SYLLABUS FOR B.E. V & VI SEMESTER
(With effect from 2017 - 18 Academic year)

ಬೆಟ್ಟಡ್ಡ
(ತಿಂದೂರುದಾಯ 2017-18)

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)
Accredited by NBA, New Delhi & Approved by AICTE, New Delhi.

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

PES College of Engineering, Mandya, started in the year 1962, has become autonomous institute in the academic year 2008-09. Since, then it has been doing the academics and assessment activities successfully. The college is running eight undergraduate and eight Postgraduate programs including MBA and MCA which are affiliated to VTU, Belagavi.

India has recently become a Permanent Member of 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. The implementation of Outcome Based Education (OBE) has been the core issue for enabling the equivalence and of Indian degrees and their mobility across the various countries.

*Our Higher Educational Institution has adopted the Choice Based Credit System (CBCS) based semester structure with OBE scheme and grading system. Which provides the flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. There lies a shift in thinking, teaching and learning process moving towards Students Centric from Teachers Centric education which enhances the knowledge, skills & moral values of each student.*

Choice Based Credit System (CBCS) provides the options for the students to select from the number of prescribed 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 for learning which enables integration of concepts, theories, techniques. These are greatly enhances the skill/employability of students.

In order to increase the Industry/Corporate readiness, many Soft Skills, self learning components and Personality Development modules have been added to the existing curriculum. In order to enhance creativity and innovation Mini Project and Industrial visit & Interaction are made mandatory for all undergraduate programs.

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

Dr. Nagarathna
Dean (Academic)
Professor,
Dept. of Computer Science &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.
# PES College of Engineering, MANDYA
## Department of Computer Science & Engineering
### Scheme of Teaching and Examination for B.E.
#### V Semester B.E. (CS & E)

<table>
<thead>
<tr>
<th>Sl. No</th>
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**Total** 27 500 450 950

### List of Electives

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<td>P17CS562</td>
<td>JAVA &amp; J2EE</td>
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<td>Compiler Design</td>
<td>P17CS563</td>
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<td>Data Mining &amp; Warehousing (FC-II)</td>
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### VI Semester B.E. (CS & E)

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**Total** 27 500 450 950

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<tr>
<td>1</td>
<td>P17CS661</td>
<td>Client Server Programming</td>
<td>P17CS661</td>
<td>Wireless Networks and Mobile Computing</td>
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<td>Soft Computing Technique</td>
<td>P17CS662</td>
<td>Semantic Web Technologies</td>
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<td>Pattern Recognition</td>
<td>P17CS663</td>
<td>Service Oriented Architecture</td>
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<td>4</td>
<td>P17CS664</td>
<td>Software Agents</td>
<td>P17CS664</td>
<td>Internet of Things</td>
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</table>
Course Title: Operating System

Course Code: P17CS51  Semester: V  L:T:P: H - 4 : 0 : 0 : 4  Credits: 4
Contact Period: Lecture: 52 Hr, Exam: 3 Hr  Weightage: CIE:50% SEE:50%

Course Learning Objectives:
1. **Explain** operating system structure, services and **determine** the interfaces between OS and other components of a computer system.
2. **Illustrate** the main principles and techniques used to implement processes and threads as well as the different algorithms for process scheduling.
3. **Analyse** the main problems related to concurrency and the different synchronization mechanisms.
4. **Describe** different approaches of memory management and **Apply** different page replacement algorithms to resolve page faults.
5. **Describe** the structure and organization of file system, **analyse** the data storage in secondary storage and **understand** the protection issues in computer systems.

Course content

**Unit – 1**

**Introduction to operating systems**, **Overview**: Need of operating systems, Computer System architecture, 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 structure, Virtual machines, System boot.

**Self-study component**: Computer System organisation, Operating System design and implementation.

10 Hours

**Unit – 2**

**Process management**, **Process concepts**: Overview, Process scheduling, operations on processes, Inter-process communication.

**Multi-Threaded Programming**: Overview, Multi-threading models, Thread Libraries.,

**Process Scheduling**: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple-Processor scheduling, thread scheduling.

**Self-study component**: threading issues.

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, Deadlock detection and recovery from deadlock.

Self-study component: Real time CPU scheduling.

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
Storage management and case study, File system: File concept, Access methods, Directory structure, File system mounting, File sharing, Protection.
Secondary storage structures: Mass storage structures, Disk structure, Disk attachment, Disk scheduling, Disk management.
Self-study component: Swap space management.

11 Hours

Text Book:

Reference Books:

Course outcomes
1. Distinguish between the different types of operating system environments.
2. Apply the concepts of process scheduling.
3. Develop solutions to process synchronization problems.
4. Analyze various memory management techniques.
5. Identify various issues of Linux Operating System.

Course Articulation Matrix (CAM)

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<tr>
<th>CO</th>
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<th>PS O2</th>
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<td>Distinguish between the different types of operating system environments.</td>
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<td>CO501.2</td>
<td>Apply the concepts of process scheduling.</td>
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<td>CO501.3</td>
<td>Develop solutions to process synchronization problems.</td>
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<td>CO501.4</td>
<td>Analyze various memory management techniques.</td>
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<tr>
<td>CO501.5</td>
<td>Identify various issues of Linux Operating System.</td>
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2 2.6 3 2
### Course Title: Database Management System

**Course Code:** P17CS52  
**Semester:** V  
**L:T:P:** H - 4 : 0 : 0  
**Credits:** 4  
**Contact Period:** Lecture :52 Hr, Exam: 3Hr  
**Weightage:** CIE:50% SEE:50%

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#### Course Learning Objectives

1. State the importance of DBMS and explain how DBMS is better than traditional File Processing Systems.
2. Analyze the basic structure of database and recognize the different views of the database.
3. Identify attributes, entities and relationship of the given system and draw Entity Relationship Diagrams.
4. Analyze and use Relational Data Model, while comparing with other data models.
5. Formulate data retrieval queries in SQL and the Relational Algebra and Calculus.
6. Apply normalization steps in database design using the design guidelines and functional dependencies.
7. Understand and explain the terms like Transaction Processing and Concurrency Control. Understand types of database failure and recovery.

#### 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. Introduction to structured, semi structured and unstructured data.

**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.

**Self-study component**: Naming Conventions and Design Issues; Relationship types of degree higher than two.

10 Hours

**Unit-2**

**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: Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER-to-Relational Mapping.

**Self-study component**: Binary Relational Operations: JOIN and DIVISION.

10 Hours

**Unit-3**

**Structured query language**: SQL Data Definition and Data Types; Specifying basic constraints in SQL; Basic Retrieval Queries in SQL, INSERT, More complex SQL Retrieval Queries, Specifying constraints as Assertion and Actions as Trigger; Views(Virtual Tables) in SQL; Additional features of SQL; Schema Change Statements in SQL.

**Self-study component**: DELETE, and UPDATE Statements in SQL.

12 Hours
Unit-4

**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:** Additional features of SQL; Schema Change Statements in SQL

10 Hours

**Transaction processing concepts:** Introduction to Transaction processing; Transactions and System concepts; Desirable properties of transactions; Characterizing Schedules based on Serializability. Concurrency control based on timestamp ordering;

**Distributed data bases:** Distributed data base concepts, Types of Distributed data base systems, Distributed data base architectures, Data fragmentation replication and allocation techniques for Distributed data base design, Query processing and optimization in Distributed data bases

**Self-study component:** Concurrency control: Two-phase locking techniques for concurrency control.

10 Hours

**Text Books:**

**Reference Books:**

**Course outcomes**
At the end of the course the student should be able to
1. **Design** an ER model for a given example from real world description.
2. **Design** relational models for a given application using schema definition and constraints.
3. **Develop** complex queries using SQL to retrieve the required information from database.
4. **Apply** suitable normal forms to normalize the given database.
5. **Determine** the roles of concurrency control in database design.
## CO-PO mapping

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<td>CO502.5</td>
<td>Determine the roles of concurrency control in database design.</td>
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| C502, C302  | 2.6 | 2.2 | 2.4 | 1   | 2   |      |      |      | 2   | 2   |       |       |       |       | 2.6   |
Course Title: Computer Networks

<table>
<thead>
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<th>Semester: V</th>
<th>L:T:P: H - 4 : 0 : 0 : 4</th>
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<tbody>
<tr>
<td>Contact Period: Lecture :52 Hr, Exam: 3Hr</td>
<td>Weightage :CIE:50% SEE:50%</td>
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</table>

Course Learning Objectives

1. **Understand** and recognize the importance of network layer and its functionalities.
2. **Analyze** various routing algorithms and the need of upgrading to IPv6 protocol.
3. **Differentiate** between TCP & UDP, and understand the services provided by them like flow control, congestion control etc.
4. **Understand** and recognize the importance of application layer and the working of protocols like HTTP, FTP, DNS etc
5. **Analyze** the different types of quality of service and understand some of the factors driving the need for network and Internet security.

