	4	8	280	320	600	20

FUNDAMENTALS OF INFORMATION TECHNOLOGY**Subject Code: PGCAS1-101****L T P C****Durations: 45 Hrs.****3 1 0 4****UNIT I (10 Hrs)**

Historical Evolution of Computer: Block Diagram of computer, characterisation of computers, types of computers, the computer generations, memory unit, input-output unit, arithmetic logic unit, control unit, central processing unit, RAM, ROM, PROM, EPROM.

Input-Output Devices: Keyboard, Mouse, Joy tick, Track Ball, Touch Screen, Light Pen, Digitizer, Scanners, Voice Recognition Devices, Optical Recognition devices, Dot matrix, Character and Line printer, Desk Jet printer, Laser printer, and plotters.

UNIT II (13 Hrs)

Number System: Non-positional and positional number systems, Base conversion, binary, decimal, hexadecimal, and octal systems, conversion from one system to the other.

Binary Arithmetic: Addition, subtraction and multiplication.

Computer Codes: weighted and non-weighted code, BCD, EBCDIC, ASCII, Unicode, XS-3, Grey Codes.

UNIT III (12 Hrs)

Computer Software: Introduction, types of software, systems software, GUI, operating system, high level languages, assemblers, compilers and interpreters, system utilities, application packages, stages in the development of software, program testing and debugging, program documentation, concept of firmware.

UNIT IV (10 Hrs)

Applications of Information Technology and Trends: IT in Business and Industry, IT in Education & training, IT in Science and Technology, IT and Entertainment, Current Trends in IT Application - AI, Virtual Reports, voice recognition, Robots, Multimedia Technology.

E-Commerce: Meaning, its advantages & limitations, Infrastructure for E-commerce, Types of E-Commerce Applications.

Multimedia: Concepts, Components and Application.

Recommended Books:

1. Chetan Srivastva, Fundamentals of Information Technology, Kalyani Publishers.
2. Turban Mclean and Wetbrete, Information Technology and Management, Second Edition, 2001, John Wiley & Sons.
3. Satish Jain, Information Technology, BPB, 1999.
4. Sukhmeen Kaur, Vikram Gupta, S. S. Hatia and Navneet Kaur, "Fundamentals of Information Technology", Kalyani Publishers.
5. P.K. Sinha and P. Sinha, Foundations of Computing, First Edition, 2002, BPB.

OPERATING SYSTEMS**Subject Code: PGCAS1-102****L T P C****Durations: 45 Hrs.****3 1 0 4****UNIT I (10Hrs)**

Introduction to operating System: Definition, its need and Operating system services, Early systems, Introduction to various types of operating systems: Batch processing operating system, Multiprogramming operating system, Time Sharing operating system, Multi-tasking operating System, distributed operating system, Network operating system, Real time operating system, Multi-processor system and parallel processing.

UNIT II (13Hrs)

Process Management: Process concept, types of Process scheduling, and Basic concept of CPU Scheduling, Scheduling criteria, and Scheduling algorithms: FCFS, SJF, Round Robin & Queue Algorithms, Deadlock definition and its characterization.

UNIT III (12Hrs)

Windows: GUI, Icon, Toolbar, working with files, closing and saving a file, Mouse Mechanics: Click, double click, Drag and drop method. Installation of a new software, Control panel, Explorer, Accessories, Network Neighbourhood, system tools, recycle bin, Files and directory management under windows, Running programs

UNIT IV (10Hrs)

UNIX: Structure of UNIX, Kernel and shell, Commands of Unix, UNIX file system, own file system, Electronic mail, Vi Editor: Editing text, screen controls printing and spooling, Unix Administration: Super user, Booting, Backup, Creating and managing new accounts.

Recommended Books:

1. Rathbone," Windows for dummies", Pustak mahal.
2. Stan Kelly-Bootley," Understanding UNIX", Sybex Tech asian edition.
3. Silverschatz," Operating system concepts", Pearson Education India.

PROGRAMMING FUNDAMENTALS THROUGH "C" LANGUAGE

Subject Code: PGCAS1-103

L T P C
3 1 0 4

Durations: 45 Hrs.

UNIT I (10Hrs)

Programming process: Problem definition, program design, coding, compilation and debugging.

Fundamentals of C: Identifiers and keywords, data types, input and output, type conversion, operators and expressions: Arithmetic, unary, logical and relational operators, assignment operator, conditional operator, and library functions.

UNIT II (13Hrs)

Control statements: branching, looping using for, while and do-while statements, nested control structures, switch, break and continue statement.

Functions: definition, call prototype and passing arguments to a function, recursion versus iteration

Storage classes: automatic, external and static variables.

UNIT III (12Hrs)

Arrays: Definition, accessing elements, initialization, passing to functions, multi-dimensional arrays, strings

Pointers: address and referencing operators, declaration, assignment, passing pointer to functions, pointer arrays.

UNIT IV (10Hrs)

Structures: variables, accessing members, nested structures, pointer to structures, self-referential structures.

Files in C: Sequential files, random access files, unformatted files, Text files, binary files.

Recommended books:

1. Ram Kumar and Rakesh Aggarwal: Programming in Ansi C, TMH.
2. B.W. Kerrighan and D.M. Richie, “ The C programming language”, 2nd edition, PHI.
3. H.H. Tan & T.B. Dorazio,” C Programming for engineers & Computer Science”, Mcgraw Hill international edition.
4. Vikram Gupts and S. S. Bhatia, "Programming Fundamentals through C Language" Kalyani Publishers.
5. Byron Gottfried, “Programming with C, Second edition, Schaum’ s outline series” TMH.

COMPUTER ORGANIZATION AND ARCHITECTURE

Subject Code: PGCAS1-104

**L T P C
3 1 0 4**

Durations: 45 Hrs.

UNIT I (10 Hrs)

Boolean algebra: Boolean operations, Truth Tables, Boolean Laws, K-maps (2, 3 and 4 variable maps, don't care conditions).

Basic Gates: Combinational logic design: half-adder, full adder, parallel adder.

UNIT II (13 Hrs)

Sequential circuits: concept, flip-flops (D, RS, JK, T), counters (Ripple, Asynchronous, Synchronous). Instruction codes, Instruction formats, Instruction cycle, Addressing modes. Register Transfer Language, Arithmetic, Logic and Shift micro-operations, Arithmetic Logic Shift unit

UNIT III (12 Hrs)

Control Memory: Design of control unit, Micro programmed and hardwired control unit (overview only), Features of RISC and CISC.

Memory Organisation: memory hierarchy, Memory types: cache, associative and other types.

UNIT IV (10 Hrs)

I/O organization: I/O interface, Modes of data transfer: Programmed I/O, Interrupt initiated I/O, DMA. Block diagram-depicting architecture of 8085 machine.

Recommended books:

1. A.S. Tannenbaum, "Structured Computer Organisation". Prentice-Hall of India, 1999.
2. William Stallings, "Computer Organisation and Architecture". Sixth Edition, Pearson Education, 2002.
3. M.M. Mano, "Computer System Architecture". Third Edition, Prentice-Hall of India, 2002.

SOFTWARE LAB – I(BASED IN PGCAS1-101)

Subject Code: PGCAS1-105

**L T P C
0 0 4 2**

This laboratory course will comprise as exercises based on Office Automation and Productivity Tools. Students are required to practice following:

WINDOWS: Windows concepts, features, windows structure, desktop, taskbar, start menu, my computer, Recycle Bin, Windows Accessories. System Tools, communication, Sharing Information between Programs.

Word Processing: Introduction to Word Processing, Interface, Toolbars, Ruler, Menus, Keyboard Shortcut, editing a Document, previewing documents, Printing documents, Formatting Documents, Checking the grammar and spelling, formatting via find and replace, Using the

Thesaurus, Using Auto Correct, Auto Complete and Auto Text, word count, Hyphenating, Mail merge, mailing Labels Wizards and Templates, Handling Graphics, tables and charts, Converting a word document into various formats.

PowerPoint: Creating slides, applying transitions and sound effects, setting up slide shows, Animation.

Spreadsheet using EXCEL: Creating worksheet, entering data into worksheet, heading information, data, text, dates, alphanumeric, values, saving & quitting worksheet, Opening and moving around in an existing worksheet, Toolbars and Menus, keyboard shortcuts, working with single and multiple workbook, working with formulas & cell referencing, Formatting of worksheet.

SOFTWARE LAB – II(BASED ON PGCAS1-103)

Subject Code: PGCAS1-106

L T P C
0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper **PGCAS1-103:** Programming Fundamentals through "C" Language. Students are required to develop programs based upon:

- 1. Input-Output Statements:** formatted and non-formatted statements.
- 2. Decision Making:** switch, if-else, nested if, else-if ladder, break, continue, goto.
- 3. Loops:** while, do-while, for.
- 4. Functions:** definition, declaration, variable scope, parameterized functions, return statement, call by value, call by reference, recursive functions.
- 5. Arrays:** Array declarations, Single and multi-dimensional, memory limits, strings and string functions.
- 6. Files:** Creation and editing of various types of files, closing a file (using functions and without functions).

DATA STRUCTURES

Subject Code: PGCAS1-201

L T P C
3 1 0 4

Duration: 45 Hrs.

UNIT I (10 Hrs)

Basic concept and notations, data structures and data structures operations, mathematical notation and functions, algorithmic complexity, Big 'O' notations and time space trade off.

Arrays: Linear array, representation of linear array in memory, traversing linear array, insertion and deletion in an array, multi-dimensional array: row-major, column major order, sparse array.

UNIT II (13 Hrs)

Stacks: Push and Pop in stack. Representation of stack in memory (linked and sequential) applications of Stack: conversion from infix notation to postfix notations, evolution of postfix notation, matching of Parenthesis, recursion, Tower of Hanoi.

UNIT III (12 Hrs)

Linked list: representation of linked list using static and dynamic data structures, Comparison of Linear and non-linear data structures, Insertion and deletion of a node from a linear linked list, Introduction to doubly and circular linked lists, Application of linked lists.

UNIT IV (10 Hrs)

Searching and Sorting: Linear and binary search, Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Radix Sort and Quick Sort comparison of various searching and sorting algorithms.

Recommended books:

1. Tenenbaum, Y. Lanhghsam and A. J. Augenstein, "Data Structures Using C and C++", Prentice Hall of India.
2. Seymour Lipschutz "Theory & Practice of Data Structures", McGraw Hill..

OBJECT ORIENTED PROGRAMMING WITH C++**Subject Code: PGCAS1-202****L T P C**
3 1 0 4**Duration: 45 Hrs.****UNIT I (10 Hrs)**

Evolution of OOP: Procedure Oriented Programming, OOP Paradigm, Advantages and disadvantages of OOP over its predecessor paradigms. Characteristics of Object Oriented Programming.

Introduction to C++: Identifier, Keywords, Constants And Operators: Arithmetic, relational, logical, And conditional and assignment. Size of operator, Operator precedence and associativity. Type conversion, Variable declaration, expressions, statements, manipulators. Input and Output statements, stream I/O, Conditional and Iterative statements, breaking control statements. Storage Classes, Arrays, Arrays as Character Strings, Structures, Unions, bit fields, Enumerations and User defined types.

UNIT II (13 Hrs)

Pointers: Pointer Operations, Pointer Arithmetic, Pointers and Arrays, Multiple indirections, Pointer to functions. **Functions:** Prototyping, Definition and Call, Scope Rules.

Parameter Passing: by functions, recursion, function overloading, Default Arguments, Const arguments, Pre-processor, Type casting.

Classes and Objects: Class Declaration and Class Definition, defining member functions, making functions inline, nesting of member functions, Members access control, this pointer, Objects: Object as function arguments, array of objects, functions returning objects, Const member. Static data member and Static member functions, Friend functions and Friend classes.

UNIT III (12 Hrs)

Constructors: Properties, types of constructors, Dynamic constructors, multiple constructors in classes.

Destructors: Properties, Virtual destructors, Destroying objects, Rules for constructors and destructors. Array of objects. Dynamic memory allocation using new and delete operators, Nested and container classes, Scopes: Local, Global, namespace and Class.

Inheritance: Defining derived classes, inheriting private members, single inheritance, types of derivation, function redefining, constructors in derived class, Types of inheritance, Types of base classes, Code Reusability.

UNIT IV (10 Hrs)

Polymorphism: Methods of achieving polymorphic behaviour. Polymorphism with pointers, virtual functions, late binding, pure virtual functions and abstract base class.

Operator overloading: over loading binary operator, overloading unary operators, rules for operator overloading, operator overloading using friend function. Function overloading: early binding. Difference between function overloading, redefining, and overriding.

Recommended Books:

1. Deitel and Deitel, "C++ How to Program", Pearson Education, 2001.
2. Robert Lafore, "Object Oriented Programming in C++", Galgotia Publications, 1994.
3. Bjarne Strastrup, "The C++ Programming Language", Addition-Wesley Publication Co., 2001.
4. Stanley B. Lippman, Josee Lajoie, "C++ Primer", Pearson Educaion, 2002.
5. E. Balagurusamy, "Object Oriented Programming with C++", Tata McGraw-Hill, 2001.
6. Herbert Schildt. "The Complete Reference C++", Tata McGraw-Hill, 2001.

DATABASE MANAGEMENT SYSTEM**Subject Code: PGCAS1-203****L T P C****Duration: 45 Hours****3 1 0 4****UNIT I (10 Hrs)**

Traditional file processing system: Characteristics, limitations, Database Definition, composition.

Database Management System: Definition, Characteristics, advantages over traditional file processing system, User of database, DBA and its responsibilities, Database schema, instance. DBMS architecture, data independence, mapping between different levels.

UNIT II (13 Hrs)

Database languages: DDL, DML, DCL.

Database utilities, Data Models, Keys: Super, candidate, primary, unique, foreign.

Entity relationship model: concepts, mapping cardinalities, entity relationship diagram, weak Entity sets, strong entity set, aggregation, generalization, converting ER diagrams to tables. Overview of Network and Hierarchical model.

UNIT III (12 Hrs)

Relational Data Model: concepts, constraints. Relational algebra: Basic operations, additional operations.

Database Design: Functional dependency, decomposition, problems arising out of bad database design, normalization, multi-valued dependency, Database design process, data base protection, database integrity.

Database concurrency: Definition and problems arising out of concurrency.

UNIT IV (10 Hrs)

Database security: Authentication, authorization, methods of implementing security.

MS-ACCESS: Introduction to MS-ACCESS, working with database and tables, queries in Access, Applying integrity constraints, Introduction to forms, sorting and filtering, Controls, Reports and Macro: creating reports, using Macros.

Recommended books:

1. C.J. Date, "An Introduction to Data Base Systems", 3rd Ed., Narosa Publishers, 1997.
2. Jeffrey D. Ullman, "Principles of Database Systems", second Ed., Galgotia Pub., 1984.
3. D. Kroenke., "Database Processing", Galgotia Publications, 1987.
4. Henry F. Korth, "Database System Concepts", McGraw Hill. Inc., 1997.
5. Naveen Prakash, "Introduction to Database Management", TMH, 1993.
6. Ivan Bayross, "Oracle 7 The complete reference", BPB Publications.
7. Bobrowsky, "Client server architecture and Introduction to Oracle 7", 1996.
8. Elmisry Nawathy, "Introduction to database System", Pearson Education India.
9. Content Development Group "Working with MS-OFFICE 2000", TMH.

FUNDAMENTALS OF COMPUTER NETWORKS, INTERNET AND SCRIPTING**Subject Code: PGCAS1-204**
Hours**L T P C****Duration: 45****3 1 0 4****UNIT I (10 Hrs)**

Computer Networks: Introduction, Applications, Network hardware and Software (protocol hierarchies, design issues for layers, interfaces and services: connection oriented and connection less), Network structure and architecture - point to point, multicast, broadcast, Classification of networks-LAN, MAN and WAN. Reference models - the OSI reference model, TCP / IP reference model. Comparison between OSI and TCP / IP models.

UNIT II (13 Hrs)

Internet: Introduction, Relays, Repeaters, Bridges, Routers, Gateways.

Internet working: How networks differ, concatenated virtual circuits, connectionless internetworking, tunnelling, internetwork Routing, fragmentation, Firewalls, internet architecture.

UNIT III (12 Hrs)

Application layer: The DNS Name Space, Electronic Mail, The World Wide Web, FTP: Introduction, data transfer and distributed computation, Generalised File Transfer, The File Transfer Protocol.

Network security: Introduction to cryptography, substitution ciphers, transposition ciphers, one-time pads, two fundamental cryptographic principles.

UNIT IV (10 Hrs)

Scripting languages: HTML: Introduction to HTML, HTML and the World Wide Web, HTML elements, basic structure elements of HTML, the two categories of body elements – block level and text level, creating HTML pages, viewing pages in different browsers, rule for nesting. HTML tags, colours and fonts, formatting the body section, creating links, creating external links, creating internal links.

Recommended Books:

1. Douglas E. Comer, "Computer Networks and Internets" second Edition, Addison Wesley.
2. D. Bertsekas and R. Gallager, "Data Networks", second Edition, Prentice Hall, 1992.
3. Andrew S. Tanenbaum, "Computer Networks", Third Edition, PHI Publications, 1997.
4. B Forousan, Introduction to data communication and networking.

SOFTWARE LAB III(BASED ON PGCAS1-201)**Subject code: PGCAS1-205****L T P C****0 0 4 2**

This laboratory course will comprise as exercises to supplement what is learnt under paper **PGCAS1-201: Data Structures & object Oriented Programming with C++**. Students are required to develop programs

1. Based upon various constructs in the C++ language.
2. Searching and sorting algorithms in C++ language.
3. Data structures like stack, queues and linked lists in C++ language.

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SOFTWARE LAB – IV(BASED ON PGCAS1-204)

Subject code: PGCAS1-206

L T P C

0 0 4 2

This laboratory course will comprise as exercises to supplement what is learnt under paper **PGCAS1-203**: Database Management System with MS ACCESS and PGDCA-204: Fundamentals of Computer Networks, Internet and Scripting Languages. Students are required to practices:

MS ACCESS: Creating tables, queries in MS Access, Applying integrity constraints, creating forms, sorting and filtering, creating reports.

HTML: Tables, Forms, Frames and other text formatting tags

DHTML: Cascading style sheets and Document object model

JavaScript: Introduction to JavaScript.

Pre-Ph.D. Courses (Food Science & Technology)**Total Contact Hours = 18****Total Marks = 400****Total Credits = 15**

Subject Code	Subject Name	Contact Hrs			Marks			Credits
		L	T	P	Int.	Ext.	Total	
MREMO-101	Research Methodology	3	1	-	40	60	100	4
PFOT1-101	Advances in Food Technology	3	1	-	40	60	100	4
PFOT1 -102	Journal Club and Report Writing	-	-	4	50	-	50	2
PFOT1 -103	Seminar	-	-	2	50	-	50	1
Departmental Electives (Choose any one subject)								
PFOT1-104	Advances in Cereal Technology	3	1	-	40	60	100	4
PFOT1-105	Advances in Fruits and Vegetable Processing Technology	3	1	-	40	60	100	4
Total	Theory = 3 Lab = 2	9	3	6	220	180	400	15

ADVANCES IN FOOD TECHNOLOGY

Subject Code – PFOT1--101

L T P C
3 1 0 4

Duration – 45 Hrs

UNIT-I (10 Hrs)

Functional foods: different functional compounds and their health promoting effects

Nutraceuticals: sources, scope and challenges

Food fortification: methods and benefits

Food allergens: different allergens and their health effects

Food additives: different additives and their usage in foods

UNIT-II (10 Hrs)

Advances in food analysis techniques:

Spectroscopy: UV-Visible spectroscopy, Atomic absorption spectroscopy, Fourier Transform Infra-Red, Mass-spectroscopy

Methods of separation and analysis of biochemical compounds: Gas chromatography, HPLC

Thermal analysis of foods: Differential scanning calorimetry, Thermo gravimetric analysis

Rheological measurements in foods: RVA, rheometer and texture analyzer

UNIT-III (10 Hrs)

Non thermal processing techniques: Membrane technology, High intensity pulsed electric field, Irradiation, Microwave, High pressure processing in food industry; their principles, safety aspects and applications in food system.

UNIT-IV (15 Hrs)

Food packaging: Active packaging, controlled and modified packaging

Use of nanotechnology in food processing

National and international food standards and regulatory agencies

Reading Material Recommended

- Handbook of Food Preservation. 2nd Edition, Edited by: M. Shafiur Rahman. (2007). CRC Press.
- Food Allergens. Edited by: T. C. Velickovic and M. Gavrovic-Jankulovic. Springer.
- Food Fortification and Supplementation: Technological, Safety and Regulatory Aspects. Editor(s): P. Berry Ottaway, Berry Ottaway and Associates Ltd, UK.
- Pare, J. R. J. and Bélanger, J. M. R. (2015). Instrumental Methods of Food Analysis: Elsevier
- Nutraceuticals and Functional Foods. 2nd Edition, Edited by: Robert E.C. Wildman, CRC Press.
- Nanotechnology applications in food. 1st Edition, Edited by: A. E. Opera and A. Mihai. (2017). Elsevier.
- Nanotechnology Applications in Food Industry. 1st Edition, Edited by: V. R. Rai and J A Bai. (2018) CRC Press.
- Food Packaging: Principles and Practices. 3rd Edition, Edited by: G. L. Robertson (2012) Taylor and Francis.

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JOURNAL CLUB AND REPORT WRITING

Subject Code – PFOT1--102
Hrs

L T P C

Duration - 36

0 0 4 2

Essentials of Report and article writing: Search Engines, Research/Review paper writing, Introduction to Impact Factor, Indexing, Citations, Peer Review, h-index, i10-index, ISSN, Leading Science Publishers Referencing styles and Process of article submission.

Journal Club – Presentation of research problems and publications. Critical review of published articles.

Working knowledge of softwares like Minitab, SPSS etc.

Recommended Websites

1. www.google.com
2. www.ncbi.nlm.nih.gov/pubmed
3. www.sciencedirect.com
4. www.elsevier.co.in
5. www.wiley.com
6. www.thomsonreuters.com
7. www.benthamscience.com
8. www.scholar.google.co.in

SEMINAR

Subject Code – PFOT1--103

L T P C

Duration - 24 Hrs

0 0 2 1

- Introduction, information and retrieval systems.
- Writing assignments and term papers.
- Reading/Presentation on areas/expertise/technology related to field of research.
- Organization and presentation of scientific material, research work, dissertations, patents etc.
- Skills in oral and technical presentations.

Each student has to present seminars during the semester.

RESEARCH METHODOLOGY

Subject Code –MREMO-101

**L T P C
3 1 0 4**

Duration – 45 Hrs

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ADVANCES IN CEREAL TECHNOLOGY

Subject Code – PFOT1--104

**L T P C
3 1 0 4**

Duration – 45 Hrs

UNIT-I (10 Hrs)

Status of cereal processing industries in India
Significance of enzymes in cereals: sources and utilization
Pseudo cereals: processing and utilization

UNIT-II (10 Hrs)

Milling technology of wheat, rice, corn and minor millets: conventional and advanced techniques

UNIT-III (10 Hrs)

Role of wheat protein in dough and gluten; application of gluten, visco-elasticity
Equipments used in dough rheology: mixograph, Rapid visco analyzer, extensograph, alveograph, falling number apparatus, and texture analyzer.
Bread and biscuit making technology: process and techniques, variety of products
Breakfast cereals and other products of extrusion cooking

UNIT-IV (15 Hrs)

Extraction of starches from different botanical sources, native starch properties, types of starch modifications, food and non-food applications of starch,
Malt technology: Malting and brewing of barley

Reading Material Recommended

- Wheat Chemistry and Technology, 4th Edition, Edited by: K. Khan and P. R. Shewry, AACC.
- Rice Chemistry and Technology, 3rd Edition, Edited by: E. T. Champagne. AACC.
- Corn Chemistry and Technology, 2nd Edition, Edited by: P. J. White and L.A. Johnson, AACC.
- Technology of Cereals. 4th Edition, Edited by: N. L. Kent and A. D. Evers. (1994). Woodhead Publishing Ltd. England.
- Dough Rheology and Baked Product Texture, Edited by: H. Faridi and J.M. Faubion. Springer.
- Starch in Food, Edited by: Ann-Charlotte Eliasson, Woodhead Publications.
- Starches: Properties and Uses, Edited by: O. B. Wurzburg, CRC Press.
- Technology of Breadmaking, 3rd Edition, Edited by: S. Cauvain, Springer.
- Biscuit, Cookie and Cracker Production, 2nd Edition, Edited by: L. Davidson. Elsevier.
- Breakfast Cereals and How they are made? Edited by: R. B. Fast and E. F. Caldwell. AACC.

ADVANCES IN FRUITS AND VEGETABLE PROCESSING TECHNOLOGY

Subject Code – PFOT1--105

L T P C
3 1 0 4

Duration – 45 Hrs

UNIT-I (10 Hrs)

Present status of fruits and vegetable processing in India & world. Prospects in fruits and vegetables processing in India.

UNIT-II (10 Hrs)

Fresh fruits & vegetable handling: Post-harvest physiology. Pre-packaging of fresh fruits and vegetables. Phyto-chemicals: fruits and vegetables as a source of bioactive compounds.

UNIT-III (10 Hrs)

Modern techniques such as MAP, Ionizing irradiation to enhance shelf life of fresh fruits and vegetables. Fruits and vegetables processing techniques: Advances in canning, aseptic canning, dehydration and freezing.

UNIT-IV (15 Hrs)

Fruit products processing: General process and modern equipments. Applications of membrane technology in clarification and concentration. Blending of fruit juices. Cold chain: Importance of cold chain in food processing industry and retail chain. Components of cold chain and integration.

Reading Material Recommended

- Modified Atmosphere Packaging of Food. Edited by: O. O. Raikul, Springer.
- Controlled and Modified Atmosphere for Fresh and Fresh Cut Produce. 1st Edition, Edited by: M. Gil and R. B. Randolph. Elsevier.
- Preservation of Fruits and Vegetables. G. L. Siddappa and G. L. Tandon 1998. ICAR, New Delhi.
- The Preservation of Fruit and Vegetable Food Products, Edited by: S. D. Holdsworth. Spriger.
- Rangana S. 1989. Handbook of analysis of fruits and vegetables products. Tata McGraw Hills, New Delhi.
- Fruit and Vegetable Phytochemicals-Chemistry and Human Health, 2nd Edition, Edited by: E. M. Yahia, Wiley Blackwell.
- Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies. Edited by: D. S. Levi, P. Kaminsky and E. S. Levi. 2000, McGraw-Hill, New York.
- Food Canning Technology. Edited by: J. Larousse and B. E. Brown. Wiley-VCH.
- Food Irradiation Research and Technology, Edited by: C. H. Bommera and X. Fan. Wiley Blackwell Publishing.

Syllabus & Regulation for Pharm.D

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TABLES

Year 1 st		Contact Hrs			Marks			Credits
Subject code	Subject Name	L	T	P	Int.	Ext.	Total	
MPHD1-101	Human Anatomy and Physiology	3	1	-	40	60	100	4
MPHD1-102	Pharmaceutics	2	1	-	40	60	100	3
MPHD1-103	Medicinal Biochemistry	3	1	-	40	60	100	4
MPHD1-104	Pharmaceutical Organic Chemistry	3	1	-	40	60	100	4
MPHD1-105	Pharmaceutical Inorganic Chemistry	2	1	-	40	60	100	3
MPHD1-106	Remedial Mathematics#/ Remedial Biology*	3	1	-	40	60	100	4
MPHD1-107	Human Anatomy and Physiology (P)	-	-	4	60	40	100	2
MPHD1-108	Pharmaceutics (P)	-	-	4	60	40	100	2
MPHD1-109	Medicinal Biochemistry (P)	-	-	4	60	40	100	2
MPHD1-110	Pharmaceutical Organic Chemistry (P)	-	-	4	60	40	100	2
MPHD1-111	Pharmaceutical Inorganic Chemistry (P)	-	-	4	60	40	100	2
MPHD1-112	Remedial Biology (P)*			4	60	40	100	2
Total		16	6	20# / 24*	540# / 600*	560# / 600*	1100# / 1200*	32# / 34*

Note: 101 refers to subject of 1st year having code 01

*Applicable ONLY for the students who have studied Mathematics/Physics/Chemistry at HSC and appearing for Remedial Biology (RB) course.

#Applicable ONLY for the students who have studied Physics/Chemistry/Botany/Zoology at HSC and appearing for Remedial Mathematics (RM) course

Year 2 nd		Contact Hrs			Marks			Credits
Subject code	Subject Name	L	T	P	Int.	Ext.	Total	
MPHD1-213	Pathophysiology	3	1	-	40	60	100	4
MPHD1-214	Pharmaceutical Microbiology	3	1	-	40	60	100	4
MPHD1-215	Pharmacognosy & Phytopharmaceuticals	3	1	-	40	60	100	4
MPHD1-216	Pharmacology-I	3	1	-	40	60	100	4
MPHD1-217	Community Pharmacy	2	1	-	40	60	100	3
MPHD1-218	Pharmacotherapeutics-I	3	1	-	40	60	100	4
MPHD1-219	Pharmaceutical Microbiology(P)	-	-	2	60	40	100	1
MPHD1-220	Pharmacognosy & Phytopharmaceuticals (P)	-	-	2	60	40	100	1
MPHD1-221	Pharmacology-I (P) Pharmacotherapeutics-I (P)	-	-	2	60	40	100	1
MPHD1-222	Pharmacology-I (P)	-	-	2	60	40	100	1
Total		17	6	8	480	520	1100	27

Note: 213 refers to subject of 2nd year having code 13

Year 3 rd		Contact Hrs			Marks			Credits
Subject code	Subject Name	L	T	P	Int.	Ext.	Total	
MPHD1-323	Pharmacology-II	3	1	-	40	60	100	4
MPHD1-324	Pharmaceutical Analysis	3	1	-	40	60	100	4
MPHD1-325	Pharmacotherapeutics-II	3	1	-	40	60	100	4
MPHD1-326	Pharmaceutical Jurisprudence	2	-	-	40	60	100	3
MPHD1-327	Medicinal Chemistry	3	1	-	40	60	100	4
MPHD1-328	Pharmaceutical Formulations	2	1	-	40	60	100	3
MPHD1-329	Pharmacology-II (P)	-	-	4	60	40	100	2
MPHD1-330	Pharmaceutical Analysis (P)	-	-	4	60	40	100	2
MPHD1-331	Pharmacotherapeutics-II (P)	-	-	4	60	40	100	2
MPHD1-332	Medicinal Chemistry (P)	-	-	4	60	40	100	2
MPHD1-333	Pharmaceutical Formulations (P)	-	-	4	60	40	100	2
Total		16	5	20	540	560	1100	32

Note: 323 refers to subject of 3rd year having code 23

Year 4 th		Contact Hrs			Marks			Credits
Subject code	Subject Name	L	T	P	Int.	Ext.	Total	
MPHD1-434	Pharmacotherapeutics-III	3	1	-	40	60	100	4
MPHD1-435	Hospital Pharmacy	2	1	-	40	60	100	3
MPHD1-436	Clinical Pharmacy	3	1	-	40	60	100	4
MPHD1-437	Biostatistics & Research Methodology	2	1	-	40	60	100	3
MPHD1-438	Biopharmaceutics & Pharmacokinetics	3	1	-	40	60	100	4
MPHD1-439	Clinical Toxicology	2	1	-	40	60	100	3
MPHD1-440	Pharmacotherapeutics-III (P)	-	-	4	60	40	100	2
MPHD1-441	Hospital Pharmacy (P)	-	-	4	60	40	100	2
MPHD1-442	Clinical Pharmacy (P)	-	-	4	60	40	100	2
MPHD1-443	Biopharmaceutics & Pharmacokinetics(P)	-	-	4	60	40	100	2
Total		15	6	16	480	520	1000	29

Note: 434 refers to subject of 4th year having code 34

Year 5 th		Contact Hrs			Marks			Credits
Subject code	Subject	L	H	S	Int.	Ext.	Total	
MPHD1-544	Clinical Research	3	-	1	40	60	100	4
MPHD1-545	Pharmacoepidemiology and Pharmacoeconomics	3	-	1	40	60	100	4
MPHD1-546	Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring	2	-	1	40	60	100	3
MPHD1-547	Clerkship *	-	-	1	60	40	100	1
MPHD1-548	Project work (Six Months)	-	20	-		100**	100	20
Total		8	20	4	120	180	500	32

* Attending ward rounds on daily basis.

** 30 marks – viva-voce (oral)

70 marks – Thesis work

Note: 544 refers to subject of 5th year having code 44.

L: Lecture, P: Practical, T: Tutorial, H: Hospital Posting, S: Seminar.

APPENDIX-A
PHARM.D. SYLLABUS

MRSPTU

First Year

MPHD1-101 HUMAN ANATOMY & PHYSIOLOGY (THEORY)

Theory : 3 Hrs. /Week

1. **Scope and Objectives:** This course is designed to impart a fundamental knowledge on the structure and functions of the human body. It also helps in understanding both homeostasis mechanisms and homeostatic imbalances of various body systems. Since a medicament, which is produced by pharmacist, is used to correct the deviations in human body, it enhances the understanding of how the drugs act on the various body systems in correcting the disease state of the organs.
2. **Upon completion of the course the student shall be able to:**
 - a. describe the structure (gross and histology) and functions of various organs of the human body;
 - b. describe the various homeostatic mechanisms and their imbalances of various systems;
 - c. identify the various tissues and organs of the different systems of the human body;
 - d. perform the hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes;
 - e. appreciate coordinated working pattern of different organs of each system; and
 - f. appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body

3. **Course materials:**

Text books

- a. Tortora Gerard J. and Nicholas, P. Principles of anatomy and physiology
Publisher Harpercollins college New York.
- b. Wilson, K.J.W. Ross and Wilson's foundations of anatomy and physiology.
Publisher: Churchill Livingstone, Edinburg.

Reference books

- a. Guyton arthur, C. *Physiology of human body*. Publisher: Holtsaunders.
- b. Chatterjee, C.C. *Human physiology*. Volume 1&11. Publisher: medical allied agency, Calcutta.
- c. Peter L. Williams, Roger Warwick, Mary Dyson and Lawrence, H.
- d. *Gray's anatomy*. Publisher: Churchill Livingstone, London

4. **Lecture wise program :**

Topics

- 1 **Introduction:** Scope of anatomy and physiology, basic terminologies used in this subject (Description of the body as such planes and terminologies)
- 2 **Structure of cell** – its components and their functions.
- 3 **Elementary tissues of the human body:** epithelial, connective, Muscular and nervous tissues-their sub-types and characteristics
- 4 **Osseous system** - structure, composition and functions of the Skeleton. (done in practical classes - 6hrs)
Classification of joints, Types of movements of joints and disorders of joints (Definitions only)

- 5 Haemopoetic System**
- a) Composition and functions of blood
 - b) Haemopoiesis and disorders of blood components (definition of disorder)
 - c) Blood groups
 - d) Clotting factors and mechanism
 - e) Platelets and disorders of coagulation
- 6 Lymph**
- a) Lymph and lymphatic system, composition, formation and circulation.
 - b) Spleen: structure and functions, Disorders
 - c) Disorders of lymphatic system (definition only)
- 7 Cardiovascular system**
- a) Anatomy and functions of heart
 - b) Blood vessels and circulation (Pulmonary, coronary and systemic circulation)
 - c) Electrocardiogram (ECG)
 - d) Cardiac cycle and heart sounds
 - e) Blood pressure – its maintenance and regulation
 - f) Definition of the following disorders
Hypertension, Hypotension, Arteriosclerosis, Atherosclerosis, Angina, Myocardial infarction, Congestive heart failure, Cardiac arrhythmias
- 8 Respiratory system**
- a) Anatomy of respiratory organs and functions
 - b) Mechanism / physiology of respiration and regulation of respiration
 - c) Transport of respiratory gases
 - d) Respiratory volumes and capacities, and Definition of: Hypoxia, Asphyxia, Dybarism, Oxygen therapy and resuscitation.
- 9 Digestive system**
- a) Anatomy and physiology of GIT
 - b) Anatomy and functions of accessory glands of GIT
 - c) Digestion and absorption
 - d) Disorders of GIT (definitions only)
- 10 Nervous system**
- a) Definition and classification of nervous system
 - b) Anatomy, physiology and functional areas of cerebrum
 - c) Anatomy and physiology of cerebellum
 - d) Anatomy and physiology of mid brain
 - e) Thalamus, hypothalamus and Basal Ganglia
 - f) Spinal cord: Structure & reflexes – mono-poly-planter
 - g) Cranial nerves – names and functions
 - h) ANS – Anatomy & functions of sympathetic & parasympathetic N.S.
- 11 Urinary system**
- a) Anatomy and physiology of urinary system
 - b) Formation of urine
 - c) Renin Angiotensin system – Juxtaglomerular apparatus - acid base Balance
 - d) Clearance tests and micturition
- 12 Endocrine system**
- a) Pituitary gland
 - b) Adrenal gland
 - c) Thyroid and Parathyroid glands
 - d) Pancreas and gonads

13 Reproductive system

- a) Male and female reproductive system
- b) Their hormones – Physiology of menstruation
- c) Spermatogenesis & Oogenesis
- d) Sex determination (genetic basis)
- e) Pregnancy and maintenance and parturition
- f) Contraceptive devices

14 Sense organs

- a) Eye
- b) Ear
- c) Skin
- d) Tongue & Nose

15 Skeletal muscles

- a) Histology
- b) Physiology of Muscle contraction
- c) Physiological properties of skeletal muscle and their disorders (definitions)

16 Sports physiology

- a) Muscles in exercise, Effect of athletic training on muscles and muscle performance,
- b) Respiration in exercise, CVS in exercise, Body heat in exercise, Body fluids and salts in exercise,
- c) Drugs and athletics

MPHD1-107 HUMAN ANATOMY & PHYSIOLOGY (PRACTICAL)

Practical : 3 Hrs./Week

General Requirements: Dissection box, Laboratory Napkin, muslin cloth, record, Observation book(100pages), Stationary items, Blood lancet.

Course materials:

Text books

Goyal, R. K, Natvar M.P, and Shah S.A, Practical anatomy, physiology and biochemistry, latest edition, Publisher: B.S Shah Prakashan, Ahmedabad.

Reference books

Ranade VG, Text book of practical physiology, Latest edition, Publisher: PVG, Pune Anderson Experimental Physiology, Latest edition, Publisher: NA

List of Experiments:

1. Study of tissues of human body
 - (a) Epithelial tissue.
 - (b) Muscular tissue.
2. Study of tissues of human body
 - (a) Connective tissue.
 - (b) Nervous tissue.
3. Study of appliances used in hematological experiments.
4. Determination of W.B.C. count of blood.
5. Determination of R.B.C. count of blood.
6. Determination of differential count of blood.
7. Determination of
 - (a) Erythrocyte Sedimentation Rate.
 - (b) Hemoglobin content of Blood.
 - (c) Bleeding time & Clotting time.
8. Determination of
 - (a) Blood Pressure.
 - (b) Blood group.
9. Study of various systems with the help of charts, models & specimens
 - (a) Skeleton system part I-axial skeleton.
 - (b) Skeleton system part II- appendicular skeleton.
 - (c) Cardiovascular system.
 - (d) Respiratory system.
 - (e) Digestive system.
 - (f) Urinary system.
 - (g) Nervous system.
 - (h) Special senses.
 - (i) Reproductive system.

10. Study of different family planning appliances.
11. To perform pregnancy diagnosis test.
12. Study of appliances used in experimental physiology.
13. To record simple muscle curve using gastrocnemius sciatic nerve preparation.
14. To record simple summation curve using gastrocnemius sciatic nerve preparation.
15. To record simple effect of temperature using gastrocnemius sciatic nerve preparation.
16. To record simple effect of load & after load using gastrocnemius sciatic nerve preparation.
17. To record simple fatigue curve using gastrocnemius sciatic nerve preparation.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

MRSPTU

MPHD1-102 PHARMACEUTICS (THEORY)

Theory : 2 Hrs. /Week

- 1. Scope and objectives:** This course is designed to impart a fundamental knowledge on the art and science of formulating different dosage forms. It prepares the students for most basics of the applied field of pharmacy.
- 2. Upon the completion of the course the student should be able to:**
 - a. know the formulation aspects of different dosage forms;
 - b. do different pharmaceutical calculation involved in formulation;
 - c. formulate different types of dosage forms; and
 - d. appreciate the importance of good formulation for effectiveness.

3. Course materials:

Text books

- a. Cooper and Gunns Dispensing for pharmacy students.
- b. A text book Professional Pharmacy by N.K.Jain and S.N.Sharma.

Reference books

- a. Introduction to Pharmaceutical dosage forms by Howard C. Ansel.
- b. Remington's Pharmaceutical Sciences.
- c. Register of General Pharmacy by Cooper and Gunn.
- d. General Pharmacy by M.L.Schroff.

4. Lecture wise

programme: Topics

- 1**
 - a. **Introduction to dosage forms** - classification and definitions
 - b. **Prescription:** definition, parts and handling
 - c. **Posology:** Definition, Factors affecting dose selection. Calculation of children and infant doses.
- 2** Historical back ground and development of profession of pharmacy and pharmaceutical industry in brief.
- 3** Development of Indian Pharmacopoeia and introduction to other Pharmacopoeias such as BP, USP, European Pharmacopoeia, Extra pharmacopoeia and Indian national formulary.
- 4** Weights and measures, Calculations involving percentage solutions, allegation, proof spirit, isotonic solutions etc.
- 5** **Powders and Granules:** Classification advantages and disadvantages, Preparation of simple, compound powders, Insufflations, Dusting powders, Eutectic and Explosive powders, Tooth powder and effervescent powders and granules.
- 6** **Monophasic Dosage forms:** Theoretical aspects of formulation including adjuvant like stabilizers, colorants, flavours with examples. Study of Monophasic liquids like gargles, mouth washes, Throat paint, Ear drops, Nasal drops, Liniments and lotions, Enemas and collodions.
- 7** **Biphasic dosage forms:** Suspensions and emulsions, Definition, advantages and disadvantages, classification, test for the type of emulsion, formulation, stability and evaluation.

- 8 Suppositories and pessaries:** Definition, advantages and disadvantages, types of base, method of preparation, Displacement value and evaluation.
- 9 Galenicals:** Definition, equipment for different extraction processes like infusion, Decoction, Maceration and Percolation, methods of preparation of spirits, tinctures and extracts.
- 10 Pharmaceutical calculations.**
- 11 Surgical aids:** Surgical dressings, absorbable gelatin sponge, sutures, ligatures and medicated bandages.
- 12 Incompatibilities:** Introduction, classification and methods to overcome the incompatibilities.

MRSPTU

MPHD1-108 PHARMACEUTICS (PRACTICAL)

Practical : 3 Hrs./Week

List of Experiments:

1. Syrups

- a. Simple Syrup I.P
- b. Syrup of Ephedrine Hcl NF
- c. Syrup Vasaka IP
- d. Syrup of ferrous Phosphate IP
- e. Orange Syrup

2. Elixir

- a. Piperizine citrate elixir BP
- b. Cascara elixir BPC
- c. Paracetamol elixir BPC

3. Linctus

- a. Simple Linctus BPC
- b. Pediatric simple Linctus BPC

4. Solutions

- a. Solution of cresol with soap IP
- b. Strong solution of ferric chloride BPC
- c. Aqueous Iodine Solution IP
- d. Strong solution of Iodine IP
- e. Strong solution of ammonium acetate I

5. Liniments

- a. Liniment of turpentine IP*
- b. Liniment of camphor IP

6. Suspensions*

- a. Calamine lotion
- b. Magnesium Hydroxide mixture BP

7. Emulsions*

- a. Cod liver oil emulsion
- b. Liquid paraffin emulsion

8. Powders[□]

- a. Eutectic powder
- b. Explosive powder
- c. Dusting powder
- d. Insufflations

9. Suppositories[□]

- a. Boric acid suppositories
- b. Chloral suppositories

10. Incompatibilities

- a. Mixtures with Physical
- b. Chemical & Therapeutic incompatibilities

* colourless bottles required for dispensing [□] Paper envelope (white), butter paper and white paper required for dispensing.

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

MPHD1-103 MEDICINAL BIOCHEMISTRY (THEORY)

Theory : 3 Hrs. /Week

1. Scope of the Subject: Applied biochemistry deals with complete understanding of the molecular level of the chemical process associated with living cells. Clinical chemistry deals with the study of chemical aspects of human life in health and illness and the application of chemical laboratory methods to diagnosis, control of treatment, and prevention of diseases.

2. Objectives of the Subject (Know, do, appreciate) :

The objective of the present course is providing biochemical facts and the principles to the students of pharmacy. Upon completion of the subject student shall be able to –

- a. understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of diseases;
- b. know the metabolic process of biomolecules in health and illness (metabolic disorders);
- c. understand the genetic organization of mammalian genome; protein synthesis; replication; mutation and repair mechanism;
- d. know the biochemical principles of organ function tests of kidney, liver and endocrine gland; and
- e. do the qualitative analysis and determination of biomolecules in the body fluids.

Text books (Theory)

- a. Harpers review of biochemistry - Martin
- b. Text book of biochemistry – D.Satyanarayana
- c. Text book of clinical chemistry- Alex kaplan &Laverve L.Szabo

Reference books (Theory)

- a. Principles of biochemistry -- Lehninger
- b. Text book of biochemistry -- Ramarao
- c. Practical Biochemistry-David T.Plummer.
- d. Practical Biochemistry-Pattabhiraman.

3. Lecture wise programme:

Topics

- 1 **Introduction to biochemistry:** Cell and its biochemical organization, transport process across the cell membranes. Energy rich compounds; ATP, Cyclic AMP and their biological significance.
- 2 **Enzymes:** Definition; Nomenclature; IUB classification; Factor affecting enzyme activity; Enzyme action; enzyme inhibition. Isoenzymes and their therapeutic and diagnostic applications; Coenzymes and their biochemical role and deficiency diseases.
- 3 **Carbohydrate metabolism:** Glycolysis, Citric acid cycle (TCA cycle), HMP shunt, Glycogenolysis, gluconeogenesis, glycogenesis. Metabolic disorders of carbohydrate metabolism (diabetes mellitus and glycogen storage diseases); Glucose, Galactose tolerance test and their significance; hormonal regulation of carbohydrate metabolism.

