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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Scheme of Instruction Hours per week</th>
<th>Scheme of Examination</th>
<th>Credit</th>
</tr>
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<tbody>
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<td></td>
<td><strong>B.E. III SEMESTER</strong></td>
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<td><strong>Name of the Course</strong></td>
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<td>BS310MA</td>
<td>Mathematics III</td>
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<tr>
<td>PC310CS</td>
<td>Data Structures</td>
<td>3</td>
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<tr>
<td>PC320CS</td>
<td>Discrete Structures</td>
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<td>1</td>
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<td>PC330CS</td>
<td>Logic &amp; Switching Theory</td>
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<td>1</td>
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<tr>
<td>ES320EC</td>
<td>Introduction to Electronics Engineering</td>
<td>3</td>
<td>1</td>
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<td>MC300EH</td>
<td>HVPE-I</td>
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<td>HS310EH</td>
<td>FS-I: Communication Skills in English-I</td>
<td>2</td>
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<tr>
<td>MC310ME</td>
<td>Introduction to Entrepreneurship</td>
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<td>OE3XXXX</td>
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<td>PC311CS</td>
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<td>ES321EC</td>
<td>Introduction to Electronics Engineering Lab</td>
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<td><strong>Grand Total</strong></td>
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*SEE- Semester End Examination  *CIE- Continuous Internal Evaluation
**COURSE OBJECTIVES**

The course will enable the students 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.
5. **Understand** how to fit a curve to a given data, how Correlation between variables can be measured.

**COURSE OUTCOMES**

At the end of the course students will be able to:

a) **Expand** any function which is continuous, discontinuous, even or odd in terms of its Fourier series.

b) **Find** the 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.

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**UNIT –I (8 classes)**

**Fourier Series** : Introduction to Fourier series –Dirichlet’s Conditions- Euler’s Formula – Functions of 2n 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)

UNIT-III (15 classes)

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)

Suggested Books:
5. S.S.Sastry, Numerical Analysis –PHI Learning Ltd.,
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E III SEMESTER
DATA STRUCTURES

<table>
<thead>
<tr>
<th>Instructions: 3+1Hrs/ Week</th>
<th>SEE Marks : 70</th>
<th>Course Code: PC310CS</th>
</tr>
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<tbody>
<tr>
<td>Credits: 3</td>
<td>CIE Marks : 30</td>
<td>SEE Duration: 3 Hours</td>
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</table>

### Course Objectives
Students should 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.

### Course Outcomes
At the end of the course, Students will be able to:
- 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
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:

Reference Books:

Online Resources:
2. http://nptel.ac.in/courses/106106127/
3. http://www.nptel.ac.in/courses/106102064
With effect from the A.Y 2017-18

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

<table>
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<th>Instructions: 3+1Hrs/ Week</th>
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<table>
<thead>
<tr>
<th>Course Objectives</th>
<th>Course Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Students should be able to</td>
<td>At the end of the course, Students will be able to</td>
</tr>
<tr>
<td>• Understand the concepts of set theory, arithmetic logic and proof techniques</td>
<td>• Construct compound statements using logical connectives and verify the validity of conclusion using inference rules</td>
</tr>
<tr>
<td>• Build mathematical models to solve the real world problems by using appropriate methods</td>
<td>• Compare different types of relations and functions and also apply principle of inclusion and exclusion to solve counting problems</td>
</tr>
<tr>
<td></td>
<td>• Solve various types of recurrence relations to find the complexity of an algorithm</td>
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<tr>
<td></td>
<td>• Develop crypto system using Ring and modular arithmetic</td>
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<td></td>
<td>• Develop group codes for error detection and correction</td>
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</table>

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


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

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:

Reference Books:

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
With effect from the A.Y 2017-18

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

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

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:**

**Reference Books:**

**Online Resources:**
## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
### SYLLABUS FOR BE III SEMESTER
#### INTRODUCTION TO ELECTRONICS ENGINEERING

