B. E. SYLLABUS

COMPUTER SCIENCE & ENGINEERING

III & IV SEMESTER

With
Scheme of Teaching
& Examination
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Qualification</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. Niranjan N. Chiplunkar</td>
<td>Ph.D.</td>
<td>Professor/ Principal</td>
</tr>
<tr>
<td>2</td>
<td>Dr. K C Shet</td>
<td>Ph.D.</td>
<td>Professor</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Sarojadevi H</td>
<td>Ph.D.</td>
<td>Prof. and HOD</td>
</tr>
<tr>
<td>4</td>
<td>Mrs. Sharada U Shenoy</td>
<td>M.Tech(PhD)</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>5</td>
<td>Mr. Venugopala P.S.</td>
<td>M.Tech(PhD)</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>6</td>
<td>Mr. Roshan Fernandes</td>
<td>M.Tech(PhD)</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>7</td>
<td>Mrs. Neelima B</td>
<td>M.Tech(PhD)</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>8</td>
<td>Ms. Shalini P.R</td>
<td>M.Tech</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>9</td>
<td>Mr. Radhakrishna Dodmane</td>
<td>M.Tech</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>10</td>
<td>Mr. Raju K</td>
<td>M.Tech(PhD)</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>11</td>
<td>Mr. Pradeep Kanchan</td>
<td>M.Tech</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>12</td>
<td>Mr. Sudeep K B</td>
<td>M.Tech(PhD)</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>13</td>
<td>Mr. Ravi B</td>
<td>M.Tech(PhD)</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>14</td>
<td>Mr. Vijaya Murari T</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>15</td>
<td>Mr. Chandra Naik</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>16</td>
<td>Mr. Manjunath Kamath</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>17</td>
<td>Mrs. Pallavi K N</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>18</td>
<td>Mrs. Reuja S.R</td>
<td>M.Tech(PhD)</td>
<td>Asst. Prof Gd II</td>
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<tr>
<td>19</td>
<td>Mr. Hemanth Kumar G</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>20</td>
<td>Mr. Pradeep Nazareth</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>21</td>
<td>Mr. Ranjan Kumar H S</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>22</td>
<td>Mrs. Anisha P Rodrigues</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
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<tr>
<td>23</td>
<td>Mr. Ramesha Shettigar</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
</tr>
<tr>
<td>24</td>
<td>Ms. Grantha K.N</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
</tr>
<tr>
<td>25</td>
<td>Ms. Savitha Shetty</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
</tr>
<tr>
<td>26</td>
<td>Ms. Sharmila Shanthi Sequeira</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<tr>
<td>27</td>
<td>Mr. Sannidhan M.S</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<tr>
<td>28</td>
<td>Mr. Naveen Chandaverkar</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<tr>
<td>29</td>
<td>Mr. Pawan Hegde</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<tr>
<td>30</td>
<td>Mrs. Keerthana B. Chigateri</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<tr>
<td>31</td>
<td>Mrs. Asmita Poojari</td>
<td>M.Tech</td>
<td>Asst. Prof Gd-I</td>
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<tr>
<td>32</td>
<td>Mr. Raghunandan K R</td>
<td>M.Tech</td>
<td>Asst. Prof Gd-I</td>
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<tr>
<td>33</td>
<td>Mrs. Minu P. Abraham</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<tr>
<td>34</td>
<td>Mrs. Shabari Shedthi. B</td>
<td>M.Tech</td>
<td>Asst. Prof Gd-I</td>
</tr>
<tr>
<td>35</td>
<td>Mr. H R Manjunath Prasad</td>
<td>M.Tech(PhD)</td>
<td>Asst. Prof Gd I</td>
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<tr>
<td>36</td>
<td>Mr. Krishna Prasad N Rao</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
</tr>
</tbody>
</table>
Department of Computer Science & Engineering

**Vision:** To become a hub of academic activities of the Computer Science & Engineering and a center of excellence in the field of computer science education.

**Mission:** To transform the students into Computer Science graduates who would be ready to take up any challenge in the field of computer science as well informed, attuned, adapted and responsible, by imparting the state of the art concepts and technologies

**Program: B.E. Computer Science & Engineering**

**PEO’s (Program Educational Objectives)**

1. Graduates must gain the ability to identify, formulate & solve challenging Computer science and Engg. problems both theoretically and practically.
2. Graduates must develop professional and communication skills that prepare them for immediate employment or for adapting to emerging trends by engaging in life-long learning in Computer science and related disciplines.
3. Graduates be provided with an educational foundation that prepares them for leadership roles along diverse career paths and work in a team.
4. Graduates must develop an understanding of the social and human context in which their engineering contribution will be utilized.

**Program Outcomes (PO’s):**

a. An ability to apply knowledge of mathematics, science and engineering
b. An ability to design and conduct experiments, as well as to analyze and interpret data
c. An ability to design a system, component or process to meet desired needs within realistic constraints such as economic,
environmental, social, political, ethical, health and safety, manufacturability and sustainability

d. An ability to function on multidisciplinary teams
e. An ability to identify, formulate and solve engineering problems
f. An understanding of professional and ethical responsibility
g. An ability to communicate effectively
h. The broad education necessary to understand the impact of engineering solutions in global, economic environmental and societal context
i. A recognition of the need for and an ability to engage in lifelong learning
j. An ability to apply engineering and project management principles.
k. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
l. An ability to understand and apply the concepts of programming and computer design & technology

<table>
<thead>
<tr>
<th>PO’s</th>
<th>Graduate Attributes</th>
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<tbody>
<tr>
<td>a</td>
<td>Engineering Knowledge</td>
</tr>
<tr>
<td>b</td>
<td>Conduct investigations of complex problems</td>
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<tr>
<td>c</td>
<td>Engineer and society</td>
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<tr>
<td>d</td>
<td>Individual and team work</td>
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<td>e</td>
<td>Problem analysis</td>
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<td>f</td>
<td>Ethics</td>
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<td>g</td>
<td>Communication</td>
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<tr>
<td>h</td>
<td>Environment and sustainability</td>
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<tr>
<td>i</td>
<td>Lifelong learning</td>
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<tr>
<td>j</td>
<td>Project Management and finance</td>
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<tr>
<td>k</td>
<td>Modern tool usage</td>
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<tr>
<td>l</td>
<td>Program Specific</td>
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# DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
## SCHEME OF TEACHING