Course Content

**Unit – 1**


- Network-layer protocols: Internet protocol (IP), ICMPv4, mobile ip
- Self-study component: IPv4 addresses

11 Hours

**Unit – 2**


- Multicast routing: Introduction, multicasting basics, intradomain multicast protocols, interdomain multicast protocols, IGMP.
- Next generation ip: IPv6 addressing, the IPv6 protocol, the ICMPv6 protocol
- Self-study component: Transition from ipv4 to ipv6.

10 Hours

**Unit – 3**

Transport layer: Introduction, user datagram protocol, transmission control protocol, SCTP.

- Self-study component: Transport-layer protocols

10 Hours

**Unit – 4**

Application layer: Introduction, client-server programming, iterative programming in c.

- Standard client-server protocols: World wide web and HTTP, FTP, electronic mail, domain name system (dns).
- Self-study component: Telnet, secure shell (ssh)

10 Hours

**Unit – 5**

Quality of service: Data-flow characteristics, flow control to improve qos, integrated services (intserv), differentiated services (dffserv).

- Internet security: Network-layer security, transport-layer security, application-layer security, firewalls.

- Self-study component: Other aspects of security

11 Hours
Text Book:

Reference Books:

Course outcomes
1. Discuss IPv4 protocols and its functions provided at networks layer.
2. Analyze various routing algorithms like distance vector, link state, hierarchical & multicast routing, and understand the concept of fragmentation.
3. Differentiate between TCP, UDP & SCTP and understand the services provided by them like flow control, congestion control etc.
4. Discuss the importance of application layer and the working of protocols like HTTP, FTP, DNS etc.
5. Analyze the different types of quality of service and understand the concept of Network & Internet security.

CO-PO Mapping

<table>
<thead>
<tr>
<th>CO</th>
<th>Statement</th>
<th>PO 1</th>
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<th>PS 02</th>
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<tbody>
<tr>
<td>C602.1</td>
<td>Discuss IPv4 protocols and its functions provided at networks layer.</td>
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<td>C602.2</td>
<td>Analyze various routing algorithms like distance vector, link state, hierarchical &amp; multicast routing, and understand the concept of fragmentation.</td>
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<tr>
<td>C602.3</td>
<td>Differentiate between TCP, UDP &amp; SCTP and understand the services provided by them like flow control, congestion control etc.</td>
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<tr>
<td>C602.4</td>
<td>Discuss the importance of application layer and the working of protocols like HTTP, FTP, DNS etc</td>
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<td>C602.5</td>
<td>Analyze the different types of quality of service and understand the concept of Network &amp; Internet security</td>
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C602
Course Title: Software Engineering (FC-I)

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<th>Course Code: P17CS54</th>
<th>Semester: V</th>
<th>L:T:P: H : 4 : 0 : 0 : 4</th>
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<td>Weightage: CIE: 50% SEE: 50%</td>
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Course Objectives

This course aims to:
1. Introduction to Software Engineering.
2. Describe the process of Software Engineering, the technologies used for Software Engineering, and configuration management of Software Engineering.
3. Apply Architectural Design Architectural design decisions System organization Modular decomposition styles Control styles.
5. Explain Project management Risk management, Managing people, Teamwork, Understand Configuration management

Course content

Unit - 1
Overview: Introduction to Software Engineering, Introduction, Professional software development, Software engineering ethics, Case studies.
Self-study component: Study of software engineering, development of software product and ethics.

8 Hours

Unit – 2
Agile software development: Agile methods, Plan driven and agile development, Extreme programming, Agile project management, Scaling agile methods
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: Study of agile software development methods and requirement engineering.

12 Hours

Unit – 3
System modelling: Context models, Interaction models, Structural models, Behavioral models, Model-driven engineering.
Architectural design: Architectural design decisions, Architectural views, Architectural patterns, Application architectures
Self-study component: Modelling techniques and study of architectural design concepts.

12 Hours

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

10 Hours
Unit – 5

**Project management:** Risk management, Managing people, Teamwork.

**Configuration management:** Change management, Version management System building, Release management.

**Self-study component:** Risk and people management, study change version and release management

8 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.
5. Identify the different forms of Software Development.

**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>
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<th>PS 02</th>
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<td>Assess the significance of software engineering</td>
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<td>Compare different Software Development methods.</td>
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FOUNDATION ELECTIVES

Course Title: System Simulation & Modeling

Course Code: P17CS551  Semester: V  L:T:P: H: 4: 0: 0: 4  Credits: 3
Contact Period: Lecture: 52 Hr, Exam: 3 Hr  Weightage: CIE: 50% SEE: 50%

Course Objectives
1. Introduce concepts of system and simulation models.
2. Analyzing the various probability distribution functions
3. Information about determining performance measures for queuing systems
4. Develop an input model for a given system
5. Verify, Validate and perform output analysis of a simulation model

Course Content

Unit – 1
Introduction: Introduction to Simulation, Advantages and disadvantages of Simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Discrete-Event System Simulation; Steps in a Simulation Study.
Self-study component: Types of Models  10 Hours

Unit – 2
Random-Number Generation: Properties of random numbers: Generation of pseudo-random numbers; Techniques for generating random numbers.
Self-study component: Tests for Random Numbers  12 Hours

Unit – 3
Queuing Models: Characteristics of queuing systems; Queuing notation Simulation Examples: Inventory System
Self-study component: Queuing  10 Hours

Unit – 4
Input Modeling: Data Collection: Identifying the distribution with data; Parameter estimation; Goodness of Fit Tests; Chi-Square test.
Self-study component: K-S Test  10 Hours

Unit – 5
Verification and Validation: Model building, verification and validation, Verification of simulation models; Calibration.
Output analysis: Types of simulations with respect to output analysis; stochastic nature of output data; Measures of performance and their estimation; Output analysis for terminating simulations.
Self-study component: Validation of models  10 Hours

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Text Book:

Reference Book:

Course Outcomes
The students will be able to
1. Develop simulation model using the engineering knowledge for a given problem.
2. Apply simulation concepts to develop simulation models.
3. Analyze methods to simulate any discrete system using queuing systems.
4. Design an input model for a given simulation system.
5. Verify, Validate and Perform output analysis of a simulation model.

CO-PO Mapping

<table>
<thead>
<tr>
<th>Semester: 5</th>
<th>Course code : P17CS551</th>
<th>Title : System Simulation &amp; Modeling</th>
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<tbody>
<tr>
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<td>Develop simulation model using the engineering knowledge for a given problem.</td>
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<tr>
<td>CO 605.2</td>
<td>Apply simulation concepts to develop simulation models.</td>
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<tr>
<td>CO 605.3</td>
<td>Analyze methods to simulate any discrete system using queuing systems</td>
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<td>Design an input model for a given simulation system</td>
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<td>Verify, Validate and Perform output analysis of a simulation model</td>
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Course Title: Web Technologies

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<td>Course Code: P17CS552</td>
<td>Semester: V</td>
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<td>L:T:P: H - 4 : 0 : 0 : 4</td>
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<td>Contact Period: Lecture: 52 Hr, Exam: 3 Hr</td>
<td>Weightage: CIE: 50% SEE: 50%</td>
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Course Learning Objectives

1. This course is intended to provide an exposure to fundamental concepts of WWW, Internet, Browsers, Servers, URL, MIME, HTTP.
2. To present competent technologies for the design of Web using XHTML and CSS.
3. To provide knowledge of scripting languages such as JavaScript and design Dynamic XHTML documents using DOM and JavaScript.
4. To create XML documents using DTD/XML schema and XSLT style sheets and Create cookies using PHP, Implement session tracking using PHP.
5. To develop a Rails application using Ajax.

Course content

Unit-1
Fundamentals of Web: Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP.
Introduction to XHTML: Origins and evolution of HTML and XHTML, Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links, Lists, Tables, Forms, Frames, Syntactic 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.
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, Examples.
Self-study component: Pattern matching using regular expressions in JavaScript, Errors in Javascripts.

10 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.
Self-study component: Slow movement of elements; Dragging and dropping elements.

11 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; Web services.
**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 component:** Cookies, Session tracking

11 Hours

**Unit-5**
Introduction to Rails: Overview of Rails, Document requests, processing forms.
**Introduction to Ajax:** Overview of Ajax, Basics of Ajax, Rails with Ajax
**Self-study component:** Rails applications with databases

10 Hours

**Text book:**

**Reference books:**

**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 a simple Rails application using Ajax.

**CO-PO Mapping**

<table>
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<tr>
<th>Semester: 5th</th>
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<td>CO601.1</td>
<td>Develop web pages using various XHTML tags</td>
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<td>CO601.2</td>
<td>Design interactive web pages using java script</td>
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<tr>
<td>CO601.3</td>
<td>Create dynamic documents using DOM object model.</td>
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<tr>
<td>CO601.4</td>
<td>Develop web pages using PHP scripts</td>
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<tr>
<td>CO601.5</td>
<td>Implement a simple Rails application using Ajax</td>
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Course Title : Green Computing

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<th>Semester : 5</th>
<th>L-T-P-H: 4 : 0 : 4</th>
<th>Credits:3</th>
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</table>

Contact Period: Lecture: 52 Hrs.  Exam: 3Hrs.  

Weightage :CIE:50% SEE:50%

Course Learning Objectives
1. To understand the need of Green Computing.
2. Evaluate the role of Cloud Computing in Green solutions.
3. Analyze Green Device Portfolio.
4. Analyze Green data centres and energy consumption.
5. To understand corporate socio economical responsibility of Green computing.

Course Content

Unit 1


Self-study component: A Brief History of the Climate

11 Hours

Unit 2


Self-study component: The Philosophical Implications of Green Computing

10 Hours

Unit 3


Self-study component: Case Study: HP vs. Dell

11 Hours

Unit 4

Part-I Green Servers and Data Centers: Choosing and Creating Green Data Centers, Green Data Centers as a Model, The Last Shall Be First, What Makes a Data Center Green?, Building and Power Supply Considerations, Servers, Storage, and Networking.

Text1: 133 to 142, 143 to 166

Self-study component: Data Center Suppliers

10 Hours

Unit 5


Self-study component: Analyzing Your Own Initiatives, Company, and Sector

10 Hours

Text Book:


Reference Books:


<table>
<thead>
<tr>
<th>CO#</th>
<th>Course Outcome</th>
<th>Program Outcome with BTL</th>
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</thead>
<tbody>
<tr>
<td>CO1</td>
<td>Understand the need of Green Computing and IT aspects.</td>
<td>PO1, [L3]</td>
</tr>
<tr>
<td>CO2</td>
<td>Evaluate the role of Cloud Computing in Green solutions and data centers.</td>
<td>PO2, [L3]</td>
</tr>
<tr>
<td>CO3</td>
<td>Knowledge of IT &amp; energy, Recycling, Recovery technologies, models and future technologies with case studies.</td>
<td>PO1, [L4]</td>
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<tr>
<td>CO4</td>
<td>Analyze Green Device Portfolio, Energy saving, cost saving and risk reductionwrt IT.</td>
<td>PO2, [L3]</td>
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<tr>
<td>CO5</td>
<td>Understand IT and corporate socio economical responsibility of Green computing and environmental issues.</td>
<td>PO1, [L2]</td>
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V & VI Semester Syllabus 2017-2018 15
Course Title: Computer Graphics & Visualization

<table>
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<td>Lecture :52 Hr, Exam: 3Hr</td>
<td>Weightage :CIE:50% SEE:50%</td>
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</table>

Students will be able to:
1. Learn the basics of Application Programming Interface (API) implementation based on graphics pipeline approach.
2. Apply mathematical transformations and vector techniques in the production of computer graphics.
3. Gain familiarity of line drawing, clipping algorithms and rasterization techniques and interaction with input devices.
4. Understand viewing, lighting and shading techniques.
5. Design and create graphics applications using OpenGL.

Course learning objectives:

Course Content

Unit – 1

Self-Study Component: The synthetic camera model
10 Hours

Unit – 2

Self-Study Component: Scalars, vectors and points and Frames in OpenGL
11 Hours

Unit – 3


Self-Study Component: OpenGL Polygon Fill Area Functions
11 Hours
Unit – 4
**Viewing:** Classical and computer viewing, Positioning of the camera, Simple projections, Projections in OpenGL, Hidden-surface removal, Interactive Mesh Displays, Parallel-projection matrices, Perspective-projection matrices, Projections and Shadows.
**Self-Study Component:** Viewing with a Computer

10 Hours

Unit – 5
**Lighting and Shading:** Light and matter, Light sources, The Phong lighting model, Computation of vectors, Polygonal shading, Approximation of a sphere by recursive subdivisions, Light sources in OpenGL, Specification of materials in OpenGL. Shading of the sphere model, Global illumination.
**Curves and Surfaces:** Representation of Curves and surfaces, Hermite Curves and Surfaces, Bezier curves and Surfaces, The Utah Teapot.
**Self-Study Component:** Cubic B-Splines

10 Hours

**Text Books:**

**Reference Books:**

**Course Outcomes:**
1. **Apply** the concepts of Application Programming Interface (API) based on graphics pipeline approach.
2. **Develop** mathematical transformation for generating graphics images.
3. **Develop** rasterization and input interaction techniques
4. **Apply** different types of projection methods.
5. **Determine** different rendering techniques and generation of curves in OpenGL.

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<td>CO 505.1</td>
<td><strong>Apply</strong> the concepts of Application Programming Interface (API) based on graphics pipeline approach</td>
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<td>CO 505.2</td>
<td><strong>Develop</strong> mathematical transformations for generating graphics images.</td>
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<td>CO 505.3</td>
<td><strong>Develop</strong> rasterization and input interaction techniques</td>
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<td>CO 505.4</td>
<td><strong>Apply</strong> different types of projection methods</td>
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<tr>
<td>CO 505.5</td>
<td><strong>Determine</strong> different rendering techniques and generation of curves in OpenGL</td>
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ELECTIVE-I

Course Title: Digital Image Processing

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<tr>
<th>Course Code: P17CS561</th>
<th>Semester: V</th>
<th>L:T:P: H - 4 : 0 : 4</th>
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<tr>
<td>Contact Period: Lecture: 52 Hr, Exam: 3Hr</td>
<td>Weightage: CIE:50% SEE:50%</td>
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Course Learning Objectives (CLOs)

This course aims to
1. To understand the image fundamentals.
2. To understand the mathematical transforms necessary for image processing and to study the image enhancement techniques.
3. To understand the image degradation/restoration model and different noise models.
4. To understand the uses of pseudo colors and to study the image compression models.
5. To understand Morphological Image Processing and the image segmentation.

Course Content

Unit – 1

Self-study component: Linear and Nonlinear Operations

10 Hours

Unit – 2

Image Enhancement In Frequency Domain: Introduction to the Fourier transform, smoothing frequency domain filters, sharpening frequency domain filters.
Self-study component: Enhancement Using Arithmetic/Logic Operations

11 Hours

Unit – 3

Image Restoration: Noise models, Restoration in the Presence of Noise, Only Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear Position–Invariant Degradations, inverse filtering, minimum mean square error (Weiner) Filtering
Self-study component: Model of image degradation/restoration process

11 Hours

Unit – 4

Color Image Processing: Color fundamentals, color models, pseudo color Image processing, basics of full color image processing.
Image Compression: Fundamentals, Image Compression Models, Elements of Information Theory
Self-study component: Color transformations

10 Hours

Unit – 5

Morphological Image Processing: Dilation and Erosion, opening and closing, Image Segmentation
Detection of discontinuities, Edge Linking and Boundary Detection, Thresholding, Region–Based Segmentation.
Self-study component: Morphological algorithms. 

10 Hours

Text Book:

Reference Books:

Course Outcomes
After learning all the units of the course, the student is able to
1. Describe the various steps in image processing.
2. Develop the suitable filters for image enhancement.
3. Analyze the image degradation restoration model and noise models.
4. Apply the color image processing techniques.
5. Develop the algorithms for image segmentation and Morphological image processing.

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<td>C101.1</td>
<td>Describe the various steps in image processing.</td>
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<td>C101.2</td>
<td>Develop the suitable filters for image enhancement.</td>
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<td>C101.3</td>
<td>Analyze the image degradation restoration model and noise models.</td>
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<td>C101.4</td>
<td>Apply the colour image processing techniques</td>
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<td>C101.5</td>
<td>Develop the algorithms for image segmentation and Morphological image processing</td>
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</table>
Course Learning Objectives:
1. **Adopt** object oriented features to develop java applications, **Handle** the exceptions and **describe** key issues of modern animations.
2. **Apply** the multithreading programming to solve synchronization problems and **Develop** generic methods and classes.
3. **Write** the java applications to deal with events using delegation event model, develop the applets and **describe** the use of collection framework.
4. **Describe JDBC process**, **Use** statement object to manipulate database and **Create** a J2ee component using java servlet technology.
5. **Create** a JSP that can be used as a middle level program between clients and web Services, **Use** Java Remote Method Invocation to invoke Server side objects that are Written in Java, **Create** and use JavaBeans.

**Course Content**

**Unit – 1**

**Introduction**, History of Java, Java Buzzwords, Java’s Bytecode, Java Development Kit (JDK), Object oriented programming, Simple Java programs.

**Introducing classes**: Class Fundamentals, Declaring Object, Constructors, This key word, Garbage collection, overloading methods, Acess control, final key word, nested and inner classes.

**Inheritance**: Simple, multiple, and multilevel inheritance, Super classes, Order of calling constructors, Overriding, Using final with inheritance.

**Interfaces and packages**, **Exception handling in Java**.

**Enumerations, Autoboxing**: Enumerations, Type Wrappers, Autoboxing, Annotations (Metadata).

**Self-study component**: Assigning object reference variables, Abstract classes

**10 Hours**

**Unit – 2**


**Multi-threaded programming**: Java’s thread model, the main thread, creation of threads, Multiple threads, isAlive() and join(), thread priorities, Synchronization, Interthread communication, suspending, reassuming, and stopping threads.

**Self-study component**: The Console Class.

**11 Hours**

**Unit – 3**

Collection Algorithms, arrays, The Legacy Classes and Interfaces: enumeration, interface, vector, stack.

**Applets:** Two types of Applets, Applet basics, Applet Architecture, An Applet skeleton, Simple Applet display methods, Requesting repaintding, using the Status Window, The HTML APPLET tag, passing parameters to Applets.

**Event Handling:** Event handling mechanisms, the delegation event model, Event classes, Sources of events, Event listener interfaces, using the delegation event model, Adapter Classes, Inner classes.

**Self-study component:** get Document base () and get Codebase ()..

**10 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, Associa the Database, Statement Objects, ResultSet, Transaction Processing.


**Self-study component:** Metadata, Data types, Exceptions.

**11 Hours**

**Unit – 5**

**JSP:** Java Server Pages (JSP): JSP, JSP Tags. Tomcat, Request String, User Sessions, Cookies, Session Objects.

**Java Remote Method Invocation:** Remote Method Invocation concept, Server side, Client side.

**Enterprise java beans:** Enterprise Java Beans, Deployment Descriptors, Session Java Bean, Entity Java Bean, Message-Driven Bean.

**Self-study component:** The JAR File.

**10 Hours**

**Text Books:**

**Reference Books:**

**Course outcomes**
1. Distinguish between various object-oriented concepts.
2. Design the solution using multithreading and generic classes.
3. Develop applications using frameworks and applets with events handling.
4. Develop programs using JDBC and Servlets.
5. CreateJ2ee component using JSP and EJB technology.
## CO-PO Mapping

**Course code : P17CS562**  **Title : JAVA & J2EE**

<table>
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<tr>
<td><strong>CO 5062.1</strong></td>
<td>Distinguish between various object-oriented concepts.</td>
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<td><strong>CO 5062.2</strong></td>
<td>Design the solution using multithreading and generic classes.</td>
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<td><strong>CO 5062.3</strong></td>
<td>Develop applications using frameworks and applets with events handling.</td>
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<td><strong>CO 5062.4</strong></td>
<td>Develop programs using JDBC and Servlets.</td>
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<td><strong>CO 5062.5</strong></td>
<td>Create J2ee component using JSP and EJB technology.</td>
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Course Learning Objectives
The course aims to:
1. Discuss the fundamentals of storage centric and server centric systems
2. Analyze the metrics used for Designing storage area networks
3. Explain the RAID concepts
4. Explain strong virtualization concepts.
5. Apply the techniques used for data maintenance.

Course Content

<table>
<thead>
<tr>
<th>Unit</th>
<th>Course Title</th>
<th>Self-study component</th>
<th>Hours</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction: Server Centric IT Architecture and its Limitations; Storage – Centric IT Architecture and its advantages. Case study: Replacing a server with Storage Networks the Data Storage and Data Intelligent Disk Subsystems: Architecture of Intelligent Disk Subsystems; Hard disks and Internal I/O Channels; JBOD, Storage virtualization using RAID and different RAID levels; Caching: Acceleration of Hard Disk Access; Intelligent disk subsystems, Availability of disk subsystems.</td>
<td>Intelligent disk subsystems, Availability of disk subsystems.</td>
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<td>2</td>
<td>I/O Techniques: The Physical I/O path from the CPU to the Storage System; SCSI; Fibre Channel Protocol Stack; Fibre Channel SAN; IP Storage. Network Attached Storage: The NAS Architecture, The NAS hardware Architecture, The NAS Software Architecture, Network connectivity, NAS as a storage system. File System and NAS: Local File Systems; Network file Systems and file servers; Shared Disk file systems; Comparison of fibre Channel and NAS.</td>
<td>Local File Systems; Network file Systems and file servers</td>
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<tr>
<td>3</td>
<td>Storage Virtualization: Definition of Storage virtualization; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network Symmetric and Asymmetric storage virtualization in the Network.</td>
<td>Local File Systems; Network file Systems and file servers</td>
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<td>4</td>
<td>SAN Architecture and Hardware devices: Overview, Creating a Network for storage; SAN Hardware devices The fibre channel switch; Host Bus Adaptors; Putting the storage in SAN; Fabric operation from a Hardware perspective. Software Components of SAN: The switch’s Operating system; Device Drivers; Supporting the switch’s components; Configuration options for SANs.</td>
<td>Putting the storage in SAN</td>
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</table>
Management Initiative Specification (SMI-S), CMIP and DMI, Optional Aspects of the Management of Storage Networks, Summary.

**Self-study component:** Management Interface

10 Hours

**Text Books:**
1. Ulf Troppens, Rainer Erkens and Wolfgang Muller: Storage Networks Explained, Wiley India, 2015.

**Reference Books:**

**Course Outcomes:**
1. The students shall able to:
2. Discuss the fundamentals of storage centric and server centric systems
3. Analyze the metrics used for Designing storage area networks
4. Explain the RAID concepts
5. Explain strong virtualization concepts.
6. Apply the techniques used for data maintenance.

**CO-PO Mapping**

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<td>Discuss the fundamentals of storage centric and server centric systems</td>
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<td>C101.2</td>
<td>Analyze the metrics used for Designing storage area networks techniques.</td>
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<td>C101.3</td>
<td>Explain the RAID concepts.</td>
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<td>C101.4</td>
<td>Explain strong virtualization concepts, composition, orchestration and Choreography.</td>
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<td>C101.5</td>
<td>Apply the techniques used for data maintenance.</td>
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Course Learning Outcomes:
After successful completion of the course, students will be able to,
1. Explain how Artificial Intelligence & Intelligence Systems enables capabilities that are beyond conventional technology.
2. Discuss how a heuristic state – space search algorithms are used to solve complex problem.
3. Analyze and design a rule-based expert system with tools.
4. Design fuzzy-logic based controllers and explore their unique characteristics.
5. Understanding of genetic algorithm and an outlook on the applications of genetic algorithm

Course Content
Unit -1
Introduction to artificial intelligence: Artificial Intelligence: Importance, Definitions, Programming Methods, Techniques; Intelligent Systems; Predicate Calculus; Rule-Based Knowledge Representation; Symbolic Reasoning Under Uncertainty; Basic Knowledge Representation Issues.
Self-study component: AI Problem Solving Languages – PROLOG, Control Structures used in Rule – Based System 11 Hours

Unit -2
Heuristic search and state space search: Heuristic Search; Techniques for Heuristic Search; Heuristic Classification; Intelligent Agents State Space Search; Strategies for State Space Search; Learning; Applications of Search Techniques in Game Playing and Planning.
Self-study component: AI Problem Solving Languages – Search, LISP 10 Hours

Unit -3
Self-study component: Expert System – Applications of Expert System 10 Hours

Unit -4
Fuzzy Systems: Introduction to fuzzy systems; Foundation of fuzzy Systems; Linguistic Description and their Analytical Forms; Defuzzification Methods; Fuzzy logic in Control and Decision-making Applications.
Self-study component: Fuzzy Systems-Fuzzy Relations, arithmetic operation of Fuzzy number 10 Hours

Unit -5
Advanced Intelligent System Concepts: Introduction to Genetic Algorithms; Genetic Algorithms; Procedures of Genetic Algorithms; The working of Genetic Algorithms; Logic behind Genetic Algorithms. Swarm Intelligent Systems Ant Colony Systems; Development of Ant Colony Systems; Applications of Ant Colony Intelligence
Self-study component: Swarm Intelligent System – Background of Ant Intelligent Systems, Importance of the Ant Colony Paradigm 11 Hours

Text Book:
Reference Book:
Course Title: Aptitude and Reasoning Development - Advanced (ARDA)

Course Code: P17HU51| Semester: 5 | L:T:P:H:0:0:2:2 | Credits: 1

Contact Period: Lecture: 32 Hr, Exam: 3 Hr | Weightage: CIE:50%; SEE:50%

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 behavior.

Course Content

UNIT – I

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.

10 Hours

UNIT – II

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.

6 Hours
UNIT – III

**Profit and Loss:** percentage change, original 100 concept effect of percentage increase or decrease in number, effect of successive percentage change, amount of change, comparison of two numbers through percentage and ratio, return to original concept, net percentage change to keep product fixed. Definition of basic terms—cost price, selling price, profit percentage, discount and marked price, solving problems using n/d method, techniques to tackle from standard set of problems, the concept of mark up. Concept of partnership and problems involving partnership

6 Hours

UNIT IV

**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., finding common difference of an A.P. given 2 terms 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

6 Hours

UNIT- V

**Simple Interest and Compound Interest**

Concept of time value of money, Terminology pertaining to interest, Relation among Principal, Time, Rate percent per annum and total interest. Compound interest, Depreciation of value, Population, Application of interest in D.I.—The difference between simple annual growth rate and compound annual growth rate.

4 Hours

**Reference books:**

3. Dr. R. S Agarwal “Quantitative aptitude” published by S.Chand private limited.
4. Dr. R. S Agarwal, “Verbal reasoning” 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 dimensions 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
## Course Articulation Matrix (CAM)

<table>
<thead>
<tr>
<th>Course Outcome (CO)</th>
<th>Program Outcome (ABET/NBA-(3a-k))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>Apply the approach of seven dimensions to better reading skills.</td>
<td>L2</td>
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<tr>
<td>Solve the questions under reading comprehension confidently with higher accuracy</td>
<td>L4</td>
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<tr>
<td>Apply the technique of alligation for effective problem solving.</td>
<td>L2</td>
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<tr>
<td>Interpret the requirement of different methods of calculating average and apply</td>
<td>L4</td>
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<tr>
<td>Effectively solve problems of profit and loss and problems related to discount,</td>
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1 – Low, 2 – Moderate and 3 – High
VI Semester

Course Title: Entrepreneurship Management & IPR

Course Code: P17CS61
Semester: 6
L:T:P: H - 4 : 0 : 0 : 4
Credits: 4

Course Learning Objectives:
The students should be able to

1. Describe the importance of management and functions of a manager
2. Explain the process of planning and organizing.
3. Explain the requirements of direction and supervision and explain the methods of establishing control.
4. Identify the role of entrepreneurs in the economic development of the nation and recognize the barriers of entrepreneurship.
5. Explain the importance of Intellectual property protection.

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, modern approaches.

Self-study component: Case studies on management and administration.

10 Hours

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, teams.

Self-study component: Staffing: Selection, requirement and training.

10 Hours

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, Methods of establishing control.

Self-study component: Leadership: Leadership styles, effective leadership.

10 Hours

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; Entrepreneurship in India; Entrepreneurship—its Barriers.

Self-study component: Case studies of successful entrepreneurship.

11 Hours
Unit–5


Self-study component: Ethical issues related to intellectual property rights.

11 Hours

Text Books:

Reference Books:
2. Dynamics of Entrepreneurial Development & Management, Vasant Desai, Himalaya publishing house, 2009

Course Outcomes
Upon completion of this course, students will be able to
1. **Describe** the importance of management and functions of a manager.
2. **Explain** the process of planning and principles of organizing.
3. **Identify** the role of entrepreneurs in the economic development of the nation.
4. **Compare** the different leadership styles.
5. **Apply** the ethical principles related to the intellectual property protection

### CO-PO Mapping

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<tr>
<th>CO</th>
<th>Statement</th>
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<th>PS 02</th>
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<td>C101.4</td>
<td>Compare the different leadership styles</td>
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Course Title: Computer Architecture

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Course learning objectives
In this course students should be able to,
1. Understand the evolution of computers, choosing the parameters needed to evaluate the performance of architectures, classification of computers to perform multiprocessor, fundamental properties of how parallelism can be introduced in program.
2. Discuss the present modern processor technology and the supporting memory hierarchy, Bus for interconnection between different processor, how shared memory concept is used in multiprocessor.
3. Examine the basic properties of pipelining, classification of pipeline processors, plan solutions for the pipeline processors.
4. Understand System architectures of multiprocessor and multicomputer, various cache coherence protocols, synchronization methods, other important concepts involved in building a multicomputer and message passing mechanisms.
5. Understand how to perform parallelization of computations of data and acquiring knowledge about scalable multiprocessor systems and different scaling methods.

Course Content

Unit–1
Self-study component: Program and Network Properties

10 Hours

Unit–2
Processor and Memory Hierarchy: Advanced Processor Technology, Design space of processors, Instruction Set Architectures, CISC Scalar Processor (exclude CISC Microprocessor Families), Superscalar and Vector Processor, Superscalar Processor (exclude IBM Rs/6000 Architecture), VLIW Architecture.
Bus and Shared Memory: Bus Systems, Shared– Memory Organization, Interleaved Memory Organization, Bandwidth and fault Tolerance, Memory Allocation Schemes(exclude swapping in Unix, Demand Paging system and Hybrid Paging system).
Self-study component: RISC Scalar Processor (exclude Sun Microsystems SPARC architectures)

10 Hours

Unit–3
Pipelining and Superscalar Techniques: Linear Pipeline Processors: Asynchronous and Synchronous Models, Clocking and Timing Control, Speed up, Efficiency and Throughput, Non-linear Pipeline Processors: Reservation and Latency Analysis, Collision free scheduling, Pipeline schedule optimizations, Instruction pipeline design: Instruction Execution Phases, Mechanism for Instruction Pipelining, Dynamic Instruction Scheduling.
Self-study component: Branch handling Techniques, Arithmetic Pipeline Design: Computer Arithmetic Principles, Static Arithmetic Pipeline, Multifunctional Arithmetic Pipelines (exclude IMB360 Floating Point unit).

11 Hours
**Unit–4**


**Self-study component:** Crossbar Switch and Multiport Memory, Multistage & Combing N/W

10 Hours

**Unit–5**

**Parallel Programs:** Parallel Application Case Studies: Simulating ocean Currents, Simulating the Evolution of Galaxies, Visualization Complex Scenes using Ray Tracing, Mining Data for Associations, The Parallelization Process: Steps in The Process, Parallelization Computation Versus Data, Parallelization of an Example Program: The Equation Solver Kernel, Decomposition, Assignment, Orchestration under the Shared address Space Model, Orchestration under the Message –Passing Model.

**Scalable Multiprocessors:** Scalability, Bandwidth scaling, Latency scaling, Cost Scaling, Physical Scaling, Realizing Programming Model: Primitive Network Transaction, Shared address Space, Message Passing.

**Self-study component:** Goals of the Parallelization Process.

11 Hours

**Text Books:**

**Reference Books:**

**Course Outcomes**
1. Describe the evolution of computers
2. Characterize the present modern technology and supporting memory hierarchy
3. Analyze the basic properties of pipelining
4. Discuss system architecture of multiprocessor and multicomputer
5. Analyze the steps to perform parallelization of computation

**CO-PO Mapping**

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<td>Characterize the present modern technology &amp; supporting memory hierarchy</td>
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<td>Analyze the basic properties of pipelining</td>
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<tr>
<td>CO 604.4</td>
<td>Discuss system architecture of multiprocessor and multicomputer</td>
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<td>CO 604.5</td>
<td>Analyze the steps to perform parallelization of computation</td>
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</table>
Course Learning Objectives

The main objective of this course is to gain in-depth knowledge in understanding the compilation process

1. **Understand** the phases of the compilation process and **Know** about the compiler generation tools, role of lexical analyzer for designing a compiler.
2. **Learn top down** parsing techniques.
3. **Learn Bottom up** parsing techniques and **analysis** of ambiguous grammar in the specification and implementation of languages.
4. **Know** how dependency graph is used in evaluation of SDD’s, **Learn** role of a semantic analyzer and type checking, how allocation and deallocation can be done during run time.
5. **Learn** intermediate machine representations and understand the concept of code generation.

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; Top-down Parsing.

**Self-study component:** Context-free grammars

11 Hours

**Unit–3**

Syntax Analysis: Bottom-up Parsing, LR parsers, using ambiguous grammars.

**Self-study component:** LALR parsers

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; Type conversions.

**Run-Time Environments:** Source language issues; Storage Organization; Storage allocation strategies; parameter passing; dynamic storage allocation techniques.

**Self-study component:** Symbol tables

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

<table>
<thead>
<tr>
<th>Semester: 6</th>
<th>Course code : P17CS63</th>
<th>Title : Compiler Design</th>
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<tbody>
<tr>
<td>CO 603.1</td>
<td><strong>Design</strong> simple lexical analyzer</td>
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<tr>
<td>CO 603.2</td>
<td><strong>Construct</strong> simple top down parser for a given context free grammar</td>
<td>3 3 3 3 1</td>
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<tr>
<td>CO 603.3</td>
<td><strong>Construct</strong> simple bottom up parser for a given context free grammar</td>
<td>3 3 3 3 1</td>
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<tr>
<td>CO 603.4</td>
<td><strong>Apply</strong> different syntax directed translation schemes</td>
<td>3 3 2 1</td>
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<tr>
<td>CO 603.5</td>
<td><strong>Generate</strong> intermediate and machine dependent code</td>
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</table>
Course Title : Data Mining & Warehousing (FC-II)

<table>
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<th>Course Code: P17CS64</th>
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<td>Contact Period: Lecture : 52 Hr, Exam: 3Hr</td>
<td>Weightage: CIE:50% SEE:50%</td>
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</tbody>
</table>

Course objectives:
This course will enable students to
1. Define Data warehousing Architecture and Implementation
2. Explain Data mining principles and techniques and Introduce DM as a cutting edge business intelligence
3. Interpret association rule mining for handling large data
4. Classification for the retrieval purposes
5. Explain clustering techniques in details for better organization and retrieval of data

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
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.

<table>
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<tr>
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ELECTIVE-II

Course Title : Client Server Programming

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Course Learning Objectives (CLOs)

This course aims to
1. Understand the client-server software, context switching software and protocol software
2. Understand system calls, basic I/O functions in UNIX operating System
3. Understand the socket interface, TCP and UDP
4. Analyze various client software applications and their issues.
5. Understand the necessity of socket interface in client server programming

Course Content

Unit-1

The Client Server Model and Software Design: Introduction, Motivation, Terminology and Concepts


12 Hours

Unit-2


Algorithms and Issues in Client Software Design: Introduction, Learning Algorithms instead of Details, Client Architecture, Identifying the Location of a Server, Parsing an Address Argument, Looking up a Domain Name, Looking up a well-known Port by Name, Port Numbers and Network Byte Order, Looking up a Protocol by Name, The TCP Client Algorithm, Allocating a Socket, Choosing a Local Protocol Port Number, A fundamental Problem in choosing a Local IP Address, Connecting a TCP Socket to a Server, Communicating with the Server using TCP, Reading a response from a TCP Connection, Closing a TCP Connection, Programming a UDP Client, Connected and Unconnected UDP Socket, Using Connect with UDP, Communicating with a Server using UDP, Closing a Socket that uses UDP, Partial Close for UDP, A Warning about UDP Unreliability

10 Hours

Unit-3

Example Client Software: Introduction, the Importance of Small Examples, Hiding Details, an Example Procedure Library for Client Programs, Implementation of Connect TCP,

**10 Hours**

**Unit-4**


**10 Hours**

**Unit-5**


**10 Hours**

**Text Book:**


**Course Outcomes**

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

1. Understand and apply client server software
2. Identify context switching software and protocol software
3. Explore system calls, basic I/O functions in UNIX operating System
4. Develop socket interface, TCP and UDP program
5. Apply socket interface in client server programming
# CO-PO Mapping

**Semester: 6th**

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<td>CO2</td>
<td>Identify context switching software and protocol software</td>
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<td>CO3</td>
<td>Explore system calls, basic I/O functions in UNIX operating System</td>
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<td>CO4</td>
<td>Develop socket interface, TCP and UDP program</td>
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<tr>
<td>CO5</td>
<td>Apply socket interface in client server programming</td>
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**Title: Client Server Programming**
Course Title: Soft Computing Technique

Course Code: P17CS652  Semester: VI  L:T:P: H - 4 : 0 : 0 : 4  Credits: 3
Contact Period: Lecture :52 Hr, Exam: 3Hr  Weightage :CIE:50% SEE:50%

Course Learning Objectives

This course aims to
1. Understand the concepts of feed forward neural networks
2. Understand the feedback neural networks
3. Understand the concept of fuzziness involved in various systems
4. Understand the ideas about genetic algorithm
5. Understand the FLC and NN toolbox

Course Content

Unit-1
Self-study component: Back propagation algorithm- factors affecting back propagation training- applications.

12 Hours

Unit-2
Self-study component: Limitations and applications- Hopfield v/s Boltzman machine

10 Hours

Unit-3
Fuzzy logic system: Introduction to crisp sets and fuzzy sets- basic fuzzy set operation and approximate reasoning. Introduction to fuzzy logic modeling and control- Fuzzification-inferencing and defuzzification- -Fuzzy modeling and control schemes for nonlinear systems.
Self-organizing fuzzy logic control- Fuzzy logic control for nonlinear time delay system
Self-study component: Fuzzy Knowledge and Rule Bases

10 Hours

Unit-4
Genetic algorithm: Basic concept of Genetic algorithm and detail algorithmic steps-adjustment of free Parameters- Solution of typical control problems using genetic algorithm-Concept on some other search techniques like tabu search.
Self-study component: Ant colony search techniques for solving optimization problems.

10 Hours

Unit-5
Applications: GA application to power system optimization problem- Case studies: Identification and control of linear and nonlinear dynamic systems using Matlab-Neural Network toolbox. Stability analysis of Neural Network interconnection systems-Implementation of fuzzy logic controller using Matlab fuzzy logic toolbox
Self-study component: Stability analysis of fuzzy control systems.

Text Books:

Reference Books:

Course Outcomes
After learning all the units of the course, the student is able to
1. **Understand and apply** feed forward neural networks
2. **Develop** feedback neural networks
3. **Identify** fuzziness involved in various systems
4. **Apply** ideas about genetic algorithm
5. **Apply** FLC and NN toolbox

CO-PO mapping

<table>
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<tr>
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<td>Understand and apply feed forward neural networks</td>
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<tr>
<td>CO2</td>
<td>Develop feedback neural networks</td>
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<tr>
<td>CO3</td>
<td>Identify fuzziness involved in various systems</td>
<td>2</td>
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<tr>
<td>CO4</td>
<td>Apply ideas about genetic algorithm.</td>
<td>2</td>
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<tr>
<td>CO5</td>
<td>Apply FLC and NN toolbox.</td>
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Course Title: Pattern Recognition

Course Code: P17CS653  Semester: VI  L:T:P: H - 4 : 0 : 0 : 4  Credits: 3

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

Course Learning Objectives
1. Introduce to fundamental concept, statistical approach to pattern recognition.
2. Learn how to design optimal classifier and focus on related techniques of parameter estimation.
3. Know about non parametric procedures used with arbitrary distribution, various procedures for determining discriminant function.
4. To learn unsupervised procedure that used unlabelled sample.
5. Introduce to various methodologies for identification and verification of a person.

Course Content

Unit 1
Introduction and Bayesian Decision Theory: Machine perception, an example; Pattern Recognition System; The Design Cycle; Learning and Adaptation. Introduction to Bayesian Decision Theory; Continuous Features, Minimum error rate, classification, classifiers, discriminant functions, and decision surfaces; The normal density;
Self-study component: Discriminant functions for the normal density.

10 Hours

Unit 2
Maximum-likelihood, Bayesian Parameter Estimation and Non-parametric Techniques: Introduction to Maximum-likelihood estimation; Bayesian Estimation; Bayesian parameter estimation: Gaussian Case, general theory; Hidden Markov Models. Introduction to Non Parametric Techniques; Density Estimation; Parzen windows; kn – Nearest-Neighbor Estimation; The Nearest-Neighbor Rule;
Self-study component: Metrics and Nearest-Neighbor Classification.

12 Hours

Unit 3
Linear Discriminant Functions: Introduction; Linear Discriminant Functions and Decision Surfaces; Generalized Linear Discriminant Functions; The Two-Category Linearly Separable case; Minimizing the Perception Criterion Functions; Relaxation Procedures; Non-separable Behavior; Minimum Squared-Error procedures;
Self-study component: The Ho-Kashyap procedures.

10 Hours

Unit 4
Unsupervised Learning and Clustering: Introduction; Mixture Densities and Identifiability; Maximum-Likelihood Estimates; Application to Normal Mixtures; Unsupervised Bayesian Learning; Data Description and Clustering;
Self-study component: Fuzzy k-means clustering and Criterion Functions for Clustering.

10 Hours

Unit 5
Self-study component: Retina scanning.

10 Hours

Text Book:
Reference Books:
2. Christopher M. Bishop ,“Pattern Recognition and Machine Learning”, Springer publication, 2006

Course Outcomes

After completing this course, students should be able to:
1. **Classify** patterns using Bayesian Decision Theory.
2. **Classify** patterns using Parametric and Non-Parametric techniques.
3. **Perform** Subspace analysis for classification problems and compare with other classification algorithms.
4. **Choose** between single Gaussian and mixture models for classification based on the applications.
5. **Understand** various biometric technologies and its merits and demerits

| CO 653.1 | Classify patterns using Bayesian Decision Theory. | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PS O1 | PS O2 |
| CO 653.2 | Classify patterns using Parametric and Non-Parametric techniques. | 3 | 1 | | | | | | | | | | | |
| CO 653.3 | Perform Subspace analysis for classification problems and compare with other classification algorithms. | 3 | 2 | 2 | | | | | | | | | | |
| CO 653.4 | Choose between single Gaussian and mixture models for classification based on the applications. | 3 | | | | | | | | | | | | |
| CO 653.5 | Understand various biometric technologies and its merits and demerits. | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1.5 | | | |

C653 | 2.7 | 1.5 | 2.5 | 2 | 2.2 | 1 | 2 | 2 | 1.5 | 2

CO-PO Mapping
This course aims to
1. **Provide** sufficient in depth knowledge in Software agents.
2. **Understand** the how software agents reduce information overhead, gain knowledge in use of software agents for cooperative learning and personal assistance
3. **Demonstrate** Software Agent can communicate and share knowledge using agent communication language,
4. **Develop** an agent interpreter and intelligent agent
5. **Understand** the concept of mobile technology and mobile agents and its security.

**Relevance of the Course:** The course gives depth knowledge in software agents. These software agents reduce information overhead, gain knowledge in use of software agents for cooperative learning and personal assistance. To know how agent can communicate and share knowledge using agent communication language, gain knowledge in design of an agent interpreter and intelligent agent. To understand the concept of mobile technology and mobile agents and its security.

**Course Content**

**Unit-1**
**Agent and User Experience:** Agent characteristics- object Vs agent. Agent types- Interacting with Agents - Agent from Direct Manipulation to Delegation - Interface Agent, Metaphor with Character – Designing Agents –problem solving agent, rational agent.
**Self-study component:** Direct Manipulation versus Agent Path to Predictable
12 Hours

**Unit-2**
**Agents for Learning And Assistance:** Agents for Information Sharing and Coordination - Agents that Reduce Work Information Overhead - Agents without Programming Language - Life like Computer character - S/W Agents for cooperative Learning – Multiple Reasoning agents –M system. Learning agents: computational architectures for learning agents; evolution, adaptation
**Self-study component:** Multi-agent learning
10 Hours

**Unit-3**
**Agent Communication And Collaboration:** Overview of Agent Oriented Programming - Agent Communication Language – KQML-Per formatives.. Virtual agents: agents in games and virtual environments; companion and coaching agents; modeling personality, emotions; multimodal interaction; verbal and non-verbal expressiveness.
**Self-study component:** Agent Based Framework of Interoperability
10 Hours

**Unit-4**
**Self-study component:** Agent societies and societal issues
10 Hours
Unit-5

**Mobile Agents:** Mobile agent paradigm - Mobile agent concepts - Mobile agent technology - programming mobile agents -. Mobile agent security - trust, reliability and reputation.

**Self-study component:** Application of mobile agents- Teleshopping

10 Hours

**Text Book:**

**Reference Books:**

**Course Outcomes**

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

1. **Analyze** how agents are used to enhance learning and provide intelligent assistance to users.
2. **Analyze** about agent–to–agent communication and the use of agents to provide intelligent interoperability in distributed systems and the Internet
3. **Implement** how agents are used to enhance learning and provide intelligent assistance to users.
4. **Demonstrate** the concept of mobile technology
5. **Develop** mobile agents and its security

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<tr>
<th>CO Statement</th>
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<th>PO 11</th>
<th>PO 12</th>
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<th>PS O2</th>
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<td>CO1 Analyze how agents are used to enhance learning and provide intelligent assistance to users.</td>
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<td>CO2 Analyze about agent–to–agent communication and the use of agents to provide intelligent interoperability in distributed systems and the Internet</td>
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<td>CO3 Implement how agents are used to enhance learning and provide intelligent assistance to users.</td>
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<td>CO4 Demonstrate the concept of mobile technology</td>
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<td>CO5 Develop mobile agents and its security.</td>
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ELECTIVE-III

Course Title : Wireless Networks and Mobile Computing

<table>
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<tr>
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<th>Semester : VI</th>
<th>L :T:P:H : 4:0:0:4</th>
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<td>Weightage: CIE:50; SEE:50</td>
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Course Content

Unit-1


10 Hours

Unit-2

Self-Study Component: WiMaxRel 1.0 IEEE 802.16e, Broadband Wireless Access, 4G Networks, Mobile Satellite Communication Networks.

11 Hours

Unit-3

Self-Study Component: Other Methods of Mobile TCP-layer Transmission, TCP over 2.5G/3G Mobile Networks.

10 Hours

Unit-4


10 Hours

Unit-5

Self-Study Component: SyncML-Synchronization Language for Mobile Computing, Sync4J (Funambol), Synchronized Multimedia Markup Language (SMIL).

11 Hours
Text Books:

Reference Books:

CO-PO Mapping

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<tr>
<td>1</td>
<td>Describe mobile computing Architecture, components of mobile.</td>
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<td>2</td>
<td>Analyze different technologies of mobile computing.</td>
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<td>3</td>
<td>Describe the working procedure of mobile computing.</td>
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<td>4</td>
<td>Analyze the database involvement in mobile computing</td>
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<td>5</td>
<td>Describe data delivery mechanisms in mobile devices</td>
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Course Title : Semantic Web Technologies

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Course learning objectives:
1. Understand the fundamentals of Semantic Web technologies.
2. Understand the concepts of RDF and web ontology language (OWL).
3. Use ontology engineering approaches in semantic Web.
4. Understand the concepts of web ontology language for services
5. Understand the various applications of Semantic Web.

Course learning objectives:
1. Understand the rationale behind Semantic Web.
2. Design RDF and RDFS for Ontologies.
3. Understand and reflect on the principles of Ontology engineering.
4. Understand the concepts of web ontology language for services
5. Apply Semantic Web technologies to real world applications.

