MRSPTU BACHELOR OF SCIENCE (INFORMATIONTECHNOLOGY)
SYLLABUS 2016 BATCH ONWARDS
(Approved in 1st MRSPTU Standing Committee of Academic Council on 20.12.2016)

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)
(1stYEAR)

Total Contact Hours = 30   Total Marks = 800   Total Credits = 25

SEMESTER 1st		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BITE1-101	Trends in Information Technology	3	1	--	40	60	100	4
BITE1-102	Developing Programming Logic and Techniques	3	1	--	40	60	100	4
BHUM0-101	Communicative Skills-I	3	1	--	40	60	100	4
BMAT0-105	Mathematics – I	3	1	--	40	60	100	4
BHUM0-103	Human Values and Professional Ethics	3	1	--	40	60	100	4
BITE1-103	Information Technology Lab	--	--	4	60	40	100	2
BITE1-104	Programming Logic Lab	--	--	4	60	40	100	2
BHUM0-102	Communication Skills Lab-I	--	--	2	60	40	100	1
Total	**Theory = 5 Labs = 3**	**15**	**5**	**10**	**380**	**420**	**800**	**25**

Total Contact Hours = 30   Total Marks = 800   Total Credits = 25

SEMESTER 2nd		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BHUM0-213	Communication Skill – II	3	1	--	40	60	100	4
BMAT0-206	Mathematics – II	3	1	--	40	60	100	4
BITE1-205	Object Oriented Programming	3	1	--	40	60	100	4
BITE1-206	Fundamental of Digital Electronics	3	1	--	40	60	100	4
BESE0-101	Environmental Science	3	1	--	40	60	100	4
BITE1-207	Object Oriented Programming Lab	--	--	4	60	40	100	2
BITE1-208	Digital Electronics Lab	--	--	4	60	40	100	2
BHUM0-214	Communication Skill Lab-II	--	--	2	60	40	100	1
Total	**Theory = 5 Lab = 3**	**15**	**5**	**10**	**380**	**420**	**800**	**25**

Overall

Semester	Marks	Credits
1st	800	25
2nd	800	25
Total	**1600**	**50**

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TRENDS IN INFORMATION TECHNOLOGY

Subject Code – BITE1-101   **L T P C**   **Duration –45 Hrs**
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UNIT–I (12 Hrs)

Introduction to Computer: Computer System Characteristics, Hardware - CPU, Memory, Input, Output & Storage Devices, Organization of Secondary Storage Media, Software - System & Application, Types of processing Batch and On-line

UNIT-II (10 Hrs)

Operating System Concepts: Role of an Operating System, Types of operating systems, Booting Procedure and Its Types, Fundamentals and Typical Instructions of Windows & Non-Windows based Operating Systems.

UNIT-III (12 Hrs)

Computer Software What is Software? Relationship between Hardware and Software, Logical System Architecture showing relationship between hardware, Types of Software: System Software, Application Software, Firmware, Functions of System Software, Type of System Software: Operating Systems, Language Translators, Utility Programs, Communications Software. Application Software, Commonly Used Application Software: Word Processing, Spreadsheet, Database, Graphics Personal Assistance, Education, Entertainment Software. Open Source Terminologies: Open Source Software, Freeware, Shareware, Proprietary Software, FLOSS, GNU, FSF, OSI.

UNIT-IV (11 Hrs)

Advanced Trends in IT Wireless: Mobile Internet, GPS, 3G, 4G, Wi-Fi, Bluetooth, Social Networking, Cloud Technology, Virtual LAN Technology, Firewall, M-Commerce, Nanotechnology, Virtual Reality, BPO and KPO, Social and Ethical Issue YouTube, FaceBook, Linkedin, Orkut.

Recommended Books

1. Peter Nortorn's, 'Introduction to Computer', Tata McGraw Hill, **2004.**
2. R.K. Taxali, 'Introduction to Software Package', Galgotia Publications.
3. P.K. Sinha, 'Introduction to Computer'.