- 4 **Lipid metabolism:** Oxidation of saturated (β-oxidation); Ketogenesis and ketolysis; biosynthesis of fatty acids, lipids; metabolism of cholesterol; Hormonal regulation of lipid metabolism. Defective metabolism of lipids (Atherosclerosis, fatty liver, hypercholesterolemia).
- 5 **Biological oxidation:** Coenzyme system involved in Biological oxidation. Electron transport chain (its mechanism in energy capture; regulation and inhibition); Uncouplers of ETC; Oxidative phosphorylation;
- 6 **Protein and amino acid metabolism:** protein turn over; nitrogen balance; Catabolism of Amino acids (Transamination, deamination & decarboxylation). Urea cycle and its metabolic disorders; production of bile pigments; hyperbilirubinemia, porphoria, jaundice. Metabolic disorder of Amino acids.
- 7 **Nucleic acid metabolism:** Metabolism of purine and pyrimidine nucleotides; Protein synthesis; Genetic code; inhibition of protein synthesis; mutation and repair mechanism; DNA replication (semiconservative /onion peel models) and DNA repair mechanism.
- 8 **Introduction to clinical chemistry: Cell;** composition; malfunction; Roll of the clinical chemistry laboratory.
- 9 **The kidney function tests:** Role of kidney; Laboratory tests for normal function includes-
 - a) Urine analysis (macroscopic and physical examination, quantitative and semiquantitative tests.)
 - b) Test for NPN constituents. (Creatinine /urea clearance, determination of blood and urine creatinine, urea and uric acid)
 - c) Urine concentration test
 - d) Urinary tract calculi. (stones)
- 10 **Liver function tests:** Physiological role of liver, metabolic, storage, excretory, protective, circulatory functions and function in blood coagulation.
 - a) Test for hepatic dysfunction-Bile pigments metabolism.
 - b) Test for hepatic function test- Serum bilirubin, urine bilirubin, and urine urobilinogen.
 - c) Dye tests of excretory function.
 - d) Tests based upon abnormalities of serum proteins. Selected enzyme tests.
- 11 **Lipid profile tests:** Lipoproteins, composition, functions. Determination of serum lipids, total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides.
- 12 **Immunochemical techniques** for determination of hormone levels and protein levels in serum for endocrine diseases and infectious diseases.
Radio immuno assay (RIA) and Enzyme Linked Immuno Sorbent Assay (ELISA)
- 13 **Electrolytes:** Body water, compartments, water balance, and electrolyte distribution. Determination of sodium, calcium potassium, chlorides, bicarbonates in the body fluids.

MPHD1-109 MEDICINAL BIOCHEMISTRY (PRACTICAL)

Practical : 3 Hrs./Week

Title of the

Experiment:

- 1 Qualitative analysis of normal constituents of urine.*
- 2 Qualitative analysis of abnormal constituents of urine.*
- 3 Quantitative estimation of urine sugar by Benedict's reagent method.**
- 4 Quantitative estimation of urine chlorides by Volhard's method.**
- 5 Quantitative estimation of urine creatinine by Jaffe's method.**
- 6 Quantitative estimation of urine calcium by precipitation method.**
- 7 Quantitative estimation of serum cholesterol by Libermann Burchard's method.**
- 8 Preparation of Folin Wu filtrate from blood.*
- 9 Quantitative estimation of blood creatinine.**
- 10 Quantitative estimation of blood sugar Folin-Wu tube method.**
- 11 Estimation of SGOT in serum.**
- 12 Estimation of SGPT in serum.**
- 13 Estimation of Urea in Serum.**
- 14 Estimation of Proteins in Serum.**
- 15 Determination of serum bilirubin**
- 16 Determination of Glucose by means of Glucoseoxidase.**
- 17 Enzymatic hydrolysis of Glycogen/Starch by Amylases.**
- 18 Study of factors affecting Enzyme activity. (pH & Temp.)**
- 19 Preparation of standard buffer solutions and its pH measurements (any two)*
- 20 Experiment on lipid profile tests**
- 21 Determination of sodium,calcium and potassium in serum.**

** indicate major experiments & * indicate minor experiments

Assignments:

Format of the assignment

1. Minimum & Maximum number of pages.
2. It shall be computer draft copy.
3. Reference(s) shall be included at the end.
4. Name and signature of the student.
5. Assignment can be a combined presentation at the end of the academic year.
6. Time allocated for presentation may be 8+2 Min.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

MPHD1-104 PHARMACEUTICAL ORGANIC CHEMISTRY (THEORY)

Theory : 3 Hrs. /Week

- 1. Scope and objectives:** This course is designed to impart a very good knowledge about
 - IUPAC/Common system of nomenclature of simple organic compounds belonging to different classes of organic compounds;
 - Some important physical properties of organic compounds;
 - Free radical/ nucleophilic [alkyl/ acyl/ aryl] /electrophilic substitution, free radical/ nucleophilic / electrophilic addition, elimination, oxidation and reduction reactions with mechanism, orientation of the reaction, order of reactivity, stability of compounds;
 - Some named organic reactions with mechanisms; and
 - Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

2. Course materials:

Text books

- T.R.Morrison and R. Boyd - Organic chemistry,
- Bentley and Driver-Text book of Pharmaceutical chemistry
- I.L.Finer- Organic chemistry, the fundamentals of chemistry

Reference books

- Organic chemistry – J.M.Cram and D.J.Cram
- Organic chemistry- Brown
- Advanced organic chemistry- Jerry March, Wiley
- Organic chemistry- Cram and Hammered, Pine Hendrickson

3. Lecture wise programme :

Topics

1 Structures and Physical properties:

- Polarity of bonds, polarity of molecules, M.P, Inter molecular forces, B.P, Solubility, non ionic solutes and ionic solutes, protic and aprotic Solvents, ion pairs,
- Acids and bases, Lowry bronsted and Lewis theories
- Isomerism

2 Nomenclature of organic compound belonging to the following classes Alkanes, Alkenes, Dienes, Alkynes, Alcohols, Aldehydes, Ketones, Amides, Amines, Phenols, Alkyl Halides, Carboxylic Acid, Esters, Acid Chlorides And Cycloalkanes.

3 Free radicals chain reactions of alkane : Mechanism, relative reactivity and stability

4 Alicyclic compounds: Preparations of cyclo alkanes, Bayer strain theory and orbital picture of angle strain.

5 Nucleophilic aliphatic substitution mechanism: Nucleophiles and leaving groups, kinetics of second and first order reaction, mechanism and kinetics of S_N2 reactions. Stereochemistry and steric hindrance, role of solvents, phase transfer catalysis, mechanism and kinetics of S_N1 reactions, stereochemistry, carbocation and their stability, rearrangement of carbocation, role of solvents in S_N1 reaction, Ion dipole bonds, S_N2 versus S_N1 solvolyses, nucleophilic assistance by the solvents.

- 6 Dehydro halogenation of alkyl halides:** 1,2 elimination, kinetics, E2 and E1 mechanism, elimination via carbocation, evidence for E2 mechanism, absence of rearrangement isotope effect, absence hydrogen exchange, the element effect, orientation and reactivity, E2 versus E1, elimination versus substitution, dehydration of alcohol, ease of dehydration, acid catalysis, reversibility, orientation.
- 7 Electrophilic and free radicals addition:** Reactions at carbon-carbon, double bond, electrophile, hydrogenation, heat of hydrogenation and stability of alkenes, markownikoff rule, addition of hydrogen halides, addition of hydrogen bromides, peroxide effect, electrophilic addition, mechanism, rearrangement, absence of hydrogen exchange, orientation and reactivity, addition of halogen, mechanism, halohydrin formation, mechanism of free radicals addition, mechanism of peroxide initiated addition of hydrogen bromide, orientation of free addition, additions of carbene to alkene, cyclo addition reactions.
- 8 Carbon-carbon double bond as substituents:** Free radical halogenations of alkenes, comparison of free radical substitution with free radical addition, free radical substitution in alkenes, orientation and reactivity, allylic rearrangements.
- 9 Theory of resonance:** Allyl radical as a resonance hybrid, stability, orbital picture, resonance stabilisation of allyl radicals, hyper conjugation, allyl cation as a resonance hybrid, nucleophilic substitution in allylic substrate, SN1 reactivity, allylic rearrangement, resonance stabilisation of allyl cation, hyper conjugation, nucleophilic substitution in allylic substrate, SN2 nucleophilic substitution in vinylic substrate, vinylic cation, stability of conjugated dienes, resonance in alkenes, hyper conjugation, ease of formation of conjugated dienes, orientation of elimination, electrophilic addition to conjugated dienes, 1,4- addition, 1,2-versus 1,4-addition, rate versus equilibrium, orientation and reactivity of free radical addition to conjugated dienes.
- 10 Electrophilic aromatic substitution:** Effect of substituent groups, determination of orientation, determination of relative reactivity, classification of substituent group, mechanism of nitration, sulphonation, halogenation, friedel craft alkylation, friedel craft acylation, reactivity and orientation, activating and deactivating O,P,M directing groups, electron release via resonance, effect of halogen on electrophilic aromatic substitution in alkyl benzene, side chain halogenation of alkyl benzene, resonance stabilization of benzyl radical.
- 11 Nucleophilic addition reaction:** Mechanism, ionisation of carboxylic acids, acidity constants, acidity of acids, structure of carboxylate ions, effect of substituent on acidity, nucleophilic acyl substitution reaction, conversion of acid to acid chloride, esters, amide and anhydride. Role of carboxyl group, comparison of alkyl nucleophilic substitution with acyl nucleophilic substitution.

- 12 Mechanism** of aldol condensation, claisen condensation, cannizzaro reaction, crossed aldol condensation, crossed cannizzaro reaction, benzoin condensation, perkin condensation. Knoevenagel, Reformatsky reaction, Wittig reaction, Michael addition.
- 13 Hoffman rearrangement:** Migration to electron deficient nitrogen, Sandmeyer's reaction, basicity of amines, diazotisation and coupling, acidity of phenols, Williamson synthesis, Fries rearrangement, Kolbe reaction, Reimer tieman's reactions.
- 14 Nucleophilic aromatic substitution:** Bimolecular displacement mechanisms, orientation, comparison of aliphatic nucleophilic substitution with that of aromatic.
- 15 Oxidation reduction reaction.**
- 16 Study of the following official compounds-** preparation, test for purity, assay and medicinal uses of Chlorbutol, Dimercaprol, Glyceryl trinitrate, Urea, Ethylene diamine dihydrate, Vanillin, Paraldehyde, Ethylene chloride, Lactic acid, Tartaric acid, citric acid, salicylic acid, aspirin, methyl salicylate, ethyl benzoate, benzyl benzoate, dimethyl phthalate, sodium lauryl sulphate, saccharin sodium, mephensin.

MPHD1-110 PHARMACEUTICAL ORGANIC CHEMISTRY (PRACTICAL)

Practical : 3 Hrs./Week

I. Introduction to the various laboratory techniques through demonstration involving synthesis of the following compounds (at least 8 compounds to be synthesised):

1. Acetanilide / aspirin (Acetylation)
2. Benzanilide / Phenyl benzoate (Benzylation)
3. P-bromo acetanilide / 2,4,6 – tribromo aniline (Bromination)
4. Dibenzylidene acetone (Condensation)
5. 1-Phenylazo-2-naphthol (Diazotisation and coupling)
6. Benzoic acid / salicylic acid (Hydrolysis of ester)
7. M-dinitro benzene (Nitration)
8. 9, 10 – Anthraquinone (Oxidation of anthracene) / preparation of benzoic acid from toluene or benzaldehyde
9. M-phenylene diamine (Reduction of M-dinitrobenzene) / Aniline from nitrobenzene
10. Benzophenone oxime
11. Nitration of salicylic acid
12. Preparation of picric acid
13. Preparation of O-chlorobenzoic acid from O-chlorotoluene
14. Preparation of cyclohexanone from cyclohexanol

II. Identification of organic compounds belonging to the following classes by :

Systematic qualitative organic analysis including preparation of derivatives Phenols, amides, carbohydrates, amines, carboxylic acids, aldehyde and ketones, Alcohols, esters, hydrocarbons, anilides, nitrocompounds.

III. Introduction to the use of stereo models:

Methane, Ethane, Ethylene, Acetylene, Cis alkene, Trans alkene, inversion of configuration.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

MPHD1-105 PHARMACEUTICAL INORGANIC CHEMISTRY (THEORY)

Theory : 2 Hrs. /Week

- 1. Scope and objectives:** This course mainly deals with fundamentals of Analytical chemistry and also the study of inorganic pharmaceuticals regarding their monographs and also the course deals with basic knowledge of analysis of various pharmaceuticals.
- 2. Upon completion of the course student shall be able to:**
 - a. understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals;
 - b. know the analysis of the inorganic pharmaceuticals their applications; and
 - c. appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease.

3. Course materials:

Text books

- a. A text book Inorganic medicinal chemistry by Surendra N. Pandeya
- b. A. H. Beckett and J. B. Stanlake's Practical Pharmaceutical chemistry Vol-I & Vol-II
- c. Inorganic Pharmaceutical Chemistry III-Edition P.Gundu Rao

Reference books

- a. Inorganic Pharmaceutical Chemistry by Anand & Chetwal
- b. Pharmaceutical Inorganic chemistry by Dr.B.G.Nagavi
- c. Analytical chemistry principles by John H. Kennedy
- d. I.P.1985 and 1996, Govt. of India, Ministry of health

4. Lecture wise programme:

Topics

- 1 Errors
- 2 Volumetric analysis
- 3 Acid-base titrations
- 4 Redox titrations
- 5 Non aqueous titrations
- 6 Precipitation titrations
- 7 Complexometric titrations
- 8 Theory of indicators
- 9 Gravimetry
- 10 Limit tests
- 11 Medicinal gases
- 12 Acidifiers
- 13 Antacids
- 14 Cathartics
- 15 Electrolyte replenishers

- 16** Essential Trace elements
- 17** Antimicrobials
- 18** Pharmaceutical aids
- 19** Dental Products
- 20** Miscellaneous compounds
- 21** Radio Pharmaceuticals

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MPHD1-111 PHARMACEUTICAL INORGANIC CHEMISTRY (PRACTICAL)

Practical : 3 Hrs./Week

1. Limit test (6 exercises)

- Limit test for chlorides
- Limit test for sulphates
- Limit test for iron
- Limit test for heavy metals
- Limit test for arsenic
- Modified limit tests for chlorides and sulphates

2. Assays (10 exercises)

- Ammonium chloride- Acid-base titration
- Ferrous sulphate- Cerimetry
- Copper sulphate- Iodometry
- Calcilugluconate- Complexometry
- Hydrogen peroxide – Permanganometry
- Sodium benzoate – Nonaqueous titration
- Sodium chloride – Modified volhard's method
- Assay of KI – KIO_3 titration
- Gravimetric estimation of barium as barium sulphate
- Sodium antimony gluconate or antimony potassium tartarate

3. Estimation of mixture (Any two exercises)

- Sodium hydroxide and sodium carbonate
- Boric acid and Borax
- Oxalic acid and sodium oxalate

4. Test for identity (Any three exercises)

- Sodium bicarbonate
- Barium sulphate
- Ferrous sulphate
- Potassium chloride

5. Test for purity (Any two exercises)

- Swelling power in Bentonite
- Acid neutralising capacity in aluminium hydroxide gel
- Ammonium salts in potash alum
- Adsorption power heavy Kaolin
- Presence of Iodates in KI

6. Preparations (Any two exercises)

- Boric acids
- Potash alum
- Calcium lactate
- Magnesium sulphate

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

MPHD1-106 REMEDIAL MATHEMATICS/BIOLOGY (THEORY)

Theory : 3 Hrs. /Week

REMEDIAL MATHEMATICS :

- 1. Scope and objectives:** This is an introductory course in mathematics. This subjects deals with the introduction to matrices, determinants, trigonometry, analytical geometry, differential calculus, integral calculus, differential equations, laplace transform.
- 2. Upon completion of the course the student shall be able to : –**
 - a. Know Trignometry, Analytical geometry, Matrices, Determinant, Integration, Differential equation, Laplace transform and their applications;
 - b. solve the problems of different types by applying theory; and
 - c. appreciate the important applications of mathematics in pharmacy.

3. Course materials:

Text books

- a. Differential calculus By Shantinakaran
- b. Text book of Mathematics for second year pre-university by Prof.B.M.Sreenivas

Reference books

- a. Integral calculus By Shanthinarayan
- b. Engineering mathematics By B.S.Grewal
- c. Trigonometry Part-I By S.L.Loney

4. Lecture wise programme :

Topics

- 1 **Algebra :** Determinants, Matrices
- 2 **Trigonometry :** Sides and angles of a triangle, solution of triangles
- 3 **Analytical Geometry :**Points, Straight line, circle, parabola
- 4 **Differential calculus:** Limit of a function, Differential calculus, Differentiation of a sum, Product, Quotient Composite, Parametric, exponential, trigonometric and Logarithmic function. Successive differentiation, Leibnitz's theorem, Partial differentiation, Euler's theorem
on homogeneous functions of two variables
- 5 **Integral Calculus:** Definite integrals, integration by substitution and by parts, Properties of definite integrals.
- 6 **Differential equations:** Definition, order, degree, variable separable, homogeneous, Linear, heterogenous, linear, differential equation with constant coefficient, simultaneous linear equation of second order.
- 7 **Laplace transform:** Definition, Laplace transform of elementary functions, Properties of linearity and shifting.

BIOLOGY :

1. **Scope and objectives:** This is an introductory course in Biology, which gives detailed study of natural sources such as plant and animal origin. This subject has been introduced to the pharmacy course in order to make the student aware of various naturally occurring drugs and its history, sources, classification, distribution and the characters of the plants and animals. This subject gives basic foundation to Pharmacognosy.

2. Course materials:

Text books

- a. Text book of Biology by S.B.Gokhale
- b. A Text book of Biology by Dr.Thulajappa and Dr. Seetaram.

Reference books

- a. A Text book of Biology by B.V.Sreenivasa Naidu
- b. A Text book of Biology by Naidu and Murthy
- c. Botany for Degree students By A.C.Dutta.
- d. Outlines of Zoology by M.Ekambaranatha ayyer and T.N.Ananthakrishnan.
- e. A manual for pharmaceutical biology practical by S.B.Gokhale and C.K.Kokate.

3. Lecture wise programme :

Topic

PART – A

- 01 Introduction
- 02 General organization of plants and its inclusions
- 03 Plant tissues
- 04 Plant kingdom and its classification
- 05 Morphology of plants
- 06 Root, Stem, Leaf and Its modifications
- 07 Inflorescence and Pollination of flowers
- 08 Morphology of fruits and seeds
- 09 Plant physiology
- 10 Taxonomy of Leguminosae, umbelliferae, Solanaceae, Lilliaceae, Zinziberaceae, Rubiaceae
- 11 Study of Fungi, Yeast, Penicillin and Bacteria

PART-B

- 01 Study of Animal cell
- 02 Study animal tissues
- 03 Detailed study of frog
- 04 Study of Pisces, Raptiles, Aves
- 05 General organization of mammals
- 06 Study of poisonous animals

MPHD1-112 BIOLOGY (PRACTICAL)

Practical : 3 Hrs./Week

Title:

1. Introduction of biology experiments
2. Study of cell wall constituents and cell inclusions
3. Study of Stem modifications
4. Study of Root modifications
5. Study of Leaf modifications
6. Identification of Fruits and seeds
7. Preparation of Permanent slides
8. T.S. of Senna, Cassia, Ephedra, Podophyllum.
9. Simple plant physiological experiments
10. Identification of animals
11. Detailed study of Frog
12. Computer based tutorials

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance.)

Second year

MPHD1-213 PATHOPHYSIOLOGY (THEORY)

Theory : 3 Hrs. /Week

- 1. Scope of the Subject:** This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic Pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge of its application in other subject of pharmacy.
- 2. Objectives of the Subject :** Upon completion of the subject student shall be able to—
 - a. describe the etiology and pathogenesis of the selected disease states;
 - b. name the signs and symptoms of the diseases; and
 - c. mention the complications of the diseases.

Text books (Theory)

- a. Pathologic basis of disease by- Cotran, Kumar, Robbins
- b. Text book of Pathology- Harsh Mohan
- c. Text book of Pathology- Y.M. Bhide

Reference books (Theory)

- a. Clinical Pharmacy and Therapeutics; Second edition; Roger Walker; Churchill Livingstone publication

3. Detailed syllabus and lecture wise schedule:

Topic

- 1 Basic principles of cell injury and Adaptation**
 - a) Causes, Pathogenesis and morphology of cell injury
 - b) Abnormalities in lipoproteinaemia, glycogen infiltration and glycogen infiltration and glycogen infiltration and glycogen storage diseases
- 2 Inflammation**
 - a) Pathogenesis of acute inflammation, Chemical mediators in inflammation, Types of chronic inflammation
 - b) Repairs of wounds in the skin, factors influencing healing of wounds
- 3 Diseases of Immunity**
 - a) Introduction to T and B cells
 - b) MHC proteins or transplantation antigens
 - c) Immune tolerance
 - Hypersensitivity
Hypersensitivity type I, II, III, IV, Biological significance, Allergy due to food, chemicals and drugs
 - Autoimmunity
Criteria for autoimmunity, Classifications of autoimmune diseases in man, mechanism of autoimmunity, Transplantation and immunologic tolerance, allograft rejections, transplantation antigens, mechanism of rejection of allograft.
 - Acquired immune deficiency syndrome (AIDS), Amyloidosis

- 4 **Cancer:** differences between benign and malignant tumors, Histological diagnosis of malignancy, invasions and metastasis, patterns of spread, disturbances of growth of cells, classification of tumors, general biology of tumors, spread of malignant tumors, etiology and pathogenesis of cancer.
- 5 Types of shock, mechanisms, stages and management
- 6 Biological effects of radiation
- 7 Environmental and nutritional diseases
 - i) Air pollution and smoking- SO₂,NO, NO₂, and CO
 - ii) Protein calorie malnutrition, vitamins, obesity, pathogenesis of starvation.
- 8 Pathophysiology of common diseases
 - a. Parkinsonism
 - b. Schizophrenia
 - c. Depression and mania
 - d. Hypertension,
 - e. Stroke (ischaemic and hemorrhage)
 - f. Angina, CCF, Atherosclerosis, Myocardial infarction
 - g. Diabetes Mellitus
 - h. Peptic ulcer and inflammatory bowel diseases
 - i. Cirrhosis and Alcoholic liver diseases
 - j. Acute and chronic renal failure
 - k. Asthma and chronic obstructive airway diseases
- 9 Infectious diseases :
Sexually transmitted diseases (HIV,Syphilis,Gonorrhoea), Urinary tract infections, Pneumonia, Typhoid, Tuberculosis, Leprosy, Malaria Dysentery (bacterial and amoebic), Hepatitis- infective hepatitis.

4. Assignments :

Title of the Experiment

- 1 Chemical Mediators of inflammation
- 2 Drug Hypersensitivity
- 3 Cigarette smoking & its ill effects
- 4 Biological Effects of Radiation
- 5 Etiology and hazards of obesity
- 6 Complications of diabetes
- 7 Diagnosis of cancer
- 8 Disorders of vitamins
- 9 Methods in Pathology-Laboratory values of clinical significance
- 10 Pathophysiology of Dengue Hemorrhagic Fever (DHF)

Format of the assignment

- 1 Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year
4. It shall be computer draft copy.
5. Name and signature of the student
6. Time allocated for presentation may be 8+2 Min.

MPHD1-214 PHARMACEUTICAL MICROBIOLOGY (THEORY)

Theory : 3 Hrs. /Week

1. Scope of the Subject: Microbiology has always been an essential component of pharmacy curriculum. This is because of the relevance of microbiology to pharmaceutical sciences and more specifically to pharmaceutical industry. Pharmaceutical biotechnology is the logical extension of pharmaceutical microbiology, which is expected to change the complete drug product scenario in the future.

This course deals with the various aspects of microorganisms, its classification, morphology, laboratory cultivation identification and maintenance. It also discusses with sterilization of pharmaceutical products, equipment, media etc. The course further discusses the immunological preparations, diseases its transmission, diagnosis, control and immunological tests.

2. Objectives of the Subject :

Upon completion of the subject student shall be able to –

- a. know the anatomy, identification, growth factors and sterilization of microorganisms;
- b. know the mode of transmission of disease causing microorganism, symptoms of disease, and treatment aspect;
- c. do estimation of RNA and DNA and there by identifying the source;
- d. do cultivation and identification of the microorganisms in the laboratory;
- e. do identification of diseases by performing the diagnostic tests; and
- f. appreciate the behavior of motility and behavioral characteristics of microorganisms.

Text books (Theory)

- a. Vanitha Kale and Kishor Bhusari — Applied Microbiology || Himalaya Publishing house Mumbai.
- b. Mary Louis Turgeon — Immunology and Serology in Laboratory Medicines|| 2nd edition, 1996 Mosby- Year book inc St. Louis Missouri 63146.
- c. Harsh Mohan, — Text book of Pathology|| 3rd edition, 1998, B-3 Ansari road Darya ganj N. Delhi.

Reference books (Theory)

- a. Prescott L.M., Jarley G.P Klein D.A -Microbiology|| 2nd- edition Mc Graw Hill Company Inc
- b. Rawlins E.A.||Bentley's Text Book of Pharmaceutics|| B ailliere Tindals 24-28 London 1988
- c. Forbisher — Fundamentals of Microbiology|| Philadelphia W.B. Saunders.
- d. Prescott L.M. Jarley G.P., Klein.D.A. — Microbiology.||2nd edition WMC Brown Publishers, Oxford. 1993
- e. War Roitt, Jonathan Brostoff, David male, — Immunology||3rd edition 1996, Mosby-year book Europe Ltd, London.
- f. Pharmacopoeia of India, Govt of India, 1996.

3. Detailed syllabus and lecture wise schedule :

Title of the topic

- 1 **Introduction** to the science of microbiology. Major divisions of microbial world and Relationship among them.
- 2 Different methods of classification of microbes and study of Bacteria, Fungi, virus, Rickettsiae, Spirochetes.
- 3 Nutritional requirements, growth and cultivation of bacteria and virus. Study of different important media required for the growth of aerobic and anaerobic bacteria & fungi. Differential media, enriched media and selective media, maintenance of lab cultures.
- 4 Different methods used in isolation and identification of bacteria with emphasis to different staining techniques and biochemical reactions. Counting of bacteria -Total and Viable counting techniques.
- 5 Detailed study of different methods of sterilization including their merits and demerits. Sterilization methods for all pharmaceutical products. Detailed study of sterility testing of different pharmaceutical preparations .
Brief information on Validation.
- 6 **Disinfectants-** Study of disinfectants, antiseptics, fungicidal and virucidal agents factors affecting their activation and mechanism of action. Evaluation of bactericidal, bacteristatic, , virucidal activities, evaluation of preservatives in pharmaceutical preparations.
- 7 **Immunology-** Immunity, Definition, Classification, General principles of natural immunity, Phagocytosis, acquired immunity(active and passive) . Antigens, chemical nature of antigens structure and formation of Antibodies, Antigen-Antibody reactions. Bacterial exotoxins and endotoxins. Significance of toxoids in active immunity, Immunization programme, and importance of booster dose.
- 8 **Diagnostic tests :** Schick's Test, Elisa test, Western Blot test, Southern Blot
PCR, Widal, QBC, Mantoux Peripheral smear. Study of malarial parasite.
- 9 **Microbial culture sensitivity Testing:** Interpretation of results
Principles and methods of different microbiological assays, microbiological assay of Penicillin, Streptomycin and vitamin B₂ and B₁₂. Standardisation of vaccines and sera.
- 10 **Study of infectious diseases:** Typhoid, Tuberculosis, Malaria, Cholera, Hepatitis, Meningitis, Syphilis & Gonorrhoea and HIV.

MPHD1-219 PHARMACEUTICAL MICROBIOLOGY (PRACTICAL)

Practical : 3 Hrs./Week

Title of the Experiment:

- 1 Study of apparatus used in experimental microbiology*.
- 2 Sterilisation of glass ware's. Preparation of media and sterilisation.*
- 3 Staining techniques – Simple staining ; Gram's staining ; Negative staining**
- 4 Study of motility characters*.
- 5 Enumeration of micro-organisms (Total and Viable)*
- 6 Study of the methods of isolation of pure culture.*
- 7 Bio chemical testing for the identification of micro*-organisms.

- 8 Cultural sensitivity testing for some micro-organisms.*
- 9 Sterility testing for powders and liquids.*
- 10 Determination of minimum inhibitory concentration.*
- 11 Microbiological assay of antibiotics by cup plate method.*
- 12 Microbiological assay of vitamins by Turbidometric method**
- 13 Determination of RWC.**
- 14 Diagnostic tests for some common diseases, Widal, malarial parasite.**

* Indicate minor experiment & ** indicate major experiment

Assignments:

- 1 Visit to some pathological laboratories & study the activities and equipment/instruments used and reporting the same.
2. Visit to milk dairies (Pasturization) and microbial laboratories(other sterization methods) & study the activities and equipment/instruments used and reporting the same.
3. Library assignments
 - a. Report of recent microbial techniques developed in diagnosing some common diseases.
 - b. Latest advancement developed in identifying, cultivating & handling of microorganisms

Format of the assignment:

1. Minimum & Maximum number of pages.
2. It shall be computer draft copy.
3. Reference(s) shall be included at the end.
4. Name and signature of the student.
5. Assignment can be a combined presentation at the end of the academic year.
6. Time allocated for presentation may be 8+2 Min.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

MPHD1-215 PHARMACOGNOSY & PHYTOPHARMACEUTICALS (THEORY)

Theory : 3 Hrs. /Week

- 1. Scope and objectives:** This subject has been introduced for the pharmacy course in order to make the student aware of medicinal uses of various naturally occurring drugs its history, sources, distribution, method of cultivation, active constituents, medicinal uses, identification tests, preservation methods, substitutes and adulterants.
- 2. Upon completion of the course student shall be able to:**
 - a. understand the basic principles of cultivation, collection and storage of crude drugs;
 - b. know the source, active constituents and uses of crude drugs; and
 - c. appreciate the applications of primary and secondary metabolites of the plant.

3. Course materials:

Text books

- a. Pharmacognosy by G.E. Trease & W.C.Evans.
- b. Pharmacognosy by C.K.Kokate,Gokhale & A.C.Purohit.

Reference books

- a. Pharmacognosy by Brady & Tyler.E.
- b. Pharmacognosy by T.E.Wallis.
- c. Pharmacognosy by C.S. Shah & Qadery.
- d. Pharmacognosy by M.A. Iyengar.

4. Lecture wise

programme: Topics

- 1 Introduction.
- 2 Definition, history and scope of Pharmacognosy.
- 3 Classification of crude drugs.
- 4 Cultivation, collection, processing and storage of crude drugs.
- 5 Detailed method of cultivation of crude drugs.
- 6 Study of cell wall constituents and cell inclusions.
- 7 Microscopical and powder Microscopical study of crude drugs.
- 8 Study of natural pesticides.
- 9 Detailed study of various cell constituents.
- 10 Carbohydrates and related products.
- 11 Detailed study carbohydrates containing drugs.(11 drugs)
- 12 Definition sources, method extraction, chemistry and method of analysis of lipids.
- 13 Detailed study of oils.
- 14 Definition, classification, chemistry and method of analysis of protein.
- 15 Study of plants fibers used in surgical dressings and related products.
- 16 Different methods of adulteration of crude drugs.

MPHD1-220 PHARMACOGNOSY & PHYTOPHARMACEUTICALS (PRACTICAL)

Practical : 3 Hrs./Week

General Requirements: Laboratory Napkin, Observation Book 150 pages Zero brush, Needle, Blade, Match box.

List of experiments:

- 1 Introduction of Pharmacognosy laboratory and experiments.
- 2 Study of cell wall constituents and cell inclusions.
- 3 Macro, powder and microscopic study of Datura.
- 4 Macro, powder and microscopic study of Senna.
- 5 Macro, powder and microscopic study of Cassia.cinnamon.
- 6 Macro, powder and microscopic study of Cinchona.
- 7 Macro, powder and microscopic study of Ephedra.
- 8 Macro, powder and microscopic study of Quassia.
- 9 Macro, powder and microscopic study of Clove
- 10 Macro, powder and microscopic study of Fennel.
- 11 Macro, powder and microscopic study of Coriander.
- 12 Macro, powder and microscopic study of Isapgol.
- 13 Macro, powder and microscopic study of Nux vomica.
- 14 Macro, powder and microscopic study of Rauwolfia.
- 15 Macro, powder and microscopic study of Liquorice.
- 16 Macro, powder and microscopic study of Ginger.
- 17 Macro, powder and microscopic study of Podophyllum.
- 18 Determination of Iodine value.
- 19 Determination of Saponification value and unsaponifiable matter.
- 20 Determination of ester value.
- 21 Determination of Acid value.
- 22 Chemical tests for Acacia.
- 23 Chemical tests for Tragacanth.
- 24 Chemical tests for Agar.
- 25 Chemical tests for Starch.
- 26 Chemical tests for Lipids.(castor oil,sesame oil, shark liver oil,bees wax)
- 27 Chemical tests for Gelatin.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance.

MPHD1-216 PHARMACOLOGY – I (THEORY)

Theory : 3 Hrs. /Week

1. **Scope of the Subject:** This subject will provide an opportunity for the student to learn about the drug with regard to classification, pharmacodynamic and pharmacokinetic aspects, adverse effects, uses, dose, route of administration, precautions, contraindications and interaction with other drugs. In this subject, apart from general pharmacology, drugs acting on autonomic nervous system, cardiovascular system, central nervous system, blood and blood forming agents and renal system will be taught. In addition to theoretical knowledge, the basic practical knowledge relevant to therapeutics will be imparted.
2. **Objectives of the Subject :** Upon completion of the subject student shall be able to (Know, do, appreciate) –
 - a. understand the pharmacological aspects of drugs falling under the above mentioned chapters;
 - b. handle and carry out the animal experiments;
 - c. appreciate the importance of pharmacology subject as a basis of therapeutics; and
 - d. correlate and apply the knowledge therapeutically.

Text books (Theory) (Author, Title, Edition, Publication Place, Publisher, Year of Publication)

- a. Tripathi, K. D. Essentials of medical pharmacology. 4th Ed, 1999. Publisher: Jaypee, Delhi.
- b. Satoskar, R.S. and Bhadarkar, S.D. Pharmacology and pharmacotherapeutics. 16th edition (single volume), 1999. Publisher: Popular, Dubai.
- c. Rang, H.P. & Dale, M.M. Pharmacology. 4th edition, 1999. Publisher: Churchill Living stone.

Reference books (Theory)(Author, Title, Edition, Publication Place, Publisher, Publication Year)

- a. Goodman Gilman, A., Rall, T.W., Nies, A.I.S. and Taylor, P. Goodman and Gilman's The pharmacological Basis of therapeutics. 9th Ed, 1996. Publisher Mc Graw Hill, Pergamon press.
- b. Craig, C.R.&Stitzel, R.E. Modern Pharmacology. Latest edition. Publisher: Little Brown.Co
- c. Katzung, B.G. Basic and clinical pharmacology. Latest edition. Publisher: Prentice Hall, Int.
- d. Shargel and Leon. Applied Biopharmaceutics and pharmacokinetics. Latest edition. Publisher: Prentice Hall, London.

Text books (Practical) :

Kulkarni, S. K. and Dandia, P. C. Hand book of experimental pharmacology. Latest edition, Publisher: Vallab, Delhi.

Reference books (Practical)

- a. Macleod, L.J. Pharmacological experiments on intact preparations. Latest edition, Publisher: Churchill livingston

- b. Macleod, L.J. Pharmacological experiments on isolated preparations. Latest edition, Publisher: Churchill livingstone.
- c. Ghosh, M.N. Fundamentals of experimental pharmacology. Latest edition, Publisher: Scientific book agency, Kolkata.
- d. Ian Kitchen. Textbook of in vitro practical pharmacology. Latest edition, Publisher: Black well Scientific.

3. Detailed syllabus and lecture wise schedule :

Title of the topic

1. General Pharmacology

- a) Introduction, definitions and scope of pharmacology
- b) Routes of administration of drugs
- c) Pharmacokinetics (absorption, distribution, metabolism and excretion)
- d) Pharmacodynamics
- e) Factors modifying drug effects
- f) Drug toxicity - Acute, sub- acute and chronic toxicity.
- g) Pre-clinical evaluations
- h) Drug interactions

Note: The term Pharmacology used here refers to the classification, mechanism of action, pharmacokinetics, pharmacodynamics, adverse effects, contraindications, Therapeutic uses, interactions and dose and route of administration.

2. Pharmacology of drugs acting on ANS

- a) Adrenergic and antiadrenergic drugs
- b) Cholinergic and anticholinergic drugs
- c) Neuromuscular blockers
- d) Mydriatics and miotics
- e) Drugs used in myasthenia gravis
- f) Drugs used in Parkinsonism

3. Pharmacology of drugs acting on cardiovascular system

- a) Antihypertensives
- b) Anti-anginal drugs
- c) Anti-arrhythmic drugs
- d) Drugs used for therapy of Congestive Heart Failure
- e) Drugs used for hyperlipidaemias

4. Pharmacology of drugs acting on Central Nervous System

- a) General anesthetics
- b) Sedatives and hypnotics
- c) Anticonvulsants
- d) Analgesic and anti-inflammatory agents
- e) Psychotropic drugs
- f) Alcohol and methyl alcohol
- g) CNS stimulants and cognition enhancers
- h) Pharmacology of local anaesthetics

5. **Pharmacology of Drugs acting on Respiratory tract**
 - a) Bronchodilators
 - b) Mucolytics
 - c) Expectorants
 - d) Antitussives
 - e) NasalDecongestants

6. **Pharmacology of Hormones and Hormone antagonists**
 - a) Thyroid and Antithyroid drugs
 - b) Insulin, Insulin analogues and oral hypoglycemic agents
 - c) Sex hormones and oral contraceptives
 - d) Oxytocin and other stimulants and relaxants

7. **Pharmacology of autocooids and their antagonists**
 - a) Histamines and Antihistaminics
 - b) 5-Hydroxytryptamine and its antagonists
 - c)
 - d) Lipid derived autocooids and platelet activating factor

MRSPTU

MPHD1-221 PHARMACOLOGY – I (Practicals)

Practicals

Title of the Experiment:

- 1 Study of agonistic and antagonistic effects of drugs using Guinea-pig ileum preparation.**
- 2 To study the effects of drugs on intestinal motility using frog's esophagus model*
- 3 To study the effects of drugs using rat uterus preparation.**
- 4 To study the anticonvulsant property of drugs (any one model).*
- 5 To study antihistaminic property of drug using histamine induced anaphylactic reaction in guinea pigs.
- 6 To study the apomorphine-induced compulsive behaviour (stereotypy) in mice.*
- 7 To study the muscle relaxant property of diazepam in mice using rotarod apparatus.*
- 8 To study the antiinflammatory property of indomethacin against carrageenan-induced paw oedema.**
- 9 To study the anxiolytic effect of diazepam in mice using mirrored-chamber apparatus.**
- 10 To demonstrate the effect of various drugs on the blood pressure and respiration of anaesthetized dog.
- 11 To study the effect of anthelmintics on earthworms.
- 12 To study the taming effect of chlorpromazine.*
- 13 To study the effects of drugs on vas deferense of the male rat.**
- 14 To study the effect of drugs on pesticide toxicity using rats as model.
- 15 To study the effect of drugs on heavy metal toxicity.

** indicate major experiment & * indicate minor experiment

MPHD1-217 COMMUNITY PHARMACY (THEORY)

Theory : 2 Hrs. /Week

1. **Scope:** In the changing scenario of pharmacy practice in India, Community Pharmacists are expected to offer various pharmaceutical care services. In order to meet this demand, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling, health screening services for improved patient care in the community set up.
2. **Objectives:** Upon completion of the course, the student shall be able to –
 - a. know pharmaceutical care services;
 - b. know the business and professional practice management skills in community pharmacies;
 - c. do patient counselling & provide health screening services to public in community pharmacy;
 - d. respond to minor ailments and provide appropriate medication;
 - e. show empathy and sympathy to patients; and
 - f. appreciate the concept of Rational drug therapy.

Text Books:

- a. Health Education and Community Pharmacy by N.S.Parmar.
- b. WHO consultative group report.
- c. Drug store & Business management by Mohammed Ali & Jyoti.

Reference books:

- a. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical press.
- b. Comprehensive Pharmacy Review – Edt. Leon Shargel. Lippincott Williams & Wilkins.

Special requirements:

1. Either the college is having model community pharmacy (meeting the schedule N requirement) or sign MoU with at least 4-5 community pharmacies nearby to the college for training the students on dispensing and counselling activities.
2. Special equipments like B.P apparatus, Glucometer, Peak flow meter, and apparatus for cholesterol estimation.

3. Scheme of evaluation (80 Marks)

- | | |
|---|----|
| 1. Synopsis | 10 |
| 2. Major Experiment
(Counselling of patients with specific diseases – emphasis should be given on Counselling introduction, content, process and conclusion) | 30 |
| 3. Minor Experiment(Ability to measure B.P/ CBG / Lung function) | 15 |
| 4. Prescription Analysis (Analyzing the prescriptions for probable drug interaction and ability to tell the management) | 15 |
| 5. Viva – Voce | 10 |

4. Lecture wise programme:

Topics

- 1 Definition, scope, of community pharmacy
Roles and responsibilities of Community pharmacist**
- 2 Community Pharmacy Management**
 - a) Selection of site, Space layout, and design
 - b) Staff, Materials- coding, stocking
 - c) Legal requirements
 - d) Maintenance of various registers
 - e) Use of Computers: Business and health care soft wares
- 3 Prescriptions – parts of prescription, legality & identification of medication related problems like drug interactions.**
- 4 Inventory control in community pharmacy**
Definition, various methods of Inventory
Control **ABC, VED, EOQ, Lead time, safety stock**
- 5 Pharmaceutical care**
Definition and Principles of Pharmaceutical care.
- 6 Patient counselling**
Definition, outcomes, various stages, barriers, Strategies to overcome barriers Patient information leaflets- content, design, & layouts, advisory labels
- 7 Patient medication adherence**
Definition, Factors affecting medication adherence, role of pharmacist in improving the adherence.
- 8 Health screening services**
Definition, importance, methods for screening Blood pressure/ blood sugar/ lung function and Cholesterol testing
- 9 OTC Medication- Definition, OTC medication list & Counselling**
- 10 Health Education**
WHO Definition of health, and health promotion, care for children, pregnant & breast feeding women, and geriatric patients.
Commonly occurring Communicable Diseases, causative agents,
Clinical presentations and prevention of communicable diseases – Tuberculosis, Hepatitis, Typhoid, Amoebiasis, Malaria, Leprosy, Syphilis, Gonorrhoea and AIDS
Balance diet, and treatment & prevention of deficiency disorders Family planning – role of pharmacist
Responding to symptoms of minor ailments
Relevant pathophysiology, common drug therapy to, Pain, GI disturbances (Nausea, Vomiting, Dyspepsia, diarrhea, constipation), Pyrexia, Ophthalmic symptoms, worms infestations.
- 11 Essential Drugs concept and Rational Drug Therapy Role of community pharmacist**
- 12 Code of ethics for community pharmacists**

MPHD1-218 PHARMACOTHERAPEUTICS - I (THEORY)

Theory : 3 Hrs. /Week

1. **Scope of the Subject:** This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.
2. **Objectives:** At completion of this subject it is expected that students will be able to understand –
 - a. the pathophysiology of selected disease states and the rationale for drug therapy;
 - b. the therapeutic approach to management of these diseases;
 - c. the controversies in drug therapy;
 - d. the importance of preparation of individualised therapeutic plans based on diagnosis;
 - e. needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);
 - f. describe the pathophysiology of selected disease states and explain the rationale for drug therapy;
 - g. summarise the therapeutic approach to management of these diseases including reference to the latest available evidence;
 - h. discuss the controversies in drug therapy;
 - i. discuss the preparation of individualised therapeutic plans based on diagnosis; and
 - j. identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

Text Books

- a. Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication.
- b. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange.

Reference Books

- a. Pathologic basis of disease - Robins SL, W.B.Saunders publication.
- b. Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice - Green and Harris, Chapman and Hall publication.
- c. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication.
- d. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA
- e. Avery's Drug Treatment, 4th Edn, 1997, Adis International Limited.
- f. Relevant review articles from recent medical and pharmaceutical literature.

3. Detailed syllabus and lecture wise schedule:

Etiopathogenesis and pharmacotherapy of diseases associated with following systems/ diseases

Title of the topic

- 1 Cardiovascular system:** Hypertension, Congestive cardiac failure, Angina Pectoris, Myocardial infarction, , Hyperlipidaemias , Electrophysiology of heart and Arrhythmias
- 2 Respiratory system :** Introduction to Pulmonary function test, Asthma, Chronic obstructive airways disease, Drug induced pulmonary diseases
Endocrine system : Diabetes, Thyroid diseases, Oral contraceptives, Hormone replacement therapy, Osteoporosis
- 3 General prescribing guidelines for**
 - a. Paediatric patients
 - b. Geriatric patients
 - c. Pregnancy and breast feeding
- 4 Ophthalmology:** Glaucoma, Conjunctivitis- viral & bacterial
- 5 Introduction to rational drug use**
Definition, Role of pharmacist Essential drug concept Rational drug Formulations

MPHD1-221 PHARMACOTHERAPEUTICS - I (PRACTICAL)

Practical:3 Hrs./Week

Practicals :

Hospital postings in various departments designed to complement the lectures by providing practical clinical discussion; attending ward rounds; follow up the progress and changes made in drug therapy in allotted patients; case presentation upon discharge. Students are required to maintain a record of cases presented and the same should be submitted at the end of the course for evaluation. A minimum of 20 cases should be presented and recorded covering most common diseases.

Assignments :

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of THREE assignments [1500 – 2000 words] should be submitted for evaluation.

Format of the assignment:

1. Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year.
4. It shall be computer draft copy.
5. Name and signature of the student.
6. Time allocated for presentation may be 8+2 Min.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record)

Third Year

MPHD1-323 PHARMACOLOGY – II (THEORY)

Theory : 3 Hrs. /Week

1. **Scope of the Subject:** This subject will provide an opportunity for the student to learn about the drug with regard to classification, pharmacodynamic and pharmacokinetic aspects, adverse effects, uses, dose, route of administration, precautions, contraindications and interaction with other drugs. In this subject, drugs acting on autacoids, respiratory system, GIT, immune system and hormones, and pharmacology of autacoids and hormones will be concentrated. In addition, pharmacology of chemotherapeutic agents, vitamins, essential minerals and principles of toxicology are also taught. In addition to theoretical knowledge, the basic practical knowledge relevant to therapeutics will be imparted.
2. **Objectives of the Subject Upon completion of the subject student shall be able to:**
 - a. understand the pharmacological aspects of drugs falling under the above mentioned chapters,
 - b. carry out the animal experiments confidently,
 - c. appreciate the importance of pharmacology subject as a basis of therapeutics, and
 - d. correlate and apply the knowledge therapeutically.

Text books (Theory)

- a. Tripathi, K. D. Essentials of medical pharmacology. 4th edition, 1999. Publisher: Jaypee, Delhi.
- b. Satoskar, R.S. and Bhadarkar, S.D. Pharmacology and pharmacotherapeutics. 16th edition (single volume), 1999. Publisher: Popular, Dubai.
- c. Rang, H.P. and Dale, M.M. Pharmacology. 4th edition, 1999. Publisher: Churchill Living stone.

Reference books (Theory)

- a. Goodman Gilman, A., Rall, T.W., Nies, A.I.S. and Taylor, P. Goodman and Gilman's The pharmacological Basis of therapeutics. 9th edition, 1996. Publisher: Mc Graw Hill, Pergamon press.
- b. Craig, C.R. and Stitzel, R.E. Modern Pharmacology. Latest edition. Publisher: Little Brown and company.
- c. Katzung, B.G. Basic and clinical pharmacology. Latest edition. Publisher: Prentice Hall, International.
- d. Gupta, P.K. and Salunkhe, D.K. Modern Toxicology. Volume I, II and III. Latest edition. Publisher: B.V. Gupta, Metropolitan Book Co. (p) Ltd, New Delhi.

Text books (Practical)

- a) Kulkarni, S. K. and Dandia, P. C. Hand book of experimental pharmacology. Latest edition, Publisher: Vallab, Delhi.

