# MUTHAYAMMAL ENGINEERING COLLEGE

**(An Autonomous Institution)**

(Approved by AICTE, New Delhi, Accredited by NAAC, NBA & Affiliated to Anna University)

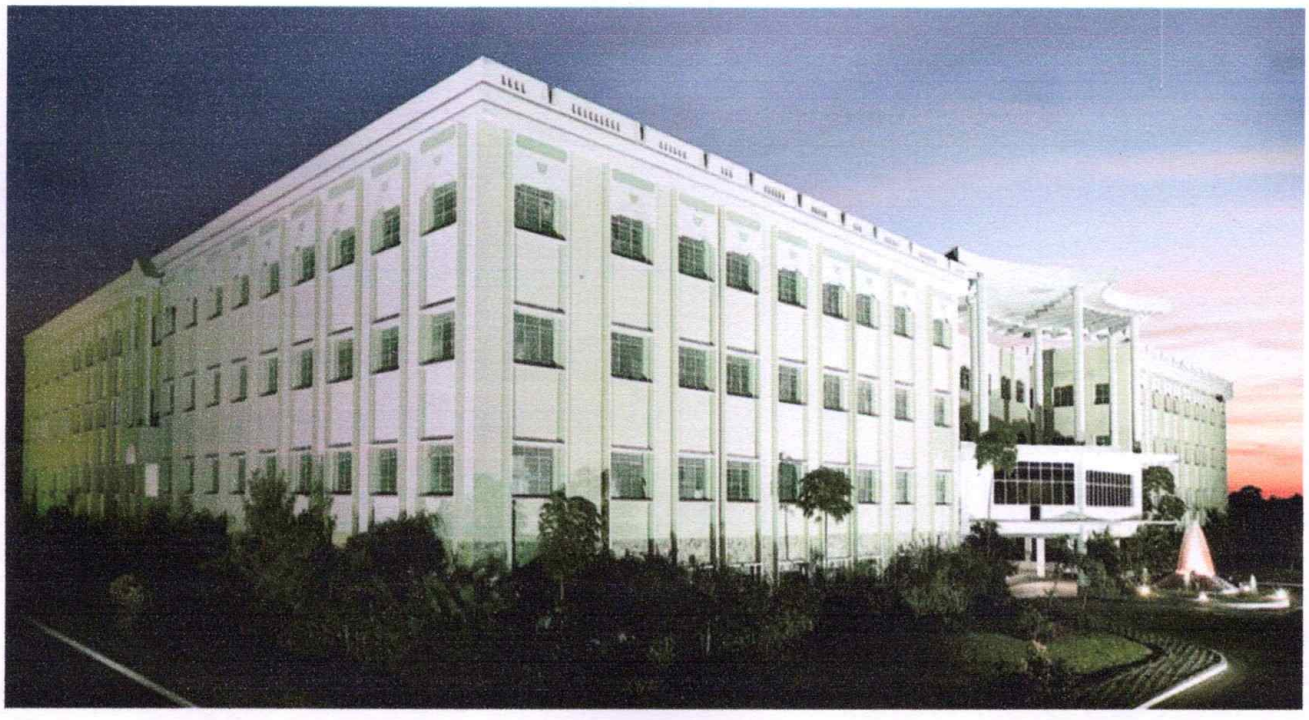
Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

## Curriculum/Syllabus

**Programme Code : IT**

**Programme Name : B.Tech-Information Technology**

**Regulation : R-2019**

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Rasipuram - 637 408, Namakkal Dt, Tamil Nadu.

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Email: principal@mec.edu.in.

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Estd. 2000

## INSTUTION VISION &MISSION

### INSTUTION VISION

To be a Centre of Excellence in Engineering, Technology and Management on par with International Standards.

### INSTUTION MISSION

- To prepare the students with high professional skills and ethical values
- To impart knowledge through best practices
- To instill a spirit of innovation through Training, Research and Development
- To undertake continuous assessment and remedial measures
- To achieve academic excellence through intellectual, emotional and social stimulation

### INSTUTION MOTTO

Rural upliftment through Technical Education.

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## DEPARTMENT VISION & MISSION

### DEPARTMENT VISION

To impart quality technical education for students to excel in their professions with social and ethical values to achieve the global level standards

### DEPARTMENT MISSION

**M1: Quality Education:** To impart high quality professional education that leads to global excellence.

**M2: Analytical Skill:** To empower the students with expertise in solving real world problems through emerging technologies.

**M3: Research and Development:** To facilitate the students with necessary skill sets to make them technically sound with strong ethical values and to promote research and development in the multidisciplinary fields of Engineering and Technology.

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## DEPARTMENT PROGRAM EDUCATIONAL OBJECTIVES, PROGRAM OUTCOMES & PROGRAM SPECIFIC OUTCOMES

### PROGRAM EDUCATIONAL OBJECTIVES

The Information Technology Graduates should be able to

**PEO1: Foundation:** To develop the students with programming skill sets with a sound foundation in mathematical, scientific and engineering fundamentals necessary for the core concepts focusing on knowledge up-gradation leading to technical innovations.

**PEO2: Analytical Skill:** Capable of analyzing and specifying the requirements of the Information Technology system to design and develop using the contemporary tools.

**PEO3: Leadership Skill:** The Graduates of the programme will have the competencies for communicating, planning, coordinating, organizing and decision making and they will have interpersonal skills and ethical responsibility.

**PEO4: Employability Skill:** The graduates will practice and demonstrate the ability to use the Knowledge and expertise through the continuous performances which will contribute to the society through active engagement.

### PROGRAM OUTCOMES

**PO1. Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3. 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 the public health and safety, and the cultural, societal, and environmental considerations.

**PO4. 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.

**PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6. 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.

**PO7. 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.

**PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with 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.

**PO11. 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.

**PO12. 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.

## PROGRAM SPECIFIC OUTCOMES

**1. Need analysis and design of new technologies**

Graduates will be able to design, analyze and test the computer application for the use in information engineering and technologies.

**2. Design of embedded system**

Design the computer and information based system consisting of digital electronics components, electrical components and micro controller devices; used for applications in microcomputer systems, telecommunications and digital signal propagation.

**3. Database administration**

Design database system with data mining, warehousing and data security by using big data and advanced security techniques and tools.

**4. Integrated computer science project**

Ability to evaluate and manage integrated Information Technology project and documentation of substantial scope.

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## B.Tech.- INFORMATION TECHNOLOGY

## GROUPING OF COURSES

### 1. Humanities and Social Sciences (HS)

| S. No. | Course Code | Course Title | Category | Contact Hours | Instruction Hours/Week | | | C |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | |
| 1. | 19HSS01 | Business English | HS | 2 | 2 | 0 | 0 | 2 |
| 2. | 19HSS02 | English Communicative Skills Laboratory | HS | 2 | 0 | 0 | 2 | 1 |
| 3. | 19HSS03 | Life Skill and Work Place Psychology | HS | 2 | 2 | 0 | 0 | 2 |
| 4. | 19HSS04 | Technical English For Engineers | HS | 2 | 2 | 0 | 0 | 2 |
| 5. | 19HSS05 | Communicative English for Engineers | HS | 2 | 2 | 0 | 0 | 2 |
| 6. | 19HSS06 | Basics of Japanese Language | HS | 2 | 2 | 0 | 0 | 2 |
| 7. | 19HSS07 | Basics of French Language | HS | 2 | 2 | 0 | 0 | 2 |
| 8. | 19HSS08 | Professional Ethics and Human Values | HS | 3 | 3 | 0 | 0 | 3 |

### 2. Basic Sciences (BS)

| S. No. | Course Code | Course Title | Category | Contact Hours | Instruction Hours/Week | | | C |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | |
| 1. | 19BSS01 | Engineering Physics | BS | 3 | 3 | 0 | 0 | 3 |
| 2. | 19BSS02 | Physics and Chemistry Laboratory | BS | 2 | 0 | 0 | 2 | 1 |
| 3. | 19BSS03 | Bio and Nanomaterials Sciences | BS | 3 | 3 | 0 | 0 | 3 |
| 4. | 19BSS04 | Material Sciences | BS | 3 | 3 | 0 | 0 | 3 |
| 5. | 19BSS05 | Physics for Mechanical Engineers | BS | 3 | 3 | 0 | 0 | 3 |
| 6. | 19BSS11 | Engineering Chemistry | BS | 3 | 3 | 0 | 0 | 3 |
| 7. | 19BSS12 | Environmental Science and Engineering | BS | 3 | 3 | 0 | 0 | 3 |
| 8. | 19BSS13 | Organic Chemistry | BS | 3 | 3 | 0 | 0 | 3 |
| 9. | 19BSS14 | Physical Chemistry | BS | 3 | 3 | 0 | 0 | 3 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10. | 19BSS15 | Applied Chemistry | BS | 3 | 3 | 0 | 0 | 3 |
| 11. | 19BSS16 | Organic Chemistry Laboratory | BS | 2 | 0 | 0 | 2 | 1 |
| 12. | 19BSS17 | Physical Chemistry Laboratory | BS | 2 | 0 | 0 | 2 | 1 |
| 13. | 19BSS21 | Algebra and Calculus | BS | 4 | 3 | 1 | 0 | 4 |
| 14. | 19BSS22 | Differential Equations and Vector Analysis | BS | 4 | 3 | 1 | 0 | 4 |
| 15. | 19BSS23 | Transform and Partial Differential Equations | BS | 4 | 3 | 1 | 0 | 4 |
| 16. | 19BSS24 | Discrete Mathematics | BS | 4 | 3 | 1 | 0 | 4 |
| 17. | 19BSS25 | Statistical and Queuing Model | BS | 4 | 3 | 1 | 0 | 4 |
| 18. | 19BSS26 | Numerical Methods | BS | 4 | 3 | 1 | 0 | 4 |
| 19. | 19BSS27 | Probability and Random Processes | BS | 4 | 3 | 1 | 0 | 4 |
| 20. | 19BSS28 | Statistic and Numerical Methods | BS | 4 | 3 | 1 | 0 | 4 |

## 3. Engineering Science (ES)

| Sl. No. | Course Code | Course Title | Category | Contact Hours | Instruction Hours/ Week | | | C |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | |
| 1. | 19GES01 | Programming for Problem Solving Using C | GES | 3 | 3 | 0 | 0 | 3 |
| 2. | 19GES02 | Programming for Problem Solving Technique | GES | 3 | 3 | 0 | 0 | 3 |
| 3. | 19GES03 | Programming in C Laboratory | GES | 2 | 0 | 0 | 2 | 1 |
| 4. | 19GES04 | Programming in C and Python Laboratory | GES | 2 | 0 | 0 | 2 | 1 |
| 5. | 19GES05 | Electrical and Electronic Sciences | GES | 3 | 3 | 0 | 0 | 3 |
| 6. | 19GES06 | Mechanical and Building Sciences | GES | 3 | 3 | 0 | 0 | 3 |
| 7. | 19GES07 | Computer Aided Drafting Laboratory | GES | 2 | 0 | 0 | 2 | 1 |
| 8. | 19GES08 | Python Programming | GES | 3 | 3 | 0 | 0 | 3 |
| 9. | 19GES09 | Programming in Python Laboratory | GES | 2 | 0 | 0 | 2 | 1 |
| 10. | 19GES10 | Soft Skills Laboratory | GES | 2 | 0 | 0 | 2 | 1 |
| 11. | 19GES11 | Electronic Devices | GES | 3 | 3 | 0 | 0 | 3 |
| 12. | 19GES12 | Electronic Simulation Laboratory | GES | 2 | 0 | 0 | 2 | 1 |
| 13. | 19GES13 | Electric Circuits | GES | 3 | 2 | 1 | 0 | 3 |
| 14. | 19GES14 | Electric Circuits Laboratory | GES | 2 | 0 | 0 | 2 | 1 |
| 15. | 19GES15 | Manufacturing Process | GES | 3 | 3 | 0 | 0 | 3 |
| 16. | 19GES16 | Manufacturing Process Laboratory | GES | 2 | 0 | 0 | 2 | 1 |
| 17. | 19GES17 | Mechanical and Building Sciences Laboratory | GES | 2 | 0 | 0 | 2 | 1 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18. | 19GES18 | Construction Materials | GES | 3 | 3 | 0 | 0 | 3 |
| 19. | 19GES19 | Concepts in Product Design | GES | 3 | 3 | 0 | 0 | 3 |
| 20. | 19GES20 | Renewable Energy Sources | GES | 3 | 3 | 0 | 0 | 3 |
| 21. | 19GES21 | Electrical Drives and Control | GES | 3 | 3 | 0 | 0 | 3 |
| 22. | 19GES22 | Electrical Drives and Control Laboratory | GES | 2 | 0 | 0 | 2 | 1 |
| 23. | 19GES23 | Analog and Digital communication | GES | 3 | 3 | 0 | 0 | 3 |
| 24. | 19GES24 | Digital Principles and System Design | GES | 3 | 3 | 0 | 0 | 3 |
| 25. | 19GES25 | Digital Principles and System Design Laboratory | GES | 2 | 0 | 0 | 2 | 1 |
| 26. | 19GES26 | Engineering Drawing | GES | 5 | 1 | 0 | 4 | 3 |
| 27. | 19GES27 | Engineering Geology | GES | 3 | 3 | 0 | 0 | 3 |
| 28. | 19GES28 | Engineering Mechanics | GES | 4 | 3 | 1 | 0 | 4 |
| 29. | 19GES29 | Wireless Communication | GES | 4 | 3 | 1 | 0 | 4 |
| 30. | 19GES30 | Electronics and Microprocessor | GES | 3 | 3 | 0 | 0 | 3 |
| 31. | 19GES31 | Electronics and Microprocessor Laboratory | GES | 2 | 0 | 0 | 2 | 1 |
| 32. | 19GES32 | Data Structures using Python | GES | 3 | 3 | 0 | 0 | 3 |

## 4. Professional Core (PC)

| Sl. No. | Course Code | Course Title | Category | Contact Hours | Instruction Hours/ Week | | | C |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | |
| 1. | 19ITC01 | Data Structures | PCC | 3 | 3 | 0 | 0 | 3 |
| 2. | 19ITC02 | Data Structures Laboratory | PCC | 2 | 0 | 0 | 2 | 1 |
| 3. | 19ITC03 | Database Management Systems | PCC | 3 | 3 | 0 | 0 | 3 |
| 4. | 19ITC04 | Database Management Systems Laboratory | PCC | 2 | 0 | 0 | 2 | 1 |
| 5. | 19ITC05 | Software Engineering | PCC | 3 | 3 | 0 | 0 | 3 |
| 6. | 19ITC06 | Computer Organization and Architecture | PCC | 3 | 3 | 0 | 0 | 3 |
| 7. | 19ITC07 | Object Oriented Programming | PCC | 3 | 3 | 0 | 0 | 3 |
| 8. | 19ITC08 | Object Oriented Programming Laboratory | PCC | 2 | 0 | 0 | 2 | 1 |
| 9. | 19ITC09 | Operating Systems | PCC | 3 | 3 | 0 | 0 | 3 |
| 10. | 19ITC10 | Operating Systems Laboratory | PCC | 2 | 0 | 0 | 2 | 1 |
| 11. | 19ITC11 | Design and Analysis of Algorithms | PCC | 4 | 3 | 1 | 0 | 4 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12. | 19ITC12 | Blockchain Technology | PCC | 3 | 3 | 0 | 0 | 3 |
| 13. | 19ITC13 | Mobile Communication | PCC | 3 | 3 | 0 | 0 | 3 |
| 14. | 19ITC14 | Mobile Application Laboratory | PCC | 2 | 0 | 0 | 2 | 1 |
| 15. | 19ITC15 | Internet of Things | PCC | 3 | 3 | 0 | 0 | 3 |
| 16. | 19ITC16 | Internet of Things Laboratory | PCC | 2 | 0 | 0 | 2 | 1 |
| 17 | 19ITC17 | Artificial Intelligence | PCC | 4 | 3 | 1 | 0 | 4 |
| 18 | 19ITC18 | Principles of Compiler Design | PCC | 3 | 3 | 0 | 0 | 3 |
| 19 | 19ITC19 | Compiler Design Laboratory | PCC | 2 | 0 | 0 | 2 | 1 |
| 20 | 19ITC20 | Cloud Computing | PCC | 3 | 3 | 0 | 0 | 3 |
| 21 | 19ITC21 | Cloud Computing Laboratory | PCC | 2 | 0 | 0 | 2 | 1 |
| 22 | 19ITC22 | Data warehousing and Data Mining | PCC | 3 | 3 | 0 | 0 | 3 |
| 23 | 19ITC23 | Information security | PCC | 3 | 3 | 0 | 0 | 3 |
| 24 | 19ITC24 | Computer Networks | PCC | 3 | 3 | 0 | 0 | 3 |

## 5. Professional Elective (PE)

| Sl. No. | Course Code | Course Title | Category | Contact Hours | Instruction Hours/ Week | | | C |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | |
| 1. | 19ITE01 | C# and .Net Framework | PEC | 3 | 3 | 0 | 0 | 3 |
| 2. | 19ITE02 | Software Project Management | PEC | 3 | 3 | 0 | 0 | 3 |
| 3. | 19ITE03 | Salesforce CRM and Platform | PEC | 3 | 3 | 0 | 0 | 3 |
| 4. | 19ITE04 | Salesforce CRM and Platform Laboratory | PEC | 2 | 0 | 0 | 2 | 1 |
| 5. | 19ITE05 | AWS Academy Cloud Developing | PEC | 3 | 3 | 0 | 0 | 3 |
| 6. | 19ITE06 | AWS Academy Cloud Developing Lab | PEC | 2 | 0 | 0 | 2 | 1 |
| 7. | 19ITE07 | AWS Academy Cloud Architecting | PEC | 3 | 3 | 0 | 0 | 3 |
| 8. | 19ITE08 | AWS Academy Cloud Architecting Lab | PEC | 2 | 0 | 0 | 2 | 1 |
| 9. | 19ITE09 | AWS Academy Cloud Foundation | PEC | 2 | 0 | 0 | 2 | 1 |
| 10. | 19ITE10 | AWS Academy Cloud Foundation Lab | PEC | 2 | 0 | 0 | 2 | 1 |
| 11. | 19ITE11 | Semantic Web | PEC | 3 | 3 | 0 | 0 | 3 |
| 12. | 19ITE12 | Network Programming and Management | PEC | 3 | 3 | 0 | 0 | 3 |