DEVELOPING PROGRAMMING LOGIC AND TECHNIQUES

Subject Code – BITE1-102   **L T P C**   **Duration –45 Hrs**
                                                            3 1 0 4

UNIT–I (12 Hrs)

Language Evolution Machine Language, Assembly Language, High Level Language. Translators: Compiler, Interpreter and Assembler. The Compilation Process, Linker, Loader, Study of HLL, Characteristics of Good Language, Generation of Languages, Study of Programming Languages (Function Oriented, Object Oriented, Event-Based).

UNIT-II (11 Hrs)

Programming Construction Tools Problem Analysis, Process Analysis, Conceptual Development of Solution. Development Tools: Algorithm: Types of Algorithm, Algorithm of Analysis, Advantage and Disadvantage of Algorithm, Complexity of Algorithm, Big-O Notation Flowcharts: Types of Flowcharts, Advantage and Disadvantage of Flowchart. Pseudo Code: Definition and Its Characteristics.

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UNIT-III (12 Hrs)

Control Statements Basics of Programming Language: Usage of Character Set, Meaning of Keywords and Identifiers, Role of Data Types, Constants and Variables. Importance of Casting, Different Types of Operators and their Precedence, Expressions, Conditional Statements (One-Way, Two-Way and Multi-Way Conditional), Looping Statements (For, While, do-while), Usage of Exit, Continue, Break and Goto Statement.

UNIT–IV (10 Hrs)

Arrays Arrays: Arrays, one dimensional array, Various Operation on Array (Inserting of Element, Deleting of Element, Rotating List, Sorting, Searching, Merging Etc.) and Two dimensional arrays (Matrix Addition, Transpose of Matrix, Matrix Multiplication), Modular programming and its features.

Recommended Books
1. Behrouz Forouzan, 'Basic of Computer Science', Cengage Leaning.
2. Horowitz, Sahani, 'Fundamental of Computer Algorithm', Orient Longman.
3. Maureen Sprankle, 'Problem Solving Programming Concepts', 7ᵗʰ Edn., Pearson, **2009.**

MATHEMATICS-I

Subject Code: BMAT0-105   **L T P C**   **Duration: 45 Hrs.**
                                     3 1 0 4

UNIT-I (11 Hrs)

Set Theory and Logics
Set Theory: Sets, Type of sets, Set operations, Principle of Inclusion-Exclusion, Cartesian product of sets, Partitions.
Logic: Propositions, Implications, Precedence of logical operators, Truth table, Arguments and validity of arguments, equivalence and implication laws of logic, Principle of Mathematical induction.

UNIT-II (11 Hrs)

Relations and Functions
Relations: Relations and diagraph, n-ary relations and their applications, properties of relations, representing relations, closure of relation, equivalence relation, operation on relations, partial ordering.
Functions: Functions, One-to-one Functions, Onto Functions, Inverse and Composition of Functions, Floor Function, Ceiling Function.

UNIT-III (11 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 Crammer's rule and matrix inversion method. Consistency of linear equations by Rank Method.

UNIT-IV (12 Hrs)

Graph Theory.
Graphs: Introduction to Graph, Graph terminology, Representing graphs and Graph Isomorphism, Connectivity, Euler Paths and Circuits, Hamiltonian paths and circuits, Shortest Path Problems, Planar Graphs.
Trees: Trees, labelled trees, Tree Traversal, Undirected trees, Spanning Trees, Minimum spanning trees.

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Recommended Books
1. Richard Johnsonbaugh, 'Discrete Mathematics', 5th Edn,, Pearson Education, Asia.
2. M.N.S. Swami. & E. Thisiraman, 'Graphics Networks and Algorithms', 2nd Edn., John Wileyand Sons.
3. Seymon Lipschutz & Max Lans Lipson, 'Discrete Mathematics', Tata McGraw Hill.