<table>
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<th>Instructions: 3+1 Hrs/ Week</th>
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<table>
<thead>
<tr>
<th>Course Objective:</th>
<th>Course Outcomes</th>
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<tbody>
<tr>
<td>• To understand the characteristics and operation of different electronic devices.</td>
<td><strong>At the end of the course students will be able to:</strong></td>
</tr>
<tr>
<td>• To study the working of transistorized amplifiers and oscillators.</td>
<td>• Employ different electronic devices to build electronic circuits such as rectifiers, voltage regulators.</td>
</tr>
<tr>
<td>• To gain the basic knowledge of digital logic circuits.</td>
<td>• Describe the functioning of electronic circuits such as amplifiers and oscillators.</td>
</tr>
<tr>
<td>• To study the working principle of different types of transducers.</td>
<td>• Implement digital circuits such as adders and subtractors using logic gates.</td>
</tr>
</tbody>
</table>

**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, Photovoltaic 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:**

5. Cooper, Electronic Measurement and Instrumentations.
HUMAN VALUES AND PROFESIONAL VALUES-I
SYLLABUS FOR B.E. III-SEMESTER

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

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<td>The course will enable the</td>
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<tr>
<td>students to</td>
<td></td>
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<tr>
<td>1. Get a holistic perspective of value-based education.</td>
<td>a. Gain a world view of the self, the society and the profession.</td>
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<tr>
<td>2. Grasp the meaning of basic human aspirations vis-a-vis the professional aspirations.</td>
<td>b. Make informed decisions.</td>
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<tr>
<td>3. Understand professionalism in harmony with self and society.</td>
<td>c. Start exploring themselves in relation to others and their work – constantly evolving into better human beings and professionals</td>
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<tr>
<td>4. Develop ethical human conduct and professional competence.</td>
<td>d. Inculcate Human values into their profession.</td>
</tr>
<tr>
<td>5. Enrich their interactions with the world around, both professional and personal.</td>
<td>e. Validate their aspirations through right understanding of human relationship and see the co-relation between the human values and prevailing problems.</td>
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<td>f. Strike a balance between physical, mental, emotional and spiritual parts their being.</td>
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<td>g. Obtain a holistic vision about value-based education and professional ethics.</td>
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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:
6. Caroline Whitback < Ethics in Engineering Practice and Research, Cambridgs University Press
7. Georgs Reynolds, Ethics in Information Technology", Cengage Learning

Online Resources:
- 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

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<td>Credits: 2</td>
<td>CIE Marks: 30</td>
<td>Duration of SEE: 3 Hrs</td>
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**Course Objective**

- 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.

**Course Outcome**

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

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

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


**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-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:

With effect from the A.Y 2017-18

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

<table>
<thead>
<tr>
<th>Instructions: 2Hrs/ Week</th>
<th>SEE Marks : 50</th>
<th>Course Code: PC311CS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credits: 1</td>
<td>CIE Marks : 25</td>
<td>SEE Duration: 3 Hours</td>
</tr>
</tbody>
</table>

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

Programming Exercise:
1. Implementation of Formula based representation.
2. Implementation of Singly Linked List, Doubly Linked List and Circular Linked List.
5. Implementation of Stacks, Queues.(Using both Arrays and Linked Lists)
7. Implementation of Binary Search and Hashing
8. Implementation of Recursive and Iterative Traversals on Binary 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.
13. Implementation of Traversal on Graphs.
15. Develop application using appropriate data structures.

Suggested Books:

Reference Books:

Online Resources :
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

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

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
11. Verifications of Logic gates
12. Realization of Half and Full adder

Suggested Reading :

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>B.E. IV SEMESTER</th>
<th>Scheme of Instruction Hours per week</th>
<th>Scheme of Examination</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Name of the Course</td>
<td>L  T  D  P</td>
<td>Duration in Hours</td>
<td>Maximum Marks</td>
</tr>
<tr>
<td>BS410MA</td>
<td>Mathematics -IV</td>
<td>3  1  -  -</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>PC410CS</td>
<td>Object Oriented Programming Using Java</td>
<td>3  1  -  -</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>PC420CS</td>
<td>Operating Systems</td>
<td>3  -  -  -</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>PC430CS</td>
<td>Design &amp; Analysis of Algorithms</td>
<td>3  1  -  -</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>PC440CS</td>
<td>Computer Architecture</td>
<td>3  1  -  -</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>HS410EH</td>
<td>FS –II : Communication Skills in English-II</td>
<td>2  2  -  -</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>MC320CE</td>
<td>Environmental Science</td>
<td>2  -  -  -</td>
<td>3</td>
<td>70</td>
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<tr>
<td>OE4XXXX</td>
<td>Open Elective-II</td>
<td>1  -  -  -</td>
<td>2</td>
<td>35</td>
</tr>
<tr>
<td>OE4XXXXX</td>
<td>Open Elective-III</td>
<td>2  -  -  -</td>
<td>3</td>
<td>70</td>
</tr>
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</table>