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|---|---|---|---|---|---|---|---|---|
| 13. | 19ITE13 | Business Intelligence | PEC | 3 | 3 | 0 | 0 | 3 |
| 14. | 19ITE14 | Wireless Sensor Networks | PEC | 3 | 3 | 0 | 0 | 3 |
| 15. | 19ITE15 | Information Retrieval Techniques | PEC | 3 | 3 | 0 | 0 | 3 |
| 16. | 19ITE16 | Service Oriented Architecture | PEC | 3 | 3 | 0 | 0 | 3 |
| 17. | 19ITE17 | Agile Technology | PEC | 3 | 3 | 0 | 0 | 3 |
| 18. | 19ITE18 | Social Network Analysis | PEC | 3 | 3 | 0 | 0 | 3 |
| 19. | 19ITE19 | Game Programming | PEC | 3 | 3 | 0 | 0 | 3 |
| 20. | 19ITE20 | Natural Language Processing | PEC | 3 | 3 | 0 | 0 | 3 |
| 21. | 19ITE21 | Big data Analytics | PEC | 3 | 3 | 0 | 0 | 3 |
| 22. | 19ITE22 | Ad hoc and Sensor Networks | PEC | 3 | 3 | 0 | 0 | 3 |
| 23. | 19ITE23 | Management Information System | PEC | 3 | 3 | 0 | 0 | 3 |
| 24. | 19ITE24 | Software Quality Assurance | PEC | 3 | 3 | 0 | 0 | 3 |
| 25. | 19ITE25 | Bioinformatics | PEC | 3 | 3 | 0 | 0 | 3 |
| 26. | 19ITE26 | Docker and Kubernetes | PEC | 3 | 3 | 0 | 0 | 3 |
| 27. | 19ITE27 | Open Stack Essentials | PEC | 3 | 3 | 0 | 0 | 3 |
| 28. | 19ITE28 | User Centric Design | PEC | 3 | 3 | 0 | 0 | 3 |
| 29. | 19ITE29 | Software Testing | PEC | 3 | 3 | 0 | 0 | 3 |
| 30. | 19ITE30 | Ethical Hacking and Cyber Security | PEC | 3 | 3 | 0 | 0 | 3 |
| 31. | 19ITE31 | Soft computing | PEC | 3 | 3 | 0 | 0 | 3 |
| 32. | 19ITE32 | Real Time Systems | PEC | 3 | 3 | 0 | 0 | 3 |
| 33. | 19ITE33 | Machine Learning | PEC | 3 | 3 | 0 | 0 | 3 |
| 34. | 19ITE34 | High Speed Networks | PEC | 3 | 3 | 0 | 0 | 3 |
| 35. | 19ITE35 | Angular JS | PEC | 3 | 3 | 0 | 0 | 3 |
| 36. | 19ITE36 | Angular JS Laboratory | PEC | 2 | 0 | 0 | 2 | 1 |

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## 6. Employability Enhancement Courses (EEC)

| Sl. No. | Course Code | Course Title | Category | Contact Hours | Instruction Hours/ Week | | | C |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | |
| 1. | 19ITP01 | Project Work Phase I | EEC | 10 | 0 | 0 | 10 | 5 |
| 2. | 19ITP02 | Project Work Phase II | EEC | 20 | 0 | 0 | 20 | 10 |
| 3. | 19ITP03 | Comprehension | EEC | 2 | 0 | 0 | 2 | 1 |
| 4. | 19ITP04 | Technical Seminar | EEC | 4 | 0 | 4 | 0 | 2 |
| 5. | 19ITP05 | Entrepreneurship Development | EEC | 3 | 3 | 0 | 0 | 3 |
| 6. | 19ITP06 | Professional Practices | EEC | 6 | 0 | 0 | 6 | 3 |
| 7. | 19ITM01 | NPTEL- Introduction to Industry 4.0 and Industrial Internet of Things | Mandatory Course | - | - | - | - | - |
| 8. | 19ITM02 | NPTEL- Introduction to Machine Learning | Mandatory Course | - | - | - | - | - |
| 9. | 19ITM03 | NPTEL- The Joy of Computing using Python | Mandatory Course | - | - | - | - | - |
| 10. | 19ITM04 | NPTEL-Data Analytics with Python | Mandatory Course | - | - | - | - | - |
| 11. | 19ITA01 | Indian Constitution | Audit Course | - | - | - | - | - |
| 12. | 19ITA02 | Value Education | Audit Course | - | - | - | - | - |
| 13. | 19ITA03 | Disaster Management | Audit Course | - | - | - | - | - |
| 14. | 19ITA04 | Pedagogy Studies | Audit Course | - | - | - | - | - |
| 15. | 19ITA05 | Stress Management by Yoga | Audit Course | - | - | - | - | - |

## 7. Open Electives (OE)

| Sl. No. | Course Code | Course Title | Category | Contact Hours | Instruction Hours/ Week | | | C |
|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | |
| 1. | 19MEE07 | Industrial Robotics | OEC | 3 | 3 | 0 | 0 | 3 |
| 2. | 19MEE18 | Power Plant Engineering | OEC | 3 | 3 | 0 | 0 | 3 |
| 3. | 19MEC26 | Total Quality Management | OEC | 3 | 3 | 0 | 0 | 3 |
| 4. | 19ECE06 | Telecommunication Switching Networks | OEC | 3 | 3 | 0 | 0 | 3 |
| 5. | 19ECE08 | Mobile Ad-Hoc Networks | OEC | 3 | 3 | 0 | 0 | 3 |
| 6. | 19PC-ED11 | Water Supply Engineering | OEC | 3 | 3 | 0 | 0 | 3 |
| 7. | 19PE-EE05 | Health Monitoring of Structures | OEC | 3 | 3 | 0 | 0 | 3 |

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| Department | Information Technology |
|---|---|
| Programme | B.Tech. – Information Technology |

**SEMESTER – I**

| Sl. No. | Course Code | Course Name | Category | Hours/ Week L | T | P | Credit C | Contact Hrs |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 19HSS01 | Business English | HS | 2 | 0 | 0 | 2 | 2 |
| 2. | 19BSS21 | Algebra and Calculus | BS | 3 | 1 | 0 | 4 | 4 |
| 3. | 19BSS01 | Engineering Physics | BS | 3 | 0 | 0 | 3 | 3 |
| 4. | 19BSS11 | Engineering Chemistry | BS | 3 | 0 | 0 | 3 | 3 |
| 5. | 19GES01 | Programming for Problem Solving Using C | GES | 3 | 0 | 0 | 3 | 3 |
| 6. | 19GES06 | Mechanical and Building Sciences | GES | 3 | 0 | 0 | 3 | 3 |
| **PRACTICALS** | | | | | | | | |
| 7. | 19BSS02 | Physics and Chemistry Laboratory | BS | 0 | 0 | 2 | 1 | 2 |
| 8. | 19GES03 | Programming in C Laboratory | GES | 0 | 0 | 2 | 1 | 2 |
| 9. | 19HSS02 | English Communicative Skills Laboratory | HS | 0 | 0 | 2 | 1 | 2 |
| **Total Credits** | | | | | | | **21** | |



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| Department | Information Technology |
|---|---|
| Programme | B.Tech. – Information Technology |



**SEMESTER – II**

| Sl. No. | Course Code | Course Name | Category | Hours/ Week L | T | P | Credit C | Contact Hrs |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 19HSS03 | Life Skill and Work Place Pyschology | HS | 2 | 0 | 0 | 2 | 2 |
| 2. | 19BSS22 | Differential Equations and Vector Analysis | BS | 3 | 1 | 0 | 4 | 4 |
| 3. | 19BSS03 | Bio and Nano materials Sciences | BS | 3 | 0 | 0 | 3 | 3 |
| 4. | 19BSS12 | Environmental Science and Engineering | BS | 3 | 0 | 0 | 3 | 3 |
| 5. | 19GES19 | Concepts in Product Design | GES | 3 | 0 | 0 | 3 | 3 |
| 6. | 19GES08 | Python Programming | GES | 3 | 0 | 0 | 3 | 3 |
| **PRACTICALS** | | | | | | | | |
| 7. | 19GES10 | Soft Skills Lab | GES | 0 | 0 | 2 | 1 | 2 |
| 8. | 19GES09 | Programming in Python Lab | GES | 0 | 0 | 2 | 1 | 2 |
| **Total Credits** | | | | | | | **20** | |

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| Department | Information Technology |
|---|---|
| Programme | B.Tech. – Information Technology |

**SEMESTER – III**

| Sl. No. | Course Code | Course Name | Category | Hours/ Week L | T | P | Credit C | Contact Hrs |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 19BSS23 | Transforms and Partial Differential Equations | BS | 3 | 1 | 0 | 4 | 4 |
| 2. | 19GES23 | Analog and Digital Communication | GES | 3 | 0 | 0 | 3 | 3 |
| 3. | 19ITC01 | Data Structures | PCC | 3 | 0 | 0 | 3 | 3 |
| 4. | 19ITC03 | Database Management Systems | PCC | 3 | 0 | 0 | 3 | 3 |
| 5. | 19ITC05 | Software Engineering | PCC | 3 | 0 | 0 | 3 | 3 |
| 6. | 19ITC06 | Computer Organization and Architecture | PCC | 3 | 0 | 0 | 3 | 3 |
| **PRACTICALS** | | | | | | | | |
| 7. | 19ITC02 | Data Structures Laboratory | PCC | 0 | 0 | 2 | 1 | 2 |
| 8. | 19ITC04 | Database Management Systems Laboratory | PCC | 0 | 0 | 2 | 1 | 2 |
| **Total Credits** | | | | | | | **21** | |

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| Department | Information Technology |
|---|---|
| Programme | B.Tech. – Information Technology |

**SEMESTER – IV**

| Sl. No. | Course Code | Course Name | Category | Hours/ Week L | T | P | Credit C | Contact Hrs |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 19HSS08 | Professional Ethics and Human Values | HS | 3 | 0 | 0 | 3 | 3 |
| 2. | 19BSS24 | Discrete Mathematics | BS | 3 | 1 | 0 | 4 | 4 |
| 3. | 19GES24 | Digital Principles and System Design | GES | 3 | 0 | 0 | 3 | 3 |
| 4. | 19ITC07 | Object Oriented Programming | PCC | 3 | 0 | 0 | 3 | 3 |
| 5. | 19ITC09 | Operating Systems | PCC | 3 | 0 | 0 | 3 | 3 |
| 6. | 19ITC11 | Design and Analysis of Algorithms | PCC | 3 | 1 | 0 | 4 | 4 |
| **PRACTICALS** | | | | | | | | |
| 7. | 19ITC08 | Object Oriented Programming Laboratory | PCC | 0 | 0 | 2 | 1 | 2 |
| 8. | 19ITC10 | Operating Systems Laboratory | PCC | 0 | 0 | 2 | 1 | 2 |
| 9. | 19GES25 | Digital Principles and System Design Laboratory | GES | 0 | 0 | 2 | 1 | 2 |
| **Total Credits** | | | | | | | **23** | |

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|---|---|---|

| Department | Information Technology |
|---|---|
| Programme | B.Tech. – Information Technology |

**SEMESTER – V**

| Sl. No. | Course Code | Course Name | Category | Hours/ Week L | T | P | Credit C | Contact Hrs |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 19GES29 | Wireless Communication | GES | 3 | 1 | 0 | 4 | 4 |
| 2. | 19ITC24 | Computer Networks | PCC | 3 | 0 | 0 | 3 | 3 |
| 3. | 19ITC20 | Cloud Computing | PCC | 3 | 0 | 0 | 3 | 3 |
| 4. | 19ITC17 | Artificial Intelligence | PCC | 3 | 1 | 0 | 4 | 4 |
| 5. | 19ITE03 | Elective I – Salesforce CRM and Platform | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | 19ITE35<br>19ITE05<br>19ITE07 | Elective II-Angular JS/ AWS Academy Cloud Developing/ AWS Academy Cloud Architecting | PEC | 3 | 0 | 0 | 3 | 3 |
| **PRACTICALS** | | | | | | | | |
| 7. | - | Elective II lab | PCC | 0 | 0 | 2 | 1 | 2 |
| 8. | 19ITC21 | Cloud Computing Laboratory | PCC | 0 | 0 | 2 | 1 | 2 |
| 9. | 19ITE04 | Elective I – Salesforce CRM and Platform Laboratory | PEC | 0 | 0 | 2 | 1 | 2 |
| | | **Total Credits** | | | | | **23** | |

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|---|---|---|

| Department | Information Technology |
|---|---|
| Programme | B.Tech. – Information Technology |

**SEMESTER – VI**

| Sl. No. | Course Code | Course Name | Category | Hours/ Week L | T | P | Credit C | Contact Hrs |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 19ITC13 | Mobile Communication | PCC | 3 | 0 | 0 | 3 | 3 |
| 2. | 19ITC15 | Internet of Things | PCC | 3 | 0 | 0 | 3 | 3 |
| 3. | 19ITC18 | Principles of Compiler Design | PCC | 3 | 0 | 0 | 3 | 3 |
| 4. | 19ITE26 | Elective III-Docker and Kubernetes | PEC | 3 | 0 | 0 | 3 | 3 |
| 5. | 19ITE35<br>19ITE05<br>19ITE07 | Elective IV- Angular JS /AWS Academy Cloud Developing/ AWS Academy Cloud Architecting | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | 19MEE07 | Open Elective I-Industrial Robotics | OEC | 3 | 0 | 0 | 3 | 3 |
| **PRACTICALS** | | | | | | | | |
| 7. | 19ITC19 | Compiler Design Laboratory | PCC | 0 | 0 | 2 | 1 | 2 |
| 8. | 19ITC16 | Internet of Things Laboratory | PCC | 0 | 0 | 2 | 1 | 2 |
| 9. | 19ITE06<br>19ITE08 | AWS Academy Cloud Developing Lab/ AWS Academy Cloud Architecting Lab | PEC | 0 | 0 | 2 | 1 | 2 |
| | | **Total Credits** | | | | | **21** | |

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| Department | Information Technology |
|---|---|
| Programme | B.Tech. – Information Technology |

**SEMESTER – VII**

| Sl. No. | Course Code | Course Name | Category | Hours/ Week L | T | P | Credit C | Contact Hrs |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | 19ITC12 | Blockchain Technology | PCC | 3 | 0 | 0 | 3 | 3 |
| 2. | 19ITC23 | Information security | PCC | 3 | 0 | 0 | 3 | 3 |
| 4. | 19ITC22 | Data Warehousing and Data Mining | PCC | 3 | 0 | 0 | 3 | 3 |
| 5. | 19ITE33 | Elective V-Machine Learning | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | 19MEE18 | Open Elective II-Power Plant Engineering | OEC | 3 | 0 | 0 | 3 | 3 |
| 7. | 19MEC26 | Open Elective III-Total Quality Management | OEC | 3 | 0 | 0 | 3 | 3 |
| **PRACTICALS** | | | | | | | | |
| 7. | 19ITP01 | Project work – Phase I | EEC | 0 | 0 | 10 | 5 | 10 |
| | | **Total Credits** | | | | | **23** | |

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|---|---|---|

| Department | Information Technology |
|---|---|
| Programme | B.Tech. – Information Technology |

**SEMESTER – VIII**

| Sl. No. | Course Code | Course Name | Category | Hours/ Week L | T | P | Credit C | Contact Hrs |
|---|---|---|---|---|---|---|---|---|
| **THEORY** | | | | | | | | |
| 1. | | Non Credit Course I | | | | | | |
| **PRACTICALS** | | | | | | | | |
| 2. | 19ITP02 | Project Work II | EEC | 0 | 0 | 20 | 10 | 20 |
| | | **Total Credits** | | | | | **10** | |

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## COURSE COMPONENT SUMMARY

| S.No. | Subject Area | Credits Per Semester | | | | | | | | Credits total | Percentage credits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | I | II | III | IV | V | VI | VII | VIII | | |
| 1. | HS | 3 | 2 | - | 3 | - | - | - | - | 8 | 4.93 |
| 2. | BS | 11 | 10 | 4 | 4 | - | - | - | - | 29 | 17.90 |
| 3. | GES | 7 | 8 | 3 | 4 | 4 | - | - | - | 26 | 16.04 |
| 4. | PCC | - | - | 14 | 12 | 12 | 11 | 9 | - | 58 | 35.80 |
| 5. | PEC | - | - | - | - | 7 | 7 | 3 | - | 17 | 10.49 |
| 6. | OEC | - | - | - | - | - | 3 | 6 | - | 9 | 5.55 |
| 7. | EEC | - | - | - | - | - | - | 5 | 10 | 15 | 9.25 |
| **TOTAL** | | **21** | **20** | **21** | **23** | **23** | **21** | **23** | **10** | **162** | |

**Total Credits: 162**

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# PROFESSIONAL CORE COURSES (PCC)

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**19ITC01** **DATA STRUCTURES** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To understand the basic structure concept such as Abstract Data Types, Linear and Non Linear Data structures.
2. To understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graph and their representations.
3. To choose the appropriate data structure for a specified application
4. To solve problems using data structures such as array, linked lists, queues, trees graphs, hash tables, search trees.
5. To understand and analyze various searching and sorting algorithms.

## COURSE OUTCOMES

1. Ability to identify the appropriate data structure for given problem.
2. Able to solve the problems using stack and queues.
3. Able to implement the application of Tree data structure.
4. Able to understand the application of Graph and hashing techniques.
5. Ability to solve the problems using various searching and sorting techniques.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC01.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC01.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC01.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC01.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC01.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

## UNIT I INTRODUCTION AND LIST 9

Definition, ADT, Types of Data Structures- Linear & Non Linear Data Structures. Array: Representation of arrays, structure and Pointers, Applications of arrays, structure and Pointer, Dynamic Memory Allocation Functions and Recursion function. Linked List: Definition, Types of List, Singly Linked List operations, Doubly Linked list operation, Circular linked list operation, Applications of linked list

## UNIT II STACKAND QUEUE 9

Stack: Stack-Definitions & Concepts, array and Linked implementation of Stack Operations on Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi. Queue: Representation Of Queue, array and Linked implementation of Queue Operations on Queue, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue.

## UNIT III TREE AND BINARY SEARCH TREE 9

Trees: Basic terminologies of trees – Node, Root, Parent, Child, Link, Sibling, Level, Height, Depth, Leaf, Degree; Binary tree – Full Binary tree, Complete Binary tree; Representation of binary tree – Linear representation, linked representation, Advantages and Disadvantages of both representations; Binary tree traversal – Inorder, Preorder, Postorder traversals; Operations on Binary tree - creation, insertion of left and right child; Tree representation of an arithmetic expression, inorder, Preorder and Postorder expressions from expression tree. Binary Search Tree – Definition, Creation of Binary search tree for a given set of values; Searching for an item – Minimum, Maximum or any given value; Applications of Binary search tree. Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap

## UNIT IV GRAPHS 9

Definition – Graph terminologies – Directed and Undirected graph, Weighted graph, Adjacent Vertices, Self loop, Parallel edges, Path, Cycle, in degree, out degree; complete graph, Connected graph; Representation of graphs – Set representation – Adjacency matrix representation – Linked representation – Comparison of representations; Breadth

First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree and Hamiltonian circuit

**UNIT V HASHING, SEARCHING AND SORTING** 9

Hashing: Introduction, Hash table, Hash function, Collision, Collision resolution – separate chaining, open addressing; Rehashing – Extendible hashing. Searching: Definition – Algorithm and Example for sequential search and binary search. Sorting: Definition – Algorithm and Example for selection sort, bubble sort, insertion sort, quick sort, merge sort, radix sort and Heap Sort.