### III Semester

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Code</th>
<th>Subject</th>
<th>Hours/week</th>
<th>Credits</th>
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<tbody>
<tr>
<td>1.</td>
<td>13CS301</td>
<td>Generating Functions and Transform Techniques</td>
<td>4+0+0</td>
<td>50</td>
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<tr>
<td>2.</td>
<td>13CS302</td>
<td>Logic Design</td>
<td>3+0+2</td>
<td>50</td>
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<tr>
<td>3.</td>
<td>13CS303</td>
<td>Discrete Mathematical Structures</td>
<td>3+0+0</td>
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<td>4.</td>
<td>13CS304</td>
<td>Web Programming through PHP &amp; HTML</td>
<td>2+0+2</td>
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<tr>
<td>5.</td>
<td>13CS305</td>
<td>Theory and Practice of Data Structures</td>
<td>4+0+2</td>
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<tr>
<td>6.</td>
<td>13CS306</td>
<td>Object Oriented Programming</td>
<td>3+0+0</td>
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<td>7.</td>
<td>13CS31Y</td>
<td>Elective I</td>
<td>3+0+0</td>
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**Total** 28 Hours/week

**Elective I:** (for III Semester)

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>13CS311</td>
<td>IT infrastructure landscape (CCV)</td>
</tr>
<tr>
<td>13CS312</td>
<td>Advanced Statistical Analysis with lab (BAO)</td>
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</tbody>
</table>
## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
### SCHEME OF TEACHING

### IV Semester

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Code</th>
<th>Subject</th>
<th>Hours/week</th>
<th>C.I.A.</th>
<th>S.E.E</th>
<th>Credits</th>
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<tbody>
<tr>
<td>1.</td>
<td>13CS401</td>
<td>Probability theory and numerical methods</td>
<td>4+0+0</td>
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<td>2.</td>
<td>13CS402</td>
<td>Design &amp; Analysis of Algorithms</td>
<td>4+0+2</td>
<td>50+50</td>
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<td>3.</td>
<td>13CS403</td>
<td>Finite Automata &amp; Formal languages</td>
<td>4+0+0</td>
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<td>4.</td>
<td>13CS404</td>
<td>Computer Organization &amp; Architecture</td>
<td>4+0+0</td>
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<td>5.</td>
<td>13CS405</td>
<td>Data Communications</td>
<td>4+0+0</td>
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<td>6.</td>
<td>13CS406</td>
<td>Unix Programming</td>
<td>2+0+2</td>
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<td>7.</td>
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<td>Elective II</td>
<td>3+1+1</td>
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<td>13CS407</td>
<td>Individual Effectiveness Labs (IEL)</td>
<td>0+4+0</td>
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<td><strong>Total</strong></td>
<td><strong>35</strong></td>
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<td><strong>550</strong></td>
<td><strong>550</strong></td>
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<td><strong>30</strong></td>
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</table>

Elective II: (For IV Semester)

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>13CS411</td>
<td>Introduction to Virtualization &amp; Cloud Computing (CCV)</td>
</tr>
<tr>
<td>13CS412</td>
<td>Applied Business analytics (BAO)</td>
</tr>
</tbody>
</table>
GENERATING FUNCTIONS AND TRANSFORM TECHNIQUES

Subject code : 13CS301/13IS301  Credits  : 4
Hrs/Week : 4  Total Hours : 52

UNIT - I
Introduction to Graph Theory: Definitions and examples, Subgraphs, Complements, and Graph Isomorphism, Euler Trails and Circuits, Hamiltonian paths and Cycles, Planar Graphs, Graph Colouring, Trees: Definitions, Properties and Examples.  10 Hrs

UNIT - II
Fourier Analysis: Periodic functions, Euler’s formulae, Fourier series of odd and even functions, functions with arbitrary period, half range series. Harmonic Analysis. Fourier integral theorem, Fourier Transforms, Inverse Fourier transform, Convolution theorem and Parseval’s identity. Fourier sine and Fourier cosine transforms, Inverse Fourier sine and Inverse Fourier cosine transforms.  12 Hrs

UNIT - III
Z transforms: Z-transform, standard forms, linearity property, damping rule, shifting rule. Inverse Z-transform, Finite differences and difference equations, Solving Difference equations using Z-transforms.  10 Hrs

UNIT - IV
Combinations with Repetition, Non-negative integer solution for linear equation, positive integer solution for linear equation. Fibonacci numbers, Catalan Numbers, The Principle of Inclusion and Exclusion, Generalization of the Principle, Derangements – Nothing is in its Right place, Rook Polynomials.  10 Hrs

UNIT-V
Generating Functions: Definition and Examples – Calculational Techniques, Partitions of Integers, the Exponential Generating Function, and the Summation Operator. The method of Generating Functions to solve Recurrence relations.  10 Hrs
Text Books:
3. Narsing Deo, Graph theory
4. Graham knuth & Patashnik, Concrete Mathematics

Reference Books:
2. Harary, Graph theory, Narosa Publishing House, 1988

LOGIC DESIGN

Subject Code : 13CS302
Hrs/Week : 3
Credits : 03
Total Hours : 39

UNIT – I

Logic gates and combinational logic:


Combinational Logic Circuits: Boolean Laws and Theorems, Sum of Products Method, Truth Table to Karnaugh Map, Pairs, Quads, and Octets, Karnaugh simplifications, Don’t Care Conditions, Product-of-sums method, Product-of-sums simplification, Simplification by Quine-McClusky Method, Hazards and Hazard cover, HDL Implementation Models.
UNIT - II

ALU design  
8 Hrs

Data-Processing Circuits: Multiplexers, Demultiplexers, 1-of-16 Decoder, BCD-to-Decimal Decoders, Seven segment Decoders, Encoders, EX-OR gates, Parity Generators and Checkers, Magnitude Comparator, Read-Only-Memory, Programmable Array Logic, Programmable Logic, Troubleshooting with a Logic Probe, HDL Implementation of Data Processing Circuits.