COMMUNICATION SKILLS-I

Subject Code: BHUM0-101	L T P C	Duration: 45 Hours
	2 1 0 3	

Learning Objectives
i) To expose the students to effective communication strategies and different modes of communication.
ii) To enable the students to analyze his/her communication Behaviour and that of others.
iii) To enable a student to apply effective communication skills professionally and socially.

UNIT-I (12 Hrs)
Communication: Meaning, its types, Significance, Process, Channels, Barriers to Communication, Making Communication Effective, Role in Society.
Business Correspondence: Elements of Business Writing, Business Letters: Components and Kinds, Memorandum, Purchase Order, Quotation and Tenders, Job Application Letters, Resume Writing etc.

UNIT-II (10 Hrs)
Discussion Meeting and Telephonic Skills: Group Discussion, Conducting a Meeting, Telephone Etiquettes, Oral Presentation: Role of Body Language and Audio Visual Aids.
Grammar: Transformation of Sentences, Words used as Different Parts of Speech One Word Substitution, Abbreviations, Technical Terms etc.

UNIT-III (11 Hrs)
Reading Skills: Process of reading, Reading Purposes, Models, Strategies, Methodologies, Reading Activities.
Writing Skills: Elements of Effective Writing, Writing Style, Technical Writing: Report Writing.

UNIT-IV (12 Hrs)
Listening Skills: The process of Listening, Barriers to Listening, Effective Listening Skills and Feedback Skills.
Speaking Skills: Speech Mechanism, Organs of Speech, Production and Classification of Speech Sound, Phonetic Transcription, Skills of Effective Speaking, Components of Effective Talk.

Course Outcomes
The students after undertaking this course will be able to:
i) Understand and appreciate the need of communication training.
ii) Use different strategies of effective communication and select the most appropriate mode of communication for a given situation.
iii) Speak effectively and assertively
iv) Correspond effectively through different modes of written communication.
v) Present himself/herself professionally through effective resumes and interviews.

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Recommended Books

1. M.V. Rodriques, 'Effective Business Communication', Concept Publishing Company New Delhi,**1992, reprint 2000.**
2. Adhikari Sethi, 'Business Communication', McGraw Hill.
3. Indrajit Bhattacharya, 'An Approach to Communication Skills', Dhanpat Rai Co., (Pvt.) Ltd., New Delhi.
4. Chrissie Wright, 'Handbook of Practical Communication Skills', Jaico Publishing House, Mumbai.
5. L. Gartside, 'Modern Business Correspondence', Pitman Publishing, London.
6. Rizvi M. Ashraf, 'Effective Technical Communication', McGraw Hill.

HUMAN VALUES & PROFESSIONAL ETHICS

Subject Code: BHUM0-103 **L T P C** **Duration: 24 Hrs**
  2 0 0 2

Learning Objectives and Expected Outcomes

To help the students discriminate between what is valuable and what is superficial in the life. To help the students develop the critical ability to distinguish between essence and form 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 the 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 fulfil 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 IIITH, IITK and UPTU on a large scale with significant results.

UNIT-I (6 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 fulfilment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfil the above human aspirations: understanding and living in harmonyat various levels

UNIT-II (8 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"

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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

UNIT-III (6 Hrs)
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!

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence
Understanding the harmony in the Nature; Interconnectedness and mutual fulfilment 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 (4 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. 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 Harper Collins, 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, 'How the Other Half Die's, Penguin Press, Reprinted **1986, 1991.**
6. P.L. Dhar, R.R. Gaur, 'Science and Humanism', Commonwealth Publishers, **1990**.

