Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
B.E. Four Year Degree Course
(Revised Curriculum as per AICTE Model Curriculum)
Scheme & Syllabus for Computer Engineering

Third Semester:-

SN	Subject	Teaching Scheme			Evaluation Scheme			Credits	Category
		L	T	P	CA	UE	Total		
1	Mathematics – III	4	-	-	30	70	100	4	BSC
2	Digital Circuits and Fundamentals of Microprocessor	3	1	-	30	70	100	4	ESC
3	Object Oriented Programming	3	1	-	30	70	100	4	PCC-CS
4	Theory of Computation	3	-	-	30	70	100	3	PCC-CS
5	Introduction to Computer Networks	3	-	-	30	70	100	3	PCC-CS
6	Universal Human Values	2	-	-	15	35	50	2	HSMC
7	Digital Circuits and Fundamentals of Microprocessor Lab	-	-	2	25	25	50	1	ESC
8	Object Oriented Programming (Lab)	-	-	2	25	25	50	1	PCC-CS
9	Computer Workshop-I(Lab)	-	-	2	25	25	50	1	LC
10	Environmental Science	2	-	-	-	-	-	Audit	HSMC
	Total	**20**	**02**	**06**	**240**	**460**	**700**	**23**	

L: Lectures T: Tutorials P: Practical
PCC-CS-Professional Core Courses **PEC-CS**-Professional Elective Courses
LC- Laboratory Course BSC- Basics Science Courses **ESC**-Engineering Science Courses
OEC-CS-Open Elective Courses **MC**- Mandatory Course
PROJ-CS- Project
HSMC- Humanities and Social Sciences including Management Courses

Dr. S. V. Sonekar
Chairman

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: 3rd (C.B.C.S.)

BRANCH: COMPUTER ENGINEERING

Subject : ***Mathematics – III*** Subject Code : **BECME301T**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
4 Hrs (Theory)	4	30	70	100

Aim: To understand the concepts of mathematics to solve the real life problems.

Prerequisite(s): Higher Secondary Mathematics.

Course Objectives:

1	A primary objective is to provide a bridge for the student from lower-division mathematics courses to upper-division mathematics.
2	Explain the importance of mathematics and its techniques to solve real life problems and provide the limitations of such techniques and the validity of the results.
3	Propose new mathematical and statistical questions and suggest possible software packages and/or computer programming to find solutions to these questions.

Course Outcomes:

After completing the course, students will be able to

CO1	Solve mathematical model with Laplace Transform and error functions and their applications.
CO2	Make use of Fourier transforms and Z - transforms to analyze wave forms of periodic functions & non periodic functions
CO3	Solve problems in engineering domain related to Linear Algebra using matrices.

CO4	Develop problem solving techniques needed to accurately calculate probabilities and describe the properties of discrete and continuous distribution functions.
CO5	Compute correlations; Apply the tests of goodness of fit.

Unit 1: Integral Transforms **(10 Hrs)**

Laplace Transform: Definition, Properties of Laplace transform (Statement only), Evaluation of integrals by Laplace transform, Inverse Laplace transform by partial fraction method, Convolution theorem (Statement only), Simple applications of Laplace transform to solve ordinary differential equations.

Fourier Transform: Definition and Properties (excluding FFT), Applications of Fourier transform to solve integral equations.

Unit 2: Z-Transform **(09 Hrs)**

Definition and convergence of Z-transform, Properties (Statement only) and examples, Inverse Z-transform by partial fraction method, Convolution of two sequences, Power series method, Solution of difference equations with constant coefficients by Z-transform method.

Unit 3: Matrices **(09 Hrs)**

Linear dependence of vectors, Eigen values and Eigen vectors, Reduction to diagonal form, Singular value decomposition, Sylvester's theorem (Statement only), Largest Eigen value and its corresponding Eigen vector by iteration method.