Reference books (Practical) :

- a. Macleod, L.J. Pharmacological experiments on intact preparations. Latest edition, Publisher: Churchill livingstone.
- b. Macleod, L.J. Pharmacological experiments on isolated preparations. Latest edition, Publisher: Churchill livingstone.

- c. Ghosh, M.N. Fundamentals of experimental pharmacology. Latest edition, Publisher: Scientific book agency, Kolkata.
- d. Ian Kitchen. Textbook of in vitro practical pharmacology. Latest edition, Publisher: Black well Scientific.

3. Detailed syllabus and lecture wise schedule:

Title of the topic

1. **Pharmacology of Drugs acting on Blood and blood forming agents**
 - a) Anticoagulants
 - b) Thrombolytics and antiplatelet agents
 - c) Haemopoietics and plasma expanders
2. **Pharmacology of drugs acting on Renal System**
 - a) Diuretics
 - b) Antidiuretics
3. **Chemotherapy**
 - a) Introduction
 - b) Sulfonamides and co-trimoxazole
 - c) Penicillins and Cephalosporins
 - d) Tetracyclins and Chloramphenicol
 - e) Macrolides, Aminoglycosides, Polyene & Polypeptide antibiotics
 - f) Quinolines and Fluroquinolines
 - g) Antifungal antibiotics
 - h) Antiviral agents
 - i) Chemotherapy of tuberculosis and leprosy
 - j) Chemotherapy of Malaria
 - k) Chemotherapy of protozoal infections (amoebiasis, Giardiasis)
 - l) Pharmacology of Anthelmintic drugs
 - m) Chemotherapy of cancer (Neoplasms)
4. **Immunopharmacology**
Pharmacology of immunosuppressants and stimulants
5. **Principles of Animal toxicology**
Acute, sub acute and chronic toxicity
6. **The dynamic cell: The structures and functions of the components of the cell**
 - a) Cell and macromolecules: Cellular classification, subcellular organelles, macromolecules, large macromolecular assemblies
 - b) Chromosome structure: Pro and eukaryotic chromosome structures, chromatin structure, genome complexity, the flow of genetic information.
 - c) DNA replication: General, bacterial and eukaryotic DNA replication.
 - d) The cell cycle: Restriction point, cell cycle regulators and modifiers.

- e) Cell signaling: Communication between cells and their environment, ion-channels, signal transduction pathways (MAP kinase, P38 kinase, JNK, Ras and PI3-kinase pathways, biosensors).

The Gene: Genome structure and function:

- a) Gene structure: Organization and elucidation of genetic code.
b) Gene expression: Expression systems (pro and eukaryotic), genetic elements that control gene expression (nucleosomes, histones, acetylation, HDACS, DNA binding protein families).
c) Transcription and Transcription factors: Basic principles of transcription in pro and eukaryotes. Transcription factors that regulate transcription in pro and eukaryotes.

RNA processing: rRNA, tRNA and mRNA processing. Protein synthesis: Mechanisms of protein synthesis, initiation in eukaryotes, translation control and post-translation events

Altered gene functions: Mutations, deletions, amplifications, LOH, translocations, trinucleotide repeats and other genetic abnormalities, Oncogenes and tumor suppressor genes, The gene sequencing, mapping and cloning of human disease genes.

Introduction to gene therapy and targeting, Recombinant DNA technology: principles, Processes (gene transfer technology) and applications.

Books:

- 1 Molecular Biology of the Cell by Alberts B., Bray, D., Lewis, J., Raff M., Roberts, K and Watson, JD, 3rd edition.
- 2 Molecular Cell Biology By Lodish, H., Baltimore, D., Berk, A et al., 5th edition.
- 3 Molecular Biology by Turner, PC., McLennan, AG., Bates, AD and White MRH 2nd edition.
- 4 Genes VIII by Lewin, B., (2004)
- 5 Pharmaceutical Biotechnology, by Crommelin, DJA and Sindelar RD (1997)
- 6 Recombinant DNA by Watson, JD., Gilman, M., et al., (1996)
- 7 Biopharmaceutical: Biochemistry and Biotechnology by Walsh, G., (1998)

MPHD1-329 PHARMACOLOGY – II (PRACTICAL)

Practical : 3 Hrs./Week

List of Experiments:

1. Study of laboratory animals and their handling (a. Frogs, b. Mice, c. Rats, d. Guinea pigs, e. Rabbits).
2. Study of physiological salt solutions used in experimental pharmacology.
3. Study of laboratory appliances used in experimental pharmacology.
4. Study of use of anesthetics in laboratory animals.
5. To record the dose response curve of Ach using isolated ileum/rectus abdominis muscle preparation.
6. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by interpolation method.
7. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by three point method.
8. To record the dose response curve of Histamine using isolated guinea -pig ileum preparation.
9. Study of agonistic and antagonistic effects of drugs using isolated guinea-pig ileum preparation.
10. To carry out bioassay of Histamine using isolated guinea -pig ileum preparation by interpolation method.
11. To carry out bioassay of Histamine using guinea-pig ileum preparation by three point method.
12. To study the routes of administration of drugs in animals (Rats, Mice, Rabbits).
13. Study of theory, principle, procedure involved and interpretation of given results for the following experiments:
 - a) Analgesic property of drug using analgesiometer.
 - b) Antiinflammatory effect of drugs using rat-paw edema method.
 - c) Anticonvulsant activity of drugs using maximal electroshock and pentylene tetrazole methods.
 - d) Antidepressant activity of drugs using pole climbing apparatus and pentobarbitone induced sleeping time methods.
 - e) Locomotor activity evaluation of drugs using actophotometer and rotorod.
 - f) Cardiotonic activity of drugs using isolated frog heart and mammalian heart preparations.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva voce and record maintenance)

MPHD1-324 PHARMACEUTICAL ANALYSIS (THEORY)

Theory : 3 Hrs. /Week

1. **Quality Assurance:**

- a. Introduction, sources of quality variation, control of quality variation.
- b. Concept of statistical quality control.
- c. Validation methods- quality of equipment, validation of equipment and validation of analytical instruments and calibration.
- d. GLP, ISO 9000.
- e. Total quality management, quality review and documentation.
- f. ICH- international conference for harmonization-guidelines.
- g. Regulatory control.

2. **Chromatography:**

Introduction, history, classification, separation techniques, choice of methods. The following techniques be discussed with relevant examples of pharmaceutical products involving principles and techniques of separation of drugs from excipients.

- a. **Column Chromatography:** Adsorption column chromatography, Operational technique, frontal analysis and elution analysis. Factors affecting column efficiency, applications and partition chromatography.
- b. **TLC:** Introduction, principle, techniques, R_f value and applications.
- c. **PC:** Introduction, principle, types of paper chromatography, preparation techniques, development techniques, applications.
- d. **Ion-exchange chromatography:** Introduction, principles, types of ion exchange synthetic resins, physical properties, factors affecting ion exchange, methodology and applications.
- e. **HPLC:** Introduction, theory, instrumentation, and applications.
- f. **HPTLC:** Introduction, theory, instrumentation, and applications.
- g. **Gas Chromatography:** Introduction, theory, instrumentation-carrier gases, types of columns, stationary phases in GLC & GSC. Detectors- Flame ionization detectors, electron capture detector, thermal conductivity detector. Typical gas chromatogram, derivatisation techniques, programmed temperature gas chromatography, applications.
- h. **Electrophoresis:** Principles of separation, equipment for paper and gel electrophoresis, and application.
- i. **Gel filtration and affinity chromatography:** Introduction, technique, applications.

3. **Electrometric Methods:**

Theoretical aspects, instrumentation, interpretation of data/spectra and analytical applications be discussed on the following topics.

- a. **Potentiometry:** Electrical potential, electrochemical cell, reference electrodes, indicator electrodes, measurement of potential and pH, construction and working of electrodes, Potentiometric titrations, methods of detecting end point, Karl Fischer titration.

- b. **Conductometry:** Introduction, conductivity cell, conductometric titrations and applications.
- c. **Polarography:** Instrumentation, DME, residual current, diffusion current and limiting current, polarographic wave, Ilkovic's equation, Effect of oxygen on polarographic wave, Polarographic maxima and suppressors and applications.
- d. **Amperometric Titrations:** Introduction, types of electrodes used, reference and indicator electrode, instrumentation, titration procedure, advantages and disadvantages of Amperometry over potentiometry. Pharma applications.

4. **Spectroscopy:**

Theoretical aspects, instrumentation, elements of interpretation of data/spectra and application of analytical techniques be discussed on:

a. **Absorption Spectroscopy:**

- Theory of electronic, atomic and molecular spectra. Fundamental laws of photometry, Beer-Lambert's Law, application and its deviation, limitation of Beer law, application of the law to single and multiple component analysis, measurement of equilibrium constant and rate constant by spectroscopy. Spectra of isolated chromophores, auxochromes, batho-chromic shift, hypsochromic shift, hyperchromic and hypochromic effect, effect of solvent on absorption spectra, molecular structure and infrared spectra.

Instrumentation – Photometer, U.V.-Visible spectrophotometer – sources of U.V.-Visible radiations, collimating systems, monochromators, samples cells and following detectors-Photocell, Barrier layer cell, Phototube, Diode array, applications of U.V.-Visible spectroscopy in pharmacy and spectrophotometric titrations.

- **Infrared Spectroscopy:** Vibrational transitions, frequency – structure correlations, Infrared absorption bands, Instrumentation–IR spectrometer – sources of IR, Collimating systems, monochromators, sample cells, sample handling in IR spectroscopy and detectors– Thermocouple, Golay Cells, Thermistor, Bolometer, Pyroelectric detector, Applications of IR in pharmacy.

Fluorimetric Analysis: Theory, luminescence, factors affecting fluorescence, quenching. Instrumentation, Applications, fluorescent indicators, study of pharmaceutically important compounds estimated by fluorimetry.

- **Flame Photometry:** Theory, nebulisation, flame and flame temperature, interferences, flame spectrometric techniques and instrumentation and pharmaceutical applications.
- **Atomic Absorption Spectrometry:** Introduction, Theory, types of electrodes, instrumentation and applications.
- **Atomic Emission Spectroscopy:** Spectroscopic sources, atomic emission spectrometers, photographic and photoelectric detection.
- **NMR & ESR (introduction only):** Introduction, theoretical aspects and applications.

- **Mass Spectroscopy: (Introduction only)** – Fragmentation, types of ions produced mass spectrum and applications.
- **Polarimetry: (Introduction only)** – Introduction to optical rotatory dispersion, circular dichroism, polarimeter.
- **X-RAY Diffraction: (Introduction only)** – Theory, reciprocal lattice concept, diffraction patterns and applications.
- **Thermal Analysis:** Introduction, instrumentation, applications, and DSC and DTA.

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MPHD1-330 PHARMACEUTICAL ANALYSIS (PRACTICAL)

Practical : 3 Hrs./Week

List of Experiments:

1. Separation and identification of Amino Acids by Paper Chromatography.
2. Separation and identification of Sulpha drugs by TLC technique.
3. Effect of pH and solvent on the UV spectrum of given compound.
4. Comparison of the UV spectrum of a compound with that of its derivatives.
5. Determination of dissociation constant of indicators using UV-Visible spectroscopy.
6. Conductometric titration of mixture of acids with a strong base.
7. Potentiometric titration of an acid with a strong base.
8. Estimation of drugs by Fluorimetric technique.
9. Study of quenching effect in fluorimetry. Colourimetric estimation of Sulpha drugs using BMR reagent.
11. Simultaneous estimation of two drugs present in given formulation.
12. Assay of Salicylic Acid by colourimetry.
13. Determination of Chlorides and Sulphates in Calcium gluconate by Nepheloturbidimetric Method.
14. Determination of Na/K by Flame Photometry.
15. Determination of pKa using pH meter.
16. Determination of specific rotation.
17. Comparison of the IR spectrum of a compound with that of its derivatives.
18. Demonstration of HPLC.
19. Demonstration of HPTLC.
20. Demonstration of GC-MS.
21. Demonstration of DSC.
22. Interpretation of NMR spectra of any one compound.

Reference Books:

1. Text Book of Pharm. Analysis by Higuchi. T and Hasen. E. B., New York Inter Science Publishers.
2. Quantitative Pharma. Analysis by Jenkins, The Blakiston division, New York.
3. Quantitative Drug Analysis, by Garrot. D, Chapman & Hall Ltd., London.
4. Undergraduate Instrumental Analysis by James. E., CBS Publishers.
5. Instrumental Analysis by Willard and Merritt, EWP, East West Press Ltd., Delhi/Madras.
6. Pharm Analysis by Skoog and West, Sounders Manipal College Publishing.
7. Text Book of Chemical Analysis, by A.I.Vogel, ELBS with Macmillan press, Hampshire.
8. Textbook of Pharm. Analysis by K.A.Connors, John Wiley & Sons, New York, Brisbane, Singapore.

9. Textbook of Pharm. Analysis (Practical) by Beckett & Stenlake, CBS Publishers, Delhi.
 10. Textbook of Drug Analysis by P.D. Sethi., CBS Publishers, Delhi.
 11. Spectroscopy by Silverstein, John & Wiley & Sons. Inc., Canada & Singapore.
 12. How to practise GMP-A Plan for total quality control by P.P. Sharma, Vandana Publications, Agra.
 13. The Science & Practice of Pharmacy by Remington Vol-I & II, Mack Publishing Co. Pennsylvania.
 14. TLC by Stahl, Spring Verlay.
 15. Text Book of Pharm. Chemistry by Chatten, CBS Publications.
 16. Spectroscopy by William Kemp, ELBS with Macmillan Press, Hampshire.
 17. I.P.-1996, The Controller of Publications, New Delhi.
 18. BPC- Dept. of Health, U.K. for HMSO.
 19. USP - Mack Publishing Co., Easton, PA.
- The Extra Pharmacopoeia – The Pharm. Press, London

Practicals

Title of the Experiment:

- 1 Study of agonistic and antagonistic effects of drugs using Guinea -pig ileum preparation.**
- 2 To study the effects of drugs on intestinal motility using frog's esophagus model*
- 3 To study the effects of drugs using rat uterus preparation.**
- 4 To study the anticonvulsant property of drugs (any one model).*
- 5 To study antihistaminic property of drug using histamine induced anaphylactic reaction in guinea pigs.
- 6 To study the apomorphine-induced compulsive behaviour (stereotypy) in mice.*
- 7 To study the muscle relaxant property of diazepam in mice using rotarod apparatus.*
- 8 To study the antiinflammatory property of indomethacin against carrageenan-induced paw oedema.**
- 9 To study the anxiolytic effect of diazepam in mice using mirrored-chamber apparatus.**
- 10 To demonstrate the effect of various drugs on the blood pressure and respiration of anaesthetized dog.
- 11 To study the effect of anthelmintics on earthworms.
- 12 To study the taming effect of chlorpromazine.*
- 13 To study the effects of drugs on vas deferense of the male rat.**
- 14 To study the effect of drugs on pesticide toxicity using rats as model.
- 15 To study the effect of drugs on heavy metal toxicity.

** indicate major experiment & * indicate minor experiment

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

MPHD1-325 PHARMACOTHERAPEUTICS – II (THEORY)

Theory : 3 Hrs. /Week

- 1. Scope of the Subject:** This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.
- 2. Objectives of the Subject Upon completion of the subject student shall be able to –**
 - a. know the pathophysiology of selected disease states and the rationale for drug therapy
 - b. know the therapeutic approach to management of these diseases;
 - c. know the controversies in drug therapy;
 - d. know the importance of preparation of individualised therapeutic plans based on diagnosis; and
 - e. appreciate the needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

Text books (Theory)

Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication

Reference books (Theory)

- a. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange
- b. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
- c. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA]

3. Detailed syllabus and lecture wise schedule :

Etiopathogenesis and pharmacotherapy of diseases associated with following systems / diseases –

Title of the topic

- 1. Infectious disease:** Guidelines for the rational use of antibiotics and surgical Prophylaxis, Tuberculosis, Meningitis, Respiratory tract infections, Gastroenteritis, Endocarditis, Septicemia, Urinary tract infections, Protozoal infection- Malaria, HIV & Opportunistic infections, Fungal infections, Viral infections, Gonorrhoea and Syphilis
- 2 Musculoskeletal disorders**
Rheumatoid arthritis, Osteoarthritis, Gout, Spondylitis, Systemic lupus erythematosus.
- 3 Renal system** Acute Renal Failure, Chronic Renal Failure, Renal Dialysis, Drug induced renal disorders
- 4 Oncology:** Basic principles of Cancer therapy, General introduction to cancer chemotherapeutic agents, Chemotherapy of breast cancer, leukemia. Management of chemotherapy nausea and emesis
- 5 Dermatology:** Psoriasis, Scabies, Eczema, Impetigo

MPHD1-331 PHARMACOTHERAPEUTICS – II (PRACTICAL)

Practical : 3 Hrs./Week

Practicals :

Hospital postings in various departments designed to complement the lectures by providing practical clinical discussion; attending ward rounds; follow up the progress and changes made in drug therapy in allotted patients; case presentation upon discharge. Students are required to maintain a record of cases presented and the same should be submitted at the end of the course for evaluation.

The student shall be trained to understand the principle and practice involved in selection of drug therapy including clinical discussion.

A minimum of 20 cases should be presented and recorded covering most common diseases.

Assignments :

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of THREE assignments [1500 – 2000 words] should be submitted for evaluation.

Format of the assignment :

1. Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year.
4. It shall be computer draft copy.
5. Name and signature of the student.
6. Time allocated for presentation may be 8+2 Min.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

MPHD1-326 PHARMACEUTICAL JURISPRUDENCE (THEORY)

Theory : 2 Hrs. /Week

- 1. Scope of the Subject:** (4-6 lines): This course exposes the student to several important legislations related to the profession of pharmacy in India. The Drugs and Cosmetics Act, along with its amendments are the core of this course. Other acts, which are covered, include the Pharmacy Act, dangerous drugs, medicinal and toilet preparation Act etc. Besides this the new drug policy, professional ethics, DPCO, patent and design Act will be discussed.
- 2. Objectives of the Subject:** Upon completion of the subject student shall be able to (Know, do, and appreciate) –
 - a. practice the Professional ethics;
 - b. understand the various concepts of the pharmaceutical legislation in India;
 - c. know the various parameters in the Drug and Cosmetic Act and rules;
 - d. know the Drug policy, DPCO, Patent and design act;
 - e. understand the labeling requirements and packaging guidelines for drugs and cosmetics;
 - f. be able to understand the concepts of Dangerous Drugs Act, Pharmacy Act and Excise duties Act; and
 - g. other laws as prescribed by the Pharmacy Council of India from time to time including International Laws.

Text books (Theory)

Mithal , B M. Textbook of Forensic Pharmacy. Calcutta :National; 1988.

Reference books (Theory)

- a. Singh, KK, editor. Beotra's the Laws of Drugs, Medicines & cosmetics. Allahabad: Law Book House; 1984.
- b. Jain, NK. A Textbook of forensic pharmacy. Delhi: Vallabh prakashan ; 1995.
- c. Reports of the Pharmaceutical enquiry Committee
- d. I.D.M.A., Mumbai. DPCO 1995
- e. Various reports of Amendments.
- f. Deshapande, S.W. The drugs and magic remedies act 1954 and rules 1955. Mumbai: Susmit Publications; 1998.
- g. Eastern Book Company .The narcotic and psychotropic substances act 1985, Lucknow: Eastern; 1987.

3. Detailed syllabus and lecture wise

schedule: Title of the topic

1. **Pharmaceutical Legislations** – A brief review.
2. Principle and Significance of professional ethics. Critical study of the code of pharmaceutical ethics drafted by PCI.
3. **Drugs and Cosmetics Act, 1940, and its rules 1945.**
Objectives, Legal definition, Study of Schedule's with reference to Schedule B, C&C1, D, E1, F&F1, F2, F3, FF, G, H, J, K, M, N, P, R, V, W, X, Y.
Sales, Import, labeling and packaging of Drugs And Cosmetics Provisions
Relating to Indigenous Systems.

Constitution and Functions of DTAB, DCC, CDL. Qualification and duties –Govt. analyst and Drugs Inspector.

4. **Pharmacy Act –1948.**
Objectives Legal Definitions, General Study, Constitution and Functions of State & Central Council, Registration & Procedure, ER.
5. **Medicinal and Toilet Preparation Act –1955.**
Objectives, Legal Definitions, Licensing, Bonded and Non Bonded Laboratory, Ware Housing, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations.
6. **Narcotic Drugs and Psychotropic substances Act-1985 and Rules.** Objectives, Legal Definitions, General Study, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and regulations, Schedules to the Act.
7. **Study of Salient Features of Drugs and magic remedies Act and its rules.**
8. **Study of essential Commodities Act Relevant to drugs price control Order.**
9. **Drug Price control Order & National Drug Policy (Current).**
10. **Prevention Of Cruelty to animals Act-1960.**
11. **Patents & design Act-1970.**
12. **Brief study of prescription and Non-prescription Products.**

4. Assignments:

Format of the assignment

1. Minimum & Maximum number of pages
2. It shall be a computer draft copy
3. Reference(s) shall be included at the end.
4. Name and signature of the student
5. Assignment can be a combined presentation at the end of the academic year.
6. Time allocated for presentation may be 8+2 Min

Case studies relating to

1. Drugs and Cosmetics Act and rules along with its amendments, Dangerous Drugs Act, Medicinal and Toilet preparation Act, New Drug Policy, Professional Ethics, Drugs (Price control) Order, Patent and Design Act.
2. Various prescription and non-prescription products.
3. Medical and surgical accessories.

Diagnostic aids and appliances available in the market.

MPHD1-327 MEDICINAL CHEMISTRY (THEORY)

Theory : 3 Hrs. /Week

1. Modern concept of rational drug design: A brief introduction to Quantitative Structure Activity Relationship (QSAR), prodrug, combinatorial chemistry and computer aided drug design (CADD) and concept of antisense molecules.

A study of the development of the following classes of drugs including SAR, mechanism of action, synthesis of important compounds, chemical nomenclature, brand names of important marketed products and their side effects.

2. Anti-infective agents
 - a) Local anti-infective agents
 - b) Preservatives
 - c) Antifungal agents
 - d) Urinary tract anti-infectives
 - e) Antitubercular agents
 - f) Antiviral agents and Anti AIDS agents
 - g) Antiprotozoal agents
 - h) Anthelmintics
 - i) Antiscabies and Antipedicular agents
3. Sulphonamides and sulphones
4. Antimalarials
5. Antibiotics
6. Antineoplastic agents
7. Cardiovascular agents
 - a) Antihypertensive agents
 - b) Antianginal agents and vasodilators
 - c) Antiarrhythmic agents
 - d) Antihyperlipidemic agents
 - e) Coagulants and Anticoagulants
 - f) Endocrine
8. Hypoglycemic agents
9. Thyroid and Antithyroid agents
10. Diuretics
11. Diagnostic agents
12. Steroidal Hormones and Adrenocorticoids

MPHD1-332 MEDICINAL CHEMISTRY (PRACTICAL)

Practical : 3 Hrs./Week

1. Assays of important drugs from the course content.
2. Preparation of medicinally important compounds or intermediates required for synthesis of drugs.
3. Monograph analysis of important drugs.
4. Determination of partition coefficients, dissociation constants and molar refractivity of compounds for QSAR analysis.

Reference Books:

- a. Wilson and Gisvold's Text book of Organic, Medicinal and Pharmaceutical Chemistry, Lippincott-Raven Publishers-New York, Philadelphia.
- b. William.O.Foye, Principles of Medicinal Chemistry, B.I. Waverly Pvt. Ltd., New Delhi.
- c. Burgers, Medicinal Chemistry, M.E., Welly Med.Chemistry M.E. Walffed Johnwiley and Sons, Wiley-interscience Publication, New York, Toronto.
- d. A Text Book of Medicinal Chemistry Vol. I and II by Surendra N. Pandeya, S.G. Publisher, 6, Dildayal Nagar, Varanasi -10.
- e. Indian Pharmacopoeia 1985 and 1996. The Controller of Publications, Civil Lines, Delhi - 54.
- f. Current Index of Medical Specialities (CIMS) and MIMS India, MIMS, A.E. Morgan Publications (I) Pvt. Ltd, New Delhi-19.
- g. Organic Drug Synthesis-Ledniser Mitzsher Vol. I and II.
- h. Pharmaceutical Chemistry drug Synthesis Vol. I and II by H. J. Roth and A. Kleemann.

The Science and Practice of Pharmacy Vol. 1 and 2, Remington, MACK Publishing Company, Easton, Pennsylvania

MPHD1-328 PHARMACEUTICAL FORMULATIONS (THEORY)

Theory : 2 Hrs. /Week

- 1. Scope of the Subject:** Scope and objectives of the course: Subject deals with the formulation and evaluation of various pharmaceutical dosage forms.
- 2. Objectives of the Subject:** Upon completion of the subject student shall be able to (Know, do, appreciate) –
 - understand the principle involved in formulation of various pharmaceutical dosage forms;
 - prepare various pharmaceutical formulation;
 - perform evaluation of pharmaceutical dosage forms; and
 - understand and appreciate the concept of bioavailability and bioequivalence, their role in clinical situations.

Text books (Theory)

- Pharmaceutical dosage forms, Vol, I,II and III by lachman
- Rowlings Text book of Pharmaceutics
- Tutorial Pharmacy – Cooper &Gun

Reference books (Theory)

- Remington's Pharmaceutical Sciences
- USP/BP/IP

3. Detailed syllabus and lecture wise

schedule: Title of the topic

- Pharmaceutical dosage form- concept and classification
- Tablets:** Formulation of different types of tablets, tablet excipients, granulation techniques quality control and evaluation of tablets. Tablet coating, Type of coating, quality control tests for coated tablet.
- Capsules;** Production and filling of hard gelatin capsules, Raw material for shell, finishing, quality control tests for capsules. Production and filling of soft gelatin capsules, quality control tests for soft gelatin capsules.
- Liquid orals:** Formulation and evaluation of suspensions, emulsions and solutions. Stability of these preparations
- Parenterals** Introduction Containers used for Parenterals (including official tests) Formulation of large and small volume Parenterals Sterilization
- Ophthalmic preparations (Semi – Solids):** Introduction and classification Factors affecting absorption and anatomy of skin Packaging storage and labeling, Ointments Types of Ointment Base Preparation of ointment, Jellies Types of jellies Formulation of jellies Suppositories, Method of preparation, Types Packaging
- Definition and concept of **Controlled and novel Drug delivery systems** with available examples, viz. parenteral, trans dermal, buccal, rectal, nasal, implants, ocular

MPHD1-333 PHARMACEUTICAL FORMULATIONS (PRACTICAL)

Practical : 3 Hrs./Week

List of Experiments :

- 1. Manufacture of Tablets**
 - a. Ordinary compressed tablet-wet granulation
 - b. Tablets prepared by direct compression.
 - c. Soluble tablet.
 - d. Chewable tablet.
- 2. Formulation and filling of hard gelatin capsules**
- 3. Manufacture of parenterals**
 - a. Ascorbic acid injection
 - b. Calcium gluconate injection
 - c. Sodium chloride infusion.
 - d. Dextrose and Sodium chloride injection/ infusion.
- 4. Evaluation of Pharmaceutical formulations (QC tests)**
 - a. Tablets
 - b. Capsules
 - c. Injections
- 5. Formulation of two liquid oral preparations and evaluation by assay**
 - a. Solution: Paracetamol Syrup
 - b. Antacid suspensions- Aluminum hydroxide gel
- 6. Formulation of semisolids and evaluation by assay**
 - a. Salicylic acid and benzoic acid ointment
 - b. Gel formulation Diclofenac gel
- 7. Cosmetic preparations**
 - a. Lipsticks
 - b. Cold cream and vanishing cream
 - c. Clear liquid shampoo
 - d. Tooth paste and tooth powders.
- 8. Tablet coating (demonstration)**

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

Fourth Year

MPHD1-434 PHARMACOTHERAPEUTICS – III (THEORY)

Theory : 3 Hrs. /Week

- 1. Scope :** This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.
- 2. Objectives:** At completion of this subject it is expected that students will be able to understand –
 - a. the pathophysiology of selected disease states and the rationale for drug therapy;
 - b. the therapeutic approach to management of these diseases;
 - c. the controversies in drug therapy;
 - d. the importance of preparation of individualised therapeutic plans based on diagnosis;
 - e. needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);
 - f. describe the pathophysiology of selected disease states and explain the rationale for drug therapy;
 - g. to summarize the therapeutic approach to management of these diseases including reference to the latest available evidence;
 - h. to discuss the controversies in drug therapy;
 - i. to discuss the preparation of individualised therapeutic plans based on diagnosis; and
 - j. identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

Text Books

- a. Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication
- b. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange

Reference Books

- a. Pathologic basis of disease - Robins SL, W.B.Saunders publication
- b. Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice - Green and Harris, Chapman and Hall publication
- c. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
- d. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda -Kimble MA
- e. Avery's Drug Treatment, 4th Edn, 1997, Adis International Limited.
- f. Relevant review articles from recent medical and pharmaceutical literature.

MPHD1-440 PHARMACOTHERAPEUTICS – III (PRACTICAL)

Practical : 3 Hrs./Week

Practicals:

Hospital postings for a period of at least 50 hours is required to understand the principles and practice involved in ward round participation and clinical discussion on selection of drug therapy. Students are required to maintain a record of 15 cases observed in the ward and the same should be submitted at the end of the course for evaluation. Each student should present at least two medical cases they have observed and followed in the wards.

Etiopathogenesis and pharmacotherapy of diseases associated with following systems/ diseases:

Title of the topic

- 1 **Gastrointestinal system:** Peptic ulcer disease, Gastro Esophageal Reflux Disease, Inflammatory bowel disease, Liver disorders - Alcoholic liver disease, Viral hepatitis including jaundice, and Drug induced liver disorders.
- 2 **Haematological system:** Anaemias, Venous thromboembolism, Drug induced blood disorders.
- 3 **Nervous system:** Epilepsy, Parkinsonism, Stroke, Alzheimer's disease,
- 4 **Psychiatry disorders:** Schizophrenia, Affective disorders, Anxiety disorders, Sleep disorders, Obsessive Compulsive disorders
- 5 Pain management including Pain pathways, neuralgias, headaches.
- 6 Evidence Based Medicine

Assignments:

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of THREE assignments [1500 – 2000 words] should be submitted for evaluation.

Format of the assignment:

1. Minimum & Maximum number of pages
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year
4. It shall be computer draft copy
5. Name and signature of the student
6. Time allocated for presentation may be 8+2 Min.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

MPHD1-435 HOSPITAL PHARMACY (THEORY)

Theory : 2 Hrs. /Week

- 1. Scope:** In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug dispensing, manufacturing of parenteral preparations, drug information, patient counselling, and therapeutic drug monitoring for improved patient care.
- 2. Objectives:** Upon completion of the course, the student shall be able to –
 - a. know various drug distribution methods;
 - b. know the professional practice management skills in hospital pharmacies;
 - c. provide unbiased drug information to the doctors;
 - d. know the manufacturing practices of various formulations in hospital set up;
 - e. appreciate the practice based research methods; and
 - f. appreciate the stores management and inventory control.

Text books: (latest editions)

- a. Hospital pharmacy by William .E. Hassan
- b. A text book of Hospital Pharmacy by S.H.Merchant & Dr. J.S. Qadry. Revised by R.K.Goyal & R.K. Parikh

References:

- a. WHO consultative group report.
- b. R.P.S. Vol.2. Part –B; Pharmacy Practice section.
- c. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical press.

3. Lecture wise programme :

Topics

1 Hospital - its Organisation and functions

2 Hospital pharmacy-Organisation and management

- a) Organizational structure-Staff, Infrastructure & work load statistics
- b) Management of materials and finance
- c) Roles & responsibilities of hospital pharmacist

3 The Budget – Preparation and implementation

4 Hospital drug policy

- a) Pharmacy and Therapeutic committee (PTC)
- b) Hospital formulary
- c) Hospital committees
 - Infection committee
 - Research and ethical committee
- d) developing therapeutic guidelines
- e) Hospital pharmacy communication - Newsletter

5 Hospital pharmacy services

- a) Procurement & warehousing of drugs and Pharmaceuticals
- b) Inventory control

Definition, various methods of Inventory
Control ABC, VED, EOQ, Lead time, safety
stock

- c) Drug distribution in the hospital
 - i) Individual prescription method
 - ii) Floor stock method
 - iii) Unit dose drug distribution method
- d) Distribution of Narcotic and other controlled substances
- e) Central sterile supply services – Role of pharmacist

6 Manufacture of Pharmaceutical preparations

- a) Sterile formulations – large and small volume parenterals
- b) Manufacture of Ointments, Liquids, and creams
- c) Manufacturing of Tablets, granules, capsules, and powders
- d) Total parenteral nutrition

**7 Continuing professional development
programs** Education and training

8 Radio Pharmaceuticals – Handling and packaging

9 Professional Relations and practices of hospital pharmacist

MPHD1-441 HOSPITAL PHARMACY (PRACTICAL)

Practical : 3 Hrs./Week

1. Assessment of drug interactions in the given prescriptions
2. Manufacture of parenteral formulations, powders.
3. Drug information queries.
4. Inventory control

List of Assignments:

1. Design and Management of Hospital pharmacy department for a 300 bedded hospital.
2. Pharmacy and Therapeutics committee – Organization, functions, and limitations.
3. Development of a hospital formulary for 300 bedded teaching hospital
4. Preparation of ABC analysis of drugs sold in one month from the pharmacy.
5. Different phases of clinical trials with elements to be evaluated.
6. Various sources of drug information and systematic approach to provide unbiased drug information.

Evaluation of prescriptions generated in hospital for drug interactions and find out the suitable management

Special requirements:

1. Each college should sign MoU with nearby local hospital having minimum 150 beds for providing necessary training to the students' on hospital pharmacy activities.
2. Well equipped with various resources of drug information.

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

MPHD1-436 CLINICAL PHARMACY (THEORY)

Theory : 3 Hrs. /Week

1. Objectives of the Subject :

Upon completion of the subject student shall be able to (Know, do, appreciate) –

- a. monitor drug therapy of patient through medication chart review and clinical review;
- b. obtain medication history interview and counsel the patients;
- c. identify and resolve drug related problems;
- d. detect, assess and monitor adverse drug reaction;
- e. interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states; and
- f. retrieve, analyse, interpret and formulate drug or medicine information.

Text books (Theory)

- a. Practice Standards and Definitions - The Society of Hospital Pharmacists of Australia.
- b. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc.
- c. Biopharmaceutics and Applied Pharmacokinetics - Leon Shargel, Prentice Hall publication.
- d. A text book of Clinical Pharmacy Practice; Essential concepts and skills, Dr.G.Parthasarathi etal, Orient Orient Langram Pvt.Ltd. ISSN8125026

References

- a. Australian drug information -Procedure manual. The Society of Hospital Pharmacists of Australia.
- b. Clinical Pharmacokinetics - Rowland and Tozer, Williams and Wilkins Publication.
- c. Pharmaceutical statistics. Practical and clinical applications. Sanford Bolton, Marcel Dekker, Inc.

2. Detailed syllabus and lecture wise

schedule: Title of the topic

1. **Definitions, development and scope of clinical pharmacy**
2. **Introduction to daily activities of a clinical pharmacist**
 - a. Drug therapy monitoring (medication chart review, clinical review, pharmacist interventions)
 - b. Ward round participation
 - c. Adverse drug reaction management
 - d. Drug information and poisons information
 - e. Medication history
 - f. Patient counseling
 - g. Drug utilisation evaluation (DUE) and review (DUR)
 - h. Quality assurance of clinical pharmacy services

3. **Patient data analysis**
The patient's case history, its structure and use in evaluation of drug therapy & Understanding common medical abbreviations and terminologies used in clinical practices.
4. **Clinical laboratory tests used in the evaluation of disease states, and interpretation of test results**
 - a. Haematological, Liver function, Renal function, thyroid function tests
 - b. Tests associated with cardiac disorders
 - c. Fluid and electrolyte balance
 - d. Microbiological culture sensitivity tests
 - e. Pulmonary Function Tests
5. **Drug & Poison information**
 - a. Introduction to drug information resources available
 - b. Systematic approach in answering DI queries
 - c. Critical evaluation of drug information and literature
 - d. Preparation of written and verbal reports
 - e. Establishing a Drug Information Centre
 - f. Poisons information- organization & information resources
6. **Pharmacovigilance**
 - a. Scope, definition and aims of pharmacovigilance
 - b. Adverse drug reactions - Classification, mechanism, predisposing factors, causality assessment [different scales used]
 - c. Reporting, evaluation, monitoring, preventing & management of ADRs
 - d. Role of pharmacist in management of ADR.
7. Communication skills, including patient counselling techniques, medication history interview, presentation of cases.
8. Pharmaceutical care concepts
9. Critical evaluation of biomedical literature
10. Medication errors

MPHD1-442 CLINICAL PHARMACY (PRACTICAL)

Practical : 3 Hrs./Week

Students are expected to perform 15 practicals in the following areas covering the topics dealt in theory class.

- a. Answering drug information questions (4 Nos)
- b. Patient medication counselling (4 Nos)
- c. Case studies related to laboratory investigations (4 Nos)
- d. Patient medication history interview (3 Nos)

Assignment:

Students are expected to submit THREE written assignments (1500 – 2000 words) on the topics given to them covering the following areas dealt in theory class.

Drug information, Patient medication history interview, Patient medication counselling, Critical appraisal of recently published articles in the biomedical literature which deals with a drug or therapeutic issue.

Format of the assignment:

1. Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year.
4. It shall be computer draft copy.
5. Name and signature of the student.
6. Time allocated for presentation may be 8+2 Min.

MPHD1-437 BIostatISTICS AND RESEARCH METHODOLOGY (THEORY)

Theory : 2 Hrs. /Week

1. Detailed syllabus and lecture wise schedule

1 Research Methodology

- a) Types of clinical study designs:
Case studies, observational studies, interventional studies,
- b) Designing the methodology
- c) Sample size determination and Power of a study
Determination of sample size for simple comparative experiments, determination of sample size to obtain a confidence interval of specified width, power of a study
- d) Report writing and presentation of data

2 Biostatistics

2.1 a) Introduction

- b) Types of data distribution
- c) Measures describing the central tendency distributions- average, median, mode
- d) Measurement of the spread of data-range, variation of mean, standard deviation, variance, coefficient of variation, standard error of mean.

2.2 Data graphics

Construction and labeling of graphs, histogram, piecharts, scatter plots, semilogarithmic plots

2.3 Basics of testing hypothesis

- a) Null hypothesis, level of significance, power of test, P value, statistical estimation of confidence intervals.
- b) Level of significance (Parametric data)- students t test (paired and unpaired), chi Square test, Analysis of Variance (one-way and two-way)
- c) Level of significance (Non-parametric data)- Sign test, Wilcoxon's signed rank test, Wilcoxon rank sum test, Mann Whitney U test, Kruskal-Wallis test (one way ANOVA)
- d) Linear regression and correlation- Introduction, Pearson's and Spearman's correlation and correlation co-efficient.

Introduction to statistical software: SPSS, Epi Info, SAS

2.4 Statistical methods in epidemiology

Incidence and prevalence, relative risk, attributable risk

3. Computer applications in pharmacy

Computer System in Hospital Pharmacy: Patterns of Computer use in Hospital Pharmacy – Patient record database management, Medication order entry – Drug

labels and list – Intravenous solution and admixture, patient medication profiles, Inventory control, Management report & Statistics.

Computer In Community Pharmacy

Computerizing the Prescription Dispensing process

Use of Computers for Pharmaceutical Care in community pharmacy Accounting and General ledger system

Drug Information Retrieval & Storage :

Introduction – Advantages of Computerized Literature

Retrieval Use of Computerized Retrieval

Reference books:

- a. Pharmaceutical statistics- practical and clinical applications, Sanford Bolton 3rd edition, publisher Marcel Dekker Inc. New York.
- b. Drug Information- A Guide for Pharmacists, Patrick M Malone, Karen L Kier, John E Stanovich , 3rd edition, McGraw Hill Publications 2006

MPHD1-438 BIOPHARMACEUTICS AND PHARMACOKINETICS (THEORY)

Theory : 3 Hrs. /Week

1. Biopharmaceutics

1. Introduction to Biopharmaceutics
 - a. Absorption of drugs from gastrointestinal tract.
 - b. Drug Distribution.
 - c. Drug Elimination.

2. Pharmacokinetics

2. Introduction to Pharmacokinetics.
 - a. Mathematical model
 - b. Drug levels in blood.
 - c. Pharmacokinetic model
 - d. Compartment models
 - e. Pharmacokinetic study.
3. One compartment open model.
 - a. Intravenous Injection (Bolus)
 - b. Intravenous infusion.
4. Multicompartment models.
 - a. Two compartment open model.
 - b. IV bolus, IV infusion and oral administration
5. Multiple – Dosage Regimens.
 - a. Repetitive Intravenous injections – One Compartment Open Model
 - b. Repetitive Extravascular dosing – One Compartment Open model
 - c. Multiple Dose Regimen – Two Compartment Open Model
6. Nonlinear Pharmacokinetics.
 - a. Introduction
 - b. Factors causing Non-linearity.
 - c. Michaelis-menton method of estimating parameters.
7. Noncompartmental Pharmacokinetics.
 - a. Statistical Moment Theory.
 - b. MRT for various compartment models.
 - c. Physiological Pharmacokinetic model.
8. Bioavailability and Bioequivalence.
 - a. Introduction.
 - b. Bioavailability study protocol.

Methods of Assessment of Bioavailability

MPHD1-443 BIOPHARMACEUTICS AND PHARMACOKINETICS (PRACTICAL)

Practical : 3 Hrs./Week

1. Improvement of dissolution characteristics of slightly soluble drugs by some methods.
2. Comparison of dissolution studies of two different marketed products of same drug.
3. Influence of polymorphism on solubility and dissolution.
4. Protein binding studies of a highly protein bound drug and poorly protein bound drug.
5. Extent of plasma-protein binding studies on the same drug (i.e. highly and poorly protein bound drug) at different concentrations in respect of constant time.
6. Bioavailability studies of some commonly used drugs on animal/human model.
7. Calculation of K_a , K_e , $t_{1/2}$, C_{max} , AUC, AUMC, MRT etc. from blood profile data.
8. Calculation of bioavailability from urinary excretion data for two drugs.
9. Calculation of AUC and bioequivalence from the given data for two drugs.
10. In vitro absorption studies.
11. Bioequivalency studies on the different drugs marketed.(eg) Tetracycline, Sulphamethoxzole, Trimethoprim, Aspirin etc., on animals and human volunteers.
12. Absorption studies in animal inverted intestine using various drugs.
13. Effect on contact time on the plasma protein binding of drugs.
14. Studying metabolic pathways for different drugs based on elimination kinetics data.
15. Calculation of elimination half-life for different drugs by using urinary elimination data and blood level data.
16. Determination of renal clearance.

References:

- a. Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi
- b. Remington's Pharmaceutical Sciences, By Mack Publishing Company, Pennsylvania.
- c. Pharmacokinetics: By Milo Gibaldi Donald, R. Mercel Dekker Inc.
- d. Hand Book of Clinical Pharmacokinetics, By Milo Gibaldi and Laurie Prescott by ADIS Health Science Press.
- e. Biopharmaceutics and Pharmacokinetics; By Robert F Notari
- f. Biopharmaceutics; By Swarbrick
- g. Bio pharmaceutics and Pharmacokinetics-A Treatise, By D. M. Brahmankar and Sunil B.Jaiswal, Vallabh Prakashan Pitampura, Delhi
- h. Cilincal Pharmacokinetics, Concepts and Applications: By Malcolm Rowland and Thomas, N. Tozen, Lea and Febrger, Philadelphia, 1995.
- i. Dissolution, Bioavailability and Bioequivalence, By Abdou H.M, Mack, Publishing Company, Pennsylvania 1989.
- j. Biopharmaceutics and Clinical Pharmacokinetics-An introduction 4th edition Revised and expanded by Rebert F Notari Marcel Dekker Inn, New York and Basel, 1987.

Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James, C. Roylan, Marcel Dekker Inc, New York 1996

MPHD1-439 CLINICAL TOXICOLOGY (THEORY)

Theory : 2 Hrs. /Week

1. General principles involved in the management of poisoning
2. Antidotes and the clinical applications.
3. Supportive care in clinical Toxicology.
4. Gut Decontamination.
5. Elimination Enhancement.
6. Toxicokinetics.
7. Clinical symptoms and management of acute poisoning with the following agents –
 - a) Pesticide poisoning: organophosphorous compounds, carbamates, organochlorines, pyrethroids.
 - b) Opiates overdose.
 - c) Antidepressants
 - d) Barbiturates and benzodiazepines.
 - e) Alcohol: ethanol, methanol.
 - f) Paracetamol and salicylates.
 - g) Non-steroidal anti-inflammatory drugs.
 - h) Hydrocarbons: Petroleum products and PEG.
 - i) Caustics: inorganic acids and alkali.
 - j) Radiation poisoning
8. Clinical symptoms and management of chronic poisoning with the following agents – Heavy metals: Arsenic, lead, mercury, iron, copper
9. Venomous snake bites: Families of venomous snakes, clinical effects of venoms, general management as first aid, early manifestations, complications and snake bite injuries.
10. Plants poisoning. Mushrooms, Mycotoxins.
11. Food poisonings
12. Envenomations – Arthropod bites and stings.

Substance abuse:

Signs and symptoms of substance abuse and treatment of dependence

- a) CNS stimulants :amphetamine
- b) Opioids
- c) CNS depressants
- d) Hallucinogens: LSD
- e) Cannabis group
- f) Tobacco

References:

- a. Matthew J Ellenhorn. ELLENHORNS MEDICAL TOXICOLOGY – DIAGNOSIS AND TREATMENT OF POISONING. Second edition. Williams and Willkins publication, London
- b. V V Pillay. HANDBOOK OF FORENSIC MEDICINE AND TOXICOLOGY. Thirteenth edition 2003 Paras Publication, Hyderabad.

Fifth year

MPHD1-544 CLINICAL RESEARCH (THEORY)

Theory : 3 Hrs. /Week

1. Drug development

process: Introduction

Various Approaches to drug discovery

1. Pharmacological
2. Toxicological
3. IND Application
4. Drug characterization
5. Dosage form

2. Clinical development of drug:

1. Introduction to Clinical trials
 2. Various phases of clinical trial.
 3. Methods of post marketing surveillance
 4. Abbreviated New Drug Application submission.
 5. Good Clinical Practice – ICH, GCP, Central drug standard control organisation (CDSCO) guidelines
 6. Challenges in the implementation of guidelines
 7. Ethical guidelines in Clinical Research
 8. Composition, responsibilities, procedures of IRB / IEC
 9. Overview of regulatory environment in USA, Europe and India.
 10. Role and responsibilities of clinical trial personnel as per ICH GCP
 - a. Sponsor
 - b. Investigators
 - c. Clinical research associate
 - d. Auditors
 - e. Contract research coordinators
 - f. Regulatory authority
 11. Designing of clinical study documents (protocol, CRF, ICF, PIC with assignment)
 12. Informed consent Process
 13. Data management and its components
- Safety monitoring in clinical trials.