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7. A.N. Tripathy, 'Human Values', <u>New Age International Publishers</u>, **2003.**
8. Subhas Palekar, 'How to Practice Natural Farming', <u>Pracheen (Vaidik) Krishi Tantra Shodh</u>, <u>Amravati</u>, **2000.**
9. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 'Limits to Growth - Club of Rome's Report', <u>Universe Books</u>, **1972.**
10. E.G. Seebauer & Robert L. Berry, 'Fundamentals of Ethics for Scientists & Engineers', <u>Oxford University Press</u>, **2000.**
11. M. Govindrajran, S. Natrajan & V.S. Senthil Kumar, 'Engineering Ethics (including Human Values)', <u>Eastern Economy Edition, Prentice Hall of India Ltd.</u>
12. B.P. Banerjee, 'Foundations of Ethics and Management', <u>Excel Books</u>, **2005.**
13. B.L. Bajpai, 'Indian Ethos and Modern Management', <u>New Royal Book Co., Lucknow,</u> **2004,** Reprinted **2008.**

INFORMATION TECHNOLOGY LAB

Subject Code: BITE1-103   **L T P C**
                                      0 0 4 2

1. Familiarizing with PC and WINDOWS
2. Hardware: Input / Output devices installation and configuration.
3. Software: Application and System Software installation and usage
4. DOS internal & external commands.
5. MS Office: MS WORD, MS EXCEL & MS PowerPoint.
6. Internetworking: WWW, Email, Blogs, Social Networking, Search Engines etc.

PROGRAMMING LOGIC LAB

Subject Code – BITE1-104   **L T P C**
                                       0 0 4 2

Programming Fundamentals
- Describe Procedural and Object-Oriented Programming Languages.
- Identify How a Computer Processes and Stores Data.

Problem Solving and Algorithm Development
- Describe The Process and Methods for Problem Recognition.
- Define The Process of Algorithm Development.
- Describe The Importance of Using a Structured Modular Approach to Program Development.
- Analyse the Development of Procedural and Object-Oriented Problem Solutions.

Programming Logic
- Demonstrate The Sequential and Selection Processing Control Structure.
- Examine The Iteration Control Structure.
- Apply Flowcharts to Represent Logic.

Structures, Verification, and Validation
- Explain Array Structures.
- Define Objects and Object-Oriented Classes.
- Apply Arrays to Program Logic and Data Manipulation.
- Verify Algorithms using Requirements and Desk Review Design.

File Processing
- Differentiate Between Sequential and Direct Access.

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- Demonstrate Reading and Writing Sequential Files in Pseudocode.
- Compare and Contrast Procedural and Object-Oriented Programming.

COMMUNICATION SKILLS-I LAB

Subject Code: BHUM0-102   **L T P C**
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The Communicative English Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

Learning Objectives

1. To expose the students to a variety of self-instructional, learner-friendly modes of language learning.
2. To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams.
3. To enable them to learn pronunciation through stress on word accent, intonation, and rhythm.
4. To train them to use communication skills effectively for interviews, group discussions, public speaking etc.

Syllabus

The following course content is prescribed for Communicative English Laboratory sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Situational Dialogues / Role Play.
4. Oral Presentations- Prepared and Extempore.
5. 'Just A Minute' Sessions (JAM).
6. Describing Objects / Situations / People.
7. Information Transfer
8. G.D. and Debate

The teacher may use following different classroom techniques to give practice and monitor the progress of the students:

- Role Play
- Question-Answer
- Discussion
- Presentation of Papers
- Seminars etc.

Minimum Requirement

The Communicative English Language Lab shall have two parts:

i) The Computer aided Language Lab for 30 students with 30 systems, one master console, LAN facility and English language software for self- study by learners.
ii) The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System & a LCD projector/ T.V.

System Requirement (Hardware Component)

Computer network with *LAN* with minimum 30 multimedia systems

Suggested Software

1. Cambridge Advanced Learners' English Dictionary with CD.
2. The Rosetta stone English Library
3. Clarity Pronunciation Power – Part I

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4. Mastering English in Vocabulary, Grammar, Spellings, Composition
5. Dorling Kindersley series of Grammar, Punctuation, Composition etc.
6. Language in Use, Foundation Books Pvt. Ltd with CD.
7. Oxford Advanced Learner's Compass, 7th Edition
8. Learning to Speak English - 4 CDs
9. Microsoft Encarta with CD
10. Murphy's English Grammar, Cambridge with CD.
11. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