Unit 4: Mathematical Expectation and Probability Distributions **(10 Hrs)**

Review of discrete and continuous random variables, Mathematical expectation, Variance, Standard deviation, Moments, Moment generating function, Binomial distribution, Poisson's distribution, Normal distribution, Exponential distribution.

Unit 5: Statistical Techniques **(10 Hrs)**

Statistics: Introduction to correlation and regression, Multiple correlation and its properties, Multiple regression analysis, Regression equation of three variables.

Measures of central tendency: Mean, Median, Quartile, Decile, Percentile, Mode, Mean deviation, Standard deviation.

Skewness: Test and uses of skewness and types of distributions, Measure of skewness, Karl Pearson's coefficient of skewness, Measure of skewness based on moments.

Text/ Reference Books:

1. *Advanced Engineering Mathematics (Wiley), Erwin Kreyzig.*
2. *Higher Engineering Mathematics (Khanna Publishers), B. S. Grewal.*
3. *Advanced Engineering Mathematics (S. Chand), H. K. Dass.*
4. *Probability and Statistics (Schaum's Outline Series), Murray Spiegel, John Schiller, R. A. Srinivasan.*
5. *Advanced Mathematics for Engineers, Chandrika Prasad.*
6. *A text book of Engineering Mathematics (Laxmi Publication), N. P. Bali & M. Goyal.*

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: 3rd (C.B.C.S.)

BRANCH: COMPUTER ENGINEERING

Subject : ***Digital Circuits and Fundamentals of Microprocessor*** Subject Code : **BECME302T**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
(3+1) Hrs (L+T)	4	30	70	100

Aim: To understand the concepts of digital circuits and microprocessor.

Prerequisite(s): Nil

Course Objectives:

1	To understand the basic digital gates used in digital system and develop logical circuits using Boolean gates, construction of various logic circuits using basic gates.
2	To understand the sequential logic design
3	Identify the logic families, memory devices & PLDs
4	To understand the 8085 microprocessor

Course Outcomes:

At the end of this course Student are able to:

CO1	Understand the concepts of realization of Boolean functions using various combinational logic design
CO2	Analyze & design digital combinational logic circuits
CO3	Illustrate memory elements & design used in sequential logic design
CO4	Classify different logic families, memory devices and PLDs
CO5	Describe the internal working of 8085microprocessor and AL programming concepts in 8085 microprocessor with examples

Unit I: Combinational Circuits **[08 Hours]**

Number system, Boolean algebra, Standard representations for logic functions, K map representation of logic functions (SOP & POS forms), minimization of logical functions for min-

terms and max-terms (upto 4 variables), don't care conditions, Design Examples: Arithmetic Circuits, BCD - to – 7 segment decoder, Code converters.

Unit II :Logic Circuit Design **[07 Hours]**

Adders and their use as substractor, look ahead carry, ALU, Digital Comparator, Parity generators/checkers, Static and dynamic hazards for combinational logic.

Multiplexers and their use in combinational logic designs, multiplexer trees, Demultiplexers, Encoders & Decoders.

Unit III: Sequential Components and their Applications **[07 Hours]**

Sequential Logic Design 1 Bit Memory Cell, Clocked SR, JK, MS J-K flip flop, D and T flip-flops. Use of preset and clear terminals, Excitation Table for flip flops, Conversion of flip flops.

Application of Flip flops: Registers, Shift registers, Counters (ring counters, twisted ring counters), Sequence Generators, ripple counters, up/down counters, synchronous counters, lock out, Clock Skew.

Unit IV: Programmable Logic Devices **[07 Hours]**

Classification and characteristics of memories: RAM, ROM, EPROM, EEPROM, SRAM, DRAM, expanding memory size, Synchronous DRAM (SDRAM), Double Data Rate SDRAM, Synchronous SRAM, DDR and QDR SRAM, Content Addressable Memory Programmable logic devices: Detail architecture, Study of PROM, PAL, PLA, Designing combinational circuits using PLDs.

