

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

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

MRSPTU

COMMUNICATIVE ENGLISH

Subject Code: HUM0-101

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'.
2. Meenakshi Raman, Parkash Singh, 'Business Communication' Paperback Edition, Oxford University Press.

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.

Personal Productivity Software:

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', 4th Edn., McGraw Hill, **1988**.
2. V. Rajaraman, 'Fundamentals of Computers', 2nd Edn., 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', 3rd Edn., Wiley, **1997**.
6. Chetan Srivastva, 'Fundamentals of Information Technology', 3rd Edn., Kalayani Publishers.
7. Larry long & Nancy long, 'Computers', 12th Edn., Prentice Hall.

COMPUTER ORGANIZATION

Subject Code: BCMC-102

**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 Tech Books, Deep and Deep Publications, New Delhi, 2009,
2. M. Morris Mano, 'Digital Logic and Computer Design', Prentice Hall of India.
3. J.P. Hayes, 'Computer Organization and Architecture', Tata McGraw Hill.
4. William Stallings, 'Computer System Architecture', PHI.

PROGRAMMING IN C LANGUAGE

Subject Code: BCMC-103

L T P C
3 1 0 4

Durations: 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', 7th Edn., BPB Publications, New Delhi.
2. E. Balagurusami, 'Programming in ANSI C', 4th Edn., Tata McGraw Hill.
3. Byron S. Gottfried, 'Programming in C', 2nd Edn., McGraw Hills.
4. Kernighan & Richie, 'The C Programming Language', 2nd Edn., PHI Publication.
5. R. Lafore, 'Object Oriented Programming', 3rd Edn., Galgotia Publications.
6. R.S. Salaria, 'Problem Solving and Programming in C', 2nd Edn.

HUMAN VALUES AND PROFESSIONAL ETHICS

Subject Code: HUM0-102

L T P C

Durations: 45 Hrs.

3 1 0 4

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 to its students the skills to do things. In other words, 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 the 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 is an effort to fulfill our responsibility to provide our students this significant input about understanding. This course encourages students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and the 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

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’ – *Sukh* and *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: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure *Sanyam* and *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 (*Akhand Samaj*), Universal Order (*Sarvabhaum Vyawastha*)- from family to world family!

UNIT-II (13 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.

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. R.R. Gaur, R. Sangal, G.P. Bagaria, 'A Foundation Course in Value Education', **2009**,
2. Ivan Illich, 'Energy & Equity', The Trinity Press, Worcester, and HarperCollins, USA, 1974,
3. E.F. Schumacher, 'Small is Beautiful: A Study of Economics as if People Mattered, Blond & Briggs', Britain, **1973**.
4. A. Nagraj, 'Jeevan Vidya ek Parichay', Divya Path Sansthan, Amarkantak, 1998.
5. Sussan George, 1976, 'How the Other Half Dies', Penguin Press, 1976, Reprinted 1986, 1991.
6. P.L. Dhar, R.R. Gaur, 'Science and Humanism', Commonwealth Purblishers, 1990.
7. A.N. Tripathy, 'Human Values', New Age International Publishers, 2003.
8. Subhas Palekar, 'How to Practice Natural Farming', Pracheen (Vaidik) Krishi Tantra Shodh, Amravati, 2000.
9. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 'Limits to Growth – Club of Rome's Report', Universe Books, 1972.
10. E.G. Seebauer & Robert L. Berry, 'Fundamentals of Ethics for Scientists & Engineers', Oxford University Press, 2000.
11. M. Govindrajran, S. Natrajan & V.S. Senthil Kumar, 'Engineering Ethics (including Human Values)', Prentice Hall of India Ltd, Eastern Economy Edn.
12. B.P. Banerjee, 'Foundations of Ethics and Management', Excel Books, 2005.
13. B.L. Bajpai, 'Indian Ethos and Modern Management', New Royal Book Co. Lucknow. Reprinted, 2004, 2008.