Recommended Books

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.
2. English Pronouncing Dictionary, Daniel Jones Current Edition with CD.
3. R.K. Bansal and J.B. Harrison, 'Spoken English', Orient Longman,**2006**.
4. A. Ramakrishna Rao, G. Natanam & S.A. Sankaranarayanan, 'English Language Communication: A Reader cum Lab Manual', Anuradha Publications, Chennai.
5. Krishna Mohan & N.P. Singh, 'Speaking English Effectively', Macmillan.
6. J. Sethi, Kamlesh Sadanand & D.V. Jindal, 'A Practical Course in English Pronunciation, (with two Audio cassettes)', Prentice-Hall of India Pvt. Ltd., New Delhi.
7. T. Balasubramanian, 'A Text Book of English Phonetics for Indian Students', Macmillan.
8. 'English Skills for Technical Students**,** WBSCTE' with British Council, OL.

Learning Outcomes:

The students after undertaking this course will be able to:

i) Understand and Appreciate the Need of Communication Skills in Personal and Professional Life.
ii) Use Different Medias/Channels of Communication and Select the Most Appropriate for a Given Situation.
iii) Speak and Present himself/herself Professionally and Socially Effectively Through Effective Talks, Resumes, Interviews etc.

COMMUNICATION SKILLS- II

Subject Code: BHUM0-213	**L T P C**	**Duration: 40 Hrs**
	3 1 0 4	

UNIT-I (10 Hrs)

Introduction to Business Communication Meaning and Definition; process and classification of communication; elements & characteristics of communication; barriers to effective communication in business organization; Formal and Informal communication; grapevine, importance of effective communication in business house; Principals of effective communication

UNIT-II (10 Hrs)

Writing Skills Inter-office memorandums; faxes; E-mails; writing effective sales letters - to agents; suppliers; customers; report writing; project writing.

UNIT-III (10 Hrs)

Curriculum Vitae (CV) Drafting a CV; writing job application and other applications; do's and don'ts while appearing for an Interview; types of interview.

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UNIT-IV (10 Hrs)

Presentation Skills, Introduction; need of good presentation skills in professional life; preparing a good presentation; group discussion; extempore speaking.

Recommended Books

1. M.V. RODRIGUEZ, 'Effective Business Communication'
2. Meenakshi Raman, Parkash Singh, 'Business Communication', Oxford University Press.

MATHEMATICS-II

Subject Code – BMAT0-206	**L T P C**	**Duration - 42 Hrs**
	3 1 0 4	

UNIT–I (10 Hrs)

Probability – Definition, Addition law of Probability, Multiplication law, Binomial Distribution, Poisson Distribution, Normal Distribution**.**

UNIT–II (11 Hrs)

Statistics and Applications of Logarithms Introduction to Statistics, Measures of Central Tendency- Mean, Median and Mode, Measures of Dispersion, Mean Deviation, Standard Deviation and Coefficient of Variation.
Problems related to Compound Interest, Depreciation and Annuities.

UNIT–III (10 Hrs)

Differential Calculus- Introduction to Differentiation, Derivative of a Function of one variable, Power Functions, Sum and Product of two functions, Function of a Function, Differentiation by Method of Substitution, Maxima and Minima.

UNIT–IV (11Hrs)

Integral Calculus- Indefinite Integral, Integration by Substitution, Integration by parts, Integration by Partial Fractions, Definite Integral, Rectification of Standard curves, Area bounded by standard curves.

RECOMMENED BOOKS:

1. B.S. Grewal, 'Engineering Mathematics', 7ᵗʰ Edn., Khanna Publishers.
2. S.C. Gupta and V.K. Kapoor, 'Fundamentals of Mathematical Statistics,'11ᵗʰ Edn., Sultan Chand & Sons.
3. H.K. Dass, 'Advanced Engineering Mathematics,' S. Chand & Company, Ltd.