Unit V: Fundamental of Microprocessor **[07 Hours]**

Introduction to microprocessor, Architecture of 8085 microprocessor, Addressing modes, 8085 instruction set, Interrupts, Concept of assembly language programming.

Text Books:

1. *Morris Mano : " An approach to digital Design", Pearson Publications.*
2. *Ramesh Gaonkar : " Microprocessor Architecture, Programming and Applications with the 8085", Penram International Publications.*
3. *W. Fletcher : "Engg. Approach to Digital Design", PHI Publications.*
4. *A. Anand Kumar*: "*Fundamentals of Digital Circuits*", *PHI Publications.*

Reference Books

1. *Wakerly Pearon : "Digital Design: Principles and Practices", Pearon Education*

Publications.

2. Mark Bach : "Complete Digital Design", Tata MCGraw Hill Publications

3. R.P. Jain : "Modern digital electronics" , TMH Publications.Reference

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: 3rd (C.B.C.S.)

BRANCH: COMPUTER ENGINEERING

Subject : ***Object Oriented Programming*** Subject Code : **BECME303T**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
(3+1) Hrs (L+T)	4	30	70	100

Aim: To realize the concepts of Object Oriented Programming

Prerequisite(s): C Programming, Object Oriented Concepts

Course Objectives:

1	To provide understanding of basics of object oriented programming
2	To enable students to understand features of object oriented programming language
3	To develop program using object oriented programming language

Course Outcomes:

At the end of this course student are able to:

CO1	Realize the difference between the top-down and bottom-up approach along with thinking in terms of objects.
CO2	Explain programming fundamentals, including statement and control flow and recursion.
CO3	Analyze the given problem keeping in mind object oriented approach
CO4	Apply the object-oriented concepts during the development of solution
CO5	Illustrate the use of static and run time binding, error handling mechanism

UNIT I: **[07 Hours]**

Introduction: Taxonomy and history of Computer Programming Program Execution basics. Problem solving and programming strategies, programming paradigms. Algorithm and flowchart design, Principles of Structured programming. C Language Fundamentals: Loop control statements, Arrays One dimensional & Two-dimensional array. Functions – Definition, call, prototypes, block structure, external variables, Recursion.

UNIT II : **[07 Hours]**

Pointers in C – Address and indirection operators, Pointer arithmetic – Functions and pointers – Arrays and pointers – Strings and pointers – Multi-dimensional arrays and pointers – Pointer arrays – Pointers to functions –Dynamic memory management. Structure in C : Structures – Variables, Accessing members, Assignment and nesting – Pointers to Structures – Structures and functions – Structures and arrays – Structures containing pointers – Unions

UNIT III : **[08 Hours]**

Principles of Object Oriented Programming: Object Oriented Programming Paradigm, Basic Concepts of Object Oriented Programming, Benefits of Object Oriented Programming, Object Oriented Languages, Applications of Object Oriented Programming, C++ Basics : Tokens, Keywords, Identifiers and Constants, Data Types, Type Compatibility, Variables, Operators in C++,Implicit Conversions, Operator Overloading, Operator Precedence, Control Structures.

UNIT IV : **[07 Hours]**

Functions in C++ :.The Main Function, Function Prototyping, Call by Reference, Return by Reference, Inline Functions, , Friend Functions. Classes & Objects: Specifying a class, Member Functions, Arrays within a class, Static Member Functions, Arrays of Objects. Constructors & Destructors: Constructors Parameterized Constructors, Copy Constructors, Dynamic Constructors, and Destructors.

UNIT V : **[07 Hours]**

Polymorphism: Operator Overloading, Overloading Operators, Rules for Overloading Operators, Type Conversions. Function Overloading, Virtual Functions. Inheritance: Derived Classes,

Single, multilevel, multiple inheritance, Abstract Classes, Virtual and pure virtual functions Pointers in C++: Pointers to Objects, this pointer, Pointer to Derived Classes, Exception handling

Text Books :-

1. *Let us C ,Yashavant Kanetkar,– BPB Publications. 2002*
2. *Object-oriented programming with C++ by E.Balagurusamy, 2nd Edition, TMH.*

Reference Books:-

1. *The C Programming Language : Dennis Ritchie & Brain Kernighan [Pearson]*
2. *Practical "C" Programming: Steve Oualline, O'Reilly Publications*
3. *Object Oriented Programming using C++, Robert Lafore, Galgotia publication 2010.*
4. *How to Program C++, Sixth Edition, by Deitel&Deitel, Prentice Hall, 2005,*

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: 3rd (C.B.C.S.)

BRANCH: COMPUTER ENGINEERING

Subject : **Theory of Computation** Subject Code : **BECSE304T**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
3 Hrs (Theory)	3	30	70	100

Aim: To understand the formal language processing and its application.

Prerequisite(s): Set theory

Course Objectives:

1	Theoretical explanation of computation resources.
2	Understanding formal language processing.
3	Construct the model or machine for solving different problems.
4	Utilize different levels of computation

Course Outcomes:

At the end of this course student are able to:

CO1	Explain fundamental properties of formal languages and formal grammars, deterministic and nondeterministic finite automata and types of languages and types of finite automata.
CO2	Compare deterministic and nondeterministic finite automata and deterministic finite automata and Explain fundamental construction of Mealy and Moore Machine.
CO3	Prove the equivalence of languages described by finite state machines and regular expressions and able to construct regular grammar from finite automata and vice versa.
CO4	Apply logic using context-free languages, context-free grammars.

CO5	Construct push-down automata, Turing machines and identify decidability and recursive enumerability.

Unit I: **[7 Hours]**

Introduction to Theory of Automaton, Strings, Alphabet, language, Chomsky hierarchy of languages, Finite state machine definitions, Finite automation model acceptance of strings and language, Non deterministic finite automaton, Deterministic finite automaton.

Unit II: **[7 Hours]**

Equivalence between NFA and DFA. Conversion of NFA into DFA, NFA with e-moves and e-closure with examples, Conversion of NFA with e moves to without e-moves Minimization of FSM, Equivalence between two FSM's, Mealy Machine and Moore Machine and its conversion.

Unit III: **[7 Hours]**

Introduction to Regular languages and Regular expression, Regular set, Regular Expression and Regular languages sample examples, Regular expression examples, Equivalence and Inter Conversion between Regular Expression and FA, Conversion from RE to RG

Unit IV: **[7 Hours]**

Introduction to Context Free Grammar (CFG) and Derivation Trees, Left Derivation Tree and Right Derivation Tree, CFG minimization (Reduction of CFG), Chomsky normal form(CNF), Greibach normal form(GNF)

Unit V: **[8 Hours]**

Introduction to Push Down Automaton (PDA) Definition and working principle, Implementation of Push Down Automaton. Introduction to Turing machines, Definition, Model of TM, Types of TM, Designing of TM. Decidability and Undecidability of problems, Properties of recursive & recursively enumerable languages, Post correspondence problem, Ackerman function.

Text books:

1. *Introduction to Theory of Computation 2nd Edition, by Sipser, Cengage publications*
2. *Introduction to Automata Theory, Languages and Computation by J. E. Hopcraft,R. Motwani, J. D Ullman, second Edition, Pearson Education, Aisa*
3. *An Introduction to Formal Languages and Automata by Peter Linz*
4. *Introduction to Langauges and the theory of Automata by John Martin, Third Edition(TMH)*

Reference books:

1. *Theory of Computer Science, Automata, Languages and Computation by K. L. P. Mishra and N. Chandrasekaran, Third Edition, PHI Learning.*
2. *Elements of Theory of Computation by Lewis H.P and Papadimition C.H.*

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: 3rd (C.B.C.S.)