**TOTAL HOURS: 45**

**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | E.Horowitz, S.Sahni Susan Anderson-Freed | Fundamentals of Data structures in C, | Universities Press. | 2008 |
| 2 | Mark Allen Weiss | Data structure and Algorithm Analysis in C | Pearson India | 2012 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | R. F. Gilberg, B. A. Forouzan | Data Structures | 2nd Edition, Thomson India | 2005 |
| 2 | R.Kruse, C.L.Tondo and B.Leung, | Data structures and Program Design in C | 2nd Edition Prentice-Hall | 2006 |
| 3 | A.M.Tanenbaum, Y. Langsam, M.J.Augenstein | Data Structures using C and C++ | 2nd Edition , PHI Learning | 2015 |
| 4 | R. Krishnamoorthy | Data Structures Using C | Tata McGraw-Hill Education | 2008 |
| 5 | E Balagurusamy | Data Structures Using C | Tata McGraw - Hill Education | 2013 |

**WEB URLs**

1. www.tutorialspoint.com/data_structures_algorithms/
2. www.nptel.ac.in/courses/106102064/1
3. www.wiziq.com/tutorials/data-structure
4. www.freevideolectures.com/Subject/Data-Structures
5. www.studytonight.com/data-structures/introduction-to-data-structures

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**19ITC02** **DATA STRUCTURES LABORATRORY** **L T P C**
0 0 2 1

## COURSE OBJECTIVES

**The students should be made to:**

1. Be familiar with C programming
2. Be exposed to implementing abstract data types
3. Learn to use files
4. Learn to implement sorting algorithms
5. Learn to implement searching algorithms

## COURSE OUTCOMES

**At the end of the course, the student should be able to:**

1. Design and implement C programs for implementing stacks, queues and linked lists.
2. Apply good programming design methods for program development.
3. Apply the different data structures for implementing solutions to practical problems.
4. Develop searching programs.
5. Create and analyze sorting programs

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC02.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC02.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC02.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC02.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC02.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

## LIST OF EXPERIMENTS:

1. Implement a menu driven program to implement operations on the singly linked list.
2. Implement a menu driven program to implement operations on the doubly linked list
3. Implement a menu driven program to implement operations on the circular linked list
4. Implement a program for stack that performs operations using array
5. Implement a program to convert infix notation to postfix notation using stack.
6. Implement a program to QUEUE using arrays that performs operations
7. Implement a program to stack using linked list.
8. Implement a program to queue using linked list.
9. Implement recursive and non-recursive tree traversing methods inorder, preorder and post-order traversal
10. Implement a program to create and operation on binary search tree.
11. Implement a program to QueueSort.
12. Implement a program to MergeSort.
13. Implement a program to Bubble Sort.
14. Implement a program to Binary Search and sequential search.
15. Implement a program to Breadth First search using linked representation of graph
16. Implement a program to Depth first search using linked representation of graph.

## LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

Standalone desktops with C compiler 30 Nos.

(Or)

Server with C compiler supporting 30 terminals or more.

**TOTAL HOURS: 30**

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**19ITC03** **DATABASE MANAGEMENT SYSTEMS** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1 Analyze database requirements and determine the entities involved in the system and their relationships.
2 Formulate solutions to a broad range of query and data update problems using SQL.
3 Understand the basic issues of transaction processing and concurrency control.
4 Explain and implement the fundamental concepts of a relational database system.
5 Understand the database security and access techniques.

## COURSE OUTCOMES

1 Design ER diagrams for new databases and apply for database applications.
2 Implement a database schema for a given problem-domain.
3 Normalize a database with non-loss decomposition.
4 Apply concurrency control techniques for database transactions.
5 Implement different database access techniques.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC03.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC03.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC03.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC03.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC03.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |

## UNIT I INTRODUCTION TO DBMS

9

Database System Applications-Purpose of Database Systems -View of data- Database Languages - Database System Architecture - Data models - Entity-Relationship model - Extended E-R Features - Introduction to relational databases- Keys - Integrity Constraints - Relational Algebra - Fundamental Operations - Additional Operations- Domain Relational Calculus - Tuple Relational Calculus.

## UNIT II SQL & QUERY OPTIMIZATION

9

SQL Standards - Data types - Basic Structure of SQL Queries - DDL-DML-DCL-TCL - Views- Advanced SQL - Embedded SQL - Static Vs Dynamic SQL - Query Processing - Query Optimization- Heuristic and Cost based Query Optimization.

## UNIT III RELATIONAL DATABASE DESIGN AND TRANSACTIONS

9

Functional Dependencies - Codd's Rule - Normalization - Non-loss decomposition- 1NF to 5NF - Domain Key Normal Form – Denormalization - Transaction Concepts - ACID Properties – Serializability- Concurrency Control - Locking Mechanisms - Two Phase Commit Protocol - Dead lock.

## UNIT IV SYSTEM ARCHITECTURE

9

Overview of Physical Storage Media - RAID - Tertiary storage - File Organization - Organization of Records in Files - Indexing and Hashing - Ordered Indices - B+ Tree Index Files - B Tree Index Files - Static Hashing - Dynamic Hashing - Distributed Databases - Distributed Data Storage - DistributedTransactions.

## UNIT V DATABASE SECURITY

9

Database Security - Data Classification - Threats and risks - Database Access Control - Types of Privileges - Security of Statistical Databases Parallel Databases- Spatial and Multimedia Databases - Mobile and Web databases - Object Oriented Databases- XML Databases.

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Abraham Silberschatz, Henry F. Korth | Database System Concepts | Tata McGraw-Hill | 2013 |
| 2. | Ramez Elmasri Shamkant | Fundamentals of Database Systems | Pearson Education | 2011 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Raghu Ramakrishnan Johannes Gehrke | Database Management Systems | Tata McGraw-Hill | 2014 |
| 2. | Hector Garcia-Molina Jeffrey D. Ullman Jennifer | Database Systems: The Complete book | Pearson Education | 2013 |
| 3. | Shefali Naik | Concepts of Database Management Systems | Pearson Education | 2013 |
| 4. | G.K.Gupta | Database Management Systems | Tata McGraw Hill | 2011 |
| 5. | Rob Cornell | Database Systems Design and | Cengage Learning | 2011 |

**WEB URLs**

1. www.w3schools.in/dbms/l
2. www.tutorialspoint.com/sql/sql_tutorial.pdf
3. tutorialink.com/dbms/introduction-to-transaction-concepts.dbms
4. https://www.cse.iitb.ac.in/~sudarsha/db-book/slide-dir/ch12.pdf
5. www.edutechlearners.com/advance-database-management-system-notes/

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**19ITC04 DATABASE MANAGEMENT SYSTEMS LABORATORY** **L T P C**
**0 0 2 1**

## COURSE OBJECTIVES

**The student should be made to:**

1. Learn to create and use a database
2. Be familiarized with a query language
3. Have hands on experience on DDL Commands
4. Have a good understanding of DML Commands and DCL commands
5. Familiarize advanced SQL queries.

## COURSE OUTCOMES

**At the end of the course, the student should be able to:**

1. Design and implement a database schema for a given problem-domain
2. Populate and query a database
3. Create and maintain tables using PL/SQL.
4. Prepare reports.
5. Create a Software using VB as front end and SQL as backend.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC04.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC04.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC04.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC04.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC04.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |

## LIST OF EXPERIMENTS:

1. Data Definition Language commands in RDBMS
2. Data Manipulation Language and Data control Language commands
3. Apply Integrity constraints and Domain constraints for a Database
4. Creation of Views, Nested Queries and Join Queries
5. Study of PL/SQL blocks
6. High level programming language extensions (Control structures and Procedures)
7. Implementation of Functions
8. Implementation of Triggers
9. Design and Implementation of Banking System
10. Design and Implementation of Student Information System
11. Design and Implementation of Payroll Processing System

## LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS HARDWARE:

Standalone desktops 30 Nos.

(Or)

Server supporting 30 terminals or more.

## SOFTWARE:

Front end: VB/VC ++/JAVA or Equivalent
Back end: Oracle / SQL / MySQL/ PostGress / DB2 or Equivalent

**TOTAL HOURS: 30**

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**19ITC05** **SOFTWARE ENGINEERING** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

**The student should be made to:**

1. Understand the phases in a software project
2. Understand fundamental concepts of requirements engineering and Analysis Modelling.
3. Understand the major considerations for enterprise integration and deployment.
4. Learn various testing and maintenance measures
5. Apply different techniques to measure software performance

## COURSE OUTCOMES

**At the end of the course, the student should be able to**

1. Identify the key activities in managing a software project.
2. Compare different process models.
3. Concepts of requirements engineering and Analysis Modeling.
4. Apply systematic procedure for software design and deployment.
5. Compare and contrast the various testing and maintenance

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC05.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC05.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC05.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC05.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC05.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

### UNIT I SOFTWARE PROCESS AND PROJECT MANAGEMENT 9

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models – Software Project Management: Estimation – LOC and FP Based Estimation, COCOMO Model – Project Scheduling – Scheduling, Earned Value Analysis - Risk Management.

### UNIT II REQUIREMENTS ANALYSIS AND SPECIFICATION 9

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

### UNIT III SOFTWARE DESIGN 9

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design – Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

### UNIT IV TESTING AND IMPLEMENTATION 9

Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques: Coding practices-Refactoring.

### UNIT V PROJECT MANAGEMENT 9

**Estimation** – FP Based, LOC Based, Make/Buy Decision, COCOMO II - Planning – Project Plan, PlanningProcess, RFP Risk Management – Identification, Projection, RMMM - Scheduling and Tracking –Relationship between people and effort, Task Set & Network, Scheduling, EVA - Process and Project Metrics.

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Roger S. Pressman | Software Engineering – A Practitioner"s Approach | Mc Graw-Hill International Edition | 2010 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Ian Sommerville | Software Engineering | Pearson Education Asia | 2011 |
| 2. | Rajib Mall | Fundamentals of Software Engineering | PHI Learning Private Limited, | 2009 |
| 3. | Pankaj Jalote | Software Engineering-A Precise Approach | Wiley India | 2010 |

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**19ITC06 COMPUTER ORGANIZATION AND ARCHITECTURE** **L T P C 3 0 0 3**

**COURSE OBJECTIVES**

1. To understand the basic hardware and software issues of computer organization
2. To understand the arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations
3. To provide the concept of pipelining and hazards
4. To familiarize the students with memory system including virtual memories and cache memories
5. To exposé the students with I/O devices and standard I/O interfaces

**COURSE OUTCOMES**

1. Analyze the abstraction of various components of a computer.
2. Design arithmetic and logical unit.
3. Analyze pipelined control units.
4. Evaluate the performance of memory systems.
5. Understanding the I/O devices and interfaces

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC06.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC06.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC06.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC06.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC06.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

**UNIT I INTRODUCTION** 9

Introduction-Technologies for building Processors and Memory-Performance-The Power Wall-Operations of the Computer Hardware-Operands Signed and Unsigned numbers, Representing Instructions, Logical Operations, Instructions for Making Decisions

**UNIT II ARITHMETIC OPERATIONS** 9

MIPS Addressing for 32-Bit Immediate and Addresses-Parallelism and Instructions: Synchronization, Translating and Starting a Program, Addition and Subtraction, Multiplication, Division, Floating Point, Parallelism and Computer Arithmetic: Subword Parallelism, Streaming SIMD Extensions

**UNIT III PIPELINING AND HAZARDS** 9

Building a Datapath-A Simple Implementation Scheme-Overview of Pipelining-Pipelined Datapath-Data Hazards: Control Hazards, Exceptions-Parallelism via Instructions-Instruction Level Parallelism and Matrix Multiply Hardware Design language

**UNIT IV MEMORY SYSTEM** 9

Memory Technologies-Basics of Caches-Measuring and Improving Cache Performance-Memory hierarchy-Virtual Memory-Secondary storage-Redundant Arrays of Inexpensive Disks-Implementing Cache Controllers

**UNIT V INPUT&OUTPUT ORGANIZATION** 9

Accessing I/O Devices-Interrupts-Interrupt Hardware-Enabling and Disabling Interrupts-Handling Multiple Devices-Controlling Device Requests-Exceptions-Direct Memory Access-Buses -Standard I/O Inter faces – PCI Bus, SCSI Bus, USB

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | David A. Patterson and John L. Hennessey | Computer Organization and design | Morgan auffman / lsevier | 2014 |
| 2. | Smruti Ranjan Sarangi | Computer Organization and Architecture | Tata McGraw Hill | 2015 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky | Computer Organisation | McGraw-Hill Inc | 2012 |
| 2. | William Stallings | Computer Organization and Architecture | Pearson Education | 2010 |
| 3. | Vincent P. Heuring, Harry F. Jordan | Computer System Architecture | Pearson Education | 2011 |
| 4. | Carl Hamacher, Zvonko Vranesic, Safwat Zaky, and Naraig Manjikian | Computer Organization and Embedded Systems | McGraw Hill Higher Education | 2011 |
| 5. | John P. Hayes | Computer Architecture and Organization | Tata McGraw Hill | 2014 |

**WEB URLs:**

1.www.ics.p.lodz.pl/~dpuchala/CompArch/Lecture_6.pdf
2.www.dauniv.ac.in/downloads/CArch_PPTs/
3. www.nptel.ac.in/Computer organization
4. www.cse.iitk.ac.in/users/karkare/courses/2011/cs220/html/notes.html
5. www.freevideolectures.com/Course/2277/Computer-Organization

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**19ITC07** **OBJECT ORIENTED PROGRAMMING** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. Understand the basic Object Oriented Programming concepts.
2. Develop solutions to problems by using of Data Abstraction, Encapsulation and Inheritance.
3. Ability to implement one or more patterns involving realization of an abstract interface.
4. Utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching.
5. To comprehend the art of programming, the structure and the meaning of basic Java programs.

## COURSE OUTCOMES

1. Classify basic concepts and structure of object-oriented programming.
2. Implement real time applications by using constructor, operator over loading and function overloading in C++ Programming language.
3. Demonstrate of Inheritance and polymorphism techniques in C++ Programming language.
4. Able to write simple programs in JAVA Programming language.
5. Implement real time application by using exception handling and multithreaded techniques in JAVA programming language.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC07.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC07.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC07.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC07.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC07.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

## UNIT I BASIC CONCEPTS OF OOP 9

Introduction OOP: Principles of OOP, Benefits and applications of OOP - Overview of C++: Program Structure-Namespace- Identifiers-Declaration of variables-Constants-Operators- Reference Variables - Functions in C++: Inline Functions-Friend Functions - Objects and classes: Basics of object and class in C++-Private and Public Members-Static Data and Function Members-Class Scope and Accessing Class Members

## UNIT II CONSTRUCTORS AND OVERLOADING 9

Constructors: Types of Constructors-Destructors - Overloading: Operator Overloading: Overloading Unary and Binary Operators-Rules for Overloading Operators - Function Overloading

## UNIT III INHERITANCE AND POLYMORPHISM 9

Base Class and Derived Class-Types of Inheritance: Single-Multiple-Multilevel-Hierarchical-Protected Members. Derived Class Constructors –Overriding, Member Functions - Virtual Base Class - Abstract Class - Polymorphism: this pointer - Virtual Functions.

## UNIT IV INTRODUCTION TO JAVA 9

Basic Java Concepts: Objects – Classes – Methods and Messages –Abstraction and Encapsulation – Inheritance – Abstract Classes – Polymorphism - Access specifiers – Static Members –Constructors – Finalize Method

## UNIT V JAVA PROGRAMMING 9

Arrays – Strings - Packages and Interfaces - Exception Handling – Multithreaded Programming- Dynamic Binding – Final Keyword – Abstract classes

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | E Balagurusamy | Object Oriented Programming with C++ | Tata McGraw Hill | 2012 |
| 2. | Herbert Schlitz | JAVA -The Compete Reference | Tata McGraw-Hill | 2014 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Bjarne Stroustrup | The C++ Programming Language | Pearson Education | 2012 |
| 2. | Deitel and Deitel | C++ : How to Program | PHI | 2014 |
| 3. | Herbert Schlitz | The Compete Reference C++ | Tata McGraw Hill Wesley | 2014 |
| 4. | Cay S. Horstmann and Gary Cornell | Core Java: Volume I – Fundamentals | Sun Microsystems Press | 2008 |
| 5. | C. Thomas Wu | An introduction to Object-oriented programming with Java | Tata McGraw-Hill Publishing company Ltd | 2006 |

**WEB URLs**

1. www.tutorialspoint.com/cplusplus/cpp_object_oriented.html
2. www.codecademy.com/courses/intro-to-object-oriented-programming
3. www.wiziq.com/tutorials/object-oriented-programming docs
4. www.java2s.com/Tutorial/Java/CataIogJava.html
5. www.docs.oracle.com/javase/tutorial/java/TOC.html

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**19ITC08 OBJECT ORIENTED PROGRAMMING LABORATORY** **L T P C**
**0 0 2 1**

## COURSE OBJECTIVES

**The student should be made to:**

1. Understand the basic Object Oriented Programming concepts.
2. Develop solutions to problems by using of Data Abstraction, Encapsulation and Inheritance.
3. Ability to implement one or more patterns involving realization of an abstract interface.
4. Utilization of polymorphism to solve problems which can take advantage of dynamic dispatching.
5. To comprehend the art of programming, the structure and the meaning of basic Java programs.

## COURSE OUTCOMES

**At the end of the course, the student should be able to:**

1. Classify basic concepts and structure of object-oriented programming.
2. Implement real time applications by using constructor, operator over loading and function overloading
3. Demonstrate Inheritance and polymorphism techniques in C++ Programming language.
4. Able to write simple programs in JAVA Programming language.
5. Implement real time application by using exception handling and multithreaded techniques in JAVA programming language.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC08.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC08.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC08.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC08.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC08.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

## LIST OF EXPERIMENTS:

## IMPLEMENTATION IN THE FOLLOWING TOPICS:

1. Pass by value, Pass by reference and Pass by address.
2. Constructors & Destructors, Copy Constructor.
3. Friend Function & Friend Class.
4. Inheritance.
5. Polymorphism & Function Overloading.
6. Virtual Functions.
7. Overload Unary & Binary Operators Both as Member Function & Non Member Function.
8. Class Templates & Function Templates.
9. Exception Handling Mechanism.
10. Standard Template Library concept.

## LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Standalone desktops with C++ compiler 30 Nos.

(or)

Server with C++ compiler supporting 30 terminals or more.

**TOTAL HOURS: 30**

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| 19ITC09 | OPERATING SYSTEMS | L T P C<br>3 0 0 3 |
|---|---|---|

## COURSE OBJECTIVES

1. To understand the basic concepts Operating System.
2. To understand the fundamental Operating System abstractions such as processes, process scheduling
3. To understand the principles of concurrency and synchronization, and apply them to write concurrent programs/software
4. To Implement basic resource management techniques (scheduling or time management, space management ) and principles
5. To describe the types of I/O management, disk scheduling, disk management and swap space management

## COURSE OUTCOMES

1. Explain structures of Operating System.
2. Apply fundamental Operating System abstractions such as processes, process scheduling, Semaphores, IPC abstractions, shared memory regions, deadlock and threads.
3. Explain the principles of concurrency and synchronization and apply them to write concurrent programs/software.
4. Implement basic resource management techniques (scheduling or time management, space management) and principles.
5. Describe the types of I/O management, disk scheduling, disk management and swap space management

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC09.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | X |
| 19ITC09.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | X |
| 19ITC09.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | X |
| 19ITC09.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | X |
| 19ITC09.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | X |

## UNIT I INTRODUCTION 9

**Introduction** – What Operating System Do – Operating System Structure – Operating system Operations – Operating System Components: Process Management – Memory Management – Storage Management – I/O Management – Network Management - Protection and Security.

**Classes of Operating Systems:** Mainframe Systems – Single Processor System - Multiprocessor Systems - Desktop Systems — Distributed Systems – Clustered Systems – Real-Time Systems – Handheld Systems - Open Source Operating Systems.

**Operating System Structures:** Operating System Services – User and Operating System Interface – System Calls– Types of System Calls.

## UNIT II PROCESS MANAGEMENT AND THREADING 9

**Processes:** Process concept – Process scheduling – Operation on Processes - Inter-process Communication: Shared Memory Systems - Message Passing Systems.