OBJECT ORIENTED PROGRAMMING

Subject Code: BITE1-205	**L T P C**	**Duration: 39 Hrs**
	3 1 0 4	

UNIT-I (10 Hrs)

Introduction: Object oriented programming approach, characteristics of object orientated languages, Bridging C & C++ (Overview of C Concepts). Structures and Unions: Declaration of structures, Accessing structure members, Structure Initialization, Arrays of structure, nested structures, structure with pointers, functions & structures, Unions, Structure/Union Versus Class in C++. Class Declaration: Data Members, Member Functions, Private and Public Members, Data Hiding and Encapsulation, Array within a class.

UNIT-II (10 Hrs)

Class Function Definition: Member Function definition inside the class and outside the class, Friend Function, Inline Function, Static Members & Functions, Scope Resolution Operator,

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Private and Public Member Functions, Nesting of Member Functions. Creating Objects, accessing class data members, accessing member functions, Arrays of Objects, Objects as function arguments: Pass by value, Pass by reference, Pointers to Objects. Constructors and Destructors: Declaration and Definition, Default Constructors, Parameterized Constructors, Constructor Overloading, Copy Constructors. Destructors: Definition and use.

UNIT-III (10 Hrs)

Inheritance - Extending Classes Concept of inheritance, Base class, Derived class, defining derived classes, Visibility modes: Private, public, protected; Single inheritance: Privately derived, publicly derived; Making a protected member inheritable, Access Control to private and protected members by member functions of a derived class, Multilevel inheritance, Nesting of classes. Function Overloading & Operator Overloading: Binary & Unary.

UNIT-IV (9 Hrs)

Polymorphism: Definition, early Binding, Polymorphism with pointers, Virtual Functions, late binding, pure virtual functions. Input/output files: Streams, buffers & iostreams, header files, redirection, file input and output.

Recommended Books

1. E. Balagurusami, 'Object Oriented Programming with C++', 4ᵗʰ Edn., Tata Mc-Graw Hill
2. Robert Lafore, 'Object Oriented Programming in Turbo C++', 4ᵗʰ Edn., Galgotia Publications.
3. Bjarna Stroustrup, 'The C++ Programming Language',3ʳᵈ Edn., Addison-Wesley Publishing Company.
4. R.S. Salaria, 'Object Oriented Programming Using C++', 4ᵗʰ Edn., Khanna Book Publishing

FUNDAMENTAL OF DIGITAL ELECTRONICS

Subject Code: BITE1-206	L T P C	Duration: 38 Hrs
	3 1 0 4	

UNIT-I (10 Hrs)

Number System: Decimal Number System, Binary Number System, Octal Number System, Hexa-decimal Number System, Conversion from One Number System to another, Arithmetic Operation without Changing the Base, 1's Complement and 2's Complement. Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR, NAND & NOR as Universal Gates, Logic Gates Applications.

UNIT-II (9 Hrs)

Boolean Algebra: Introduction, Theorems, Simplification of Boolean Expression using Boolean Algebra, SOP & POS Forms, Realization of Boolean Expression using Gates, KMaps, Simplification of Boolean Expression using K-Maps. Combinational Logic Circuits: Half Adder & Half Subtractor, Full Adder & Full Subtractor, Parallel Binary Adder, Binary Adder/Subtractor.

UNIT-III (10 Hrs)

Combinational Logic Circuits: Multiplexers & Demultiplexers, Implementation of Boolean equations using Multiplexer and Demultiplexer, Encoders & Decoders. Sequential Logic Circuits: Latch, Flip Flops- R-S Flip-Flop, J-K Flip-Flop, Master-Slave J-K Flip-Flop, Race Condition, Removing Race Condition, D Flip-Flop, T Flip-Flop, Applications of Flip-Flops.

UNIT-IV (9 Hrs)

Counters: Clock Pulse Generator using 555 Timer as Monostable and Multivibrator, Design of Asynchronous Counters, Design of Synchronous Counters, Up-Down Counters, MOD-N Counters.