References :

- a. Central Drugs Standard Control Organization. Good Clinical Practices-Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health; 2001.
- b. International Conference on Harmonisation of Technical requirements for registration

of Pharmaceuticals for human use. ICH Harmonised Tripartite Guideline. Guideline for Good Clinical Practice.E6; May 1996.

- c. Ethical Guidelines for Biomedical Research on Human Subjects 2000. Indian Council of Medical Research, New Delhi.
- d. Textbook of Clinical Trials edited by David Machin, Simon Day and Sylvan Green, March 2005, John Wiley and Sons.
- e. Principles of Clinical Research edited by Giovanna di Ignazio, Di Giovanna and Haynes.
- f. Clinical Data Management edited by R K Rondels, S A Varley, C F Webbs. Second Edition, Jan 2000, Wiley Publications.

Goodman & Gilman: JG Hardman, LE Limbard, 10th Edn. McGraw Hill Publications, 2001.

MRSPTU

MPHD1-545 PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS (THEORY)

Theory : 3 Hrs. /Week

1. Pharmacoepidemiology :

Definition and scope:

Origin and evaluation of pharmacoepidemiology need for pharmacoepidemiology, aims and applications.

Measurement of outcomes in

pharmacoepidemiology Outcome measure and drug use measures

Prevalence, incidence and incidence rate. Monetary units, number of prescriptions, units of drugs dispensed, defined daily doses and prescribed daily doses, medication adherence measurement

Concept of risk in pharmacoepidemiology

Measurement of risk, attributable risk and relative risk, time-risk relationship and odds ratio

Pharmacoepidemiological methods

Includes theoretical aspects of various methods and practical study of various methods with the help of case studies for individual methods

Drug utilization review, case reports, case series, surveys of drug use, cross – sectional studies, cohort studies, case control studies, case –cohort studies, meta – analysis studies, spontaneous reporting, prescription event monitoring and record linkage system.

Sources of data for pharmacoepidemiological

studies Ad Hoc data sources and automated data systems.

Selected special applications of pharmacoepidemiology

Studies of vaccine safety, hospital pharmacoepidemiology, pharmacoepidemiology and risk management, drug induced birth defects.

2. Phrmacoeconomics:

Definition, history, needs of pharmacoeconomic

evaluations Role in formulary management decisions

Pharmacoeconomic evaluation

Outcome assessment and types of evaluation

Includes theoretical aspects of various methods and practical study of various methods with the help of case studies for individual methods:

Cost – minimization, cost- benefit, cost – effectiveness, cost utility

Applications of Pharmacoeconomics Software and case studies

S)

**MPHD1-546 CLINICAL PHARMACOKINETICS AND
PHARMACOTHERAPEUTIC
DRUG MONITORING (THEORY)**

Theory : 2 Hrs. /Week

- 1. Introduction to Clinical pharmacokinetics.**
- 2. Design of dosage regimens:**
Nomograms and Tabulations in designing dosage regimen, Conversion from intravenous to oral dosing, Determination of dose and dosing intervals, Drug dosing in the elderly and pediatrics and obese patients.
- 3. Pharmacokinetics of Drug Interaction:**
 - a. Pharmacokinetic drug interactions
 - b. Inhibition and Induction of Drug metabolism
 - c. Inhibition of Biliary Excretion.
- 4. Therapeutic Drug monitoring:**
 - a. Introduction
 - b. Individualization of drug dosage regimen (Variability – Genetic, Age and Weight , disease, Interacting drugs).
 - c. Indications for TDM. Protocol for TDM.
 - d. Pharmacokinetic/Pharmacodynamic Correlation in drug therapy.
 - e. TDM of drugs used in the following disease conditions: cardiovascular disease, Seizure disorders, Psychiatric conditions, and Organ transplantations.
- 5. Dosage adjustment in Renal and hepatic Disease.**
 - a. Renal impairment
 - b. Pharmacokinetic considerations
 - c. General approach for dosage adjustment in Renal disease.
 - d. Measurement of Glomerular Filtration rate and creatinine clearance.
 - e. Dosage adjustment for uremic patients.
 - f. Extracorporeal removal of drugs.
 - g. Effect of Hepatic disease on pharmacokinetics.
- 6. Population Pharmacokinetics.**
 - a. Introduction to Bayesian Theory.
 - b. Adaptive method or Dosing with feed back.
 - c. Analysis of Population pharmacokinetic Data.
- 7. Pharmacogenetics**
 - a. Genetic polymorphism in Drug metabolism: Cytochrome P-450 Isoenzymes.
 - b. Genetic Polymorphism in Drug Transport and Drug Targets.Pharmacogenetics and Pharmacokinetics/Pharmacodynamic considerations

Syllabus & Regulation for Pharm. D
2017 Onwards

MRSPTU

Year 1 st		Contact Hrs			Marks			Credits
Subject code	Subject Name	L	T	P	Int.	Ext.	Total	
1.1T	Human Anatomy and Physiology (T)	3	1	-	30	70	100	4
1.2T	Pharmaceutics (T)	2	1	-	30	70	100	3
1.3T	Medicinal Biochemistry (T)	3	1	-	30	70	100	4
1.4T	Pharmaceutical Organic Chemistry (T)	3	1	-	30	70	100	4
1.5T	Pharmaceutical Inorganic Chemistry (T)	2	1	-	30	70	100	3
1.6T	Remedial Mathematics#/ Remedial Biology* (T)	3	1	-	30	70	100	4
1.1P	Human Anatomy and Physiology (P)	-	-	4	30	70	100	2
1.2P	Pharmaceutics (P)	-	-	4	30	70	100	2
1.3P	Medicinal Biochemistry (P)	-	-	4	30	70	100	2
1.4P	Pharmaceutical Organic Chemistry (P)	-	-	4	30	70	100	2
1.5P	Pharmaceutical Inorganic Chemistry (P)	-	-	4	30	70	100	2
1.6P	Remedial Biology (P)*			4	30	70	100	2
Total		16	6	20# / 24*	330# / 360*	770# / 840*	1100# / 1200*	32# / 34*

*Applicable ONLY for the students who have studied Mathematics/Physics/Chemistry at HSC and appearing for Remedial Biology (RB) course.

#Applicable ONLY for the students who have studied Physics/Chemistry/Botany/Zoology at HSC and appearing for Remedial Mathematics (RM) course

Year 2 nd		Contact Hrs			Marks			Credits
Subject code	Subject Name	L	T	P	Int.	Ext.	Total	
2.1T	Pathophysiology (T)	3	1	-	30	70	100	4
2.2T	Pharmaceutical Microbiology (T)	3	1	-	30	70	100	4
2.3T	Pharmacognosy & Phytopharmaceuticals (T)	3	1	-	30	70	100	4
2.4T	Pharmacology-I (T)	3	1	-	30	70	100	4
2.5T	Community Pharmacy (T)	2	1	-	30	70	100	3
2.6T	Pharmacotherapeutics-I (T)	3	1	-	30	70	100	4
2.2P	Pharmaceutical Microbiology(P)	-	-	2	30	70	100	1
2.3P	Pharmacognosy & Phytopharmaceuticals (P)	-	-	2	30	70	100	1
2.4P	Pharmacology-I (P)	-	-	2	30	70	100	1
2.6P	Pharmacotherapeutics-I (P)	-	-	2	30	70	100	1
Total		17	6	8	300	700	1000	27

Year 3 rd		Contact Hrs			Marks			Credits
Subject code	Subject Name	L	T	P	Int.	Ext.	Total	
3.1T	Pharmacology-II (T)	3	1	-	30	70	100	4
3.2T	Pharmaceutical Analysis (T)	3	1	-	30	70	100	4
3.3T	Pharmacotherapeutics-II (T)	3	1	-	30	70	100	4
3.4T	Pharmaceutical Jurisprudence (T)	2	-	-	30	70	100	3
3.5T	Medicinal Chemistry(T)	3	1	-	30	70	100	4
3.6T	Pharmaceutical Formulations (T)	2	1	-	30	70	100	3
3.1P	Pharmacology-II (P)	-	-	4	30	70	100	2
3.2P	Pharmaceutical Analysis (P)	-	-	4	30	70	100	2
3.3P	Pharmacotherapeutics-II (P)	-	-	4	30	70	100	2
3.5P	Medicinal Chemistry (P)	-	-	4	30	70	100	2
3.6P	Pharmaceutical Formulations (P)	-	-	4	30	70	100	2
Total		16	5	20	330	770	1100	32

Year 4 th		Contact Hrs			Marks			Credits
Subject code	Subject Name	L	T	P	Int.	Ext.	Total	
4.1T	Pharmacotherapeutics-III (T)	3	1	-	30	70	100	4
4.2T	Hospital Pharmacy (T)	2	1	-	30	70	100	3
4.3T	Clinical Pharmacy (T)	3	1	-	30	70	100	4
4.4T	Biostatistics & Research Methodology (T)	2	1	-	30	70	100	3
4.5T	Biopharmaceutics & Pharmacokinetics (T)	3	1	-	30	70	100	4
4.6T	Clinical Toxicology (T)	2	1	-	30	70	100	3
4.1P	Pharmacotherapeutics-III (P)	-	-	4	30	70	100	2
4.2P	Hospital Pharmacy (P)	-	-	4	30	70	100	2
4.3P	Clinical Pharmacy (P)	-	-	4	30	70	100	2
4.4P	Biopharmaceutics & Pharmacokinetics(P)	-	-	4	30	70	100	2
Total		15	6	16	300	700	1000	29

Year 5 th		Contact Hrs			Marks			Credits
Subject code	Subject	L	H	S	Int.	Ext.	Total	
5.1T	Clinical Research (T)	3	-	1	30	70	100	4
5.2T	Pharmacoepidemiology and Pharmacoconomics(T)	3	-	1	30	70	100	4
5.3T	Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring (T)	2	-	1	30	70	100	3
5.4	Clerkship *	-	-	1	30	70	100	1
5.5	Project work (Six Months)	-	20	-	-	100**	100	20

Total	8	20	4	120	380	500	32
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* Attending ward rounds on daily basis.

** 30 marks – viva-voce (oral)

70 marks – Thesis work

L: Lecture, **P:** Practical, **T:** Tutorial, **H:** Hospital Posting, **S:** Seminar.

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APPENDIX-A
PHARM.D. SYLLABUS

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First Year

1.1 T. HUMAN ANATOMY & PHYSIOLOGY (THEORY)

Theory : 3 Hrs. /Week

1. **Scope and Objectives:** This course is designed to impart a fundamental knowledge on the structure and functions of the human body. It also helps in understanding both homeostasis mechanisms and homeostatic imbalances of various body systems. Since a medicament, which is produced by pharmacist, is used to correct the deviations in human body, it enhances the understanding of how the drugs act on the various body systems in correcting the disease state of the organs.
2. **Upon completion of the course the student shall be able to:**
 - a. describe the structure (gross and histology) and functions of various organs of the human body;
 - b. describe the various homeostatic mechanisms and their imbalances of various systems;
 - c. identify the various tissues and organs of the different systems of the human body;
 - d. perform the hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes;
 - e. appreciate coordinated working pattern of different organs of each system; and
 - f. appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body

3. **Course materials:**

Text books

- a. Tortora Gerard J. and Nicholas, P. Principles of anatomy and physiology
Publisher Harpercollins college New York.
- b. Wilson, K.J.W. Ross and Wilson's foundations of anatomy and physiology.
Publisher: Churchill Livingstone, Edinburg.

Reference books

- a. Guyton arthur, C. *Physiology of human body*. Publisher: Holtsaunders.
- b. Chatterjee, C.C. *Human physiology*. Volume 1&11. Publisher: medical allied agency, Calcutta.
- c. Peter L. Williams, Roger Warwick, Mary Dyson and Lawrence, H.
- d. *Gray's anatomy*. Publisher: Churchill Livingstone, London

4. **Lecture wise program :**

Topics

- 1 **Introduction:** Scope of anatomy and physiology, basic terminologies used in this subject (Description of the body as such planes and terminologies)
- 2 **Structure of cell** – its components and their functions.
- 3 **Elementary tissues of the human body:** epithelial, connective, Muscular and nervous tissues-their sub-types and characteristics
- 4 **Osseous system** - structure, composition and functions of the Skeleton. (done in practical classes - 6hrs)
Classification of joints, Types of movements of joints and disorders of joints (Definitions only)
- 5 **Haemopoetic System**
 - a) Composition and functions of blood
 - b) Haemopoiesis and disorders of blood components (definition of disorder)
 - c) Blood groups
 - d) Clotting factors and mechanism
 - e) Platelets and disorders of coagulation

- 6 Lymph**
a) Lymph and lymphatic system, composition, formation and circulation.
b) Spleen: structure and functions, Disorders
c) Disorders of lymphatic system (definition only)
- 7 Cardiovascular system**
a) Anatomy and functions of heart
b) Blood vessels and circulation (Pulmonary, coronary and systemic circulation)
c) Electrocardiogram (ECG)
d) Cardiac cycle and heart sounds
e) Blood pressure – its maintenance and regulation
f) Definition of the following disorders
Hypertension, Hypotension, Arteriosclerosis, Atherosclerosis, Angina, Myocardial infarction, Congestive heart failure, Cardiac arrhythmias
- 8 Respiratory system**
a) Anatomy of respiratory organs and functions
b) Mechanism / physiology of respiration and regulation of respiration
c) Transport of respiratory gases
d) Respiratory volumes and capacities, and Definition of: Hypoxia, Asphyxia, Dybarism, Oxygen therapy and resuscitation.
- 9 Digestive system**
a) Anatomy and physiology of GIT
b) Anatomy and functions of accessory glands of GIT
c) Digestion and absorption
d) Disorders of GIT (definitions only)
- 10 Nervous system**
a) Definition and classification of nervous system
b) Anatomy, physiology and functional areas of cerebrum
c) Anatomy and physiology of cerebellum
d) Anatomy and physiology of mid brain
e) Thalamus, hypothalamus and Basal Ganglia
f) Spinal cord: Structure & reflexes – mono-poly-planter
g) Cranial nerves – names and functions
h) ANS – Anatomy & functions of sympathetic & parasympathetic N.S.
- 11 Urinary system**
a) Anatomy and physiology of urinary system
b) Formation of urine
c) Renin Angiotensin system – Juxtaglomerular apparatus - acid base Balance
d) Clearance tests and micturition
- 12 Endocrine system**
a) Pituitary gland
b) Adrenal gland
c) Thyroid and Parathyroid glands
d) Pancreas and gonads
- 13 Reproductive system**
a) Male and female reproductive system
b) Their hormones – Physiology of menstruation
c) Spermatogenesis & Oogenesis
d) Sex determination (genetic basis)
e) Pregnancy and maintenance and parturition
f) Contraceptive devices

14 Sense organs

- a) Eye
- b) Ear
- c) Skin
- d) Tongue & Nose

15 Skeletal muscles

- a) Histology
- b) Physiology of Muscle contraction
- c) Physiological properties of skeletal muscle and their disorders (definitions)

16 Sports physiology

- a) Muscles in exercise, Effect of athletic training on muscles and muscle performance,
- b) Respiration in exercise, CVS in exercise, Body heat in exercise, Body fluids and salts in exercise,
- c) Drugs and athletics

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1.1 P. HUMAN ANATOMY & PHYSIOLOGY (PRACTICAL)

Practical : 3 Hrs./Week

General Requirements: Dissection box, Laboratory Napkin, muslin cloth, record, Observation book(100pages), Stationary items, Blood lancet.

Course materials:

Text books

Goyal, R. K, Natvar M.P, and Shah S.A, Practical anatomy, physiology and biochemistry, latest edition, Publisher: B.S Shah Prakashan, Ahmedabad.

Reference books

Ranade VG, Text book of practical physiology, Latest edition, Publisher: PVG, Pune Anderson Experimental Physiology, Latest edition, Publisher: NA

List of Experiments:

1. Study of tissues of human body
 - (a) Epithelial tissue.
 - (b) Muscular tissue.
2. Study of tissues of human body
 - (a) Connective tissue.
 - (b) Nervous tissue.
3. Study of appliances used in hematological experiments.
4. Determination of W.B.C. count of blood.
5. Determination of R.B.C. count of blood.
6. Determination of differential count of blood.
7. Determination of
 - (a) Erythrocyte Sedimentation Rate.
 - (b) Hemoglobin content of Blood.
 - (c) Bleeding time & Clotting time.
8. Determination of
 - (a) Blood Pressure.
 - (b) Blood group.
9. Study of various systems with the help of charts, models & specimens
 - (a) Skeleton system part I-axial skeleton.
 - (b) Skeleton system part II- appendicular skeleton.
 - (c) Cardiovascular system.
 - (d) Respiratory system.
 - (e) Digestive system.
 - (f) Urinary system.
 - (g) Nervous system.
 - (h) Special senses.
 - (i) Reproductive system.
10. Study of different family planning appliances.

11. To perform pregnancy diagnosis test.
12. Study of appliances used in experimental physiology.
13. To record simple muscle curve using gastrocnemius sciatic nerve preparation.
14. To record simple summation curve using gastrocnemius sciatic nerve preparation.
15. To record simple effect of temperature using gastrocnemius sciatic nerve preparation.
16. To record simple effect of load & after load using gastrocnemius sciatic nerve preparation.
17. To record simple fatigue curve using gastrocnemius sciatic nerve preparation.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

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1.2 T. PHARMACEUTICS (THEORY)

Theory : 2 Hrs. /Week

1. **Scope and objectives:** This course is designed to impart a fundamental knowledge on the art and science of formulating different dosage forms. It prepares the students for most basics of the applied field of pharmacy.
2. **Upon the completion of the course the student should be able to:**
 - a. know the formulation aspects of different dosage forms;
 - b. do different pharmaceutical calculation involved in formulation;
 - c. formulate different types of dosage forms; and
 - d. appreciate the importance of good formulation for effectiveness.

3. Course materials:

Text books

- a. Cooper and Gunns Dispensing for pharmacy students.
- b. A text book Professional Pharmacy by N.K.Jain and S.N.Sharma.

Reference books

- a. Introduction to Pharmaceutical dosage forms by Howard C. Ansel.
- b. Remington's Pharmaceutical Sciences.
- c. Register of General Pharmacy by Cooper and Gunn.
- d. General Pharmacy by M.L.Schroff.

4. Lecture wise

programme: Topics

- 1 a. **Introduction to dosage forms** - classification and definitions
b. **Prescription:** definition, parts and handling
c. **Posology:** Definition, Factors affecting dose selection. Calculation of children and infant doses.
- 2 Historical back ground and development of profession of pharmacy and pharmaceutical industry in brief.
- 3 Development of Indian Pharmacopoeia and introduction to other Pharmacopoeias such as BP, USP, European Pharmacopoeia, Extra pharmacopoeia and Indian national formulary.
- 4 Weights and measures, Calculations involving percentage solutions, allegation, proof spirit, isotonic solutions etc.
- 5 **Powders and Granules:** Classification advantages and disadvantages, Preparation of simple, compound powders, Insufflations, Dusting powders, Eutectic and Explosive powders, Tooth powder and effervescent powders and granules.
- 6 **Monophasic Dosage forms:** Theoretical aspects of formulation including adjuvant like stabilizers, colorants, flavours with examples. Study of Monophasic liquids like gargles, mouth washes, Throat paint, Ear drops, Nasal drops, Liniments and lotions, Enemas and collodions.
- 7 **Biphasic dosage forms:** Suspensions and emulsions, Definition, advantages and disadvantages, classification, test for the type of emulsion, formulation, stability and evaluation.
- 8 **Suppositories and pessaries:** Definition, advantages and disadvantages, types of base, method of preparation, Displacement value and evaluation.

- 9 **Galenicals:** Definition, equipment for different extraction processes like infusion, Decoction, Maceration and Percolation, methods of preparation of spirits, tinctures and extracts.
- 10 **Pharmaceutical calculations.**
- 11 **Surgical aids:** Surgical dressings, absorbable gelatin sponge, sutures, ligatures and medicated bandages.
- 12 **Incompatibilities:** Introduction, classification and methods to overcome the incompatibilities.

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1.2 P. PHARMACEUTICS (PRACTICAL)

Practical : 3 Hrs./Week

List of Experiments:

1. Syrups

- a. Simple Syrup I.P
- b. Syrup of Ephedrine Hcl NF
- c. Syrup Vasaka IP
- d. Syrup of ferrous Phosphate IP
- e. Orange Syrup

2. Elixir

- a. Piperizine citrate elixir BP
- b. Cascara elixir BPC
- c. Paracetamol elixir BPC

3. Linctus

- a. Simple Linctus BPC
- b. Pediatric simple Linctus BPC

4. Solutions

- a. Solution of cresol with soap IP
- b. Strong solution of ferric chloride BPC
- c. Aqueous Iodine Solution IP
- d. Strong solution of Iodine IP
- e. Strong solution of ammonium acetate I

5. Liniments

- a. Liniment of turpentine IP*
- b. Liniment of camphor IP

6. Suspensions*

- a. Calamine lotion
- b. Magnesium Hydroxide mixture BP

7. Emulsions*

- a. Cod liver oil emulsion
- b. Liquid paraffin emulsion

8. Powders[□]

- a. Eutectic powder
- b. Explosive powder
- c. Dusting powder
- d. Insufflations

9. Suppositories[□]

- a. Boric acid suppositories
- b. Chloral suppositories

10. Incompatibilities

- a. Mixtures with Physical
- b. Chemical & Therapeutic incompatibilities

* colourless bottles required for dispensing [□] Paper envelope (white), butter paper and white paper required for dispensing.

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

1.3 T. MEDICINAL BIOCHEMISTRY (THEORY)

Theory : 3 Hrs. /Week

1. Scope of the Subject: Applied biochemistry deals with complete understanding of the molecular level of the chemical process associated with living cells. Clinical chemistry deals with the study of chemical aspects of human life in health and illness and the application of chemical laboratory methods to diagnosis, control of treatment, and prevention of diseases.

2. Objectives of the Subject (Know, do, appreciate) :

The objective of the present course is providing biochemical facts and the principles to the students of pharmacy. Upon completion of the subject student shall be able to –

- a. understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of diseases;
- b. know the metabolic process of biomolecules in health and illness (metabolic disorders);
- c. understand the genetic organization of mammalian genome; protein synthesis; replication; mutation and repair mechanism;
- d. know the biochemical principles of organ function tests of kidney, liver and endocrine gland; and
- e. do the qualitative analysis and determination of biomolecules in the body fluids.

Text books (Theory)

- a. Harpers review of biochemistry - Martin
- b. Text book of biochemistry – D.Satyanarayana
- c. Text book of clinical chemistry- Alex kaplan &Laverve L.Szabo

Reference books (Theory)

- a. Principles of biochemistry -- Lehninger
- b. Text book of biochemistry -- Ramarao
- c. Practical Biochemistry-David T.Plummer.
- d. Practical Biochemistry-Pattabhiraman.

3. Lecture wise programme:

Topics

- 1 **Introduction to biochemistry:** Cell and its biochemical organization, transport process across the cell membranes. Energy rich compounds; ATP, Cyclic AMP and their biological significance.
- 2 **Enzymes:** Definition; Nomenclature; IUB classification; Factor affecting enzyme activity; Enzyme action; enzyme inhibition. Isoenzymes and their therapeutic and diagnostic applications; Coenzymes and their biochemical role and deficiency diseases.
- 3 **Carbohydrate metabolism:** Glycolysis, Citric acid cycle (TCA cycle), HMP shunt, Glycogenolysis, gluconeogenesis, glycogenesis. Metabolic disorders of carbohydrate metabolism (diabetes mellitus and glycogen storage diseases); Glucose, Galactose tolerance test and their significance; hormonal regulation of carbohydrate metabolism.

- 4 **Lipid metabolism:** Oxidation of saturated (β -oxidation); Ketogenesis and ketolysis; biosynthesis of fatty acids, lipids; metabolism of cholesterol; Hormonal regulation of lipid metabolism. Defective metabolism of lipids (Atherosclerosis, fatty liver, hypercholesterolemia).
- 5 **Biological oxidation:** Coenzyme system involved in Biological oxidation. Electron transport chain (its mechanism in energy capture; regulation and inhibition); Uncouplers of ETC; Oxidative phosphorylation;
- 6 **Protein and amino acid metabolism:** protein turn over; nitrogen balance; Catabolism of Amino acids (Transamination, deamination & decarboxylation). Urea cycle and its metabolic disorders; production of bile pigments; hyperbilirubinemia, porphoria, jaundice. Metabolic disorder of Amino acids.
- 7 **Nucleic acid metabolism:** Metabolism of purine and pyrimidine nucleotides; Protein synthesis; Genetic code; inhibition of protein synthesis; mutation and repair mechanism; DNA replication (semiconservative /onion peel models) and DNA repair mechanism.
- 8 **Introduction to clinical chemistry: Cell;** composition; malfunction; Roll of the clinical chemistry laboratory.
- 9 **The kidney function tests:** Role of kidney; Laboratory tests for normal function includes-
 - a) Urine analysis (macroscopic and physical examination, quantitative and semiquantitative tests.)
 - b) Test for NPN constituents. (Creatinine /urea clearance, determination of blood and urine creatinine, urea and uric acid)
 - c) Urine concentration test
 - d) Urinary tract calculi. (stones)
- 10 **Liver function tests:** Physiological role of liver, metabolic, storage, excretory, protective, circulatory functions and function in blood coagulation.
 - a) Test for hepatic dysfunction-Bile pigments metabolism.
 - b) Test for hepatic function test- Serum bilirubin, urine bilirubin, and urine urobilinogen.
 - c) Dye tests of excretory function.
 - d) Tests based upon abnormalities of serum proteins. Selected enzyme tests.
- 11 **Lipid profile tests:** Lipoproteins, composition, functions. Determination of serum lipids, total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides.
- 12 **Immunochemical techniques** for determination of hormone levels and protein levels in serum for endocrine diseases and infectious diseases.
Radio immuno assay (RIA) and Enzyme Linked Immuno Sorbent Assay (ELISA)
- 13 **Electrolytes:** Body water, compartments, water balance, and electrolyte distribution. Determination of sodium, calcium potassium, chlorides, bicarbonates in the body fluids.

1.3 P. MEDICINAL BIOCHEMISTRY (PRACTICAL)

Practical : 3 Hrs./Week

Title of the

Experiment:

- 1 Qualitative analysis of normal constituents of urine.*
- 2 Qualitative analysis of abnormal constituents of urine.*
- 3 Quantitative estimation of urine sugar by Benedict's reagent method.**
- 4 Quantitative estimation of urine chlorides by Volhard's method.**
- 5 Quantitative estimation of urine creatinine by Jaffe's method.**
- 6 Quantitative estimation of urine calcium by precipitation method.**
- 7 Quantitative estimation of serum cholesterol by Libermann Burchard's method.**
- 8 Preparation of Folin Wu filtrate from blood.*
- 9 Quantitative estimation of blood creatinine.**
- 10 Quantitative estimation of blood sugar Folin-Wu tube method.**
- 11 Estimation of SGOT in serum.**
- 12 Estimation of SGPT in serum.**
- 13 Estimation of Urea in Serum.**
- 14 Estimation of Proteins in Serum.**
- 15 Determination of serum bilirubin**
- 16 Determination of Glucose by means of Glucoseoxidase.**
- 17 Enzymatic hydrolysis of Glycogen/Starch by Amylases.**
- 18 Study of factors affecting Enzyme activity. (pH & Temp.)**
- 19 Preparation of standard buffer solutions and its pH measurements (any two)*
- 20 Experiment on lipid profile tests**
- 21 Determination of sodium, calcium and potassium in serum.**

** indicate major experiments & * indicate minor experiments

Assignments:

Format of the assignment

1. Minimum & Maximum number of pages.
2. It shall be computer draft copy.
3. Reference(s) shall be included at the end.
4. Name and signature of the student.
5. Assignment can be a combined presentation at the end of the academic year.
6. Time allocated for presentation may be 8+2 Min.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

1.4 T. PHARMACEUTICAL ORGANIC CHEMISTRY (THEORY)

Theory : 3 Hrs. /Week

- 1. Scope and objectives:** This course is designed to impart a very good knowledge about
- IUPAC/Common system of nomenclature of simple organic compounds belonging to different classes of organic compounds;
 - Some important physical properties of organic compounds;
 - Free radical/ nucleophilic [alkyl/ acyl/ aryl] /electrophilic substitution, free radical/ nucleophilic / electrophilic addition, elimination, oxidation and reduction reactions with mechanism, orientation of the reaction, order of reactivity, stability of compounds;
 - Some named organic reactions with mechanisms; and
 - Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

2. Course materials:

Text books

- T.R.Morrison and R. Boyd - Organic chemistry,
- Bentley and Driver-Text book of Pharmaceutical chemistry
- I.L.Finer- Organic chemistry, the fundamentals of chemistry

Reference books

- Organic chemistry – J.M.Cram and D.J.Cram
- Organic chemistry- Brown
- Advanced organic chemistry- Jerry March, Wiley
- Organic chemistry- Cram and Hammered, Pine Hendrickson

3. Lecture wise programme :

Topics

- 1 Structures and Physical properties:**
- Polarity of bonds, polarity of molecules, M.P, Inter molecular forces, B.P, Solubility, non ionic solutes and ionic solutes, protic and aprotic Solvents, ion pairs,
 - Acids and bases, Lowry bronsted and Lewis theories
 - Isomerism
- 2 Nomenclature of organic compound belonging to the following classes**
Alkanes, Alkenes, Dienes, Alkynes, Alcohols, Aldehydes, Ketones, Amides, Amines, Phenols, Alkyl Halides, Carboxylic Acid, Esters, Acid Chlorides And Cycloalkanes.
- 3 Free radicals chain reactions of alkane :** Mechanism, relative reactivity and stability
- 4 Alicyclic compounds:** Preparations of cyclo alkanes, Bayer strain theory and orbital picture of angle strain.
- 5 Nucleophilic aliphatic substitution mechanism:** Nucleophiles and leaving groups, kinetics of second and first order reaction, mechanism and kinetics of SN_2 reactions. Stereochemistry and steric hindrance, role of solvents, phase transfer catalysis, mechanism and kinetics of SN_1 reactions, stereochemistry, carbocation and their stability, rearrangement of carbocation, role of solvents in SN_1 reaction, Ion dipole bonds, SN_2 versus SN_1 solvolyses, nucleophilic assistance by the solvents.

- 6 Dehydro halogenation of alkyl halides:** 1,2 elimination, kinetics, E2 and E1 mechanism, elimination via carbocation, evidence for E2 mechanism, absence of rearrangement isotope effect, absence hydrogen exchange, the element effect, orientation and reactivity, E2 versus E1, elimination versus substitution, dehydration of alcohol, ease of dehydration, acid catalysis, reversibility, orientation.
- 7 Electrophilic and free radicals addition:** Reactions at carbon-carbon, double bond, electrophile, hydrogenation, heat of hydrogenation and stability of alkenes, markownikoff rule, addition of hydrogen halides, addition of hydrogen bromides, peroxide effect, electrophilic addition, mechanism, rearrangement, absence of hydrogen exchange, orientation and reactivity, addition of halogen, mechanism, halohydrin formation, mechanism of free radicals addition, mechanism of peroxide initiated addition of hydrogen bromide, orientation of free addition, additions of carbene to alkene, cyclo addition reactions.
- 8 Carbon-carbon double bond as substituents:** Free radical halogenations of alkenes, comparison of free radical substitution with free radical addition, free radical substitution in alkenes, orientation and reactivity, allylic rearrangements.
- 9 Theory of resonance:** Allyl radical as a resonance hybrid, stability, orbital picture, resonance stabilisation of allyl radicals, hyper conjugation, allyl cation as a resonance hybrid, nucleophilic substitution in allylic substrate, SN1 reactivity, allylic rearrangement, resonance stabilisation of allyl cation, hyper conjugation, nucleophilic substitution in allylic substrate, SN2 nucleophilic substitution in vinylic substrate, vinylic cation, stability of conjugated dienes, resonance in alkenes, hyper conjugation, ease of formation of conjugated dienes, orientation of elimination, electrophilic addition to conjugated dienes, 1,4- addition, 1,2-versus 1,4-addition, rate versus equilibrium, orientation and reactivity of free radical addition to conjugated dienes.
- 10 Electrophilic aromatic substitution:** Effect of substituent groups, determination of orientation, determination of relative reactivity, classification of substituent group, mechanism of nitration, sulphonation, halogenation, friedel craft alkylation, friedel craft acylation, reactivity and orientation, activating and deactivating O,P,M directing groups, electron release via resonance, effect of halogen on electrophilic aromatic substitution in alkyl benzene, side chain halogenation of alkyl benzene, resonance stabilization of benzyl radical.
- 11 Nucleophilic addition reaction:** Mechanism, ionisation of carboxylic acids, acidity constants, acidity of acids, structure of carboxylate ions, effect of substituent on acidity, nucleophilic acyl substitution reaction, conversion of acid to acid chloride, esters, amide and anhydride. Role of carboxyl group, comparison of alkyl nucleophilic substitution with acyl nucleophilic substitution.

- 12 Mechanism** of aldol condensation, claisen condensation, cannizzaro reaction, crossed aldol condensation, crossed cannizzaro reaction, benzoin condensation, perkin condensation. Knoevenagel, Reformatsky reaction, Wittig reaction, Michael addition.
- 13 Hoffman rearrangement:** Migration to electron deficient nitrogen, Sandmeyer's reaction, basicity of amines, diazotisation and coupling, acidity of phenols, Williamson synthesis, Fries rearrangement, Kolbe reaction, Reimer tieman's reactions.
- 14 Nucleophilic aromatic substitution:** Bimolecular displacement mechanisms, orientation, comparison of aliphatic nucleophilic substitution with that of aromatic.
- 15 Oxidation reduction reaction.**
- 16 Study of the following official compounds-** preparation, test for purity, assay and medicinal uses of Chlorbutol, Dimercaprol, Glycerol trinitrate, Urea, Ethylene diamine dihydrate, Vanillin, Paraldehyde, Ethylene chloride, Lactic acid, Tartaric acid, citric acid, salicylic acid, aspirin, methyl salicylate, ethyl benzoate, benzyl benzoate, dimethyl phthalate, sodium lauryl sulphate, saccharin sodium, mephensin.

1.4 P. PHARMACEUTICAL ORGANIC CHEMISTRY (PRACTICAL)

Practical : 3 Hrs./Week

I. Introduction to the various laboratory techniques through demonstration involving synthesis of the following compounds (at least 8 compounds to be synthesised):

1. Acetanilide / aspirin (Acetylation)
2. Benzanilide / Phenyl benzoate (Benzoylation)
3. P-bromo acetanilide / 2,4,6 – tribromo aniline (Bromination)
4. Dibenzylidene acetone (Condensation)
5. 1-Phenylazo-2-naphthol (Diazotisation and coupling)
6. Benzoic acid / salicylic acid (Hydrolysis of ester)
7. M-dinitro benzene (Nitration)
8. 9, 10 – Anthraquinone (Oxidation of anthracene) / preparation of benzoic acid from toluene or benzaldehyde
9. M-phenylene diamine (Reduction of M-dinitrobenzene) / Aniline from nitrobenzene
10. Benzophenone oxime
11. Nitration of salicylic acid
12. Preparation of picric acid
13. Preparation of O-chlorobenzoic acid from O-chlorotoluene
14. Preparation of cyclohexanone from cyclohexanol

II. Identification of organic compounds belonging to the following classes by :

Systematic qualitative organic analysis including preparation of derivatives Phenols, amides, carbohydrates, amines, carboxylic acids, aldehyde and ketones, Alcohols, esters, hydrocarbons, anilides, nitrocompounds.

III. Introduction to the use of stereo models:

Methane, Ethane, Ethylene, Acetylene, Cis alkene, Trans alkene, inversion of configuration.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

1.5 T. PHARMACEUTICAL INORGANIC CHEMISTRY (THEORY)

Theory : 2 Hrs. /Week

- 1. Scope and objectives:** This course mainly deals with fundamentals of Analytical chemistry and also the study of inorganic pharmaceuticals regarding their monographs and also the course deals with basic knowledge of analysis of various pharmaceuticals.
- 2. Upon completion of the course student shall be able to:**
 - a. understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals;
 - b. know the analysis of the inorganic pharmaceuticals their applications; and
 - c. appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease.

3. Course materials:

Text books

- a. A text book Inorganic medicinal chemistry by Surendra N. Pandeya
- b. A. H. Beckett and J. B. Stanlake's Practical Pharmaceutical chemistry Vol-I & Vol-II
- c. Inorganic Pharmaceutical Chemistry III-Edition P.Gundu Rao

Reference books

- a. Inorganic Pharmaceutical Chemistry by Anand & Chetwal
- b. Pharmaceutical Inorganic chemistry by Dr.B.G.Nagavi
- c. Analytical chemistry principles by John H. Kennedy
- d. I.P.1985 and 1996, Govt. of India, Ministry of health

4. Lecture wise programme:

Topics

- 1 Errors
- 2 Volumetric analysis
- 3 Acid-base titrations
- 4 Redox titrations
- 5 Non aqueous titrations
- 6 Precipitation titrations
- 7 Complexometric titrations
- 8 Theory of indicators
- 9 Gravimetry
- 10 Limit tests
- 11 Medicinal gases
- 12 Acidifiers
- 13 Antacids
- 14 Cathartics
- 15 Electrolyte replenishers

- 16** Essential Trace elements
- 17** Antimicrobials
- 18** Pharmaceutical aids
- 19** Dental Products
- 20** Miscellaneous compounds
- 21** Radio Pharmaceuticals

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1.5 P. PHARMACEUTICAL INORGANIC CHEMISTRY (PRACTICAL)

Practical : 3 Hrs./Week

1. Limit test (6 exercises)

- a. Limit test for chlorides
- b. Limit test for sulphates
- c. Limit test for iron
- d. Limit test for heavy metals
- e. Limit test for arsenic
- f. Modified limit tests for chlorides and sulphates

2. Assays (10 exercises)

- a. Ammonium chloride- Acid-base titration
- b. Ferrous sulphate- Cerimetry
- c. Copper sulphate- Iodometry
- d. Calcilugluconate- Complexometry
- e. Hydrogen peroxide – Permanganometry
- f. Sodium benzoate – Nonaqueous titration
- g. Sodium chloride – Modified volhard's method
- h. Assay of KI – KIO_3 titration
- i. Gravimetric estimation of barium as barium sulphate
- j. Sodium antimony gluconate or antimony potassium tartarate

3. Estimation of mixture (Any two exercises)

- a. Sodium hydroxide and sodium carbonate
- b. Boric acid and Borax
- c. Oxalic acid and sodium oxalate

4. Test for identity (Any three exercises)

- a. Sodium bicarbonate
- b. Barium sulphate
- c. Ferrous sulphate
- d. Potassium chloride

5. Test for purity (Any two exercises)

- a. Swelling power in Bentonite
- b. Acid neutralising capacity in aluminium hydroxide gel
- c. Ammonium salts in potash alum
- d. Adsorption power heavy Kaolin
- e. Presence of Iodates in KI

6. Preparations (Any two exercises)

- a. Boric acids
- b. Potash alum
- c. Calcium lactate
- d. Magnesium sulphate

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

1.6 T. REMEDIAL MATHEMATICS/BIOLOGY (THEORY)

Theory : 3 Hrs. /Week

REMEDIAL MATHEMATICS :

1. **Scope and objectives:** This is an introductory course in mathematics. This subjects deals with the introduction to matrices, determinants, trigonometry, analytical geometry, differential calculus, integral calculus, differential equations, laplace transform.

2. **Upon completion of the course the student shall be able to : –**

- a. Know Trignometry, Analytical geometry, Matrices, Determinant, Integration, Differential equation, Laplace transform and their applications;
- b. solve the problems of different types by applying theory; and
- c. appreciate the important applications of mathematics in pharmacy.

3. **Course materials:**

Text books

- a. Differential calculus By Shantinarayan
- b. Text book of Mathematics for second year pre-university by Prof.B.M.Sreenivas

Reference books

- a. Integral calculus By Shanthinarayan
- b. Engineering mathematics By B.S.Grewal
- c. Trigonometry Part-I By S.L.Loney

4. **Lecture wise programme :**

Topics

- 1 **Algebra :** Determinants, Matrices
- 2 **Trigonometry :** Sides and angles of a triangle, solution of triangles
- 3 **Analytical Geometry :**Points, Straight line, circle, parabola
- 4 **Differential calculus:** Limit of a function, Differential calculus, Differentiation of a sum, Product, Quotient Composite, Parametric, exponential, trigonometric and Logarithmic function. Successive differentiation, Leibnitz's theorem, Partial differentiation, Euler's theorem
on homogeneous functions of two variables
- 5 **Integral Calculus:** Definite integrals, integration by substitution and by parts, Properties of definite integrals.
- 6 **Differential equations:** Definition, order, degree, variable separable, homogeneous, Linear, heterogenous, linear, differential equation with constant coefficient, simultaneous linear equation of second order.
- 7 **Laplace transform:** Definition, Laplace transform of elementary functions, Properties of linearity and shifting.

BIOLOGY :

1. Scope and objectives: This is an introductory course in Biology, which gives detailed study of natural sources such as plant and animal origin. This subject has been introduced to the pharmacy course in order to make the student aware of various naturally occurring drugs and its history, sources, classification, distribution and the characters of the plants and animals. This subject gives basic foundation to Pharmacognosy.

2. Course materials:

Text books

- a. Text book of Biology by S.B.Gokhale
- b. A Text book of Biology by Dr.Thulajappa and Dr. Seetaram.

Reference books

- a. A Text book of Biology by B.V.Sreenivasa Naidu
- b. A Text book of Biology by Naidu and Murthy
- c. Botany for Degree students By A.C.Dutta.
- d. Outlines of Zoology by M.Ekambaranatha ayyer and T.N.Ananthakrishnan.
- e. A manual for pharmaceutical biology practical by S.B.Gokhale and C.K.Kokate.

3. Lecture wise programme :

Topic

PART – A

- 01 Introduction
- 02 General organization of plants and its inclusions
- 03 Plant tissues
- 04 Plant kingdom and its classification
- 05 Morphology of plants
- 06 Root, Stem, Leaf and Its modifications
- 07 Inflorescence and Pollination of flowers
- 08 Morphology of fruits and seeds
- 09 Plant physiology
- 10 Taxonomy of Leguminosae, umbelliferae, Solanaceae, Liliaceae, Zinziberaceae, Rubiaceae
- 11 Study of Fungi, Yeast, Penicillin and Bacteria

PART-B

- 01 Study of Animal cell
- 02 Study animal tissues
- 03 Detailed study of frog
- 04 Study of Pisces, Raptiles, Aves
- 05 General organization of mammals
- 06 Study of poisonous animals

1.6 P. BIOLOGY (PRACTICAL)

Practical : 3 Hrs./Week

Title:

1. Introduction of biology experiments
2. Study of cell wall constituents and cell inclusions
3. Study of Stem modifications
4. Study of Root modifications
5. Study of Leaf modifications
6. Identification of Fruits and seeds
7. Preparation of Permanent slides
8. T.S. of Senna, Cassia, Ephedra, Podophyllum.
9. Simple plant physiological experiments
10. Identification of animals
11. Detailed study of Frog
12. Computer based tutorials

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

Second year

2.1 T. PATHOPHYSIOLOGY (THEORY)

Theory : 3 Hrs. /Week

1. **Scope of the Subject:** This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic Pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge of its application in other subject of pharmacy.
2. **Objectives of the Subject :** Upon completion of the subject student shall be able to—
 - a. describe the etiology and pathogenesis of the selected disease states;
 - b. name the signs and symptoms of the diseases; and
 - c. mention the complications of the diseases.

Text books (Theory)

- a. Pathologic basis of disease by- Cotran, Kumar, Robbins
- b. Text book of Pathology- Harsh Mohan
- c. Text book of Pathology- Y.M. Bhide

Reference books (Theory)

- a. Clinical Pharmacy and Therapeutics; Second edition; Roger Walker; Churchill Livingstone publication

3. Detailed syllabus and lecture wise schedule:

Topic

- 1 **Basic principles of cell injury and Adaptation**
 - a) Causes, Pathogenesis and morphology of cell injury
 - b) Abnormalities in lipoproteinaemia, glycogen infiltration and glycogen infiltration and glycogen infiltration and glycogen storage diseases
- 2 **Inflammation**
 - a) Pathogenesis of acute inflammation, Chemical mediators in inflammation, Types of chronic inflammation
 - b) Repairs of wounds in the skin, factors influencing healing of wounds
- 3 **Diseases of Immunity**
 - a) Introduction to T and B cells
 - b) MHC proteins or transplantation antigens
 - c) Immune tolerance
 - Hypersensitivity
Hypersensitivity type I, II, III, IV, Biological significance, Allergy due to food, chemicals and drugs
 - Autoimmunity
Criteria for autoimmunity, Classifications of autoimmune diseases in man, mechanism of autoimmunity, Transplantation and immunologic tolerance, allograft rejections, transplantation antigens, mechanism of rejection of allograft.
 - Acquired immune deficiency syndrome (AIDS), Amyloidosis

- 4 **Cancer:** differences between benign and malignant tumors, Histological diagnosis of malignancy, invasions and metastasis, patterns of spread, disturbances of growth of cells, classification of tumors, general biology of tumors, spread of malignant tumors, etiology and pathogenesis of cancer.
- 5 Types of shock, mechanisms, stages and management
- 6 Biological effects of radiation
- 7 Environmental and nutritional diseases
 - i) Air pollution and smoking- SO₂,NO, NO₂, and CO
 - ii) Protein calorie malnutrition, vitamins, obesity, pathogenesis of starvation.
- 8 Pathophysiology of common diseases
 - a. Parkinsonism
 - b. Schizophrenia
 - c. Depression and mania
 - d. Hypertension,
 - e. Stroke (ischaemic and hemorrhage)
 - f. Angina, CCF, Atherosclerosis, Myocardial infarction
 - g. Diabetes Mellitus
 - h. Peptic ulcer and inflammatory bowel diseases
 - i. Cirrhosis and Alcoholic liver diseases
 - j. Acute and chronic renal failure
 - k. Asthma and chronic obstructive airway diseases
- 9 Infectious diseases :
Sexually transmitted diseases (HIV,Syphilis,Gonorrhea), Urinary tract infections, Pneumonia, Typhoid, Tuberculosis, Leprosy, Malaria Dysentery (bacterial and amoebic), Hepatitis- infective hepatitis.

4. Assignments :

Title of the Experiment

- 1 Chemical Mediators of inflammation
- 2 Drug Hypersensitivity
- 3 Cigarette smoking & its ill effects
- 4 Biological Effects of Radiation
- 5 Etiology and hazards of obesity
- 6 Complications of diabetes
- 7 Diagnosis of cancer
- 8 Disorders of vitamins
- 9 Methods in Pathology-Laboratory values of clinical significance
- 10 Pathophysiology of Dengue Hemorrhagic Fever (DHF)

Format of the assignment

- 1 Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year
4. It shall be computer draft copy.
5. Name and signature of the student
6. Time allocated for presentation may be 8+2 Min.

2.2 T. PHARMACEUTICAL MICROBIOLOGY (THEORY)

Theory : 3 Hrs. /Week

1. Scope of the Subject: Microbiology has always been an essential component of pharmacy curriculum. This is because of the relevance of microbiology to pharmaceutical sciences and more specifically to pharmaceutical industry. Pharmaceutical biotechnology is the logical extension of pharmaceutical microbiology, which is expected to change the complete drug product scenario in the future.