BRANCH: COMPUTER ENGINEERING

Subject : ***Introduction to Computer Networks*** Subject Code : **BECME305T**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
3 Hrs (Theory)	3	30	70	100

Aim: To provide the students with the knowledge and skills of layered models in various categories of network.

Prerequisite(s): Concepts of Computer Engineering

Course Objectives:

1	To obtain a theoretical understanding of various aspects of Data Communication & Computer Network and explore the functions of layered architecture.
2	To explain the concept of layered architecture when two entities need to communicate with each other.
3	To enable the students to understand cryptography concepts related to network security

Course Outcomes:

At the end of this course Student are able to:

CO1	Describe the basics of network and its hardware components
CO2	Explain the different network models
CO3	Interpret the various functions and protocols of network models.
CO4	Distinguish different transmission media with its connectors.
CO5	Summarize the concepts of network security and privacy.

Unit I: **[07 Hours]**

Introduction to Data Communication and Computer Networks: Definition, Characteristics, Components, Data Representation, Types of Data flow, Need of Computer Networks, advantages and disadvantages, Goals and Application of Computer Network, Network Hardware Components, Computer Network Criteria, Physical structure(types of connection, physical topology), Types of network: (LAN,MAN,WAN,PAN,CAN), Classification of Local Area network.

Unit II: **[06 Hours]**

Layered Model: Protocol Hierarchies, Network Model, Design issues for the Layers, Interfaces and Services, Service primitives, Connection Oriented and Connectionless types of services, OSI Reference Model & architecture, TCP/IP reference model, types of addressing.

Unit III: **[07 Hours]**

Physical Layer: Types of signals, Transmission Mode, Transmission Impairment, Data rate Limits, Performance, Digital to Digital Conversion Line coding techniques, Transmission Media, Switching techniques. Data Link Layer: Introduction to MAC and LLC sub layers, Framing methods, error detection and correction methods, LLC sub layer Protocols for Noise and Noiseless channels, MAC layer multiple access protocols (CSMA,CSMA/CD,CSMA/CA), channelization(FDMA, TDMA, CDMA), Introduction to Virtual LAN.

Unit IV: **[08 Hours]**

Network Layer: IPv4 addressing method, Routing algorithm(Static, Dynamic, Hierarchical), Address Mapping protocols(ARP,RARP, DHCP), ICMP protocol, Subnet & Subnet Masking techniques for classful addressing methods, Transport Layer: Elements of Transport Protocols, Addressing technique, Connection Oriented Service, TCP protocol and header format, TCP checksum calculation, TCP transmission policy, UDP protocol and header format, UDP checksum calculation, SCTP protocol, QoS parameters, Congestion control methods, Traffic shaping algorithms. Session and Presentation layer: Session layer design issues, responsibilities of Presentation layer

Unit V: **[08 Hours]**

Application Layer and Network Security: Responsibilities of Application Layer, Application Layer Services (DNS, E-mail, MIME, SMTP, FTP, TFTP),Architecture of WWW and HTTP,

Introduction to Cryptography, Security Services, Introduction to Symmetric and Asymmetric Key Cryptography, Digital Signature.

Text Books:

1. *Data Communications and Networking, Fourth Edition, Behrouz A Forouzan, (McGraw Hill)*
2. *Computer Networks, Vol.4, Andrew S. Tanenbaum. PHI*

Reference Books :

1. *Data and Computer Communication, 2nd Edition. by William Stallings.*
2. *A Course in Computer Networks, 3rd Edition by Dr. Sanjay Sharma, Katson Books*
3. *Computer Networks Principles, technologies and Protocols for Network Design, Natalia Olifer, Wiley India Student edition.*

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: 3rd (C.B.C.S.)

BRANCH: COMPUTER ENGINEERING

Subject : ***Universal Human Values*** Subject Code : **BECME306T**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
2 Hrs	2	15	35	50

Aim: To inculcate sensitivity among students towards themselves and their surrounding including family, society and nature

Prerequisite(s):Values education from school.

Course Objectives:- The objective of the course is four fold:

1	Development of a holistic perspective based on self-exploration, about themselves (human being), family, society and nature/existence.
2	Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3	Strengthening of self-reflection.
4	Development of commitment and courage to act.

Course Outcomes:

By the end of the course students shall be able to

CO1	Expected to become more aware of themselves, and their surroundings (family, society, nature)
CO2	Become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
CO3	Handle better critical ability.
CO4	Become sensitive to their commitment towards what they have understood (human values, human relationship and human society).

Unit 1 **[06 Hours]**

Value education, definition, need for value education. The content and the process of value education, basic guidelines for value education, self-exploration as a means of value education, happiness and prosperity as part of value education.

Unit 2 **[06 Hours]**

Harmony of self with body, coexistence of self and body, understanding the needs of self and the needs of body, understanding the activities in the self and the activities in the body.

Unit 3 **[06 Hours]**

Values in relationship, the five dimensions of human endeavour, the holistic perception of harmony in existence.

Unit 4 **[06 Hours]**

Basics for ethical human conduct, defects in ethical human conduct, human rights violations and social disparities, value based life.

Reference Books

1. *Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria,ExcelBooks, NewDelhi,2010*
2. *Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999.*
3. *Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.*
4. *Indian Ethos and Modern Management: Amalgam of the best of the ideas from the East and the West, B.L. Bajpai, New Royal Book Bo., Lucknow, 2004*
5. *Human society in ethics and politics, Bertrand Russel, Routledge Publications, 2009*

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: 3rd (C.B.C.S.)

BRANCH: COMPUTER ENGINEERING

Subject : ***Digital Circuits and Fundamentals of Microprocessor(Lab)*** Subject Code : **BECME302P**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
2 Hrs (Practical)	1	25	25	50

- ***Minimum eight to ten practical based on Digital Circuits and Fundamentals of Microprocessor syllabus***

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: 3rd (C.B.C.S.)

BRANCH: COMPUTER ENGINEERING

Subject : ***Object Oriented Programming (Lab)*** Subject Code : **BECME303P**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
2 Hrs (Practical)	1	25	25	50

Practical based on syllabus using C and C++ programming language(Any 8 to 10 practicals)

Practical - 1: Program to demonstrate use of loops & recursion

Practical - 2: Program to demonstrate arrays

Practical - 3: Program to demonstrate pointers

Practical - 4: Program to demonstrate structures and pointers

Practical - 5: Program to implement concept of class and object

Practical - 6: Program to implement constructor & destructor

Practical - 7: Program to implement inheritance

Practical - 8: Program to implement polymorphism

Practical - 9: Program to implement abstract class

Practical - 10: Program to implement copy constructor & assignment operator

Practical - 11: Program to implement run time binding (Virtual function)

Practical – 12: Program to implement friend class and friend function

Practical - 13 : Program to implement exception handling

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: 3rd (C.B.C.S.)

BRANCH: COMPUTER ENGINEERING

Subject : ***Computer Workshop -I (Lab)*** Subject Code : **BECME309P**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
2 Hrs (Practical)	1	25	25	50

Syllabus:

File Handling in C- Creation of a new file, Opening an existing file, Reading data from a file, writing data in a file, Closing a file. Performing various file manipulation operations.

Introduction to PHP- Introduction to the open source Web scripting language PHP. Build dynamic Web applications. Semantics and syntax of the PHP language, including discussion on the practical problems that PHP solves.

Introduction to Python Language-Variables, strings, and Numbers, Lists and Tuples, Introducing Functions, If Statements While Loops and Input, Dictionaries

Practicals should be performed based on above syllabus but not restricted to following list.. Sample List is provided.

1. C Program to Delete a Specific Line From a Text File and Find the Number of Lines in a Text File
2. C Program to Delete a file and Copy contents of File to another file.
3. C Program to Merge Two Files
4. Write PHP scripts to handle HTML forms.
5. Write regular expressions including modifiers, operators, and metacharacters.