Course Content

Unit - 1

Self-Learning Component: Comparison of web 1.0, web 2.0, web 3.0
10 Hours

Unit - 2


Self-Learning Component: Problems on RDF and RDFS
10 Hours

Unit – 3

Self-Learning Component: Problems on RDF inference engine
11 Hours

Unit-4
Web Ontology Language for Services: XML-based Web Services, Next Generation Web Services, Process Ontology, Process control ontology, Relationship between OWL-S and WSDL and SOAP, Creating an OWL-S Ontology for Web Services, Semantic web rule language
**Semantic Tools:** Semantic Tools, Ontology tools, Cerebra, Visual Ontology Modeler, SMORE, Drive, Semantic Web Services Tools.

**Self-Learning Component:** software tools in semantic web

**11 Hours**

**Unit-5**

**Semantic Web Applications:** Semantic Web Applications, Semantic Web Services, Semantic Search, e-Learning, Semantic Bioinformatics, Enterprise Application Integration, Knowledge Base.

**Semantic Search Technology:** Search Engines, Semantic Search, Semantic Search Technology
Web Search Agents, Semantic Methods, Latent Semantic Index Search, TAP, Swoogle.

**Self-Learning Component:** E-learning

**10 Hours**

**Text Book:**

**Reference Books:**

**Course Outcomes**

At the end of the course the student should be able to
1. **State** the reason for the semantic web and its applicability
2. **Describe** RDF and RDFS
3. **Understand and Describe** ontologies
4. **Apply** Semantic Web technologies to real world applications
5. **Implement** a group project leveraging semantic web techniques

**CO-PO Mapping**

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<td>State the reason for the semantic web and its applicability</td>
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<td>Understand and Describe ontologies</td>
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<td>C04</td>
<td>Apply Semantic Web technologies to real world applications</td>
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<td>Implement a group project leveraging semantic web techniques</td>
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Course Title : Service Oriented Architecture

Course Code: P17CS663  Semester : VI  L:T:P: H - 4 : 0 : 0 : 4  Credits: 3
Contact Period : Lecture :52 Hr, Exam: 3Hr  Weightage :CIE:50% SEE:50%

Prerequisites: Student should have knowledge of basic SOFTWARE architecture, Web Service systems, java language and databases.

Course Learning Objectives (CLO’s)
The course aims to:
1. Discuss the basic principles of service orientation.
2. Discuss the service oriented analysis techniques.
3. Describe technology underlying the service design.
4. Explain advanced concepts such as service composition, orchestration and Choreography.
5. Discuss about various WS-* specification standards.

Course Content

Unit-1
Self-study component: Comparing SOA to client-server and distributed internet architectures 10 Hours

Unit -2
Self-study component: Application Service Layer 12 Hours

Unit -3
Self-study component: Entity-centric business service design 9 Hours

Unit -4
SOA platform basics – SOA support in J2EE – Java API for XML-based web services JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC), SOA support in .NET – Common Language Runtime - ASP.NET web forms - ASP. NET web services – Web Services Enhancements (WSE)
Self-study component: Web Services Interoperability Technologies (WSIT) 12 Hours

Unit -5
WS-BPEL basics – WS-Coordination overview - WS-Choreography, SSecurity
Self-study component: WS-Policy 9 Hours
Text Book:

Course Outcomes:
This course will enable students to:
1. Discuss the basic principles of service orientation.
2. Discuss the service oriented analysis techniques.
3. Describe technology underlying the service design.
4. Explain advanced concepts such as service composition, orchestration & choreography
5. Discuss about various WS-* specification standards.

<table>
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<th>CO</th>
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<td>Discuss the basic principles of service orientation.</td>
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<td>C101.2</td>
<td>Discuss the service oriented analysis techniques.</td>
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<td>C101.3</td>
<td>Design technology underlying the service design.</td>
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<td>Explain advanced concepts such as service composition, orchestration and Choreography.</td>
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<td>C101.5</td>
<td>Describe about various WS-* specification standards.</td>
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</table>
Course Title : Internet of Things

<table>
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<tr>
<th>Course Code : P17CS664</th>
<th>Semester : 6</th>
<th>L : T : P : H : 4 : 0 : 0 : 4</th>
<th>Credits: 3</th>
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Contact Period: Lecture: 52 Hr, Exam: 3 Hr  | Weightage: CIE:50%, SEE:50%

**Course Content**

**Unit-1**
M2M to IoT-The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context.
Self-study component: A use case example, Differing Characteristics

10 Hours

**Unit-2**
Self-study component: An IoT architecture outline, standards considerations.

10 Hours

**Unit-3**
M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics.
Self-study component: Knowledge Management.

11 Hours

**Unit-4**
Self-study component: IoT reference Model.

10 Hours

**Unit-5**
Self-study component: Case study: phase two- commercial building automation in the future.

11 Hours

Textbook:

Reference Books:
Course Outcomes:
At the end of the course the student will be able to:
1. Understand the vision of IoT from a global context.
2. Determine the Market perspective of IoT.
3. Use of Devices, Gateways and Data Management in IoT.
4. Building state of the art architecture in IoT.

<table>
<thead>
<tr>
<th>CO Statement</th>
<th>PO1</th>
<th>PO2</th>
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<tr>
<td>CO-1 Understand the vision of IoT from a global context.</td>
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<td>CO-2 Determine the Market perspective of IoT.</td>
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<td>CO-3 Use of Devices, Gateways and Data Management in IoT.</td>
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<td>CO-4 Building state of the art architecture in IoT.</td>
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<td>CO-4 Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints</td>
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Course Title : Aptitude and Reasoning Development - EXPERT (ARDE)

Course Code : P17HU610  Semester : 6  L:T:P:H 0:0:2:2  Credits: 1
Contact Period: Lecture: 32 Hr, Exam: 3 Hr  Weightage: CIE:50%; SEE:50%
Prerequisites: Number system, Concept of percentage, Analytical reasoning-2.

Course Learning Objectives (CLOS)

This course aims to
1. Explain different types of functions, representation of different functions on the graphs.
2. Describe the properties of quadratic equations and application of quadratic equations.
3. Demonstrates the principle of counting.
4. Differentiates between permutation and combination and solve problems conceptually.
5. Predict the probabilities in different scenarios and its application in our day-to-day life.
6. Evaluate the cause and effect of the statements logically.
7. Recognize different ways in which a statement can be strengthened or weakened.
8. Explain the criticality of data sufficiency chapter, universal methodology to solve any problem.
9. Analyse the data in a bar graph, pie chart and tabular column and line graph and the combination of these graphs.
10. Compare the data in different format and understand the difference between them

Course Content

Unit-1

Functions and Quadratic equations:
Quadratic equations: Theory, properties of quadratic equations and their roots, the sign of quadratic equation, Equations in more than one variable. Simultaneous equations, number of solutions of the simultaneous equations.

6 Hours

Unit-2

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 2ⁿ, 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.

8 Hours
Unit-3

Analytical reasoning 3: Punchline: Introduction, format of the problem, an analysis, Does a suggested statement qualify as a punchline? If a given statement fits as a punchline, what is its idea or wavelength? The complete method of solving a punchline problem, Solved examples, conclusion, Sample company questions.

Strengthening and weakening arguments: Format of the problem, an analysis, Suggested methods, solved examples, conclusion, sample company questions.

Cause and Effect: Cause and Effect—A theoretical discussion, Immediate cause, Principal cause, A quick check– Cause always antecedent. The strategy for solution.

6 Hours

Unit-4

Data Sufficiency: Introduction, answer choices in data sufficiency, tips to solve data sufficiency problems, directions of questions, classification of sections in data sufficiency—Number system, Algebra, series and sequence, logical, geometry and mensuration, arithmetic.

6 Hours

Unit-5

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

6 Hours

Reference Books:
2. CAT Mathematics by AbhijithGuha. 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.
6. Analytical reasoning by M.K Pandey BSC PUBLISHING.CO.PVT.LTD

Course Outcomes (CO)
After learning all the units of the course, the student is able to:
1. Graphically represent the functions and analyze it. L5
2. Infer the conclusions based on the roots obtained by solving quadratic equations and establish relationship between them. L6
3. Effective solve the problems of permutation and combination. L4
4. Predict different possibilities by the principle of probability. L3
5. Interpret the data given in the graphical format and infer the results. L5
6. Analyze the statement critically and solve the questions from verbal logic section. L5
### A. Course Articulation Matrix (CAM)

<table>
<thead>
<tr>
<th>Course Outcome (CO)</th>
<th>Program Outcome (ABET/NBA-(3a-k))</th>
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<tbody>
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<td>Interpret the data given in the graphical format and infer the results.</td>
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L- Low, M- Moderate, H-High