SOFTWARE LAB-I (BASED ON BCMC-101)

Subject Code: BCMC-104

L T P C

0 0 4 2

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 BCMC-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-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: BCMC-206

L T P C

Durations: 45 Hrs.

3 1 0 4

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, 4th NF, 5th NF, 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'.
2. B.C. Desai, 'Database Management System'.
3. Korth, 'Database Concept'.
4. 'Simplified Approach to DBMS', Kalyani Publishers.
5. Ivan Bayross, 'Oracle – Developer – 2000'.
6. Database System Concepts & Oracle (SQL/PLSQ) – AP Publishers.

COMPUTER NETWORK

Subject Code: BCMC-207

L T P C
3 1 0 4

Durations: 45 Hrs.

UNIT-I (10 Hrs.)

Introduction: Network Definition, Basic Components of a Network, Network types and topologies, Uses of Computer Networks, Network Architecture. Transmission Media: Coaxial cable, twisted pair cable, fibre optics & satellites. OSI reference model, TCP/IP reference model, comparison of OSI and TCP reference model.

UNIT-II (13 Hrs.)

Introduction to Analog and Digital Transmission: Telephone system, Modems, Types of modems, pulse code modulation. **Transmission & Switching:** Multiplexing, circuit switching, packet switching, hybrid switching, ISDN service transmission.

UNIT-III (12 Hrs.)

Local Area Network Protocols: CSMA Protocols, BRAP, MLMA, IEEE standards 802, Token Bus, Token Ring, FDDI. **Data Link Layer Design Issues:** Services provided to Network layer framing, error control, flow control, link management. **Error detection & correction, Elementary Datalink Protocols.** **Design Issues of Network Layer:** Services provided to transport layer, routing, connection, internet & World Wide Web.

UNIT-IV (10 Hrs.)

Network Security and Privacy: Brief Introduction to Cryptography. **Network Services:** File transfer, Access & Management, Electronic Mail, Remote login

Recommended Books:

1. A.S. Tannanbum, 'Computer Networks', 3rd Edn., Prentice Hall, 1992.
2. Stallings, William, 'Local Networks: An Introduction', Macmillan Publishing Co.
3. Stallings, William, 'Data Computer Communication', Macmillan Publishing Co.

MANAGEMENT INFORMATION SYSTEM

Subject Code: BCMC-208

L T P C
3 1 0 4

Durations: 45 Hrs.

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 LANGUAGE USING C++

Subject Code: BCMC-209

L T P C
3 1 0 4

Durations: 45 Hrs.

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 McGraw Hill.
2. Deitel and Deitel, 'C++ How to Program', Pearson Education.
3. Herbert Schildt, 'The Complete Reference C++', Tata McGraw Hill.
4. Robert Lafore, 'Object Oriented Programming in C++', Galgotia Publications.
5. Bjarne Strastrup, 'The C++ Programming Language', Addison-Wesley Publication Co.
6. Stanley B. Lippman, Josee Lajoie, 'C++ Primer', Pearson Education, 2002.

OPERATING SYSTEM

Subject Code: BCMC-210

L T P C

Durations: 45 Hrs.

3 1 0 4

UNIT- I (10 Hrs.)

Introduction: Definition, Early Systems, Simple Batch system, Multi programmed Batch. Time Sharing Systems, Personal Computer System, Parallel Systems, Distributed Systems, 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', 4th Edn., Addison Wesley,
2. Crowley, 'Operating Systems, A Design Oriented Approach', Tata McGraw Hill.
3. Dietel, 'Operating Systems', 2nd Edn., Addison Wesley.

SOFTWARE LAB.-III (BASED ON BCMC-201)

Subject Code: BCMC-211

L T P C

Durations: 45 Hrs.

3 1 0 4

Operational Knowledge and Implementation of Database using SQL.

SOFTWARE LAB-IV (BASED ON BCMC-204)

Subject Code: BCMC-212

L T P C
3 1 0 4

Durations: 45 Hrs.

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

MRSPTU