This course deals with the various aspects of microorganisms, its classification, morphology, laboratory cultivation identification and maintenance. Its also discusses with sterilization of pharmaceutical products, equipment, media etc. The course further discusses the immunological preparations, diseases its transmission, diagnosis, control and immunological tests.

2. Objectives of the Subject :

Upon completion of the subject student shall be able to –

- a. know the anatomy, identification, growth factors and sterilization of microorganisms;
- b. know the mode of transmission of disease causing microorganism, symptoms of disease, and treatment aspect;
- c. do estimation of RNA and DNA and there by identifying the source;
- d. do cultivation and identification of the microorganisms in the laboratory;
- e. do identification of diseases by performing the diagnostic tests; and
- f. appreciate the behavior of motility and behavioral characteristics of microorganisms.

Text books (Theory)

- a. Vanitha Kale and Kishor Bhusari – Applied Microbiology || Himalaya Publishing house Mumbai.
- b. Mary Louis Turgeon – Immunology and Serology in Laboratory Medicines|| 2nd edition, 1996 Mosby- Year book inc St. Louis Missouri 63146.
- c. Harsh Mohan, – Text book of Pathology|| 3rd edition, 1998, B-3 Ansari road Darya ganj N. Delhi.

Reference books (Theory)

- a. Prescott L.M., Jarley G.P Klein D.A –Microbiology|| 2nd- edition Mc Graw Hill Company Inc
- b. Rawlins E.A.||Bentley's Text Book of Pharmaceutics|| B ailliere Tindals 24-28 London 1988
- c. Forbisher – Fundamentals of Microbiology|| Philadelphia W.B. Saunders.
- d. Prescott L.M. Jarley G.P., Klein.D.A. – Microbiology.||2nd edition WMC Brown Publishers, Oxford. 1993
- e. War Roitt, Jonathan Brostoff, David male, – Immunology||3rd edition 1996, Mosby-year book Europe Ltd, London.
- f. Pharmacopoeia of India, Govt of India, 1996.

3. Detailed syllabus and lecture wise schedule :

Title of the topic

- 1 **Introduction** to the science of microbiology. Major divisions of microbial world and Relationship among them.
- 2 Different methods of classification of microbes and study of Bacteria, Fungi, virus, Rickettsiae, Spirochetes.
- 3 Nutritional requirements, growth and cultivation of bacteria and virus. Study of different important media required for the growth of aerobic and anaerobic bacteria & fungi. Differential media, enriched media and selective media, maintenance of lab cultures.
- 4 Different methods used in isolation and identification of bacteria with emphasis to different staining techniques and biochemical reactions. Counting of bacteria -Total and Viable counting techniques.
- 5 Detailed study of different methods of sterilization including their merits and demerits. Sterilization methods for all pharmaceutical products. Detailed study of sterility testing of different pharmaceutical preparations .
Brief information on Validation.
- 6 **Disinfectants-** Study of disinfectants, antiseptics, fungicidal and virucidal agents factors affecting their activation and mechanism of action. Evaluation of bactericidal, bacteristatic, , virucidal activities, evaluation of preservatives in pharmaceutical preparations.
- 7 **Immunology-** Immunity, Definition, Classification, General principles of natural immunity, Phagocytosis, acquired immunity(active and passive) . Antigens, chemical nature of antigens structure and formation of Antibodies, Antigen-Antibody reactions. Bacterial exotoxins and endotoxins. Significance of toxoids in active immunity, Immunization programme, and importance of booster dose.
- 8 **Diagnostic tests :** Schick's Test, Elisa test, Western Blot test, Southern Blot
PCR, Widal, QBC, Mantoux Peripheral smear. Study of malarial parasite.
- 9 **Microbial culture sensitivity Testing:** Interpretation of results
Principle
s and methods of different microbiological assays, microbiological assay of Penicillin, Streptomycin and vitamin B₂ and B₁₂. Standardisation of vaccines and sera.
- 10 **Study of infectious diseases:** Typhoid, Tuberculosis, Malaria, Cholera, Hepatitis, Meningitis, Syphilis & Gonorrhoea and HIV.

2.2 P. PHARMACEUTICAL MICROBIOLOGY (PRACTICAL)

Practical : 3 Hrs./Week

Title of the Experiment:

- 1 Study of apparatus used in experimental microbiology*.
- 2 Sterilisation of glass ware's. Preparation of media and sterilisation.*
- 3 Staining techniques – Simple staining ; Gram's staining ; Negative staining**
- 4 Study of motility characters*.
- 5 Enumeration of micro-organisms (Total and Viable)*
- 6 Study of the methods of isolation of pure culture.*
- 7 Bio chemical testing for the identification of micro*-organisms.

- 8 Cultural sensitivity testing for some micro-organisms.*
- 9 Sterility testing for powders and liquids.*
- 10 Determination of minimum inhibitory concentration.*
- 11 Microbiological assay of antibiotics by cup plate method.*
- 12 Microbiological assay of vitamins by Turbidometric method**
- 13 Determination of RWC.**
- 14 Diagnostic tests for some common diseases, Widal, malarial parasite.**

* Indicate minor experiment & ** indicate major experiment

Assignments:

- 1 Visit to some pathological laboratories & study the activities and equipment/instruments used and reporting the same.
2. Visit to milk dairies (Pasturization) and microbial laboratories(other sterization methods) & study the activities and equipment/instruments used and reporting the same.
3. Library assignments
 - a. Report of recent microbial techniques developed in diagnosing some common diseases.
 - b. Latest advancement developed in identifying, cultivating & handling of microorganisms

Format of the assignment:

1. Minimum & Maximum number of pages.
2. It shall be computer draft copy.
3. Reference(s) shall be included at the end.
4. Name and signature of the student.
5. Assignment can be a combined presentation at the end of the academic year.
6. Time allocated for presentation may be 8+2 Min.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

2.3 T. PHARMACOGNOSY & PHYTOPHARMACEUTICALS (THEORY)

Theory : 3 Hrs. /Week

1. **Scope and objectives:** This subject has been introduced for the pharmacy course in order to make the student aware of medicinal uses of various naturally occurring drugs its history, sources, distribution, method of cultivation, active constituents, medicinal uses, identification tests, preservation methods, substitutes and adulterants.
2. **Upon completion of the course student shall be able to:**
 - a. understand the basic principles of cultivation, collection and storage of crude drugs;
 - b. know the source, active constituents and uses of crude drugs; and
 - c. appreciate the applications of primary and secondary metabolites of the plant.

3. **Course materials:**

Text books

- a. Pharmacognosy by G.E. Trease & W.C.Evans.
- b. Pharmacognosy by C.K.Kokate,Gokhale & A.C.Purohit.

Reference books

- a. Pharmacognosy by Brady & Tyler.E.
- b. Pharmacognosy by T.E.Wallis.
- c. Pharmacognosy by C.S. Shah & Qadery.
- d. Pharmacognosy by M.A. Iyengar.

4. **Lecture wise**

programme: Topics

- 1 Introduction.
- 2 Definition, history and scope of Pharmacognosy.
- 3 Classification of crude drugs.
- 4 Cultivation, collection, processing and storage of crude drugs.
- 5 Detailed method of cultivation of crude drugs.
- 6 Study of cell wall constituents and cell inclusions.
- 7 Microscopical and powder Microscopical study of crude drugs.
- 8 Study of natural pesticides.
- 9 Detailed study of various cell constituents.
- 10 Carbohydrates and related products.
- 11 Detailed study carbohydrates containing drugs.(11 drugs)
- 12 Definition sources, method extraction, chemistry and method of analysis of lipids.
- 13 Detailed study of oils.
- 14 Definition, classification, chemistry and method of analysis of protein.
- 15 Study of plants fibers used in surgical dressings and related products.
- 16 Different methods of adulteration of crude drugs.

2.3 P. PHARMACOGNOSY & PHYTOPHARMACEUTICALS (PRACTICAL)

Practical : 3 Hrs./Week

General Requirements: Laboratory Napkin, Observation Book 150 pages Zero brush, Needle, Blade, Match box.

List of experiments:

- 1 Introduction of Pharmacognosy laboratory and experiments.
- 2 Study of cell wall constituents and cell inclusions.
- 3 Macro, powder and microscopic study of Datura.
- 4 Macro, powder and microscopic study of Senna.
- 5 Macro, powder and microscopic study of Cassia.cinnamon.
- 6 Macro, powder and microscopic study of Cinchona.
- 7 Macro, powder and microscopic study of Ephedra.
- 8 Macro, powder and microscopic study of Quassia.
- 9 Macro, powder and microscopic study of Clove
- 10 Macro, powder and microscopic study of Fennel.
- 11 Macro, powder and microscopic study of Coriander.
- 12 Macro, powder and microscopic study of Isapgol.
- 13 Macro, powder and microscopic study of Nux vomica.
- 14 Macro, powder and microscopic study of Rauwolfia.
- 15 Macro, powder and microscopic study of Liquorice.
- 16 Macro, powder and microscopic study of Ginger.
- 17 Macro, powder and microscopic study of Podophyllum.
- 18 Determination of Iodine value.
- 19 Determination of Saponification value and unsaponifiable matter.
- 20 Determination of ester value.
- 21 Determination of Acid value.
- 22 Chemical tests for Acacia.
- 23 Chemical tests for Tragacanth.
- 24 Chemical tests for Agar.
- 25 Chemical tests for Starch.
- 26 Chemical tests for Lipids.(castor oil,sesame oil, shark liver oil,bees wax)
- 27 Chemical tests for Gelatin.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance.

2.4 T. PHARMACOLOGY – I (THEORY)

Theory : 3 Hrs. /Week

1. **Scope of the Subject:** This subject will provide an opportunity for the student to learn about the drug with regard to classification, pharmacodynamic and pharmacokinetic aspects, adverse effects, uses, dose, route of administration, precautions, contraindications and interaction with other drugs. In this subject, apart from general pharmacology, drugs acting on autonomic nervous system, cardiovascular system, central nervous system, blood and blood forming agents and renal system will be taught. In addition to theoretical knowledge, the basic practical knowledge relevant to therapeutics will be imparted.
2. **Objectives of the Subject :** Upon completion of the subject student shall be able to (Know, do, appreciate) –
 - a. understand the pharmacological aspects of drugs falling under the above mentioned chapters;
 - b. handle and carry out the animal experiments;
 - c. appreciate the importance of pharmacology subject as a basis of therapeutics; and
 - d. correlate and apply the knowledge therapeutically.

Text books (Theory) (Author, Title, Edition, Publication Place, Publisher, Year of Publication)

- a. Tripathi, K. D. Essentials of medical pharmacology. 4th Ed, 1999. Publisher: Jaypee, Delhi.
- b. Satoskar, R.S. and Bhadarkar, S.D. Pharmacology and pharmacotherapeutics. 16th edition (single volume), 1999. Publisher: Popular, Dubai.
- c. Rang, H.P. & Dale, M.M. Pharmacology. 4th edition, 1999. Publisher: Churchill Living stone.

Reference books (Theory)(Author, Title, Edition, Publication Place, Publisher, Publication Year)

- a. Goodman Gilman, A., Rall, T.W., Nies, A.I.S. and Taylor, P. Goodman and Gilman's The pharmacological Basis of therapeutics. 9th Ed, 1996. Publisher Mc Graw Hill, Pergamon press.
- b. Craig, C.R.&Stitzel, R.E. Modern Pharmacology. Latest edition. Publisher: Little Brown.Co
- c. Katzung, B.G. Basic and clinical pharmacology. Latest edition. Publisher: Prentice Hall, Int.
- d. Shargel and Leon. Applied Biopharmaceutics and pharmacokinetics. Latest edition. Publisher: Prentice Hall, London.

Text books (Practical) :

Kulkarni, S. K. and Dandia, P. C. Hand book of experimental pharmacology. Latest edition, Publisher: Vallab, Delhi.

Reference books (Practical)

- a. Macleod, L.J. Pharmacological experiments on intact preparations. Latest edition, Publisher: Churchill livingston

- b. Macleod, L.J. Pharmacological experiments on isolated preparations. Latest edition, Publisher: Churchill livingstone.
- c. Ghosh, M.N. Fundamentals of experimental pharmacology. Latest edition, Publisher: Scientific book agency, Kolkata.
- d. Ian Kitchen. Textbook of in vitro practical pharmacology. Latest edition, Publisher: Black well Scientific.

3. Detailed syllabus and lecture wise schedule :

Title of the topic

1. General Pharmacology

- a) Introduction, definitions and scope of pharmacology
- b) Routes of administration of drugs
- c) Pharmacokinetics (absorption, distribution, metabolism and excretion)
- d) Pharmacodynamics
- e) Factors modifying drug effects
- f) Drug toxicity - Acute, sub- acute and chronic toxicity.
- g) Pre-clinical evaluations
- h) Drug interactions

Note: The term Pharmacology used here refers to the classification, mechanism of action, pharmacokinetics, pharmacodynamics, adverse effects, contraindications, Therapeutic uses, interactions and dose and route of administration.

2. Pharmacology of drugs acting on ANS

- a) Adrenergic and antiadrenergic drugs
- b) Cholinergic and anticholinergic drugs
- c) Neuromuscular blockers
- d) Mydriatics and miotics
- e) Drugs used in myasthenia gravis
- f) Drugs used in Parkinsonism

3. Pharmacology of drugs acting on cardiovascular system

- a) Antihypertensives
- b) Anti-anginal drugs
- c) Anti-arrhythmic drugs
- d) Drugs used for therapy of Congestive Heart Failure
- e) Drugs used for hyperlipidaemias

4. Pharmacology of drugs acting on Central Nervous System

- a) General anesthetics
- b) Sedatives and hypnotics
- c) Anticonvulsants
- d) Analgesic and anti-inflammatory agents
- e) Psychotropic drugs
- f) Alcohol and methyl alcohol
- g) CNS stimulants and cognition enhancers
- h) Pharmacology of local anaesthetics

5. **Pharmacology of Drugs acting on Respiratory tract**
 - a) Bronchodilators
 - b) Mucolytics
 - c) Expectorants
 - d) Antitussives
 - e) NasalDecongestants

6. **Pharmacology of Hormones and Hormone antagonists**
 - a) Thyroid and Antithyroid drugs
 - b) Insulin, Insulin analogues and oral hypoglycemic agents
 - c) Sex hormones and oral contraceptives
 - d) Oxytocin and other stimulants and relaxants

7. **Pharmacology of autocooids and their antagonists**
 - a) Histamines and Antihistaminics
 - b) 5-Hydroxytryptamine and its antagonists
 - c)
 - d) Lipid derived autocooids and platelet activating factor

MRSPTU

2.4 P. PHARMACOLOGY – I (Practicals)

Practicals

Title of the Experiment:

- 1 Study of agonistic and antagonistic effects of drugs using Guinea-pig ileum preparation.**
- 2 To study the effects of drugs on intestinal motility using frog's esophagus model*
- 3 To study the effects of drugs using rat uterus preparation.**
- 4 To study the anticonvulsant property of drugs (any one model).*
- 5 To study antihistaminic property of drug using histamine induced anaphylactic reaction in guinea pigs.
- 6 To study the apomorphine-induced compulsive behaviour (stereotypy) in mice.*
- 7 To study the muscle relaxant property of diazepam in mice using rotarod apparatus.*
- 8 To study the antiinflammatory property of indomethacin against carrageenan-induced paw oedema.**
- 9 To study the anxiolytic effect of diazepam in mice using mirrored-chamber apparatus.**
- 10 To demonstrate the effect of various drugs on the blood pressure and respiration of anaesthetized dog.
- 11 To study the effect of anthelmintics on earthworms.
- 12 To study the taming effect of chlorpromazine.*
- 13 To study the effects of drugs on vas deferense of the male rat.**
- 14 To study the effect of drugs on pesticide toxicity using rats as model.
- 15 To study the effect of drugs on heavy metal toxicity.

** indicate major experiment & * indicate minor experiment

2.5 T. COMMUNITY PHARMACY (THEORY)

Theory : 2 Hrs. /Week

- 1. Scope:** In the changing scenario of pharmacy practice in India, Community Pharmacists are expected to offer various pharmaceutical care services. In order to meet this demand, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling, health screening services for improved patient care in the community set up.
- 2. Objectives:** Upon completion of the course, the student shall be able to –
 - a. know pharmaceutical care services;
 - b. know the business and professional practice management skills in community pharmacies;
 - c. do patient counselling & provide health screening services to public in community pharmacy;
 - d. respond to minor ailments and provide appropriate medication;
 - e. show empathy and sympathy to patients; and
 - f. appreciate the concept of Rational drug therapy.

Text Books:

- a. Health Education and Community Pharmacy by N.S.Parmar.
- b. WHO consultative group report.
- c. Drug store & Business management by Mohammed Ali & Jyoti.

Reference books:

- a. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical press.
- b. Comprehensive Pharmacy Review – Edt. Leon Shargel. Lippincott Williams & Wilkins.

Special requirements:

1. Either the college is having model community pharmacy (meeting the schedule N requirement) or sign MoU with at least 4-5 community pharmacies nearby to the college for training the students on dispensing and counselling activities.
2. Special equipments like B.P apparatus, Glucometer, Peak flow meter, and apparatus for cholesterol estimation.

3. Scheme of evaluation (80 Marks)

- | | |
|---|----|
| 1. Synopsis | 10 |
| 2. Major Experiment
(Counselling of patients with specific diseases – emphasis should be given on Counselling introduction, content, process and conclusion) | 30 |
| 3. Minor Experiment(Ability to measure B.P/ CBG / Lung function) | 15 |
| 4. Prescription Analysis (Analyzing the prescriptions for probable drug interaction and ability to tell the management) | 15 |
| 5. Viva – Voce | 10 |

4. Lecture wise programme:

Topics

- 1 Definition, scope, of community pharmacy
Roles and responsibilities of Community pharmacist**
- 2 Community Pharmacy Management**
 - a) Selection of site, Space layout, and design
 - b) Staff, Materials- coding, stocking
 - c) Legal requirements
 - d) Maintenance of various registers
 - e) Use of Computers: Business and health care soft wares
- 3 Prescriptions** – parts of prescription, legality & identification of medication related problems like drug interactions.
- 4 Inventory control in community pharmacy**
Definition, various methods of Inventory
Control ABC, VED, EOQ, Lead time, safety stock
- 5 Pharmaceutical care**
Definition and Principles of Pharmaceutical care.
- 6 Patient counselling**
Definition, outcomes, various stages, barriers, Strategies to overcome barriers Patient information leaflets- content, design, & layouts, advisory labels
- 7 Patient medication adherence**
Definition, Factors affecting medication adherence, role of pharmacist in improving the adherence.
- 8 Health screening services**
Definition, importance, methods for screening Blood pressure/ blood sugar/ lung function and Cholesterol testing
- 9 OTC Medication- Definition, OTC medication list & Counselling**
- 10 Health Education**
WHO Definition of health, and health promotion, care for children, pregnant & breast feeding women, and geriatric patients.
Commonly occurring Communicable Diseases, causative agents, Clinical presentations and prevention of communicable diseases – Tuberculosis, Hepatitis, Typhoid, Amoebiasis, Malaria, Leprosy, Syphilis, Gonorrhoea and AIDS
Balance diet, and treatment & prevention of deficiency disorders Family planning – role of pharmacist
Responding to symptoms of minor ailments
Relevant pathophysiology, common drug therapy to, Pain, GI disturbances (Nausea, Vomiting, Dyspepsia, diarrhea, constipation), Pyrexia, Ophthalmic symptoms, worms infestations.
- 11 Essential Drugs concept and Rational Drug Therapy Role of community pharmacist**
- 12 Code of ethics for community pharmacist**

2.6 T. PHARMACOTHERAPEUTICS - I (THEORY)

Theory : 3 Hrs. /Week

1. **Scope of the Subject:** This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.
2. **Objectives:** At completion of this subject it is expected that students will be able to understand –
 - a. the pathophysiology of selected disease states and the rationale for drug therapy;
 - b. the therapeutic approach to management of these diseases;
 - c. the controversies in drug therapy;
 - d. the importance of preparation of individualised therapeutic plans based on diagnosis;
 - e. needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);
 - f. describe the pathophysiology of selected disease states and explain the rationale for drug therapy;
 - g. summarise the therapeutic approach to management of these diseases including reference to the latest available evidence;
 - h. discuss the controversies in drug therapy;
 - i. discuss the preparation of individualised therapeutic plans based on diagnosis; and
 - j. identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

Text Books

- a. Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication.
- b. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange.

Reference Books

- a. Pathologic basis of disease - Robins SL, W.B.Saunders publication.
- b. Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice - Green and Harris, Chapman and Hall publication.
- c. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication.
- d. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA
- e. Avery's Drug Treatment, 4th Edn, 1997, Adis International Limited.
- f. Relevant review articles from recent medical and pharmaceutical literature

3. Detailed syllabus and lecture wise schedule:

Etiopathogenesis and pharmacotherapy of diseases associated with following systems/ diseases

Title of the topic

- 1 Cardiovascular system:** Hypertension, Congestive cardiac failure, Angina Pectoris, Myocardial infarction, , Hyperlipidaemias , Electrophysiology of heart and Arrhythmias
- 2 Respiratory system :** Introduction to Pulmonary function test, Asthma, Chronic obstructive airways disease, Drug induced pulmonary diseases
Endocrine system : Diabetes, Thyroid diseases, Oral contraceptives, Hormone replacement therapy, Osteoporosis
- 3 General prescribing guidelines for**
 - a. Paediatric patients
 - b. Geriatric patients
 - c. Pregnancy and breast feeding
- 4 Ophthalmology:** Glaucoma, Conjunctivitis- viral & bacterial
- 5 Introduction to rational drug use**
Definition, Role of pharmacist Essential drug concept Rational drug Formulations

2.2 P. PHARMACOTHERAPEUTICS - I (PRACTICAL)

Practical:3 Hrs./Week

Practicals :

Hospital postings in various departments designed to complement the lectures by providing practical clinical discussion; attending ward rounds; follow up the progress and changes made in drug therapy in allotted patients; case presentation upon discharge. Students are required to maintain a record of cases presented and the same should be submitted at the end of the course for evaluation. A minimum of 20 cases should be presented and recorded covering most common diseases.

Assignments :

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of THREE assignments [1500 – 2000 words] should be submitted for evaluation.

Format of the assignment:

1. Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year.
4. It shall be computer draft copy.
5. Name and signature of the student.
6. Time allocated for presentation may be 8+2 Min.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record)

Third Year

3.1 T. PHARMACOLOGY – II (THEORY)

Theory : 3 Hrs. /Week

1. **Scope of the Subject:** This subject will provide an opportunity for the student to learn about the drug with regard to classification, pharmacodynamic and pharmacokinetic aspects, adverse effects, uses, dose, route of administration, precautions, contraindications and interaction with other drugs. In this subject, drugs acting on autacoids, respiratory system, GIT, immune system and hormones, and pharmacology of autacoids and hormones will be concentrated. In addition, pharmacology of chemotherapeutic agents, vitamins, essential minerals and principles of toxicology are also taught. In addition to theoretical knowledge, the basic practical knowledge relevant to therapeutics will be imparted.
2. **Objectives of the Subject Upon completion of the subject student shall be able to:**
 - a. understand the pharmacological aspects of drugs falling under the above mentioned chapters,
 - b. carry out the animal experiments confidently,
 - c. appreciate the importance of pharmacology subject as a basis of therapeutics, and
 - d. correlate and apply the knowledge therapeutically.

Text books (Theory)

- a. Tripathi, K. D. Essentials of medical pharmacology. 4th edition, 1999. Publisher: Jaypee, Delhi.
- b. Satoskar, R.S. and Bhadarkar, S.D. Pharmacology and pharmacotherapeutics. 16th edition (single volume), 1999. Publisher: Popular, Dubai.
- c. Rang, H.P. and Dale, M.M. Pharmacology. 4th edition, 1999. Publisher: Churchill Living stone.

Reference books (Theory)

- a. Goodman Gilman, A., Rall, T.W., Nies, A.I.S. and Taylor, P. Goodman and Gilman's The pharmacological Basis of therapeutics. 9th edition, 1996. Publisher: Mc Graw Hill, Pergamon press.
- b. Craig, C.R. and Stitzel, R.E. Modern Pharmacology. Latest edition. Publisher: Little Brown and company.
- c. Katzung, B.G. Basic and clinical pharmacology. Latest edition. Publisher: Prentice Hall, International.
- d. Gupta, P.K. and Salunkhe, D.K. Modern Toxicology. Volume I, II and III. Latest edition. Publisher: B.V. Gupta, Metropolitan Book Co. (p) Ltd, New Delhi.

Text books (Practical)

- a) Kulkarni, S. K. and Dandia, P. C. Hand book of experimental pharmacology. Latest edition, Publisher: Vallab, Delhi.

Reference books (Practical) :

- a. Macleod, L.J. Pharmacological experiments on intact preparations. Latest edition, Publisher: Churchill livingstone.
- b. Macleod, L.J. Pharmacological experiments on isolated preparations. Latest edition, Publisher: Churchill livingstone.

- c. Ghosh, M.N. Fundamentals of experimental pharmacology. Latest edition, Publisher: Scientific book agency, Kolkata.
- d. Ian Kitchen. Textbook of in vitro practical pharmacology. Latest edition, Publisher: Black well Scientific.

3. Detailed syllabus and lecture wise schedule:

Title of the topic

1. **Pharmacology of Drugs acting on Blood and blood forming agents**
 - a) Anticoagulants
 - b) Thrombolytics and antiplatelet agents
 - c) Haemopoietics and plasma expanders
2. **Pharmacology of drugs acting on Renal System**
 - a) Diuretics
 - b) Antidiuretics
3. **Chemotherapy**
 - a) Introduction
 - b) Sulfonamides and co-trimoxazole
 - c) Penicillins and Cephalosporins
 - d) Tetracyclins and Chloramphenicol
 - e) Macrolides, Aminoglycosides, Polyene & Polypeptide antibiotics
 - f) Quinolines and Fluroquinolines
 - g) Antifungal antibiotics
 - h) Antiviral agents
 - i) Chemotherapy of tuberculosis and leprosy
 - j) Chemotherapy of Malaria
 - k) Chemotherapy of protozoal infections (amoebiasis, Giardiasis)
 - l) Pharmacology of Anthelmintic drugs
 - m) Chemotherapy of cancer (Neoplasms)
4. **Immunopharmacology**
Pharmacology of immunosuppressants and stimulants
5. **Principles of Animal toxicology**
Acute, sub acute and chronic toxicity
6. **The dynamic cell: The structures and functions of the components of the cell**
 - a) Cell and macromolecules: Cellular classification, subcellular organelles, macromolecules, large macromolecular assemblies
 - b) Chromosome structure: Pro and eukaryotic chromosome structures, chromatin structure, genome complexity, the flow of genetic information.
 - c) DNA replication: General, bacterial and eukaryotic DNA replication.
 - d) The cell cycle: Restriction point, cell cycle regulators and modifiers.

- e) Cell signaling: Communication between cells and their environment, ion-channels, signal transduction pathways (MAP kinase, P38 kinase, JNK, Ras and PI3-kinase pathways, biosensors).

The Gene: Genome structure and function:

- a) Gene structure: Organization and elucidation of genetic code.
b) Gene expression: Expression systems (pro and eukaryotic), genetic elements that control gene expression (nucleosomes, histones, acetylation, HDACS, DNA binding protein families).
c) Transcription and Transcription factors: Basic principles of transcription in pro and eukaryotes. Transcription factors that regulate transcription in pro and eukaryotes.

RNA processing: rRNA, tRNA and mRNA processing. Protein synthesis: Mechanisms of protein synthesis, initiation in eukaryotes, translation control and post-translation events

Altered gene functions: Mutations, deletions, amplifications, LOH, translocations, trinucleotide repeats and other genetic abnormalities, Oncogenes and tumor suppressor genes, The gene sequencing, mapping and cloning of human disease genes.

Introduction to gene therapy and targeting, Recombinant DNA technology: principles, Processes (gene transfer technology) and applications.

Books:

- 1 Molecular Biology of the Cell by Alberts B., Bray, D., Lewis, J., Raff M., Roberts, K and Watson, JD, 3rd edition.
- 2 Molecular Cell Biology By Lodish, H., Baltimore, D., Berk, A et al., 5th edition.
- 3 Molecular Biology by Turner, PC., McLennan, AG., Bates, AD and White MRH 2nd edition.
- 4 Genes VIII by Lewin, B., (2004)
- 5 Pharmaceutical Biotechnology, by Crommelin, DJA and Sindelar RD (1997)
- 6 Recombinant DNA by Watson, JD., Gilman, M., et al., (1996)
- 7 Biopharmaceutical: Biochemistry and Biotechnology by Walsh, G., (1998)

3.1 P. PHARMACOLOGY – II (PRACTICAL)

Practical : 3 Hrs./Week

List of Experiments:

1. Study of laboratory animals and their handling (a. Frogs, b. Mice, c. Rats, d. Guinea pigs, e. Rabbits).
2. Study of physiological salt solutions used in experimental pharmacology.
3. Study of laboratory appliances used in experimental pharmacology.
4. Study of use of anesthetics in laboratory animals.
5. To record the dose response curve of Ach using isolated ileum/rectus abdominis muscle preparation.
6. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by interpolation method.
7. To carry out bioassay of Ach using isolated ileum/rectus abdominis muscle preparation by three point method.
8. To record the dose response curve of Histamine using isolated guinea -pig ileum preparation.
9. Study of agonistic and antagonistic effects of drugs using isolated guinea-pig ileum preparation.
10. To carry out bioassay of Histamine using isolated guinea -pig ileum preparation by interpolation method.
11. To carry out bioassay of Histamine using guinea-pig ileum preparation by three point method.
12. To study the routes of administration of drugs in animals (Rats, Mice, Rabbits).
13. Study of theory, principle, procedure involved and interpretation of given results for the following experiments:
 - a) Analgesic property of drug using analgesiometer.
 - b) Antiinflammatory effect of drugs using rat-paw edema method.
 - c) Anticonvulsant activity of drugs using maximal electroshock and pentylene tetrazole methods.
 - d) Antidepressant activity of drugs using pole climbing apparatus and pentobarbitone induced sleeping time methods.
 - e) Locomotor activity evaluation of drugs using actophotometer and rotorod.
 - f) Cardiotonic activity of drugs using isolated frog heart and mammalian heart preparations.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva voce and record maintenance)

3.2 T. PHARMACEUTICAL ANALYSIS (THEORY)

Theory : 3 Hrs. /Week

1. **Quality Assurance:**

- a. Introduction, sources of quality variation, control of quality variation.
- b. Concept of statistical quality control.
- c. Validation methods- quality of equipment, validation of equipment and validation of analytical instruments and calibration.
- d. GLP, ISO 9000.
- e. Total quality management, quality review and documentation.
- f. ICH- international conference for harmonization-guidelines.
- g. Regulatory control.

2. **Chromatography:**

Introduction, history, classification, separation techniques, choice of methods. The following techniques be discussed with relevant examples of pharmaceutical products involving principles and techniques of separation of drugs from excipients.

- a. **Column Chromatography:** Adsorption column chromatography, Operational technique, frontal analysis and elution analysis. Factors affecting column efficiency, applications and partition chromatography.
- b. **TLC:** Introduction, principle, techniques, R_f value and applications.
- c. **PC:** Introduction, principle, types of paper chromatography, preparation techniques, development techniques, applications.
- d. **Ion-exchange chromatography:** Introduction, principles, types of ion exchange synthetic resins, physical properties, factors affecting ion exchange, methodology and applications.
- e. **HPLC:** Introduction, theory, instrumentation, and applications.
- f. **HPTLC:** Introduction, theory, instrumentation, and applications.
- g. **Gas Chromatography:** Introduction, theory, instrumentation-carrier gases, types of columns, stationary phases in GLC & GSC. Detectors- Flame ionization detectors, electron capture detector, thermal conductivity detector. Typical gas chromatogram, derivatisation techniques, programmed temperature gas chromatography, applications.
- h. **Electrophoresis:** Principles of separation, equipment for paper and gel electrophoresis, and application.
- i. **Gel filtration and affinity chromatography:** Introduction, technique, applications.

3. **Electrometric Methods:**

Theoretical aspects, instrumentation, interpretation of data/spectra and analytical applications be discussed on the following topics.

- a. **Potentiometry:** Electrical potential, electrochemical cell, reference electrodes, indicator electrodes, measurement of potential and pH, construction and working of electrodes, Potentiometric titrations, methods of detecting end point, Karl Fischer titration.

- b. **Conductometry:** Introduction, conductivity cell, conductometric titrations and applications.
- c. **Polarography:** Instrumentation, DME, residual current, diffusion current and limiting current, polarographic wave, Ilkovic's equation, Effect of oxygen on polarographic wave, Polarographic maxima and suppressors and applications.
- d. **Amperometric Titrations:** Introduction, types of electrodes used, reference and indicator electrode, instrumentation, titration procedure, advantages and disadvantages of Amperometry over potentiometry. Pharma applications.

4. Spectroscopy:

Theoretical aspects, instrumentation, elements of interpretation of data/spectra and application of analytical techniques be discussed on:

a. Absorption Spectroscopy:

- Theory of electronic, atomic and molecular spectra. Fundamental laws of photometry, Beer-Lambert's Law, application and its deviation, limitation of Beer law, application of the law to single and multiple component analysis, measurement of equilibrium constant and rate constant by spectroscopy. Spectra of isolated chromophores, auxochromes, batho-chromic shift, hypsochromic shift, hyperchromic and hypochromic effect, effect of solvent on absorption spectra, molecular structure and infrared spectra.

Instrumentation – Photometer, U.V.-Visible spectrophotometer – sources of U.V.-Visible radiations, collimating systems, monochromators, samples cells and following detectors-Photocell, Barrier layer cell, Phototube, Diode array, applications of U.V.-Visible spectroscopy in pharmacy and spectrophotometric titrations.

- **Infrared Spectroscopy:** Vibrational transitions, frequency – structure correlations, Infrared absorption bands, Instrumentation–IR spectrometer – sources of IR, Collimating systems, monochromators, sample cells, sample handling in IR spectroscopy and detectors– Thermocouple, Golyay Cells, Thermistor, Bolometer, Pyroelectric detector, Applications of IR in pharmacy.

Fluorimetric Analysis: Theory, luminescence, factors affecting fluorescence, quenching. Instrumentation, Applications, fluorescent indicators, study of pharmaceutically important compounds estimated by fluorimetry.

- **Flame Photometry:** Theory, nebulisation, flame and flame temperature, interferences, flame spectrometric techniques and instrumentation and pharmaceutical applications.
- **Atomic Absorption Spectrometry:** Introduction, Theory, types of electrodes, instrumentation and applications.
- **Atomic Emission Spectroscopy:** Spectroscopic sources, atomic emission spectrometers, photographic and photoelectric detection.
- **NMR & ESR (introduction only):** Introduction, theoretical aspects and applications.

- **Mass Spectroscopy: (Introduction only)** – Fragmentation, types of ions produced mass spectrum and applications.
- **Polarimetry: (Introduction only)** – Introduction to optical rotatory dispersion, circular dichroism, polarimeter.
- **X-RAY Diffraction: (Introduction only)** – Theory, reciprocal lattice concept, diffraction patterns and applications.
- **Thermal Analysis:** Introduction, instrumentation, applications, and DSC and DTA.

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3.2 P. PHARMACEUTICAL ANALYSIS (PRACTICAL)

Practical : 3 Hrs./Week

List of Experiments:

1. Separation and identification of Amino Acids by Paper Chromatography.
2. Separation and identification of Sulpha drugs by TLC technique.
3. Effect of pH and solvent on the UV spectrum of given compound.
4. Comparison of the UV spectrum of a compound with that of its derivatives.
5. Determination of dissociation constant of indicators using UV-Visible spectroscopy.
6. Conductometric titration of mixture of acids with a strong base.
7. Potentiometric titration of a acid with a strong base.
8. Estimation of drugs by Fluorimetric technique.
9. Study of quenching effect in fluorimetry. Colourimetric estimation of Supha drugs using BMR reagent.
11. Simultaneous estimation of two drugs present in given formulation.
12. Assay of Salicylic Acid by colourimetry.
13. Determination of Chlorides and Sulphates in Calcium gluconate by Nepheloturbidimetric Method.
14. Determination of Na/K by Flame Photometry.
15. Determination of pKa using pH meter.
16. Determination of specific rotation.
17. Comparison of the IR spectrum of a compound with that of its derivatives.
18. Demonstration of HPLC.
19. Demonstration of HPTLC.
20. Demonstration of GC-MS.
21. Demonstration of DSC.
22. Interpretation of NMR spectra of any one compound.

Reference Books:

1. Text Book of Pharm. Analysis by Higuchi. T and Hasen. E. B., New York Inter Science Publishers.
2. Quantitative Pharma. Analysis by Jenkins, The Blakiston division, New York.
3. Quantitative Drug Analysis, by Garrot. D, Chapman & Hall Ltd., London.
4. Undergraduate Instrumental Analysis by James. E., CBS Publishers.
5. Instrumental Analysis by Willard and Merritt, EWP, East West Press Ltd., Delhi/Madras.
6. Pharm Analysis by Skoog and West, Sounders Manipal College Publishing.
7. Text Book of Chemical Analysis, by A.I.Vogel, ELBS with Macmillan press, Hampshire.
8. Textbook of Pharm. Analysis by K.A.Connors, John Wiley & Sons, New York, Brisbane, Singapore.

9. Textbook of Pharm. Analysis (Practical) by Beckett & Stenlake, CBS Publishers, Delhi.
10. Textbook of Drug Analysis by P.D. Sethi., CBS Publishers, Delhi.
11. Spectroscopy by Silverstein, John & Wiley & Sons. Inc., Canada & Singapore.
12. How to practise GMP-A Plan for total quality control by P.P. Sharma, Vandana Publications, Agra.
13. The Science & Practice of Pharmacy by Remington Vol-I & II, Mack Publishing Co. Pennsylvania.
14. TLC by Stahl, Spring Verlay.
15. Text Book of Pharm. Chemistry by Chatten, CBS Publications.
16. Spectroscopy by William Kemp, ELBS with Macmillan Press, Hampshire.
17. I.P.-1996, The Controller of Publications, New Delhi.
18. BPC- Dept. of Health, U.K. for HMSO.
19. USP - Mack Publishing Co., Easton, PA.
The Extra Pharmacopoeia – The Pharm. Press, London

Practicals

Title of the Experiment:

- 1 Study of agonistic and antagonistic effects of drugs using Guinea -pig ileum preparation.**
- 2 To study the effects of drugs on intestinal motility using frog's esophagus model*
- 3 To study the effects of drugs using rat uterus preparation.**
- 4 To study the anticonvulsant property of drugs (any one model).*
- 5 To study antihistaminic property of drug using histamine induced anaphylactic reaction in guinea pigs.
- 6 To study the apomorphine-induced compulsive behaviour (stereotypy) in mice.*
- 7 To study the muscle relaxant property of diazepam in mice using rotarod apparatus.*
- 8 To study the antiinflammatory property of indomethacin against carrageenan-induced paw oedema.**
- 9 To study the anxiolytic effect of diazepam in mice using mirrored-chamber apparatus.**
- 10 To demonstrate the effect of various drugs on the blood pressure and respiration of anaesthetized dog.
- 11 To study the effect of anthelmintics on earthworms.
- 12 To study the taming effect of chlorpromazine.*
- 13 To study the effects of drugs on vas deferense of the male rat.**
- 14 To study the effect of drugs on pesticide toxicity using rats as model.
- 15 To study the effect of drugs on heavy metal toxicity.

** indicate major experiment & * indicate minor experiment

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

3.3 T. PHARMACOTHERAPEUTICS – II (THEORY)

Theory : 3 Hrs. /Week

- 1. Scope of the Subject:** This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.
- 2. Objectives of the Subject Upon completion of the subject student shall be able to –**
 - a. know the pathophysiology of selected disease states and the rationale for drug therapy
 - b. know the therapeutic approach to management of these diseases;
 - c. know the controversies in drug therapy;
 - d. know the importance of preparation of individualised therapeutic plans based on diagnosis; and
 - e. appreciate the needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

Text books (Theory)

Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication

Reference books (Theory)

- a. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange
- b. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
- c. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda-Kimble MA]

3. Detailed syllabus and lecture wise schedule :

Etiopathogenesis and pharmacotherapy of diseases associated with following systems / diseases –

Title of the topic

- 1. Infectious disease:** Guidelines for the rational use of antibiotics and surgical Prophylaxis, Tuberculosis, Meningitis, Respiratory tract infections, Gastroenteritis, Endocarditis, Septicemia, Urinary tract infections, Protozoal infection- Malaria, HIV & Opportunistic infections, Fungal infections, Viral infections, Gonorrhoea and Syphilis
- 2 Musculoskeletal disorders**
Rheumatoid arthritis, Osteoarthritis, Gout, Spondylitis, Systemic lupus erythematosus.
- 3 Renal system** Acute Renal Failure, Chronic Renal Failure, Renal Dialysis, Drug induced renal disorders
- 4 Oncology:** Basic principles of Cancer therapy, General introduction to cancer chemotherapeutic agents, Chemotherapy of breast cancer, leukemia. Management of chemotherapy nausea and emesis
- 5 Dermatology:** Psoriasis, Scabies, Eczema, Impetigo

3.3 P. PHARMACOTHERAPEUTICS – II (PRACTICAL)

Practical : 3 Hrs./Week

Practicals :

Hospital postings in various departments designed to complement the lectures by providing practical clinical discussion; attending ward rounds; follow up the progress and changes made in drug therapy in allotted patients; case presentation upon discharge. Students are required to maintain a record of cases presented and the same should be submitted at the end of the course for evaluation.

The student shall be trained to understand the principle and practice involved in selection of drug therapy including clinical discussion.

A minimum of 20 cases should be presented and recorded covering most common diseases.

Assignments :

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of THREE assignments [1500 – 2000 words] should be submitted for evaluation.

Format of the assignment :

1. Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year.
4. It shall be computer draft copy.
5. Name and signature of the student.
6. Time allocated for presentation may be 8+2 Min.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

3.4 T. PHARMACEUTICAL JURISPRUDENCE (THEORY)

Theory : 2 Hrs. /Week

1. **Scope of the Subject:** (4-6 lines): This course exposes the student to several important legislations related to the profession of pharmacy in India. The Drugs and Cosmetics Act, along with its amendments are the core of this course. Other acts, which are covered, include the Pharmacy Act, dangerous drugs, medicinal and toilet preparation Act etc. Besides this the new drug policy, professional ethics, DPCO, patent and design Act will be discussed.
2. **Objectives of the Subject:** Upon completion of the subject student shall be able to (Know, do, and appreciate) –
 - a. practice the Professional ethics;
 - b. understand the various concepts of the pharmaceutical legislation in India;
 - c. know the various parameters in the Drug and Cosmetic Act and rules;
 - d. know the Drug policy, DPCO, Patent and design act;
 - e. understand the labeling requirements and packaging guidelines for drugs and cosmetics;
 - f. be able to understand the concepts of Dangerous Drugs Act, Pharmacy Act and Excise duties Act; and
 - g. other laws as prescribed by the Pharmacy Council of India from time to time including International Laws.

Text books (Theory)

Mithal , B M. Textbook of Forensic Pharmacy. Calcutta :National; 1988.

Reference books (Theory)

- a. Singh, KK, editor. Beotra's the Laws of Drugs, Medicines & cosmetics. Allahabad: Law Book House; 1984.
- b. Jain, NK. A Textbook of forensic pharmacy. Delhi: Vallabh prakashan ; 1995.
- c. Reports of the Pharmaceutical enquiry Committee
- d. I.D.M.A., Mumbai. DPCO 1995
- e. Various reports of Amendments.
- f. Deshapande, S.W. The drugs and magic remedies act 1954 and rules 1955. Mumbai: Susmit Publications; 1998.
- g. Eastern Book Company .The narcotic and psychotropic substances act 1985, Lucknow: Eastern; 1987.

3. Detailed syllabus and lecture wise

schedule: Title of the topic

1. **Pharmaceutical Legislations** – A brief review.
2. Principle and Significance of professional ethics. Critical study of the code of pharmaceutical ethics drafted by PCI.
3. **Drugs and Cosmetics Act, 1940, and its rules 1945.**
Objectives, Legal definition, Study of Schedule's with reference to Schedule B, C&C1, D, E1, F&F1, F2, F3, FF, G, H, J, K, M, N, P, R, V, W, X, Y.
Sales, Import, labeling and packaging of Drugs And Cosmetics Provisions
Relating to Indigenous Systems.

Constitution and Functions of DTAB, DCC, CDL. Qualification and duties –Govt. analyst and Drugs Inspector.

4. **Pharmacy Act –1948.**
Objectives Legal Definitions, General Study, Constitution and Functions of State & Central Council, Registration & Procedure, ER.
5. **Medicinal and Toilet Preparation Act –1955.**
Objectives, Legal Definitions, Licensing, Bonded and Non Bonded Laboratory, Ware Housing, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations.
6. **Narcotic Drugs and Psychotropic substances Act-1985 and Rules.** Objectives, Legal Definitions, General Study, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and regulations, Schedules to the Act.
7. **Study of Salient Features of Drugs and magic remedies Act and its rules.**
8. **Study of essential Commodities Act Relevant to drugs price control Order.**
9. **Drug Price control Order & National Drug Policy (Current).**
10. **Prevention Of Cruelty to animals Act-1960.**
11. **Patents & design Act-1970.**
12. **Brief study of prescription and Non-prescription Products.**

4. Assignments:

Format of the assignment

1. Minimum & Maximum number of pages
2. It shall be a computer draft copy
3. Reference(s) shall be included at the end.
4. Name and signature of the student
5. Assignment can be a combined presentation at the end of the academic year.
6. Time allocated for presentation may be 8+2 Min

Case studies relating to

1. Drugs and Cosmetics Act and rules along with its amendments, Dangerous Drugs Act, Medicinal and Toilet preparation Act, New Drug Policy, Professional Ethics, Drugs (Price control) Order, Patent and Design Act.
2. Various prescription and non-prescription products.
3. Medical and surgical accessories.

Diagnostic aids and appliances available in the market.

3.5 T. MEDICINAL CHEMISTRY (THEORY)

Theory : 3 Hrs. /Week

1. Modern concept of rational drug design: A brief introduction to Quantitative Structure Activity Relationship (QSAR), prodrug, combinatorial chemistry and computer aided drug design (CADD) and concept of antisense molecules.

A study of the development of the following classes of drugs including SAR, mechanism of action, synthesis of important compounds, chemical nomenclature, brand names of important marketed products and their side effects.

2. Anti-infective agents
 - a) Local anti-infective agents
 - b) Preservatives
 - c) Antifungal agents
 - d) Urinary tract anti-infectives
 - e) Antitubercular agents
 - f) Antiviral agents and Anti AIDS agents
 - g) Antiprotozoal agents
 - h) Anthelmintics
 - i) Antiscabies and Antipedicular agents
3. Sulphonamides and sulphones
4. Antimalarials
5. Antibiotics
6. Antineoplastic agents
7. Cardiovascular agents
 - a) Antihypertensive agents
 - b) Antianginal agents and vasodilators
 - c) Antiarrhythmic agents
 - d) Antihyperlipidemic agents
 - e) Coagulants and Anticoagulants
 - f) Endocrine
8. Hypoglycemic agents
9. Thyroid and Antithyroid agents
10. Diuretics
11. Diagnostic agents
12. Steroidal Hormones and Adrenocorticoids

3.5 P. MEDICINAL CHEMISTRY (PRACTICAL)

Practical : 3 Hrs./Week

1. Assays of important drugs from the course content.
2. Preparation of medicinally important compounds or intermediates required for synthesis of drugs.
3. Monograph analysis of important drugs.
4. Determination of partition coefficients, dissociation constants and molar refractivity of compounds for QSAR analysis.

Reference Books:

- a. Wilson and Gisvold's Text book of Organic, Medicinal and Pharmaceutical Chemistry, Lippincott-Raven Publishers-New York, Philadelphia.
 - b. William.O.Foye, Principles of Medicinal Chemistry, B.I. Waverly Pvt. Ltd., New Delhi.
 - c. Burgers, Medicinal Chemistry, M.E., Welly Med.Chemistry M.E. Walffed Johnwilley and Sons, Wiley-interscience Publication, New York, Toranto.
 - d. A Text Book of Medicinal Chemistry Vol. I and II by Surendra N. Pandeya, S.G. Publisher, 6, Dildayal Nagar, Varanasi -10.
 - e. Indian Pharmacopoeia 1985 and 1996. The Controller of Publications, Civil Lines, Delhi - 54.
 - f. Current Index of Medical Specialities (CIMS) and MIMS India, MIMS, A.E. Morgan Publications (I) Pvt. Ltd, New Delhi-19.
 - g. Organic Drug Synthesis-Ledniser Mitzsher Vol. I and II.
 - h. Pharmaceutical Chemistry drug Synthesis Vol. I and II by H. J. Roth and A. Klemann.
- The Science and Practice of Pharmacy Vol. 1 and 2, Remington, MACK Publishing Company, Easton, Pennsylvania

3.6 T. PHARMACEUTICAL FORMULATIONS (THEORY)

Theory : 2 Hrs. /Week

1. **Scope of the Subject:** Scope and objectives of the course: Subject deals with the formulation and evaluation of various pharmaceutical dosage forms.
2. **Objectives of the Subject:** Upon completion of the subject student shall be able to (Know, do, appreciate) –
 - a. understand the principle involved in formulation of various pharmaceutical dosage forms;
 - b. prepare various pharmaceutical formulation;
 - c. perform evaluation of pharmaceutical dosage forms; and
 - d. understand and appreciate the concept of bioavailability and bioequivalence, their role in clinical situations.

Text books (Theory)

- a. Pharmaceutical dosage forms, Vol, I,II and III by lachman
- b. Rowlings Text book of Pharmaceutics
- c. Tutorial Pharmacy – Cooper & Gun

Reference books (Theory)

- a. Remington's Pharmaceutical Sciences
- b. USP/BP/IP

3. Detailed syllabus and lecture wise

schedule: Title of the topic

1. Pharmaceutical dosage form- concept and classification
2. **Tablets:** Formulation of different types of tablets, tablet excipients, granulation techniques quality control and evaluation of tablets. Tablet coating, Type of coating, quality control tests for coated tablet.
3. **Capsules;** Production and filling of hard gelatin capsules, Raw material for shell, finishing, quality control tests for capsules. Production and filling of soft gelatin capsules, quality control tests for soft gelatin capsules.
4. **Liquid orals:** Formulation and evaluation of suspensions, emulsions and solutions. Stability of these preparations
5. **Parenterals** Introduction Containers used for Parenterals (including official tests) Formulation of large and small volume Parenterals Sterilization
6. **Ophthalmic preparations (Semi – Solids):** Introduction and classification Factors affecting absorption and anatomy of skin Packaging storage and labeling, Ointments Types of Ointment Base Preparation of ointment, Jellies Types of jellies Formulation of jellies Suppositories, Method of preparation, Types Packaging
7. Definition and concept of **Controlled and novel Drug delivery systems** with available examples, viz. parenteral, trans dermal, buccal, rectal, nasal, implants, ocular

3.6 P. PHARMACEUTICAL FORMULATIONS (PRACTICAL)

Practical : 3 Hrs./Week

List of Experiments :

- 1. Manufacture of Tablets**
 - a. Ordinary compressed tablet-wet granulation
 - b. Tablets prepared by direct compression.
 - c. Soluble tablet.
 - d. Chewable tablet.
- 2. Formulation and filling of hard gelatin capsules**
- 3. Manufacture of parenterals**
 - a. Ascorbic acid injection
 - b. Calcium gluconate injection
 - c. Sodium chloride infusion.
 - d. Dextrose and Sodium chloride injection/ infusion.
- 4. Evaluation of Pharmaceutical formulations (QC tests)**
 - a. Tablets
 - b. Capsules
 - c. Injections
- 5. Formulation of two liquid oral preparations and evaluation by assay**
 - a. Solution: Paracetamol Syrup
 - b. Antacid suspensions- Aluminum hydroxide gel
- 6. Formulation of semisolids and evaluation by assay**
 - a. Salicylic acid and benzoic acid ointment
 - b. Gel formulation Diclofenac gel
- 7. Cosmetic preparations**
 - a. Lipsticks
 - b. Cold cream and vanishing cream
 - c. Clear liquid shampoo
 - d. Tooth paste and tooth powders.
- 8. Tablet coating (demonstration)**

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

Fourth Year

4.1 T PHARMACOTHERAPEUTICS – III (THEORY)

Theory : 3 Hrs. /Week

- 1. Scope :** This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.
- 2. Objectives:** At completion of this subject it is expected that students will be able to understand –
 - a. the pathophysiology of selected disease states and the rationale for drug therapy;
 - b. the therapeutic approach to management of these diseases;
 - c. the controversies in drug therapy;
 - d. the importance of preparation of individualised therapeutic plans based on diagnosis;
 - e. needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects);
 - f. describe the pathophysiology of selected disease states and explain the rationale for drug therapy;
 - g. to summarize the therapeutic approach to management of these diseases including reference to the latest available evidence;
 - h. to discuss the controversies in drug therapy;
 - i. to discuss the preparation of individualised therapeutic plans based on diagnosis; and
 - j. identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).

Text Books

- a. Clinical Pharmacy and Therapeutics - Roger and Walker, Churchill Livingstone publication
- b. Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange

Reference Books

- a. Pathologic basis of disease - Robins SL, W.B.Saunders publication
- b. Pathology and therapeutics for Pharmacists: A Basis for Clinical Pharmacy Practice - Green and Harris, Chapman and Hall publication
- c. Clinical Pharmacy and Therapeutics - Eric T. Herfindal, Williams and Wilkins Publication
- d. Applied Therapeutics: The clinical Use of Drugs. Lloyd Young and Koda -Kimble MA
- e. Avery's Drug Treatment, 4th Edn, 1997, Adis International Limited.
- f. Relevant review articles from recent medical and pharmaceutical literature.

4.1 P. PHARMACOTHERAPEUTICS – III (PRACTICAL)

Practical : 3 Hrs./Week

Practicals:

Hospital postings for a period of at least 50 hours is required to understand the principles and practice involved in ward round participation and clinical discussion on selection of drug therapy. Students are required to maintain a record of 15 cases observed in the ward and the same should be submitted at the end of the course for evaluation. Each student should present at least two medical cases they have observed and followed in the wards.

Etiopathogenesis and pharmacotherapy of diseases associated with following systems/ diseases:

Title of the topic

- 1 **Gastrointestinal system:** Peptic ulcer disease, Gastro Esophageal Reflux Disease, Inflammatory bowel disease, Liver disorders - Alcoholic liver disease, Viral hepatitis including jaundice, and Drug induced liver disorders.
- 2 **Haematological system:** Anaemias, Venous thromboembolism, Drug induced blood disorders.
- 3 **Nervous system:** Epilepsy, Parkinsonism, Stroke, Alzheimer's disease,
- 4 **Psychiatry disorders:** Schizophrenia, Affective disorders, Anxiety disorders, Sleep disorders, Obsessive Compulsive disorders
- 5 Pain management including Pain pathways, neuralgias, headaches.
- 6 Evidence Based Medicine

Assignments:

Students are required to submit written assignments on the topics given to them. Topics allotted should cover recent developments in drug therapy of various diseases. A minimum of THREE assignments [1500 – 2000 words] should be submitted for evaluation.

Format of the assignment:

1. Minimum & Maximum number of pages
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year
4. It shall be computer draft copy
5. Name and signature of the student
6. Time allocated for presentation may be 8+2 Min.

Note: Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance)

4.2 T. HOSPITAL PHARMACY (THEORY)

Theory : 2 Hrs. /Week

1. **Scope:** In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug dispensing, manufacturing of parenteral preparations, drug information, patient counselling, and therapeutic drug monitoring for improved patient care.
2. **Objectives:** Upon completion of the course, the student shall be able to –
 - a. know various drug distribution methods;
 - b. know the professional practice management skills in hospital pharmacies;
 - c. provide unbiased drug information to the doctors;
 - d. know the manufacturing practices of various formulations in hospital set up;
 - e. appreciate the practice based research methods; and
 - f. appreciate the stores management and inventory control.

Text books: (latest editions)

- a. Hospital pharmacy by William .E. Hassan
- b. A text book of Hospital Pharmacy by S.H.Merchant & Dr. J.S. Qadry. Revised by R.K.Goyal & R.K. Parikh

References:

- a. WHO consultative group report.
- b. R.P.S. Vol.2. Part –B; Pharmacy Practice section.
- c. Handbook of pharmacy – health care. Edt. Robin J Harman. The Pharmaceutical press.

3. Lecture wise programme :

Topics

- 1 **Hospital - its Organisation and functions**
- 2 **Hospital pharmacy-Organisation and management**
 - a) Organizational structure-Staff, Infrastructure & work load statistics
 - b) Management of materials and finance
 - c) Roles & responsibilities of hospital pharmacist
- 3 **The Budget – Preparation and implementation**
- 4 **Hospital drug policy**
 - a) Pharmacy and Therapeutic committee (PTC)
 - b) Hospital formulary
 - c) Hospital committees
 - Infection committee
 - Research and ethical committee
 - d) developing therapeutic guidelines
 - e) Hospital pharmacy communication - Newsletter
- 5 **Hospital pharmacy services**
 - a) Procurement & warehousing of drugs and Pharmaceuticals
 - b) Inventory control

Definition, various methods of Inventory
Control ABC, VED, EOQ, Lead time, safety
stock

- c) Drug distribution in the hospital
 - i) Individual prescription method
 - ii) Floor stock method
 - iii) Unit dose drug distribution method
- d) Distribution of Narcotic and other controlled substances
- e) Central sterile supply services – Role of pharmacist

6 Manufacture of Pharmaceutical preparations

- a) Sterile formulations – large and small volume parenterals
- b) Manufacture of Ointments, Liquids, and creams
- c) Manufacturing of Tablets, granules, capsules, and powders
- d) Total parenteral nutrition

**7 Continuing professional development
programs** Education and training

8 Radio Pharmaceuticals – Handling and packaging

9 Professional Relations and practices of hospital pharmacist

4.2 P. HOSPITAL PHARMACY (PRACTICAL)

Practical : 3 Hrs./Week

1. Assessment of drug interactions in the given prescriptions
2. Manufacture of parenteral formulations, powders.
3. Drug information queries.
4. Inventory control

List of Assignments:

1. Design and Management of Hospital pharmacy department for a 300 bedded hospital.
2. Pharmacy and Therapeutics committee – Organization, functions, and limitations.
3. Development of a hospital formulary for 300 bedded teaching hospital
4. Preparation of ABC analysis of drugs sold in one month from the pharmacy.
5. Different phases of clinical trials with elements to be evaluated.
6. Various sources of drug information and systematic approach to provide unbiased drug information.

Evaluation of prescriptions generated in hospital for drug interactions and find out the suitable management

Special requirements:

1. Each college should sign MoU with nearby local hospital having minimum 150 beds for providing necessary training to the students' on hospital pharmacy activities.
2. Well equipped with various resources of drug information.

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).

4.3 T. CLINICAL PHARMACY (THEORY)

Theory : 3 Hrs. /Week

1. Objectives of the Subject :

Upon completion of the subject student shall be able to (Know, do, appreciate) –

- a. monitor drug therapy of patient through medication chart review and clinical review;
- b. obtain medication history interview and counsel the patients;
- c. identify and resolve drug related problems;
- d. detect, assess and monitor adverse drug reaction;
- e. interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states; and
- f. retrieve, analyse, interpret and formulate drug or medicine information.

Text books (Theory)

- a. Practice Standards and Definitions - The Society of Hospital Pharmacists of Australia.
- b. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc.
- c. Biopharmaceutics and Applied Pharmacokinetics - Leon Shargel, Prentice Hall publication.
- d. A text book of Clinical Pharmacy Practice; Essential concepts and skills, Dr.G.Parthasarathi etal, Orient Orient Langram Pvt.Ltd. ISSN8125026

References

- a. Australian drug information -Procedure manual. The Society of Hospital Pharmacists of Australia.
- b. Clinical Pharmacokinetics - Rowland and Tozer, Williams and Wilkins Publication.
- c. Pharmaceutical statistics. Practical and clinical applications. Sanford Bolton, Marcel Dekker, Inc.

2. Detailed syllabus and lecture wise

schedule: Title of the topic

1. **Definitions, development and scope of clinical pharmacy**
2. **Introduction to daily activities of a clinical pharmacist**
 - a. Drug therapy monitoring (medication chart review, clinical review, pharmacist interventions)
 - b. Ward round participation
 - c. Adverse drug reaction management
 - d. Drug information and poisons information
 - e. Medication history
 - f. Patient counseling
 - g. Drug utilisation evaluation (DUE) and review (DUR)
 - h. Quality assurance of clinical pharmacy services

3. **Patient data analysis**
The patient's case history, its structure and use in evaluation of drug therapy & Understanding common medical abbreviations and terminologies used in clinical practices.
4. **Clinical laboratory tests used in the evaluation of disease states, and interpretation of test results**
 - a. Haematological, Liver function, Renal function, thyroid function tests
 - b. Tests associated with cardiac disorders
 - c. Fluid and electrolyte balance
 - d. Microbiological culture sensitivity tests
 - e. Pulmonary Function Tests
5. **Drug & Poison information**
 - a. Introduction to drug information resources available
 - b. Systematic approach in answering DI queries
 - c. Critical evaluation of drug information and literature
 - d. Preparation of written and verbal reports
 - e. Establishing a Drug Information Centre
 - f. Poisons information- organization & information resources
6. **Pharmacovigilance**
 - a. Scope, definition and aims of pharmacovigilance
 - b. Adverse drug reactions - Classification, mechanism, predisposing factors, causality assessment [different scales used]
 - c. Reporting, evaluation, monitoring, preventing & management of ADRs
 - d. Role of pharmacist in management of ADR.
7. Communication skills, including patient counselling techniques, medication history interview, presentation of cases.
8. Pharmaceutical care concepts
9. Critical evaluation of biomedical literature
10. Medication errors

4.3 P. CLINICAL PHARMACY (PRACTICAL)

Practical : 3 Hrs./Week

Students are expected to perform 15 practicals in the following areas covering the topics dealt in theory class.

- a. Answering drug information questions (4 Nos)
- b. Patient medication counselling (4 Nos)
- c. Case studies related to laboratory investigations (4 Nos)
- d. Patient medication history interview (3 Nos)

Assignment:

Students are expected to submit THREE written assignments (1500 – 2000 words) on the topics given to them covering the following areas dealt in theory class.

Drug information, Patient medication history interview, Patient medication counselling, Critical appraisal of recently published articles in the biomedical literature which deals with a drug or therapeutic issue.

Format of the assignment:

1. Minimum & Maximum number of pages.
2. Reference(s) shall be included at the end.
3. Assignment can be a combined presentation at the end of the academic year.
4. It shall be computer draft copy.
5. Name and signature of the student.
6. Time allocated for presentation may be 8+2 Min.

4.4 T. BIOSTATISTICS AND RESEARCH METHODOLOGY (THEORY)

Theory : 2 Hrs. /Week

1. Detailed syllabus and lecture wise schedule

1 Research Methodology

- a) Types of clinical study designs:
Case studies, observational studies, interventional studies,
- b) Designing the methodology
- c) Sample size determination and Power of a study
Determination of sample size for simple comparative experiments, determination of sample size to obtain a confidence interval of specified width, power of a study
- d) Report writing and presentation of data

2 Biostatistics

2.1 a) Introduction

- b) Types of data distribution
- c) Measures describing the central tendency distributions- average, median, mode
- d) Measurement of the spread of data-range, variation of mean, standard deviation, variance, coefficient of variation, standard error of mean.

2.2 Data graphics

Construction and labeling of graphs, histogram, piecharts, scatter plots, semilogarithmic plots

2.3 Basics of testing hypothesis

- a) Null hypothesis, level of significance, power of test, P value, statistical estimation of confidence intervals.
- b) Level of significance (Parametric data)- students t test (paired and unpaired), chi Square test, Analysis of Variance (one-way and two-way)
- c) Level of significance (Non-parametric data)- Sign test, Wilcoxon's signed rank test, Wilcoxon rank sum test, Mann Whitney U test, Kruskal-Wallis test (one way ANOVA)
- d) Linear regression and correlation- Introduction, Pearson's and Spearman's correlation and correlation co-efficient.

Introduction to statistical software: SPSS, Epi Info, SAS

2.4 Statistical methods in epidemiology

Incidence and prevalence, relative risk, attributable risk

3. Computer applications in pharmacy

Computer System in Hospital Pharmacy: Patterns of Computer use in Hospital Pharmacy – Patient record database management, Medication order entry – Drug

labels and list – Intravenous solution and admixture, patient medication profiles, Inventory control, Management report & Statistics.

Computer In Community Pharmacy

Computerizing the Prescription Dispensing process

Use of Computers for Pharmaceutical Care in community pharmacy Accounting and General ledger system

Drug Information Retrieval & Storage :

Introduction – Advantages of Computerized Literature

Retrieval Use of Computerized Retrieval

Reference books:

- a. Pharmaceutical statistics- practical and clinical applications, Sanford Bolton 3rd edition, publisher Marcel Dekker Inc. NewYork.
- b. Drug Information- A Guide for Pharmacists, Patrick M Malone, Karen L Kier, John E Stanovich , 3rd edition, McGraw Hill Publications 2006

4.5 T. BIOPHARMACEUTICS AND PHARMACOKINETICS (THEORY)

Theory : 3 Hrs. /Week

1. Biopharmaceutics

1. Introduction to Biopharmaceutics
 - a. Absorption of drugs from gastrointestinal tract.
 - b. Drug Distribution.
 - c. Drug Elimination.

2. Pharmacokinetics

2. Introduction to Pharmacokinetics.
 - a. Mathematical model
 - b. Drug levels in blood.
 - c. Pharmacokinetic model
 - d. Compartment models
 - e. Pharmacokinetic study.
3. One compartment open model.
 - a. Intravenous Injection (Bolus)
 - b. Intravenous infusion.
4. Multicompartment models.
 - a. Two compartment open model.
 - b. IV bolus, IV infusion and oral administration
5. Multiple – Dosage Regimens.
 - a. Repetitive Intravenous injections – One Compartment Open Model
 - b. Repetitive Extravascular dosing – One Compartment Open model
 - c. Multiple Dose Regimen – Two Compartment Open Model
6. Nonlinear Pharmacokinetics.
 - a. Introduction
 - b. Factors causing Non-linearity.
 - c. Michaelis-menton method of estimating parameters.
7. Noncompartmental Pharmacokinetics.
 - a. Statistical Moment Theory.
 - b. MRT for various compartment models.
 - c. Physiological Pharmacokinetic model.
8. Bioavailability and Bioequivalence.
 - a. Introduction.
 - b. Bioavailability study protocol.

Methods of Assessment of Bioavailability

4.5 P. BIOPHARMACEUTICS AND PHARMACOKINETICS (PRACTICAL)

Practical : 3 Hrs./Week

1. Improvement of dissolution characteristics of slightly soluble drugs by some methods.
2. Comparison of dissolution studies of two different marketed products of same drug.
3. Influence of polymorphism on solubility and dissolution.
4. Protein binding studies of a highly protein bound drug and poorly protein bound drug.
5. Extent of plasma-protein binding studies on the same drug (i.e. highly and poorly protein bound drug) at different concentrations in respect of constant time.
6. Bioavailability studies of some commonly used drugs on animal/human model.
7. Calculation of K_a , K_e , $t_{1/2}$, C_{max} , AUC, AUMC, MRT etc. from blood profile data.
8. Calculation of bioavailability from urinary excretion data for two drugs.
9. Calculation of AUC and bioequivalence from the given data for two drugs.
10. In vitro absorption studies.
11. Bioequivalency studies on the different drugs marketed.(eg) Tetracycline, Sulphamethoxazole, Trimethoprim, Aspirin etc., on animals and human volunteers.
12. Absorption studies in animal inverted intestine using various drugs.
13. Effect on contact time on the plasma protein binding of drugs.
14. Studying metabolic pathways for different drugs based on elimination kinetics data.
15. Calculation of elimination half-life for different drugs by using urinary elimination data and blood level data.
16. Determination of renal clearance.

References:

- a. Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi
 - b. Remington's Pharmaceutical Sciences, By Mack Publishing Company, Pennsylvania.
 - c. Pharmacokinetics: By Milo Gibaldi Donald, R. Mercei Dekker Inc.
 - d. Hand Book of Clinical Pharmacokinetics, By Milo Gibaldi and Laurie Prescott by ADIS Health Science Press.
 - e. Biopharmaceutics and Pharmacokinetics; By Robert F Notari
 - f. Biopharmaceutics; By Swarbrick
 - g. Bio pharmaceutics and Pharmacokinetics-A Treatise, By D. M. Brahmankar and Sunil B.Jaiswal, Vallabh Prakashan Pitampura, Delhi
 - h. Clinical Pharmacokinetics, Concepts and Applications: By Malcolm Rowland and Thomas, N. Tozen, Lea and Febrger, Philadelphia, 1995.
 - i. Dissolution, Bioavailability and Bioequivalence, By Abdou H.M, Mack, Publishing Company, Pennsylvania 1989.
 - j. Biopharmaceutics and Clinical Pharmacokinetics-An introduction 4th edition Revised and expanded by Rebert F Notari Marcel Dekker Inn, New York and Basel, 1987.
- Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James, C. Roylan, Marcel Dekker Inc, New York 1996

4.6 T. CLINICAL TOXICOLOGY (THEORY)

Theory : 2 Hrs. /Week

1. General principles involved in the management of poisoning
2. Antidotes and the clinical applications.
3. Supportive care in clinical Toxicology.
4. Gut Decontamination.
5. Elimination Enhancement.
6. Toxicokinetics.
7. Clinical symptoms and management of acute poisoning with the following agents –
 - a) Pesticide poisoning: organophosphorous compounds, carbamates, organochlorines, pyrethroids.
 - b) Opiates overdose.
 - c) Antidepressants
 - d) Barbiturates and benzodiazepines.
 - e) Alcohol: ethanol, methanol.
 - f) Paracetamol and salicylates.
 - g) Non-steroidal anti-inflammatory drugs.
 - h) Hydrocarbons: Petroleum products and PEG.
 - i) Caustics: inorganic acids and alkali.
 - j) Radiation poisoning
8. Clinical symptoms and management of chronic poisoning with the following agents – Heavy metals: Arsenic, lead, mercury, iron, copper
9. Venomous snake bites: Families of venomous snakes, clinical effects of venoms, general management as first aid, early manifestations, complications and snake bite injuries.
10. Plants poisoning. Mushrooms, Mycotoxins.
11. Food poisonings
12. Envenomations – Arthropod bites and stings.

Substance abuse:

Signs and symptoms of substance abuse and treatment of dependence

- a) CNS stimulants :amphetamine
- b) Opioids
- c) CNS depressants
- d) Hallucinogens: LSD
- e) Cannabis group
- f) Tobacco

References:

- a. Matthew J Ellenhorn. ELLENHORNS MEDICAL TOXICOLOGY – DIAGNOSIS AND TREATMENT OF POISONING. Second edition. Williams and Wilkins publication, London
- b. V V Pillay. HANDBOOK OF FORENSIC MEDICINE AND TOXICOLOGY. Thirteenth edition 2003 Paras Publication, Hyderabad.

Fifth year

5.1 T. CLINICAL RESEARCH (THEORY)

Theory : 3 Hrs. /Week

1. Drug development

process: Introduction

Various Approaches to drug discovery

1. Pharmacological
2. Toxicological
3. IND Application
4. Drug characterization
5. Dosage form

2. Clinical development of drug:

1. Introduction to Clinical trials
 2. Various phases of clinical trial.
 3. Methods of post marketing surveillance
 4. Abbreviated New Drug Application submission.
 5. Good Clinical Practice – ICH, GCP, Central drug standard control organisation (CDSCO) guidelines
 6. Challenges in the implementation of guidelines
 7. Ethical guidelines in Clinical Research
 8. Composition, responsibilities, procedures of IRB / IEC
 9. Overview of regulatory environment in USA, Europe and India.
 10. Role and responsibilities of clinical trial personnel as per ICH GCP
 - a. Sponsor
 - b. Investigators
 - c. Clinical research associate
 - d. Auditors
 - e. Contract research coordinators
 - f. Regulatory authority
 11. Designing of clinical study documents (protocol, CRF, ICF, PIC with assignment)
 12. Informed consent Process
 13. Data management and its components
- Safety monitoring in clinical trials.

References :

- a. Central Drugs Standard Control Organization. Good Clinical Practices-Guidelines for Clinical Trials on Pharmaceutical Products in India. New Delhi: Ministry of Health; 2001.
- b. International Conference on Harmonisation of Technical requirements for registration of Pharmaceuticals for human use. ICH Harmonised Tripartite Guideline. Guideline for Good Clinical Practice.E6; May 1996.

- c. Ethical Guidelines for Biomedical Research on Human Subjects 2000. Indian Council of Medical Research, New Delhi.
- d. Textbook of Clinical Trials edited by David Machin, Simon Day and Sylvan Green, March 2005, John Wiley and Sons.
- e. Principles of Clinical Research edited by Giovanna di Ignazio, Di Giovanna and Haynes.
- f. Clinical Data Management edited by R K Rondels, S A Varley, C F Webbs. Second Edition, Jan 2000, Wiley Publications.
Goodman & Gilman: JG Hardman, LE Limbard, 10th Edn. McGraw Hill Publications, 2001.

MRSPTU

5.2 T. PHARMACOEPIDEMOLOGY AND PHARMACOECONOMICS (THEORY)

Theory : 3 Hrs. /Week

1. **Pharmacoepidemiology :**

Definition and scope:

Origin and evaluation of pharmacoepidemiology need for pharmacoepidemiology, aims and applications.

Measurement of outcomes in

pharmacoepidemiology Outcome measure and drug use measures

Prevalence, incidence and incidence rate. Monetary units, number of prescriptions, units of drugs dispensed, defined daily doses and prescribed daily doses, medication adherence measurement

Concept of risk in pharmacoepidemiology

Measurement of risk, attributable risk and relative risk, time-risk relationship and odds ratio

Pharmacoepidemiological methods

Includes theoretical aspects of various methods and practical study of various methods with the help of case studies for individual methods

Drug utilization review, case reports, case series, surveys of drug use, cross – sectional studies, cohort studies, case control studies, case –cohort studies, meta – analysis studies, spontaneous reporting, prescription event monitoring and record linkage system.

Sources of data for pharmacoepidemiological studies

Ad Hoc data sources and automated data systems.

Selected special applications of pharmacoepidemiology

Studies of vaccine safety, hospital pharmacoepidemiology, pharmacoepidemiology and risk management, drug induced birth defects.

2. **Pharmacoeconomics:**

Definition, history, needs of pharmacoeconomic

evaluations Role in formulary management decisions

Pharmacoeconomic evaluation

Outcome assessment and types of evaluation

Includes theoretical aspects of various methods and practical study of various methods with the help of case studies for individual methods:

Cost – minimization, cost- benefit, cost – effectiveness, cost utility

Applications of Pharmacoeconomics Software and case studies

S)

5.3 T. CLINICAL PHARMACOKINETICS AND PHARMACOTHERAPEUTIC DRUG MONITORING (THEORY)

Theory : 2 Hrs. /Week

- 1. Introduction to Clinical pharmacokinetics.**
- 2. Design of dosage regimens:**
Nomograms and Tabulations in designing dosage regimen, Conversion from intravenous to oral dosing, Determination of dose and dosing intervals, Drug dosing in the elderly and pediatrics and obese patients.
- 3. Pharmacokinetics of Drug Interaction:**
 - a. Pharmacokinetic drug interactions
 - b. Inhibition and Induction of Drug metabolism
 - c. Inhibition of Biliary Excretion.
- 4. Therapeutic Drug monitoring:**
 - a. Introduction
 - b. Individualization of drug dosage regimen (Variability – Genetic, Age and Weight , disease, Interacting drugs).
 - c. Indications for TDM. Protocol for TDM.
 - d. Pharmacokinetic/Pharmacodynamic Correlation in drug therapy.
 - e. TDM of drugs used in the following disease conditions: cardiovascular disease, Seizure disorders, Psychiatric conditions, and Organ transplantations.
- 5. Dosage adjustment in Renal and hepatic Disease.**
 - a. Renal impairment
 - b. Pharmacokinetic considerations
 - c. General approach for dosage adjustment in Renal disease.
 - d. Measurement of Glomerular Filtration rate and creatinine clearance.
 - e. Dosage adjustment for uremic patients.
 - f. Extracorporeal removal of drugs.
 - g. Effect of Hepatic disease on pharmacokinetics.
- 6. Population Pharmacokinetics.**
 - a. Introduction to Bayesian Theory.
 - b. Adaptive method or Dosing with feed back.
 - c. Analysis of Population pharmacokinetic Data.
- 7. Pharmacogenetics**
 - a. Genetic polymorphism in Drug metabolism: Cytochrome P-450 Isoenzymes.
 - b. Genetic Polymorphism in Drug Transport and Drug Targets.

Pharmacogenetics and Pharmacokinetics/Pharmacodynamic considerations

3 rd Semester		Contact Hrs.			Marks			Credits
Code	Course	L	T	P	Int.	Ext.	Total	
MCSCE1-308	Dissertation-I /Industrial Project	0	0	16	60	40	100	10
Departmental Elective-V		3	0	0	40	60	100	3
MCSCE1-382	Mobile Applications and Services							
MCSCE1-383	Compiler for HPC							
MCSCE1-384	Optimization Techniques							
XXXX	Open Elective	3	0	0	40	60	100	3
Total		6	0	16	140	160	300	16

Open Elective:-

1. **Business Analytics**
2. Industrial Safety & Environment
3. Operations Research
4. Cost Management of Engineering Projects
5. Composite Materials
6. Waste to Energy

Note:

1. **Students going for Industrial Project/Thesis will complete these courses through MOOCs.**
2. **Choose any one OpenCourse in the table for 3rd semester.**

MRSPTU

4 th Semester		Contact Hrs.			Marks			Credits
Code	Course	L	T	P	Int.	Ext.	Total	
MCSCE1-409	Dissertation II	0	0	32	60	40	100	16
Total		0	0	32				16

Subject Code: MCSCE1-382

L T P C
3 0 0 3

Duration: 45 Hrs.

COURSE OBJECTIVES:

- This course presents the three main mobile platforms and their ecosystems, namely Android, iOS, and PhoneGap/WebOS.
- It explores emerging technologies and tools used to design and implement feature-rich mobile applications for smartphones and tablets
- It also take into account both the technical constraints relative to storage capacity, processing capacity, display screen, communication interfaces, and the user interface, context and profile

COURSE OUTCOMES: On completion of the course the student should be able to

CO1 Identify the target platform and users and be able to define and sketch a mobile application

CO2 Understand the fundamentals, frameworks, and development lifecycle of mobile application platforms including iOS, Android, and PhoneGap

CO3 Design and develop a mobile application prototype in one of the platform (challenge project)

COURSE CONTENT:

UNIT-I (13 HRS.)

Introduction: Introduction to Mobile Computing, Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User

More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider

UNIT-II (11 HRS)

Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony

Notifications and Alarms: Performance, Performance and Memory Management, Android Notifications and Alarms, Graphics, Performance and Multithreading, Graphics and UI Performance, Android Graphics

UNIT-III (11 HRS)

Putting It All Together: Packaging and Deploying, Performance Best Practices, Android Field Service App, Location Mobility and Location Based Services Android

Multimedia: Mobile Agents and Peer-to-Peer Architecture, Android Multimedia

UNIT-IV (10 HRS)

Platforms and Additional Issues: Development Process, Architecture, Design, Technology Selection, Mobile App Development Hurdles, Testing, Security and Hacking, Active Transactions, More on Security, Hacking Android

Recent trends in Communication protocols for IOT nodes, mobile computing techniques in IOT, agents based communications in IOT

RECOMMENDED BOOKS:

1. Wei-Meng Lee, Beginning Android™ 4 Application Development, 2012 by John Wiley & Sons

COMPILER FOR HPC

Subject Code: MCSCE1-383

L T P C
3 0 0 3

Duration: 45 Hrs.

Course Objectives:

The objective of this course is to introduce structure of compilers and high performance compiler design for students. Concepts of cache coherence and parallel loops in compilers are included.

COURSE OUTCOMES:

After completion of course, students would be able to:

CO1: Familiar with the structure of compiler.

CO2: Parallel loops, data dependency and exception handling and debugging in compiler.

UNIT-I

High Performance Systems, Structure of a Compiler, Programming Language Features, Languages for High Performance.

Data Dependence: Data Dependence in Loops, Data Dependence in Conditionals, Data Dependence in Parallel Loops, Program Dependence Graph.

Scalar Analysis with Factored Use-Def Chains: Constructing Factored Use- Def Chains, FUD Chains for Arrays, Induction Variables Using FUD Chains, Constant Propagation with FUD Chains, Data Dependence for Scalars. Data Dependence Analysis for Arrays.

UNIT-II

Array Region Analysis, Pointer Analysis, I/O Dependence, Procedure Calls, Inter-procedural Analysis.

Loop Restructuring: Simple Transformations, Loop Fusion, Loop Fission, Loop Reversal, Loop Interchanging, Loop Skewing, Linear Loop Transformations, Strip-Mining, Loop Tiling, Other Loop Transformations, and Inter-procedural Transformations.

Optimizing for Locality: Single Reference to Each Array, Multiple References, General Tiling, Fission and Fusion for Locality.

UNIT-III

Concurrency Analysis: Concurrency from Sequential Loops, Concurrency from Parallel Loops, Nested Loops, Round off Error, Exceptions and Debuggers.

Vector Analysis: Vector Code, Vector Code from Sequential Loops, Vector Code from For all Loops, Nested Loops, Round off Error, Exceptions, and Debuggers, Multi-vector Computers.

UNIT – IV

Message-Passing Machines: SIMD Machines, MIMD Machines, Data Layout, Parallel Code for Array Assignment, Remote Data Access, Automatic Data Layout, Multiple Array Assignments, Other Topics.

Scalable Shared-Memory Machines: Global Cache Coherence, Local Cache Coherence, Latency Tolerant Machines.

Recent trends in compiler design for high performance computing and message passing machines and scalable shared memory machine.

RECOMMENDED BOOKS:

1. Michael Wolfe, High-Performance Compilers for Parallel Computing, Pearson

OPTIMIZATION TECHNIQUES

Subject Code: MCSCE1-384

L T P C
3 0 0 3

Duration: 45 Hrs.

COURSE OBJECTIVES:

The objective of this course is to provide insight to the mathematical formulation of real world problems.

To optimize these mathematical problems using nature based algorithms. And the solution is useful especially for NP-Hard problems.

COURSE OUTCOMES:

At the end of this course, students will be able to

CO1: Formulate optimization problems.

CO2: Understand and apply the concept of optimality criteria for various types of optimization problems.

CO3: Solve various constrained and unconstrained problems in Single variable as well as multivariable.

CO4: Apply the methods of optimization in real life situation.

UNIT-I

Engineering application of Optimization, Formulation of design problems as mathematical programming problems.

General Structure of Optimization Algorithms, Constraints, The Feasible Region.

UNIT-II

Branches of Mathematical Programming: Optimization using calculus, Graphical Optimization, Linear Programming, Quadratic Programming, Integer Programming, Semi Definite Programming.

UNIT-III

Optimization Algorithms like Genetic Optimization, Particle Swarm Optimization, Ant Colony Optimization etc.

Real life Problems and their mathematical formulation as standard programming problems.

UNIT-IV

Recent trends: Applications of ant colony optimization, genetics and linear and quadratic programming in real world applications.

RECOMMENDED BOOKS:

1. Laurence A. Wolsey (1998). Integer programming. Wiley. ISBN 978-0-471-28366-9.
2. Practical Optimization Algorithms and Engineering Applications Andreas Antoniou.
3. An Introduction to Optimization Edwin K., P. Chong & Stanislaw h. Zak.
4. Dimitris Bertsimas; Robert Weismantel (2005). Optimization over integers. Dynamic Ideas. ISBN 978-0-9759146-2-5.
5. John K. Karlof (2006). Integer programming: theory and practice. CRC Press. ISBN 978-0-8493- 1914-3.
6. H. Paul Williams (2009). Logic and Integer Programming. Springer. ISBN 978-0-387-92279-9.
7. Michael Jünger; Thomas M. Liebling; Denis Naddef; George Nemhauser; William R. Pulleyblank; Gerhard Reinelt; Giovanni Rinaldi; Laurence A. Wolsey, eds. (2009). 50 Years of Integer Programming 1958-2008: From the Early Years to the State-of-the- Art. Springer. ISBN 978-3- 540-68274-5.
8. Der-San Chen; Robert G. Batson; Yu Dang (2010). Applied Integer Programming: Modeling and Solution. John Wiley and Sons. ISBN 978-0-470-37306-4.

BUSINESS ANALYTICS

Subject Code:

L T P C
3 0 0 3

Duration: 45 Hrs.

COURSE OBJECTIVES:

1. Understand the role of business analytics within an organization.

2. Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
3. To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
4. To become familiar with processes needed to develop, report, and analyze business data.
5. Use decision-making tools/Operations research techniques.
6. Manage business process using analytical and management tools.
7. Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc.

COURSE OUTCOMES:

At the end of this course, students will be able to

CO1: Students will demonstrate knowledge of data analytics.

CO2: Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.

CO3: Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.

CO4: Students will demonstrate the ability to translate data into clear, actionable insights.

UNIT-I

Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics.

Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.

UNIT-II

Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.

Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes.

UNIT-III

Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models.

Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

UNIT-IV

Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making.

Recent Trends in : Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

Recommended Books:

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.
2. Business Analytics by James Evans, persons Education.

INDUSTRIAL SAFETY

Subject Code:

L T P C
3 0 0 3

Duration: 45 Hrs.

COURSE OBJECTIVES:

The objective of course is to provide insight to distributed database, normalization techniques and integrity rules. It also includes parallel database systems along with object oriented models.

COURSE OUTCOMES:

At the end of this course, students will be able to

CO1: Understand relational database management systems, normalization to make efficient retrieval from database and query.

UNIT-I

Introduction: Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT-II

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT-III

Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT-IV

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

RECOMMENDED BOOKS:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

OPERATIONS RESEARCH

Subject Code:

L T P C
3 0 0 3

Duration: 45 Hrs.

COURSE OUTCOMES:

At the end of this course, students will be able to

CO1: Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.

CO2: Students should able to apply the concept of non-linear programming

CO3: Students should able to carry out sensitivity analysis

CO4: Student should able to model the real world problem and simulate it.

UNIT-I

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models.

UNIT-II

Formulation of a LPP, Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Nonlinear programming problem, Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

UNIT-III

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

UNIT-IV

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

RECOMMENDED BOOKS:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

COST MANAGEMENT OF ENGINEERING PROJECTS

Subject Code:

L T P C
3 0 0 3

Duration: 45 Hrs.

UNIT-I

Introduction and Overview of the Strategic Cost Management Process

Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

UNIT-II

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of

technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

UNIT-III

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

UNIT-IV

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

Recommended Books:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

COMPOSITE MATERIALS

Subject Code:

L T P C
3 0 0 3

Duration: 45 Hrs.

COURSE OBJECTIVES:

COURSE OUTCOMES:

UNIT-I

Introduction: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.

UNIT-II

Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT-III

Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT-IV

Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first ply failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

RECOMMENDED BOOKS:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

REFERENCES:

1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials – K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L. Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

WASTE TO ENERGY

Subject Code:

L T P C
3 0 0 3

Duration: 45 Hrs.

COURSE OBJECTIVES:

COURSE OUTCOMES:

UNIT-I

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods – Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

UNIT-II

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

UNIT-III

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

UNIT-IV

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion – Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

RECOMMENDED BOOKS:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.

