VASAVI COLLEGE OF ENGINEERING(AUTONOMOUS)
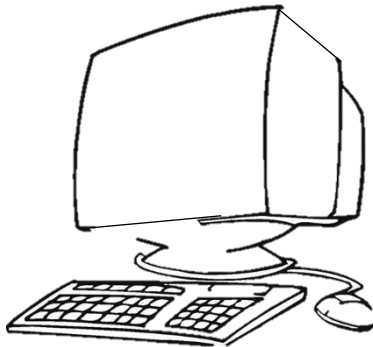## Ibrahimbagh, Hyderabad-31
Approved by A.I.C.T.E., New Delhi and
Affiliated to Osmania University, Hyderabad-07

Sponsored by
VASAVI ACADEMY OF EDUCATION
Hyderabad

SYLLABI UNDER CBCS FOR
B.E (CSE) SECOND YEAR
WITH EFFECT FROM 2017-18
(For the students admitted in 2016-17)

DEPARTMENT OFCOMPUTER SCIENCE ENGINERING
+91-40-23146020, 23146021
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Website: www.vce.ac.in

VISION OF THE DEPARTMENT

To be a center for academic excellence in the field of Computer Science and Engineering education to enable graduates to be ethical and competent professionals.

MISSION OF THE DEPARTMENT

To enable students to develop logic and problem solving approach that will help build their careers in the innovative field of computing and provide creative solutions for the benefit of society.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATIONS FOR
B.E III SEMESTER (CBCS) WITH EFFECT FROM THE ACADEMIC YEAR 2017-18

Course Code	B.E. III SEMESTER Name of the Course	Scheme of Instruction Hours per week				Scheme of Examination			Credits
		L	T	D	P	Duration in Hours	Maximum Marks SEE	CIE	
THEORY							SEE	CIE	
BS310MA	Mathematics III	3	1	-	-	3	70	30	3
PC310CS	Data Structures	3	1	-	-	3	70	30	3
PC320CS	Discrete Structures	3	1	-	-	3	70	30	3
PC330CS	Logic & Switching Theory	3	1	-	-	3	70	30	3
ES320EC	Introduction to Electronics Engineering	3	1	-	-	3	70	30	3
MC300EH	HVPE-I	1	-	-	-	2	35	15	1
HS310EH	FS-I: Communication Skills in English-I	2	2	-	-	3	70	30	2
MC310ME	Introduction to Entrepreneurship	1	-	-	-	2	35	15	1
OE3XXXX	Open Elective-I	2	-	-	-	3	70	30	2
LABS									
PC311CS	Data Structures Lab	-	-	-	2	3	50	25	1
ES321EC	Introduction to Electronics Engineering Lab	-	-	-	2	3	50	25	1
	Total	**21**	**7**	**-**	**4**		**660**	**290**	**23**
	Grand Total	**32**				**-**	**950**		

* SEE- Semester End Examination   * CIE- Continuous Internal Evaluation

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SYLLABUS FOR BE III SEMESTER
ENGINEERING MATHEMATICS – III

Instruction:3+1 Hrs /week	SEE Marks :70	Course Code : BS310MA
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	*At the end of the course students will be able to:*
1. **Study** the Fourier series, conditions for expansion of function and half range series 2. **Formulate** and solve linear and nonlinear partial differential equations and apply partial differential equations to engineering problems viz., wave, heat and Laplace's equations. 3. **Study** the methods to solve equations, apply numerical methods to interpolate, differentiate and integrate functions and to solve differential equations using numerical methods and solve systems of equations. 4. *Understand* Random variables Probability Distributions, Statistics and their applications. 5. *Understand* how to fit a curve to a given data, how Correlation between variables can be measured.	a) **Expand** any function which is continuous, discontinuous, even or odd in terms of its Fourier series. b) **Find t**he Partial differential equations by eliminating arbitrary constants and functions and solve linear, non linear Partial differential equations and also will be able solve wave, heat and Laplace's equations in engineering problems . c) **Solve** algebraic and transcendental equations using Bisection method Regula-Falsi, Newton-Raphson, apply numerical methods to interpolate, differentiate functions, solve systems of equations and solve differential equations using numerical methods. d) **Apply** various probability distributions to solve practical problems, to estimate unknown parameters of populations and apply the tests of hypotheses. e) **Solve** problems on how fitting of a curve to given data using curve fitting, and also to find co-efficient of correlation and to determine regression lines and their applications.

UNIT –I (8 classes)

Fourier Series : Introduction to Fourier series –Dirichlet's Conditions-Euler's Formula – Functions of 2π interval – Change of Interval - Fourier series expansions of even and odd functions - Fourier Expansion of Half-range Sine and Cosine series.

UNIT –II (15 classes)

Partial Differential Equations and its Applications: Formation of first and second order Partial Differential Equations - Solution of First Order Equations – Linear Equation - Lagrange's Equation, Non-linear first order equations - Charpit's method

Applications of Partial Differential Equations: Method of Separation of Variables - Solution of One **D**imensional Heat Equation - One Dimensional Wave Equation – Steady State Two Dimensional Heat Equation.

UNIT-III (15 classes)

Numerical Methods: Interpolation- Newton's Forward and Backward Interpolation Formulae - Lagrange's Interpolation Formula - Newton's Divided Difference Formula - Numerical Differentiation -Interpolation approach- Numerical Solutions of Ordinary Differential Equations - Runge - Kutta Method of 4th order(without proofs).

UNIT-IV (6 classes)

Curve Fitting: Curve fitting by the Method of Least Squares **-** Fitting of Straight line – Regression - Lines of Regression - Correlation – Karl Pearson's Co-efficient of Correlation.

UNIT-V (12 classes)

Probability and Statistics: Random Variables - Probability Distribution function for Discrete and Continuous Random variables -   Expectation – Variance – Moments -Moment Generating Function- Normal Distributions – Testing of Hypothesis - Tests of Significance - t-test - F- test $-\chi^2$ - test for small samples.

Suggested Books:

1. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Third Edition, Narosa Publications,2007.
2. Dr.B.S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publishers.
3. Kreyszig E, Advanced Engineering Mathematics,8th Edition, John Wiley & Sons Ltd, 2006.
4. N.P.Bali & Manish Goyal, A text book of Engineering Mathematics by, Laxmi Publication.
5. S.S.Sastry, Numerical Analysis –PHI Learning Ltd.,
6. Gupta & Kapoor , Fundamentals of Mathematical Statistics, Sultan chand & sons, New Delhi.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E III SEMESTER
DATA STRUCTURES

Instructions: 3+1Hrs/ Week	SEE Marks : 70	Course Code: PC310CS
Credits: 3	CIE Marks : 30	SEE Duration: 3 Hours

Course Objectives	Course Outcomes
Students should be able to	At the end of the course, Students will be able to
• Identify and use appropriate data structure for a given problem with effective utilization of space and time. • Describe the linear and nonlinear data structures • Analyze the complexities of different sorting techniques	• Analyze the time and space complexities of Algorithms. Implement linear data structures • Develop an application using stacks, queues and linked lists • Choose the appropriate nonlinear data structure and perform various operations on them • Choose suitable sorting techniques to maximize the performance. Implement different hashing techniques. • Illustrate various operation on Efficient Binary Search Trees and Multiway Search Trees

UNIT-I

Basic concepts: Algorithm Specification- Introduction, Recursive algorithms, Data Abstraction, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations.
Arrays: Arrays - ADT, Polynomials, Sparse matrices, Strings-ADT, Pattern Matching.

UNIT – II

Stacks and Queues: Stacks, Stacks using dynamic arrays, Queues, Circular Queues using dynamic arrays, A Mazing Problem, Evaluation of Expressions – Evaluating Postfix Expression, Infix to Postfix.
Linked Lists: Singly Linked Lists and Chains, Linked Stacks and Queues, Polynomials, Operations for Circularly linked lists, Equivalence Classes, Sparse matrices, Doubly Linked Lists.

UNIT – III

Trees: Introduction, Binary Trees, Binary Tree Traversals, Heaps, Binary Search trees (BST) : Definition, Searching a BST, Insertion into a BST, Deletion from a BST.

Graphs: The Graph ADT, Elementary graph operations, Minimum Cost Spanning Trees- Kruskal's Algorithm, Prim's Algorithm.

UNIT – IV
Sorting: Insertion Sort, Quick sort, Merge sort, Heap sort, Sorting on Several Keys, List and Table Sorts
Hashing : Introduction, Static Hashing – Hash tables, Hash functions, Overflow handling.

UNIV – V
Efficient Binary Search Trees: AVL Trees, Red-Black Trees, Splay Trees
Multiway Search Trees: m-way search trees-Definition and Properties, Searching an m-way search tree, B-Trees-Definition and properties, Number of Elements in a B-Tree, Insertion into a B-Tree and Deletion from a B-Tree.

Suggested Books:
1. Horowitz E, Sahni S and Susan Anderson-Freed, Fundamentals of Data structures in C, 2nd Edition (2008), Universities Press

Reference Books:
1. Mark A Weiss, Data Structures and Algorithm Analysis In C, Second Edition (2002), Pearson
2. Kushwaha D. S and Misra A.K, Data structures A Programming Approach with C, Second Edition (2014), PHl.
3. Gilberg R. F and Forouzan B. A, Data structures: A Pseudocode Approach with C, Second Edition (2007), Cengage Leaming
4. Tanenbaum A. M , Langsam Y. Augenstein M. J, Data Structures using C, Second Edition (2008), Pearson.
5. Thomas H. Cormen, Charles E. Leiserson, Ronald L Rivest, Clifford Stein, Introduction to Algorithms, Third Edition (2009), MIT Press
6. Yedidyah Langsam , Moshe J. Augenstein ,Aaron M. Tenenbaum, Data Structures Using C and C++ , Second Edition (2009), PHI

Online Resources :
1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-fall-2011/lecture-videos
2. http://nptel.ac.in/courses/106106127/
3. http://www.nptel.ac.in/courses/106102064

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E III SEMESTER
DISCRETE STRUCTURES

Instructions: 3+1Hrs/ Week	SEE Marks : 70	Course Code: PC320CS
Credits: 3	CIE Marks : 30	SEE Duration: 3 Hours

Course Objectives	Course Outcomes
Students should be able to	At the end of the course, Students will be able to
• Understand the concepts of set theory, arithmetic logic and proof techniques • Build mathematical models to solve the real world problems by using appropriate methods	• Construct compound statements using logical connectives and verify the validity of conclusion using inference rules • Compare different types of relations and functions and also apply principle of inclusion and exclusion to solve counting problems • Solve various types of recurrence relations to find the complexity of an algorithm • Develop crypto system using Ring and modular arithmetic • Develop group codes for error detection and correction

UNIT – I
Fundamentals of Logic: Basic Connectives and Truth Tables, Logical Equivalence, Logical Implication, Use of Quantifiers, Definitions and the Proof of Theorems.

Properties of the Integers: The well – ordering principle, Recursive definitions, The division algorithms, The Greatest Common Divisor, The Fundamental theorem of arithmetic.

UNIT – II
Functions: Cartesian Product, One-to-one, Onto Functions, Special Functions, Pigeonhole Principle, Composition and Inverse Functions.

Relations: Partial Orders, Equivalence Relations and Partitions.

Principle of Inclusion and Exclusion: Principles of Inclusion and Exclusion, Generalizations of Principle, Derangements, Rook Polynomials, Arrangements with Forbidden Positions.

UNIT – III Generating Functions:
Introductory Examples, Definition and Examples, Partitions of Integers, Exponential Generating Function, Summation Operator.

Recurrence Relations: First – Order Linear Recurrence Relation, Second – Order Linear Homogenous Recurrence Relation with Constant Coefficients, Non Homogenous Recurrence Relation.

UNIT – IV
Rings and Modular Arithmetic
The Ring structure: Definition and Examples, Ring Properties and Substructures, The Integers modulo n, Ring Homomorphism and Isomorphism, RSA cryptosystem.
Number Theory
Prime Numbers, Fermat's and Euler Theorems , Testing for Primality, The Chinese Reminder Theorem.

UNIT – V
Algebraic Structures: Algebraic System – General Properties, semi groups, Monoids, Homomorphism, Cosets and Lagrange's Theorem, Elements of Coding Theory, The Hamming Metric, The Parity Check generating Matrices, Group Codes: Decoding with Coset Leaders.

Suggested Books:
1. Ralph P. Grimaldi, Discrete and Combinatorial Mathematics, 4th Edition (2003), Pearson Education.
2. William Stallings, Cryptography and Network Security , 4th Edition (2009), Pearson.
3. Kenneth H Rosen, Discrete mathematics and its applications, 5th Edition (2006), Tata McGraw-Hill Edition, New Delhi.

Reference Books:
1. J.P. Tremblay, R. Manohar, Discrete Mathematical Structure with Applications to Computer Science, 4th Edition (1987),McGraw Hill , New Delhi.
2. Joe L. Mott, A. *Kandel, T.P. Baker,* Discrete Mathematics for Computer Scientists & Mathematicians, 2nd Edition (1986), Prentice Hall.
3. Thomas Koshy, Discrete Mathematics with Applications, 1st Edition (2004), Elsevier Inc.

Online Resources:
1. http://nptel.ac.in/courses/106106094/
2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematics-for-computer-science-fall-2010

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E III SEMESTER
LOGIC AND SWITCHING THEORY

| Instructions: 3+1Hrs/ Week | SEE Marks : 70 | Course Code: PC330CS |
| Credits: 3 | CIE Marks : 30 | SEE Duration: 3 Hours |

Course objectives	Course outcomes
Students should be able to	At the end of the course, students will be able to
• Understand the use of logic minimization methods and to solve the Boolean logic expressions. • Design combinational and sequential circuits.	• Apply Boolean logic, postulates and Karnaugh-Map to simplify the Boolean expressions. • Apply Tabulation procedure to minimize Boolean expressions. • Design combinational circuits like adders, encoders, multiplexers. • Apply state reduction method to design sequential circuits like counters and registers. • Design combinational circuits like Programmable Read Only Memory(PROM) using programmable logic devices

UNIT-I
Boolean Algebra: Axiomatic definition of Boolean Algebra, Postulates and Theorems, Boolean Functions, Canonical Forms and Standard Forms, Simplification of Boolean Functions Using Theorems and Karnaugh Map Method.

UNIT-II
Minimization of Switching Functions: Quine-McCluskey Tabular Method, Determination of Prime Implicants and Essential Prime Implicants.
Implementation of Boolean Functions: Single-Output and Multiple-Output Combinational Circuit Design, AND-OR, OR-AND and NAND & NOR Realizations, Exclusive-OR and Equivalence functions.

UNIT-III
Design of Combinational Logic Circuits: Analysis Procedure, Design Procedure, Modular Combinational Logic Elements- Decoders, Encoders, Priority Encoders, Multiplexers and De-multiplexers.
Design of Integer Arithmetic Circuits using Combinational Logic: Integer Adders – Binary Adders, Subtractors, Ripple Carry Adder and Carry Look Ahead Adder, and Carry Save Adders.

UNIT-IV

Introduction to Sequential Circuit Elements: Latches, Various types of Flip-Flops, Excitation Tables.

Models of Sequential Circuits: Moore Machine and Mealy Machine, Analysis of Sequential Circuits-State Table and State Transition Diagrams. Design of Sequential Circuits - Counters. Moore and Mealy State Graphs for Sequence Detection, Methods for Reduction of State Tables and State Assignments.

UNIT-V

Design of Combinational Circuits using Programmable Logic Devices (PLDs): Read Only Memory (ROM), Programmable Logic Array (PLA), Programmable Array Logic (PAL) devices.

Suggested Books:
1. Morris Mano M and Michael D Ciletti, Digital Design, 4th Edition (2008), Prentice Hall of India.

Reference Books:
1. Zvi Kohavi, Switching and Finite Automata Theory, 2nd Edition (1978), Tata McGraw Hill.
2. Charles H. Roth, Jr., Larry L. Kenny, Fundamentals of Logic Design, 7th Edition (2013), Cengage Learning.
3. Anand Kumar A, Switching Theory and Logic Design, 2nd Edition (2014), PHI Publishers.
4. CH Roth , Fundamentals of Logic Design, 4th Edition (2006), Jaico Publishers.

Online Resources:
1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-111-introductory-digital-systems-laboratory-spring-2006/
2. http://www.facweb.iitkgp.ernet.in/~isg/SWI TCHING/

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SYLLABUS FOR BE III SEMESTER
INTRODUCTION TO ELECTRONICS ENGINEERING

Instructions: 3+1Hrs/ Week	SEE Marks : 70	Course Code: ES320EC
Credits: 3	CIE Marks : 30	SEE Duration: 3 Hours

Course Objective:	**Course Outcomes**
• To understand the characteristics and operation of different electronic devices. • To study the working of transistorized amplifiers and oscillators. • To gain the basic knowledge of digital logic circuits. • To study the working principle of different types of transducers.	**At the end of the course students will be able to:** • Employ different electronic devices to build electronic circuits such as rectifiers, voltage regulators. • Describe the functioning of electronic circuits such as amplifiers and oscillators. • Implement digital circuits such as adders and subtractors using logic gates. • Have the knowledge of certain electronic devices such as SCR, DIAC, TRIAC, UJT. • Convert real time electrical signals into corresponding signals using different types of transducers.

UNIT - I

Semiconductor Theory: Classification of semiconductors, Energy Levels, Conductivity, Mobility, Diffusion and Drift currents, Hall Effect, Characteristics of P-N Junction diode, Parameters and Applications.
Rectifiers: Half wave and Full wave Rectifiers (Bridge, center tapped), ripple factor and efficiency, comparison of rectifiers, Filters, types of filters, Rectifiers with and without filters

UNIT - II

Transistors: Bipolar Junction Transistor, Construction, Types, Working principle, Configurations, Transistor parameters, Transistor as an amplifier, Problems, h-parameter equivalent circuits. Field effect transistor, Construction and working of JFET, Parameters and applications of JFET,

Types of MOSFET (depletion and enhancement), Comparison of BJTs with JFETs; **Regulators:** Characteristics of Zener Diode, Voltage Regulation, Zener diode as voltage regulator, IC voltage regulators.

UNIT - III
Feedback Concepts – Basic concept of feedback, Types of feedback, Feedback topologies, General characteristics of Negative feedback amplifiers; **Oscillators** – Classification of Oscillators, Types, LC Type and RC Type Oscillators and Crystal Oscillators (Qualitative treatment only)

UNIT - IV
Operational Amplifiers – Introduction, Characteristics of ideal Operational amplifier, Operational amplifier stages, Parameters, Open loop and closed loop configurations, Applications (Adder, Subtractor, Voltage follower, Integrator, Differentiator, Instrumentation Amplifier); **Digital circuits:** Boolean Algebra, Logic Gates, Combinational circuits such as half and full adders, half and full subtractors.

UNIT - V
Data Acquisition systems: Introduction, Classification of transducers, Capacitive transducer, Inductive transducer, LVDT, Electrical strain gauges, Temperature transducers (Thermocouple), Piezoelectric transducer, Photoelectric transducer; **Photo Electric Devices:** Photo diode, Photo Transistor, LED, LCD; **Industrial Devices:** SCR, TRIAC, DIAC, UJT - Construction, Working principle and Characteristics only; **Display Systems:** Constructional details of C.R.O and Applications.

Suggested Reading:
1. S.Shalivahan, N. Suresh Kumar, A Vallavea Raj Electronic Devices and Circuits Tata McGraw Hill, 2003.
2. Jacob Milman & C., Halkias, Electronic devices Eighth Edition, Reprinted, Mc Graw Hill,1985.
3. Ramakanth A. Gayakwad, Op-AMPS and Linear Integrated Circuits, 3rd edition, Prentice Hall of India,1985.
4. Mooris Mano, Digital design, 3rd edition, Prentice Hall of India,2002.
5. Cooper, Electronic Measurement and Instrumentations.

HUMAN VALUES AND PROFESIONAL VALUES-I
SYLLABUS FOR B.E. III-SEMESTER

Instruction:1Hrs/ Week	SEE Marks: 35	Course Code: MC300EH
Credits: 1	CIE Marks: 15	Duration of SEE: 2Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to	At the end of this course the student will be able to
1. Get a holistic perspective of value- based education. 2. Grasp the meaning of basic human aspirations vis-a-vis the professional aspirations. 3. Understand professionalism in harmony with self and society. 4. Develop ethical human conduct and professional competence. 5. Enrich their interactions with the world around, both professional and personal.	a. Gain a world view of the self, the society and the profession. b. Make informed decisions. c. Start exploring themselves in relation to others and their work –constantly evolving into better human beings and professionals d. Inculcate Human values into their profession. e. Validate their aspirations through right understanding of human relationship and see the co-relation between the human values and prevailing problems. f. Strike a balance between physical, mental, emotional and spiritual parts their being. g. Obtain a holistic vision about value-based education and professional ethics.

UNIT-I: A. Human and Ethical values

 What are they? --The Indian concept of values-- Modern approach to the study of values - Basis for Moral Judgement--- A new approach to Human Values-- freedom, creativity, love, wisdom, concern.

UNIT-II: Canons of Ethics

Virtue Ethics-- Ethics of Duty-- Ethics of Responsibility-- Factors to be considered in making Ethical Judgments.

UNIT-III: The Value of time

The importance of managing time-- Factors that hinder time management-Benefits of time management-- Using time judiciously-- practical strategies to manage time.

UNIT-IV: The Power of Positive thinking

Nature and Scope of Positive thinking-- Methods to change one's thinking---Strategies to change the cycle of one's thinking.

UNIT-V: The Value of Setting Goals

Goal setting-- Importance of setting goals for oneself—Achieving excellence through SMART goals.

Suggested Books:

1. B.L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
2. A.N Tripathy, 2003 Human values, New Age International Publishers.
3. EG Seebauer & Robert L. Berry,2000,Fundamentals of Ethics for Scientists and Engineers, Oxford University Press.
4. Mike Martin and Ronald Schinzinger "Ethics in Engineering "McGraw Hill
5. Charles E Haris, Micheal J Rabins, " Engineering Ethics "Cengage Learning
6. Caroline Whitback < Ethics in Engineering Practice and Research, Cambridgs University Press
7. Georgs Reynolds, Ethics in Information Technology", Cengage Learning
8. Charles D.Fleddermann, " Engineering Ethics", Pearson Education Prentice Hall, New Jersey,2004 (Indian Reprint)

Online Resoureces:

- Value Education website, Http://www.universalhumanvalues.info
- UPTU webiste, Http://www.uptu.ac.in
- Story of stuff, Http://www.storyofstuff.com
- AlGore, As Inconvenient Truth, Paramount Classics ,USA
- Charlie Chaplin, Modern Times, United Artists, USA
- IIT Delhi, Modern Technology-The Untold story-Anand Gandhi, Right Here Right Now, Cyclewala production

FS-I: COMMUNICATION SKILLS IN ENGLISH-I
SYLLABUS FOR B.E. III-SEMESTER

Instruction:2+2Hrs/ Week	SEE Marks: 70	Course Code: HS310EH
Credits: 2	CIE Marks: 30	Duration of SEE: 3 Hrs

Course Objective	**Course Outcome**
• The four major skills of language learning, listening, speaking, reading and writing provide the right key to success. • The main objective of this finishing school curriculum is to involve content for all the above mentioned four skills in teaching English and to get students proficient in both receptive and productive skills	1. Respond to questions and Engage in an informal conversation. 2. Narrate a message/story/incident, both verbally and in writing. 3. Describe an event/a session/ a movie/ an article. 4. Respond to others while being in a casual dialogue. 5. comprehend facts given and respond in an appropriate manner. 6. Construct sentences in a coherent form 7. Provide explanations 8. Recognize and list the key points in a topic/message/article. 9. Participate in group and forum discussions by providing factual information, possible solutions, and examples. 10. Debate on a topic by picking up the key points from the arguments placed. 11. Provide logical conclusions to the topics under discussion. 12. Prepare, present, and analyze reports

UNIT I – FUNDAMENTALS OF COMMUNICATION
Competencies:
- Basic conversational ability.
- Write e-mails introducing themselves & their purpose

Topics covered

Greeting and Introductions

Small Talk

Recalling

Topic Level Details

Greeting & Introductions

Competencies:
- Greeting appropriately
- Introducing themselves, a friend
- Responding to simple statements and questions both verbally and in writing
- Seeking introduction from others about themselves or about any topic.
- Writing an email with appropriate salutation, subject lines, self introduction, and purpose of mail.

Small Talk

Competencies:
- Identifying the topic of conversation.
- Speaking a few sentences on a random list of topics
- Reading simple information like weather reports, advertisements
- Seeking clarifications.

Recalling

Competencies:
- State takeaways from a session or conversations

UNIT II : NARRATIONS AND DIALOGUES

Competencies:
- Framing proper phrases and sentences to describe in context
- Speaking fluently with clarity and discrimination
- Responding to others in the dialogue.

Topics covered

Paraphrasing

Describing

Topic Level Details

Paraphrasing

Competencies:
- Listen for main ideas and reformulating information in his/her own words
- Draw appropriate conclusions post reading a passage.
- Writing an email confirming his/her understanding about a topic

Describing

Competencies:

- Speaking, Reading, and Writing descriptive sentences and paragraphs.

UNIT-III: RATIONAL RECAP

Competencies:

- Organizing and structuring the communication
- Detailing a topic
- Summarizing a topic.

Topics Covered:

Organizing

Sequencing

Explaining

Summarizing

Topic Level Details

Organizing

Competencies:

- Organizing the communication based on the context and audience

Sequencing

Competencies:

- Structuring the content based on the type of information.

Explaining

Competencies:

- Explaining a technical/general topic in detail.
- Write an email giving detailed explanation/process

Summarizing

Competencies:

- Recapitulating

UNIT-IV: PROFESSIONAL DISCUSSIONS AND DEBATES

Competencies:

- Analytical and Probing Skills
- Interpersonal Skills

Topics Covered:

Discussing

Debating

Topic Level Details
Discussing
Competencies:
- Thinking
- Assimilating

Debating
Competencies:
- Comprehending key points of the debate and note decisive points including supporting details.
- Construct a logical chain of arguments and decisive points.
- Writing a review about a product by providing reasons, causes, and effects

UNIT -V: DRAWING CONCLUSIONS AND REPORTING
Competencies:
- Reasoning skills - Coherent and logical thinking
- Reporting and Analyzing skills.

Topics Covered:
Concluding
Reporting

Topic Level Details
Concluding
Competencies:
- Analyzing the points discussed.
- Connecting all points without gaps.
- Identifying clinchers.
- Communicating the decisions

Reporting
Competencies:
- Reporting an incident
- Writing/Presenting a project report

SYLLABUS FOR BE III SEMESTER
INTRODUCTION TO ENTREPRENEURSHIP

Instruction:1 Hours /week	SEE Marks :35	Course Code : MC310ME
Credits : 1	CIE Marks: 15	Duration of SEE : 2 Hours

Course objectives	Course Outcomes
The objectives of this course are to : • inspire students and help them imbibe an entrepreneurial mind-set. • introduce key traits and the DNA of an entrepreneur • provide the information about the facilities , schemes available to start enterprise in INDIA • educate the government policies and support structure for the entrepreneur • improve the entrepreneur skills	On completion of the course, the student will be able to: • develop awareness about entrepreneurship and successful entrepreneurs. • generate and analyse the business ideas • understand the supporting organizations available to establish the business in the country • understand the different government policies which support the entrepreneur • understand how to Prepare a business plan report

Unit-I: Entrepreneurship: Entrepreneur characteristics – Classification of Entrepreneurships – Incorporation of Business – Forms of Business organizations –Role of Entrepreneurship in economic development –Start-ups.

Unit-II: Idea Generation and Opportunity Assessment: Ideas in Entrepreneurships – Sources of New Ideas – Techniques for generating ideas – Opportunity Recognition – Steps in tapping opportunities.

Unit-iii: Institutions Supporting Small Business Enterprises: Central level Institutions: NABARD, SIDBI, NIC, KVIC, NIESBUD,SIDO, DST,EDI,FICCI,CII,ASSOCHAM etc. – state level Institutions –DICs- SFC-SIDC- Other financial assistance.

Unit-IV: Government Policy and Taxation Benefits: Government Policy for SSIs- tax Incentives and Concessions –Non-tax Concessions –Rehabilitation and Investment Allowances.

Unit-V: entrepreneurial skills-design thinking, selling and communication. Project Formulation and Appraisal: Preparation of Project Report –Content; Guidelines for Report preparation, project report and pitching

Learning Resources:

1. Bruce R. Barringer and R. Duane Ireland, "Entrepreneurship: successfully launching new ventures", 3rd edition, Pearson Prentice Hall, 2009.
2. P. Denning and R. Dunham, "The Innovator's Way", MIT Press: Cambridge, Massachusetts, 2010.
3. Arya Kumar, "Entrepreneurship", Pearson Education, Delhi, 2012.
4. Michael H. Morris, D.F.Kuratko, J G Covin, "Corporate Entrepreneurship and Innovation", Cengage learning, New Delhi,2010
5. Peter F. Drucker, "Innovation and Entrepreneurship", Routledge Classics, 2015 .
6. https://www.wfglobal.org/initiatives/national-entrepreneurship-network

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E III SEMESTER
DATA STRUCTURES LAB

Instructions: 2Hrs/ Week	SEE Marks : 50	Course Code: PC311CS
Credits: 1	CIE Marks : 25	SEE Duration: 3 Hours

Course Objectives	Course Outcomes
Students should be able to	At the end of the course, Students will be able to
• Design and analyze linear and nonlinear data structures • Acquire programming skills to implement sorting and searching techniques • Identify and apply the suitable data structure for the given real world problem	• Implement various operations on array and linked list • Develop applications using stack and queue • Apply nonlinear data structures to solve computing problems • Implement optimized sorting technique for a given data set • Choose the suitable data structure to solve a real world problem

Programming Exercise:

1. Implementation of Formula based representation.
2. Implementation of Singly Linked List, Doubly Linked List and Circular Linked List.
3. Implementation of Polynomial Arithmetic using Linked List.
4. Implementation of String Matching algorithms.
5. Implementation of Stacks, Queues.(Using both Arrays and Linked Lists)
6. Implementation of Infix to Postfix Conversion, Postfix Expression Evaluation.
7. Implementation of Binary Search and Hashing
8. Implementation of Recursive and Iterative Traversals on Binary Tree.
9. Implementation of Binary Search Tree.
10. Implementation of Operations on Binary Tree (Delete Entire Tree, Copy Entire Tree, Mirror Image, Level Order, Search for a Node etc.)

11. Implementation of operations on AVL Trees.
12. Implementation of B-Trees.
13. Implementation of Traversal on Graphs.
14. Implementation of Selection, Merge, Quick, Heap, and Insertion Sort.
15. Develop application using appropriate data structures.

Suggested Books:
1. Horowitz E, Sahni S and Susan Anderson-Freed, Fundamentals of Data structures in C, 2nd Edition(2008), Universities Press

Reference Books:
1. Mark A Weiss, Data Structures and Algorithm Analysis In C, Second Edition(2002), Pearson
2. Kushwaha D. S and Misra A.K, Data structures A Programming Approach with C, Second Edition(2014), PHl.,
3. Gilberg R. F and Forouzan B. A, Data structures: A Pseudocode Approach with C, Second Edition(2007), Cengage Leaming
4. Tanenbaum A. M , Langsam Y. Augenstein M. J, Data Structures using C, Second Edition (2008), Pearson.
5. Thomas H. Cormen, Charles E. Leiserson, Ronald L Rivest, Clifford Stein, Introduction to Algorithms, Third Edition(2009), MIT Press
6. Yedidyah   Langsam , Moshe   J.   Augenstein ,Aaron   M. Tenenbaum, Data Structures Using C and C++ , Second Edition(2009), PHI

Online Resources :
1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-fall-2011/lecture-videos
2. http://nptel.ac.in/courses/106106127/
3. http://www.nptel.ac.in/courses/106102064

INTRODUCTION TO ELECTRONICS ENGINEERING LAB

Subject Code : ES 311 EC	Instruction:2 Periods/ week	CIE – Marks : 25
SEE – Marks : 50	SEE - Duration : 3 Hours	Credits: 01

Course Objective:	Course Outcomes
• Verify the characteristics of various electronic devices. • Understand the functioning of voltage regulator and rectifiers. • Perform different arithmetic operations using operational amplier. • Understand the working of logic gates to implement adder and subtractor.	**At the end of the course students will be able to:** • Verify input/output characteristics of active devices and to compute their parameters. • Analyse the functioning of voltage regulators, rectifiers and oscillators. • Perform operations such as addition, subtraction, comparison of voltage levels using operational amplifier. • Implement digital adders and subtractors using logic gates.

1. Characteristics of Semiconductor (Si and Ge) and Zener diodes
2. CRO Applications
3. Full wave rectifier with and without filter
4. Zener Voltage Regulator
5. Characteristics of BJT (CB and CE)
6. Characteristics of FET
7. Amplifier with and without feedback
8. RC Phase shift oscillator
9. Hartley oscillator and Calpitt's Oscillator
10. Applications of Operational Amplifier: Adder, Subtractor, Comparator.
11. Verifications of Logic gates
12. Realization of Half and Full adder

Suggested Reading :
1. Paul B. Zbar, Albert P. Malvino , Michael A. Miller, Basic Electronics, A Text-Lab Manual, 7th Edition, TMH, 1994.
2. Paul B. Zbar, Industrial Electronics, A Text – Lab Manual, 3rd Edition, TMH, 1983.

General Note :
1. There should not be more than 2 students per batch while performing any of the lab experiments.

a) Mini Project cum design exercise**:** The students must design, rig-up, and test the circuits wherever possible and should carry out the experiments individually.

b) This exercise carries sessional marks of 10 out of 25, while the remaining 15 marks are for the remaining lab exercises.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATIONS FOR
B.E IV SEMESTER (CBCS) With effect from the A.Y 2017-18

Course Code	B.E. IV SEMESTER — Name of the Course	Scheme of Instruction Hours per week L	T	D	P	Scheme of Examination Duration in Hours	Maximum Marks SEE	CIE	Credits
	THEORY						SEE	CIE	
BS410MA	Mathematics -IV	3	1	-	-	3	70	30	3
PC410CS	Object Oriented Programming Using Java	3	1	-	-	3	70	30	3
PC420CS	Operating Systems	3	-	-	-	3	70	30	3
PC430CS	Design & Analysis of Algorithms	3	1	-	-	3	70	30	3
PC440CS	Computer Architecture	3	1	-	-	3	70	30	3
HS410EH	FS –II : Communication Skills in English-II	2	2	-	-	3	70	30	2
MC320CE	Environmental Science	2	-	-	-	3	70	30	2
OE4XXXX	Open Elective-II	1	-	-	-	2	35	15	1
OE4XXXX	Open Elective-III	2	-	-	-	3	70	30	2
	LABS								
PC411CS	Java Lab	-	-	-	2	3	50	25	1
PC421CS	Operating Systems Lab	-	-	-	2	3	50	25	1
	Total	22	6	-	4	-	695	305	24
	Grand Total	32					1000		24
*SEE- Semester End Examination * CIE- Continuous Internal Evaluation									

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SYLLABUS FOR B.E. IV-SEMESTER
ENGINEERING MATHEMATICS – IV

Instruction: 3+1Hrs /week	SEE Marks :70	Course Code : BS410MA
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable students to:	*At the end of the course students will be able to:*
1. ***Understand*** the Definition of Laplace and inverse Laplace Transforms-Shifting Properties and various theorems and how to apply them in solving Differential Equations. 2. Analyze the characteristics and properties of and Z – transforms and solve the Difference Equations. 3. ***Study*** the concept of Fourier and inverse Fourier Transform of a function and various properties. 4. ***Understand*** the Analytic functions, to evaluate a line integral of a function of a complex variable using Cauchy's integral formula, to evaluate real integrals using complex integration and how to evaluate Laurent Series and residues.	a) ***Evaluate*** Laplace transforms and inverse Laplace transforms of functions. Apply Laplace transforms to solve ordinary differential equations arising in engineering problems. b) Apply Z-transform in the analysis of continuous time and discrete time systems and also solve the Difference Equations using Z-transform. c) Determine Fourier transform, Fourier sine and cosine transform of a function. d) Know the condition(s) for a complex variable function to be analytic and/or harmonic and state and prove the Cauchy Riemann Equation and use it to show that a function is analytic and to define singularities of a function, know the different types of singularities, evaluate contour integrals using the Cauchy Integral Theorem and the Cauchy Integral Formula and will be able to determine transformation in a complex space.

UNIT- I (12 classes)
Laplace Transforms: Introduction to Integral Transformation- Laplace transforms - Inverse Laplace transform - Sufficient Condition for Existence of Laplace Transform - Laplace Transform of Derivatives - Laplace Transform of Integrals –Translation theorems-First shifting theorem – Unit step function- Second shifting theorem – Differentiation of Laplace

transform – Integration of Laplace transform - Convolution Theorem - Application of Laplace transforms to Initial value problems.

UNIT –II (8 classes)

Fourier Transforms: Fourier Integral Theorem(with or without proof) - Fourier Transforms – Inverse Fourier Transform - Properties of Fourier Transform –Fourier Cosine & Sine Transforms - Convolution Theorem.

UNIT-III: (8 classes)

Z-Transforms: Introduction - Z-transforms of Standard sequences - Linearity Property – Scaling Property - Shifting Properties- Initial and Final value theorems – Differentiation of Z-transform - Inverse Z-Transforms-Convolution Theorem – Application of Z-Transforms to solve Difference Equations.

UNIT-IV (15 classes)

Functions of Complex Variables: Limits and Continuity of function - **D**ifferentiability and Analyticity - Necessary & Sufficient Condition for a Function to be Analytic - Cauchy-Riemann Equations in Cartesian & Polar Form - Milne-Thomson's method - Harmonic Functions - Complex Integration - Cauchy's Theorem -   Extension of Cauchy's Theorem for multiply connected regions- Cauchy's Integral Formula.

UNIT-V (10 classes)

Power series - Taylor's Series - Laurent's Series (without proofs) - Zeros and Singularities –Residues – Cauchy's Residue Theorem -Evaluation of Real Definite Integrals Involving Trigonometric functions and improper integrals of the form $\int_{-\infty}^{\infty} f(x)\, dx$ using Residue Theorem .

Text Books:
1. R.K.Jain & S.R.K.Iyengar, Advanced Engineering Mathematics - 3rd Edition, Narosa Publications
2. Dr.B.S Grewal , Higher Engineering Mathematics, 40th Edition, Khanna Publishers.
3. Goyal & Gupta, Laplace's and Fourier transforms, Pragati prakashan

Reference books:
1. Kreyszig E, Advanced Engineering Mathematics, 8 th Edition, John Wiley & Sons Ltd, 2006.
2. N.P.Bali & Manish Goyal, A text book of Engineering Mathematics Laxmi Publication.
3. H.K. Dass, Er.Rajnish Verma, Higher Engineering Mathematics, 2011 Edition S.Chand & company Ltd.
4. R.V. Churchill, "Complex Variables & its Applications".Mc Graw-Hill Book Company, INC.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E IV SEMESTER
OBJECT ORIENTED PROGRAMMING USING JAVA

Instruction: 3+1Hrs /week	SEE Marks :70	Course Code : PC410CS
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objectives	Course outcomes
Students should be able to	At the end of the course, Students will be able to
• Apply object oriented principles for developing an application using Java constructs • Design GUI using existing java classes and interfaces	• Understand the object oriented programming paradigm to design a Java application • Apply concurrent programming and runtime error handling on a Collection of objects to build a robust java application • Design dynamic java applications using IO streams and work with console, files and network streams • Develop event driven GUI for a java application using AWT package • Create an enhanced java application following MVC architecture using Swing Package

UNIT – I
Object Oriented System Development: Understanding Object Oriented Development, Understanding Object Concepts, Benefits of Object Oriented Development.
Java Programming Fundamentals: Introduction, Overview of Java, Data types, Variables and Arrays, Operators, Control Statements, Classes, Methods, Inheritance, Packages and Interfaces,

UNIT – II
Exception Handling, Multithreaded Programming, String Handling.
Collections: Overview, Collection Interfaces, Collection Classes, Iterators, Random Access Interface, List, Set, Maps, Comparators, Arrays, Legacy Classes and Interfaces, StringTokenizer, BitSet, Date, Calendar, Observable, Timer.

UNIT – III
IO: Java I/O Classes and Interfaces, Files and Directories, Byte and Character Streams, Serialization.
Networking: Classes & Interfaces, INetAddress, TCP/IP Sockets, DatagramSocket, URL, URLConnection

UNIT – IV
GUI and event Programming: Applet Class, Applet architecture, Event Handling, The Delegation Event Model, Event Classes, Source of Events, Events Listener Interfaces, AWT: Classes, Working with Graphics, Layout Managers
Regular Expressions: Regular Expression Processing, RMI

UNIT – V
Java Swing: Basics of Swing, Difference between AWT & Swing, MVC Architecture, Components and Container, Swing Components: JLabel, JTextField, JList, JRadioButton, JCheckBox, JComboBox, JButton, JScrollPane, JTabbedPane, JTable, JToggleButton, JTree, Layout Managers.

Suggested Books:
   1. Herbert Schildt, The Complete Reference Java, 7th Edition (2007), Tata McGraw Hill, New Delhi.

Reference Books:
   1. C Thomas Wu, An Introduction to Object Oriented Programming with Java, 5th Edition (2010), Tata McGraw Hill, India
   2. P. Radha Krishna, Object Oriented Programming through Java, (2007), Universities Press, India
   3. Sachin Malhotra and Saurabh Choudhary, Programming in Java, 2nd Edition (2013), Oxford Press, 2014, India
   4. James M Slack, Programming and Problem Solving with JAVA, (2011), Thomson Learning, India

Online Resources:
   1. https://docs.oracle.com/javase/tutorial/java

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E IV SEMESTER
OPERATING SYSTEMS

Instruction: 3Hrs /week	SEE Marks :70	Course Code : PC420CS
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objective	Course outcomes
Students should be able to	At the end of the course, students will be able to
• Understand different Operating system Structures, Services and threading models • Learn various operating system services by considering case studies such as Linux and Windows10	• Compare various CPU scheduling algorithms and Operating system structures • Apply different techniques for Main memory management and File allocation • Design solutions for classical synchronization problems and describe various deadlock handling methods • Analyze various Disk scheduling algorithms and I/O operation implementation techniques • Understand the features of Linux and Windows Operating systems

UNIT-I
Introduction to operating systems: Definition, Mainframe, Multiprocessor, Clustered and Real time systems, Distributed, OS System structure, Unikernel, OS Services, Virtual machines, Containers, System calls.
Process: Process concept, Process Scheduling, Inter-process communication, Threads, Multithreading Models.
CPU Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiprocessor scheduling.

UNIT-II
Memory Management: Swapping, Contiguous allocation, Paging, Segmentation, Segmentation with Paging.
Virtual memory: Demand paging, Page replacement Algorithms, Thrashing.
File System Interface: File Concept, Access Methods, Directory Structure, File System Mounting.

File System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free Space management.

UNIT –III
Process synchronization: Critical Section problem, Two process solution, Multiple process Solutions, Synchronization Hardware, Semaphores, Classical problems of Synchronization, Monitors.
Deadlocks: Necessary conditions, Resource allocation graph, Methods for handling deadlocks: Prevention, Avoidance, Detection and Recovery.

UNIT -IV
Device Management: Disk Structure, Disk Scheduling, Disk Management, Swap Space Management, RAID structure, Disk Attachment, Stable storage Implementation.
I/O System: I/O hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O request to hardware operation, Streams.

UNIT-V
Protection: Goal, Domain of protection, Access matrix, Implementation of Access matrix.
Case Studies: Linux System: Design Principles, Kernel Modules, Process Management, Network Structure, And Security.
Windows - Design Principles, Architecture, Environmental Subsystem.
Android- Architecture, Application framework, Resources, Activities, Services

Suggested Books:
1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, 9th Edition (2016), Wiley India.

Reference Books:
1. Andrew S. Tanenbaum, Modern Operating Systems, 2nd Edition (2001), Pearson Education, Asia.
2. Dhananjay, Dhamdhere.M, Operating System-concept based approach, 3rd edition (2009), Tata McGraw Hill, Asia
3. Robet Love, Linux Kernel Development, (2004)Pearson Education
4. Richard Stevens, Stephen Rago, Advanced Programming in the UNIX Environment, 3rd Edition (2013), Pearson Education

Online Resources:
1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-828-operating-system-engineering-fall-2012/

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E IV-SEMESTER
DESIGN AND ANALYSIS OF ALGORITHMS

Instruction: 3+1Hrs /week	SEE Marks :70	Course Code : PC430CS
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
Students should be able to	At the end of the course, students will be able to
• Analyze the asymptotic performance of algorithms • Apply various algorithm design strategies to solve engineering problems.	• Compare asymptotic behavior of functions obtained by elementary composition of polynomials, exponentials and logarithmic functions. • Apply fundamental algorithmic paradigms like The Divide and conquer paradigm and greedy strategy in designing algorithms. • Design algorithms by using Dynamic Programming • Adapt and design algorithms for specific problems by using backtracking, and branch & bound algorithm design techniques • Distinguish different complexity classes P,NP, NP-Hard, and NP-complete.

UNIT – I
Introduction: what is an algorithm, algorithm specification.
Performance analysis: space complexity, time complexity. Asymptotic notations, amortized analysis

UNIT – II
 Divide and Conquer: General method, binary search, finding maximum and minimum, Merge sort, quick sort, performance measurement, Masters theorem.
The Greedy Method: The general method, Knapsack problem, Job sequencing with deadlines, minimum cost spanning trees, optimal Storage on Tapes, Optimal Merge Patterns, single Source Shortest Paths.

UNIT – III
Dynamic Programming: the general method, matrix-chain multiplication problem, multistage graph, All Pairs Shortest Paths, Optimal Binary Search Trees (OBST), 0/1 Knapsack, Reliability Design, Traveling Salesman Problem, Bi-connected Components and DFS, Longest Common Subsequence (LCS) problem.

UNIT – IV
Backtracking: General method, the 8-Queens Problem, Graph Coloring, Hamiltonian Cycles, Knapsack Problem.
Branch and Bound: The method, 0/1 Knapsack problem, Traveling Salesperson problem.

UNIT – V
NP-Hard and NP-Complete problems: Basic concepts, Cook's theorem, NP-hard graph problems- clique decision problem, Node cover decision problem, NP-Hard scheduling problems- scheduling Identical processors. NP-Hard code generation problems-code generation with common sub expressions.

Suggested Books:
1. Ellis Horowitz, Sartaj Sahani, Sanguthevar Rajasekaran," Fundamentals of computer Algorithms", Second edition (2008),Universities Press.
2. Thomas H. Cormen, Leiserson C.E, Rivest.R.L , Stein.C, Introduction to Algorithm, 2nd edition (2001), MIT press, USA.

Reference Books:
1. Michael T. Goodrich, Roberto Tamassia, Algorithm Design, foundations, analysis, and internet examples, WIELEY student edition (2006).
2. Aho, Hopcroft, Ulman, The Design and Analysis of Computer Algorithms, (2000), Pearson Education.
3. Steven S.Skiena, The Algorithm Design Manual, Springer (1997).

Online Resources:
1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015/index.htm.
2. http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms
3. http://nptel.ac.in/courses/106101060/

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E IV- SEMESTER
COMPUTER ARCHITECURE

Instruction: 3+1Hrs /week	SEE Marks :70	Course Code : PC440CS
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
Students should be able to	At the end of the course, students will be able to
• Learn the structure and behavior of various functional modules of a computer and identify how they interact to provide the processing needs of the user. • Understand memory hierarchy and analyze different ways of communicating with I/O of digital computer.	• Identify major components of a computer and design basic hardware for functional modules of digital computer. • Understand organization and design of digital computer and build micro programmed control unit. • Understand internal organization of CPU and apply pipeline concepts to increase computational speed of CPU. • Analyze techniques used by a computer to communicate with I/O devices. • Identify various types of memory organizations and evaluate performance of a CPU.

UNIT-I
Overview of Computer Function and Interconnection: Computer Components, Interconnection Structures, Bus Interconnection, Bus Structure, Data Transfer.

Register Transfer Micro operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic, Logic, Shift Micro operations, Arithmetic Logic Shift Unit.

UNIT-II
Basic Computer organization and Design: Instruction codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instruction, Input-Output and Interrupt.

Micro programmed Control: Control memory, Address Sequencing, Micro program Example, Design of Control Unit.

UNIT-III

Central Processing Unit: General Register organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, RISC.

Pipeline: Parallel processing, Pipelining, Arithmetic pipeline, Instruction Pipeline.

Computer Arithmetic: Addition and Subtraction, Multiplication, Division, Floating Point Arithmetic Operations, Decimal Arithmetic Unit.

UNIT-IV

Input-Output organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor (IOP), Serial Communication.

UNIT-V

Memory Organization: Memory Hierarchy, Main Memory, RAM and ROM, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Assessing and Understanding Performance: CPU Performance and its Factors, Evaluating Performance.

Suggested Books:
1. M.Morris Mano, Computer System Architecture, 3rd Edition (2007), Pearson Education Asia.

Reference Books:
1. William Stallings, Computer Organization & Architecture, 8th Edition (2011), Pearson Education Asia.
2. David A Patterson, John L Hennessy, Computer Organization and Design, 4th Edition (2014), Morgan Kaufmann.
3. Carl.V Hamacher, Vranesic Z.G, Zaky S.G, Computer Organization, 5th Edition (2011), McGraw Hill.
4. Pal Chaudhuri.P, Computer Organization and Design,   , 3rd Edition(2009), Prentice Hall of India.

Online Resources:
1. http://nptel.ac.in/courses/106102157/
2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-823-computer-system-architecture-fall-2005/

DEPARTMENT OF HUNANITIES AND SOCIAL SCIENCES
FS-II: COMMUNICATION SKILLS IN ENGLISH-II
SYLLABUS FOR B.E. IV-SEMESTER

Instruction: 2+2Hrs/ Week	SEE Marks: 70	Course Code:HS410EH
Credits: 2	CIE Marks: 30	Duration of SEE: 3 Hrs

Course Objective	Course Outcomes
1. identify the various features and functions of human language and communication. 2. develop the habit of listening effectively so as to analyze the speaker's tone and tenor. 3. choose appropriate words so as to speak and write accurately. 4. read various types of texts and sift information correctly. 5. study organizational structures and behavioral patterns and adapt appropriately.	1. Participate in group and forum discussions by providing factual information, possible solutions, and examples. 2. Debate on a topic by picking up the key points from the arguments placed. 3. Provide logical conclusions to the topics under discussion. 2. Prepare, present, and analyze reports. 3. choose appropriate words and tone to present accurate, specific, and factual reports. 4. Compose a summary of beginning high level reading text that identifies the thesis and key supporting details. 5. Summarize with 70% comprehension.. 6. Apply reading skills, including how to approach different types of literature.

UNIT I: PROFESSIONAL DISCUSSIONS AND DEBATES
Competencies:
- Analytical and Probing Skills
- Interpersonal Skills

Topics Covered:
Discussing
Debating
Topic Level Details
Discussing
Competencies:
- Thinking
- Assimilating

Debating
Competencies:
- Comprehending key points of the debate and note decisive points

including supporting details.
- Construct a logical chain of arguments and decisive points.
- Writing a review about a product by providing reasons, causes, and effects

UNIT II: DRAWING CONCLUSIONS
Competencies:
- Reasoning skills - Coherent and logical thinking
- Reporting and Analyzing skills.

Topics Covered:
How to draw conclusions
Importance of Logic

Topic Level Details:
Drawing conclusions
Competencies:
- Analyzing the points discussed.
- Connecting all points without gaps.
- Identifying clinchers.
- Communicating the decisions

UNIT III - REPORTING
Competencies:
- Reporting an incident
- Writing/Presenting a project report

UNIT IV - READING FOR CONTEXT
Competencies
Develop metacognitive strategies
Topics covered

Develop critical reading skills:

- o   Recognition of author's purpose
- o   Awareness of stylistic differences
- o   Discernment of fact and opinion
- o   Evaluation of fact and opinion
- o   Recognition of propaganda techniques
- o   Present vocabulary building methods
- o   Use comprehension and vocabulary strategies to raise reading rate.

UNIT V- SOFT-SKILLS
1.   Professional integrity
2.   Managing time
3.   Coping with stress
4.   Organizational skills

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR BE IV SEMESTER
ENVIRONMENTAL SCIENCE

Instruction: 2Hrs /week	SEE Marks :70	Course Code : MC320CE
Credits : 1	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
In this subject the students will	*Upon the completion of this course students will be able to*
• Describe various types of natural resources available on the earth surface. • Explain the concepts of an ecosystem and the biotic and abiotic components of various aquatic ecosystems. • Identify the values, threats of biodiversity, endangered and endemic species of India along with the conservation of biodiversity. • Explain the causes, effects and control measures of various types of environmental pollutions. • Describe the methods for water conservation, the causes, effects of global warming, climate change, acid rain, ozone layer depletion, various types of disasters and their mitigation measures.	1. Describe the various types of natural resources. 2. Differentiate between various biotic and abiotic components of ecosystem. 3. Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species of India. 4. Illustrate causes, effects, control measures of various types of environmental pollutions. 5. Explain the methods of water conservation, causes, effects of climate change, global warming, acid rain and ozone layer depletion, various types of disasters and their mitigation measures.

UNIT-I
Environmental Studies: Definition, importance of environmental studies. Natural resources: Water resources; floods, drought, conflicts over water, dams-benefits and problems. Food resources; Effects of modern agriculture, fertilizer-pesticide problems, water logging salinity. Energy resources: Renewable and non-renewable energy resources. Land Resources, soil erosion and desertification.

UNIT-II
Ecosystems: Structure and function of an ecosystem, producers, consumers and decomposers, food chains, food webs, ecological pyramids, aquatic ecosystem (ponds, oceans, estuaries).

UNIT-III
Biodiversity: Genetic species and ecosystem diversity. Values of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT-IV
Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution and solid waste & e-waste management.

UNIT-V
Social Aspects and the Environment: Water conservation, Climate change, global warming, acid rain, ozone layer depletion. Environmental Impact Assesment, population explosion.

Suggested Books:
1. Deswal S. and Deswal A., A Basic Course on Environmental studies, Dhanpat Rai & Co Pvt. Ltd. 2013.
2. Benny Joseph, Environmental Studies, Tata McGraw-Hill, 2006.
3. Suresh K. Dhameja, Environmental Studies, S.K. Kataria & Sons, 2010.

References Books:
1. De A.K., Environmental Chemistry, New Age International, 2003.
2. Odum E.P., Fundamentals of Ecology, W.B. Sunders Co., USA, 2004.
3. Sharma V.K., Disaster Management, National Centre for Disaster Management, IIPE, Delhi, 2013.
4. Rajagopalan R., Environmental Studies, Second Edition, Oxford University Press, 2013.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E. IV SEMESTER
JAVA LAB

Instruction: 2Hrs /week	SEE Marks :50	Course Code : PC411CS
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course objectives	Course outcomes
Students should be able to	At the end of the course, students will be able to
- Implement object oriented system development using Java - Develop graphical user interface using Java constructs	- Implement object oriented system development using java - Apply various data structures for solving a use cases using Collection framework - Implement IO programming to work with console, files and network streams - Develop applets and frames implementing event driven programming - Develop a front end application using Java Swing framework

Programming Exercise:

1. Illustrating the class with constructors, methods and overloading
2. Demonstrate the inheritance and dynamic polymorphism
3. Program to illustrate the usage of abstract class
4. A program to illustrate multithreading and thread synchronization
5. Write a program using StringTokenizer
6. Write a program using Linkedlist and TreeSet
7. A program using HashSet, Iterator Map classes
8. A program using Enumeration and Comparator interfaces
9. Program to illustrate the usage of Filter, Buffered I/O streams
10. Program to create TCP/UDP Sockets
11. A program to illustrate the usage of Serialization
12. Program for Regular Expressions processing
13. An application involving GUI with different controls, menus and event handling

14. A program to implement an Applet
15. Program to create GUI for Bank Account Simulation
16. Simple Calculator in Java Using Remote Method Invocation

Suggested Books:
1. Herbert Schildt, The Complete Reference Java, 7th Edition (2007), Tata McGraw Hill, New Delhi.

Reference Books:
1. C Thomas Wu, An Introduction to Object Oriented Programming with Java, 5th Edition (2010), Tata McGraw Hill, India
2. P. Radha Krishna, Object Oriented Programming through Java, (2007), Universities Press, India
3. Sachin Malhotra and Saurabh Choudhary, Programming in Java, 2nd Edition (2013), Oxford Press, 2014, India
4. James M Slack, Programming and Problem Solving with JAVA, (2011), Thomson Learning, India

Online Resources:
1. https://docs.oracle.com/javase/7/docs/api/

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E. IV- SEMESTER
OPERATING SYSTEMS LAB

Instruction: 2Hrs /week	SEE Marks :50	Course Code : PC421CS
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course objective	**Course outcomes**
Students should be able to	At the end of the course, students will be able to
• Implement system calls related to files and process • Implement techniques related to CPU Scheduling, Main memory management, Process synchronization and deadlock avoidance and detection	• Implement operations on Files and Process by using system calls • Develop CPU Scheduling mechanisms • Implement Contiguous memory allocation techniques and Page Replacement techniques • Design solutions for Inter-Process Communication • Develop Deadlock handling techniques

Programming Exercise:

1. Implement Shell script programs

2. Implement system calls for
    - i)   File system management
    - ii) Process management

3. Implementation of CPU scheduling algorithms (FCSF, SJF, Priority, RR, Multi level)

4. Implement contiguous Memory management techniques
    - i.   Best Fit
    - ii. Worst Fit
    - iii. First Fit
5. Implementation of Page Replacement algorithms
    - i)   FIFO
    - ii) LRU
    - iii) OPTIMAL

6. Implement Inter-process communication using
     i) Pipes
     ii) Message Queues
     iii) Shared Memory

7. Implementation of Process Synchronization for Bounded buffer, Readers-Writers and Dining philosophers problems

8. Implementation of Deadlock handling
     i) Resource Allocation Graph
     ii) Safety Algorithm
     iii) Resource Request algorithm
     iv) Wait for graph

9. Build a real operating system kernel by using an open source operating system (Linux) kernel to implement services such as Process Scheduling, Process synchronization, Virtual memory and File system

Suggested Books:
   1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, 9th Edition (2016), Wiley India.

Reference Books:
   1. Andrew S. Tanenbaum, Modern Operating Systems, 2nd Edition (2001), Pearson Education, Asia.
   2. Dhananjay, Dhamdhere.M, Operating System-concept based approach, 3rd edition (2009), Tata McGraw Hill, Asia
   3. Robet Love: Linux Kernel Development, (2004)Pearson Education
   4. Richard Stevens, Stephen Rago, Advanced Programming in the UNIX Environment, 3rd
   5. Edition(2013), Pearson Education

Online Resources:
   1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-828-operating-system-engineering-fall-2012/