**Process Scheduling:** Basic Concepts – Scheduling Criteria – Scheduling Algorithms: First-Come, First-Served – Priority – Round-Robin – Multilevel Queue – Multilevel Feedback Queue.

**Threads:** Overview – Multithreading models - Threading issues.

## UNIT III PROCESS SYNCHRONIZATIONAND DEADLOCKS 9

**Process Synchronization:** Background - The critical-section problem (Software based solution and hardware based solution) – Semaphores – Classic Problems of Synchronization – Monitors.

**Deadlocks:** System model - Deadlock Characterization – Methods for Handling Deadlocks -Deadlock Prevention Deadlock Avoidance – Deadlock Detection – Recovery from Deadlocks.

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**UNIT IV MEMORY MANAGEMENT** 9

**Management Strategies:** Background – Swapping – Memory allocation: Contiguous Memory Allocation –Non- Contiguous Memory Allocation: Segmentation - Paging – Segmentation with Paging - Structure of the Page Table.

**Virtual Memory:** Background - Demand Paging – Page Replacement – Allocation of Frames – Thrashing.

**UNIT V FILE SYSTEM AND STORAGE MANGEMENT** 9

**System Interface:** File Concept – Access Methods – Directory and Disk Structure – Protection.

**File System Implementation:** File System Structure – File System Implementation – Directory Implementation

- Allocation Methods – Free Space Management.

**Mass Storage Structure:** Overview of Mass Storage Structure – Disk Structure - Disk Scheduling – Disk Management - Swap Space Management.

**Case Study**: Windows, Linux and Android operating Systems.

**TOTAL HOURS:45**

**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, | Operating System Concepts | John Wiley & Sons (ASIA) Pvt. Ltd, 9th Edition | 2015 |
| 2 | Harvey M. Deitel | Operating Systems | Pearson Education, 3rd Edition. | 2007 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Andrew S. Tanenbaum | Modern Operating Systems | Prentice Hall of India, 3rd Edition | 2009 |
| 2 | William Stallings | Operating Systems: Internals and Design Principles | Prentice Hall of India, 6th Edition | 2009 |
| 3 | D M Dhamdhere | Operating Systems: A Concept-Based Approach | Tata Mc-graw Hill Publishing3rd Edition | 2012 |
| 4 | Charles Crowley | Operating System: A Design-Oriented Approach | Tata Mc-graw Hill Publishing, 1st edition | 2009 |
| 5 | Evi Nemeth , Garth Snyder, Trent R. Hein , Ben Whaley , Dan Mackin | UNIX and Linux System Administration Handbook | Prentice Hall of India, 4th Edition | 2010 |

**WEB URLs:**

1. www.onlinecourses.nptel.ac.in/noc16_cs10
2. www.udacity.com/course/introduction-to-operating-systems--ud923
3. www.cs140.stanford.edu/
4. www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-828-operating- system- engineering-fall-2012/
5. www.tutorialspoint.com/operating_system/

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**19ITC10** **OPERATING SYSTEMS LABORATORY** **L T P C**
**0 0 2 1**

## COURSE OBJECTIVES

**The student should be made to:**

1. Learn shell programming and the use of filters in the UNIX environment.
2. Be exposed to programming in C using system calls.
3. Learn to use the file system related system calls.
4. Be exposed to process creation and inter process communication.
5. Be familiar with implementation of CPU Scheduling Algorithms, page replacement algorithms and Deadlock avoidance

## COURSE OUTCOMES

**At the end of the course, the student should be able to**

1. Implement deadlock avoidance, and Detection Algorithms
2. Compare the performance of various CPU Scheduling Algorithm
3. Critically analyze the performance of the various page replacement algorithms
4. Create processes and implement IPC
5. Develop various algorithms for CPU scheduling and for deadlock avoidance

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC10.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | X |
| 19ITC10.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | X |
| 19ITC10.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | X |
| 19ITC10.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | X |
| 19ITC10.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | X |

## LIST OF EXPERIMENTS:

1. File exploring basic commands under Linux Operating systems
2. Program using Shell scripts.
3. Basic process management algorithms.
4. Process synchronization algorithms.
5. Implementing various memory allocation methods.
6. Implementing paging and segmentation.
7. Implementing various page replacement policies.
8. Implementation of file system calls.
9. Implementation of Pattern matching.
10. Implementation of disk scheduling algorithms.

## LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Standalone desktops with C / C++ / Java / Equivalent complier 30 Nos.
(Or)
Server with C / C++ / Java / Equivalent complier supporting 30 terminals or more.

**TOTAL HOURS: 30**

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**19ITC11** **DESIGN AND ANALYSISOF ALGORITHMS** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To learn how to develop efficient algorithms for simple computational tasks.
2. To learn reasoning and correctness of algorithms.
3. To learn the complexity measures, different range of behaviors of algorithms and the notion of tractable and intractable problems will be understood.
4. To design the algorithms for real time problems.
5. To solve the problems by using different types of algorithms techniques.

## COURSE OUTCOMES

1. Design algorithms for various computing problems.
2. Analyze the time and space complexity of algorithms.
3. Critically analyze the different algorithm design techniques for a given problem.
4. Modify existing algorithms to improve efficiency
5. Solve the real time problems by using backtracking and branch and bound techniques.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC11.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC11.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC11.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC11.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC11.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

## UNIT I INTRODUCTION 9

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms.

## UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER 9

Brute Force - Closest-Pair and Convex-Hull Problems-Exhaustive Search - Traveling Salesman Problem - Knapsack Problem - Assignment problem. Divide and conquer methodology – Merge sort – Quick sort – Binary search – Multiplication of Large Integers – Strassen's Matrix Multiplication-Closest-Pair and Convex-Hull Problems.

## UNIT III DYNAMIC PROGRAMMINGAND GREEDY TECHNIQUE 9

Computing a Binomial Coefficient – Warshall's and Floyd' algorithm – Optimal Binary Search Trees – Knapsack Problem and Memory functions. Greedy Technique– Prim's algorithm- Kruskal's Algorithm- Dijkstra's Algorithm- Huffman Trees.

## UNIT IV ITERATIVE IMPROVEMENT AND LIMITATION OF ALGORITHM 9

The Simplex Method-The Maximum-Flow Problem – Maximm Matching in Bipartite Graphs- the Stable marriage Problem. Limitations of Algorithm Power-Lower-Bound Arguments-Decision Trees-P, NP and NP Complete Problems.

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**UNITV BACKTRACKING, BRANCH AND BOUND AND APPROXIMATION ALGORITHM 9**

Backtracking – n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem-Branch and Bound – Assignment problem – Knapsack Problem – Traveling Salesman Problem- Approximation Algorithms for NP – Hard Problems – Traveling Salesman problem – Knapsack problem.

**TOTAL HOURS: 45**

**TEXT BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Anany Levitin | Introduction to the Design and Analysis of Algorithms | Third Edition, Pearson Education,. | 2012 |
| 2. | Bogdan Ciubotaru & Gabriel-Miro Muntean | Advanced Network Programming Principles & Techniques, Network Application Programming with Java | Springer Verlag | 2013 |

**REFERENCE BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman | Data Structures and Algorithms | Pearson Education Reprint | 2006 |
| 2 | Donald E. Knuth, | The Art of Computer Programming | Volumes 1& 3 Pearson Education, | 2009 |
| 3 | A I. Chandra Mohan | Design and Analysis of Algorithms | PHI Learning Pvt. Ltd, 2nd Edition | 2012 |
| 4 | Steven S. Skiena | The Algorithm Design Manual | Second Edition , Springer | 2008 |
| 5 | Manas Ranjan Kabat | Design And Analysis Of Algorithms | PHI Learning Pvt. Ltd, 2nd Edition | 2013 |

**WEB URLs:**

1. www.nptel.ac.in/ algorithms
2. www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
3. www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html
4. www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015/lecture-videos/
5. www.khanacademy.org/computing/computer-science/algorithms

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**19ITC12** **BLOCKCHAIN TECHNOLOGY** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To study Basic cryptographic primitives and Blockchain Technology.
2. To study about Distributed computing basics and the issues related to it.
3. To know about Bitcoin and ethereum crypto- currencies.
4. To learn about Hyperledger and other advancement in Blockchain.
5. To learn about privacy and security issues in Blockchain.

## COURSE OUTCOMES

**The student should be able to:**

1. Explore Blockchain Technology and cryptographic primitives.
2. Tell about Distributed Computing and various Cryptographic Techniques.
3. Solve Bitcoin and Ethereum puzzles to include blocks into Blockchain.
4. Tell about Hyperledger and its uses.
5. Address the privacy and security issues In Blockchain Technology.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC12.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC12.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC12.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC12.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC12.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

## UNIT I INTRODUCTION 9

Introduction- Distributed systems- Architecture- Need for Distributed Record Keeping- Modeling faults and adversaries- Byzantine Generals problem-Consensus algorithms and their scalability problems- Cryptcurrency- Technologies Borrowed in Blockchain – hash pointers, consensus, byzantine fault-tolerant distributed computing and digital cash.

## UNIT II DISTRIBUTED COMPUTING AND CRYPTOGRAPHY BASICS 9

Introduction- Distributed Computing- issues in Distributed Computing- Atomic Broadcast, Consensus, Byzantine Models of fault tolerance- Hash functions, Puzzle friendly Hash, Collision resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge system.

## UNIT III BITCOIN AND ETHEREUM 9

Bitcoin- blockchain, the challenges, and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use- Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges.

## UNIT IV HYPERLEDGER 9

Using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts- Hyperledger fabric, the plug and play platform and mechanisms in permissioned blockchain.

## UNIT V PRIVACY AND SECURITY ISSUES IN BLOCKCHAIN 9

Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Blockchains – such as Sybil attacks, selfish mining, 51% attacks - -advent of algorand, and Sharding based consensus algorithms to prevent these.

**Total Hours: 45**

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**TEXT BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan | Blockchain Technology: Cryptocurrency and Applications | Oxford University Press | 2019 |
| 2. | Josh Thompson | Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming | Create Space Independent Publishing Platform | 2017 |

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**19ITC13**

## MOBILE COMMUNICATION

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**COURSE OBJECTIVES**

1. Understand the fundamentals of mobile communication
2. Apply the typical mobile networking infrastructure through a popular GSM protocol
3. Summarize the basics of mobile telecommunication system.
4. Identify the Mobile Network Layer Functionalities of Mobile communication.
5. Define the functions of Transport and Application layers

**COURSE OUTCOMES**

1. State the basics of mobile telecommunication system
2. Illustrate the generations of telecommunication systems in wireless network
3. Understand the architectures, the challenges and the Solutions of Wireless Communication
4. Identify solution for each functionality at each layer
5. Analyze the functionality of Transport and Application layer

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC13.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |
| 19ITC13.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |
| 19ITC13.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |
| 19ITC13.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |
| 19ITC13.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |

**UNIT I WIRELESS COMMUNICATION FUNDAMENTALS** 9

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks.

**UNIT II TELECOMMUNICATION NETWORKS** 11

Telecommunication systems – GSM – GPRS – DECT – Satellite Networks - Basics – Parameters and Configurations – Capacity Allocation – FAMA and DAMA – Broadcast Systems – DAB - DVB.

**UNIT III WIRLESS LAN** 9

Wireless LAN – IEEE 802.11 - Architecture – services – MAC – Physical layer – IEEE 802.11a - HIPERLAN – Blue Tooth.

**UNIT IV MOBILE NETWORK LAYER** 9

Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR – Alternative Metrics.

**UNIT V TRANSPORT AND APPLICATION LAYERS** 7

Traditional TCP -- Classical TCP improvements – WAP- Introduction to 4G mobile networks- Case study – Mobile multimedia networks.

**TOTAL HOURS : 45**

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**TEXT BOOK**

| Sl.No | AUTHOR(s) | TITLE OF THE BOOK | PUBLISHER | YEAR OF PUBLICATION |
|---|---|---|---|---|
| 1 | Jochen Schiller | Mobile Communications | PHI/Pearson Education.Second Edition | 2003 |
| 2 | William Stallings | Wireless Communications and Networks | PHI/Pearson Education | 2002 |

**REFERENCE BOOKS**

| Sl.No | AUTHOR(s) | TITLE OF THE BOOK | PUBLISHER | YEAR OF PUBLICATION |
|---|---|---|---|---|
| 1. | Kaveh Pahlavan, Prasanth Krishnamoorthy | Principles of Wireless Networks | PHI/Pearson Education | 2003 |
| 2. | Uwe Hansmann, Lothar Merk, Martin S, Nicklons and Thomas Stober | Principles of Mobile Computing | Springer, New York | 2003 |
| 3. | Hazysztof Wesolowshi | Mobile Communication Systems | John Wiley and Sons Ltd | 2002 |

**WEB REFERENCE(s)**

1. http://www.wirelesscommunication.nl/reference/chaptr01/wrlscomp/wcompute.htm
2. https://en.wikipedia.org/wiki/Telecommunications_network
3. https://www.javatpoint.com/wireless-lan-introduction
4. https://www.cisco.com/c/en/us/td/docs/ios/solutions_docs/mobile_ip/mobil_ip.html
5. https://www.omicsonline.org/scholarly/multimedia-network-journals-articles-ppts-list.php

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**19ITC14** **MOBILE APPLICATION LABORATORY** **L T P C**
**0 0 2 1**

## COURSE OBJECTIVES

1. Apply the fundamental design paradigms and technologies to mobile computing applications
2. Design consumer and enterprise mobile applications using representative mobile devices and platforms using modern development methodologies.
3. Implement the skills of finding solutions and building software for mobile computing applications
4. Discuss wireless communication and networking principles, which support connectivity to cellular networks, wireless internet and sensor devices.
5. Classify user Interfaces for the Android platform.

## COURSE OUTCOMES

1. Understand the characteristics and limitations of mobile hardware devices including their user-interface modalities.
2. The ability to develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts.
3. A comprehension of the design of context-aware solutions for mobile devices.
4. Develope various Android applications related to layouts & rich uses interactive interfaces.
5. Illustrate the Mobile Network performance parameters and design decisions.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC14.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC14.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC14.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC14.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC14.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |

| Sl.No | LIST OF EXPERIMENTS |
|---|---|
| 1. | Study of WML and J2ME simulators |
| 2. | Design of simple Calculator having +,,,* and / using WML/J2ME |
| 3. | Design of Calendar for any given month and year using WML/J2ME |
| 4. | Design a Timer to System Time using WML/J2ME |
| 5. | Design of simple game using WML/J2ME |
| 6. | Animate an image using WML/J2ME |
| 7. | Design a personal phone book containing the name, phone no., address, e-mail, etc |
| 8. | Simulation of Authentication and encryption technique used in GSM |
| 9. | Browsing the Internet using Mobile phone simulator |
| 10. | Study of GlomoSim Simulator |

**TOTAL: 30 HOURS**

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**19ITC15** **INTERNET OF THINGS** **L T P C**
3 0 0 3

**COURSE OBJECTIVES**

1. To understand Smart Objects and IoT Architectures
2. To learn about various IOT-related protocols
3. To be exposed to web, cloud in the context of IoT
4. To develop different models for network dynamics
5. To analyze applications of IoT in realtime scenario

**COURSE OUTCOMES**

1. Explain the underlying architectures and models in IoT.
2. Analyze various protocols for IoT at the different layers for IoT
3. Apply the web of things and cloud of things Models
4. Develop different models for network dynamics
5. Study the needs and suggest appropriate solutions for Industrial applications

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO 1 | PO2 | PO3 | PO4 | PO5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO11 | PO12 | PSO1 | PSO 2 | PSO 3 | PSO 4 |
| 19ITC15.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - |
| 19ITC15.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - |
| 19ITC15.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - |
| 19ITC15.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - |
| 19ITC15.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - |

**UNIT I** **INTRODUCTION** **9**

Definitions and Functional Requirements –Motivation – Architecture - Web 3.0 View of IoT– Ubiquitous IoT Applications – Four Pillars of IoT – DNA of IoT - The Toolkit Approach for End-user Participation in the Internet of Things. Middleware for IoT: Overview – Communication middleware for IoT –IoT Information Security.

**UNIT II** **IoT PROTOCOLS** **9**

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus – KNX – Zigbee Architecture – Network layer – APS layer – Security

**UNIT III** **WEB OF THINGS** **9**

Web of Things versus Internet of Things – Two Pillars of the Web – Architecture standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing–Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture

**UNIT IV** **IOT BUSINESS MODELS** **9**

Integrated Billing Solutions in the Internet of Things Business Models for the Internet of Things - Network Dynamics: Population Models – Information Cascades - Network Effects – Network Dynamics: Structural Models - Cascading Behavior in Networks - The Small-World Phenomenon

**UNIT V** **APPLICATIONS** **9**

The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronisation and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging.

**TOTAL HOURS : 45**

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**TEXT BOOKS**

| S.No | AUTHOR(s) | TITLE OF THE BOOK | PUBLISHER | YEAR OF PUBLICATION |
|---|---|---|---|---|
| 1. | David Hanes,Gonzalo Salgueiro,Patrick,Grossetete, Rob Barton and Jerome Henry | Fundamentals:Networking Technologies, Protocols and Use Cases for Internet of Things | Cisco Press | 2017 |
| 2. | Arshdeep Bahga,Vijay Madisetti | Internet of Things | A hands-on approach, Universities press | 2015 |

**REFERENCE BOOK**

| Sl.No | AUTHOR(s) | TITLE OF THE BOOK | PUBLISHER | YEAR OF PUBLICATION |
|---|---|---|---|---|
| 1. | David Easley and Jon Kleinberg | Networks, Crowds, and Markets: Reasoning About a Highly Connected World | Cambridge University Press | 2010 |
| 2. | Olivier Hersent, David Boswarthick, Omar Elloumi | The Internet of Things | A John Wiley & Sons, Ltd | 2012 |
| 3. | Honbo Zhou | The Internet of Things in the Cloud: A Middleware Perspective | CRC Press | 2012 |
| 4. | Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds) | Architecting the Internet of Things | Springer | 2011 |
| 5. | Olivier Hersent, Omar Elloumi and David Boswarthick | The Internet of Things: Applications to the Smart Grid and Building Automation | Wiley | 2012 |

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**19ITC16** **INTERNET OF THINGS LABORATORY** **LTPC**

**0 0 2 1**

**COURSE OBJECTIVES**

1. To study the assembly language using simulator and kit.
2. To perform ALU operations.
3. To generate waveforms and test timers.
4. To develop applications using Embedded C.
5. To develop IoT applications using Aurdino, Raspberry Pi, and Bluemix.

**COURSE OUTCOMES**

1. Execute Assembly Language experiments using simulator.
2. Implement ALU operations.
3. Design waveforms and test timers
4. Develop real time applications and explore ARM/PIC using Embedded C,
   Demonstrate real time applications using Aurdino, Raspberry Pi, and Bluemix.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC16.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - |
| 19ITC16.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - |
| 19ITC16.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - |
| 19ITC16.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - |
| 19ITC16.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - |

**LIST OF EXPERIMENTS**

Write 8051 Assembly Language experiments using simulator.