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Recommended Books
1. Malvino, 'Digital Computer Electronics', 2ⁿᵈ Edn., Mc-Graw Hill.
2. R.P. Jain, 'Modern Digital Electronics', 4ᵗʰEdn., Tata Mc-Graw Hill.
3. D. Morris Mano, 'Digital Logic & Computer Design', 2ⁿᵈ Edn., Prentice Hall India.
4. T.C. Bartee, 'Digital and Electronic Circuits', McGraw Hill.

ENVIRONMENTAL SCIENCE

Subject Code: BESE0-101   **L T P C**   **Duration: 48 Hrs.**
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Course Objectives:
1. To identify global environmental problems arising due to various engineering/industrial/ and technological activities and the science behind these problems
2. To realize the importance of ecosystem and biodiversity for maintaining ecological balance.
3. To identify the major pollutants and abatement devices for environmental management and sustainable development.
4. To estimate the current world population scenario and thus calculating the economic growth, energy requirement and demand.
5. To understand the conceptual process related with the various climatologically associated problems and their plausible solutions.

UNIT-1

1. The Multidisciplinary Nature of Environmental Studies (2 Hrs.)
Definition, scope and importance. Need for public awareness.

2. Natural Resources (Hrs.)
Renewable and Non-renewable Resources:
Natural resources and associated problems.
   (a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
   (b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
   (c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
   (d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
   (e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
   (f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
   (g) Role of an individual in conservation of natural resources.
   (h) Equitable use of resources for sustainable lifestyles.

UNIT-1I

3. Ecosystems (8 Hrs.)
   (a) Concept of an ecosystem.
   (b) Structure and function of an ecosystem.
   (c) Producers, consumers and decomposers.
   (d) Energy flow in the ecosystem.

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   (e) Ecological succession.
   (f) Food chains, food webs and ecological pyramids.
   (g) Introduction, types, characteristic features, structure and function of the following ecosystem:
      i)   Forest ecosystem.
      ii)   Grassland ecosystem.
      iii) Desert ecosystem.
      iv) Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries).

4. Biodiversity and its Conservation (6 Hrs.)
   (a) Introduction – Definition: genetic, species and ecosystem diversity.
   (b) Biogeographical classification of India.
   (c) Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and
   (d) option values.
   (e) Biodiversity at global, national and local levels.
   (f) India as a mega-diversity nation.
   (g) Hot-spots of biodiversity.
   (h) Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts.
   (i) Endangered and endemic species of India.
   (j) Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-1II

5. Environmental Pollution (8Hrs.)
Definition
   (a) Causes, effects and control measures of:
      i)   Air pollution
      ii)   Water pollution
      iii) Soil pollution
      iv) Marine pollution
      v)   Noise pollution
      vi) Thermal pollution
      vii) Nuclear pollution
   (b) Solid Waste Management: Causes, effects and control measures of urban and industrial wastes.
   (c) Role of an individual in prevention of pollution.
   (d) Pollution Case Studies.
   (e) Disaster management: floods, earthquake, cyclone and landslides

6. Social Issues and the Environment (8 Hrs.)
   (a) From unsustainable to sustainable development
   (b) Urban problems and related to energy
   (c) Water conservation, rain water harvesting, Watershed Management
   (d) Resettlement and rehabilitation of people; its problems and concerns. Case studies.
   (e) Environmental ethics: Issues and possible solutions
   (f) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
   (g) Wasteland reclamation
   (h) Consumerism and waste products
   (i) Environmental Protection Act
   (j) Air (Prevention and Control of Pollution) Act
   (k) Water (Prevention and control of Pollution) Act

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(l) Wildlife Protection Act
(m) Forest Conservation Act
(n) Issues involved in enforcement of environmental legislation
(o) Public awareness