2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

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MRSPTU MBA Syllabus 2019 Batch Onwards

.MASTERS IN BUSINESS ADMINISTRATION (1st YEAR)

Total Contact Hours = 32

Total Marks = 800

Total Credits = 30

SEMESTER 1 st		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MBADS1-101	Corporate Social Responsibility & Sustainability	4	-	-	40	60	100	4
MBADS1-102	Organization Behaviour	4	-	-	40	60	100	4
MBADS1-103	Financial Statements Analysis and Reporting	4	-	-	40	60	100	4
MBADS1-104	Business Statistics and Analytics for Decision Making	4	-	-	40	60	100	4
MBADS1-105	Managerial Economics	4	-	-	40	60	100	4
MBADS1-106	Marketing Management	4	-	-	40	60	100	4
MBADS1-107	Business Communication	2	-	2	40	60	100	3
MBADS1-108	Computer Applications for Business	2	-	2	40	60	100	3
Total	Theory = 7 Labs = 2	28	0	4	320	480	800	30

MASTERS IN BUSINESS ADMINISTRATION (1st YEAR)

Total Contact Hours = 30

Total Marks = 800

Total Credits = 30

SEMESTER 2 nd		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MBADS1-201	Indian Ethos and Business Ethics	4	-	-	40	60	100	4
MBADS1-202	Indian Economy and Policy	4	-	-	40	60	100	4
MBADS1-203	Marketing Research	4	-	-	40	60	100	4
MBADS1-204	Corporate Finance	4	-	-	40	60	100	4
MBADS1-205	Human Resource Management	4	-	-	40	60	100	4
MBADS1-206	Operations Management	4	-	-	40	60	100	4
MBADS1-207	Minor Research Project – I	3	-	-	100	-	100	3
XXXXXX	Open Elective – I	3	-	-	40	60	100	3
Total	Theory = 7 Labs = 0	30	0	0	380	420	800	30

**Summer/Industrial Training for 6-8 weeks at the end of 2nd semester*

MRSPTU MBA Syllabus 2019 Batch Onwards

MASTERS IN BUSINESS ADMINISTRATION (2nd YEAR)

Total Contact Hours = 30

Total Marks = 700

Total Credits = 30

Specialization - Finance									
SEMESTER 3rd		Contact Hrs			Marks			Credits	
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total		
MBADS1-301	Quantitative Technique	4	-	-	40	60	100	4	
MBADS1-302	Legal and Business Environment	4	-	-	40	60	100	4	
MBADS1-303	Internship / Field Work								
a)	<i>Internship / Field Work Presentation</i>	4	-	-	60		60	4	
b)	<i>Internship / Field External Evaluation (Feedback by company supervisor)</i>	-	-	-	-	40	40	2	
FINANCE (Compulsory)									
MBADD1-311	Financial Markets and Services <i>(Compulsory for Minor)</i>	4	-	-	40	60	100	4	
MBADD1-312	Investment Analysis & Portfolio Management	4	-	-	40	60	100	4	
MBADD1-313	Business Valuation	4	-	-	40	60	100	4	
FINANCE (Departmental Electives) Select any one									
MBADD1-314	Strategic Financial Management	4	-	-	40	60	100	4	
MBADD1-315	Financial Derivatives								
MBADD1-316	Financial Planning & Taxation								
Total	Theory = 6 Labs = 0	24	0	-	300	400	700	30	

MASTERS IN BUSINESS ADMINISTRATION (2nd YEAR)

Total Contact Hours = 30

Total Marks = 700

Total Credits = 30

Specialization – HR									
SEMESTER 3rd		Contact Hrs			Marks			Credits	
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total		
MBADS1-301	Quantitative Technique	4	-	-	40	60	100	4	
MBADS1-302	Legal and Business Environment	4	-	-	40	60	100	4	
MBADS1-303	Internship / Field Work								
a)	<i>Internship / Field Work Presentation</i>	4	-	-	60		60	4	
b)	<i>Internship / Field External Evaluation (Feedback by company supervisor)</i>	-	-	-	-	40	40	2	
HR (Compulsory)									
MBADD2-311	Manpower Planning, Recruitment & Selection <i>(Compulsory for Minor)</i>	4	-	-	40	60	100	4	
MBADD2-312	Strategic HRM	4	-	-	40	60	100	4	
MBADD2-313	Performance Management Systems	4	-	-	40	60	100	4	
HR (Departmental Electives) Select any one									
MBADD2-314	Training & Development	4			40	60	100	4	
MBADD2-315	Team Dynamics at Work								
MBADD2-316	Negotiation								
Total	Theory = 6 Labs = 0	24	0	-	300	400	700	30	

MRSPTU MBA Syllabus 2019 Batch Onwards

MASTERS IN BUSINESS ADMINISTRATION (2nd YEAR)

Total Contact Hours = 30

Total Marks = 700

Total Credits = 30

Specialization - IT								
SEMESTER 3rd		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MBADS1-301	Quantitative Technique	4	-	-	40	60	100	4
MBADS1-302	Legal and Business Environment	4	-	-	40	60	100	4
MBADS1-303	Internship / Field Work							
a)	<i>Internship / Field Work Presentation</i>	4	-	-	60		60	4
b)	<i>Internship / Field External Evaluation (Feedback by company supervisor)</i>	-	-	-	-	40	40	2
IT (Compulsory)								
MBADD3-311	Managing Software Projects <i>(Compulsory for Minor)</i>	4	-	-	40	60	100	4
MBADD3-312	Data Mining for Business Decisions	4	-	-	40	60	100	4
MBADD3-313	Relational Database Management System	4	-	-	40	60	100	4
IT (Departmental Electives) (Select any one)								
MBADD3-314	Enterprise Resource Planning	4	-	-	40	60	100	4
MBADD3-315	Managing Digital Innovation & Transformation							
MBADD3-316	IT Consulting							
Total	Theory = 6 Labs = 0	24	0	-	300	400	700	30

MASTERS IN BUSINESS ADMINISTRATION (2nd YEAR)

Total Contact Hours = 30

Total Marks = 700

Total Credits = 30

Specialization – Marketing								
SEMESTER 3rd		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MBADS1-301	Quantitative Technique	4	-	-	40	60	100	4
MBADS1-302	Legal and Business Environment	4	-	-	40	60	100	4
MBADS1-303	Internship / Field Work							
a)	<i>Internship / Field Work Presentation</i>	4	-	-	60		60	4
b)	<i>Internship / Field External Evaluation (Feedback by company supervisor)</i>	-	-	-	-	40	40	2
MARKETING (Compulsory)								
MBADD4-311	Consumer Behaviour <i>(Compulsory for Minor)</i>	4	-	-	40	60	100	4
MBADD4-312	Sales & Distribution Management	4	-	-	40	60	100	4
MBADD4-313	Digital & Social Media Marketing	4	-	-	40	60	100	4
MARKETING (Departmental Electives) Select any one								
MBADD4-314	Rural Marketing	4	-	-	40	60	100	4
MBADD4-315	Advertising Marketing							
MBADD4-316	Industrial Marketing							
Total	Theory = 6 Labs = 0	24	0	-	300	400	700	30

MRSPTU MBA Syllabus 2019 Batch Onwards

MASTERS IN BUSINESS ADMINISTRATION (2nd YEAR)

Total Contact Hours = 30

Total Marks = 700

Total Credits = 30

Specialization – Operations									
SEMESTER 3 rd		Contact Hrs			Marks			Credits	
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total		
MBADS1-301	Quantitative Technique	4	-	-	40	60	100	4	
MBADS1-302	Legal and Business Environment	4	-	-	40	60	100	4	
MBADS1-303	Internship / Field Work								
a)	<i>Internship / Field Work Presentation</i>	4	-	-	60		60	4	
b)	<i>Internship / Field External Evaluation (Feedback by company supervisor)</i>	-	-	-	-	40	40	2	
OPERATIONS (Compulsory)									
MBADD5-341	Supply Chain & Logistic Management <i>(Compulsory for Minor)</i>	4	-	-	40	60	100	4	
MBADD5-342	Operations Strategy	4	-	-	40	60	100	4	
MBADD5-343	Operation Research Applications	4	-	-	40	60	100	4	
OPERATIONS (Departmental Electives) Select any one									
MBADD5-344	Pricing & Revenue Management	4	-	-	40	60	100	4	
MBADD5-345	Supply Chain Analytics								
MBADD5-	Behavioural Operation Management								
Total	Theory = 6 Labs = 0	24	0	-	300	400	700	30	

MASTERS IN BUSINESS ADMINISTRATION (2nd YEAR)

Total Contact Hours = 30

Total Marks = 700

Total Credits = 30

Specialization – Retail									
SEMESTER 3 rd		Contact Hrs			Marks			Credits	
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total		
MBADS1-301	Quantitative Technique	4	-	-	40	60	100	4	
MBADS1-302	Legal and Business Environment	4	-	-	40	60	100	4	
MBADS1-303	Internship / Field Work								
a)	<i>Internship / Field Work Presentation</i>	4	-	-	60		60	4	
b)	<i>Internship / Field External Evaluation (Feedback by company supervisor)</i>	-	-	-	-	40	40	2	
Retail (Compulsory)									
MBADD6-311	Logistic and Supply Chain Aspects in Retail Management <i>(Compulsory for Minor)</i>	4	-	-	40	60	100	4	
MBADD6-312	Retail Brand Management	4	-	-	40	60	100	4	
MBADD6-313	Sales & Distribution Management	4	-	-	40	60	100	4	
RETAIL (Departmental Electives) Select any one									
MBADD6-314	Rural Marketing	4	-	-	40	60	100	4	
MBADD6-315	Services Marketing								
MBADD6-316	Direct and Network Marketing								
Total	Theory = 6 Labs = 0	24	0	-	300	400	700	30	

MRSPTU MBA Syllabus 2019 Batch Onwards

MASTERS IN BUSINESS ADMINISTRATION (2nd YEAR)

Total Contact Hours = 30

Total Marks = 800

Total Credits = 30

Specialization – Finance									
SEMESTER 4 th		Contact Hrs			Marks				
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total		
MBADS1-401	Corporate Strategy	4	-	-	40	60	100	4	
MBADS1-402	Entrepreneurship	4	-	-	40	60	100	4	
MBADS1-403	Field Project / Live Project	3			40	60	100	3	
XXXXX	Open Elective – II	3	-	-	40	60	100	3	
FINANCE (Compulsory)									
MBADD1-411	Managing Banks & Financial Institutions <i>(Compulsory for Minor)</i>	4	-	-	40	60	100	4	
MBADD1-412	International Finance	4	-	-	40	60	100	4	
MBADD1-413	Merger, Acquisition & Financial Restructuring	4	-	-	40	60	100	4	
FINANCE (Departmental Electives) (Select any one)									
MBADD1-414	Entrepreneurial Finance	4	-	-	40	60	100	4	
MBADD1-415	Behavioural Finance								
MBADD1-416	Project Appraisal & Finance								
Total	Theory = 7 Labs = 0	30	0	0	320	480	800	30	

MASTERS IN BUSINESS ADMINISTRATION (2nd YEAR)

Total Contact Hours = 30

Total Marks = 800

Total Credits = 30

Specialization – HR									
SEMESTER 4 th		Contact Hrs			Marks				
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	Credits	
MBADS1-401	Corporate Strategy	4	-	-	40	60	100	4	
MBADS1-402	Entrepreneurship	4	-	-	40	60	100	4	
MBADS1-403	Field Project / Live Project	3			40	60	100	3	
XXXXX	Open Elective – II	3	-	-	40	60	100	3	
HR (Compulsory)									
MBADD2-411	Compensation & Benefits Management <i>(Compulsory for Minor)</i>	4	-	-	40	60	100	4	
MBADD2-412	International HRM	4	-	-	40	60	100	4	
MBADD2-413	Cross Cultural Management	4	-	-	40	60	100	4	
HR (Departmental Electives) (Select any one)									
MBADD2-414	Industrial Relation & Labour Law	4	-	-	40	60	100	4	
MBADD2-415	Employee Relations								
MBADD2-416	HR Metrics & Analytics								
Total	Theory = 7 Labs = 0	30	0	0	320	480	800	30	

MRSPTU MBA Syllabus 2019 Batch Onwards

MASTERS IN BUSINESS ADMINISTRATION (2nd YEAR)

Total Contact Hours = 30

Total Marks = 800

Total Credits = 30

Specialization – IT

SEMESTER 4 th		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MBADS1-401	Corporate Strategy	4	-	-	40	60	100	4
MBADS1-402	Entrepreneurship	4	-	-	40	60	100	4
MBADS1-403	Field Project / Live Project	3			40	60	100	3
XXXXX	Open Elective – II	3	-	-	40	60	100	3
IT (Compulsory)								
MBADD3-411	E-commerce & Digital Markets <i>(Compulsory for Minor)</i>	4	-	-	40	60	100	4
MBADD3-412	Strategic Management of IT	4	-	-	40	60	100	4
MBADD3-413	Managing Digital Platforms	4	-	-	40	60	100	4
IT (Departmental Electives) (Select any one)								
MBADD3-414	Web Technology (HTML & Java Script)	4	-	-	40	60	100	4
MBADD3-415	Data Sciences							
MBADD3-416	Software Engineering							
XXXXX	Open Elective – II	3	-	-	40	60	100	3
Total	Theory = 7 Labs = 0	30	0	0	320	480	800	30

MASTERS IN BUSINESS ADMINISTRATION (2nd YEAR)

Total Contact Hours = 30

Total Marks = 800

Total Credits = 30

Specialization- Marketing

SEMESTER 4 th		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MBADS1-401	Corporate Strategy	4	-	-	40	60	100	4
MBADS1-402	Entrepreneurship	4	-	-	40	60	100	4
MBADS1-403	Field Project / Live Project	3			40	60	100	3
XXXXX	Open Elective – II	3	-	-	40	60	100	3
MARKETING (Compulsory)								
MBADD4-411	Services Marketing <i>(Compulsory for Minor)</i>	4	-	-	40	60	100	4
MBADD4-412	International Marketing	4	-	-	40	60	100	4
MBADD4-413	Product & Brand Management							
MARKETING (Departmental Electives) (Select any one)								
MBADD4-414	Retail Management	4	-	-	40	60	100	4
MBADD4-415	B2B Marketing							
MBADD4-416	Integrated Marketing Communication / Promotion Strategy							
Total	Theory = 7 Labs = 0	30	0	0	320	480	800	30

MRSPTU MBA Syllabus 2019 Batch Onwards

MASTERS IN BUSINESS ADMINISTRATION (2nd YEAR)

Total Contact Hours = 30

Total Marks = 800

Total Credits = 30

Specialization – Operations									
SEMESTER 4th		Contact Hrs			Marks			Credits	
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total		
MBADS1-401	Corporate Strategy	4	-	-	40	60	100	4	
MBADS1-402	Entrepreneurship	4	-	-	40	60	100	4	
MBADS1-403	Field Project / Live Project	3			40	60	100	3	
XXXXX	Open Elective – II	3	-	-	40	60	100	3	
OPERATIONS (Compulsory)									
MBADD5-411	Total Quality Management <i>(Compulsory for Minor)</i>	4	-	-	40	60	100	4	
MBADD5-412	Production Planning & Control	4	-	-	40	60	100	4	
MBADD5-413	Management of Manufacturing System	4	-	-	40	60	100	4	
OPERATIONS (Departmental Electives) (Select any one)									
MBADD5-414	Sourcing Management	4	-	-	40	60	100	4	
MBADD5-415	Sales & Operations Planning								
MBADD5-416	Material Management								
Total	Theory = 7 Labs = 0	30	0	0	320	480	800	30	

MASTERS IN BUSINESS ADMINISTRATION (2nd YEAR)

Total Contact Hours = 30

Total Marks = 800

Total Credits = 30

Specialization - Retail									
SEMESTER 4th		Contact Hrs			Marks			Credits	
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total		
MBADS1-401	Corporate Strategy	4	-	-	40	60	100	4	
MBADS1-402	Entrepreneurship	4	-	-	40	60	100	4	
MBADS1-403	Field Project / Live Project	3			40	60	100	3	
XXXXX	Open Elective – II	3	-	-	40	60	100	3	
RETAIL (Compulsory)									
MBADD6-411	Merchandising Planning & Strategies <i>(Compulsory for Minor)</i>	4	-	-	40	60	100	4	
MBADD6-412	E-Retailing	4	-	-	40	60	100	4	
MBADD6-413	Retail Consumer Behaviour	4	-	-	40	60	100	4	
RETAIL (Departmental Electives) (Select any one)									
MBADD6-414	Customer Relationship Management	4	-	-	40	60	100	4	
MBADD6-415	Advertising & Sales Management								
MBADD6-416	Visual Merchandising, Franchising & Vendor Management								
Total	Theory = 7 Labs = 0	30	0	0	320	480	800	30	

Semester	Marks	Credits
1 st	800	30
2 nd	800	30
3 rd	700	30
4 th	800	30
Total	3100	120

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Super-Specialization

The students, who opt for super specialization, will study four Subjects (Three compulsory Subjects and One from departmental electives) from their specialization.

Major-Minor

The students, who opt for Major Minor specialization, will study Three compulsory subjects from their major stream and One from their minor stream (Subject compulsory for minor stream is mentioned in the study scheme)

Open Elective

Open Elective subject will be an inter-disciplinary subject and it will be offered by other disciplines like Engineering, Applied Sciences etc. to MBA students.

MBA
FIRST SEMESTER
SYLLABUS

CORPORATE SOCIAL RESPONSIBILITY & SUSTAINABILITY

Subject Code: MBADS1-101

L T P C

Duration: 60 Hrs

4 0 0 4

Learning Objectives: This course aims to provide a thorough and systematic coverage of management theory and practice. The course aims at providing fundamental knowledge and exposure of the concepts, theories and practices in the field of management. It focuses on the basic roles, skills and functions of management, with special attention to managerial responsibility for effective and efficient achievement of goals.

UNIT-I (10 Hrs)

Introduction to CSR: Meaning, Definition & Objectives of CSR, Chronological evolution of CSR in India; Need of CSR, Models of CSR in India, Carroll's model; Drivers of CSR; Major codes on CSR; Initiatives in India, Corporate citizenship-Business practices-Strategies for CSR-Challenges and implementation

UNIT-II (10 Hrs)

Evolution of corporate governance-Governance practices and regulation-Structure and Development of boards-Role of capital market and government-Governance ratings-Future of governance- innovative practices-Case studies with lessons learnt

UNIT-III (10 Hrs)

Sustainability: Meaning and Scope, Corporate Social Responsibility and Corporate Sustainability-Sustainability Terminologies and Meanings-Why is Sustainability an Imperative-Sustainability Case Studies-Triple Bottom Line (TBL).

UNIT-IV (10 Hrs)

Corporate Sustainability Reporting Frameworks, Global Reporting Initiative Guidelines, National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business International Standards, Sustainability Indices-Principles of Responsible Investment-Challenges in Mainstreaming Sustainability Reporting-Sustainability Reporting Case Studies.

Recommended Books

1. C.V. Baxi and Ajit Prasad, 'Corporate Social Responsibility: Concepts and Cases: The Indian Experience', Excel Books India, New Delhi, 2005
2. Mike Blowfield and Alan Murray, 'Corporate Responsibility', Oxford University Press, 2011
3. J.P. Sharma, Corporate Governance, Business Ethics & CSR, 2nd Edn., Ane Books Pvt Ltd, New Delhi, 2016

ORGANIZATION BEHAVIOR

Subject Code: MBADS1-102

L T P C

Duration: 60 Hrs

4 0 0 4

Learning Objectives: The course aims to provide an understanding of basic concepts, theories and techniques in the field of human behavior at the individual, group and organizational levels in the changing global scenario. The course must be taught using case study method.

UNIT-I (10 Hrs)

Organizational Behavior: Concepts, Theories and organization aspects of OB, Contributing Disciplines to OB, challenges and opportunities for OB. Foundations of Individual Behavior: Biographical Characteristics, Learning, Theories of Learning, Ability, Attitudes, Attitude Change, Values & Beliefs, Prejudices

Personality: Determinants of Personality, Perception, Attribution Theory, Person's Perception.

UNIT-II (12 Hrs)

Motivation: Definition & Process, Early Theories of Motivation, Contemporary Theories of Motivation, Nature and process of Motivation, Application of Motivation Concept.

Job Satisfaction: Nature & Significance of Job satisfaction

Leadership: Nature Significance & Theories; Leadership Effectiveness Model; Leadership in Indian Culture; Leadership Traits & Skills; Behavioural Styles in Leadership. Transactional Analysis, Life Position, Johari Window Model.

UNIT-III (13 Hrs)

Foundations of Group Behavior: Nature & Concept of Group Formation, Group properties: Roles, Norms, Status, Size and Cohesiveness, Stages of Group Formation, Theories of Group Formation. Teams, Work Teams, Difference between Group & Team.

Group Decision Making: Decision Making Process; Decision Making Styles; Advantages & Disadvantages of Decision Making; Techniques of Decision Making; Consensus Decision Making in Groups.

Conflict Management: Definition of Conflict, Transitions in Conflict thought; Functional Vs Dysfunctional Conflict; Conflict Process; Individual, Group Level Conflict and Organization level Conflict; Managing Organizational Conflict

Negotiations - Meaning & Definition, Negotiations Process; Issues in Negotiations

UNIT-IV (10 Hrs)

Organizational Change & Development: Understanding Organization, Managing Organization Culture and Technology, Organizational Change: Change Agents, Change Models, Resistance to Change.

Managing Power and Politics in Organization: Nature & Concepts, Sources & Types of Power, Techniques of Politics.

Course Outcomes: After studying this course the students will equip with ability to Identify, explore and examine factors impinge on individual and group behavior in organizations in the new millennium; explain the terminology associated with organizational behavior.

MRSPTU MBA Syllabus 2019 Batch Onwards

Incorporate and apply the predominant organizational behavior theories to gain knowledge of contemporary issues in organizational behavior and frameworks to work with real life organizational issues concerned with Human Behaviour at work place.

Recommended Books

1. Robbins, 'Organization Behaviour', Pearson Education
2. Luthans, 'Organization Behaviour', Tata McGraw Hill
3. Hersey, 'Management of Organizational Behaviour', Prentice Hall India
4. Aswathappa, 'Organization Behaviour', Himalaya Publications
5. L.M. Prasad, 'Organisation Behaviour', Sultan Chand
6. Parikh, Gupta, 'Organisational Behaviour', Tata McGraw Hill

FINANCIAL STATEMENT ANALYSIS AND REPORTING

Subject code – MBADS1-103

L T P C

Duration – 60 Hrs

4 0 0 4

Learning Objective: This course aims to acquaint the students regarding various accounting concepts and its application in managerial decision making. The course attempts to build potential to use appropriate accounting tools and techniques of financial accounting and management accounting for preparing and analyzing financial statements.

UNIT-I (10 Hrs)

Accounting - Accounting as an Information System, Concepts, Convention and Principles of Accounting, Role of Accountant in an Organization, Branches of Accounting: Financial, Cost and Management Accounting and Their Inter-Relationships, Introduction of Accounting Standards.

Forms of Business Organizations: Sole Proprietorship, Partnership Firms and Private Companies, Public and Govt. Companies

Financial Statements - Need of Financial Statement, Nature, Objectives, Uses and Limitations of Financial Statement, Stakeholders of Financial Statements

UNIT-II (10 Hrs)

Readings of Financial Statements: Income Statement, Balance Sheet, Statement of Retained Earnings, Fund Flow Statement, Cash Flow Statement,

Cost Analysis: Marginal Costing, Break Even Analysis, Standard Costing, Variance Analysis, Introduction to Budgets and its Types.

UNIT-III (10 Hrs)

Analysis of Financial Statements with Managerial Perspective:

Techniques of Financial Statement Analysis: Common Size Statements, Comparative Statements, Trend Analysis and Ratio Analysis (Liquidity, Leverage, Solvency, Turnover Ratio, Market Ratio and Profitability Ratio), Du Pont Analysis.

Analysis of Firm Performance: Time Series Analysis and Cross Sectional Analysis,

UNIT-IV (10 Hrs)

Financial Reporting System - Content of Annual Reports, Quality of Financial Reporting, Consolidated Financial Statements, Indian Financial Reporting System, Ethical Issues in Financial Reporting (Window Dressing, Quality of Earnings, Financial Scams etc.)

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Short Project

Students have to submit a mandatory project in group. The project will be equivalent to two regular assignments. (Maximum Three students can be part of one group). Students have to do financial analysis of two or more companies on the basis of their annual reports. A comparative study of Indian and Foreign companies is preferred)

Course Outcomes: After completing the subject students will be able to analyze a company's financial statements and come to a reasoned conclusion about the financial situation of the company. Students will also learn how to use the accounting and business terminology.

Recommended Books

1. Narayanaswamy, R., 'Financial Accounting – A Managerial Perspective', 5th Edn., Prentice Hall of India. **2015**
2. Gerald White, Ashwinderpaul Sondhi and Dov Fried, 'The Analysis and Use of Financial Statements', Wiley India Edn., **2010**.
3. Gokul Sinha, 'Financial Statement analysis', Prentice Hall of India, New Delhi **2009**
4. John J. Wild, K. R. Subramanyam and Robert F. Halsey, 'Financial Statement Analysis', Tata McGraw Hill Publishing company Ltd. New Delhi, **2004**.
5. Stephen H Penman, 'Financial Statement Analysis and Security Valuation', Tata McGraw Hill Publishing Company Ltd. New Delhi, **2007**
6. ICAI notes on 'Financial Analysis & Business Valuation

BUSINESS STATISTICS AND ANALYTICS FOR DECISION MAKING

Subject Code – MBADS1-104

L T P C

Duration – 60 Hrs

4 0 0 4

Learning Objectives: Statistical methods are applied in all functional areas of business: accounting, finance, management and marketing. The main objective of the course is to enable students to understand the role and importance of Statistics in improving managerial decisions.

UNIT-I (12 Hrs)

Statistics: An Overview- Concept, Significance and Limitations, Importance and Scope of Statistics in Decision Making, Especially in Business Management, Identification of Problem, Review of Literature, Distribution of Data - Normal Distribution

Measure of Central Tendency: Objectives of Averaging. Requisites of Measure of Central Tendency, Mathematical Averages – Arithmetic Mean (Simple And Weighted), Geometric Mean, Harmonic Mean, Averages of Position-Median and Mode, Partition Values- Quartiles, Deciles and Percentiles, Relationship Between Mean, Median and Mode, Comparison Between Measures of Central Tendency

Measure of Dispersion: Significance of Measuring Dispersion (Variation), Classification of Measure of Dispersion, Dispersion Measures- Range and Inter Quartile Range or Deviation. Average Deviation Measures- Mean Absolute Deviation, Variance and Standard Deviation, Chebyshev's Theorem, Coefficient of Variation, Skewness, Moments and Kurtosis: Measures of Skewness, Moments and Kurtosis

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UNIT-II (10 Hrs)

Correlation: Significance, Types, Methods of Correlation Analysis: Scatter Diagrams, Graphic Method, Karl Pearson's Correlation Co-Efficient, Rank Correlation Coefficient, Properties of Correlation, Karl Pearson's Co-Efficient of Correlation and Rank Correlation

Regression: Concept of Regression and The Difference between Correlation and Regression, Lines and Equations of Regression. Regression as a Predicting Tool

Time Series Analysis: Components of a Time Series, Determination of Secular Trend and Seasonal Variations in Business Data, Least Squares Method as a Tool for Forecasting.

UNIT-III (8 Hrs)

Index Numbers: Different Methods of Constructing Price and Quantity Index Numbers. Fixed Base and Chain Base Index Numbers, Problems of Reversibility in Index Numbers

Probability: Definition, Types of Probability, Classical Approach, Relative Frequency and Subjective Approach to Probability, Theorems of Probability, Addition, Multiplication and Bays Theorem and Its Application

Probability Distribution Function: Discrete Probability Distribution (Binomial Distribution and Poisson Distribution), Continuous Probability Distribution (Approximation of Binomial and Poisson Distribution of Normal Distribution)

UNIT-IV (10 Hrs)

Sampling: Concepts of Census and Sampling, Types of Sampling – Probability and Non Probability Sampling Central Limit Theorem, Determination of Sample Size and Sample Error

Hypotheses Design: Formulation of Null and Alternative Hypothesis, Level of Significance. Concept of Standard Error of Mean, Confidence Limits

Hypotheses Testing: Type I and Type II Errors, Student's 'T' Test in Small Samples, Z-Test, Chi-Square Test, Analysis of Variance (Numerical Using Statistical Tables).

Course Outcomes: Student will be able to understand the measurement systems variability, control processes (as in statistical process control or SPC), for summarizing data, and to make data-driven decisions.

Recommended Books

1. Levin & Rubin, 'Statistics for Management', Prentice Hall
2. Beri, 'Business Statistics', Tata Mc Graw Hill
3. Croucher, 'Statistics: Making Business Decisions', Tata McGraw Hill
4. Gupta & Gupta, 'An Introduction to Statistical Methods', Vikas Publications
5. S P Gupta, 'Statistical Methods', Sultan Chand
6. C.R. Reddy, 'Quantitative Techniques for Management Decisions', Himalaya Publishing

MANAGERIAL ECONOMICS

Subject Code: MBADS1-105

L T P C

Duration: 60 Hrs

4 0 0 4

Learning Objective: This course is intended to make students understand various social, political, legal and economic and other factors that influence business in India so as

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to enable them appreciate associated opportunities, risks and challenges and their relevance for managerial decisions.

UNIT-I (10 Hrs)

Managerial Economics: Meaning, Nature, Scope & Relationship with Other Disciplines, Role of Managerial Economics in Decision Making, Opportunity Cost Principle, Production Possibility Curve, Incremental Concept

Marginal Analysis: Law of Diminishing Marginal Utility, Law of Equi-Marginal Utility, **Indifference Curve Analysis:** Meaning Assumptions Properties, Consumer Equilibrium and its Application.

UNIT-II (10Hrs)

Demand Analysis: Law of Demand: Meaning, Determinants, Exceptions, Bandwagon and Snob Effects, Demand Function, Application of Demand Analysis in Managerial Decision Making.

Elasticity of Demand: Meaning, Types & Degree of Elasticity of Demand, Methods of Measuring Price Elasticity of Demand, Factors Determining the Elasticity of Demand,

Demand Forecasting: Importance, Scope, Techniques of Forecasting.

UNIT-III (8 Hrs)

Theory of Production: Production Function, Short Run and Long Run Production, Analysis, Isoquants, Optimal Combination of Inputs, Application in Managerial Decision Making.

Theory of Cost - Cost Analysis: Cost Concepts and Determinants of Cost, Traditional and Modern Theory of Cost: Long Run and Short Run, Economy of Scale, Revenue Curve.

UNIT-IV (12 Hrs)

Price Determination under Perfect Competition- Introduction, Market and Market Structure, Perfect Competition, Price-Output Determination under Perfect Competition, Short-run Industry Equilibrium under Perfect Competition, Short-run Firm Equilibrium under Perfect Competition, Long-run Industry Equilibrium under Perfect Competition, Long-run Firm Equilibrium under Perfect Competition

Pricing Under Imperfect Competition- Introduction, Monopoly, Price Discrimination under Monopoly, Bilateral Monopoly, Monopolistic Competition, Oligopoly, Collusive Oligopoly and Price Leadership, Duopoly.

Behavior of Firms: Nash Equilibrium, Prisoner's Dilemma, Asymmetric Information.

Course Outcomes: After studying the subject the students will be able to understand and explain the concept of economics and its managerial perspective including the real insight of the consumer's economic behavior leading them to estimate the demand for the new product as well as changes in the existing products.

Recommended Books

1. Peterson and Lewis, 'Managerial Economic', Prentice Hall of India
2. Froeb, 'Managerial Economics', Cengage Learning
3. Geetika, 'Managerial Economics', Tata McGraw Hills
4. K.K .Dewett, ' Modern Economic Theory', S. Chand Publication
5. D.M.Mithani, 'Managerial Economics Theory and Applications', Himalaya Publication
6. D.N.Dwivedi, 'Managerial Economic', Vikas Publications.

MARKETING MANAGEMENT

Subject Code: MBADS1-106

L T P C

Duration: 60 Hrs

4 0 0 4

Learning Objectives: The course aims at making students understand concepts, philosophies, processes and techniques of managing the marketing operations of a firm in turbulent business environment. This course will provide better understanding of the complexities associated with marketing functions, strategies and provides students with the opportunity to apply the key concepts to practical business situations.

UNIT-I (12 Hrs)

Understanding Marketing and Consumers: Definition, Importance, Scope, Various Marketing Concepts, Marketing Mix, Marketing vs Selling, Effect of Liberalization and Globalization, Creating Customer Value. **Analyzing Marketing Environment:** Micro, Macro **Corporate Strategic Planning:** Defining Role Marketing Strategies, Marketing Planning Process.

Marketing Information System: Concept and Components

Consumer Behaviour: Understanding Consumer Behaviour, Factors Influencing Consumer Buying Behaviour, Business Buying Process, Understanding Business Buyer Behaviour

UNIT-II (12 Hrs)

Creating and Managing Product: Market Segmentation & Targeting, Differentiation & Positioning, Competitors Analysis

Product Decisions: Product Mix, Packaging and Labelling Decisions, Branding & Brand Equity, Services Marketing, New Product Development, Consumer Adoption Process, Product Life Cycle and Strategies

Pricing Decisions: Objectives, Factors Affecting Pricing Decisions, Pricing Methods, Price Changes, Pricing Strategies

UNIT-III (11 Hrs)

Delivering and Promoting Product - Supply Chain Decisions: Nature, Types, Channel Design and Channel Management Decisions, Retailing, Wholesaling, Managing Logistics and Supply Chain.

Promotion Decisions: Communication Process, Promotion Mix, Advertising, Sales Promotion, Public Relations, Direct Selling and Online Marketing.

Personal Selling: Personal Selling Process, Managing the Sales Force, Designing Quota & Territories, Evaluating Performance.

UNIT-IV (10 Hrs)

Emerging Trends in Marketing: Green Marketing, Event Marketing, Network Marketing, Direct Marketing, Social Marketing, Buzz Marketing/ Viral Marketing, Consumerism, Customer Relationship Management (CRM), Customer Satisfaction, Loyalty, Retention, Global Marketing, Rural Marketing,

E-Commerce: Marketing in Digital Age

Note: Relevant Case Studies should be discussed in class.

Course Outcomes: This course will equip students to review marketing issues with respect to understand basic concepts of Marketing, understand target segmentation and consumer

MRSPTU MBA Syllabus 2019 Batch Onwards

decision making design of products that meet consumer needs understand pricing, channels of distribution understand marketing communication.

Recommended Books

1. Ramaswamy & Namakumari, 'Marketing Management', McMillan
2. Etzel, Walker, Stanton, and Pandit, 'Marketing Management', Tata McGrawHill,
3. Kurtz & Boone, 'Principles of Marketing', Cengage Learning
4. Kotler & Koshy, 'Marketing Management', Pearsons Education
5. Kotler & Armstrong, 'Principles of Marketing', Prentice Hall
6. Biplob S. Bose, 'Marketing Management', Himalaya Publications

BUSINESS COMMUNICATIONS

Subject Code: MBADS1-107

L T P C

Duration: 45 Hrs

2 0 2 3

Learning Objective: This course is designed to give students a comprehensive view of communication, its scope and importance in business, the role of communication in establishing a favorable image of the organization. The aim is to develop students' ability to communicate correctly and effectively on matters having relevance to day-to-day business operations. This course will make student conversant with fundamentals of communication, help them honing oral, written and non-verbal communication skills and to transform their communication abilities.

UNIT- I (7 Hrs)

Introduction to Communication: Meaning, Process, Importance of Communication in Business, Types of Information, Formal and Informal Communication, Internal and External Communication. Approaches to Effective Communication, Essentials of Effective Business Communication (7Cs model)

Developing Reading Skills: Identify the Purpose of Reading, Factors Effecting Reading, Learning How to Think and Read, Developing Effective Reading Habits, Reading Tactics and Strategies: Training Eye and Training Mind (SQ3R), Building Vocabulary.

Developing Listening Skills: Importance, Purpose of Listening, Art of Listening, Factors Affecting Listening, Components of Effective Listening, Process of Listening, Principles and Barriers to Listening, Activities to Improve Listening

UNIT –II (7 Hrs)

Developing Writing Skills: Basics, Advantages and Disadvantages, Covering letter, Need, Functions and Kinds, Layout of Letter Writing, Types of Letter Writing: Persuasive Letters, Request Letters, Sales Letters, Complaints and Adjustments, Business Proposals, Emails, Summaries

Report Writing: Structure, Types, Formats, Drafting of Various Types of Report. Writing

Departmental Communication: Meaning, Need and Types: Interview Letters, Promotion Letters, Resignation Letters, Newsletters, Circulars, Agenda, Notice, Office Memorandums, Office Orders, Press Release

UNIT- III (7 Hrs)

Developing Speaking Skills: Advantages and Disadvantages, Conversation as Communication, Art of Public Speaking, Just a Minute Presentation, How To Make Effective Presentations, Four P's of Presentation, Structuring, Rehearsing and Delivery Methods.

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Workshop -Jam Feedback, Overcoming Stage Fright and Overcoming Glossophobia

Presentation–1 (Planning & Preparing)

Presentation–2 (Visual Aids)

Presentation–3 (Delivery)

UNIT- IV (7 Hrs)

Group Discussion: Nature, Uses and Importance, Guidelines for GD Presentations

Resume Writing: Planning, Organizing Contents, Layout, Guidelines for Good Resume.

Interview Skills: Preparation Techniques, Frequently Asked Questions about How to Face an Interview Board, Proper Body Posture, Projecting a Positive Image, Steps To Succeed In Interviews, Practice Mock Interview in Classrooms.

The Case Method of Learning: Dimensions of a Case, Case Discussion, Usefulness of The Case Method, Training of Managers, Use The Case Method. Report Writing: Structure, Types, Formats, Preparations And Presentation.

Course Outcome: After studying this course the students will enable to:

- Know the dynamics of communication in the business world
- Practice the different tools of communication
- Enable them to speak effectively suited to the situation
- Improve their competence in English

Recommended Books

1. Lesikar, Petit & Flatley, 'Lesikar's Basic Business Communication', [Tata McGraw Hill](#)
2. Raman Meenakshi 'Prakash Singh, Business Communication', [Oxford University Press.](#)
3. Rizvi Ashraf,' Effective Technical Communication', [Tata McGraw Hill](#)
4. Krizan, Buddy, 'Merrier, Effective Business Communication', [Cengage Learning](#)
5. Diwan & Aggarwal, 'Business Communication', [Excel](#)
6. Baugh, Frayer & Thomas, 'How to write first class Business Correspondence, Viva Book
7. Taylor, English Conversion Practice', [Tata McGrawHill](#)
8. Devaraj, 'Executive Communication', [Tata McGraw Hill](#)
9. Ober, 'Effective Bossiness Communication', [Cengage Learning](#)

COMPUTER APPLICATIONS FOR BUSINESS

Subject Code: MBADS1 -108

L T P C

Duration: 45 Hrs

2 0 2 3

Learning Objective: The objective of this course is to provide an insight into basic features of computer systems and their applications in Managerial Decision Making. It also provides technical framework to students for understanding the emerging world of e-Business.

UNIT-I (5 Hrs)

Introduction to Computers: Types of Computers, Storage Devices and Memories, Input/Output Devices. Introduction to Software, Types of software – Software, its Nature and Qualities, Introduction to Electron Display Gadgets

Operating System: Types of Operating System: Windows, Linux, Mac and features.

MRSPTU MBA Syllabus 2019 Batch Onwards

UNIT-II (12 Hrs)

MS Applications: MS Word – Basics, Formatting Text and Documents, Mail Merge, Hyperlinks, Bookmark.

MS Excel – Introduction, Creating a List, Graphs and Charts, Sorting, Filtering Data, Pivot Tables, Freezing Panes, Basic Statistical Formulae in Excel and Macros

MS PowerPoint – Introduction–Toolbar, their Icons and Commands– Navigating in Power point–Creation of slides, animation, and templates–Designing Presentations–Slide show controls–Making notes on Pages and Handouts–Printing Presentations–Customizing Presentations–Auto content Wizard

UNIT-III (5 Hrs)

Internet and E-Business: Introduction to internet and its applications, Intranet and Extranet, World Wide Web, Internet Applications. E – business - E-Business framework, Infrastructure for E-Business, Electronic Data Interchange.

UNIT-IV (8 Hrs)

Computer Networks and Security: Introduction: Cryptography, Ethical Hacking, Cyber Crime, Digital Signatures, E Wallets, Point of Sales.

Poster Making with Photoshop: Opening new and existing files, Exploring tool box, various Operations: Zooming, Cropping, Adjusting colours with adjustment panels, Understanding pixel and resolution, image size command, resizing for print and web.

Course Outcomes: Students will be able to understand the concepts of computer and various software related to it. The use of MS Office (Excel, Access & Power point) helps in different type of analysis and projection of reports related to the business management. The software helps in planning & coordinating the supply chain of the company.

Recommended Books

1. Rainer and Potter, 'Introduction to Information Technology', John Wiley and Sons.
2. Roger Jennings, 'Microsoft Access 2010', Pearson Education
3. Forouzan, 'Basics of Computer Science', Cengage Learning
4. Joseph Brady & Ellen F Monk, 'Problem Solving Cases in Microsoft', Excel Thomson Learning.
5. K. Saini & Pradeep Kumar, 'Computer Applications in Management', Anmol Publications.
6. Deepak Bharihoke, 'Fundamentals of Information Technology', Excel Books

MBA
SECOND SEMESTER
SYLLABUS

INDIAN ETHOS AND BUSINESS ETHICS

Subject Code: MBADS1-201

L T P C
4 0 0 4

Duration: 60 Hrs

Learning Objectives: Well thought-out decision making in a business organization requires the proper knowledge of the environment in which it has to function. This course aims at exposing the students to the corporate business environment forces that may affect their future decision making.

UNIT – I (12 Hrs)

History & Relevance, Principles Practiced by Indian Companies, Role of Indian Ethos in Managerial Practices, Management Lessons from Vedas, Mahabharata, Bible, Quran, Kautilya's Arthashastra, Indian Heritage in Business, Management-Production and Consumption. Ethics v/s Ethos , Indian v/s Western Management, Work Ethos and Values for Indian Managers- Relevance of Value Based Management in Global Change- Impact of Values on Stakeholders, Trans-Cultural Human Values, Secular v/s Spiritual Values , Value System in Work Culture

UNIT - II (10 Hrs)

Stress Management-Meditation for mental health, Yoga, Contemporary Approaches to Leadership- Joint Hindu Family Business–Leadership Qualities of Karta, Indian Systems of Learning-Gurukul System of Learning , Advantages- Disadvantages of Karma, importance of Karma to Managers-Nishkama Karma, Laws of Karma, Law of Creation- Law of Humility- Law of Growth- Law of Responsibility- Law of Connection-Corporate Karma Leadership.

UNIT - III (8 Hrs)

Understanding the need for ethics, Ethical values, myths and ambiguity, ethical codes, Ethical Principles in Business; Theories of Ethics, Absolutism verses Relativism, Teleological approach, the Deontological approach, Kohlberg's six stages of moral development (CMD)

UNIT - IV (10 Hrs)

Managing Ethical Dilemma: Characteristics, Ethical Decision Making, Ethical Reasoning, the dilemma resolution process; Ethical dilemmas in different business areas: Finance, Marketing HRM and International Business.

Ethical Culture in Organization, Developing Codes of Ethics and Conduct, Ethical and Value Based Leadership. Role of scriptures in understanding ethics, Indian wisdom & Indian approaches towards business ethics

Recommended Books

1. Manuel G. Velasquez, 'Business Ethics', Pearson Education
2. Biswanath Ghosh, 'Ethics in Management and Indian Ethos', 2nd Edn., Vikas Publication, 2011
3. Balachandaran S., 'Ethics, Indian Ethos and Management', 2nd Edn. Shroff Publishers & Distributors 2003
4. Aanda das Gupta, 'Business Ethics Text and cases from Indian Perspectives' Springer

INDIAN ECONOMY AND POLICY

Subject Code: MBADS1-202

L T P C
4 0 0 4

Duration: 60 Hrs

Learning Objective: This course will teach students the basic tools of macroeconomics and apply them to real world economic policy. The goals of the course are for students to understand how to evaluate macroeconomic conditions, understand how monetary policy and fiscal policy can be used to influence short-run macroeconomic conditions.

UNIT-I (11 Hrs)

Nature of Macro-Economic System: Colonialism and development of the Indian economy-De-industrialization of Indian economy-Business enterprises-Growth and economic reforms-Poverty, Role of Macro Economics for Managerial Decision Making Circular Flow of Income;

National Income: Concepts and Measurement, Keynesian Theory of Income Determination, Consumption Function, Keynes' Psychological Law of Consumption, Income-Consumption Relationship: Relative Income, Life Cycle and Permanent Income Hypothesis

UNIT-II (10 Hrs)

Saving and Investment Functions; Marginal Efficiency of Capital; Multiplier, Accelerator and Investment Behavior, Balance of Payment and Exchange Rate Determination Applications: India's Experience With Exchange Rate, Impact of Fluctuations in Exchange Rate on Export, Import and Growth of Domestic Industry

Introduction to Demand and Supply of Money: Motive for Holding Money; Liquidity Preference

UNIT-III (10 Hrs)

Inflation and Unemployment: Concepts of Inflation-Demand Pull and Cost Push; Introduction to Philips Curve as Relation between Inflation and Unemployment.

Business Cycle:-Features and Phases, Effects and Control.

Macro Economic Policy: Understanding of Macroeconomic Stabilization and Structural Reforms. Central Banking Operations and Aspects of Monetary Management; Growth and Stabilization Effects of Monetary Policy Operations

UNIT-IV (14 Hrs)

Fiscal Policy - Nature and Components of Fiscal Policy; Fiscal Policy Operations for Macro-Economic Growth and Stabilization; Fiscal Deficit and Its Management; Public Debt Operations and Their Impact, Co-Ordination of Fiscal and Monetary Policies for Effective Macro-Management; Corporate Adjustments to Monetary and Fiscal Variations.

Financial Sector Performance and Impending Reforms, Economic reforms towards more liberalization-Agriculture, industry and services, Government reforms and the emerging energy-economy-environment regulatory framework

Course Outcomes: Upon successful completion of the course, the student should be able to demonstrate a basic understanding of news relating to the economy as a whole, the economic implications of changes in government fiscal or monetary policy; how interest rates are determined and the role of interest rates in personal and corporate decision-making; and critically apply economic concepts when participating as a citizen in a democratic society. In

MRSPTU MBA Syllabus 2019 Batch Onwards

particular, the students should be able to calculate equilibrium national income levels, calculate and use various multipliers, convert nominal values to real values.

Recommended Books

1. Olivier Blanchard, 'Macroeconomics Updated Englewood Cliffs:' Prentice Hall 5th edition, 2011
2. Dimand, Robert W. Durlauf, Steven N.; Blume, Lawrence E., eds. "Macroeconomics, Origins and History" 2008
3. D.N. Dwivedi, 'Macroeconomics: Theory and Policy', Tata McGraw-Hill, New Delhi, 2001
4. John Bouman, 'Principles of Macroeconomics – free fully comprehensive Principles of Microeconomics and Macroeconomics Texts'

MARKETING RESEARCH

Subject Code – MBADS1-203

L T P C

Duration – 60 Hours

4 0 0 4

UNIT-I (10 Hrs)

Introduction to Research: Meaning, Definition, Objective and Process, Qualitative Research, Quantitative Research, Research Ethics

Research Design: Meaning, Types - Historical, Descriptive, Exploratory and Experimental

Research Problem: Necessity of Defined Problem, Problem Formulation, Understanding of Problem,

Literature Review: Identifying, Accessing and Managing Sources of Information and Scholarly Literature- Academic Writing and Referencing, Steps in Literature Review Development-Argumentation

Design of Experiment: Basic Principal of Experimental Design, Randomized Block, Completely Randomized Block, Latin Square, Factorial Design.

UNIT-II (10 Hrs)

Sources of Data: Primary and Secondary, Validation of Data

Data Collection Methods: Survey, Questionnaire: Process of Questionnaire Design, Information Required, Interview Method, Questionnaire Format and Question Composition, Individual Question Content, Questions Order, Form and Layout, Pilot Testing the Questionnaire

Sampling Design & Techniques – Probability Sampling and Non Probability Sampling

Scaling Techniques: Meaning & Types

Reliability: Test – Retest Reliability, Alternative Form Reliability, Internal Comparison Reliability and Scorer Reliability

Validity: Content Validity, Criterion Related Validity and Construct Validity

UNIT-III (10 Hrs)

Data Process Operations: Editing, Sorting, Coding, Classification and Tabulation

Analysis of Data: Statistical Measure and Their Significance, Central Tendency, Dispersion, Correlation: Linear and Partial, Regression: Simple and Multiple Regression, Skewness, Time series Analysis, Index Number

Hypothesis: Introduction, Types, Formulation of Hypothesis, Type-I Error, Type-II Error

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Testing of Hypothesis: Steps of Hypothesis Testing, T-test, Z- test, Chi Square, F-test, ANOVA

UNIT – IV (10 Hrs)

Multivariate Analysis: Factor Analysis, Discriminant Analysis, Cluster Analysis, Conjoint Analysis, Multi Dimensional Scaling

Report Writing: Essentials of Report Writing, Report Format

Research Proposal: Purpose, Nature and Evaluation - Content and Format

Practical Considerations - Timelines, Budgets, Supervision Management, Presentation and Defence of proposals

Statistical Software: Application of Statistical Softwares like SPSS, MS Excel, Mini Tab or MATLAB Software in Data Analysis

Recommended Books

1. R.I Levin and D.S. Rubin, 'Statistics for Management', Pearson Education New Delhi, Seventh Edition
2. N.K. Malhotra, 'Marketing Research–An Applied Orientation', Pearson Education New Delhi, Fourth Edition
3. Donald Cooper, 'Business Research Methods', Tata McGraw Hill New Delhi
4. Sadhu Singh, 'Research Methodology in Social Sciences', Himalaya Publishers
5. Darren George & Paul Mallery, 'SPSS for Windows Step by Step', Pearson Education New Delhi
6. C.R.Kothari, 'Research Methodology Methods & Techniques', New Age International Publishers, Second Edition.

OPERATIONS MANAGEMENT

Subject Code: MBADS1 - 206

L T P C

Duration: 60 Hrs

4 0 0 4

Learning Objective: It is a subject where a student learns various steps of product design, development, production, plant location, storage, production planning and control. The students are motivated to apply concepts and principles of management to become more effective professional

UNIT – I (10 Hrs)

Operations Management: Concept, Functions. Transformation Process Model: Inputs, Process and Outputs; Classification of Operations; Responsibilities of Operations Manager, Nature of International Operations Management, Sustainable Operations Management
Difference between Manufacturing and Service Operations

Operations Strategy: Operations Strategy, Competitive Capabilities and Core Competencies, Operations Strategy as a Competitive Weapon, Linkage between Corporate, Business, and Operations Strategy, Developing Operations Strategy, Elements or Components of Operations Strategy, Global Strategies and Role of Operations Strategy

UNIT – II (10 Hrs)

Facility Location – Importance, Factors in Location Analysis, Location Analysis Techniques. Product Design and Development – Product Design and Its Characteristics, Product Development Process (Technical), Product Development Techniques

MRSPTU MBA Syllabus 2019 Batch Onwards

Process Selection- Project, Job, Batch, Mass and Process Types of Production Systems, Operations Management in Corporate Profitability and Competitiveness

UNIT – III (10 Hrs)

Capacity Planning: Concepts, Factors affecting Capacity Planning, Capacity Planning Decisions.

Inventory Management: Deterministic Demand Model, EOQ, Re-order level, ABC analysis, Continuous and Periodic Review Inventory models

Supply Chain Management; Lean vs Agile supply chains; Aggregate Production Planning; Master Production Schedule (MPS) and Material Requirement Planning (MRP), JIT Approach, Implementation requirements, Services, Kanban System

UNIT – IV (10 Hrs)

Quality Management: Introduction, Meaning, Quality Characteristics of Goods and Services, Jurans' Quality Trilogy, Deming's 14 Principles, Tools and Techniques for Quality Improvement, Statistical Process Control Chart, Quality Assurance, Total Quality Management (TQM) Model. Introduction to Six Sigma

Project Management - Project Lifecycle Understanding, Project Definition, WBS (Work Breakdown Structure), Planning Scope-Planning Schedule

Course Outcomes: After studying this course, the students learn the role of operations on achieving various competitive capabilities. The students also learn how to help an organization in improving productivity and meeting customer's competitive capabilities.

Recommended Books

1. Buffa & Sarin, 'Modern Production/Operations Management', John Wiley, 8th edition
2. Chary, Production and Operations Management, Tata McGraw-Hill
3. Krajewski & Ritzman, 'Operations Management', Pearson Education, 5th edition
4. Adam and Eben, 'Production & Operations', Prentice Hall, 5th edition

HUMAN RESOURCE MANAGEMENT

Subject Code: MBADS1- 205

L T P C

Duration: 60 Hrs

4 0 0 4

Learning Objectives: The objective of the paper is to make student aware of the various functions and importance of the HR Department in any organization. It is basically concerned with managing the human resources, whereby the underlying objective is to attract retain and motivate the human resources in any organization, which is the most challenging and daunting look for any organization today.

UNIT-I (10 Hrs)

Human Resources Management: Meaning, Scope, Objective, Functions, Roles and Importance. Interaction with other Functional Areas, HRM & HRD – A Comparative Analysis, Human Resource Management practices in India. Line and Staff Responsibility of HR Managers, HR as a Factor of Competitive Advantage,

Human Resource Planning: Concept, Process, Importance and Methods. Human Resource Information System (HRIS)

Job Analysis: Job Description, Job Specification. Job Evaluation – Concepts and Methods

UNIT-II (10 Hrs)

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Recruitment & Selection: Concept, Process & Methods of Recruitment & Selections. Induction & Placement

Training & Development: Concept and Methods, Difference between Training & Development, Aligning Training to Business Needs, Training Need Analysis, Delivery Methodology, Evaluation, Capacity Building, Future of Training & Development. Career Planning, Coaching & Mentoring

Internal Mobility: Promotion, Transfer, Demotion, Separation, Downsizing, Outplacement

UNIT-III (10 Hrs)

Performance Appraisal: Concept, Methods, Issues and Ethics in Performance Appraisal, Potential Appraisal.