1. Test data transfer between registers and memory.
2. Perform ALU operations.
3. Using interrupts generate waveforms and test Timers.
4. Write assembly language experiments using Kit to test interfaces and interrupts using Traffic Generator, DAC, ADC, Stepper Motor (2).
5. Write Basic and arithmetic Programs Using Embedded C.
6. Write Embedded C program to test interrupt and timers.
7. Develop Real time applications – clock generation, wave form generation, counter using embedded C.
8. Explore ARM/PIC based controllers using Embedded C.
9. Explore different communication methods with IoT devices
10. Develop simple application – testing infrared sensor – IoT Applications – using Aurdino.
11. Develop simple application – testing temperature, light sensor – IOT Application using open platform/Raspberry Pi.
12. Deploy IOT applications using platforms such as Bluemix.

**TOTAL HOURS: 30**

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**19ITC17** **ARTIFICIAL INTELLIGENCE** **L T P C**
**3 1 0 4**

## COURSE OBJECTIVES

1. To learn the concepts of computational intelligence for solving problems
2. To Understand about knowledge representation and decisions making
3. To introduce the concepts of machine learning and Neural Networks
4. To Initiate the Perception of Genetic Algorithms.
5. To understand the knowledge about Expert Systems

## COURSE OUTCOMES

1. Apply different searching strategies for problem solving
2. Represent planning problems and find the sequence of actions to achieve goals by using knowledge representation.
3. Comprehends the various machine learning techniques.
4. Demonstrate different techniquesto represent Genetic Algorithms
5. Develop the expert system for the real time problems.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC17.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC17.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC17.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC17.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC17.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

## UNIT I INTRODUCTION TO AI AND PRODUCTION SYSTEMS 9+3

Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms

## UNIT II REPRESENTATION OF KNOWLEDGE 9+3

Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic- Structured representation of knowledge.

## UNIT III MACHINE LEARNING 9+3

Machine Learning-Supervised learning-un Supervised learning-Reinforcement Learning-Learning by Inductive Logic Programming-Computational Learning Theory-Neural Nets-Artificial Neural Nets-Topology of AI- Learning using Neural Nets-Back Propagation Training Algorithm- Multi-Layered ADALINE Models- Hopfield Neural Net-Associative Memory-Fuzzy Neural Nets- Self Organizing Neural Net-Adaptive Resonance Theory.

## UNIT IV GENETIC ALGORITHMS 9+3

Genetic Algorithms-Hollands Observation-Fundamental Theorem of Genetic Algorithms-Markov Model for Convergence Analysis-Applications of Optimization problem,Intelligent Systems-Genetic Programming- Fuzzy Neural Nets-Cognitive Maps-Stability Analysis-Control Command by Cognitive Map-Visual perception- Case Study

## UNIT V EXPERT SYSTEMS 9+3

Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells.

**TOTAL HOURS: 45+15=60**

**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Elaine Rich, Kevin Knight, Shivashankar.B.Nair | Artificial Intelligence | Tata Mc Graw Hill | 2011 |
| 2. | Amit Konar | Artificial Intelligence | CRC,Press | 2009 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Russell, Peter Norvig | Artificial Intelligence – | Prentice Hall of India | 2009 |
| 2. | Dan W. Patterson | Introduction to AI and ES | Pearson Education | 2007 |
| 3. | AndriesP.Engelbrecht, | Computational Intelligence: An Introduction | John Wiley & Sons | 2007 |
| 4. | Eugene Charniak, Drew McDermott | Introduction to Artificial Intelligence | Pearson Education | 2006. |
| 5. | Nils.J.Nilsson | Artificial Intelligence: A new synthesis | Elsevier | 2003 |

**WEB URLs**

1. www.artint.info/html/ArtInt.html
2. www.aima.cs.berkeley.edu
3. www-formal.stanford.edu/jmc/whatisai/
4. www.nptel.ac.in/courses/106106126
5. www.sciencedaily.com/news/computers_math/artificial_intelligence/

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**19ITC18** **PRINCIPLES OF COMPILER DESIGN** **L T P T**
**3 0 0 3**

## COURSE OBJECTIVES

1. To learn the basic concepts of Automata theory.
2. To know the basic concepts of compilers.
3. To learn the functions of Lexical Analyzer and Syntax Analyzer.
4. To understand the process of Intermediate Code Generation.
5. To understand the concepts of Code Generation and Code Optimization

## COURSE OUTCOMES

1. Design a lexical analyzer for compiler.
2. Implement a parser such as a bottom– up SLR parser without using YACC.
3. Implement semantic rules into a parser.
4. Implement intermediate code generator for compiler design.
5. Implement code generator and code optimizer.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC18.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC18.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC18.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC18.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC18.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

## UNIT I INTRODUCTION TO AUTOMATA AND COMPILER 9

Basic Machines Finite Automata (FA) - Deterministic Finite Automata (DFA) – Nondeterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions-Finite State Automata and Regular Expressions. Compilers – Phases of a compiler – Cousins of the Compiler– Compiler construction tools – Lexical Analysis – Role of LexiAnalyzer – Input Buffering – Tokens Specification.

## UNIT II LEXICAL ANALYSIS 9

Recognition machine - A typical lexical analyzer generator - Parsing - Top Down parsing – Recursive Descent Parsing – Predictive Parsing. Syntax

## UNIT III ANALYSIS 9

**Analysis:** Role of the parser – Context-Free Grammars — Bottom-up parsing – Shift Reduce Parsing – Operator Precedent Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser.

## UNIT IV INTERMEDIATECODE GENERATION 9

Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Procedure calls. Code Optimization and Code generation:

## UNIT V CODE OPTIMIZATION 9

Introduction to code optimization - Principal Sources of Optimization – Optimization of basic Blocks – DAG representation of Basic Blocks – Peephole Optimization - code generation- Issues in design of code generator – The target machine - A simple Code generator.

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| Sl. No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Alfred Aho Jeffrey D Ullman | Compilers Principles Techniques and Tools | Pearson Education | 2014 |
| 2 | J.E.Hopcroft, R.Motwani and J.D Ullman | Introduction to Automata Theory, Languages and Computations | Pearson Education | 2003 |

**REFERENCE BOOKS:**

| Sl. No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Fischer C N LeBlanc R J | Crafting a compiler with C | Benjamin Cummings | 2003 |
| 2. | Bennet J P | Introduction to Compiler Techniques | Tata McGraw Hill | 2003 |
| 3. | Kenneth C Louden | Compiler Construction Principles and Practice | Thompson Learning | 2003 |
| 4 | Henk Alblas and Albert Nymeyer | Pract ice and Principles of Compiler Building wit h C | PH. | 2001 |
| 5 | Alfred V. Ahoet. Al | Compilers Principles, Techniques and Tools | Pearson Education | 2007 |

**WEB URLs:**

1. www.personal.kent.edu/~rmuhamma/Compilers/compiler.html
2. www.cs.rpi.edu/~moorthy/Courses/compiler98/Lectures/lecturesinppt/
3. www.cse.iitd.ernet.in/~sak/courses/cdp/slides.pdf
4. www.cs.nyu.edu/courses/fall06/G22.2130-001/lectures/lectures.html
5. www.nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/30Oct/sanjeev/power- system/ui/TOC.html

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| 19ITC19 | COMPILER DESIGN LABORATORY | L T P C<br>0 0 2 1 |
|---|---|---|

**COURSE OBJECTIVES**

1. To learn the basic concepts of Automata theory.
2. To know the basic concepts of compilers.
3. To learn the functions of Lexical Analyzer and Syntax Analyzer.
4. To understand the process of Intermediate Code Generation.
5. To understand the concepts of Code Generation and Code Optimization

**COURSE OUTCOMES**

1. Ability to design and implement lexical analyzer using C and LEX tool.
2. Ability to design and implement parsers using C, YACC and LEX tools.
3. Ability to design and implement compilers.
4. Implement intermediate code generator for compiler design.
5. Implement code generator and code optimizer.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC19.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC19.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC19.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC19.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC19.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

**LISTOF EXPERIMENTS**

1. Implementation of lexical analyzer in C.
2. Implementation of lexical analyzer using LEX tool.
3. Implementation ofthe recursive descent parser for an expression grammar that generates arithmetic expressions with digits, + and *.
4. Implementation of a parser for the same grammar as given in problem using YACC and LEX.
5. Write semantic rules to the YACC program in problem and implement a calculator that takes an expression with digits, + and * and computes and prints its value.
6. Implementation of the front end of a compiler that generates the three address code for a simple language with: one data type integer, arithmetic operators, relational operators, variable declaration statement, one conditional construct, one iterative construct and assignment statement.
7. Implementation of back end of a compiler using C.
8. Stack implementation of LR parser using C.

**LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

Standalone desktops with C / C++ / Java / Equivalent complier 30 Nos.

(Or)

Server with C / C++ / Java / Equivalent complier supporting 30 terminals or more.

**TOTAL HOURS: 30**

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**19ITC20** **CLOUD COMPUTING** **L T P C 3 0 0 3**

## COURSE OBJECTIVES

1. Describe three cloud deployment models, and Overview of AWS Global infrastructure.
2. Understand the different AWS core services.
3. Formulate virtual firewalls with security groups.
4. Review the availability differences of alternative database solutions.
5. Summarize the AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

## COURSE OUTCOMES

1. Construct three cloud deployment models, and Overview of AWS Global infrastructure.
2. Implement the different AWS compute services.
3. Create virtual firewalls with security groups.
4. Construct the availability of different alternative database solutions.
5. Implement AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC20.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC20.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC20.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC20.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC20.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |

## UNIT I - CLOUD CONCEPTS 9

Cloud Concepts Overview - Introduction to Cloud Computing, Advantages of Cloud Computing, CC Reference Model, Introduction to Amazon Web Services (AWS), AWS Cloud Adoption Framework (CAF). Cloud Economics - Fundamentals of Pricing, Total Cost of Ownership, AWS Global Infrastructure Overview - AWS Global Infrastructure, AWS Service and Service Category Overview.

## UNIT II - AWS CORE SERVICES 9

Compute - Compute Services Overview, Introduction to Amazon Elastic Compute Cloud (EC2), Amazon EC2 Cost Optimization, Introduction to AWS Lambda, Introduction to AWS Elastic Beanstalk. Storage - Amazon Elastic Block Store (EBS), Amazon Simple Storage Service (S3), Amazon Elastic File System (EFS), Amazon Glacier. VPC - Amazon Virtual Private Cloud (VPC), Amazon VPC Security Groups, Amazon CloudFront,. Database - Amazon Relational Database Service (RDS), Amazon DynamoDB, Amazon Redshift, Amazon Aurora. Balancing, Scaling, Monitoring - Elastic Load Balancing (ELB), Amazon CloudWatch, Auto Scaling.

## UNIT III - CLOUD SECURITY 9

AWS Shared Responsibility Model, AWS Identity and Access Management (IAM), AWS Trusted Advisor, AWS CloudTrail, AWS Config, AWS Day One Best Practice Review, AWS Security and Compliance Programs, AWS Security Resources.

## UNIT IV - CLOUD ARCHITECTING 9

Introduction to the Well-Architected Framework, Well-Architected Design Principles, Understanding Reliability and High Availability.

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**UNIT V - CLOUD SUPPORT** 9

Introduction to AWS Organizations, AWS Cost Explorer, Overview of AWS Technical Support Plans and Costs, Microsoft azure, Google app Engine.

**TOTAL HOURS: 45**

**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1 | Kai Hwang, Geoffrey C Fox, Jack G Dongarra | Distributed and Cloud Computing From Parallel Processing to the Internet of Things | Morgan Kaufmann Publishers | 2012 |
| 2 | Rajkumar Buyya, Christian Vecchiola, S Thamarai Selvi | Mastering Cloud Computing | Tata McGraw Hill | 2010 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1 | John W.Rittinghouse and James F.Ransome | Cloud Computing: Implementation, Management, and Security | CRC Press | 2010 |
| 2 | Bernard Golden | Amazon Web Service For Dummies | John Wiley & Sons, Inc | 2013 |
| 3 | Mitch Tulloch with the Windows Azure Team | Introducing Windows Azure | Microsoft Press | 2013 |
| 4 | Barrie Sosinsky | Cloud Computing Bible | Wiley India | 2015 |
| 5. | Gautam Shroff | Enterprise Cloud Computing | Cambridge | 2010 |

**WEB URLs**

1. www.cloud-standards.org/wiki/index.php?title=Main_Page
2. www.nptel.ac.in/courses/106105033/41
3. www.courses.cs.ut.ee/2011/cloud/Main/Lectures
4. www.cloudbus.org/cloudsim/
5. www.hadoop.apache.org/docs/stable/hdfs_design.html 6.www.eucalyptus.com/

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**19ITC21** **CLOUD COMPUTING LABORATORY** **L T P C**
**0 0 2 1**

## COURSE OBJECTIVES

1. To understand and study Amazon EC2
2. To work with EBS.
3. To build VPC, web server and DB server
4. To build the DB Server.
5. To construct scale and load balance of cloud architecture.

## COURSE OUTCOMES

1. Construct Amazon EC2
2. Working with EBS
3. Develop VPC, web server and DB server
4. Build the DB Server.
5. Implement scale and load balance of cloud architecture.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC21.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC21.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC21.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC21.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC21.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |

## LISTOF EXPERIMENTS

1. Introduction to Amazon EC2
2. Working with EBS
3. Build VPC and Launch a Web Server
4. Build DB Server and Interact with DB Using an App
5. Scale and Load Balance Architecture
6. Introduction to AWS IAM
7. Sandbox.
8. Use GAE launcher to launch the web applications.
9. Simulate a Cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
10. Install Hadoop single node cluster and run simple applications like wordcount.

## LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Standalone desktops with C / C++ / Java / Equivalent complier 30 Nos.

(Or)

Server with C / C++ / Java / Equivalent complier supporting 30 terminals or more.

**TOTAL HOURS: 30**

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**19ITC22** **DATA WAREHOUSING AND DATA MINING**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

## COURSE OBJECTIVES

1. To study the concepts of data warehousing architecture
2. To understand data mining principles and techniques
3. To learn to use association rule mining for handling large data
4. To study classification and clustering for better organization and retrieval of data
5. To expose business applications and recent trends of Data mining

## COURSE OUTCOMES

1. Identify the components of data warehousing architecture
2. Implement data preprocessing for mining applications
3. Apply the association rules for mining the data
4. Deploy appropriate classification and clustering techniques
5. Use recent trends of Data mining in business applications.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC22.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC22.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC22.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC22.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC22.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |

## UNIT I DATA WAREHOUSING 9

Introduction to Data warehousing - Data warehousing Components - Building a Data Warehouse - Mapping the Data Warehouse to Multiprocessor Architecture - DBMS Schemas for Decision Support - Data Extraction, Cleanup, and Transformation Tools - Multidimensional Data Model-On Line Analytical Processing and tools - Need for OLAP- OLAP Operations – Types of OLAP servers.

## UNIT II DATA MINING 9

Data Mining-Motivation and Importance of Data mining – Evolution of Database systems – Data mining functionalities – Steps in KDD process- Architecture of a typical data mining system - Classification of data mining systems – Data mining task primitives - Major issues in data mining

## UNIT III ASSOCIATION RULE MINING 9

Introduction - Association rule mining - Mining frequent item sets with and without candidate generation – Pattern evaluation methods - Mining various kinds of association rules: Pattern mining - Mining multilevel association - Mining multidimensional association - Constraint based mining.

## UNIT IV CLASSIFICATION AND CLUSTERING 9

Basic concepts - Decision tree induction - Bayesian classification - Rule based classification - Classification by
back propagation - Model Evaluation and Selection - Techniques to improve classification – Case study

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**UNIT V CLUSTERING** 9

Cluster analysis - Clustering techniques: Partitioning methods - Hierarchical methods - Evaluation of clustering

Outlier detection: Outliers and Outlier analysis - Outlier detection methods- Case study

**TOTAL HOURS: 45**

**TEXT BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Jiawei Han and Micheline Kamber, | Data Mining: Concepts and Techniques | Morgan Kaufmann Publishers | 2011. |
| 2. | Alex Berson and Stephen J. Smith | Data Warehousing, Data Mining & OLAP | Tata McGraw Hill Edition | 2011 |

**REFERENCE BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | G. K. Gupta | Introduction to Data Mining with Case Studies | Prentice Hall of India | 2014 |
| 2. | Ian Witten, Eibe Frank | Data Mining: Practical Machine Learning Tools and Techniques | Morgan Kaufmann | 2011 |
| 3. | Alex Berson and Stephen J. Smith | Data Warehousing, Data Mining & OLAP | Tata McGraw – Hill Edition | 2007 |
| 4. | K.P. Soman, ShyamDiwakar and V. Ajay | Insight into Data mining Theory and Practice | Prentice Hall of India | 2006 |
| 5. | George M Marakas | Modern Data Warehousing, Mining and Visualization | Prentice Hall | 2003 |

**WEB URLs**

1. www.nptel.ac.in
2. www.gtbit.org/downloads/dwdmsem6/dwdmsem6lman.pdf
3. www.abbottanalytics.com/data-mining-resources-websites.php
4. www.gephi.org
5. www.ocw.mit.edu/courses/sloan-school-of-management/15-062-data-mining-spring-2003

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**19ITC23** **INFORMATION SECURITY** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To understand the basics of information security.
2. To describe the legal, ethical and professional issues in information security.
3. To estimate the level of security risk faced by an organization and the counter measures to handle the risk.
4. To understand the logical design and security models.
5. To implement the physical design and implementation of information security.

## COURSE OUTCOMES

1. Explore the basic concept of information security models.
2. Analyze the need for security issues.
3. Use the security policies for information security.
4. Design logical structure of the information systems.
5. Implement physical structure of information security system by using security tools.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC23.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC23.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC23.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC23.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITC23.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |

## UNIT I INTRODUCTION 9

Introduction to Information Security: History- Aspects of Security- NSTISSC Security Model, Components of Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

## UNIT II SECURITY INVESTIGATION 9

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

## UNIT III SECURITY PRACTICE 9

Vulnerability Analysis-Auditing-Anatomy of an Auditing System-Design of Auditing Systems-Auditing Mechanisms-Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk.

## UNIT IV LOGICAL DESIGN 9

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

## UNIT V PHYSICAL DESIGN AND IMPLEMENTATION 9

Security Technology, IDS, Honey Pots, Honey Nets, and Padded Cell Systems, Scanning and Analysis Tools, Access Control Devices, Implementing Information Security, Project Management for Information Security, Technical Topics of Implementation, Nontechnical Aspects of Implementation

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Michael E Whitman and Herbert J Mattord | Principles of Information Security | Thomson (Cengage) Indian | 2016 |
| 2. | Mark Rhodes- Ousley | Information Security: The Complete Reference | Pearson/PHI | 2013 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Stuart Mc Clure, Joel Scrambray, George Kurtz | Hacking Exposed | Tata McGraw-Hill | 2003 |
| 2. | Micki Krause, Harold F. Tipton | Handbook of Information Security Management | CRC Press LLC | 2004 |
| 3. | Charles Pfleeger,Shari Lawrence Pfleeger,Devin N Paul | Security in Coding | Pearson Education | 2007 |
| 4. | Wenbo Mao | Modern Cryptography Theory and Practice | Pearson Education | 2004 |
| 5. | Matt Bishop | Computer Security: Art and Science | Pearson Education | 2003 |

**WEB URLs**

1. www.nptel.ac.in/courses/106106129/
2. www.vssut.ac.in/lecture_notes/lecture1423183198.pdf
3. www.course.cs.tau.ac.il/infosec15/lectures
4. www.caislab.kaist.ac.kr/lecture/2009/summer/ice1212/Data/Lect1-introduction.ppt
   www.iiscs.wssu.edu/drupal/node/2991

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**19ITC24** **COMPUTER NETWORKS** **L T P C**
**3 0 0 3**

**COURSE OBJECTIVES :**

1. Understanding the basic concepts of computer networking
2. Describe the MAC protocols
3. Appraise the switching concepts and Routing Techniques
4. Distinguish about UDP & TCP
5. Formulate the Application Layer

**COURSE OUTCOMES :**

Student will able to

1. Summarize the functionality and protocols operating in each layer of OSI reference model.
2. Compare network topology, devices and transmission medium.
3. Analyze error control, flow control and routing protocols
4. Construct IP, TCP and UDP header formats.
5. Predict Network traffic characteristics and congestion control mechanism. Analyze Network traffic characteristics and congestion control mechanism

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITC24.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC24.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC24.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC24.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITC24.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

**Unit I : Data Communications** **8**

Data Communication – The OSI Model – TCP/IP Protocol Suite – Addressing – Transmission Media – Networking devices – Network Topologies.

**Unit II : Data Link Layer** **10**

Encoding - Error Detection – Reliable Transmission – MAC protocols – CSMA/CD – CSMA/CA.

**Unit III : Network Layer** **9**

Circuit Switching – Packet Switching – Bridges and LAN Switches: Spanning Tree algorithm – Internetworking – IPv4 - Subnetting – IPv6 – Routing Techniques: Distance vector (RIP) – Link state (OSPF) — Interdomain Routing (BGP).

**Unit IV : Transport Layer** **9**

UDP – TCP – Congestion Control and Resource Allocation: TCP Congestion Control – Congestion Avoidance Mechanisms – Quality of Service: Integrated Services – Differentiated Services – Network Traffic Analysis.

**Unit V : Application Layer** **9**

Domain Name System – Electronic Mail (SMTP, MIME, IMAP) – File Transfer (FTP) – WWW (HTTP).

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**TEXT BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Behrouz A. Foruzan | Data communication and Networking | Tata McGraw-Hill | 2013 |
| 2. | Larry L. Peterson and Bruce S. Davie | Computer Networks: A systems approach | Morgan Kaufmann Publishers | 2010 |

**REFERENCE BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Mani Subramanium | Network Management Principles and practices | Pearson Education | 2010 |
| 2. | Andrew S Tanenbaum, David J. Wetherall | Computer Networks | Prentice Hall of India/ Pearson Education | 2010 |
| 3. | William Stallings | Data and Computer Communications | Pearson Education | 2013 |
| 4. | James F. Kurose, Keith W. Ross | Computer Networking, A Top–Down Approach Featuring the Internet | Pearson Education | 2012 |
| 5. | Ying-Dar Lin, Ren-Hung Hwang, Fred Baker | Computer Networks: An Open Source Approach | McGraw Hill Publisher | 2011 |

**WEB URLs:**

1. http://nptel.ac.in/courses/106105082/
2. http://compnetworking.about.com/od/basicnetworkingconcepts/a/network_types.htm
3. http://www.protocols.com/pbook/tcpip1.htm
4. http://docs.oracle.com/cd/E23824_01/html/821-1453/ipv6-troubleshoot-2.html
5. http://searchsecurity.techtarget.com/tip/Get-ready-for-IPv6-Five-security-issues-to-consider

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# PROGRAMME ELECTIVE COURSES
# (PEC)

**19ITE01** **C# AND .NET FRAMEWORK** **L T P C**
**3 0 0 3**

**COURSE OBJECTIVES**

1. To discuss the concepts of NET Framework and C#language
2. To Design and develop real-time applications using object oriented concepts in C#
3. To Design and develop real-time applications using .NET
4. To Design and develop windows and web based applications usingC#
5. To Develop C# programs for Multithreading and databaseapplications

**COURSE OUTCOMES**

1. Discuss the concepts of NET Framework and C#language
2. Design and develop real-time applications using object oriented concepts inC#
3. Design and develop real-time applications using.NET
4. Develop the web based applications using ADO.NET in C#
5. Implement the network application by using .Net framework.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE01.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE01.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE01.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE01.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE01.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

**UNIT-I INTRODUCTION TO C#** 9

Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations.

**UNIT-II OBJECT ORIENTED ASPECTS OF C#** 9

Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.

**UNIT-III APPLICATION DEVELOPMENT ON .NET** 9

Windows Applications: Basic windows controls. Advanced controls, multi window applications, Accessing Data with ADO.NET: Connections, Data Adapters, Datasets, Data Application, Working with relational databases, multiple tables in a single dataset, Data views, Data Binding, Complex Binding, Navigating through datasets using bound controls.

**UNIT -IV WEB BASED APPLICATION DEVELOPMENT ON .NET** 9

Programming Web Applications with Web Forms, web server controls, Programming Web Services.

**UNIT –V THE CLR AND THE NET FRAMEWORK** 9

Assemblies, Versioning, Attributes, Reflection, Viewing Metadata, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using Single Call, Threads.

**TOTAL HOURS:45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | E. Balagurusamy | Programming in C# | Tata McGraw-Hill | 2004 |
| 2. | J. Liberty | Programming C# | O'Reilly | 2002 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Herbert Schildt | The Complete Reference: C# | Tata McGraw-Hill | 2004 |
| 2. | Robinson et al | Professional C# | Wrox Press | 2002 |
| 3. | Andrew Troelsen | C# and the .NET Platform | A1 Press | 2003 |
| 4. | Thamarai Selvi, R. Murugesan | A Textbook on C# | Pearson Education | 2003 |
| 5. | Karli Watson, Christian Nagel,Jacob Hammer Pedersen,Jon Reid, Morgan Skinner | Beginning Viual C# 2010 | Wiley India Pvt.Ltd | 2010 |

**WEB URLs**

1. www.tutorialspoint.com/net_framework_online_training/index.asp
2. www.csharp.net-tutorials.com/basics/visual-csharp-express/
3. www.lynda.com/C-sharp-training-tutorials/1022-0.html.
4. www.learncs.org\
5. www.msdn.microsoft.com/en-us/library/aa288436(v=vs.71).aspx

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| 19ITE02 | SOFTWARE PROJECT MANAGEMENT | L T P C<br>3 0 0 3 |
|---|---|---|

## COURSE OBJECTIVES

1. To highlight different techniques for software cost estimation
2. To plan and monitor projects for the risk management
3. To explore the process of monitoring and controlling
4. To manage people and organization of teams
5. To estimate the cost associated with a project

## COURSE OUTCOMES

1. Able to practice the process of project management and its application in delivering successful projects
2. Evaluate the risks and hazards in the project management
3. Apply cost monitoring and control strategies for software projects
4. Identify desirable characteristics of effective project managers and manage the organizational behavior of people working in teams
5. Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE02.CO1 | X | X | X | X | - | - | - | - | X | - | X | X | X | - | - | - |
| 19ITE02.CO2 | X | X | X | X | - | - | - | - | X | - | X | X | X | - | - | - |
| 19ITE02.CO3 | X | X | X | X | - | - | - | - | X | - | X | X | X | - | - | - |
| 19ITE02.CO4 | X | X | X | X | - | - | - | - | X | - | X | X | X | - | - | - |
| 19ITE02.CO5 | X | X | X | X | - | - | - | - | X | - | X | X | X | - | - | - |

## UNIT I INTRODUCTION AND PROJECT EVALUATION 9

Project Definition – Importance of Software Project Management – Contract Management – Activities covered by Software Project Management – Setting objectives – Stakeholders - Management Control – Overview of Project Planning – Stepwise Project Planning – Project evaluation - Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques

## UNIT II ACTIVITY PLANNING AND RISK MANAGEMENT 9

Objectives – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Critical path (CRM) method – Activity Float – Shortening the Project Duration
– Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis

## UNIT III PROJECT MANAGEMENT AND CONTROL 9

Introduction – Creating the Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types of Contract – Stages in Contract Placement – Typical Terms of a Contract – Contract Management – Acceptance

## UNIT IV MANAGING PEOPLE AND ORGANIZING TEAMS 9

Introduction – Understanding Behavior – Organizational Behavior – Selecting the Right Person for the Job
–Instruction in the Best Methods – Motivation – The Oldham Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health And Safet

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**UNIT V SOFTWAREEFFORT ESTIMATION**

Introduction – The basics for software estimation – Software effort estimation techniques – Expertjudgment –Estimating by analogy – Albrecht function point analysis –Function points Mark II – COSMIC Full function points - COCOMO: A Parametric Productivity Model.

**TOTAL HOURS: 45**

**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Bob Hughes, Mike Cotterell | Software Project Management | Tata McGraw Hill, Fifth Edition | 2011 |
| 2. | Robert K. Wysocki | Effective Software Project Management | Wiley Publication | 2011 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Adolfo Villafiorita | Introduction to Software Project Management | CRC Press | 2014 |
| 2. | Jalote | Software Project Management in Practice | Pearson Education | 2010 |
| 3. | Murali k. chemuturi, Thomas m cagly | Mastering software project management- best practices tools and Techniques | j ross Publication | 2010 |
| 4. | Richard E. Fairly | Managing and Leading Software projects | Weilly and sons | 2009 |
| 5. | Ramesh, Gopalaswamy | Managing Global Projects | Tata McGraw Hill | 2001 |

**WEB URLs**

1. www.cs.ox.ac.uk/people/michael.wooldridge/teaching/soft-eng/lect05.pdf
2. www.at-web1.comp.glam.ac.uk/staff/dwfarthi/projman.html
3. www.tutorialspoint.com/management_concepts/project_management_softwares.htm
4. www.projectmanagement.com/wikis/233034/Cost-Benefit-Analysis
5. www.abebooks.com/book-search/kw/software-project-management-5th-edition-bob-hughes-mike- cotterell/

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**19ITE03** **SALESFORCE CRM AND PLATFORM** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To learn the basics of Salesforce as a CRM and a Platform
2. To learn the administrative and configurable capabilities of Salesforce
3. To write business logic customizations using Apex triggers and classes customized using SOQL and DML
4. To describe how trigger code works within the basics of the Save Order of Execution and transactions
5. To write Visualforce markup code to customize the user interface

## COURSE OUTCOMES

The students will be able to:

1. Understand the basics of Salesforce platform
2. Leverage configurable aspects of Salesforce for business process automation
3. Understand Apex Programming and Visual force
4. Develop Apex program with SOQL & DML
5. Testing and Execution of triggers in Apex

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE03.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE03.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE03.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE03.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE03.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |

## UNIT I INTRODUCTION TO SALESFORCE 9

Salesforce Overview - Architecture – Environment - Sales Cloud - Service Cloud - Navigating Setup Salesforce Objects - Standard Objects - Custom Objects & Fields - Field Types - Master Detail - Lookup Relationship - Schema Builder - Global Search.Standard UI Configuration - Page Layouts - Record Types - Record Type Based Picklist Values. Process Automation - Validation Rules, Workflow Rules and Actions - Process Builder - Approval Process. Salesforce Security Model - Role Hierarchy - Profiles and Permission Sets - Access Controls - Object and Field Level Security - Record Level Security - Org Wide Defaults - Record Ownership - Sharing Rules.

## UNIT II SALESFORCE CRM FUNCTIONALITY 9

CRM Basics : Introduction to CRM - Sales Objects - Service Objects. Sales Process: Lead - Web-to-Lead - Lead Conversion - Opportunities - Accounts & Contacts – Products. Service Process: Case, Email-to-Case, Web-to-Case. Automation Rules: Lead/Case Assignment Rules - Escalation Rules - Merge Records - Duplication Rules.

## UNIT III APEX PROGRAMMING BASICS 9

Programming with Apex: Introduction to Apex - Statements & Collections - Introduction to Apex Classes. SOQL: Syntax, SOQL in Apex, Dynamic SOQL. Query using relationships: Relationship name, child-to-parent relationship – parent-to- child relationship.DML essentials: DML operations with Apex - Transaction Controls - DML errors.

## UNIT IV APEX PROGRAMMING DEVELOPMENT 9

Apex Trigger Essentials: Introduction - Trigger Events - Syntax - Trigger context variables. Apex Class Implementation: Implement Business Logic in Apex class - Trigger Handlers and Controllers - Best Practices (Bulkification, No DML & queries inside loops) - Apex Test Classes. Advanced Apex: Asynchronous Apex - Apex Scheduler - Batch Apex - Future methods - Queueable Apex API Callouts - Apex Web Services - Standard APIs. Transactions: Lifecycle of a transaction – Memory life cycle for static variable - Salesforce order of Execution - Execution Governor Limits. Development Tools: Developer Console - Debug Logs - Eclipse & Force.com IDE - Visual Studio – Workbench

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**UNIT V VISUALFORCE DEVELOPMENT** 9

Visualforce: Introduction – Creating Visualforce pages – Important Visualforce Tags - Exploring the View and Controller layers of Visualforce – Standard Controller – Display data from a record in a Visualforce page – Display related data – Invoke standard controller actions– Using standard list controller in a Visualforce page – Using custom controllers and extensions – Security concerns.

**TOTAL PERIODS: 45**

**REFERENCE BOOK**

| SI.NO | Author(s) | Title of the Book | Publisher | Year of Publications |
|---|---|---|---|---|
| 1. | Paul Goodey, - Fourth Edition, | Salesforce CRM - The Definitive Admin Handbook | 4th Revised edition Edition, PACKT enterprises, Kindle edition | 2016 |
| 2. | Matt Kaufmann and Michael Wicherski | Learning Apex Programming | PACKT enterprises, Kindle edition | 2015 |
| 3. | David Taber | Salesforce.com Secrets of Success: Best Practices for Growth and Profitability | 2nd Edition, Prentice Hall | 2013 |
| 4. | Keir Bowden | Visualforce Development Cookbook | PACKT enterprises, Kindle edition | 2016 |

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**19ITE04** **SALESFORCE CRM AND PLATFORM LABORATORY** **L T P C**
**0 0 2 1**

## COURSE OBJECTIVES

1. To learn the basics of Salesforce as a CRM and a Platform
2. To learn the administrative and configurable capabilities of Salesforce
3. To write business logic customizations using Apex triggers and classes customized using SOQL and DML
4. To describe how trigger code works within the basics of the Save Order of Execution and transactions
5. To write Visualforce markup code to customize the user interface

## COURSE OUTCOMES

The students will be able to:

1. Understand the basics of Salesforce platform
2. Leverage configurable aspects of Salesforce for business process automation
3. Understand Apex Programming and Visual force
4. Develop Apex program with SOQL & DML
5. Testing and Execution of triggers in Apex

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE04.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE04.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE04.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE04.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE04.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |

## LIST OF EXPERIMENTS

1. Salesforce Basics
2. Salesforce Platform Basics
3. Platform Development Basics
4. Developer Console Basics
5. Apex Basics for Admin
6. Object Oriented Programming for Admin
7. Apex Triggers
8. SOQL Database .Net Basics
9. Visual force Basics
10. Build a Conference Management Application
11. Development an Account Geolocation Application
12. Transform SQL Queries to SOQL Queries

**TOTAL HOURS: 30**

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**19ITE05** **AWS ACADEMY CLOUD DEVELOPING** **L T P C**
**3 0 0 3**

**COURSE OBJECTIVES**

1. Recall cloud computing services and models.
2. Configure AWS Identity and Access Management for programmatic access.
3. To Develop containers with AWS Lambda
4. Assess solutions with Amazon API Gateway.
5. Identify best practice for building secure applications and deploying applications.

**COURSE OUTCOMES**

1. Create on AWS.
2. Develop AWS Identity and Access Management for programmatic access.
3. Implement Container with AWS Lambda.
4. Organize solutions with Amazon API Gateway.
5. Build secure applications and deploying applications.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 | PSO 4 |
| 19ITE05.CO 1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE05.CO 2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE05.CO 3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE05.CO 4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE05.CO 5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |

**Unit I : Introduction to Developing on AWS** 9

Course Prerequisites, objectives and overview, AWS Training Portal, Lab Environment, AWS Free Tier, AWS Educate, Systems Development Lifecycle, Steps to Get Started Developing on AWS, Working with AWS SDKs, Errors and Exceptions, Introduction to AWS X-Ray, Introduction to Amazon CloudWatch and AWS CloudTrail, IAM - Shared Responsibility Model, Overview of IAM, Authentication with IAM, Authorization with IAM.

**Unit II : Developing Storage Solutions with Amazon S3** 9

Introduction to Amazon S3, Creating Amazon S3 Buckets, Working with Amazon S3 Objects, Protecting Data and Managing Access to Amazon S3 Resources. Developing NoSQL Solutions with Amazon DynamoDB - Introduction to Amazon DynamoDB, Amazon DynamoDB Key Concepts, Partitions and Data Distribution, Secondary Indexes, Read/Write Throughput, Streams and Global Tables, Backup and Restore, Basic Operations for Amazon DynamoDB Tables. Caching Information for Scalability - Caching Overview, Caching with Amazon CloudFront, Caching with Amazon ElastiCache, Caching Strategies.

**Unit III : Introduction to Containers with AWS Lambda** 9

Introduction to Containers, Containers vs. Hardware Virtualization, Microservices – Use Case for Containers, Amazon Container Services. Developing Solutions with Amazon SQS and Amazon SNS - Introduction to Message Queues, Introduction to Amazon SQS, Amazon SQS Developer Concepts, Introduction to Amazon SNS, Amazon SNS Developer Concepts, Introduction to Amazon MQ. Developing Event – Driven solutions with AWS Lambda - Introduction to Serverless Computing with AWS Lambda, Overview of AWS Lambda, Execution Models for Invoking Lambda Functions, AWS Lambda Permissions, Overview of Authoring and Configuring Lambda Functions, Overview of Deploying Lambda Functions.

**Unit IV : Developing Solutions with Amazon API Gateway** 9

Application Programming Interfaces, Amazon API Gateway, Creating a RESTful API, Controlling Access to a RESTful API, Testing a RESTful API, Deploying a RESTful API, Invoking a RESTful API, Monitoring a RESTful API. Developing solutions with AWS step functions - Workflow Coordination in Distributed Applications, Introduction to AWS Step Functions, State Types, AWS Step Functions Use Case, AWS Step Functions API. Developing secure application on AWS - Secure Network Connections, Manage Application Secrets, Authenticate with AWS Security Token Service, Authenticate with Amazon Cognito.

**Unit V : Deploying Applications on AWS** 9

Introducing DevOps Using AWS code services for CI/CD, Introducing Deployment and Testing Strategies, Developing Applications with AWS Elastic Beanstalk, Deploy applications AWS CloudFormation, Deploying Serverless applications AWS SAM.

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**19ITE06** **AWS ACADEMY CLOUD DEVELOPING LAB** **L T P C**
**0 0 2 1**

**COURSE OBJECTIVES**

1. To Understand and study AWS Documentation and AWS Cloud9
2. To create an IAM User and IAM Group
3. To develop Amazon S3 and AWS Lambda and Amazon API Gateway
4. To perform an activity RCUs and WCUs
5. To demonstrate AWS Lambda with API Gateway.