UNIT-1V

7. Human Population and the Environment (7 Hrs.)
(a) Population growth, variation among nations
(b) Population explosion – Family Welfare Programmes
(c) Environment and human health
(d) Human Rights
(e) Value Education
(f) HIV/AIDS
(g) Women and Child Welfare
(h) Role of Information Technology in Environment and Human Health
(i) Case Studies

8. Field Work (6 Hrs.)
(a) Visit to a local area to document environmental assets river/
(b) forest/grassland/hill/mountain
(c) Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
(d) Study of common plants, insects, birds
(e) Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Recommended Books
1. J.G. Henry and G.W. Heinke, 'Environmental Sc. & Engineering', Pearson Education, **2004.**
2. G.B. Masters, 'Introduction to Environmental Engg. & Science', Pearson Education, **2004.**
3. Erach Bharucha, 'Textbook for Environmental Studies', UGC, New Delhi.

OBJECT ORIENTED PROGRAMMING LAB

Subject Code: BITE1-207   **L T P C**
                                                           0 0 4 2

1. [Classes and Objects] Write a program that uses a class where the member functions are defined inside a class.
2. [Classes and Objects] Write a program that uses a class where the member functions are defined outside a class.
3. [Classes and Objects] Write a program to demonstrate the use of static data members.
4. [Classes and Objects] Write a program to demonstrate the use of const data members.
5. [Constructors and Destructors] Write a program to demonstrate the use of zero argument and parameterized constructors.
6. [Constructors and Destructors] Write a program to demonstrate the use of dynamic constructor.
7. [Constructors and Destructors] Write a program to demonstrate the use of explicit constructor.
8. [Initializer Lists] Write a program to demonstrate the use of initializer list.
9. [Operator Overloading] Write a program to demonstrate the overloading of increment and decrement operators.
10. [Operator Overloading] Write a program to demonstrate the overloading of binary arithmetic operators.

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11. [Operator Overloading] Write a program to demonstrate the overloading of memory management operators.
12. [Typecasting] Write a program to demonstrate the typecasting of basic type to class type.
13. [Typecasting] Write a program to demonstrate the typecasting of class type to basic type.
14. [Typecasting] Write a program to demonstrate the typecasting of class type to class type.
    15. [Inheritance] Write a program to demonstrate the multilevel inheritance.
15. [Inheritance] Write a program to demonstrate the multiple inheritance.
16. [Inheritance] Write a program to demonstrate the virtual derivation of a class.
17. [Polymorphism] Write a program to demonstrate the runtime polymorphism.
18. [Exception Handling] Write a program to demonstrate the exception handling.
19. [Templates and Generic Programming] Write a program to demonstrate the use of function template.
20. [Templates and Generic Programming] Write a program to demonstrate the use of class template.
21. [File Handling] Write a program to copy the contents of a file to another file byte by byte. The name of the source file and destination file should be taken as command-line arguments,
22. [File Handling] Write a program to demonstrate the reading and writing of mixed type of data.
23. [File Handling] Write a program to demonstrate the reading and writing of objects.

DIGITAL ELECTRONIC LAB

Subject Code: BITE1-208   **L T P C**
                                        0 0 4 2

To study the function of basic logic gates and verify the truth table of AND, OR, NOT, X OR, NAND, NOR.
1. To study applications of AND, OR, NAND, X-OR gates for gating digital signals.
2. To develop the different Arithmetic Circuits:
   a. Half-Adder and Subtractor. b. Full-Adder and Subtractor.
3. To study the BCD to binary and binary to BCD Code converter.
4. Study of Decoder Circuits: a. BCD-to-Decimal Decoder b. BCD-to-7-Segment Decoder
5. Study of Encoder Circuits: a. BCD-to-Decimal Encoder b. Octal-to-Binary Encoder
6. To study the flip flop circuit using Gates:
   a. R-S Flip Flop b. J-K Flip Flop c. Master Slave J-K Flip Flop d. D-Flip Flop
7. To study R-S, J-K and D Flip Flop Using IC's.
8. Study of Ring Counter.
9. Study of Asynchronous and Synchronous Counters.

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