Compensation Management: Wage & Salary Administration: Concept of Wage & Salary Administration, Elements & Methods of Wage & Salary, Incentive Plans, Bonus, ESOPs & Fringe Benefits.

Quality of Work Life (QWL): Concept, Development, Various Approaches and Techniques for improving QWL, Counselling and Monitoring, Morale and Productivity

UNIT IV (10 Hrs)

Industrial Relations: Concept, Importance and Difference between HR and IR.

Collective Bargaining: Meaning, Scope, Objectives, Issues and Strategies, Negotiations Skills and Strategies, Participative Management

Employee Grievances and Their Resolution: Model for Grievance Resolution Procedure, Fundamentals of Industrial Relations and Fundamentals of Labour Laws, Overcoming harassment at workplace

Course Outcome: After completing this course the students should be able to understand the concepts, principles and processes of HRM, understand the crucial role that HRM plays in helping organizations all over the world adapt to the endless change today.

Recommended Books

1. Edwin B.Flippo, 'Personal Management,Tata', Mc Graw Hill
2. Bohlander, 'Snell &Vohra, Human Resource Management', Cengage Learning
3. Gary Dessler, 'Human Resource Management', McMillan
4. V.S.P.Rao,' Human Resource Management', Excel Books
5. C.B. Memoria, 'Personnel Management,' Himalaya Publications
6. T.N. Chhabra, 'Human Resource Management', Dhanpat rai & sons.
7. C.B. Gupta,' Human Resource Management', Sultan Chand and Sons
8. R.S. Dwivedi,' HRD in India Companies', Himalaya Publications

CORPORATE FINANCE

Subject Code: MBADS1-204

L T P C

Duration: 60 Hrs

4 0 0 4

Learning Objectives: To provide an understanding of the function, the roles, the goals and the processes of corporate financial management, covering the sourcing of finances and their issues in investment and operations. Problem-solving methodology will be used to illustrate the theories and tools in financial decision making.

UNIT-I (10 Hrs)

Introduction: Nature, Scope and Objectives of Financial Management, Profit Maximization Vs Wealth Maximization, Role of Financial Manager, Agency Problem, Interface between Finance and other Business Functions, Financial Planning: Objectives, Factors affecting Financial Planning

Risk and Return: Risk and Return Concepts, Types of Risks, Relationship between Risk and Return Model - CAPM, Arbitrage Pricing Theory

Investment Decision: Nature and Significance of Investment Decision, Time Value of Money: Future Value of a Single Cash Flow, Annuity, Present Value of a Single Cash Flow, Annuity, Present Value of an Uneven Cash Flow

Capital Budgeting: Process and Techniques, Discounted and Non-Discounted Methods (Pay Back, ARR, NPV, IRR, Benefit Cost Ratio), Capital Rationing, Certainty Equivalent Factor

UNIT-II (10 Hrs)

Financing Decision: Cost of Capital, Computation of Cost of Equity, Debentures, Preference Shares and Retained Earnings, Weighted Average Cost Capital and Implications

Capital Structure – Introduction, Factors Affecting Capital Structure, Capital Structure Theories: Net Income Approach, Net Operating Income Approach, Traditional Approach, Modigliani-Miller Model (MM) , Criticisms of MM Models, Determinants of Capital Structures, EBIT - EPS Analysis

UNIT-III (10 Hrs)

Leverage: Introduction, Operating Leverage, Financial Leverage and Combined Leverage, Application of Leverage

Dividend Decisions: Meaning and Significance of Dividend, Dividend Models: Traditional Model, Walter Model, Gordon Model, Miller-Modigliani Position, Determinants of Dividend, Bonus Shares, Stock Splits, Dividend Capitalization Approach

UNIT-IV (10 Hrs)

Working Capital Decision: Meaning, Nature and Scope of Working Capital - Component of Working Capital – Factors affecting Working Capital, Working Capital Strategies, Cash Management, Inventory Management, Receivable Management

Long term Sources of Funds: Equity share, Preference shares, Debentures, Bonds, Warrants, Venture capital, Convertible Bonds/Debentures et.

Short Term Sources of Funds: Commercial Paper, Certificate of Deposit, Treasury Bills etc.

Course Outcome: After completing this course the students should be able to make optimum decisions pertaining to raising funds, making investments & managing the assets of a corporation, big or small, with an ultimate goal of creating value.

Recommended Books

1. Brigham, 'Financial Management : Text & Cases', [Cengage Learning](#)
2. Brealy & Myres, 'Principles of Corporate Finance', [Tata McGraw Hill](#)
3. John J., 'Financial Decision Making: Concept, Problem & Cases', [Prentice Hall](#)
4. I.M. Pandey, 'Financial Management', [Vikas Publishers](#)
5. Khan & Jain, 'Financial Management', [Tata McGraw Hill](#)

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MINOR PROJECT - I

Subject Code – MBADS1- 207

L T P C

Duration: 45 Hrs

3 0 0 3

1. Students have to prepare a research report on their interest area (Finance, HR, Marketing etc.)
2. Students will have to apply all research report components like Introduction, Review of literature, Research Methodology, Statistical Techniques (Learn in Market Research), Findings etc. Students have to Statistical Software like SPSS should be used to apply statistical techniques.
3. The students will have to give presentation of 15-20 minute on the research report.

OPEN ELECTIVE - I

Subject Code – XXXX

L T P C

Duration: 45 Hrs

3 0 0 3

Students will study one interdepartmental subject. List of Open Electives – I is available on the university website.



Department of Applied Physics

(head.physics.gzs@gmail.com, Ph. 87250-72490)

Ref No : Phy/19/ 177

Dated 05/03/17

Sub: Revised Agenda for meeting of Standing Committee for Academic Council

Ref: Your letter no. DAA/MRSPTU/2019/2449 dated 11.02.2019

In continuation to our earlier letter no. Phy/19/152 dated 21.02.2019 and as required by your office, please find below the detailed agenda items for meeting of Standing Committee for Academic Council:

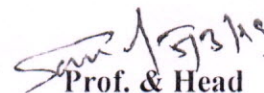
1. **To Start a New Course: It is proposed** to Start a New Course B.Sc. (Hons. School) in Physics which will be of 3 years (6 semester course) w.e.f. 2019-20 with intake of 60 seats. Department already running two years M.Sc. (Physics) Course and Ph.D. Course.

2. **Regarding Lab External Viva-voce Examination:** It is recommended that for conduct of M.Sc. (Physics)/B.Sc. (Hons. School)/B.Tech end semester external viva-voce examination for labs, instead of calling external examiner, it should be done from the other faculty of the department. As per existing practice external faculty from outside college is invited to conduct viva exams.

3. **Regarding Ph.D. Synopsis Submission:** As per existing rules, Ph.D. Synopsis can be submitted after completion of Course Work, in which it takes atleast one year to start work for the candidate. It is requested that Ph.D. Synopsis may be allowed to be submitted after enrollment and its presentation may be taken after the completion of Course Work. It would help in starting the work early and completion of the degree in time.

4. **Regarding Six Month Evaluation Presentation:** It is requested that for registered candidates these presentations may be allowed and taken with or without the presence of allotted external examiner. As per MRSPTU regulation 2016, for six months evaluation of Ph.D. registered candidate, minimum four DDRC members are required. The presence of external examiner is must only at the time of initial Ph.D. Synopsis viva to finalise broad topic and objective and at the time of final Ph.D. thesis submission.

5. **Scholarship for Ph.D. Students:** it is also proposed that some scholarship may be given to atleast one Ph.D pursuing candidate in each Department. He / she may be given some teaching load/ lab which will compensate the scholarship. It will help to attract good number of students which would help to establish labs and promote research in university.


Prof. & Head

Deptt. of Applied Physics

DAA, MRSPTU, Bathinda



Model Curriculum for First Year Undergraduate Degree Courses in Engineering & Technology

Chapter -1 General, Course structure & Theme & Semester-wise credit distribution

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credits
2 Hours Practical(Lab)/week	1 credit

B. Range of credits –

A range of credits from 150 to 160 for a student to be eligible to get Under Graduate degree in Engineering. A student will be eligible to get Under Graduate degree with Honours or additional Minor Engineering, if he/she completes an additional 20 credits. These could be acquired through MOOCs.

C. Structure of Undergraduate Engineering program:

S. No.	Category	Suggested Breakup of Credits(Total 160)
1	Humanities and Social Sciences including Management courses	12*
2	Basic Science courses	25*
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc	24*
4	Professional core courses	48*
5	Professional Elective courses relevant to chosen specialization/branch	18*
6	Open subjects – Electives from other technical and /or emerging subjects	18*
7	Project work, seminar and internship in industry or elsewhere	15*
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	(non-credit)
	Total	160*

*Minor variation is allowed as per need of the respective disciplines.

**PROCEEDINGS OF THE MEETING OF BOARD OF STUDIES (AGRICULTURE) HELD
AT BOARD ROOM (ROOM NO. A-201) MRSPTU, BATHINDA ON MARCH 7, 2019**

Following members attended this meeting and participated in the deliberations:

1. Dr. S.S. Bal, Dean Agriculture, Baba Farid Group of Institutions, Bathinda
2. Dr. Joginder Singh Ex-Professor Economics, PAU Ludhiana
3. Dr. Naveen Singh, Principal Scientist, ICAE-IARI, New Delhi
4. Dr. B.D.Sharma, Ex-Professor Soil Science, PAU Ludhiana
5. Dr. Surbhi Sharma, Assistant Professor Botany, Baba Farid College, Bathinda
6. Mr. Gurjinder Singh, Assistant Professor Agronomy, Guru Kashi University, Talwandi Sabo

The BOS (Agriculture) discussed the agenda and took following decisions:

1. The ordinance for B.Sc. (Hons.) Agriculture was discussed in detail and finalized.
2. Committee strongly felt that courses suggested in the agenda w.r.t. offering B.Sc. (Agronomy) and B.Sc. (Agricultural Economics) does not have much relevance in present national scene and scenario. However, these courses are being taught as elective subjects in the regular curriculum of B.Sc. (Hons.) Agriculture. Committee has also discussed that these courses are not being taught in any of the reputed university of the country and are also not in line with the ICAR education frame work.
3. The matter of the nomination/designation of B.Sc. (Hons.) Agriculture was discussed in the meeting with Dean Academics affair (MRSPTU). She was apprised that the renaming/ nomination of degree to B.Sc. (Hons.) Agriculture was already proposed by the BOS Agriculture in its meeting on May, 2017 which need to be enforced as soon as possible. Copy of the above mentioned proceeding is attached herewith.
4. Separate meeting in the month of April/ May, 2019 is proposed for finalization of course scheme and syllabus for semester VII and VIII.

Joginder Singh
7/3/19

Dr. S.S. Bal
7/3/19

Dr. Naveen Singh
7.3.19

B.D. Sharma
7/03/19

S. Sharma
7/03/19

Dr. Surbhi Sharma
7/3/19

DR (Acad)
Plu in AC meeting. 1/19
7/3/19

To comply the orders as above 'at A'
Thrup
8/3/19

**PROCEEDINGS OF THE MEETING OF BOARD OF STUDIES (AGRICULTURE) HELD
AT COMMITTEE ROOM (ROOM NO. A201) MRSPTU, BATHINDA ON MAY 17, 2017**

Following members attended this meeting and participated in the deliberations:

1. Dr. S.S. Bal, Dean Academics, Baba Farid Institutions, Bathinda
2. Dr. Naveen Singh, Principal Scientist, IARI, New Delhi
3. Dr. K.C Chaudhary, Ex-Professor, PAU Ludhiana
4. Dr. Sunil Garg, Senior Research Engineer, PAU Ludhiana (Special invitee)
5. Dr. Baldev Dogra, Senior Research Engineer, PAU Ludhiana (Special invitee)
6. Dr. Lakhwinder Singh, Dean Academics, BBSBEC, Fatehgarh Sahib (Special invitee)
7. Mr. Ravi Shankar, Asstt. Prof. BBSBEC, Fatehgarh Sahib (Special invitee)

The BOS took following decisions:

1. The syllabus for 4th Semester of B.Sc. Agriculture was discussed in detail and finalized. The list of books for individual Courses was also prepared.
2. The list of Examiners for different Courses to be offered during 3rd Semester for B.Sc. Agriculture was finalized.
3. After thorough discussion the members/special invitee felt that the designation of **B.Sc. Agriculture degree should be renamed as B.Sc. (Hons.) Agriculture**. This will help in making this degree as a Professional Course and at par with the other Universities/Institutions. This shall help the students of this Course to get wider acceptance for higher education at National and International level.
4. **The Committee strongly felt that a separate Board of Studies be constituted for B. Tech. Agriculture Engineering and the designation of this degree should be changed to B. Tech. (Agricultural Engineering).**
5. The study scheme for Semester 3rd and 4th of B. Tech. Agriculture Engineering was prepared by special invitees having expertise in Agriculture Engineering. These invitees agreed to prepare the rough draft of the course curricula to be offered in the 3rd and 4th Semester and communicate with in a fortnight to the university.
6. BOS require adequate and timely logistic facilities for smooth conductance of every meeting.

1. Lakhwinder Singh

2. Naveen Singh

3. K.C. Chaudhary
17/5/17

4. Sunil Garg
17/5/17

5. Baldev Dogra
17/5/17

6. Ravi Shankar
17/5/17

7. Ravi Shankar
17-05-2017



MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY,
DABWALI ROAD, BATHINDA-151001

[Established by Govt. of Punjab vide Act No. 5 of 2015, UGC Act 2(f)]

Ref. No. HMED-288

Dated. 26-03-19

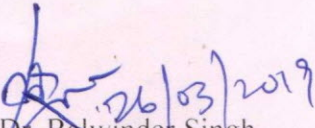
To

The Dean academics,
MRSPTU, Bathinda

Subject: Minutes of meeting of BOS Mechanical Engineering

R/Madam

Meeting of Board of Studies in Mechanical Engineering was held on 14-03-2019 at 11.00 AM in the HOD Room, GZSCCET, Maharaja Ranjit Singh Punjab Technical University, Bathinda. Please find the enclosed minutes of meetings along with this letter.


Dr. Balwinder Singh
Chairman BOS,
Mechanical Engineering

Encl:

1. Copy of minutes of meeting
2. Study scheme of B-Tech 2nd year
3. Revised syllabus of Engineering Drawing for B-Tech first year

CC: (for information only)

1. Hon'ble Vice chancellor, MRSPTU, Bathinda



MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY,
DABWALI ROAD, BATHINDA-151001

[Established by Govt. of Punjab vide Act No. 5 of 2015, UGC Act 2(f)]

Dated..14/03/19..

Minutes of Meeting

Board of studies of Mechanical Engineering

Meeting of Board of Studies in Mechanical Engineering was held on 14-03-2019 at 11.00 AM in the HOD Room, GZSCCET, Maharaja Ranjit Singh Punjab Technical University, Bathinda. The following committee members were present:

1. Dr. Balwinder Singh, Professor and Head Mechanical Engg. Deptt., GZSCCET, Bathinda
2. Dr. Buta Singh Sidhu, Dean Planning & Development, MRSPTU, Bathinda
4. Dr. Pardeep Jindal, Assistant Professor, YCOE, Talwandi Sabo, Bathinda.
5. Dr. Neel Kanth Grover, Associate Professor, & Head, Mech. Engg. Deptt., IKGPTU, Kapurthalla.
6. Er. Yadwinder Singh Dhaliwal, Assistant Manager, Ambuja Cement, Bathinda
7. Dr. Rajesh Gupta, Professor, Mechanical Engg. Deptt., GZSCCET, Bathinda (Special invitee)
8. Dr. Harish Garg, Professor, Mechanical Engg. Deptt., GZSCCET, Bathinda (Special invitee)
9. Er. Harjot Singh, Director, Training and Placement, GZSCCET, Bathinda (Special invitee)

Following members of BOS could not attend the meeting:

1. Prof. Charnjit Singh, Associate Professor, Mechanical Engg. Deptt., GZSCCET, Bathinda
2. Dr. Sehijpal Singh, Director, GNDEC, Ludhiana
3. Dr. B.S. Bhullar, Professor, BBSBCET, Fatehgarh Sahib.
4. Dr. Harpreet Singh, Professor, IIT, Ropar.

The board has taken the following decisions:

1. The scheme for B.Tech Mechanical Engineering (Batch 2018 onwards) from 3rd semester to 4th semester was discussed and finalized (attached herewith as Annexure-I)
2. The team of faculty members have been constituted to purpose the detailed contents of the syllabus of various subjects of 3rd and 4th semester (Mechanical Engineering) as per the following details.

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MRSKR
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MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY,
DABWALI ROAD, BATHINDA-151001

[Established by Govt. of Punjab vide Act No. 5 of 2015, UGC Act 2(f)]

Sr. No.	Semester	Subject	Faculty Members
1	3 rd	Engineering Mechanics & Physics	Dr. Neelkanth Grover
2	3 rd	Strength of Materials-I	Dr. Rajesh Gupta
3	3 rd	Fluid Mechanics	Dr. Balwinder Singh Sidhu
4	3 rd	Thermodynamics	Dr. Pardeep Jindal
5	3 rd	Mechanical Engineering Lab-I (Design-I)	Dr. Rajesh Gupta
6	4 th	Materials Engineering	Dr. Buta Singh Dr. Balwinder Singh Sidhu
7	4 th	Strength of Materials-II	Dr. Rajesh Gupta
8	4 th	Fluid Machines	Dr. Balwinder Singh Sidhu
9	4 th	Applied Thermodynamics	Dr. Pardeep Jindal
10	4 th	Basic Electronics & Instrumentation	Dr. Harish Garg
11	4 th	Machine Drawing using CAD	Dr. Harish Garg
12	4 th	Mechanical Engineering Lab-I (Thermal Lab-I)	Dr. Balwinder Singh Sidhu

3. Subject codes were finalized in the meeting.
4. The proposal to start B.Tech Mechatronics branch was discussed and was recommended to be started from session 2019. The study scheme of first year will remain as that of B.Tech Mechanical Engineering.
5. Syllabus for the subject of Engineering drawing was also revised for first year (attached herewith as Annexure-II).

The meeting ended with the vote of thanks to the chair.

1. Dr. Balwinder Singh

2. Dr. Buta Singh

3. Dr. Pardeep Jindal

4. Dr. Neelkanth Grover

5. Er. Yadwinderpal Dhaliwal



**MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY,
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[Established by Govt. of Punjab vide Act No. 5 of 2015, UGC Act 2(f)]

Special Invitee

1. Dr Rajesh Gupta

2. Dr. Harish Garg

3. Er. Harjot Singh

ENGINEERING GRAPHICS & DESIGN LAB.

Subject Code: BMEE0-102

L T P C
0 0 2 1

Duration: 20 Hrs.

1. Overview of Computer Graphics

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

2. Customization & CAD Drawing

Consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

3. Annotations, Layering & other Functions

Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques.

Course Outcomes

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software. This course is designed to address:

1. To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
2. To prepare you to communicate effectively.
3. To prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice.

The student will learn:

2. Introduction to engineering design and its place in society
3. Exposure to the visual aspects of engineering design
4. Exposure to engineering graphics standards
5. Exposure to solid modelling
6. Exposure to computer-aided geometric design
7. Exposure to creating working drawings
8. Exposure to engineering communication

Wahid

H. I.

4/3/2019

14/3/19
14/3/19

ml



Maharaja Ranjit Singh Punjab Technical University

BADAL ROAD, BATHINDA-151001

[Established by Govt. of Punjab vide Act No. 5 of 2015, UGC Act 2(f) & 12(B)]

DEAN ACADEMIC AFFAIRS

www.mrsptu.ac.in

Ph. 0164-2284298

daa@mrsptu.ac.in

daa.mrsstu@gmail.com

Ref. No.: DAA/MRSPTU/2018/2052

Date: 30/8/18

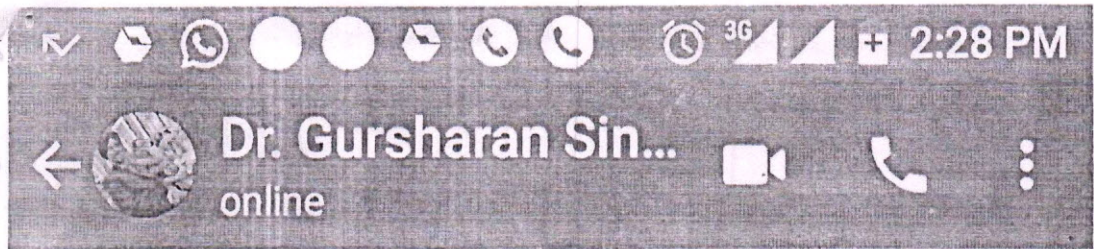
Office Order

It has been decided that taking of counseling fee from SC/ST students of 2018 batch admissions is deferred till further orders. This has the approval of the competent authority.

Praveen
30/8/18
+ Dean Academic Affairs,
MRSPTU, Bathinda

Copy to:

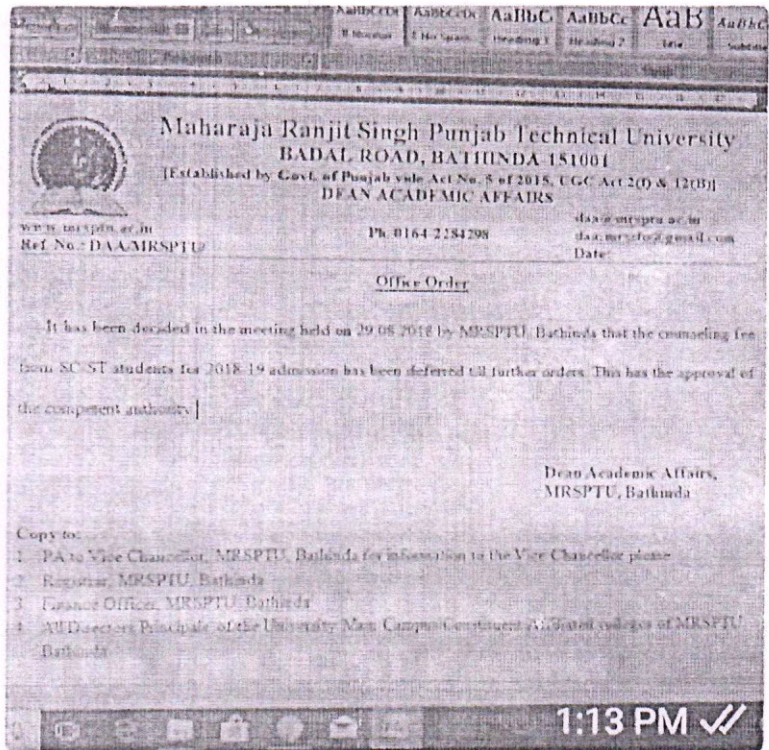
1. PA to Vice Chancellor, MRSPTU, Bathinda for information to the Vice Chancellor please
2. Registrar, MRSPTU, Bathinda
3. Finance Officer, MRSPTU, Bathinda
4. All Directors/Principals of the University Main Campus/Constituent/Affiliated colleges of MRSPTU, Bathinda



1 page PDF

6:32 PM

TODAY



1.

It has been decided that taking of counselling fee from SC/ST students of 2018 batch admissions is deferred till further orders. This has the approval of competent authority.

1:38 PM

Ok sir 1:39 PM ✓✓

whatsapp msg received from Dr. Gursharan Singh on 30/8/2018 for prep work & order
30/8/2018





Maharaja Ranjit Singh Punjab Technical University

BADAL ROAD, BATHINDA-151001

[Established by Govt. of Punjab vide Act No. 5 of 2015, UGC Act 2(f) & 12(B)]

DEAN ACADEMIC AFFAIRS

www.mrsptu.ac.in

Ph. 0164-2284298

daa.mrsstu@gmail.com

Ref. No.: DAA/MRSPTU/2018/2042

Date: 28/08/2018

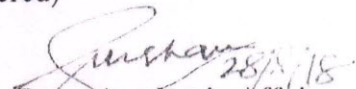
OFFICE ORDER

Sub.: Regarding Admission Counselling Fee for AICTE courses for session 2018-19

In continuation of letter no. DAA/MRSPTU/2018/1964 dated 08.08.2018, it is informed that the counseling fee collected by affiliated/constituent colleges for AICTE courses 2018 Batch is to be deposited through DD/NEFT/RTGS upto 30.08.2018 without fine.

It is further informed that from 31.08.2018, fine shall be charged from the colleges/institutes for late submission of counselling fee for AICTE admissions as per details given below;

31.08.2018 to 10.09.2018	-	Fine Rs. 100/- (per student registered)
11.09.2018 to 17.09.2018	-	Fine Rs. 200/- (per student registered)


28/08/18
Dean Academic Affairs,
MRSPTU, Bathinda

Copy to:

1. PA to Vice Chancellor, MRSPTU, Bathinda for the information of the Vice Chancellor please
2. Registrar MRSPTU, Bathinda
3. Chairman Admission Committee, MRSPTU, Bathinda
4. Director, IT Enabled Services, MRSPTU, Bathinda to upload it on university website
5. Principal/Director of all constituent/affiliated colleges of MRSPTU, Bathinda
6. Finance Officer, MRSPTU, Bathinda



Maharaja Ranjit Singh Punjab Technical University

BADAL ROAD, BATHINDA-151001

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DEAN ACADEMIC AFFAIRS

www.mrsptu.ac.in

Ph. 0164-2284298

daa.mrsstu@gmail.com

Ref. No.: DAA/MRSPTU/2018/2128

Date: 24/9/18

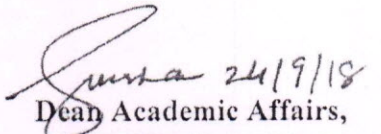
OFFICE ORDER

Sub.: Regarding Admission Counselling Fee for AICTE courses for session 2018-19

In continuation of letter no. DAA/MRSPTU/2018/2042 dated 28.08.2018, it is informed that from 18.09.2018, late fee shall be charged from the colleges/institutes for late submission of counselling fee for AICTE admissions as per details given below;

18.09.2018 to 27.09.2018 - Late fee Rs. 300/- (per student registered)

This has the approval of the competent authority.


Dean Academic Affairs,
MRSPTU, Bathinda

Copy to:

1. PA to Vice Chancellor, MRSPTU, Bathinda for the information of the Vice Chancellor please
2. Registrar MRSPTU, Bathinda
3. Chairman Admission Committee, MRSPTU, Bathinda
4. Director, IT Enabled Services, MRSPTU, Bathinda to upload it on university website
5. Principal/Director of all constituent/affiliated colleges of MRSPTU, Bathinda
6. Finance Officer, MRSPTU, Bathinda



Maharaja Ranjit Singh Punjab Technical University

BADAL ROAD, BATHINDA-151001

[Established by Govt. of Punjab vide Act No. 5 of 2015, UGC Act 2(f) & 12(B)]

DEAN ACADEMIC AFFAIRS

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Ph. 0164-2284298

daa.mrsstu@gmail.com

Ref. No.: DAA/MRSPTU/2018/2127

Date: 24/9/18

OFFICE ORDER

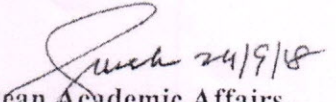
Sub.: Regarding Admission Counselling Fee for Non-AICTE courses for session 2018-19

In continuation of letter no. DAA/MRSPTU/2018/2085 dated 12.09.2018, it is informed that the counseling fee collected by affiliated/constituent colleges for Non-AICTE courses 2018 Batch is to be deposited through DD/NEFT/RTGS upto 28.09.2018 without late fee.

It is further informed that from 01.10.2018, late fee shall be charged from the colleges/institutes for late submission of counselling fee for Non-AICTE admissions as per details given below:

01.10.2018 to 10.10.2018	-	Late fee Rs. 100/- (per student registered)
11.10.2018 to 17.10.2018	-	Late fee Rs. 200/- (per student registered)
18.10.2018 to 26.10.2018	-	Late fee Rs. 300/- (per student registered)

This has the approval of the competent authority.


Dean Academic Affairs,
MRSPTU, Bathinda

Copy to:

1. PA to Vice Chancellor, MRSPTU, Bathinda for the information of the Vice Chancellor please
2. Registrar MRSPTU, Bathinda
3. Chairman Admission Committee, MRSPTU, Bathinda
4. Director, IT Enabled Services, MRSPTU, Bathinda to upload it on university website
5. Principal/Director of all constituent/affiliated colleges of MRSPTU, Bathinda
6. Finance Officer, MRSPTU, Bathinda

Sub.: Regarding Deposition of Admission Counselling Fee for AICTE courses for session 2018-19.

In reference to letter no. DAA/MRSPTU/2018/2128 dated 24.09.2018 (copy attached), the late fee charged from the institutes was 300/- per student from 18.09.2018 to 27.09.2018.

It is proposed that the late fee of Rs. 300/- may be extended from 28.09.2018 to 14.10.2018. Late fee for late submission of counselling fee for AICTE admissions may be charged from the colleges/institutes as follows;

- 15.10.2018 to 18.10.2018 - Fine Rs. 500/- (per student registered)
- 19.10.2018 to 26.10.2018 - Fine Rs. 800/- (per student registered)

Sushan 15/10/18
 Dean Academic Affairs
 MRSPTU, Bathinda

Vice Chancellor

Al disan

*Admission processing/counselling fee
 is to be charged for students whose artificial
 number of
 are verified. Therefore above proposal is
 not valid*

Receipt No. 663.....
 Date 25/10/18.....
 Dean Academic Affairs,
 MRSSTU, Bathinda

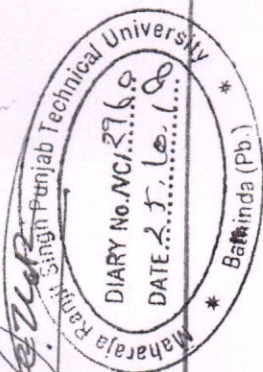
[Signature]
[Signature]

[Signature]
 23/10/18
 DR (A&A)

In the light of the above, letter no. DAA/MRSPTU/2018/2128 dt. 24/9/18 for DAA/MRSPTU/2018/2042 dt. 28/8/18 both for AICTE courses & letter no. DAA/MRSPTU/2018/2127 dt. 24/9/18 (copies & apprais attached) may be allowed for with drawl.

Receipt No. 611.....
 Date 15/10/18.....
 Dean Academic Affairs,
 MRSSTU, Bathinda

Vice-Chancellor



ਮਹਾਰਾਜਾ ਰਣਜੀਤ ਸਿੰਘ
ਪੰਜਾਬ ਟੈਕਨੀਕਲ ਯੂਨੀਵਰਸਿਟੀ
ਬਾਦਲ ਰੋਡ, ਬਠਿੰਡਾ-151001, ਪੰਜਾਬ (ਭਾਰਤ)



MAHARAJA RANJIT SINGH
PUNJAB TECHNICAL UNIVERSITY
BADAL ROAD, BATHINDA-151001, PUNJAB (INDIA)

ਪ੍ਰੋ. ਕਰਨਵੀਰ ਸਿੰਘ
ਕੰਟਰੋਲਰ (ਪ੍ਰੀਖਿਆਵਾਂ)

(Established by Govt. of Punjab vide Punjab Act No. 5 of 2015 under section 2(f) of UGC Act)

Prof. Karanvir Singh
Controller (Examinations)

Ref. No : CoE/MRSPTU/ 4988

Date: 11.03.19

To
Registrar
MRSPTU, Bathinda

Subject: - UMC Rules: Offences & Punishment

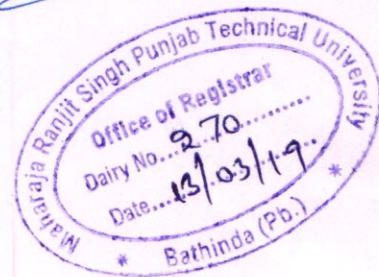
This is for your kind information that Maharaja Ranjit Singh Punjab State Technical University has been following the UMC Rules & Regulation of IKG Punjab Technical University, Jalandhar since its establishment in 2015. Please find attached the proposed rules & regulations of MRSPTU as regarding to offences & punishment of Unfair means cases to be followed henceforth by MRSPTU, Bathinda.

Submitted for approval please

Karanvir
Controller of Examinations
MRSPTU, Bathinda

*Include this item in
scheduled meeting of standing
Acad Committee for Academic
Council.*

DR (A & R)



MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY

BATHINDA - 151001, PUNJAB (INDIA)

Ph. No.: +91-87250-72333, Fax: +91-164-2280164, Website: www.mrsstu.ac.in, E-mail id: coemrs@gmail.com

UMC RULES: OFFENCES & PUNISHMENT

S. No.	Offence Code	Nature of Offences	Punishment Code	Punishment
1.	OF1.1	(i) Being in possession in the examination hall, a material which is not related to the concerned paper	P1.1 (i)	Cancel the concerned paper
		(ii) Being in possession in the examination hall, of papers, books, notes or writing on any part of the candidate's clothes or any writing on his/ her body or table or desk or on a foot rule and/ or instruments like set squares, protractors, slide rules or any other material with notes or hints written thereon or any such material accessible to him / her which may be, or intended to be of possible help to the candidate in the examination but not used.	P1.1 (ii)	Cancel all the papers
		(iii) a) Copying or attempting to copy from the objectionable material found in his / her possession ; or b) copying or attempting to copy from another candidate : or c) assisting another candidate to copy from the objectionable material in his / her possession or from his / her answer-book.	P1.1 (iii)	Disqualification for a period of not less than two semesters
2.	OF1.2	Talking to another candidate or any person inside or outside the examination hall without the permission of the supervisory staff.	P1.2	Cancellation of his/her answer book in the subject/ paper concerned without any implication of moral turpitude
3.	OF1.3	Leaving the examination hall without delivering to the supervisor concerned the answer book or may part thereof or taking away the same or tearing it or otherwise disposing it of or tearing the answer-book of other candidate or otherwise disposing it of	P1.3	Disqualification for a period of not less than two semesters
4.	OF1.4	Refusing to obey the legitimate orders of the Superintendent and / or any other member of the Supervisory Staff.	P1.4	Disqualification for a period of not less than two semesters
5.	OF1.5	Changing the seat without the permission of the supervisory staff or occupying the seat not allotted to him / her.	P1.5	cancellation of his/her answer book in the subject/ paper concerned without any implication of moral turpitude
6.	OF1.6	Coming to the examination hall under the influence of alcoholic drink or drugs.	P1.6	Disqualification for a period of not less than two semesters
7.	OF1.7	Receiving help or attempting to receive help	P1.7	Disqualification for a

		for answering the question paper from any source in any manner, inside or outside the examination hall.		period of not less than two semesters
8.	OF1.8	Swallowing or attempting to swallow a note or paper or running away with it or causing its disappearance or destroying it in any manner.	P1.8	Disqualification for a period of not less than two semesters
9.	OF1.9	Writing on any piece of paper or blotting paper or on any other material any question or a part thereof set in the question paper or anything connected with it or a solution thereof in the examination hall.	P1.9	Cancellation of paper and disqualify upto two semesters
10.	OF1.10	Passing or attempting to pass on to any one a copy of the question set in the question paper or the question itself, or a part thereof, or a solution to a question set in the question paper.	P1.10	Cancellation of paper and disqualify upto two semesters
11.	OF1.11	Possessing a solution to a question set in the question paper with or without the connivance of any person including a member of the supervisory staff.	P1.11	Disqualification for a period of not less than three semesters.
12.	OF1.12	Smuggling an answer book of a continuation sheet or any part thereof in or outside the place of examination.	P1.12	Disqualification for a period of not less than four semesters.
13.	OF1.13	Replacing or getting replaced answer books or any of its leaves or a continuation sheet during or after the examination.	P1.13	Disqualification for a period of not less than four semesters.
14.	OF1.14	(i) Misbehaving towards the Superintendent or any other member of the Supervisory staff or any member of the inspection team or the flying squad, or with another candidate inside the examination hall or outside, before, during or after the examination; or (ii) Creating disturbance in the examination hall or in its vicinity; or (iii) Organising a walk out; or instigating others to walk out; or misconducting oneself in any manner in or outside the examination hall; or (iv) Disturbing or disrupting the examination in any manner whatsoever; or (v) Carrying into the examination hall fire-arms or any other weapon.	P1.14	Disqualification for a period that may extend to five semesters
15.	OF1.15	Deliberately disclosing one's identity or making any distinctive mark in the answer book for that purpose.	P1.15	cancellation of his/her answer book in the subject/ paper concerned without any implication of moral turpitude

16.	OF1.16	Using abusive or obscene language in the answer book.	P1.16	Disqualification for a period that may extend to two semesters but be not less than one semester.
17.	OF1.17	Obtaining admission to an examination on a false representation made in the admission form.	P1.17	Disqualification for a period of not less than three semesters.
18.	OF1.18	Getting oneself impersonation by someone in the examination or impersonating another candidate.	P1.18	Disqualification for a period of not less than four semesters.
19.	OF1.19	Communicating or attempting to communicate, directly or through person, with an examiner with the object of influencing him / her in the award of marks.	P1.19	Disqualification for a period of not less than two semesters
20.	OF1.20	Making an appeal to the examiner in the answer book.	P1.20	cancellation of his/her answer book in the subject/ paper concerned without any implication of moral turpitude
21.	OF1.21	Knowingly writing another person's Roll Number on one's answer book. And / or	P1.21	Disqualification for a period of not less than two semesters
22.	OF1.22	Engaging in any other act or omission which amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	P1.22	Disqualification for a period that may extend to five semesters, but be not less than two semesters.
23.	OF1.23	(i) Carriage of mobile or other means of electronics communication inside the examination hall but no relevant material.	P1.23 (i)	Cancel the concerned paper
		(ii) Carriage of mobile or other means of electronics communication inside the examination hall with relevant material but not used.	P1.23 (ii)	Cancel all the papers
		(iii) Communicating or trying to communicate, by any means whatsoever, through electronic media or otherwise with any other person in a manner that is indicative of help being sought/ given in an examination.”	P1.23 (iii)	Disqualification for a period of not less than two semesters
24.	OF1.24	If the answer book of a candidate shows or it is otherwise established that he/she had received or attempted to receive help from any source and in any manner, or has given help or attempted to give help to another candidate in any manner.	P1.24	Cancel of concerned paper and disqualify upto two semesters
25.	OF1.25	A person found guilty of writing an answer book or a continuation sheet for a candidate,	P1.25	Disqualified from appearing in any

		which the latter has smuggled, or intends to smuggle, into the examination hall and has submitted or intends to submit, as one having been written by himself / herself.		examination for a period of not less than four years, including that in which he/she is found guilty.
26.	OF1.26	A person, not being a candidate, found guilty of impersonating or misrepresenting a candidate in the examination.	P1.26	Shall be declared not a fit and proper person to be admitted to any future examination of the University. Besides, if it is considered necessary, his/her case may be reported to the Police
27.	OF1.27	If a person misbehaves with an examiner or any other individual deputed in connection with the evaluation work of threatens or intimidates any one or more of them or otherwise interferes with their work in any manner.	P1.27	Disqualified from appearing in any examination for a period which may extend from two semesters to four semesters.
Punishment for Supervisory Staff				
28.	OF1.28	If a person, including a member of the supervisory staff or menial, helps the candidate to copy from certain material or from the answer-book of another candidate or helps in any other manner.	P1.28	<ol style="list-style-type: none"> 1. Not be given any remunerative work of the University for a period to be determined by the Vice- Chancellor. 2. In case such a person is a member of the teaching staff or a College affiliated to the University, or is working as a Librarian, or a Director of Physical Education etc. his approval as Lecturer, Instructor or Librarian or Director Physical Education, as the case may be, shall be withdrawn. 3. The Vice Chancellor may hand over the case to the Police if it discloses commission of a criminal offence.

Others

1. For cases of unfair means not covered by these Regulations, the Board of Governors may, on the recommendations of the Committee, impose such punishment as the nature of the offence demands.

2. An appeal against the decision of the Committee shall lie to the Vice Chancellor only if a candidate, or a Branch dealing with Unfair Means Cases, is in a position to put up some new facts which are likely to be crucial in the sense that they might induce the Committee to come to a decision other than the one taken by it. The candidate may go in for appeal within thirty days from the date of receipt of information about the decision whereas the Branch may also initiate the cases, if any, within thirty days from the date of receipt of decision from the Committee. In such cases, the Vice Chancellor may order that such facts be reduced to writing and placed before the Committee for reconsidering the whole case. After reconsideration of the whole case by the Committee, the case shall be referred to the Vice Chancellor, who may either finally decide the case himself/herself or refer it to the Board of Governors for final decision, as he/she may deem proper.
3. If the Board of Governors is satisfied after enquiry that the integrity of an examination has been violated at an examination centre as a consequence of large-scale unfair assistance rendered to the examinees, it may, besides taking action under these Regulations order re-examinations, cancelling the results of such examination if already declared, and may also abolish that examination centre for future or for a specified period.

To

The Dean Academics
MRSPTU Bathinda

Subject: Regarding appreciation to SWAYAM certified students.

Madam

The students who have got good score and certification in the SWAYAM courses may be appreciated by giving some financial assistance as per the type of certificate based on consolidated score (available on <https://nptel.ac.in/pdf/NOC.pdf>).

17/5/19
Dr. Shaveta Rani
Professor
GZSCCETMRSPTU
Bathinda

17/05/19
Dr. Manoj Kumar
Assistant Prof.
GZSCCETMRSPTU
Bathinda

17/5/19
Dr. Anil Jindal
Assistant Prof.
GZSCCETMRSPTU
Bathinda

—
Er. Swati
Assistant Prof.
GZSCCETMRSPTU
Bathinda

Encl: Types of certificates from nptel website attached.

for further up in AC meeting
AS
17/5/19

DR (Acad)

Scoring, Certification and Credits

<https://nptel.ac.in/pdf/no>

Final score calculation for certification

- Online assignments: 25% + Proctored exam: 75%

PASS CRITERIA: If learner gets ≥ 40 in assignments AND Final exam

Types of certificates based on Final score

- Elite + Gold certificate : $\geq 90\%$
- Elite + Silver certificate : 76 - 89%
- Elite certificate: 60 - 75%
- Successful completion : $\geq 40\%$
- No certificate $< 40\%$

4 weeks course: Best 3 out of 4 assignments

8 weeks course: Best 6 out of 8 assignments

12 weeks course: Best 8 out of 12 assignments

de

**MINUTES OF 2ND MEETING OF B.O.S. (AERONAUTICAL ENGG.) HELD ON 17
MAY 2019**



PUNJAB STATE AERONAUTICAL ENGINEERING COLLEGE

(A constituent College of Maharaja Ranjit Singh Punjab Technical University, Bathinda)

Patiala Civil Aerodrome, Sangrur Road, Patiala - 147 001.

Phone: + 91 175 2970697, E-mail: patialapsaec@gmail.com

Ref. No. PSAEC/BOS/272

Dt.17/05/2019

**MINUTES OF 2ND MEETING OF B.O.S.(AERONAUTICAL ENGG.)HELD ON 17
MAY 2019**

Minutes of board of studies in B.Tech.(Aeronautical Engg.) meeting held on 17 may 2019 at 10:00 am in the Director's Office, Punjab State Aeronautical Engineering College, Patiala. The following members were present.

- | | |
|--|------------------------|
| 1. Dr. Rakesh Kumar
Associate Professor & Head,
Department of Aerospace Engineering,
Punjab Engineering College, Sector-12, Chandigarh | Chairman |
| 2. Er. Tushar Siag
Assistant Professor,
Department of Aerospace Engineering,
Punjab Engineering College, Sector-12, Chandigarh | Member |
| 3. Sh. Kanwardeep Singh
Chief Engineer
Department of Civil Aviation, Punjab | Member |
| 4. Dr. Amarjit Singh
Visiting professor
Aerospace Engineering Department, PEC | Member |
| 5. Er. J S tiwana
Associate professor
GZSCCET, Bathinda | Member |
| 6. Dr. Om Parkash
Head
Department of aerospace Engineering
UPES, Dehradun | Special Invitee |
| 7. Dr. Dharmendera singh
Professor & Head
Chandigarh University, Gharuan | Special Invitee |
| 8. Er. Vinod Kumar
Assistant Professor
Punjab State Aeronautical Engg. College, Patiala | Special Invitee |

MINUTES OF 2ND MEETING OF B.O.S. (AERONAUTICAL ENGG.) HELD ON 17 MAY 2019

At the outset agenda items were taken up one by one and the following decisions were arrived at unanimously after due deliberations in the meeting:

Item No	Description	Decision Taken
01.01	To Introduce new courses for 2019 Batch at Punjab State aeronautical Engineering College, Patiala	Two Bachelor level courses have been finalized and approved 1. Bachelor of Technology (Avionics Engineering) 2. Bachelor of Management studies (Airlines, Tourism and Hospitality) <i>Note: Study Scheme for both courses have been attached</i>

RK Kumar
17/5/2019
Dr. Rakesh Kumar

Tushar Singh
Er. Tushar Singh

KS Singh
Sh. Kanwardeep Singh

Amarjit Singh
Dr. Amarjit Singh

Om Parkash
17/5/19
Dr. Om Parkash

Dharmahinder Singh Chand
17/5/19
Dr. Dharmahinder Singh Chand

JS Tiwana
17/5/19
Er. J S Tiwana

Vinod Kumar
17/5/2019
Er. Vinod Kumar

for directions pl. see
17/5/19

Pl. discuss for the DR (A) 201-5/19

Hemilok

Receipt No. ...1342.....
Date ...17/5/19.....
Dean Academic Affairs,
MRSSTU, Bathinda

21

May be allowed and put up in meeting of the Standing Committee of Academic Council

PUNJAB STATE AERONAUTICAL ENGINEERING COLLEGE

(A constituent College of Maharaja Ranjit Singh Punjab Technical University, Bathinda)

Patiala Civil Aerodrome, Sangrur Road, Patiala – 147 001.

Phone: + 91 175 2970697, E-mail: patialapsaec@gmail.com

Ref. No.PSAEC/BOS/278

Date. 21.05.2019

To

Dean, Academic Affairs

MRSPTU, Bathinda

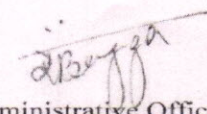
Subject: Regarding New Courses introduced at Punjab State Aeronautical Engineering College, Patiala for the session 2019-20 onwards.

Respected Sir

Minutes of the meeting of the BOS for introduction of new courses was held on May 17, 2019 at Punjab State Aeronautical Engineering College, Patiala are enclosed herewith. In the said meeting, it was resolved to introduce 02 news courses at Punjab Sate Aeronautical Engineering College as per detail given below:

Sr. No.	Course Introduced	Course Duration	No. of Seats Purposed
1	B.Tech. Avionics Engineering	4 Years	30
2	Bachelor of Management Studies (Airlines, Tourism & Hospitality)	3 Years	30

Study schemes of above course are also attached for your information. May i request you to kindly provide the fee structures of the above courses, so that, same be uploaded on the website of the College.


Administrative Officer

Encl: As above