**COURSE OUTCOMES**

1. Generate AWS Cloud9
2. Implement IAM user and Group
3. Developing Amazon S3 and AWS Lambda and Amazon API Gateway
4. Able to implement Docker Container.
5. Demonstrate AWS Lambda with API Gateway.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 | PSO 4 |
| 19ITE06.CO 1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE06.CO 2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE06.CO 3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE06.CO 4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE06.CO 5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |

**LIST OF PROGRAMS**

1. Activity - AWS Documentation Scavenger Hunt
2. Introduction to AWS Cloud9
   Educator Demo - AWS Cloud9
3. Educator Demo - Create an IAM User and IAM Group
4. Developing with Amazon S3 using the AWS SDK
   Activity - Calculate Read Capacity Units (RCUs)
   Activity - Calculate Write Capacity Units (WCUs)
5. Working with Docker Containers
6. Developing with AWS Lambda and Amazon API Gateway using the AWS SDK
7. Sandbox

**Total Hours :45**

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**19ITE07** **AWS ACADEMY CLOUD ARCHITECTING**

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**Course Objectives**

1. Illustrate how cloud adoption transforms the way IT systems work.
2. Identify the benefits of Infrastructure as Code.
3. Summarize database services for storing and deploying web-accessible applications.
4. Describe how the AWS Well-Architected Framework improves cloud-based architectures.
5. Evaluate the most important performance metrics for applications

**Course Outcomes**

1. Implement IT related work and access Amazon Web Services
2. Develop code
3. Construct real time database application using current techniques
4. Populate Cloud based architectures
5. Design real time application with performance metrics.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE07.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE07.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE07.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE07.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE07.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |

**Unit I : Welcome to AWS Academy Cloud Architecting** 9

Course Prerequisites, Objectives, Overview, Creating AWS Training Portal Account, Accessing Course Materials. Designing Environment - Choosing a Region, Selecting Availability Zones, Virtual Private Cloud (VPC), Dividing VPCs and Subnets, Default VPCs and Default Subnets, Controlling VPC Traffic, Connecting Multiple VPCs, Integrating On-premises Components, VPC Best Practices. Designing for High Availabilty I - Load Balancing and Fault Tolerance, High Availability Across Regions, Connections Outside of Amazon VPC.

**Unit II : Designing for High Availability II and Infrastructure** 9

Designing for High Availabilty II - Best Practice – Scalability, Determining if Scaling is Needed, Automatic Scaling, Scaling Data Stores, AWS Lambda and Event Driven Scaling. Automating Infrastructure - Manual Environment Configuration, Infrastructure as code on AWS, Grouping resources in a template, Resources not supported by AWS CloudFormation. Decoupling Infrastructure - Loose Coupling, Loose Coupling Strategies, Communicating Easily and Reliably Among Components, Communicating with Loose Coupling and Amazon DynamoDB, Amazon API Gateway, Serverless Architectures, Decoupling Examples

**Unit III : Designing Web-Scale Media and Architected Framework** 9

Storing Web-Accessible Content with Amazon S3, Caching with Amazon Cloud Front, Managing NoSQL Databases, Storing Relational Data in Amazon RDS. Architected Framework - Introduction to the Well-Architected Framework, Pillars of the Well-Architected Framework, Well-Architected Design Principles. Operational Excellence - Principles of the Operational Excellence Pillar, Drive Operational Excellence, Operational Excellence Pillar Questions

**Unit IV : Well-Architected Pillars : Security, Reliability, Performance Efficiency** 9

Security - Principles of the Security Pillar, Preventing Common Security Exploits, Securing Data in Cloud Front, Encrypting Data, Authentication. Reliability - Principles of the Reliability Pillar, Making Infrastructure More Reliable, Reliability Pillar Questions. Performance Efficiency - Principles of the Performance Efficiency Pillar, Infrastructure Efficiency Improvements, Performance Efficiency Pillar Questions and Best Practice.

**Unit V : Well-Architected Pillars : Cost Optimization, Troubleshooting, Design Patterns and Sample Architectures** 9

Cost Optimization - Principles of the Cost Optimization Pillar, Optimizing the Cost of Infrastructure, Dedicated Instances and Dedicated Hosts, Trusted Advisor, Optimizing Costs with Caching, AWS Cost Calculation Tools, Cost Optimization Questions. Troubleshooting - Troubleshooting Steps, AWS Support Options. Design Patterns - High-Availability Design Patterns, Stream Processing Example, Sensor Network Data Ingestion and Processing Example, Application Backend Example, Transcoding and Serving Video Files Example.

**19ITE08** **AWS ACADEMY CLOUD ARCHITECTING LAB** **L T P C**
**0 0 2 1**

**COURSE OBJECTIVES:**

1.Formulate Auto scaling with AWS Lambda.

2.To Summarize AWS Cloud formation.

3.To decouple the infrastructure.

4.To implement Serverless Architecture and Amazon CloudFront

5.To Develop Amazon Route 53 and sandbox

**COURSE OUTCOMES:**

1. Develop Auto scaling with AWS Lambda.

2. Deploy AWS Cloud formation.

3. Decoupling the infrastructure.

4.To implement Serverless Architecture and Amazon CloudFront

5.Construct Amazon Route 53 and sandbox

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE08.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE08.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE08.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE08.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE08.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |

**LIST OF PROGRAMS**

1.Making Environment Highly Available

2.Using Auto Scaling with AWS Lambda

3.Automating Infrastructure Deployment with AWS Cloud Formation

4.Decoupling Infrastructure

5.Implementing a Serverless Architecture with AWS Managed Services

6.Introduction to Amazon CloudFront

7.Multi-Region Failover With Amazon Route 53

8.Sandbox

**Total Hours : 30**

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**19ITE09** **AWS ACADEMY CLOUD FOUNDATIONS**

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 1 |

**COURSE OBJECTIVES:**

1. Describe three cloud deployment models, and Overview of AWS Global infrastructure.
2. Understand the different AWS core services.
3. Formulate virtual firewalls with security groups.
4. Review the availability differences of alternative database solutions.
5. Summarize the AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

**COURSE OUTCOMES:**

1. Construct three cloud deployment models, and Overview of AWS Global infrastructure.
2. Implement the different AWS compute services.
3. Create virtual firewalls with security groups.
4. Construct the availability of different alternative database solutions.
5. Implement AWS Shared Responsibility Model, Examine IAM users, groups, and roles.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE09.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE09.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE09.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE09.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE09.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |

**Unit I : Cloud Concepts** **6**

Cloud Concepts Overview - Introduction to Cloud Computing, Advantages of Cloud Computing, Introduction to Amazon Web Services (AWS), AWS Cloud Adoption Framework (CAF). Cloud Economics - Fundamentals of Pricing, Total Cost of Ownership, AWS Global Infrastructure Overview - AWS Global Infrastructure, AWS Service and Service Category Overview.

**Unit II : AWS Core Services** **6**

Compute - Compute Services Overview, Introduction to Amazon Elastic Compute Cloud (EC2), Amazon EC2 Cost Optimization, Introduction to AWS Lambda, Introduction to AWS Elastic Beanstalk. Storage - Amazon Elastic Block Store (EBS), Amazon Simple Storage Service (S3), Amazon Elastic File System (EFS), Amazon Glacier. VPC - Amazon Virtual Private Cloud (VPC), Amazon VPC Security Groups, Amazon CloudFront,. Database - Amazon Relational Database Service (RDS), Amazon DynamoDB, Amazon Redshift, Amazon Aurora. Balancing, Scaling, Monitoring - Elastic Load Balancing (ELB), Amazon CloudWatch, Auto Scaling.

**Unit III : Cloud Security** **6**

AWS Shared Responsibility Model, AWS Identity and Access Management (IAM), AWS Trusted Advisor, AWS CloudTrail, AWS Config, AWS Day One Best Practice Review, AWS Security and Compliance Programs, AWS Security Resources.

**Unit IV : Cloud Architecting** **6**

Introduction to the Well-Architected Framework, Well-Architected Design Principles, Understanding Reliability and High Availability.

**Unit V : Cloud Support** **6**

Introduction to AWS Organizations, AWS Cost Explorer, Overview of AWS Technical Support Plans and Costs.

**Total Hours: 30**

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| 19ITE10 | AWS ACADEMY CLOUD FOUNDATION LAB | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

**COURSE OBJECTIVES:**

1.To understand and study Amazon EC2

2. To work with EBS.

3.To build VPC, web server and DB server

4.To build the DB Server.

5.To construct scale and load balance of cloud architecture.

**COURSE OUTCOMES:**

1.Construct Amazon EC2

2.Working with EBS

3.Develop VPC, web server and DB server

4.Build the DB Server.

5.Implement scale and load balance of cloud architecture.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE10.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE10.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE10.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE10.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE10.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | X | - |

**LIST OF PROGRAMS**

1. Introduction to Amazon EC2
2. Working with EBS
3. Build VPC and Launch a Web Server
4. Build DB Server and Interact with DB Using an App
5. Scale and Load Balance Architecture
6. Introduction to AWS IAM
7. Sandbox.

**Total Hours : 30**

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**19ITE11** **SEMANTIC WEB** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To learn Web Intelligence
2. To learn Knowledge Representation for the Semantic Web
3. To learn Ontology Engineering
4. To learn Semantic Web Applications, Services and Technology
5. To learn Social Network Analysis and semantic web

## COURSE OUTCOMES

1. Understand the concept structure of the semantic web technology and how this technology revolutionizes the World Wide Web.
2. Understand the concepts of Web Science, semantics of knowledge and resource, ontology.
3. Describe logic semantics and inference with OWL.
4. Use ontology engineering approaches in semantic applications
5. To perform social network k analysis for different applications

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE11.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE11.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE11.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE11.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE11.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

**UNIT –I: Web Intelligence:** 9

Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

**UNIT -II: Knowledge Representation for the Semantic Web:** 9

Ontologies and their role in the semantic web,Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

**UNIT-III: Ontology Engineering:** 9

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

**UNIT-IV: Semantic Web Applications, Services and Technology:** 9

Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.

**UNIT-V: Semantic Patterns and Tools, Challenges and Opportunities:** 9

Patterns in Software Design, Pattern Frame, Semantic Patterns, Semantic Tools, Semantic Web Services Tools, Semantic Doubts, Semantic Opportunities and Challenges.

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1 | Berners Lee, Godel and Turing | Thinking on the Web | Wiley inter science | 2008 |

**REFERENCE BOOKS:**

| Sl. No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | J. Davies, R. Studer, P. Warren, John Wiley & Sons | Semantic Web Technologies, Trends and Research in Ontology Based Systems | Wiley inter science | 2006 |
| 2 | Liyang Lu Chapman | Information sharing on the semantic Web | CRC Publishers, (Taylor & Francis Group) | 2006 |

**WEB URLs**

1. https://www.cambridgesemantics.com/blog/semantic-university/intro-semantic-web/
2. https://semantic-web.com/
3. https://www.w3.org/2001/sw/
4. https://www.w3.org/standards/semanticweb/
5. https://ontotext.com/documents/SemTech-intro.pdf

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**19ITE12** **NETWORK PROGRAMMING AND MANAGEMENT** **L T P C**
**3 0 0 3**

**COURSE OBJECTIVES**

1. To Explain socket programming to design client server environment
2. To understand the basics of socket programming using TCP and UDP Sockets
3. To analyze the socket options and Internet protocol interoperability
4. To develop macros for including objects in MIB structure.
5. T o Understand SNMPv1, v2 and v3 protocols & practical issues

**COURSE OUTCOMES**

1. Apply socket structure and functions to client server applications
2. Design applications using TCP and UDP sockets
3. Implement socket options and advanced sockets to applications
4. Compare number of variations of the network management architecture
5. Configure and manage network services and network architecture

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE12.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE12.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE12.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE12.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE12.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

**UNIT I SOCKET STRUCTURE AND FUNCTIONS** **9**

Introduction to Socket Programming - OSI Layer and Services - Overview of TCP/IP Protocols - Socket Introduction - Socket address Structures - Value - Result Arguments - Byte Ordering Functions Byte Manipulation Functions - Elementary TCP sockets - Socket, connect, bind, listen, accept, fork and exec functions, concurrent servers - Close function

**UNIT II TCP AND UDP SOCKETS** **9**

TCP Echo Server - TCP Echo Client - Posix Signal handling - TCP Echo server functions - Normal startup -terminate and signal handling server process termination - Crashing and Rebooting of server host - shutdown of server host - I/O multiplexing - I/O Models - select function - shutdown function - pselect function - poll function- Multiplexing TCP Sockets - TCP socket options - Elementary UDP sockets - UDP echo Server - UDP echo Client - Multiplexing UDP sockets

**UNIT III SOCKET OPTIONS AND ADVANCED SOCKETS** **9**

Socket options - getsocket and setsocket functions - generic socket options - IP socket options - ICMP socket options - Domain name system - gethostbyname function - gethostbyadr function -getservbyname and getservbyport functions Ipv4 and Ipv6 interoperability - threaded servers - thread creation and termination - Mutex - condition variables - raw sockets - raw socket creation - raw socket output - raw socket input - ping program - trace route program

**UNIT IV SIMPLE NETWORK MANAGEMENT** **9**

SNMP network management concepts - SNMPv1 - Management information - MIB Structure - Object syntax - Standard MIBs - MIB-II Groups - SNMPv1 protocol and Practical issues

**UNIT V SNMP ENHANCED FEATURES AND RMON** **9**

Introduction to SNMPv2 - SMI for SNMPV2 - Protocol - SNMPv3 - Architecture and Applications - Security and access control model - Overview of RMON

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | W. Richard Stevens, Bill Fenner Andrew M. Rudoff | Unix Network Programming Vol-I | Pearson Education | 2015 |
| 2. | Mani Subramaniam | Network Management: Principles and Practice | PHI | 2012 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | D.E. Comer, David L. Stevens | Internetworking with TCP/IP Vol- III | Pearson Education | 2015 |
| 2. | Brijendra Singh | Network Security and Management | PHI | 2012 |
| 3. | William Stallings | SNMP, SNMPv2, SNMPv3 and RMON 1 and 2 | Pearson Education | 2011 |
| 4. | W. Richard Stevens | Unix Network Programming Vol-II | Pearson Education | 2015 |
| 5. | Andrew S. Tanenbaum, David J. Wetherall | Computer Networks | Pearson Education | 2013 |

**WEB URLs**

1. www.tutorialspoint.com/unix_sockets/
2. www.csd.uoc.gr/~hy556/material/tutorials/cs556-3rd-tutorial.pdf
3. www.codeproject.com › General Programming › Internet / Network
4. www.cs.rpi.edu/~moorthy/Courses/os98/Pgms/socket.html
5. www.cisco.com/networkers/nw04/presos/docs/NMS-1N01.pdf

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**19ITE13** **BUSINESS INTELLIGENCE** **L T P C**
**3 0 0 3**

**COURSE OBJECTIVES**

1. To understand the business intelligence architectures.
2. T o develop a foundation in Business Intelligence (BI) for Business Analysis through knowledge delivery.
3. T o understand the different aspects of the BI environment, and data envelopment analysis.
4. To implementation methodology and project life cycle business intelligence
5. To understand the management and future of business intelligence

**COURSE OUTCOMES**

1. Explain about business intelligence architectures.
2. Summarize various knowledge delivery methods
3. Summarize data envelopment analysis
4. Implement the business intelligent system for real time application.
5. Explain the management and future of business intelligent system.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE13.CO1 | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - | - |
| 19ITE13.CO2 | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - | - |
| 19IT E13.CO3 | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - | - |
| 19ITE13.CO4 | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - | - |
| 19ITE13.CO5 | X | X | X | X | - | - | - | - | - | X | X | X | X | - | - | - |

## UNIT I BUSINESS INTELLIGENCE 9

Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business Intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.

## UNIT II KNOWLEDGE DELIVERY 9

The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.

## UNIT III DATA ENVELOPMENT ANALYSIS 9

Efficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models.

## UNIT IV BUSINESS INTELLIGENCE IMPLEMENTATION: INTEGRATION AND EMERGING TRENDS 9

Implementing BI – Overview – BI and Integration Implementation – Connecting BI System to Database and other Enterprise Systems – On-Demand BI – Issues of Legality, Privacy, and Ethics –Emerging Topics in BI – The Rise of Collaborative Decision Making

## UNIT V MANAGEMENT AND FUTURE OF BUSINESS INTELLIGENCE 9

Development of BI - Business Intelligence System - Reporting system - Data Warehouse - Data Mart- Knowledge Management Systems - Discussion and Case Study – The Future of Business Intelligence.

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| Sl .No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | David Loshin Morgan, Kaufman | Business Intelligence: TheSavy Managers Guide | Wiley Publications | 2012 |
| 2. | Efraim Turban, Ramesh Sharda, Jay E.Aronson, David King | Business Intelligence: A Managerial Approach | Pearson Education | 2011 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Efraim Turban, Ramesh Sharda, Dursun Delen, | Decision Support and Business Intelligence Systems | Pearson | 2013 |
| 2. | Rajiv Sabherwal, Irma Becerra- Fernandez | Business Intelligence Practices, Technologies, and Management | Wiley | 2011 |
| 3. | Carlo Vercellis | Business Intelligence: Data Mining and Optimization for Decision Making | Wiley Publications | 2009 |

**WEB URLs**

1. www.nptel.ac.in/courses/110106050/
2. www.dea-analysis.com/
3. www.youtube.com/watch?v=SE7IpYJ77Dg
4. www.nptel.ac.in/courses/106106093/31
5. www.youtube.com/watch?v=-GKpYTLRFbQ

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**19ITE14** **WIRELESS SENSOR NETWORKS** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To understand basic sensor network concepts
2. To know physical layer issues, medium Access control Protocols
3. To comprehend network layer characteristics and protocols and transport layer issues and protocols
4. To understand the network management in Wireless sensor network.
5. To understand the Middleware services

## COURSE OUTCOMES

1. Explain the basic concepts of wireless sensor networks.
2. Describe the structure physical and medium access layer of wireless sensor networks.
3. Apply structure of network and transport layer in wireless sensor networks (WSN) to various application areas.
4. Implement and manage the Wireless Sensor Network.
5. Implement the middleware for Wireless Sensor Network.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE14.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |
| 19ITE14.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |
| 19ITE14.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |
| 19ITE14.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |
| 19ITE14.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |

## UNIT I - INTRODUCTION 9

Introduction to wireless sensor networks - Challenges and Constraints - Application of sensor networks - Node architecture - Operating System - Fundamental aspects.

## UNIT II - PHYSICAL LAYER AND MEDIUM ACCESS LAYER 9

Basic architectural framework – Physical layer – source encoding –channel encoding – modulation – medium access control- Wireless MAC protocols – Characteristics of MAC protocols in sensor networks – Contention free MAC protocols - traffic adaptive medium access - Low-Energy Adaptive Clustering Hierarchy – Contention based protocols - Power Aware Multi-Access with Signaling - Data-Gathering MAC - Receiver-Initiated MAC.

## UNIT III - NETWORK LAYER AND TRANSPORT LAYER 9

Routing metrics – Data centric Routing - Proactive routing – OLSR – Reactive Routing – AODV – Location Based Routing - Traditional Transport Control Protocols - TCP (RFC 793) - UDP (RFC 768) - Mobile IP - Feasibility of Using TCP or UDP for WSNs - Transport Protocol Design Issues – Examples of Existing Transport Control Protocols- CODA (Congestion Detection and Avoidance).

## UNIT IV – NETWORK MANAGEMENT 9

Power Management - Local Power Management Aspects - Processor Subsystem - Communication Subsystem - Active Memory - Power Subsystem- Dynamic Power Management - Dynamic Operation Modes - Time Synchronization – Clocks and the Synchronization Problem - Time Synchronization in Wireless Sensor Networks- Reasons for Time Synchronization - Challenges for Time Synchronization - Basics of Time Synchronization - Synchronization Messages Non determinism of Communication Latency -Time Synchronization Protocols Lightweight Tree-Based Synchronization - Timing-sync Protocol for Sensor Networks Localization -Ranging Techniques -Time of Arrival - Time Difference of Arrival - Angle of Arrival - Received Signal Strength - Range- Based Localization - Triangulation -Range-Free Localization - Ad Hoc Positioning System (APS) .