6. Create PHP programs that use various PHP library functions, and that manipulate files and directories.
7. Python Program to Add Two Numbers.
8. Python Program to Find the Square Root.
9. Python Program to Calculate the Area of a Triangle.
10. Python Program to Solve Quadratic Equation.
11. Python Program to Swap Two Variables.
12. Python Program to Generate a Random Number.

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FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: 3rd (C.B.C.S.)

BRANCH: COMPUTER ENGINEERING

Subject : ***Environmental Science (Audit Course)*** Subject Code : **BECME310T**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
2 Hrs (Theory)	Nil	Nil	Nil	Nil

Unit-I Air pollution and its control techniques: [06 Hours]

Contaminant behavior in the environment, Air pollution due to SOx, NOx, photochemical smog, Indoor air pollution

Natural pathways for degradation: Carbon cycle, Sulphur cycle, Nitrogen cycle, Oxygen cycle.

Factors responsible for altering the composition of atmosphere (deforestation, burning of fossil fuels, industrial and vehicular emissions, CFCs).

Techniques to control Air pollution, ambient air quality and continuous air quality monitoring, Control measures at source, Kyoto Protocol, Carbon Credits.

Unit-II Water pollution and its control techniques: [06 Hours]

Major sources of water pollution: Eutrophication, acid mine drains, pesticides and fertilizers, dyeing and tanning, marine pollution, micro plastics

Techniques to control water pollution: Conventional waste water treatment-types of sewage, sewerage system, alternative systems, primary, secondary and tertiary processes including aerobic and anaerobic techniques, safe disposal and its utility.

Treatment schemes for waste water from dairy, textile, power plants, pharmaceutical industries, and agro based industries such as rice mills

Unit-III Other Environmental Pollution& Waste Management: [06 Hours]

Soil pollution: Soil around us, Soil water characteristics, soil pollution. Causes, effects &

control: noise pollution, nuclear & radiation hazards, marine pollution (Oil spills & Ocean Acidification)

Solid waste management: Composting, vermiculture, landfills, hazardous waste treatment, bioremediation technologies, conventional techniques (land farming, constructed wetlands), and phytoremediation.

Degradation of xenobiotics in environment: Petroleum hydrocarbons, pesticides, heavy metals

Introduction, types of e-wastes, environmental impact, e-waste recycling, e-waste management rules.

Unit-IV Social Issues and the Environmental Laws **[06 Hours]**

Concept of Sustainable development Water conservation, rain water harvesting, watershed management Resettlement and rehabilitation of people; its problems and concerns. Environmental Laws (brief idea only) Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act Issues involved in enforcement of environmental legislation. Different government initiatives (brief idea only)- National ambient air quality standard 2009, Swachh Bharat Abhiyan, National afforestation program and Act- 2016, National River conservation plan and National Ganga River basin authority, Formation of National Green Tribunal

Activity

1. Field Trip & Report Writing
2. Case-study & Report Writing

Reference Books:

1. *Benny Joseph, Environmental Studies, Mc Graw Hill Education (India) Private Limited*
2. *B. K. Sharma, Environmental Chemistry, Goel Publishing House, Meerut*
3. *P Aarne Vesilind, J. Jeffrey Peirce and Ruth F. Weiner, Environmental Pollution and Control, Butterworth-Heinemann*
4. *D. D. Mishra, S. S. Dara, A Textbook of Environmental Chemistry and Pollution Control, S. Chand & Company Ltd.*
5. *Shree Nath Singh, Microbial Degradation of Xenobiotics, Springer-Verlag Berlin*

Heidelberg

6. *Indian Environmental Law: Key Concepts and Principles edited by Shibani Ghosh, Publisher, Orient BlackSwan, 2019. ISBN, 9352875796.*
7. *P. Thangavel & Sridevi, Environemental Sustainability: Role of Green technologies, Springer publications*

Dr. S. V. Sonekar
Chairman