UNIT - III

Basics of Sequential circuits  
8 Hrs


UNIT - IV

Registers and Counters  
8 Hrs

Registers: Types of Registers, Serial In – Serial Out, Serial In – Parallel Out, Parallel In- Serial Out, Parallel In – Parallel Out, Applications of Shift Register, Register Implementation in HDL.

Counters: Asynchronous Counters, Decoding Gates, Synchronous Counters, Changing the Counter Modulus, Decade Counters, Presettable Counters, Counter Design as a Synthesis Problem, Counter Design Using HDL.

UNIT - V

Mixed signal systems and IC families  
7 Hrs

Digital Integrated Circuits: CMOS inverter, CMOS NAND gate, CMOS NOR gate, Two input TTL NAND gate, TTL NOR gate, AND-OR-INVERT gate.

Text Book:

Reference Books

Mode of evaluation: Continuous evaluation tests, quizzes, assignments

LOGIC DESIGN LABORATORY

Subject Code: 13CS307  Credits:01
Hrs/Week: 2

PART A

1. Design and implementation of a Half-adder and a Full-adder using minimum number of 2-input NAND gates.
2. Given any four variable logic expression, simplify using Entered Variable Map and realize the simplified logic expression using 8:1 multiplexer IC.
3. Design and implementation of a Full adder and a Full subtractor using 3:8 decoder and 4 input NAND gates.
4. Design and implementation of a Mod-N (N<8) Synchronous up counter using J-K flip flop ICs.
5. Design and implementation of the following using 4-bit shift register
   i) Ring counter
   ii) Johnson counter
6. Design and implementation of an Asynchronous counter using a Decade counter IC to count up from 0 to n (n<=9)
7. Boolean Expression realization using Logic gates
8. To design and realize the following using IC 7483.
   1. BCD to Excess- 3 Code
   2. Excess-3 to BCD Code.
9. Design Parallel Adder/ Subtractor circuit
10. Design Comparators circuit
11. To design and set up the following circuit
    a) To design and set up a 4:1 Multiplexer (MUX) using only NAND gates.
    b) To design and set up a 1:4 Demultiplexer(DE-MUX) using only NAND gates.
    c) To verify the various functions of IC 74153(MUX) and IC 74139(DEMUX).
    d) To set up a Half/Full Adder and Half/Full Subtractor using IC 74153.
12. Decoder Chip for LED Display

   **PART B**

   **Using Verilog /VHDL, simulate the following:**

   1. Simulation of 8:1 multiplexer.
   2. Simulation of full adder.
   3. Simulation of the following
      i. Multiplexer
      ii. Demultiplexer
   4. Simulation of the following:
      a. Ring counter
      b. Johnson counter

   **Mode of evaluation:** Conduction of experiments, laboratory records, tests
DISCRETE MATHEMATICAL STRUCTURES

Subject Code : 13CS303  
Credits : 03

Hrs/Week : 3  
Total Hours : 39

UNIT – I

Sets and Relations
Set Theory and Counting.
Introduction to Set, Operations on sets, Principle of inclusion exclusion, The Pigeonhole principle and Recurrence Relations.

Relations and its Properties.
Product sets and Partitions, Relations and Digraphs, Paths in relations and Digraphs

UNIT - II

More about relations and Functions  8 Hrs.
Relations and its Properties Contd.:
Properties of relations, Equivalence relations, Computer representation of Relations and Digraphs and Transitive closure and Warshall’s algorithm.

Functions. Definition, Types of functions, Invertible functions, Functions for computer science and Permutation functions.

UNIT – III

Relations, structures and Lattices:
7 Hrs

Order relations and Structures
Partially Ordered Sets, External elements of Partially ordered sets, Lattices, Introduction to Group theory, Semi groups, Groups and Abelian groups.

UNIT – IV

Logic fundaments  8 Hrs.
Fundamentals of logic.

UNIT - V

Number theory  8 Hrs
Introduction to number Theory:
Modular Arithmetic: The Integers Modulo n, Prime and Relatively prime numbers, Properties of integers, Fermat’s and Euler’s

TEXT BOOKS:

REFERENCE BOOKS:

Mode of evaluation: Continuous assessment tests, assignments, tutorial sheets etc.

WEB PROGRAMMING THROUGH PHP & HTML
(Contains lab component)

Subject Code : 13CS304
Credits : 02
Hrs/Week : 2
Total Hours : 36

UNIT – I

PHP Basics
Introduction to PHP, Support for Database, PHP Installation, Working with PHP, Why PHP?, Basic Syntax of PHP, PHP statement terminator and case insensitivity, Embedding PHP in HTML, Comments, Variables, Assigning value to a variable, Constants, Managing Variables
UNIT - II
Operators, Controls Structures and Functions in PHP 9 Hrs.

UNIT - III
Arrays and PHP File Handling, Class, Object and Exception Handling, JAVA Script 12 Hrs.
Introduction to Array, Array in PHP, Creating an Array, Accessing Elements of an Array, Modifying Elements of an Array, Finding the Size of an Array, Printing an Array in the readable Way, Iterating Array Elements, Modifying Array while iteration, Iterating Array with Numeric index, Removing Element from an Array, Converting an Array to String, Converting String to an Array, Array Sorting, Multidimensional Array, Accessing elements of a Multidimensional Array, Iterating Multidimensional Array. Introduction, File Open, File Creation, Writing to files, Reading from File, Searching a record from a file, Closing a File, Using PHP With HTML Forms. Introduction, Object, Class, Defining Class in PHP, Object in PHP, Usage of $this variable, Constructor, Constructor with Parameters. Introduction to Exception, Exception Handling mechanisms, Creating Custom Exceptions, Multiple Catch Blocks, Exception Propagation, Error Handling in PHP. Java Introduction, JavaScript Basics.

UNIT - IV
Introduction to Advance PHP, Set up PHP Development on Eclipse 5 Hrs.
Advanced functions in PHP, Serializing data for persistence, Pattern matching with PHP, Object-oriented Programming and PHP, PHP frameworks - CakePHP, Symfony, & Zend Framework, Manage PEAR modules, Install prebuilt PHP applications, Eclipse installation.
– All in one , PDT runtime, installation via Update Manager Eclipse, Installing a debugger, Running the code inside the web server.

UNIT V
Creating and Debugging PHP Projects 5 Hrs.
Install the local Web Server, Install the PHP engine. Create and Run PHP Project, Understanding Debug View, The PHP debug perspective – the Variables view, the breakpoints view, the editor view, the console view, the debug output view, the browser output view; Installing and Configuring the debuggers – Install the Zend debugger, Install XDebug, Configure the debuggers, Setting up PDT (PHP Development Tools) – Set up PHP servers, Set up PHP executables, Debug Web Application, Inserting other languages e.g. SQL, HTML, Java Script in PHP Code. SQL – PHP SQL Script Installing PHP Projects on Web Server

Text Books and Reference URLs:
1. Web Programming Thru PHP (IBM ICE Publication)
2. PHP Bible - Tim Converse
3. PHP A beginners guide - Bill McCarthy
4. PHP and MySQL Web Development - Luke Welling
5. Learning PHP - OReilly Press

WEB PROGRAMMING THROUGH PHP LABORATORY

Subject Code : 13CS304
Hrs/Week : 2
Credits: 1

Basics Programming
• Exercise 1 – Branching Statements using character
• Exercise 2 - Branching Statements using number
• Exercise 3 – Looping Statement
• Exercise 4 – String Functions
• Exercise 5 – String Manipulation

- Exercise 6 - Calculator
- Exercise 7 - Strings

**Practicals using Functions**
- Exercise 8 – Generate Employee ID
- Exercise 9 – Calculate Tax
- Exercise 10 – Reverse a string
- Exercise 11 – Call by value and Call by reference
- Exercise 12 – Find Grade

**Practicals using Arrays**
- Exercise 13 – Sorting
- Exercise 14 – Find grade
- Exercise 15 – Sort Array
- Exercise 16 – Multidimensional Array
- Exercise 17 – Population Details

**File Handling programs**
- Exercise 18 – Writing into a existing file
- Exercise 19 – Read from a file
- Exercise 20 – Filter the contents from the file
- Exercise 21 – File Copy

**PHP programming through HTML**
- Exercise 22 – PHP with HTML

**Programs related with PHP Classes and Objects**
- Exercise 23 – Student Registration
- Exercise 24 – Online Examination System
- Exercise 25 – Online Feedback System

**Exception Handling in PHP**
- Exercise 26 – User Defined Exception
- Exercise 27 – Exception Propagation
- Exercise 28 – Error Handling in PHP

**Java Scripting**
- Exercise 29 – Arithmetic Operation
- Exercise 30 – Html and java script
THEORY AND PRACTICE OF DATA STRUCTURES

Subject Code : 13CS305  Credits : 04
Hrs / Week : 04  Total Hours : 52

UNIT - I

Introduction And Overview  10 Hrs
Definitions, Concepts of data structures, types, Overview of data structures.
Pointers Definition and Concepts, Accessing variables through pointers, Pointers and functions, Arrays and pointers, Array of pointers, Pointer arithmetic.
Linear Data Structures - Stacks

UNIT - II

Linear Data Structures – Queues  10 Hrs
Introduction and Definition Representation of Queue: Array and Structure representation of queue, various queue Structures: ordinary queue, circular queue, priority queue.
Linear Data Structures - Singly Linked lists
Memory allocation functions. Definition and concepts singly Linked List: Representation of link list in memory, Operations on singly Linked List , Circular Linked List

UNIT - III

Linear Data Structures - Doubly Linked lists  12 Hrs

Nonlinear Data Structures - Tree data structures  1

UNIT - IV

Nonlinear Data Structures - Tree data structures 2  10 Hrs
Expression Tree: Evaluating expression tree, Constructing expression tree from postfix expression, traversals, Threaded binary Tree: types, B-Trees, B+ Trees, AVL Trees: Definition, Constructing a general AVL tree.

UNIT - V

Nonlinear Data Structures – Graphs 10 Hrs
Graph terminologies: Walks, Paths, Circuits, Connected graphs, Disconnected graphs and Components, Euler graphs. Directed graphs, Undirected graphs, Hamiltonian paths and Circuits.

Representation of graphs
Set Representation, Linked representation, Matrix representation.
Operations on Graphs: Insertion and Deletion of edges and vertices (linked representation), DFS, BFS,

Text Books:
3. Data Structures With C; Seymour Lipschutz ; Tata Megra w Hill Education Private Limited 2010.

Reference Books:
1. Classic Data Structures; D.Samanta.
DATA STRUCTURES LAB

Subject Code : 13CS305
Hrs/Week : 2

Credits: 1

PART A
Data Structures Programs using C++

Contains programs on data structures such as stacks, queues, linked lists and trees and operations on them. Programs will be implemented using C and C++.

PART B
Object Oriented Concepts using C++

Contains programs implemented using C++ to learn C++ programming.

OBJECT ORIENTED PROGRAMMING

Subject Code : 13CS306
Hrs / Week : 03

Credits : 03
Total Hours : 39

UNIT - I
Overview of Object Orientation & Basics of C++

7 Hrs

Principles of object – oriented programming:
A look at Procedure Oriented Programming, object Oriented Programming Paradigm, Basic Concepts of OOP, Benefits of OOP, Object oriented languages ,Applications of OOP.

Beginning with C++:
What is C++, Applications of C++, Structure of C++ program, Basic Data types, derived data types, user defined data types, variables in c++, dynamic initialization of variables, reference variables, operators in c++, scope resolution operator, memory management operators, type cast operators, manipulators, namespace.
UNIT - II

Classes and Objects  8 Hrs
Functions in C++:
Function prototyping, Inline Functions, Default Arguments, Function Overloading

Classes and objects:
Introduction, C Structure Revisited, Specifying a Class, Defining Member Functions, Static Data Members, and Static Member Functions. Arrays of Objects, Objects as Functions Arguments, this pointer, Friend Functions, Returning Objects, Constant Member Functions.

UNIT - III

Constructors and Overloading  8 Hrs

Constructors and Destructors
Introduction, Constructors, Parameterised Constructors, Multiple Constructors in a Class. Constructors with Default Arguments, Copy Constructors, Dynamic Constructors, Constant Objects, Destructors.

Operator Overloading and Type Conversions
Introduction, Defining Operator Overloading, Overloading the Various Operators, Overloading the Increment and the Decrement Operators (Prefix and Postfix), Overloading the Unary Minus and the Unary Plus Operator, Overloading the Arithmetic Operators. Overloading the Relational Operators, Overloading the Assignment Operator, Overloading the Insertion and Extraction Operators, Rules for overloading operators. Type Conversions.

UNIT - IV

Inheritance and Polymorphism  8 Hrs

Inheritance
Introduction, Defining Derived Classes, Single Inheritance, Protected Access Specifier, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes.

Pointers, Virtual Functions and Polymorphism
Introduction, Pointers, Pointers to Objects, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions.

UNIT - V

Exceptions and File handling  8 Hrs

Templates and Exception Handling

**Working with files**
Classes for Files Stream Operations, Opening and Closing a File, Error Handling during File Operations.

**Text Book:**
1. E.Balagurusamy: Object – Oriented Programming with C++, Third Edition, Tata McGraw Hill. (Chapters 1.3 to 1.8, 2.1, 2.2, 2.6, 3.5 to 3.7, 3.10 to 3.18, 4.3, 4.6 to 4.9, 5, 6, 7, 8, 9, 11, and 12)

**References:**
2. Herbert Schildt: C++ The Complete Reference
3. K.R. Venugopal: Mastering C++

**IT INFRASTRUCTURE LANDSCAPE**

<table>
<thead>
<tr>
<th>Subject Code</th>
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<tr>
<td>13CS311</td>
<td>03</td>
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<tr>
<td>Hrs/Week</td>
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<td>Teaching Hours</td>
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**UNIT - I**
**Database and Application and Middleware Overview** 8 Hrs
Understanding Database types, SQL, JDBC, Indexing, Database clustering replication. Introduction to common Messaging Systems (MQSeries), Web tiered deployment, Application Servers & Clustered deployment, E-mail (Lotus Notes / exchange). Understanding Datawarehouse concepts, DataWarehouse Architectures, Logical Design, Physical Design

**UNIT - II**
**Storage Overview** 5 Hrs
Storage Networking Technology, Types of storage system, FC- AL, FABRIC, Storage Area Networks, Zones, Storage virtualization
UNIT – III

Systems Overview  
8 Hrs  
Server Technology (Rack, Blades, Enterprise, HPC), Operating systems, Virtualization (Hypervisors, Partitioning, VMs, I/O Virtualization), Server Deployment (Physical and Virtual), Server Management console, Server Availability concepts and techniques. Server workloads

UNIT - IV

Directory Services Overview  
6 Hrs  
Directory Server concepts, LDAP protocol, LDAP replication topologies, LDIF data exchange

UNIT - V

Network & Security Overview  
8 Hrs  

Text Books and reference books :
1. Introduction to IT infrastructure Landscape by IBMICE Publication
4. It Infrastructure Management by Anita Sengar
ADVANCED STATISTICAL ANALYSIS WITH LAB

Subject Code : 13CS312  
Credits : 03  
Hrs/Week : 3  
Total Hours : 36

UNIT - I
Introduction to Statistical Analysis  6 Hrs
Terminology & definitions, basic steps of the research process, differences between populations and samples, Survey data, designing experiments, independent and dependent variables, testing hypothesis, examining relationships, Introduction to SPSS Statistics, Opening & copying datafiles, statistical procedure

UNIT - II
Describing Data  7 Hrs
Levels of measurement, measures of central tendency and dispersion, normal distributions and z-scores, Data Distributions for Categorical Variables, Data Distributions for Scale Variables, Computing description statistics, compare groups, Interpretation of results of the Frequencies – tabulation & charts, Descriptive, and Explore procedures, Making Inferences about Populations from Samples, influence of sample size, nature of probability, Relationships Between Categorical Variables.

UNIT - III
Testing Hypothesis  8 Hrs
Explain hypothesis testing, types of statistical errors, statistical vs practical importance, Binomial test, Null & alternate hypothesis, Confidence intervals, Independent- Samples T Test, Paired-Samples T Test procedure, One-way ANOVA, two-way ANOVA, Chi-square test, Nonparametric tests – sign, Wilcoxon, Friedman, Mann-Whitney, Kruskal-Wallis tests

UNIT - IV
Examining Relationships  8 Hrs
Linear regression, Predicting numerical outcomes, GLM Multivariate/Repeated Measures, Non-linear regression, Weighted least squares, Two Stage Least Squares, Survival Analysis/Cox regression, Structural Equation Modeling, Bivariate plots & correlation for scale variables, Pearson correlation coefficient, Partial correlation, Analysing residuals, scatterplots of residuals
UNIT - V

Advanced techniques 7 Hrs
Identifying groups: Classification, Binary Logistic Regression, Multinomial Logistic Regression, Probit analysis, Discriminant Function Analysis, Proportional odds model, Decision Trees, Neural Networks. Identifying groups: Segmentation, Two-step cluster, K-means cluster analysis, Hierarchical cluster analysis, Factor analysis, Multidimensional scaling

Text Books:
1. Applied Statistical Analysis By IBM ICE Publication

Reference Books:

1. Statistical Data Analysis (Oxford Science Publications) by Glen Cowan
4. Handbook of Statistical Analysis and Data Mining Applications By Robert Nisbet, John, IV Elder ,
5. Gary Miner
6. An Introduction to Statistical Methods and Data Analysis By R. Ott, Micheal Longnecker

APPLIED STATISTICAL ANALYSIS LAB

Subject Code: 13CS312
List of Experiments:
- Using the pre existing Drinks.sav data file
- **Exercise 1**: to create standardized (Z-) scores for several variables

- Using the preexisting Census.sav data file
- **Exercise 2**: To run Frequencies to explore the distributions of several variables.

- Using the preexisting Drinks.sav data file
- **Exercise 3**: To obtain summary statistics for scale variables

- Using the preexisting Census.sav data file
Exercise 4: To create two and three-way cross tabulations to explore the relationship between several variables and to use the Chart Builder to visualize the relationship.

Using the preexisting Census.sav data file

Exercise 5: To run the Independent-Samples T Test, to interpret the output and visualize the results with an error bar chart.

Using the preexisting data file Census.sav.

Exercise 6: To use One-Way ANOVA with post hoc tests to explore the relationship between several variables. You will use the PASW Statistics.

Using the preexisting data file Bank.sav.

Exercise 7: To visualize the relationship between two scale variables creating scatterplots and to quantify this relationship with the correlation coefficient.

Using the preexisting PASW Statistics data file Census.sav.

Exercise 8: To run linear regressions and to interpret the output.

Using the preexisting data file SPSS_CUST.SAV

Exercise 9: To use nonparametric tests to explore the relationship between several variables

PROBABILITY THEORY AND NUMERICAL METHODS

Subject Code: 13CS401/ IS401/CV401
Credits: 04
Hrs/Week: 4
Total Hours: 52

UNIT - I

Introduction to probability: finite sample space, conditional probability and independence. Baye’s theorem. One dimensional random variable, pdf, cdf, expectation and variance. Two and higher dimensional random variables, joint pdf, marginal pdf, covariance, correlation coefficient.

12 Hrs
UNIT - II
Distributions: Binomial, Poisson, uniform, normal, Chi-square and exponential. Simple problems. Linear and quadratic curve fitting using least square principle. correlation and regression. 10 Hrs

UNIT - III
Sampling theory-Random samples, sampling distributions, t&F distributions. Moment generating function, Central limit theorem and its applications. 10 Hrs

UNIT - IV
Numerical Analysis: Finite differences, Newton-Gregory forward and backward difference interpolation formulae, Lagrange’s interpolation formula, Lagrange’s Inverse interpolation formula. Numerical differentiation using Newton’s forward & backward formulae. Numerical integration: General quadrature formula, Trapezoidal rule, Simpson’s one third rule, Simpson’s three eighth rule. 12 Hrs

UNIT - V
Roots of algebraic and transcendental equations, Numerical solution of first order ordinary differential equations: Taylor’s series Method, Modified Euler’s method, Runge –Kutta 4th order Method. Milne’s predictor-corrector methods. 8Hrs

Text Books:

Reference Books:
DESIGN & ANALYSIS OF ALGORITHMS

Subject Code : 13CS402
Credits : 04
Hrs/Week : 4
Total Hours : 52

UNIT - I
Introduction
Introduction: What is an Algorithm?, Fundamentals of Algorithmic, Problem Solving, Important Problem Types, Fundamental Data Structures

UNIT – II
Brute Force and Divide & Conquer
Brute Force: Selection Sort and Bubble Sort, Sequential Search and Brute-Force String Matching, Exhaustive Search
Divide and Conquer: Mergesort, Quicksort, Binary Search, Binary tree traversals and related properties, Multiplication of large integers and Stressen’s Matrix Multiplication.

UNIT – III
Decrease & Conquer and Transform & Conquer
Decrease & Conquer: Insertion Sort, Depth First Search, Breadth First Search, Topological Sorting, Algorithms for Generating Combinatorial Objects
Transform and Conquer: Presorting, Balanced Search Trees, Heaps and Heapsort, Problem Reduction

UNIT – IV
Tradeoffs and Dynamic Programming

UNIT – V
Greedy, Backtracking and Branch & Bound Techniques
Greedy Method: Prim’s Algorithm, Kruskal’s Algorithm, Dijkstra’s Algorithm, Huffman Trees, Backtracking: n queens problem, subset-sum problem, Branch and Bound: Assignment problem, Knapsack problem
Text Book:

Reference Books:

DESIGN & ANALYSIS OF ALGORITHMS LABORATORY

Subject Code : 13CS402  
Credits : 1  
Hrs/Week : 2

Students have to write, execute and test programs covering the syllabus of 13CS402. The execution times of programs for various types of inputs have to be recorded and analyzed. Various versions of programs to solve same problem must be attempted and a comparison of performance must be drawn.

Typical problems that may be tried are
1. Merge sort
2. Quick sort
3. Topological sort in graphs
4. Strassen matrix multiplication
5. Heapsort
6. Prim’s algorithm
7. Kruskal’s algorithm
8. Dijkstra’s algorithm
9. Warshall’s algorithm
10. Floyd algorithm
11. Travelling salesperson problem
12. N-Queen problem

Note: Students may implement the programs using C/C++ language on Windows platform.
FINITE AUTOMATA AND FORMAL LANGUAGES

Subject Code : 13CS403  
Credits : 04  
Hrs/Week : 4  
Total Hours : 52

UNIT – I
Introduction to the theory of computation.  
Mathematical preliminaries and notation, Three basic concepts, Some applications  
2 Hrs

Finite Automata  
Deterministic Finite accepter-Deterministic accepter and transition graphs, Languages and DFA’s, Regular languages, Nondeterministic finite accepter: Definition, Examples, Equivalence of Deterministic and Nondeterministic Finite Acceptor. Reduction of the number of states in finite automata.  
8 Hrs

UNIT - II
Regular Languages and Regular Grammars.  
Regular expressions, Languages associated with regular expressions, Regular expressions denote regular languages, Regular expressions for regular languages, Regular grammars-Right and Left linear grammars-examples. Right linear grammar generate regular languages, Right linear grammars for regular languages.  
5 Hrs

Properties of Regular Languages  
Closure properties of regular languages-Closure under simple set operations, closure under other operations. Identifying nonregular languages-Using the Pigeonhole principle, A pumping lemma  
5 Hrs

UNIT - III
Context-Free languages: Context-Free grammars-examples, Leftmost and rightmost derivations, Derivations trees, Parsing and ambiguity-Ambiguity in grammars and languages.  
5 Hrs

Simplification of CFG and Normal Forms  
Methods for transforming grammars-Substitution rule, Removing useless, lambda, unit productions. Normal forms-Chomsky normal form and Greibach normal form.  
5 Hrs
UNIT - IV

Properties of Context-Free Languages.
Two pumping lemmas:A pumping lemma for Context-Free languages,A pumping lemma for Linear languages. 5 Hrs

Pushdown Automata
Nondeterministic pushdown automata-Definition, Language accepted by a PDA,PDA for Context Free languages, Context free grammars for pushdown automata, Deterministic pushdown automata. 5 Hrs

UNIT - V

Turing Machines.
The standard Turing machine-Definition,examples,Turing machine as language accepter.Turing machine as Transducers,Combining Turing machines for complicated tasks. Universal turing machine Other models of Turing machines: Multitape turing machines,Nondeterministic turing machines etc. 7 Hrs

A Hierarchy of Formal Languages and Automata:
Recursive and recursively enumerable languages,The Chomsky hierarchy. 3 Hrs

Limits of Algorithmic Computation:
Some problems that cannot be solved by Turing machines,The post correspondence problem 2 Hrs

Text Books:

Reference books:
COMPUTER ORGANIZATION AND ARCHITECTURE

Subject Code : 13CS404  
Credits : 04
Hrs/Week : 4  
Teaching Hours : 2

UNIT – I

Basic Computer Organization
Basic structure of computer and its components, Machine Instructions and Programs, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Stacks and Queues, Subroutines, Additional Instructions, Number representation and operation on numbers in IEEE format. Comparison of RISC and CISC architectures.  
11 Hrs

UNIT – II

Arithmetic Operations
Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Integer Division, Floating-point Numbers and Operations

UNIT – III

Basic Processing Unit
Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control, Microprogrammed Control, Pipelining basics.  
10 Hrs

UNIT – IV

Memory Systems
Memory System: Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions, FIFO and LRU replacement policies, Performance Considerations, Virtual Memories, Secondary Storage  
10 Hrs

UNIT – V

Input/Output Organization
Input/Output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Exceptions, Handling Multiple Devices, Controlling Device Requests, Buses,
Direct Memory Access, Interface Circuits (parallel, Serial). Standard I/O Interfaces – PCI Bus, SCSI Bus, USB (Basics only)  

11 Hrs

Text Books:

Reference Books

DATA COMMUNICATIONS

Subject Code : 13CS405  
Credits : 04
Hrs/Week : 4  
Total Hours : 52

UNIT - I

Introduction to data communications  
10 Hrs

UNIT - II
**Digital Transmission Fundamentals - I** 10 Hrs
Analog and Digital Data, Analog and Digital Signals, Transmission impairment Data rate limits: Nyquist Bit rate and Shannon Channel Capacity, Performance Digital Transmission: Digital to digital conversion, Line coding, Block Coding, Scrambling Analog to digital conversion: Pulse code modulation, Delta Modulation
Transmission modes: Parallel and Serial transmission.

UNIT - III
**Digital Transmission Fundamentals – II** 10 Hrs
Analog Transmission: Digital to analog conversion, Amplitude shift keying, Frequency shift keying and phase shift keying. Quadrature Amplitude shift keying, Analog to analog conversion: Amplitude Modulation, Frequency Modulation, Phase Modulation
Transmission Media: Twisted Pair, Coaxial Cable, Fiber Optic Cable, Radio waves, Microwaves, Infrared
Error Detection and Correction: Introduction, Block Coding, Linear Codes, Cyclic Codes, Cyclic redundancy check, Hardware implementation, Cyclic code analysis, Internet Checksum.

UNIT - IV
**Switching and Multiplexing** 11 Hrs
CIRCUIT-SWITCHED NETWORKS: Three Phases, Efficiency, Delay, Circuit-Switched Technology in Telephone Networks, DATAGRAM NETWORKS: Routing Table Datagram Networks in the Internet, VIRTUAL-CIRCUIT NETWORKS, STRUCTURE OF A SWITCH Frequency-Division Multiplexing, Wavelength-Division Multiplexing, Synchronous Time-Division Multiplexing, Statistical Time-Division Multiplexing, SPREAD SPECTRUM: Frequency Hopping Spread Spectrum (FHSS), Direct Sequence Spread Spectrum

UNIT - V
**Data link control and multiple access** 11 Hrs
FRAMING, FLOW AND ERROR CONTROL, PROTOCOLS, NOISELESS CHANNELS, NOISY CHANNELS: Stop-and-Wait Automatic Repeat Request, Go-Back-N Automatic Repeat Request, Selective Repeat Automatic Repeat Request, Piggybacking, RANDOM ACCESS, ALOHA, CONTROLLED ACCESS, CHANNELIZATION.
Text Books:

References:
1. Alberto Leon Garcia and Indra Widjaja, Communication Networks – Fundamental Concepts and Key architectures, 2nd edition

UNIX PROGRAMMING

Subject Code : 13CS406  
Credits : 02
Hrs/Week : 2  
Total Hours : 26

UNIT - I
Unix Operating System, The UNIX architecture and command usage, The File System, Basic file Attributes, the vi Editor, The Shell and basic commands and their usage. 6 Hrs

UNIT - II
More file Attributes, Simple filters, Filters using regular expressions. 5 Hrs

UNIT - III
The process, Essential Shell Programm 5 Hrs

UNIT - IV
Perl-The Master Manipulator.  
Awk –An Advanced filter 5 Hrs
UNIT - V

Advanced Shell programming. 5 Hrs

Text Books:
2. Python Cookbook, Alex Martelli, Anna Ravenscroft, David Ascher, O'Reilly Media Publication, Second Edition

Reference Books:

UNIX PROGRAMMING LAB

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<tr>
<td>Hrs/Week</td>
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1. Students must familiarize themselves with vi editor on Linux platform. Write some C and C++ programs, compile them and execute. (Programs from Data structures and OOP can be taken as examples). Debugging using debug utility on Linux must be tried.
2. X-windows GUI on Linux platform must be studied.
3. Perl and awk utilities must be used in programming.
4. Shell programs have to be written.
5. ‘Make’ file utility and other useful utilities must be tried.
6. Students must be trained on Installation of Linux OS
INTRODUCTION TO VIRTUALIZATION
AND CLOUD COMPUTING

Subject Code : 13CS411
Credits : 3.5
Hrs/Week : 3
Total Hours : 30
Tutorial Hrs : 1

UNIT - I
Introduction to Virtualization 6 Hrs
Traditional IT Infrastructure, Benefits of Virtualization, Types of Virtualization, History of Virtualization.

UNIT - II
Server, Storage, Network and Application Virtualization 6 Hrs

UNIT - III
Introduction to Cloud Computing 6 Hrs
History, Importance of Virtualization in Cloud, Anatomy of Cloud, Cloud deployment models, Cloud delivery models, Stepping stones for the development of cloud, Grid Computing, Cloud Computing

UNIT - IV
Cloud Implementations / Cloud Deployment Models, Cloud Delivery Models 6 Hrs
Decision Factors for Cloud Implementations, Public, Private and Hybrid Cloud, Overview, Infrastructure as a Service (IaaS) Cloud Delivery Model, Platform as a Service (PaaS) Cloud Delivery Model, Software as a Service (SaaS) Cloud Delivery Model

UNIT – V
Case Study On Virtualization, Cloud Workloads 6 Hrs
Customer IT Landscape, Triggers of Virtualization, Preparation for Virtualization, Transition Tools for Virtualization, Cost savings , Cloud workload Overview, Workloads most suitable for Cloud, Workloads not suitable for Cloud
Text Books:
- **Introduction to Virtualization and Cloud Computing** by IBM ICE Publication
- IBM Redbooks | System x Virtualization Strategies

PowerVM Virtualization on IBM System p: Introduction and Configuration Fourth Ed. ...

**VIRTUALIZATION LABORATORY**

Subject Code : 13CS411  
Credits : 0.5

Hrs/Week : 1

List of Experiments:
1. Virtual Machine Using VMware
2. Virtual Machine Using QEMU
3. KVM on Ubuntu 12.10
4. KVM and guest operating system on CentOS6.3
5. Installation Of VMware ESX Server

Text Books
Introduction to Virtualization and Cloud computing by IBM ICE Publication

**APPLIED BUSINESS ANALYTICS**

Subject Code : 13CS412  
Credits : 3+1

Hrs/Week : 4  
Total Hours : 25

Tutorial Hrs : 1

UNIT – I

**Introduction to Strategy Management**  5 Hrs
Meaning, essence & nature of strategy, levels & importance of strategy; Process of strategy, Strategic intent, Environmental & organizational Analysis; Identification of strategic alternatives, choice of strategy, implementation of strategy, evaluation & control
UNIT – II

**Strategic Planning** 5 Hrs
Strategy planning process, Key elements; Importing selected data from all relevant sources; Cross-functional planning, Collaborative environment for planning; Developing workflow & interfaces for all participants, Use of IT tools for planning & budgeting

UNIT – III

**Developing and using KPIs** 5 Hrs
What is Performance indicators; Brainstorming performance measures; Impact of KPIs, Types of KPIs; Steps in KPIs identification, Setting KPI owners & milestones; Monitoring, Measuring and reporting KPIs

UNIT - IV

**Balanced Scorecard overview** 5 Hrs
Monitor Performance with Scorecards -- Identify scorecards, metrics/KPIs, and metric types, Organize metrics with strategies, Track initiative with projects.

View and Monitor Metrics -- View metric history, Address problems with actions, Monitor status visually with diagrams, Validate metric details, Quickly access metrics
Overview of IT tools for Scorecarding, Building and tracking KPIs

UNIT – V

**Management Dashboards** 5 Hrs
Categorizing Dashboards; Types of dashboard data; Design a dashboard – best practices; Characteristics of well designed dashboard; Key goals in visual design process; Create a new dashboard as per business scenario; Self-service capabilities in Dashboards; Create a dashboard from existing content ; Modify an existing dashboard ; Collaborate on a dashboard

Text Book:
*Business Strategy and Analytics* by IBM ICE Publication

References and URLs
INDIVIDUAL EFFECTIVENESS LABS (IEL)

Sub Code: 13CS407          Hrs / Week: 4

Introduction
Entry Edge (E$^2$) is an industry readiness program designed for technology undergraduates to help them enhance important individual behavior & skills, and become productive from the very beginning of their corporate carrier. The program places a high emphasis on the pedagogy of learning by doing.

As part of the program, students first go through individual behavior & skill labs (Individual Effectiveness Labs) in their II year of engineering curriculum and then participate in “hands on” and “minds on” team activities in a simulated work environment, to accomplish tasks and to solve real-world organizational issues during a week long Immersive Group Workshop (IGW) held in the III year of their engineering course.

This document provides the syllabus and evaluation framework for Individual Effectiveness Labs (IEL).
Objectives
1. To help the students understand themselves. Identify and analyze personality/behavioral attributes of personal effectiveness – exploratory orientation, self-disclosure, receptivity to feedback and sensitivity to others.
2. To help the students identify their primary and secondary motivators – what drives them for achievement?
   a. Understanding the student’s need for achievement
   b. Understanding how positive expectations lead to positive results.
3. To help the students to develop a goal driven mindset and to take the first steps into individual personal planning, controlling and measuring results.
4. To make the students aware of importance of communication and typical barriers to communication.
5. To help the students develop effective oral communication skills.
6. To help the students develop effective written communication skills.
7. To help the students develop listening skills.
8. To help the students participate in group discussions.
9. To help the students develop effective business presentation skills.
10. To help the students receive feedback with an open mind, respond to feedback and take the action on them.
11. To help the students develop time management and organization skills.

Contents

Module 1: Know Yourself
Self assessment profilers to identify and assess the following – Identify and analyze personality/behavioral attributes of personal effectiveness – exploratory orientation, self disclosure, receptivity to feedback, sensitivity to others. 8 Hrs

Module 2: Achievement Motivation & Goal Setting
- Identifying primary and secondary motivators using a motivational profiler.
- Understanding need for achievement.
- Developing goal driven mindset.
- First steps into career planning. 8 Hrs
Module 3: Communication Skills
- Effective oral communication
- Effective written communication
- Constructing effective messages (memo, letters, e-mails)
- Writing persuasively
- Correspondence etiquettes – letters & email
- Importance of listening responsively
- Handling conversations
- Effective group discussions 15 Hrs

Module 4: Presentation Skills
- Understanding audience, presentation objectives, best practices & tools in preparation of presentation.
- Improving quality of presentation through better use of voice, eyes, gestures, visual aids.
- Presenting to groups
- Presenting one-on-one.

Module 5: Handling Feedback
- Seeking feedback
- Accepting feedback with an open mind
- Responding to feedback
- Actionizing feedback 6 Hrs

Module 6: Time Management
- Introduction to Time Management and importance of managing self
- Beating procrastination
- Action plans-starting to achieve in a small way
- Scheduling skills 6 Hrs

Reference Books
2. Online reference materials provided as part of the Entry Edge program.