### LABS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Name of the Course</th>
<th>L  T  D  P</th>
<th>Duration in Hours</th>
<th>Maximum Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC411CS</td>
<td>Java Lab</td>
<td>-  -  -  2</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>PC421CS</td>
<td>Operating Systems Lab</td>
<td>-  -  -  2</td>
<td>3</td>
<td>50</td>
</tr>
</tbody>
</table>

| 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

<table>
<thead>
<tr>
<th>Instruction: 3+1Hrs /week</th>
<th>SEE Marks :70</th>
<th>Course Code : BS410MA</th>
<th>CIE Marks: 30</th>
<th>Duration of SEE : 3 Hrs</th>
</tr>
</thead>
</table>

### COURSE OBJECTIVES

<table>
<thead>
<tr>
<th>The course will enable students to:</th>
<th>COURSE OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Understand</strong> the Definition of Laplace and inverse Laplace Transforms-Shifting Properties and various theorems and how to apply them in solving Differential Equations.</td>
<td><strong>Evaluate</strong> Laplace transforms and inverse Laplace transforms of functions. Apply Laplace transforms to solve ordinary differential equations arising in engineering problems.</td>
</tr>
<tr>
<td>2. Analyze the characteristics and properties of and Z – transforms and solve the Difference Equations.</td>
<td>b) Apply Z-transform in the analysis of continuous time and discrete time systems and also solve the Difference Equations using Z-transform.</td>
</tr>
<tr>
<td>3. <strong>Study</strong> the concept of Fourier and inverse Fourier Transform of a function and various properties.</td>
<td>c) Determine Fourier transform, Fourier sine and cosine transform of a function.</td>
</tr>
<tr>
<td>4. <strong>Understand</strong> 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.</td>
<td>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.</td>
</tr>
</tbody>
</table>

**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)


UNIT-IV (15 classes)

Functions of Complex Variables: Limits and Continuity of function - Differentiability 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:
3. Goyal & Gupta, Laplace’s and Fourier transforms, Pragati prakashan

Reference books:

27
With effect from the A.Y 2017-18

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

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

UNIT – I

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
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:

Reference Books:
2. P. Radha Krishna, Object Oriented Programming through Java, (2007), Universities Press, 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
Credits : 3          CIE Marks: 30   Duration of SEE : 3 Hrs

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

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.


Android - Architecture, Application framework, Resources, Activities, Services

**Suggested Books:**

**Reference Books:**

**Online Resources:**
With effect from the A.Y 2017-18

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

<table>
<thead>
<tr>
<th>Instruction: 3+1 Hrs /week</th>
<th>SEE Marks : 70</th>
<th>Course Code: PC430CS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credits : 3</td>
<td>CIE Marks: 30</td>
<td>Duration of SEE : 3 Hrs</td>
</tr>
</tbody>
</table>

**Course Objectives**

Students should be able to

- Analyze the asymptotic performance of algorithms
- Apply various algorithm design strategies to solve engineering problems.

**Course Outcomes**

At the end of the course, students will be able to

- 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

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

Suggested Books:

Reference Books:

Online Resources:
3. http://nptel.ac.in/courses/106101060/
With effect from the A.Y 2017-18

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

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

<table>
<thead>
<tr>
<th>Course Objectives</th>
<th>Course Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students should be able to</td>
<td>At the end of the course, students will be able to</td>
</tr>
<tr>
<td>• 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.</td>
<td>• Identify major components of a computer and design basic hardware for functional modules of digital computer.</td>
</tr>
<tr>
<td>• Understand memory hierarchy and analyze different ways of communicating with I/O of digital computer.</td>
<td>• Understand organization and design of digital computer and build micro programmed control unit.</td>
</tr>
<tr>
<td></td>
<td>• Understand internal organization of CPU and apply pipeline concepts to increase computational speed of CPU.</td>
</tr>
<tr>
<td></td>
<td>• Analyze techniques used by a computer to communicate with I/O devices.</td>
</tr>
<tr>
<td></td>
<td>• Identify various types of memory organizations and evaluate performance of a CPU.</td>
</tr>
</tbody>
</table>

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

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

Suggested Books:

Reference Books:

Online Resources:
1. http://nptel.ac.in/courses/106102157/
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
FS-II: COMMUNICATION SKILLS IN ENGLISH-II
SYLLABUS FOR B.E. IV-SEMESTER

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

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Course Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. identify the various features and functions of human language and communication.</td>
<td>1. Participate in group and forum discussions by providing factual information, possible solutions, and examples.</td>
</tr>
<tr>
<td>2. develop the habit of listening effectively so as to analyze the speaker’s tone and tenor.</td>
<td>2. Debate on a topic by picking up the key points from the arguments placed.</td>
</tr>
<tr>
<td>3. choose appropriate words so as to speak and write accurately.</td>
<td>3. Provide logical conclusions to the topics under discussion.</td>
</tr>
<tr>
<td>4. read various types of texts and sift information correctly.</td>
<td>2. Prepare, present, and analyze reports.</td>
</tr>
<tr>
<td>5. study organizational structures and behavioral patterns and adapt appropriately.</td>
<td>3. choose appropriate words and tone to present accurate, specific, and factual reports.</td>
</tr>
</tbody>
</table>

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:

- Recognition of author’s purpose
- Awareness of stylistic differences
- Discernment of fact and opinion
- Evaluation of fact and opinion
- Recognition of propaganda techniques
- Present vocabulary building methods
- 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
With effect from the Academic Year 2017-18

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR BE IV SEMESTER
ENVIRONMENTAL SCIENCE

<table>
<thead>
<tr>
<th>Instruction: 2Hrs /week</th>
<th>SEE Marks : 70</th>
<th>Course Code: MC320CE</th>
</tr>
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<tbody>
<tr>
<td>Credits : 1</td>
<td>CIE Marks: 30</td>
<td>Duration of SEE : 3 Hrs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COURSE OBJECTIVES</th>
<th>COURSE OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>In this subject the students will</td>
<td>Upon the completion of this course students will be able to</td>
</tr>
<tr>
<td>• Describe various types of natural resources available on the earth surface.</td>
<td>1. Describe the various types of natural resources.</td>
</tr>
<tr>
<td>• Explain the concepts of an ecosystem and the biotic and abiotic components of various aquatic ecosystems.</td>
<td>2. Differentiate between various biotic and abiotic components of ecosystem.</td>
</tr>
<tr>
<td>• Identify the values, threats of biodiversity, endangered and endemic species of India along with the conservation of biodiversity.</td>
<td>3. Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species of India.</td>
</tr>
<tr>
<td>• Explain the causes, effects and control measures of various types of environmental pollutions.</td>
<td>4. Illustrate causes, effects, control measures of various types of environmental pollutions.</td>
</tr>
<tr>
<td>• 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.</td>
<td>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.</td>
</tr>
</tbody>
</table>

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

Suggested Books:

References Books:
With effect from the A.Y 2017-18

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

<table>
<thead>
<tr>
<th>Instruction: 2Hrs /week</th>
<th>SEE Marks :50</th>
<th>Course Code : PC411CS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credits : 1</td>
<td>CIE Marks: 25</td>
<td>Duration of SEE : 3 Hrs</td>
</tr>
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</table>

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

**Reference Books:**
2. P. Radha Krishna, Object Oriented Programming through Java, (2007), Universities Press, 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/
With effect from the A.Y 2017-18

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

<table>
<thead>
<tr>
<th>Instruction: 2Hrs /week</th>
<th>SEE Marks :50</th>
<th>Course Code : PC421CS</th>
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<tbody>
<tr>
<td>Credits : 1</td>
<td>CIE Marks: 25</td>
<td>Duration of SEE : 3 Hrs</td>
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<td>Students should be able to</td>
<td>At the end of the course, students will be able to</td>
</tr>
<tr>
<td>• Implement system calls related to files and process</td>
<td>• Implement operations on Files and Process by using system calls</td>
</tr>
<tr>
<td>• Implement techniques related to CPU Scheduling, Main memory management, Process synchronization and deadlock avoidance and detection</td>
<td>• Develop CPU Scheduling mechanisms</td>
</tr>
<tr>
<td></td>
<td>• Implement Contiguous memory allocation techniques and Page Replacement techniques</td>
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<td></td>
<td>• Design solutions for Inter-Process Communication</td>
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<tr>
<td></td>
<td>• Develop Deadlock handling techniques</td>
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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:

Reference Books:
5. Edition(2013), Pearson Education

Online Resources: