SYLLABUS
(With effect from 2018-19)

V & VI Semester
BACHELOR DEGREE
IN
COMPUTER SCIENCE & ENGINEERING
OUT COME BASED EDUCATION
WITH
CHOICE BASED CREDIT SYSTEM

P.E.S. COLLEGE OF ENGINEERING,
MANDYA - 571 401, KARNATAKA
(An Autonomous Institution Affiliated to VTU, Belagavi,
Grant -in- Aid Institution (Government of Karnataka), World Bank Funded College (TEQIP)
Accredited by NBA, New Delhi and Approved by AICTE, New Delhi.)

Ph : 08232- 220043, Fax : 08232 – 222075, Web : www.pescemandya.org
PREFACE

P.E.S. College of Engineering, Mandya, started in the year 1962, has become autonomous in the academic year 2008-09. Since, then it has been doing the academic and examination activities successfully. The college is running Eight Undergraduate and Six Postgraduate programs. It consists of four M.Tech programs, which are affiliated to VTU. Other postgraduate programs are MBA and MCA.

India has become a Permanent Member by signing the Washington Accord. The accord was signed by the National Board of Accreditation (NBA) on behalf of India on 13th June 2014. It enables not only the mobility of our degree globally but also establishes equivalence to our degrees with that of the member nations such as Taiwan, Hong Kong, Ireland, Korea, Malaysia, New Zealand, Russia, Singapore, South Africa, Turkey, Australia, Canada and Japan. Among other signatories to the international agreement are the US and the UK. Implementation of Outcome Based Education (OBE) has been the core issue for enabling the equivalence and of Indian degrees and their mobility across the countries.

Our Higher Educational Institution has adopted the CBCS based semester structure with OBE scheme and grading system.

The credit based OBE semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching.

The OBE, emphasize setting clear standards for observable, measurable outcomes of programs in stages. There lies a shift in thinking, teaching and learning processes moving towards Students Centric from Teacher Centric education. OBE standards focus on mathematics, language, science, attitudes, social skills & moral values.

The key features which may be used to judge, if a system has implemented an outcome based education system is mainly Standard based assessments that determines whether students have achieved the stated standard. Assessments may take any form, so long as the process actually measure whether the student knows the required information or can perform the required task. Outcome based education is a commitment that all students of all groups will ultimately reach the same minimum standards. Outcome Based Education is a method or means which begins with the end in mind and constantly emphasizes continuous improvement.

Choice Based Credit System (CBCS) provides choice for students to select from the prescribed courses (core, Foundation, Foundation Elective, elective, open elective and minor or soft skill courses). The CBCS provides a ‘cafeteria’ type approach in which the students can Choose electives from a wide range of courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, adopt an interdisciplinary approach to learning which enables integration of concepts, theories, techniques, and, perspectives from two or more disciplines to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline. These greatly enhance the skill/employability of students.

In order to increase the Industry/Corporate readiness, many Soft Skills, Personality Development modules and Technical Skills have been added to the existing curriculum of the academic year 2018-19. Internship have been made compulsory to enhance the field experience. In order to enhance creativity and innovation Technical Skills and Skill Oriented Lab are included in all undergraduate programs.

Dr. Umesh D R
Deputy Dean (Academic)
Associate Professor,
Dept. of CS & Engg

Dr. Nagarathna
Dean (Academic)
Professor
Dept. of CS & Engg
P.E.S. College of Engineering, Mandya

VISION

“PESCE shall be a leading institution imparting quality Engineering and Management education developing creative and socially responsible professionals

MISSION

• Provide state of the art infrastructure, motivate the faculty to be proficient in their field of specialization and adopt best teaching-learning practices.
• Impart engineering and managerial skills through competent and committed faculty using outcome based educational curriculum.
• Inculcate professional ethics, leadership qualities and entrepreneurial skills to meet the societal needs.
• Promote research, product development and industry-institution interaction.

Department of Computer Science and Engineering

The Vision of the department is:

“The Department of Computer Science and Engineering shall create professionally competent and socially responsible engineers capable of working in global environment.”

The mission of the department is:

DM1: Enforce best practices in teaching-learning, with dedicated faculty and supportive infrastructure to impart the knowledge in emerging technologies.
{Required to create professionally competent engineers}
DM2: Improve Industry-Institute relationship for mutual benefit.
{Required to create professionally competent engineers}
DM3: Inculcate ethical values, communication and entrepreneurial skills.
{Required to create professionally competent and socially responsible engineers}
DM4: Sensitize social, legal, environmental and cultural diversity issues through professional training and balanced curriculum.
{Required to create engineers capable of working in global environment}

Program Educational Objectives (PEOs)

Graduates of the program shall
1. Have Successful computer professional career in IT industry and related areas.
2. Pursue higher education in engineering or management with the focus on intensive research and developmental activities.
3. Develop computing systems in a responsible, professional and ethical manner to serve the society.

The National Board of Accreditation (NBA) has defined twelve Program Outcomes for Under Graduate (UG) engineering programs as listed below.
Program Outcomes (POs)

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling to complex engineering activities, with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess Societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

The Under Graduate (UG) of B.E Computer Science & Engineering Program has defined Program Specific Outcomes (PSO) which are listed below.

The students shall have the

1. Ability to design and develop network based systems in emerging technology environments like Cloud Computing, Security, Internet of Things and embedded systems.

2. Ability to develop knowledge based data management system in the areas like data analytics, data mining, business intelligence, pattern recognition and knowledge discovery in solving engineering problems.
# Scheme of Teaching and Examination (CBCS with OBE) for B.E. Computer Science & Engg.

## V – Semester

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<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Teaching Department</th>
<th>Hrs / Week</th>
<th>Credits</th>
<th>Examination Marks</th>
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<td>Management and Entrepreneurship</td>
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**Total**                                25 500 500 1000

### Professional Elective - I

- **Sl. No.**  
  1. P18CS551  
  2. P18CS552  
  3. P18CS553  
  4. P18CS554

### List of Electives

#### Professional Elective - II

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**Total**                                23 450 450 900

#### Open Elective – I

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</table>
Course Title: Management and Entrepreneurship

Course Code: P18CS51  Semester: 5  L:T:P: 4:0:0  Credits: 4

Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs  Weightage: CIE:50%, SEE:50%

Course Content

Unit-1
Management: Importance of management, definition, management functions, roles of a manager, levels of management, managerial skills, management and administration, management—a science or art, management—a profession, professional management v/s family management. Development of management thought. Early classical approaches, Neo classical approaches
Self Study Component: Modern approaches.

Unit-2
Planning: Nature, Importance of planning, forms, types of plans, steps in planning, limitations of planning, making planning effective, planning skills, strategic planning in Indian industry. Organization: Meaning, process of organizing, span of management principles of organizing, Departmentation, Organization structure, committees.
Self Study Component: Teams.

Unit-3
Direction and supervision: Requirements of effective direction, giving orders, motivation, job satisfaction, morale, organizational commitment, first level supervision or front line supervision. Controlling: Meaning and steps in controlling, Essential of a sound control system.
Self Study Component: Methods of establishing control.

Unit-4
Entrepreneurship: Meaning of Entrepreneur; Evolution of the Concept, Functions of an Entrepreneur, Types of Entrepreneur, Entrepreneur—an emerging Class. Concept of Entrepreneurship—Evolution of Entrepreneurship, Development of Entrepreneurship, Stages in entrepreneurial process; Role of entrepreneurs in Economic Development.
Self Study Component: Entrepreneurship in India; Entrepreneurship—its Barriers.

Unit-5
Small scale industries: Definition; Characteristics; Need and rationale; Objectives; Scope; role of SSI in Economic Development. Advantages of SSI. Steps to start and SSI - Government policy towards SSI; Different Policies of SSI; Government Support for SSI during 5 year plans. Impact of Liberalization, Privatization, Globalization on SSI Effect of WTO/GATT Supporting Agencies of Government for SSI, Meaning, Nature of support; Objectives; Functions; Types of Help.
Self Study Component: Ancillary Industry and Tiny Industry.

Text Books:
Reference Book:

**Course Outcomes**: Upon completion of this course, students will be able to
1. Describe the basic principles and concepts of management.
2. Distinguish different plans and List steps in Planning.
3. Interpret the concept of directing and controlling.
4. Demonstrate the meaning, functions, types and role of Entrepreneur and describe various industrial supports.
5. Explain in detail about small scale industries and prepare the project report

**CO-PO Mapping**

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<tr>
<th>CO</th>
<th>Statement</th>
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<td>Distinguish different plans and List steps in Planning</td>
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<td>CO4</td>
<td>Demonstrate the meaning, functions, types and role of Entrepreneur and describe various industrial supports</td>
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Course Title: Operating System

Course Code: P18CS52
Semester: 5
L:T:P: 4:0:0
Credits: 4
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs

Weightage: CIE:50%, SEE:50%

Course Content

Unit–1
INTRODUCTION TO OPERATING SYSTEMS: Overview: Need of operating systems, Computer System organization, Computer System architecture, Operating System structure, Operating System operations, Process management, Memory management, Storage management, Protection and security, Distributed system, computing environments.
System structure: Operating System Services, User- Operating System interface, System calls, Types of system calls, System programs, Operating System design and implementation, Operating System structure, System boot.
Self-study component: Virtual machines

10 Hours

Unit-2
PROCESS MANAGEMENT: Process concepts: Overview, Process scheduling, operations on processes, Inter-process communication.
Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple-Processor scheduling
Self-study component: Thread scheduling

11 Hours

Unit-3
PROCESS SYNCHRONIZATION: Synchronization: Background, The Critical section problem, Peterson’s solution, Synchronization hardware, Semaphores, Classical problems of synchronization, Monitors
Deadlocks: Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance,
Self-study component: Deadlock detection and recovery from deadlock

10 Hours

Unit-4
MEMORY MANAGEMENT AND PROTECTION: Memory Management Strategies: Background, Swapping, Contiguous memory allocation, Paging, Structure of page table, Segmentation.
Virtual Memory Management: Background, Demand paging, Copy-on-write, Page replacement, Allocation of frames,
Self-study component: Thrashing.

10 Hours

Unit-5
Secondary storage structures: Mass storage structures, Disk structure, Disk attachment, Disk scheduling,
Self-study component: Disk management, Swap space management.
Text Book:

Reference Books:

Course outcomes
1. Explain operating system structure, services, types, design and implementation of OS
2. Apply the various algorithms of process scheduling.
3. Develop solutions to process synchronization and dead lock problems.
4. Analyze various memory management techniques.
5. Explain file system implementation and allocation methods

CO-PO Mapping

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<td>Analyze various memory</td>
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<td>management techniques</td>
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<td>CO5</td>
<td>Explain file system implementation and allocation methods</td>
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11 Hours
Course Title: Computer Networks

Course Code: P18CS53  Semester : 5  L:T:P - 4 : 4 : 0  Credits: 4
Contact Period : Lecture :52 Hr, Exam: 3Hr  Weightage :CIE:50% SEE:50%

Course Content

Unit-1


Network-Layer Protocols: Internet protocol (IP), ICMPv4, Mobile IP.
Self study component: Network Address Resolution (NAT), Routers as Packet Switches, Insufficiency in Mobile IP.

Unit-2


Unit-3


Self study component: Group Membership Messages, Write a program to simulate the distance vector algorithm, link-state algorithm and path vector algorithm.

Unit-4


Self study component: TCP Timers, Iterative Programming in C: General Issues, Iterative programming using UDP, Iterative programming using TCP.

Fifth and Sixth Semester Syllabus [CBCS with OBE] of 2018-19 Academic Year
Unit-5

Standard Client-Server Protocols: WWW (World Wide Web), HTTP (Hyper Text Transfer Protocol), FTP (File Transfer Protocol), Electronic Mail (e-mail), TELNET, SecureShell (SSH), DNS (Domain Name System): Name Space, DNS in the Internet, Resolution, Catching, Resource Records, DNS messages, Registrars.

Network Management: Introduction, SNMP, ASN.1


11 Hours

Text Book:

Reference Books:

Course Outcomes
1. Discuss the services provided by network layer such as Packetizing, Forwarding and Routing, IPV4 addressing for host-to-host communication.
2. Analyse and apply the routing algorithms such as distance vector, link state, hierarchical & multicast routing for transmitting reliable data through wired/wireless media.
3. Design and Construct a Network and its Performance can be measured based on various factors such as delay, throughput, and packet loss.
4. Discuss the service provided by transport layer such as process to process communication, addressing, multiplexing, de-multiplexing, error control, flow control and congestion control.
5. Design and Implement client - server paradigm or peer-to-peer paradigm using HTTP, DNS, TELNET, FTP protocols by knowing the importance of application layer in internet.
### CO-PO Mapping

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<thead>
<tr>
<th>CO</th>
<th>Statement</th>
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<th>PS 01</th>
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<td>CO1</td>
<td>Discuss the services provided by network layer such as Packetizing, Forwarding and Routing, IPV4 addressing for host-to-host communication.</td>
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<td>CO2</td>
<td>Analyze and Apply the routing algorithms such as distance vector, link state, hierarchical &amp; multicast routing for transmitting reliable data through wired/wireless media.</td>
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<td>CO3</td>
<td>Design and Construct a Network and its Performance can be measured based on various factors such as delay, throughput and packet loss.</td>
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<td>CO4</td>
<td>Discuss the service provided by transport layer such as process to process communication, addressing, multiplexing, de-multiplexing, error control, flow control and congestion control.</td>
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<tr>
<td>CO5</td>
<td>Design and Implement client-server paradigm or peer-to-peer paradigm using HTTP, DNS, TELNET, FTP protocols by knowing the importance of application layer in internet.</td>
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</table>
Course Title: Software Engineering

Course Code: P18CS54  Semester: 5  L:T:P: 4:0:0  Credits: 4

Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs  Weightage: CIE:50%, SEE:50%

Prerequisites: Knowledge of process and product software.

Course Content

Unit–1

Self study component: Case studies.

9 Hours

Unit–2
Agile software development: Agile methods, Plan driven and agile development, Extreme programming, Agile project management.
Requirements engineering: Functional and non-functional requirements, the software requirements document Requirements specification, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management.
Self study component: Scaling agile methods.

12 Hours

Unit–3
System modelling: Context models, Interaction models, Structural models, Behavioural models, Model-driven engineering.
Self study component: Application architectures

12 Hours

Unit–4
Design and Implementation: Object-oriented design using the UML Design patterns, Implementation issues.
Software testing: Development testing, Test-driven development, Release testing, User testing.
Self study component: Open source development.

10 Hours

Unit–5
Project management: Risk management, Managing people, Teamwork.
Configuration management: Change management, Release management.
Self study component: Version management System building.

9 Hours

Text book:

Reference books:
Course Outcomes: At the end of the course the student should be able

1. **Explore** the various types of software process.
2. **Elaborate** the importance of software development.
3. **Assess** the significance of software engineering.
4. **Compare** different Software Development methods.
5. **Identify** the different forms of Software Development.

**CO-PO mapping**

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<tr>
<th>Semester: 5th</th>
<th>Course code: P18CS54</th>
<th>Title: Software Engineering</th>
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<tr>
<td>CO Statement</td>
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<td>1 Introduction to Software Engineering</td>
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<td>2 Describe the process of Software Engineering, the technologies used for Software Engineering, and configuration management of Software Engineering</td>
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<td>3 Apply Architectural Design Architectural design decisions System organization Modular decomposition styles Control styles</td>
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<td>4 Understand what Software Testing is</td>
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<tr>
<td>5 Explain Project management Risk management, Managing people, Teamwork, Understand Configuration management</td>
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</table>
Course Title: Advanced Java

Course Code: P18CS551  Semester : 5  L:T:P - 2 : 2 : 0  Credits: 3

Contact Period : Lecture :52 Hr, Exam: 3Hr  Weightage :CIE:50% SEE:50%

Course Content

Unit-1

Event Handling and Applets : Event Handling  –Introduction, Delegation Event Model, Hierarchy of Event Classes, Types and Sources of Events, Event Listener Interfaces, class Action Event, class Adjustment Event, change Event and Change Listener, class Component Event, class Container Event, class Focus Event, class Item Event, class Key Event, class Mouse Event, class Text Event, class Window Event, interface Window Listener

Applets-Introduction, Applet Architecture, Applet Class and Methods, Creating Applets, HTML Tags, Simple Applet Display Methods, Passing Parameters to Applets, Passive Applet Programs, Adding Images to Applet Windows, Managing Colours in Applet Window, Interactive Applets with AWT Graphical Components, AWT Text fields in Applets, Animation in Applet Windows

Self Study Component: Details of Event Listener Interfaces, Display of Numerical Values on Applet Windows

11 Hours

Unit-2

Multithreaded Programming-Introduction, Need for Multiple Threads, Thread Class, Main Thread, Creation of New Threads, Thread States, Thread Priority, Synchronization, Deadlock and Race Situations, Inter-thread Communication, Suspending, Resuming, and Stopping of Threads, Sample Programs, Application Programs with Threads: Producer–Consumer Problem

Self Study Component: Creation of Multiple Threads by Extending Thread Class

10 Hours

Unit-3

Networking :Introduction ,Networking Basics ,Protocols, Classes and Interfaces in java.net, class Inet Address, class URL Connection, TCP/IP Server Socket Programming, Class Server Socket, Communication through Sockets, Users/Unreliable Datagram Protocol class Datagram Packet, Datagram Socket Class, Programs for Sending and Receiving Datagram

Self Study Component: Class URL

11 Hours

Unit-4

Java 2 enterprise edition overview, database access: Overview of J2EE and J2SE. The Concept of JDBC, JDBC Driver Types, JDBC Packages, A Brief Overview of the JDBC process, Database Connection, Associating the JDBC/ODBC Bridge with the Database, Statement Objects, ResultSet, Transaction Processing, Exceptions.

Self Study Component: Metadata, Data types

10 Hours

Unit-5

Servlets: Java Servlet and common Gateway Interface Programming, A simple Java Servlet, Anatomy of a Java Servlet, Reading Data from a Client, Reading HTTP Requests Headres, sending Data to a Client and writing HTTP Response Headres, Working with Cookies, Tracking Session.

Java Server Pages: JSP, JSP Tags. Tomcat, Request String, User Sessions, Cookies

Self Study Component: Session Objects.
Text Books:

Reference Books:

Course Outcomes:
1. Demonstrate the usage of Event handling and Applets
2. Understand and develop programs using thread concepts
3. Implement client side and server side programming for two way communication
4. Develop programs using Java Database Connectivity
5. Gain the knowledge of Server Side programming by implementing Servlet and JSP.

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<td>Demonstrate the usage of Event handling and Applets</td>
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<td>CO 2</td>
<td>Understand and develop programs using thread concepts</td>
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<td>CO 3</td>
<td>Implement client side and server side programming for two way communication</td>
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<td>CO 4</td>
<td>Develop programs using Java Database Connectivity</td>
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<td>CO 5</td>
<td>Gain the knowledge of Server Side programming by implementing Servlet and JSP</td>
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</table>
Course Title: Web Technologies

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<td>P18CS552</td>
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Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs

Weightage: CIE: 50%, SEE: 50%

Course Content

Unit–1

Fundamentals of Web: Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, the Web Programmers Toolbox.


Self study Component: Differences between HTML and XHTML

10 Hours

Unit-2

CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The Box model, Background images, The <span> and <div> tags, Conflict resolution.

JAVASCRIPT: Overview of JavaScript, Object orientation and JavaScript, General syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructor.

Self study Component: Pattern matching using regular expressions.

11 Hours

Unit-3

JAVASCRIPT AND HTML DOCUMENTS: The JavaScript execution environment; The Document Object Model; Element access in JavaScript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements

DYNAMIC DOCUMENTS WITH JAVASCRIPT: Introduction to dynamic documents; Positioning elements; Moving elements; Element visibility; Changing colors and fonts; Dynamic content; Stacking elements; Locating the mouse cursor; Reacting to a mouse click; Slow movement of elements.

Self study Component: Dragging and dropping elements.

10 Hours

Unit-4

XML: Introduction; Syntax; Document structure; Document Type definitions; Namespaces; XML schemas; Displaying raw XML documents; Displaying XML documents with CSS; XSLT style sheets; XML processors.

PHP: Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, Operations and expressions, Output, Control statements, Arrays, Functions, Pattern Matching Form handling, Files, Cookies.

Self study Component: Session tracking

11 Hours

Unit-5


Introduction to ASP.NET: Introduction to ASP.NET, ASP.NET Controls, ASP.NET AJAX, Self study Component: Web Services

10 Hours
Text Book:

Reference Books:
3. The Web Warrior Guide to Web Programming – Xue Bai et al,

Course Outcomes
1. Develop web pages using various XHTML tags.
2. Design interactive web pages using java script.
3. Create dynamic documents using DOM object model.
4. Develop web pages using PHP scripts.
5. Implement simple application using Ajax.

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<td>Develop web pages using various XHTML tags</td>
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<td>Design interactive web pages using CSS</td>
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<td>Create dynamic documents using DOM object model.</td>
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<td>CO5</td>
<td>Implement simple application using Ajax.</td>
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Course Title: Artificial Intelligence

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<td>Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs</td>
<td>Weightage: CIE:50%, SEE:50%</td>
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Course Content

Unit-1


**Solving problem by searching** - Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions;

**Adversarial Search** - Alpha – Beta Pruning.

Self-Study Component: Solving problem by searching - Example Problems

12 Hours

Unit-2


**First-Order Logic** - Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic;

**Inference in First-Order Logic** - Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

Self-Study Component: Inference in First-Order Logic - Propositional vs. First-Order Inference

10 Hours

Unit-3

**Quantifying Uncertainty** - Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes’ Rule and Its Use;

**Probabilistic Reasoning** - Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Exact Inference in Bayesian Networks, Approximate Inference in Bayesian Networks, Relational and First-Order Probability Models;

**Probabilistic Reasoning over Time** – Hidden Markov Models

Self-Study Component: Probabilistic Reasoning – Other Approaches to Uncertain Reasoning

10 Hours

Unit-4

**Learning from Examples** – Forms of Learning, Supervised Learning, Learning Decision Trees, Evaluating and Choosing the Best Hypothesis, The Theory of Learning, Regression and Classification with Linear Models, Artificial Neural Networks, Nonparametric Models, Support Vector Machines, Ensemble Learning.

Self-Study Component: Learning from Examples – Practical Machine Learning

10 Hours

Unit-5

**Knowledge in Learning** – A Logical Formulation of Learning, Knowledge in Learning, Explanation-Based Learning, Learning Using Relevance Information, Inductive Logic Programming;

**Learning Probabilistic Models** – Statistical Learning, Learning with Complete Data, Learning with Hidden Variables: The EM Algorithm;
Reinforcement Learning - Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search.

Self-Study Component: Reinforcement Learning - Applications of Reinforcement Learning

10 Hours

Text Book:

Reference Book:
2. Demonstrate Natural Language Processing and its application in Natural Language Communication

Course outcomes: At the end of the course the student will be able to:
1. Define Artificial intelligence and identify problems for AI. Characterize the search techniques to solve problems and recognize the scope of classical search techniques
2. Define knowledge and its role in AI. Demonstrate the use of Logic in solving AI problems.
3. Demonstrate handling of uncertain knowledge and reasoning in probability theory.
4. Explain Learning methods in AI
5. Explain Knowledge Learning, probabilistic models and reinforcement learning in AI

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</tbody>
</table>

Course Articulation Matrix (CAM)
Course Title: Data Mining & Warehousing

Course Code: P18CS554  Semester: 5  L:T:P - 2:2:0  Credits: 3

Contact Period: Lecture: 52 Hr, Exam: 3 Hr  Weightage: CIE:50% SEE:50%

Course Content

Unit-1
Data warehousing and online analytical processing: Data warehousing: Basic concepts, Data warehouse modeling: Data cube and OLAP, Data warehouse design and usage, Data warehouse implementation, Data generalization by attribute-oriented induction.
Self study component: Three Tier Data warehouse architecture
10 Hours

Unit-2
Introduction and Data Preprocessing: Why data mining, What is data mining, What kinds of data can be mined, What kinds of patterns can be mined, Which Technologies Are used, Which kinds of Applications are targeted. Data Preprocessing: An overview, Data cleaning, Data integration, Data reduction, Data transformation and data discretization.
Self study component: Major issues in data mining
12 Hours

Unit-3
Classification: Basic Concepts: Basic Concepts, Decision tree induction, Bays Classification Methods, Rule-Based classification, Model evaluation and selection.
Self study component: Techniques to improve classification accuracy
10 Hours

Unit-4
Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and Methods: Basic Concepts, Frequent Itemset Mining Methods, Which Patterns Are Interesting?—Pattern Evaluation Methods, Pattern Mining in Multilevel, Multidimensional Space.
Self study component: Constraint-Based Frequent Pattern Mining
10 Hours

Unit-5
Cluster Analysis: Basic concepts and methods: Cluster Analysis, Partitioning methods, Hierarchical Methods, Density-based methods, Grid-Based Methods.
Self study component: Evaluation of clustering.
10 Hours

Text Book:
1. Jiawei Han, Micheline Kamber, Jian Pei: Data Mining Concepts and Techniques, ELSEVIER (MK) 3rd edition 2012.

Reference Books:
2. Jiawei Han and Micheline Kamber: Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006.

Course Outcomes: The students shall able to:
1. **Analyze** different data models used in data warehouse.
2. **Apply** different preprocessing techniques for different attributes.
3. **Determine** frequent item set using association rules.
4. **Apply** different classification techniques to classify the given data set.
5. **Analyze** different clustering techniques.

### CO-PO mapping

<table>
<thead>
<tr>
<th>CO</th>
<th>Statement</th>
<th>PO 1</th>
<th>PO 2</th>
<th>PO 3</th>
<th>PO 4</th>
<th>PO 5</th>
<th>PO 6</th>
<th>PO 7</th>
<th>PO 8</th>
<th>PO 9</th>
<th>PO 10</th>
<th>PO 11</th>
<th>PO 12</th>
<th>PS 01</th>
<th>PS 02</th>
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</thead>
<tbody>
<tr>
<td>CO1</td>
<td><strong>Analyze</strong> different data models used in data warehouse.</td>
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<tr>
<td>CO2</td>
<td><strong>Apply</strong> different preprocessing techniques for different attributes.</td>
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<tr>
<td>CO3</td>
<td><strong>Determine</strong> frequent item set using association rules.</td>
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<tr>
<td>CO4</td>
<td><strong>Apply</strong> different classification techniques to classify the given data set.</td>
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<tr>
<td>CO5</td>
<td><strong>Analyze</strong> different clustering techniques.</td>
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</tbody>
</table>
Write assembly level program to perform the following:

1. a) To find the largest of three numbers which are stored in three registers. Store the Largest number at memory location large.
   b) To swap two numbers stored in registers using stack

2. a) To add or subtract two numbers based on the operator. Accept the operands and Operator from porta, portb and portc respectively. Send the result to portd.

3. To clear bits 15th, 13th and 10th. To set the bits 8th, 3rd, 2nd and 1st. To invert the bit 6. After this 16 data is stored in pair of registers.

4. To add N numbers stored in memory and send the result to port-a. Check whether the sum is odd or even. If odd display ff else display 22.

5. To find the factorial of a number using function.

6. To count the number of zeros in a given number and position of first occurrence of 1 and multiply the number of zeros and position.

7. To swap the adjacent bit (odd and even position bits) of 8 bit number. If the 5th bit is 1 in the resultant data add 2 to it.

8. Implement BCD Up counter with appropriate delay. Store the count at memory starting from 0X0200. Separate odd BCD numbers and store it starting from location 0X0223.

9. To convert 2 digit hexadecimal data to decimal. Save the digits at location 0X322, 0X323 and 0X324. Where LSB location is 0X322.

10. Convert packed BCD to ASCII using function.

| COURSE ARTICULATION MATRIX (AVR MICROCONTROLLER LABORATORY) |
|-----------------|-----------------|-----------------|
| COs             | PO1  | PO2  | PO3  | PO4  | PO5  | PO6  | PO7  | PO8  | PO9  | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO-1            | 2    | 2    | 2    | 2    | 1    | 1    | 1    | 1    |      |      |      |      |      |      |
| CO-2            | 2    | 2    | 2    | 2    | 1    | 1    | 1    | 1    |      |      |      |      |      |      |

Co1: Code simple AVR assembly to process the data stored in memory

Co2: Code simple AVR assembly to accept the data from port, process it and send processed data to port
Course Title: Networks Laboratory

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Experiments</th>
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<tbody>
<tr>
<td></td>
<td><strong>Simulation Exercises:</strong> Note: Simulate the following programs using Cisco Packet tracer</td>
</tr>
</tbody>
</table>
| 1.     | Simulate the given topology and observe the working of each devices  
        |   a) LAN 1 have three devices connected to a hub1.  
        |   b) LAN 2 have two devices connected to a hub2.  
        |   c) Both the hubs are connected to a switch which is intern connected to a server. |
| 2.     | Simulate a topology with 2 LAN’s each having two devices connected to switches. Switches are connected to a common router. Observe the packet flow. |
| 3.     | Simulate the topology where two networks are connected via two routers. Both the routers are in tern connected. Each LAN has only one device. Use static routing and observe the routing table at the end of simulation. |
| 4.     | Simulate the topology where two networks are connected via two routers. Both the routers are in tern connected. Each LAN has only one device. Use RIP routing and observe the routing table at the end of simulation. |
| 5.     | Configure a network for browsing |

**Part –B**

Implement the following in C/C++:

1. Write a program for error detecting code using CRC
2. Write a program for distance vector algorithm to find suitable path for transmission.
3. Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present.
4. Implement the above program using as message queues or FIFOs as IPC channels.
5. Write a program for simple RSA algorithm to encrypt and decrypt the data.
6. Write a program for Hamming code generation for error detection and correction.
7. Write a program for congestion control using leaky bucket algorithm

**PART-B. The questions are allotted based on lots. Both Questions carry equalmarks.**
CO-PO Mapping

<table>
<thead>
<tr>
<th>CO</th>
<th>Course Outcomes</th>
<th>PO 1</th>
<th>PO 2</th>
<th>PO 3</th>
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<th>PO 10</th>
<th>PO 11</th>
<th>PO 12</th>
<th>PS O1</th>
<th>PS O2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>Analyse the working principles of various network components such as Hub, Switch, Router, Gateways etc. before construct any network.</td>
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<td>CO2</td>
<td>Design and Implement the given problems using a Cisco packet tracer tool.</td>
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<tr>
<td>CO3</td>
<td>Design and Construct a Network (Wired or Wireless) and its performance can be measured based on various factors such as delay, throughput, and packet loss.</td>
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<tr>
<td>CO4</td>
<td>Design and Implement RSA, Hamming code, Leaky bucket, CRC, Distance Vector algorithm using C/C++ language.</td>
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<tr>
<td>CO5</td>
<td>Design and Implement Client–Server program using TCP/IP sockets and FIFOs (or Message Queues) as IPC channels.</td>
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</tbody>
</table>
Course Title: Android Application Development Laboratory (Skill Oriented Laboratory - I)

Course Code : P18CSL58  |  Semester : 5  |  L :T:P : 0:0:2  |  Credits: 1
Contact Period: Practical: 3 Hr/Week, Exam: 3 Hr  |  Weightage: CIE:50%, SEE:50%

This course aims to

1. Access and work with the Android APIs.
2. Design, implement and deploy mobile applications using an appropriate software development environment.

List of Programs

1. Develop an application that uses GUI components, font and colors.
2. Develop an application that uses layout manager and event listener.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen in android.
5. Develop an application that makes uses of database.
6. Develop an application that creates an alert upon receiving a message.
7. Develop an android application that calls the built in applications to perform the following operations.
   I. Visit the website
   II. Display Contacts
   III. Open Phone dialer
   IV. Send SMS
8. Develop an android application to set the date using Fragments.
9. Develop an android application to read student details like Name, USN and Semester in first activity and display the same in second activity. (Use radios button to select semester).
10. Develop an android application to perform the following operations to animate an image
    I. Slide_up
    II. Slide_down
    III. Zoom_in
    IV. Zoom_out
Course Outcomes

After learning all programs of the course, the student is able to,

1. Access and work with the Android APIs.
2. Design, implement and deploy mobile applications using an appropriate software Development environment.

<table>
<thead>
<tr>
<th>Course Articulation Matrix (CAM)</th>
<th>Program Outcomes (PO’s)</th>
<th>PSO’s</th>
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</thead>
<tbody>
<tr>
<td>Course Outcomes</td>
<td>1</td>
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<tr>
<td>CO 1</td>
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<tr>
<td>CO 2</td>
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</tbody>
</table>
Course Title: Android Application Development (Technical Skills-I)

Course Code: P18CS59  |  Semester: 5  |  L:T:P - 0:2:0  |  Credits: 1
Contact Period: Lecture: 26 Hr, Exam: 3 Hr  |  Weightage: CIE: 50% SEE: 50%

Course Content

Unit-1

Preliminary considerations: Why you might be here? Cost of development, Importance of mobile strategies, Why is mobile development difficult? Mobile development today, Mobile Myths, Third party Frameworks.

Diving into mobile: app or website? Mobile Web Presence, Mobile Applications, Marketing.


6 Hours

Unit-2


5 Hours

Unit-3


5 Hours

Unit-4


5 Hours

Unit- V

Data Persistence: Saving and Loading User Preferences: Accessing Preferences Using an Activity, Programmatically Retrieving and Modifying the Preferences Values, Changing the Default Name of the Preferences File. Persisting Data to Files: Saving to Internal Storage, Saving to External Storage (SD Card), Choosing the Best Storage Option, Using Static Resources, Creating and Using Databases: Creating the DB Adapter Helper Class, Using the Database programmatically, Pre-Creating the Database.
Messaging : SMS Messaging: Sending SMS Messages Programmatically, Getting Feedback after Sending a Message, Sending SMS Messages Using Intent, Receiving SMS Messages, Caveats and Warnings, Sending E-mail.

Text Books:

Reference Books:

Course Outcomes: After learning all the units of the course, the student is able to:
1. Develop simple consumable web services for mobile devices
2. Apply Java programming concepts to Android application development.
3. Design and Develop Android application by setting up Android development environment
4. Implement adaptive and responsive graphical user interfaces that work across a wide range of devices.
5. Create mobile application to persist data in Android applications.

Course Articulation Matrix (CAM)

<table>
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<th>Course Outcomes</th>
<th>Program Outcomes (PO’s)</th>
<th>PSO’s</th>
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<tbody>
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<td>CO 1</td>
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<td>CO 2</td>
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<td>CO 3</td>
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<td>CO 4</td>
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<tr>
<td>CO 5</td>
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</table>
Prerequisites: Vocabulary builder, Concept of Percentage

Course Learning Objectives (CLOs)

This course aims to
1. Describe the importance of reading with comprehension.
2. Explain seven dimensions approach to better reading skills.
3. Explain the purpose, plan and the ways to identify specific details in a paragraph for better comprehension.
4. Formulate easier ways to solve problems of averages.
5. Explain the Application of the technique of alligation while solving weighted average and mixture problems.
6. Describe the concepts of profit, loss, discount, Marked price.
7. Explain the application of percentage in our daily life.
8. Discover different ways to identify the progressions and to compare between AP, GP and HP.
9. Explain the basic concepts in calculating simple interest and compound interest.
10. Differentiate between simple interest and compound interest and describes the importance of compound interest and its behaviour.

Course Content

Unit-1

Reading Comprehension:
Introduction: Read more and more, The process of writing and its relevance to the process of writing, how reading skills are important for aspects other than the reading comprehension questions, the daily reading scheme.
Seven dimension approach to better reading skills: Developing the ability of understanding vocabulary in context, Ability to identify and understand main ideas, Ability to predict and identify supporting details, Understanding the use of transition and idea organization patterns, Inferences, Identifying purpose and tone, Recognizing and evaluating arguments and their common structures.
Theory of reading comprehension: Solving RC passages is an exact science, tackling RC on the basis of evaluation of support, All passages have a topic, purpose and a plan, Other things to pick up while reading the passage– The tonality and other software related the author’s viewpoint in the passage, specific details and their use in the passage, Types of questions asked in reading comprehension passage.

Unit-2

Averages and Alligations mixtures: Average: relevance of average, meaning of average, properties of average, deviation method, concept of weighted average. Alligation method: situation where allegation technique, general representation of alligations, the straight line approach, application of weighted average and alligation method in problems involving mixtures. Application of alligation on situation other than mixtures problems.
Unit-3
Permutation and Combination: Understanding the difference between the permutation and combination, Rules of Counting-rule of addition, rule of multiplication, factorial function, Concept of step arrangement, Permutation of things when some of them are identical, Concept of 2nd Arrangement in a circle.
Probability: Single event probability, multi event probability, independent events and dependent events, mutually exclusive events, non-mutually exclusive events, combination method for finding the outcomes.

Unit-4
Progression:
Arithmetic Progression: sum of given number of terms in an A.P., arithmetic mean, to insert a given number of arithmetic means between two given quantities, nth term of an A.P., types of A.P.s– increasing A.P.s and decreasing A.P.s
Geometric: to find, the geometric mean between two given quantities, to insert a given number of geometric means between two given quantities, sum of a number of terms in a G.P. Types of G.P.s— increasing G. P. s type one and two, decreasing G. P. s type one and two.
Harmonic Progression: to find the harmonic mean between two given quantities, theorems related with progressions, solved examples sample company questions

Unit-5
Coding Decoding: Letter Coding, Number Coding, symbol coding
Crypt arithmetic: Basic concepts, addition, subtraction, multiplication of coded alphabets, Types of cryptarithm
Data Interpretation: Approach to interpretation - simple arithmetic, rules for comparing fractions, Calculating (approximation) fractions, short cut ways to find the percentages, Classification of data— Tables, Bar graph, line graph, Cumulative bar graph, Pie graph, Combination of graphs. Combination of table and graphs

Reference books:
1. The Trachtenberg speed system of basic mathematics, published by Rupa publications.
2. CAT Mathematics by Abhijith Guha. published by PHI learning private limited.
3. Quantitative aptitude by Dr. R. S Agarwal, published by S.Chand private limited.
4. Verbal reasoning by Dr. R. S Agarwal, published by S. Chand private limited.

Course Outcomes (CO)
After learning all the units of the course, the student is able to:
1. Apply the approach of seven dimension to better reading skills. L2
2. Solve the questions under reading comprehension confidently with higher accuracy than random reading. L4
3. Apply the technique of alligation for effective problem solving. L2
4. Interpret the requirement of different methods of calculating average and apply the right method at right scenario. L4
5. Effectively solve problems of profit and loss and problems related to discount, simple interest and compound interest. L5
6. Formulate the equations for summation and other functions for all the kinds of progressions– AP, GP and HP. L1
After learning all the topics of Unit-1, the student is able to
1. Explain the importance of reading skills. L1
2. Interpret the importance of vocabulary in solving Reading comprehension questions. L4
3. Identify the main idea and supporting details in the paragraph. L2
4. Identify purpose and tone of the author. L2
5. Interpret the use of transition and idea organization pattern. L4
6. Recognize and evaluate arguments and their common structures. L1
7. Solve RC questions methodologically. L5
8. Classify types of questions asked in the RC passages. L2
9. Apply flow chart or mind map to solve RC questions. L4

After learning all the topics of Unit-2, the student is able to
1. Analyze the properties of average and apply them in the right scenarios. L5
2. Apply the mean deviation method in certain set of questions. L2
3. Distinguish between the usage of simple average and weighted average. L1
4. Apply weighted average concept and formula to solve the problems of mixtures. L2
5. Compare the weighted average method with the alligation method and understand their strengths and limitations. L4
6. Apply the technique of alligation to solve problems in very less duration of time. L2
7. Understand the concept of homogeneity and other properties of mixtures. L4
8. Apply the basic properties of mixtures while solving the problems under the concept of removal and replacement. L2
9. Extend the application of alligation technique to solve the problems of other topics such as Profit and loss, time speed and distance, ratio and comparison etc... L6

After learning all the topics of Unit-3, the student is able to
1. Apply the fundamental principle of counting to solve basic level problems and apply its logic in complex problems. L2
2. Distinguish between permutation and combination. L4
3. Combine the principles of counting with combination to solve the problems on permutation. L4
4. Select and arrange “r” objects out of “n” objects under different constraints. L4
5. Criticize the restricted use of \(^nP_r\). L6
6. Analyze the concept of step arrangement and apply its principles in problem solving. L5
7. Analyze the permutation of things when some of them are identical. L5
8. Apply the concepts of combination. L2
9. Describe the applications of the concept of \(2^n\). L1
10. Solve the problems under division of things into groups. L3
11. Differentiate between linear arrangement and circular arrangement. L3
12. Recognize the importance of probability. L4
13. Use the conjunction AND tool and OR tool. L2
14. Define an event and solve it under specific constraints. L1
15. Develop the ability to apply the concepts of probability and its applications in real life scenarios. L6

After learning all the topics of Unit-4, the student is able to
1. Interpret the series of numbers in Arithmetic, Geometric and Harmonic Progression. L1
2. Summarize the basic concepts of progressions, i.e., arithmetic mean, nth term of a progression. L6
3. Predict the missing terms of the given progression. L5
4. Compare AM, HM and GM. L4
5. Compute the sum or product of n terms in the given progression. L4
6. Differentiate between increasing and decreasing progression and solve application based problems accordingly. L1
7. Understand the theorems governing progressions. L4
8. Identify the similarity and difference between AP, HP and GP. L1
9. Analyze application problems involving combination of concepts of AP, HP and GP or all the three. L5
10. Create own problems based on creative progressive patterns and its combinations. L6
11. Solve problems based on average speed using concept of HP and AP. L6

**After learning all the topics of Unit-5, the student is able to**
1. Understand the concept of coding decoding and will be able to solve various types of examples. L1
2. Understand the concept of crypt arithmetic or verbal arithmetic and solve examples of various types. L1
3. Demonstrate better interpretation and representation of data. L1
4. Discover various forms of data representation their advantages and disadvantages. L1
5. Analyze the data provided in the form of tabular column, pie graph, bar graph, line graph, combination of two or more. L5
6. Understand the concept of angles and area swept in a pie chart. L5
7. Apply simple arithmetic and shortcuts to solve problems based on given graph. L2
8. Identify percentage hacks and use shortcuts to find the actual value when percentage is given. L4
9. Convert ratios to percentages and vice versa. L4
10. Analyze case studies based on statistical data. L5
11. Identify the limitations of each data representation technique. L6
12. Choose better, the correct method to represent statistics in corporate presentations. L2

**Lesson Plan**

**Unit-1**

1. Importance of reading skills. L1
2. Importance of vocabulary in solving Reading comprehension questions. L4
3. Identifying the main idea and supporting details in the paragraph. L2
4. Purpose and tone of the author. L2
5. Use of transition and idea organization pattern. L4
6. Arguments and their common structures. L1
7. Solving RC questions. L5
8. Classification of types of questions asked in the RC passages. L2
9. Flow chart or mind map to solve RC questions. L4

**Unit-2**

1. Properties of average.
2. Mean deviation.
4. Weighted average concept and formula to solve the problems of mixtures.
5. Comparison of the weighted average method with the alligation method.
6. Application of the technique of alligation to solve problems in very less duration of time.
7. Homogeneity and other properties of mixtures.
8. Basic properties of mixtures while solving the problems under the concept of removal and replacement.
9. Application of alligation technique to solve the problems of other topics such as Profit and loss, time speed and distance, ratio and comparison etc..

Unit-3
1. Fundamental principle of counting to solve basic level problems.
2. Differences between permutation and combination.
3. Principles of counting with combination to solve the problems on permutation.
4. Selection and arrangement of “r” objects out of “n” objects under different constraints.
5. Restricted use of \(^nP_r\).
7. Permutation of things when some of them are identical.
9. Applications of the concept of \(2^n\).
10. Problems under division of things into groups.
11. Differences between linear arrangement and circular arrangement.
12. Importance of probability.
13. Conjunction AND tool and OR tool.
14. Defining an event and solving it under specific constraints.

Unit-4
1. Arithmetic, Geometric and Harmonic Progression.
2. Arithmetic mean, nth term of a progression.
3. Predicting the missing terms of the given progression.
4. Comparison of AM, HM and GM.
5. Sum or product of n terms in the given progression.
6. Differences between increasing and decreasing progression and solve application based problems accordingly.
7. Theorems governing progressions.
8. Differences between AP, HP and GP.
9. Combination of concepts of AP, HP and GP or all the three.
10. Progressive patterns and it’s combinations.
11. Average speed using concept of HP and AP.

Unit-5
1. Concepts of coding decoding
2. Types of questions in coding decoding
3. Concepts of crypt arithmetic
4. Methods to solve crypt arithmetic questions
5. Demonstrate better interpretation and representation of data.L1
6. Various forms of data representation and their advantages and disadvantages.
7. tabular column, pie graph, bar graph, line graph, combination of two or more.
8. Concept of angles and area swept in a pie chart.
9. Simple arithmetic and shortcuts to solve problems based on given graph.
10. Identification of percentage hacks and use shortcuts to find the actual value when percentage is given.
11. Conversion of ratios to percentages and vice versa.
12. Case studies based on statistical data.
13. Limitations of each data representation technique.
Review Questions

Unit-1

Seagulls live on the beach. They eat small fish, bread, and seaweed. Seagulls run quickly on the sand and fly quickly in the sky. Seagulls will run or fly away if you try to catch them. There are many seagulls on the beach. Crabs also live on the beach. They eat shrimp, ocean plants, and small fish. Crabs crawl quickly on the sand and in the ocean. Crabs will crawl away if you try to catch them. There are many crabs on the beach, but it is not always easy to see them. Starfish live on the beach, too. They eat clams, oysters, and small fish. Starfish move slowly on the sand and in the ocean. Starfish will not move away if you try to catch them. There are few starfish on the beach.

1) Seagulls, crabs, and starfish all eat
   A. clams    B. bread    C. fish

2) Which animal does not move quickly?
   A. starfish    B. seagulls    C. crabs

3) Based on information in the passage, which sentence is false?
   A. Starfish are hard to catch.
   B. Crabs eat shrimp and ocean plants.
   C. Seagulls move quickly on the sand and in the air.

4) The passage does not talk about
   A. what starfish eat
   B. how crabs catch food
   C. how fast beach animals move

5) According to the passage, seagulls
   I. live on the beach
   II. move quickly in the ocean
   III. eat bread only
   A. I only    B. I and II only    C. I, II, and III

Unit-2

1. A vessel is filled with liquid, 3 parts of which are water and 5 parts syrup. How much of the mixture must be drawn off and replaced with water so that the mixture may be half water and half syrup?

2. Tea worth Rs. 126 per kg and Rs. 135 per kg are mixed with a third variety in the ratio 1 : 1 : 2. If the mixture is worth Rs. 153 per kg, the price of the third variety per kg will be:

3. A can contains a mixture of two liquids A and B is the ratio 7 : 5. When 9 litres of mixture are drawn off and the can is filled with B, the ratio of A and B becomes 7 : 9. How many litres of liquid A was contained by the can initially?

4. A milk vendor has 2 cans of milk. The first contains 25% water and the rest milk. The second contains 50% water. How much milk should he mix from each of the containers so as to get 12 litres of milk such that the ratio of water to milk is 3 : 5?

5. In what ratio must a grocer mix two varieties of pulses costing Rs. 15 and Rs. 20 per kg respectively so as to get a mixture worth Rs. 16.50 kg?

6. A dishonest milkman professes to sell his milk at cost price but he mixes it with water and thereby gains 25%. The percentage of water in the mixture is:

7. How many kilogram of sugar costing Rs. 9 per kg must be mixed with 27 kg of sugar costing Rs. 7 per kg so that there may be a gain of 10% by selling the mixture at Rs. 9.24 per kg?

8. A container contains 40 litres of milk. From this container 4 litres of milk was taken out and replaced by water. This process was repeated further two times. How much milk is now contained by the container?
9. A jar full of whisky contains 40% alcohol. A part of this whisky is replaced by another containing 19% alcohol and now the percentage of alcohol was found to be 26%. The quantity of whisky replaced is:

10. In what ratio must water be mixed with milk to gain 16% on selling the mixture at cost price?

Unit-3

1. From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done?
2. In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together?
3. In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together?
4. Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?
5. In how many ways can the letters of the word 'LEADER' be arranged?

Unit-4

1. Common difference of sequence 5,8,11,14,… is
2. 2,4,6,8,10,12,… is
3. Second term of sequence with general term n² - 4/2 is
4. 1,8,15,22,29,36,… is
5. A.P whose nth term is 2n - 1 is
6. How many terms are there in 20, 25, 30,……… 140
7. Find the first term of an AP whose 8th and 12th terms are respectively 39 and 59.
8. Find the 15th term of the sequence 20, 15, 10,…. 
9. The sum of the first 16 terms of an AP whose first term and third term are 5 and 15 respectively is
10. How many terms are there in the GP 5, 20, 80, 320,……… 20480?

Unit-5

1. In a certain code 'MISSIONS' is written as 'MSIISNOS'. How is 'ONLINE' written in that code?
   A. OLNNIE  
   B. ONILEN  
   C. NOILEN  
   D. LNOENI  
   E. ONNLIE
2. In certain code 'TIGER' is written as 'QDFHS'. How is 'FISH' written in that code?
   A. GERH  
   B. GRHE  
   C. GREH  
   D. GHRE
3. In certain code 'FROZEN' is written as 'OFAPSG'. Then how would 'MOLTEN' be written in that code?
   A. OFPOMN
   B. OFSMPN
   C. OFUMPN
   D. OFUNPM

4. If AA + BB = ABC, then what is the value of A+B+C = ?
   A. 1.15
   B. 2.18
   C. 3.21
   D. 4.12

5. HERE = COMES – SHE, (Assume S = 8). Find the value of R + H + O.
   A. 15
   B. 18
   C. 14
   D. 12

6. NO + GUN + NO = HUNT, find the value of HUNT.
   A. 1082
   B. 1802
   C. 1208
   D. 1280

The following table gives the sales details for text books and reference books at Primary / Secondary/ Higher Secondary/ Graduate Levels

7. What is the growth rate of sales of books at primary school level from 1975 to 1980?
   A. 29%
   B. 51%
   C. 63%
   D. 163%

8. Which of the categories shows the lowest growth rate from 1975 to 1980?
   A. Primary
   B. Secondary
   C. Higher secondary
   D. Graduate Level

9. Which category had the highest growth rate in the period?
   A. Primary
   B. Secondary
   C. Higher secondary
   D. Graduate Level

10. Which of the categories had either a consistent growth or a consistent decline in the period shown?
    A. Primary
    B. Secondary
    C. Higher secondary
    D. Graduate Level
### Course Articulation Matrix (CAM)

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<td>Apply the approach of seven dimension to better reading skills.</td>
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<td>Solve the questions under reading comprehension confidently with higher accuracy</td>
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<td>Apply the technique of alligation for effective problem solving.</td>
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<td>Effective solve the problems of permutation and combination. Predict different</td>
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<tr>
<td>Formulate the equations for summation and other functions for all the kinds of</td>
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<td>Effective solve the problems of coding decoding and crypt arithmetic and Interpret</td>
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L- Low, M- Moderate, H-High
Course Title: Computer Architecture

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Contact Period: Lecture: 52 Hr, Exam: 3 Hr

Weightage: CIE:50%, SEE:50%

Prerequisite: Computer Organization, Digital Logic Design

Course Content

Unit-1


10 Hours

Unit-2


Self Study Component: Linear Pipeline Processors: Asynchronous and Synchronous Models, Non-linear Pipeline Processors: Reservation and Latency Analysis, Collision free scheduling.

10 Hours

Unit-3

Instruction-Level parallelism and its Exploitation: Instruction –Level Parallelism: Concepts and Challenges, Basic Compiler Techniques for Exposing ILP, Reducing Branch costs with Prediction, Overcome Data Hazards with Dynamic Scheduling, Dynamic Scheduling: Examples and the Algorithm.

Self Study Component: Instruction Set Architectures, Hardware based Speculation, Studies of the Limitations of ILP

11 Hours

Unit-4

Multiprocessor and Thread Level Parallelism: Introduction, Symmetric shared-memory architectures, Distributed Shared Memory and Directory based Coherence, Synchronization-The Basic, Models of Memory Consistency – An Introduction

Self Study Component: Performance of Symmetric Shared-Memory Multiprocessors, Crossbar Switch

10 Hours

Unit-5


11 Hours

Text Books:

Reference Books:

Course Outcomes:
1. Describe the evolution of computers.
2. Analyze the basic properties of pipelining.
3. Understand the Instruction Level Parallelism and Its Exploitation.
4. Discuss system architecture of multiprocessor and Thread Level Parallelism.
5. Analyze the steps to perform parallelization of computation.

CO-PO Mapping

<table>
<thead>
<tr>
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<th>Title : Computer Architecture</th>
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<td>CO</td>
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<td>Describe the evolution of computers</td>
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<td>Analyze the basic properties of pipelining</td>
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<tr>
<td>CO3</td>
<td>Understand the Instruction Level Parallelism and Its Exploitation.</td>
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<tr>
<td>CO4</td>
<td>Discuss system architecture of multiprocessor and Thread Level Parallelism.</td>
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<tr>
<td>CO5</td>
<td>Analyze the steps to perform parallelization of computation</td>
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Prerequisites: Knowledge of theory of computation.

Course Content

Unit-1
Introduction, Lexical analysis, Syntax analysis: Various phases of a compiler, Grouping of phases; Lexical analysis: The Role of Lexical Analyzer; Input Buffering; Specifications of Tokens; Recognition of Tokens.
Self study component: Compiler-Construction tools

10 Hours

Unit-2
Syntax Analysis: Role of parser; Context-free grammars; Top-down Parsing.
Self study component: Error handling

11 Hours

Unit-3
Syntax Analysis: Bottom-up Parsing, LR parsers.
Self study component: Using ambiguous grammars

10 Hours

Unit-4
Syntax-Directed Translation: Syntax-directed definitions; Construction of syntax tree; Evaluation orders for SDDs; Syntax-directed translation schemes. Type checking-Type Systems; Specification of a simple type checker; Equivalence of type expression.
Run-Time Environments: Source language issues; Storage Organization; Storage allocation strategies; parameter passing; Symbol tables; dynamic storage allocation techniques.
Self study component : Type conversions.

11 Hours

Unit-5
Intermediate Code Generation: Intermediate languages; declaration; Assignment statements; Boolean expressions; Case statements; Back patching ;Procedure calls.
Code Generation: Issues in the design of Code Generator; basic blocks and flow graphs; A simple code generation; Register allocation and assignment.
Self study component : DAG representation of basic blocks.

10 Hours

Text Book:

Reference Books:

Course Outcomes
1. Design simple lexical analyzer
2. Construct simple top down parser for a given context free grammar
3. Construct simple bottom up parser for a given context free grammar
4. **Apply** different syntax directed translation schemes
5. **Generate** intermediate and machine dependent code

### CO-PO Mapping

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<td><strong>Design</strong> simple lexical analyzer</td>
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<td>CO2</td>
<td><strong>Construct</strong> simple top down parser for a given context free grammar</td>
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<td>CO3</td>
<td><strong>Construct</strong> simple bottom up parser for a given context free grammar</td>
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<td>CO4</td>
<td><strong>Apply</strong> different syntax directed translation schemes</td>
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<tr>
<td>CO5</td>
<td><strong>Generate</strong> intermediate and machine dependent code</td>
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Course Title: Data Analytics

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</table>

Unit-1

Introduction To Data Analytics: What is Data? A Short Taxonomy of Data Analytics, Examples of Data Use, Breast Cancer in Wisconsin, Polish Company Insolvency Data, A Project on Data Analytics, The KDD Process, The CRISP-DM Methodology

Descriptive Statistics: Scale Types, Descriptive Univariate Analysis, Descriptive bivariate Analysis.

Multivariate Analysis: Multivariate Frequencies, Multivariate Data Visualization, Multivariate Statistics.

Self study Component: Operationalize, Case Study: Global Innovation Network and Analysis 10hrs

Unit-2

Data Quality and Pre-processing: Data Quality, Missing Values, Redundant Data, Inconsistent Data, Noisy Data Outliers, Converting to a Different Scale Type, Converting to a Different Scale, Data Transformation, Dimensionality Reduction: Attribute Aggregation: Principal Component Analysis. Attribute selection: filters, wrappers. Review of Basic Data Analytic Methods using R: Introduction to R: Data types, Data import and Export, Descriptive statistics. Exploratory Data Analysis: Visualization tools for single and multivariable: Bar chart, Histogram, line graph, box plot and scatter plot and scatter plot matrix

Self Study Component: Search Strategies 10hrs

Unit-3

Clustering: Distance Measures, Difference between Values of Common Attribute Types, Distance Measures for Objects with Quantitative Attributes, Distance Measures for Non-conventional Attributes, Clustering Validation, Clustering Techniques, K-means, Centroids and Distance Measures, How K-means Works, Density-based spatial clustering of applications with noise (DBSCAN ), Frequent Pattern Mining: Frequent Item sets, Setting the min_sup Threshold, Apriori – a Join-based Method, Eclat, FP-Growth, Maximal and Closed Frequent Item sets, Association Rules

Self Study Component: Other Types of Pattern 10hrs
Unit-4

**Regression:** Predictive Performance Estimation, Generalization, Model Validation, Predictive Performance Measures for Regression, Finding the Parameters of the Model, Linear Regression, **Classification:** Binary Classification, Predictive Performance Measures for Classification, Distance-based Learning Algorithms, K-nearest Neighbor Algorithms, Case-based Reasoning, Logistic Regression Algorithm, Naive Bayes Algorithm

**Self Study Component:** Empirical Error  

10hrs

Unit-5

**Additional Predictive Methods:** Search-based Algorithms, Decision Tree Induction Algorithms, Decision Trees for Regression  **Optimization-based Algorithms:** Support Vector Machines  **Applications for Text, Web and Social Media:** Working with Texts, Recommender Systems.

**Self Study Component:** Social Network Analysis  

10hrs

**Textbook:**
1. A General Introduction to Data Analytics, João Mendes Moreira, André C.P.L.F.deCarvalho, © 2019 John Wiley & Sons, Inc
2. Data Science & Big Data Analytics, Discovering, Analyzing, Visualizing and Presenting Data, Published by John Wiley & Sons, Inc.

**Reference Books:**
1. Big Data and Data Analytics by Seema Acharya & Subhashini Chellappan by Wiley India Pvt Ltd.

**Course Outcomes:**
1. Students can able to Understanding the Data Analytics Life Cycle & Taxonomy.
2. Students can Analyze Preprocessing of the Data & Analytical Methods with data System With R Tool.
3. Students can able to build and Perform Clustering & Frequent Pattern Mining.
4. Student can able to Implement Additional Predictive Methods including Applications of Text, Web & Social Media.
### CO-PO Mapping

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<td>CO-5</td>
<td>Design and Implement real time applications in data analytics</td>
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Professional Elective - II

Course Title: Block Chain Technology

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Prerequisite:
Expertise In Programming, Basic Knowledge Of Computer Security, Cryptography, Networking, Concurrent Or Parallel Programming.

Course Learning Objectives:

1. Be Able to explain what is blockchain
2. Be able to explain why we need blockchain? What is the real world problems that blockchain is trying to solve?
3. Understand and describe how blockchain works
4. Explain the underlying technology of transactions, blocks, proof-of-work, and consensus building
5. How does blockchain exist in the public domain (decentralized, distributed) yet maintain transparency, privacy, anonymity, security, immutability, history
6. How is blockchain incentivized without any central controlling or trusted agency
7. How bitcoin crypto currency works
8. Why people value a ‘digital’ currency, how it can be protected against scam, fraud, hacking and devaluation
9. Design and implement new ways of using blockchain for applications other than crypto currency
10. Explore platforms such as Ethereum to build applications on blockchain

Course Content

Unit: 1

Introduction to Block chain: Backstory of Block chain, what is Block chain? Centralized vs. Decentralized Systems, Layers of Block chain, why is Blockchain Important? Limitations of Centralized Systems, Blockchain Adoption So Far, Blockchain Uses and Use Cases How Blockchain Works-1: Laying the Blockchain Foundation, Cryptography, Symmetric Key Cryptography, Cryptographic Hash Functions.

Self Study: MAC and HMAC

10 Hours

Unit-2

Self Study: Game Theory  

Unit-3


Self Study: Putting it All Together  

Unit-4


Self Study: Ethereum Ecosystem  

Unit 5


Self Study: Public Nodes vs. Self-Hosted Nodes, Decentralized Applications and Servers  

Text Book:  

Reference Books:

3. https://www.coursera.org/specializations/introduction-to-blockchain
4. https://nptel.ac.in/courses/106/104/106104220/

Course Outcome’s

1. Understand the structure of a blockchain and why/when it is better than a simple distributed database
2. Explain the significance of cryptographic algorithms in blockchain
3. Describe the features and importance of Bitcoin
4. Explain about the principles of Ethereum Virtual Machine
5. Design, build, and deploy smart contracts and distributed applications,

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<th>Program Outcomes (PO’s)</th>
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Course Articulation Matrix (CAM)
Course Title: Cloud Computing Platform

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Course Content

Unit-1

**Introduction, Cloud Infrastructure:** Cloud computing, Cloud computing delivery models and services, Ethical issues, Cloud vulnerabilities, Cloud computing at Amazon, Cloud computing the Google perspective, Microsoft Windows Azure and online services, Open-source software platforms for private clouds, Cloud storage diversity and vendor lock-in, Energy use and ecological impact, User experience and software licensing. Exercises and problems.

Self Study Component: Service level agreements

11 Hours

Unit-2

**Cloud Resource Virtualization:** Virtualization, Layering and virtualization, Virtual machine monitors, Virtual Machines, Performance and Security Isolation, Full virtualization and paravirtualization, Hardware support for virtualization, Case Study: Xen a VMM based paravirtualization, Optimization of network virtualization, vBlades, The dark side of virtualization, Exercises and problems

Self Study Component: Performance comparison of virtual machines.

10 Hours

Unit-3

**Cloud Resource Management and Scheduling:** Policies and mechanisms for resource management, Application of control theory to task scheduling on a cloud, Stability of a two-level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers, A utility-based model for cloud-based Web services, Resourcing bundling: Combinatorial auctions for cloud resources, Scheduling algorithms for computing clouds, Fair queuing, Start-time fair queuing, Borrowed virtual time, Cloud scheduling subject to deadlines, Scheduling MapReduce applications subject to deadlines, Exercises and problems.

Self Study Component: Resource management and dynamic scaling

11 Hours

Unit-4

**Google Cloud Platform Overview:** GCP resource- [Google data centers](#), Accessing resources through services, Global, regional, and zonal resources, Projects, interact with the services, GCP services-Computing and hosting services, Serverless computing, , Containers, Virtual machines, **Cloud services** -Combining computing and hosting options, Storage services, Database services. Lab sessions on services includes all cloud services

Self Study Component: Cloud Functions, Application platform

10 Hours

Unit-5

**Cloud services:** Networking services-Networks, firewalls, and routes, Load balancing, Cloud DNS, Advanced connectivity, Big data services-Data analysis, Batch and streaming data processing, Asynchronous messaging, Machine learning services- Machine learning APIs, Lab sessions on services includes all Google cloud services

Self Study Component: AI Platform.

10 Hours
Text Book:

Reference Book:

Links of materials:

Course Outcomes: At the end of the course the student will be able to:
1. Understand Cloud Infrastructure of different service providers
2. Explain Virtualization, Layering & virtualization and performance of virtual machines
3. Describe the different modes of Cloud Resource Management and Scheduling
4. Understand Google cloud platform and services
5. Implement Google cloud platform and services

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<th>Course Articulation Matrix (CAM)</th>
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<td>Course Outcomes (CO’s)</td>
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Course Title: Mobile Computing

Course Code: P18CS643  |  Semester: 6  |  L:T:P: 2:2:0  |  Credits: 3

Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs  |  Weightage: CIE:50%, SEE:50%

Course Content

Unit–1
Self Study Component: Mobile IP with IPv6, GSM Addresses and Identities.

11 Hours

Unit-2
Self Study Component: Spread Spectrum technology, Mobile phones and their features.

10 Hours

Unit-3
Self Study Component: Data Synchronization.

11 Hours

Unit-4
Building Wireless Internet Applications: Thin client overview: Architecture, the client, Middleware, messaging Servers, Processing a Wireless request, Protocol (WAP) Overview, Wireless Languages: Markup Languages, HDML, WML, HTML, cHTML, XHTML, Voice XML.
Self Study Component: Wireless Applications.

10 Hours

Unit-5
J2ME: Introduction, CDC, CLDC, MIDP; Programming for CLDC, MIDlet model, Provisioning, MIDlet life-cycle, Creating new application, MIDlet event handling, Low level GUI Components, Communication in MIDP, Security Considerations in MIDP.
Self Study Component: GUI in MIDP, Multimedia APIs.

10 Hours

Text Books:

Reference Books:

Course Outcomes: The student will be able to:
1. Explain architecture of Mobile Computing, GSM, SMS.
2. Explain state of art techniques in wireless communication.
3. Describe Mobile OS and Data Synchronization.
4. Discover CDMA, Mobile IP, WiMax.
5. Demonstrate program for CLDC, MIDP let model and security concerns

**CO-PO Mapping**

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<td>Describe Mobile OS and Data Synchronization</td>
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<td>Discover CDMA, Mobile IP, WiMax.</td>
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Course Content

Unit–1

Introduction: The vision of Ambient Intelligence, Application Examples, Types of applications, Challenges for WSNs, Enabling Technologies for wireless sensor networks.

Single-node Architecture: Hardware components, Operating systems and execution environments: Embedded OS, Programming paradigms and application programming interfaces. Network Architecture: Sensor network scenarios, Optimization goals and figures of merit, Design principles for WSNs: Distributed organization, Data centricity, Gateway concepts.

Self Study Component: In-network processing

11 Hours

Unit-2


Self Study Component: SMAC protocol

10 Hours

Unit-3


Self Study Component: Geographic routing

11 Hours

Unit-4

Data Aggregation in WSN: Challenges in data aggregation, data aggregation techniques, Localization and Positioning: Properties of localization and positioning procedures, Possible approaches, Mathematical basics for the lateration problem, Single hop localization

Self Study Component: Positioning in multihop environments

10 Hours

Unit-5

Naming and addressing: Fundamentals, Address and name management in wireless sensor networks, Assignment of MAC addresses, Distributed assignment of locally unique addresses: Address assignment algorithm. Time Synchronization: Introduction to time synchronization problem, Protocols based on sender/receiver synchronization: Light weight time synchronization protocol

Self Study Component: Timing –Sync protocol

10 Hours

Text Book:


Reference Books:
Course Outcomes:
1. Explain Fundamental Concepts, applications and network architectures of WSN.
2. Describe the physical layer and MAC protocol concepts for communication in WSN
3. Discuss the different routing protocols and issues
4. Discuss the different data aggregation techniques and different positioning and localization algorithms
5. Describe the naming, addressing and time synchronization in WSN

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CO-PO Mapping

Semester: 6  | Course code: P18CS644  | Title: Wireless Sensor Networks

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Open Elective – I

Course Title: Python Programming

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Course Content

Unit-1
Why should you learn to write programs, Variables, expressions and statements, Conditional execution, Functions.
Self study component: Fruitful functions and void functions

Unit-2
Iteration, Strings, Files
Self study component: Using try, except, and open, Writing files

Unit-3
Lists, Dictionaries, Tuples, Regular Expressions
Self study component: Bonus section for Unix / Linux users

Unit-4
Object oriented programming, using Databases and SQL
Self study component: Spidering Twitter using a database.

Unit-5
Simple Graphics and Image Processing: “turtle” module; simple 2d drawing - colors, shapes; digital images, image file formats, image processing; Simple image manipulations with 'image' module (convert to bw, greyscale, blur, etc). Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames.
Self study component: Manipulating a Turtle’s Screen

Course outcomes: The students should be able to:
1. Develop python programs using modular approach.
2. Demonstrate proficiency in handling Strings and File Systems.
3. Implement Python Programs using data structures.
4. Develop application using object oriented and database concepts.
5. Create graphical user interface for the applications.

Text Books:

Reference Books:

<table>
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<th>Course Outcomes</th>
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Course Title : Data Base Management System

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Course content

Unit-1

INTRODUCTION: An example: Characteristics of Database approach; Advantages of using DBMS approach; A brief history of database applications; Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment.

Self study component: Actors on the scene, workers behind the scene.

10 Hours

Unit-2

ENTITY-RELATIONSHIP MODEL: Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues.

Self study component: Relationship types of degree higher than two.

10 Hours

Unit-3

RELATIONAL MODEL AND RELATIONAL ALGEBRA: Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.

Self study component: Rename and Division operation.

11 Hours

Unit-4

STRUCTURED QUERY LANGUAGE: SQL Data Definition and Data Types; Specifying basic constraints in SQL; Basic Retrieval Queries in SQL, INSERT, DELETE, and UPDATE Statements in SQL, More complex SQL Retrieval Queries.

Self study component: Specifying constraints as assertions and triggers.

11 Hours

Unit-5

DATABASE DESIGN: Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form; Multi valued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form.
Self study component: Inclusion dependencies.  

**Text Books:**

**Reference Books:**

**Course outcomes**
At the end of the course the student should be able to
1. **Explain** the characteristics of database management system
2. **Design** an ER model for a given example from real world description.
3. **Design** relational models for a given application using schema definition and constraints.
4. **Develop** complex queries using SQL to retrieve the required information from database.
5. **Apply** suitable normal forms to normalize the given database.

**CO-PO Mapping**

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<td><strong>Design</strong> an ER model for a given example from real world description</td>
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<td><strong>Apply</strong> suitable normal forms to normalize the given database</td>
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Course Title: Web Technologies

Course Code: P18CSO653  |  Semester: 6  |  L:T:P - 3 : 0 : 0  |  Credits: 3

Contact Period: Lecture: 52 Hr, Exam: 3 Hr  |  Weightage: CIE: 50% SEE: 50%

Course Content

Unit-1

Fundamentals of Web: Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, the Web Programmers Toolbox.


Self-study components: security, The Web Programmers Toolbox

10 Hours

Unit-2

Lists, Tables, Forms, Frames, Syntactic differences between HTML and XHTML.

Cascading Style Sheets: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Colour, Alignment of text, The Box model, Background images, The <span> and <div> tags.

Self-study components: Frames

10 Hours

Unit-3

The Basics of JavaScript: Overview of JavaScript, Object orientation and JavaScript, General syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructor.

Self-study components: Pattern matching using regular expressions, Errors in scripts.

10 Hours

Unit-4

JavaScript and HTML documents: The JavaScript execution environment; The Document Object Model; Element access in JavaScript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements

Dynamic Documents With JavaScript: Introduction to dynamic documents; Positioning elements; Moving elements; Element visibility; Changing colours and fonts; Dynamic content; Stacking elements; Locating the mouse cursor; Reacting to a mouse click;

Self-study components: Slow movement of elements; Dragging and dropping elements.

12 Hours

Unit-5

PHP: Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, Operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching, Form Handling, Files.

Self-study components: Cookies, Session tracking

10 Hours

Text Book:

Reference Books:
Course Outcomes

1. Develop web pages using various XHTML tags.
2. Design effective web pages using various style properties.
3. Design interactive web pages using java script.
5. Implement web pages using PHP scripts.

CO-PO Mapping

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<th>PS O1</th>
<th>PS O2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>Develop web pages using various XHTML tags.</td>
<td>2</td>
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<tr>
<td>CO2</td>
<td>Design effective web pages using various style properties</td>
<td>2</td>
<td>2</td>
<td>2</td>
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<tr>
<td>CO3</td>
<td>Design interactive web pages using java script.</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<tr>
<td>CO4</td>
<td>Create dynamic documents using DOM object model</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<tr>
<td>CO5</td>
<td>Implement web pages using PHP scripts.</td>
<td>2</td>
<td>1</td>
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<table>
<thead>
<tr>
<th>Course Title : Internet of Things</th>
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</thead>
<tbody>
<tr>
<td>Course Code: P18CSO654</td>
</tr>
<tr>
<td>Semester : 6</td>
</tr>
<tr>
<td>L:T:P - 3 : 0 : 0</td>
</tr>
<tr>
<td>Credits: 3</td>
</tr>
<tr>
<td>Contact Period : Lecture :52 Hr, Exam: 3Hr</td>
</tr>
<tr>
<td>Weightage :CIE:50% SEE:50%</td>
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</tbody>
</table>

**Course Content**

**Unit-1**

**Introduction to Internet of Things: What is the Internet of Things?:** Overview and Motivations, Examples of Applications, IPv6 Role, Area of Development and Standardization, Scope of Present Investigation. **Internet of Things Definitions and Frameworks:** IoT Definitions, IoT Frameworks.

Self study component: Basic Nodal Capabilities

10 Hours

**Unit-2**

**Internet of Things Application Examples:** Overview, Smart metering, Advanced Metering Infrastructure, e-Health, Body Area Networks, City Automation, Automotive applications, Home Automation, Smart Cards, Tracking, Over-The-Air-Passive surveillance, Ring of steel.

Self study component: Control application examples, Myriad other applications

10 Hours

**Unit-3**


Self study component: Representation State Transfer (REST), ETSI M2M, Third-Generation Partnership Project, CENELEC, IETF IPv6 Over Lowpower WPAN, ZigBee IP (ZIP), IP in Smart Objects (IPSO).

12 Hours

**Unit-4**

**Mobility, Clouds, and Digital Tools Usher in a Connected World:** The Rise of the Global Village, Into Thin Air, How Mobile Technology Changes Everything, A Clearer View through Clouds, Things Get Social, Following the Crowd, Big Data = Big Results, Focus on the Future. **The Industrial Internet Emerges:** A New Model Takes Shape, Data Matters, Sensing Gains.


10 Hours

**Unit-5**

**Putting the Internet of Things to Work:** The IoT Meets the Real World, It’s a Matter of Standards, Tackling the Adoption Curve, building a Better Sensor, Reliability Is Paramount, Putting Data into Context, The IoT: An Open Frontier.


10 Hours

**Text Books:**


**Reference Books:**


**Course Outcomes:** At the end of the course the student will be able to:

1. Able to identify and understand the basic concepts and frameworks of Internet of Things
2. Understand the practical knowledge through different case studies of various levels of IOT applications examples
3. Understand the key technologies and application of different protocols on various applications
4. Understand the working knowledge related to enabling technologies like WSN
5. Demonstrating the applications of Mobile IPv6 Technologies and 6LoWPAN on IoT

**CO-PO Mapping**

<table>
<thead>
<tr>
<th>Semester : 6</th>
<th>Course code : P18CSO654</th>
<th>Title : Internet of Things</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>Statement</td>
<td>PO 1</td>
</tr>
<tr>
<td>CO1</td>
<td>Able to Identify and understand the basic concepts and Frameworks of Internet of Things</td>
<td>1</td>
</tr>
<tr>
<td>CO2</td>
<td>Understand the practical knowledge through different case studies of various levels of IOT applications examples</td>
<td>2</td>
</tr>
<tr>
<td>CO3</td>
<td>Understand the key technologies and application of different protocols on various applications</td>
<td>2</td>
</tr>
<tr>
<td>CO4</td>
<td>Understand the working knowledge related to enabling technologies like WSN</td>
<td>2</td>
</tr>
<tr>
<td>CO5</td>
<td>Demonstrating the applications of Mobile IPv6 Technologies and 6LoWPAN on IoT</td>
<td>2</td>
</tr>
</tbody>
</table>

2 1.8 1.4 1 1 1 1
Course Title : Data Analytics Laboratory

Course Code: P18CSL66  |  Semester: 6  |  L:T:P - 0 : 0 : 3  |  Credits: 1.5

Contact Period : Practical : 3 Hr/Week, Exam: 3Hr  |  Weightage : CIE:50% SEE:50%

Course Content

1. Introduction to R & Getting started with Installation of R
2. Execute the R commands for
   a) Entering Inputs, Evaluation, R objects & Numbers
   b) Attributes, Creating Vectors, Mixing Objects,
   c) Explicit Correction, Matrices, List
   d) Factors, Missing Values, Data frames
3. Write R Code for below functions
   a. write.table, for writing tabular data to text files (i.e. CSV) or connections
   b. writeLines, for writing character data line-by-line to a file or connection
   c. dump, for dumping a textual representation of multiple R objects
   d. dput, for outputting a textual representation of an R object
   e. save, for saving an arbitrary number of R objects in binary format (possibly compressed) to a file.
   f. serialize, for converting an R object into a binary format for outputting to a connection (or file).
4. Write a R Program to extract the subsets of R object
   a. The [ operator always returns an object of the same class as the original. It can be used to select multiple elements of an object
   b. The [[ operator is used to extract elements of a list or a data frame. It can only be used to extract a single element and the class of the returned object will not necessarily be a list or data frame.
   c. The $ operator is used to extract elements of a list or data frame by literal name. Its semantics are similar to that of [[
5. Perform Vector Operations & Vectorized Matrix Operations & also perform Date & time operations
6. Write R code AND Implement Managing Data Frames with the dplyr package
7. Write an R code for implementation of below control strictures
   a. if and else: testing a condition and acting on it
   b. for: execute a loop a fixed number of times
   c. while: execute a loop while a condition is true
   d. repeat: execute an infinite loop (must break out of it to stop)
   e. break: break the execution of a loop
   f. next: skip an iteration of a loop
8. Write R Code for implement the following functions
   a. Functions can be passed as arguments to other functions. This is very handy for the various apply funtions, like lapply() and sapply().
   b. Functions can be nested, so that you can define a function inside of another function
9. Write R code for implementing of below
   R has some functions which implement looping in a compact
   a. lapply(): Loop over a list and evaluate a function on each element
   b. sapply(): Same as lapply but try to simplify the result
   c. apply(): Apply a function over the margins of an array
d. `tapply()`: Apply a function over subsets of a vector

e. `mapply()`: Multivariate version of `lapply`

10. Implement R code for following conditions

a. `message`: A generic notification/diagnostic message produced by the `message()` function; execution of the function continues

b. `warning`: An indication that something is wrong but not necessarily fatal; execution of the function continues. Warnings are generated by the `warning()` function

c. `error`: An indication that a fatal problem has occurred and execution of the function stops. Errors are produced by the `stop()` function.

d. `condition`: A generic concept for indicating that something unexpected has occurred; Programmers can create their own custom conditions if they want.

Reference:

1. R Programming for Data Science by Roger D. Peng, Lenpub Publishing 20/7/2015
Course Title: Operating System & Compiler Design Laboratory

Course Code: P18CSL67  Semester: 6  L:T:P - 0 : 0 : 3  Credits: 1.5

Contact Period: Practical: 3 Hr/Week, Exam: 3Hr  Weightage: CIE:50% SEE:50%

Course Content

1. a) Given the list of processes and their CPU burst times, write a program to compute and print the average waiting time and average turnaround time using FCFS algorithm.
   b) Write a LEX program to count the number of characters, words, spaces and lines in a given input file.

2. a) Given the list of processes, their CPU burst times, write a program to compute and print the average waiting time and average turnaround time using SJF algorithm.
   b) Write a LEX program to count the number of comment lines in a given C program. Also eliminate them and copy that program into separate file.

3. a) Given the list of processes, their CPU burst times and time slice, write a program to compute and print the average waiting time and average turnaround time for Round robin scheduling policy.
   b) Write a LEX program to recognize a valid arithmetic expression and identity the identifiers and operators present. Print them separately.

4. a) Write a program to implement the FIRST FIT allocation technique.
   b) Write a LEX program to recognize whether a given sentence is simple or compound.

5. a) Write a program to implement the BEST FIT memory allocation technique.
   b) Write a YACC program to recognize a valid variable, which starts with a letter, followed by any number of letters or digits.

6. a) Write a program to implement the FIFO page replacement algorithm.
   b) Write a YACC program to evaluate an arithmetic expression involving operators +, -, *, and /.

7. a) Write a program to implement the Optimal page replacement algorithm.
   b) Write a YACC program Program to recognize strings ‘aaab’, ‘abbb’, ‘ab’ and ‘a’ using the grammar \( (a^n \ b^n \ n \geq 0) \).

8. a) Write a program to implement the FCFS Disk scheduling algorithm.
   b) Write a YACC Program to recognize a valid arithmetic expression that uses operators +, -, *, and /.
Course Title: Python Programming Laboratory (for Image processing)  
(Skill oriented Laboratory)

<table>
<thead>
<tr>
<th>Course Code: P18CSL68</th>
<th>Semester: 6</th>
<th>L:T:P - 0:0:2</th>
<th>Credits: 1</th>
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<tbody>
<tr>
<td>Contact Period: Practical: 2 Hr, Exam: 3 Hr</td>
<td>Weightage: CIE:50% SEE:50%</td>
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</table>

Course Content

1. To study the Image Processing concept.
2. To obtain histogram equalization image.
3. To perform smoothing and sharpening of the image.
4. To find the region of interest for the image.
5. Image compression
6. Color image processing
7. Image segmentation
8. Image morphology
9. Edge detection

Course Outcomes

1. Learn to apply preprocessing methods on the images
2. Design image processing application using packages in python.

CO-PO Mapping

<table>
<thead>
<tr>
<th>Course Outcomes</th>
<th>Program Outcomes (PO’s)</th>
<th>PSO’s</th>
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<tr>
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<td>2</td>
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<tr>
<td>CO1</td>
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<tr>
<td>CO2</td>
<td>2</td>
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</table>
Department of Computer Science and Engineering
P.E.S College of Engineering, Mandya, (An Autonomous Institution under VTU)

Course Title : Technical Training Program (Technical Skills-II)

<table>
<thead>
<tr>
<th>Course Code: P18HU691</th>
<th>Semester : 6</th>
<th>L:T:P – 2:0:0</th>
<th>Credits: 1</th>
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<tbody>
<tr>
<td>Contact Period : Lecture :12 Hr, Practical : 26 Hr</td>
<td>Exam: 3Hr Methodology: Blended (Classroom &amp; lab)</td>
<td>Weightage :CIE:50% SEE:50%</td>
<td></td>
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</tbody>
</table>

To enable students to:
1. Strengthen their understanding of how Computer works, C, and Data Structures
2. Write effective codes on C Programming and to debug.

OVERALL SYLLABUS BREAKUP:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Module name</th>
<th>Classroom (Hours)</th>
<th>Lab (Hours)</th>
<th>Total duration (Hours)</th>
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<tbody>
<tr>
<td>1.</td>
<td>Working of Computer</td>
<td>6</td>
<td>0</td>
<td>6</td>
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<tr>
<td>2.</td>
<td>C Programming</td>
<td>0</td>
<td>16</td>
<td>16</td>
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<tr>
<td>3.</td>
<td>Introduction to Data Structures</td>
<td>2</td>
<td>2</td>
<td>4</td>
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<tr>
<td></td>
<td>Total Hours</td>
<td>8</td>
<td>18</td>
<td>26</td>
</tr>
</tbody>
</table>

Learning Outcomes:
After undergoing training in this course, the students will be in a position to –
1. Deep understanding of Computer components and working of its components.
2. Write complete program based on the requirements and to debug.
3. Frame effective programs using C programming and Data Structures.

Assessments:
All of the modules will have two types of assessments
1. Multiple-choice assessment for programming logic, concepts and debugging
2. Coding

Course Plan

C Programming:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Topics covered</th>
<th>Learning outcome</th>
<th>Type of learning</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>Working of Computer:</strong></td>
<td>• Understand the basics of computer working and operation of peripherals.</td>
<td>Class - 6</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>• Booting, Loading of O.S., Dual Booting</td>
<td>• The purpose of Operating System, Basic Electronics, Logic design, Computer organization, Computer architecture, Linux Internals.</td>
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<tr>
<td></td>
<td>• How a computer executes a Program.</td>
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<td></td>
<td>• What happens inside the computer when programs run?</td>
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<td></td>
<td>• Difference between running and executing states of a process in the Operating System</td>
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<td></td>
<td>• The Fetch and Execute Cycle: Machine Language.</td>
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<tr>
<td></td>
<td>• Discussion of Basic Electronics, Logic design, Computer organization, Computer architecture, Compilers, System Programming, Linux Internals.</td>
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</tr>
<tr>
<td>1.</td>
<td><strong>C Programming Language:</strong></td>
<td>• Understand the concepts of snippets in a programming</td>
<td>Lab - 16</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>• <strong>Difficult level</strong> of Snippets for</td>
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<td>o Understanding basic syntax</td>
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</tbody>
</table>
### Introduction to Data Structures:

**Data Structures Basics:** Structure and Problem Solving, Data structures, Data structure Operations, Algorithm: complexity, Time-space tradeoff.
- Linked List
- Stack and Queue
- Searching and Sorting Techniques

**Objectives:**
- Understand common data structures and the algorithms that build and manipulate them including various sorting and searching algorithms. Data structures include arrays, linked lists, stacks, queues, features, properties, applications, enumerators, and performance issues.

<table>
<thead>
<tr>
<th>Class –2 Lab - 2</th>
<th>04</th>
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