## UNIT V-MIDDLEWARE FOR WIRELESSSENSOR NETWORKS 9

Introduction -WSN Middleware Principles - Middleware Architecture – Data Related Functions, Architectures – Case study - MiLAN (Middleware Linking Applications and Networks) - IrisNet (Internet-Scale Resource-Intensive Sensor Networks Service

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Dr.Xerenium, Shen, Dr. Yi Pan | Fundamentals of Wireless Sensor Networks, Theory and Practice | Wiley Series | 2010 |
| 2. | H. Karl and A. Willig | Protocols and Architectures for Wireless Sensor Networks | John Wiley & Sons | 2005 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1 | Kazem Sohraby, Daniel Manoli | Wireless Sensor networks-Technology, Protocols and Applications | Wiley Inter Science Publications | 2007 |
| 2 | Bhaskar Krishnamachari | Networking Wireless Sensors | Cambridge university press | 2005. |
| 3 | C. S. Raghavendra, K. M. Sivalingam, and T. | Wireless Sensor Networks | John Wiley & Sons | 2007 |
| 4 | N.P. Mahalik | Sensor Networks and Configuration: Fundamentals, Standards, Platforms, and | Springer | 2006 |

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**19ITE15** **INFORMATION RETRIEVAL TECHNIQUES** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To know about Information retrieval system strategies.
2. To learn Web Search Engine and Compare various types of retrieval utilities.
3. To know about Information Retrieval modeling techniques
4. To Identify various web based information retrieval techniques using modern tools.
5. To understand information retrieval techniques in XML retrieval and multimedia

## COURSE OUTCOMES

1. Explain the factors which optimize the information retrieval process
2. Understand web based information retrieval techniques
3. Identify the techniques of Information Retrieval modeling
4. Apply parallel information retrieval models and distributed information retrieval models in real time problem.
5. Summarize various steps involved in XML and multimedia information retrieval techniques

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE15.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE15.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE15.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE15.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE15.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |

## UNIT I INTRODUCTION 9

Introduction - History of IR- The IR problem – Software Architectures of the IR system – The retrieval and ranking processes – Open source Search engine Frameworks - The impact of the web on IR - The role of artificial intelligence (AI) in IR – IR Versus Web Search - Components of a Search engine- Characterizing the web.

## UNIT II WEB RETRIEVAL AND WEB CRAWLING 9

Web retrieval – Introduction – The web – search engine architectures – search engine ranking – managing web data – search engine user interaction – browsing – Web crawling – Introduction – Applications of web crawler – Architecture and implementation

## UNIT III INFORMATION RETRIEVAL MODELING 9

IR Models-Modeling and Ranking - A Taxonomy of IR Models - Classic Information Retrieval -The Boolean Model – TF - IDF Weights - Document Length Normalization - The Vector Model- The Probabilistic Model - Alternative Set Theoretic Models - Set-Based Model - Extended Boolean Model-Fuzzy Set Model - Alternative Algebraic Models - Generalized Vector Space Model - Latent Semantic Indexing Model - Neural Network Model - Alternative Probabilistic Models - BM25 - Language Models - Divergence from Randomness – Bayesian Network Models

## UNIT IV PARALLEL AND DISTRIBUTED INFORMATION RETRIEVAL 9

Distributed Information Retrieval – Introduction – A taxonomy of Distributed IR systems – Theoretical Model – Data partitioning – Parallel IR – Introduction – Parallel Indexing – Clustering and Classification – Parallel Systems – Parallel IR on MIMD architectures – parallel IR on SIMD architectures – Cluster based IR – Retrieval in peer to peer networks.

## UNIT V XML RETRIEVAL AND MULTIMEDIA INFORMATION RETRIEVAL 9

XML Retrieval – Introduction – XML retrieval evaluation – Query Languages – Multimedia Information Retrieval –The challenges – Content based image retrieval – Audio and Music retrieval – Retrieving and browsing video.

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**TOTAL HOURS:45**

**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Ricardo Baeza -Yates and Berthier Ribeiro - Neto | Modern Information Retrieval: The Concepts and Technology behind search | 2nd Edition, ACM Press Books | 2011 |
| 2. | Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack | Information Retrieval: Implementing and Evaluating Search Engines | The MIT Press | 2010 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | G.G. Chowdhury | Introduction to Modern Information Retrieval | Neal- Schuman Publishers, Third Edition | 2010 |
| 2. | Mark Levene | An Introduction to Search Engines and Web Navigation | 2nd Edition Wiley | 2010 |
| 3. | Bruce Croft, Donald Metzler and Trevor Strohman | Search Engines: Information Retrieval in Practice | 1st Edition Addison Wesley | 2009 |
| 4. | Christopher D. Manning, PrabhakarRaghavan, Hinrich Schütze | An Introduction to Information Retrieval | Cambridge University Press, Cambridge, England | 2008 |
| 5. | David A. Grossman, Ophir Frieder | Information Retrieval: Algorithms, and Heuristics | Academic Press, Second Edition | 2008 |

**WEB URLs:**

1. www.viveksingh.in/ir/ir.htm
2. www.gib.fi.upm.es/sites/default/files/irmodeling.pdf
3. www.mir2ed.org/
4. www.itracs.com.
5. www.gib.fi.upm.es/sites/default/files/irmodeling.pdf

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**19ITE16** **SERVICE ORIENTED ARCHITECTURE** **L T P C**
3 0 0 3

## COURSE OBJECTIVES

1. To study the importance of Service Oriented Architecture.
2. To provide an overview of XML Technology and modeling databases in XML
3. To introduce Security solutions in XML and Web Services and to introduce Security standards for Web Services
4. To learn to implement SOA in the J2EE and .Net environment
5. T o Implement the various advanced web services using J2EE

## COURSE OUTCOMES

1. Explain the fundamental principles of SOA
2. Develop a simple XML services using SOA principles
3. Develop a simple web services using SOA principles
4. Model and analyze the JAVA web services and architecture.
5. Implement the various advanced web services using J2EE

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE16.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE16.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE16.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE16.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE16.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

### UNIT I INTRODUCTION 9

The Evolution of SOA –Characteristics of SOA – Introducing SOA- Service oriented analysis – Business-centric SOA – Deriving business services- service modeling - Service Oriented Design- SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design – Task centric business service design

### UNIT II XML SERVICES 9

XML document structure – Well formed and valid documents – Namespaces – DTD – XML Schema – X- Files-Parsing XML – using DOM, SAX – XML Transformation and XSL – XSL Formatting – Modeling Databases in XML

### UNIT III WEB SERVICES AND SOA 9

Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination-Atomic Transactions – Business activities – Orchestration – Choreography- Service layer abstraction – Application Service Layer – Business Service Layer – Orchestration Service Layer.

### UNIT IV JAVA WEB SERVICES ARCHITECTURE 9

Java Web Service Developer pack– JAXP- Architecture-SAX-DOM-XSLT-JDOM-JAX RI – JAX- RPC-Service Model - JAX RPC and J2EE - JAXM – JAXM Architecture –JAXR - Registries and Repositories – JAXR Architecture – JAXR Information Model - JAXB – Architecture – Developing with JAXB - XML to Java mapping – JAXB API - Validation with JAXB – Customizing JAXB.

### UNIT V EXTENDED WEB SERVICES SPECIFICATION 9

Metadata Management - Metadata Specification - Policy – Metadata exchange – Web Services Security –Core concepts – Challenges - Threads and Remedies – Message Level Security – Data Level Security – Advanced Messaging – Reliable Messaging - Notification – Transaction Management - Protocols and Specification – Transaction Specification

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Eric Newcomer, Greg Lomow | Understanding SOA with Web Services | Pearson Education | 2005 |
| 2. | James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew | Java Web Services Architecture | Elsevier | 2003 |

**REFERENCE BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| **1.** | Thomas Erl | Service Oriented Architecture | Pearson Education | 2005. |
| 2. | Frank Cohen | Fast SOA | Elsevier | 2007 |
| 3. | Scott Campbell, Vamsi Mohun, | Mastering Enterprise SOA | Wiley | 2007 |
| 4. | Eric Pulier, Hugh Taylor | Understanding Enterprise SOA | Dreamtech Press | 2007 |
| 5. | Sandeep Chatterjee, James Webber | "Developing Enterprise Web Services | Pearson Education | 2004. |

**WEB URLs**

1. http://www. W3.orh/TR/soap12-part1/
2. http://www.w3.org/TR/ws-arch/
3. http://xml.coverpages.org/Burdett-WSChoreographyJune032003.pdf
4. http://java.sun.com/developer/technicalArticles/xml/jaxb/
5. http://java.ociweb.com/mark/JavaUserGroup/JAXB.pdf

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**19 ITE 17** **AGILE TECHNOLOGY** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. T o Identify core agile principles
2. T o Describe agile requirement over traditional methods of software development
3. T o Understand Extreme Programming Concepts.
4. To develop the agile products.
5. T o Demonstrate the advanced techniques of Agile Methods

## COURSE OUTCOMES

1. Apply agile principles and practices in an actual project.
2. Prepare the Document and assess an agile project.
3. Apply Extreme Programming in agile technology.
4. Explain the steps of releasing agile product.
   Demonstrate the advanced techniques of Agile Methods.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE17.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE17.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE17.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE17.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE17.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

## UNIT I INTRODUCTION TO AGILE SOFTWARE DEVELOPMENT 9

Agile Software Development-Cayman design- Organizational Culture Considerations with Agile - eam Members'Viewpoint- Manager's Viewpoint- Executive's Viewpoint- Different Types of Agile- Extreme Programming (XP)- Scrum- Feature-Driven Development- Dynamic Systems Development Method- Kanban Method- Crystal Family- Certification - Different Roles- Deep Dive into Scrum Roles- Roles in Other Methodologies

## UNIT II AGILE REQUIREMENTS 9

Document Requirements- Scrum- Enhancing Requirements- From User Stories to Deliverables- Grooming and Planning- Product Backlog- Prioritization of Stories – Estimating- Product Backlog Grooming- Sprint Planning- XP Planning Game- Maintenance of Legacy Code - Triple Constraints- Refactored Code- Tracking - Meetings or Ceremonies - Products beyond Software Development

## UNIT III EXTREME PROGRAMMING 9

XP Life Cycle-XP Team-XP Concepts-Prerequisite of XP-Recommendation of XP-Pair Programming-Energized Work-Informative Workspace-Root-Cause Analysis-Retrospectives-Collaborating-Team Strategy-Organizational Strategy-Sit Together-Real Customer Involvement-Ubiquitous Language-Coding Standards-Iteration Demo- Reporting

## UNIT-IV RELEASING AGILE PRODUCTS 9

Done Done-No Bugs-Version Control-Continuous Integration-Collective Code Ownership-documentation- Planning-Vision-Release Planning-Planning Game-Risk Management-Iteration Planning-Slack- Stories- Estimating-

## UNIT-V MASTERING AGILITY 9

Developing-Incremental Requirements-Customer Tests-Test Driven Development-Refactoring-Simple Design-Incremental Design and Architecture-Spike Solutions-Performance Optimization-Exploratory Testing Values and Principles-Improve the Process-Rely on People-Eliminate Waste-Deliver Value-Seek Technical Excellence-Case Study

**TOTAL HOURS:45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Sondra Ashmore, Kristin Runyan | Introduction to Agile Methods | Addison-Wesley Professional | 2014 |
| 2. | James Shore, Shane Warden | The Art of Agile Development | O'REILLY | 2008 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Woodward,E.Surdeck | A Practical guide to Distributed Scrum | Addison-wesley | 2010 |
| 2. | Dean Leffingwell | Agile Software Requirements | Agile software Development Series | 2010 |
| 3. | Kent ,Beck | Extreme Programming Explained | Pearson Education | 2008 |
| 4. | Larman | Agile and iterative development: A Managers Guide | Addison-wesley | 2004 |
| 5. | Anderson, David | Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results | Prentice Hall | 2003 |

**WEB URLs**

1. www.agilemainfesto.org
2. www.satisfice.com/articles/sbtm.pdf
3. www.dx.doi.org/10.1109/ADC.2005
4. www.informit.com/articles/article.aspx?p=405514
5. www.cio.com/archive/090103/money.html

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| 19ITE18 | SOCIAL NETWORK ANALYSIS | L T P C<br>3 0 0 3 |
|---|---|---|

**COURSE OBJECTIVES**

1. Understand the concept of semantic web and related applications.
2. Learn knowledge representation using ontology.
3. Understand human behaviour in social web and related communities
4. Learn to handle privacy related issues
5. Learn visualization of social networks

**COURSE OUTCOMES**

1. Develop semantic web related applications.
2. Represent knowledge using ontology.
3. Predict human behaviour in social web and related communities.
4. Handle privacy related issues
   Visualize social networks

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE18.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE18.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE18.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE18.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE18.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

**UNIT I SOCIAL NETWORK ANALYSIS** 9

Social Network Analysis: History, Concepts and Research - Structure and Dynamics of Social Networks - Analysis of Social Networks - Analyzing the Dynamics of Communication in Online Social Networks - Qualitative Analysis of Commercial Social Network Profiles - Analysis of Social Networks Extracted from Log Files - Perspectives on Social Network Analysis for Observational Scientific Data - Modeling Temporal Variation in Social Network: An Evolutionary web graph approach - Churn in Social Networks.

**UNIT II SOCIAL MEDIA MINING AND SEARCH** 9

Discovering Mobile Social Networks - Online Identities and Social Networking - Detecting Communities - Concept Discovery in Youtube.com - Mining Regional Representative Photos from Consumer- Generated Geo tagged Photos - Collaborative Filtering Based on Choosing a Different Number of Neighbors - Discovering Communities from Social Networks

**UNIT III SOCIAL NETWORK INFRASTRUCTURES AND COMMUNITIES** 9

Decentralized Online Social Networks - Multi-Relational Characterization of Dynamic Social Network Communities- Accessibility Testing of Social Websites - Understanding and Predicting Human Behavior for Social Communities- Associating Human-Centered Concepts with Social Networks Using Fuzzy Sets

**UNIT IV PRIVACY IN ONLINE SOCIAL NETWORKS** 9

Managing Trust in Online Social Networks - Security and Privacy in Online Social Networks - Investigation of Key-Player Problem in Terrorist Networks Using Bayes Conditional Probability - Optimizing Targeting of Intrusion Detection Systems in Social Networks - Security Requirements for Social Networks in Web 2.0

**UNIT V VISUALISATION AND APPLICATIONS OF SOCIAL NETWORKS** 9

Visualization of Social Networks - Novel Visualizations and Interactions for Social Networks Exploration- Applications of Social Network Analysis - Online Advertising in Social Networks - Social Bookmarking on a Company's Intranet: A Study of Technology Adoption and Diffusion

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Furht, Borko | Handbook of Social Network Technologies and Applications | Springer | 2010 |
| 2. | Giles, Mark Smith, John Yen | Advances in Social Network Mining and Analysis | Springer | 2010 |

**REFERENCE BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Max Chevalier, Christine Julien and Chantal Soul- Dupuy | Collaborative and Social Information Retrieval and Access: Techniques for Improved User Modelling | IGI Global snippet | 2010 |
| 2. | Charu C. Aggarwal | Social Network Data Analytics | Springer | 2011 |
| 3. | Guandong Xu, Yanchun Zhang and Lin Li | Web Mining and Social Networking Techniques and applications | Springer | 2011 |
| 4. | John Scott | Social Network Analysis | SAGE Publications Ltd | 2013 |
| 5. | Toby Segaran | Programming Collective Intelligence | O□Reilly | 2012 |

**WEB URLs**

1. https://www.sagepub.com/sites/default/files/upm-binaries/35208_Chapter1.pdf
2. https://www.researchgate.net/publication/324575362_Social_network_analysis_An_overview
3. http://www.mjdenny.com/workshops/SN_Theory_I.pdf
4. https://www.youtube.com/watch?v=d6bi0QTaX5Y
5. https://en.wikipedia.org/wiki/Social_network_analysis

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19ITE19 **GAME PROGRAMMING** L T P C
3 0 0 3

**COURSE OBJECTIVES**

1. Understand the concepts of Game design and development.
2. Learn the processes, mechanics and issues in Game Design.
3. Be exposed to the Core architectures of Game Programming.
4. Know about Game programming platforms, frame works and engines.
5. Learn to develop games

**COURSE OUTCOMES**

1. Understand the concepts of Game design and development.
2. Learn the processes, mechanics and issues in Game Design.
3. Be exposed to the Core architectures of Game Programming.
4. Know about Game programming platforms, frame works and engines.
5. Learn to develop games.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE19.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE19.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE19.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE19.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE19.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

**UNIT I 3D GRAPHICS FOR GAME PROGRAMMING** 9

Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing, Rasterization, Fragment Processing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces, Shader Models, Image Texturing, Bump Mapping, Advanced Texturing, Character Animation, Physics-based Simulation

**UNIT II GAME DESIGN PRINCIPLES** 9

Character development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection, Game Logic, Game AI, Path Finding

**UNIT III GAMING ENGINE DESIGN** 9

Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics

**UNIT IV GAMING PLATFORMS AND FRAMEWORKS** 9

Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DXStudio, Unity

**UNIT V GAME DEVELOPMENT** 9

Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | David H. Eberly | Game Engine Design, Second Edition: A Practical Approach to Real Time Computer Graphics | "3D" Morgan Kaufmann, 2 Edition | 2006 |

**REFERENCES:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Ernest Adams and Andrew Rollings | Fundamentals of Game Design | Prentice Hall 1st edition | 2006 |
| **2.** | Roger E. Pedersen | Game Design Foundations | Edition 2, Jones & Bartlett Learning | 2006 |

**WEB URLs**

1. https://www.gamefromscratch.com/page/Game-Development-Tutorial-Series.aspx
2. http://gamecodeschool.com/
3. https://www.studytonight.com/game-development-in-2D/
4. https://www.raywenderlich.com/2795-beginning-game-programming-for-teens-with-python
5. https://canvas.projekti.info/ebooks/Game%20Coding%20Complete%20-%204th%20Edition.pdf

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**19ITE20** **NATURAL LANGUAGE PROCESSING** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To tag a given text with basic language processing features,
2. To Design An innovative application using NLP components,
3. To implement a rule based system to tackle morphology/syntax of a language,
4. To Design a tag set to be used for statistical processing keeping an application in mind,
5. To Compare and contrast use of different statistical approaches for different types of applications.

## COURSE OUTCOMES

1. Understand the basic concepts of Natural Language Processing.
2. Describe the tag a given text with basic language processing features,
3. Implement a rule based system to tackle morphology/syntax of a language
4. Design a tag set to be used for statistical processing keeping an application in mind
5. To Compare and contrast use of different statistical approaches for different types of applications.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE20.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE20.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE20.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE20.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE20.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

## UNIT I INTRODUCTION 9

Natural Language Processing tasks in syntax, semantics, and pragmatics – Issues - Applications - The role of machine learning - Probability Basics –Information theory – Collocations -N-gram Language Models - Estimating parameters and smoothing - Evaluating language models.

## UNIT II MORPHOLOGY AND PART OF SPEECH TAGGING 9

Linguistic essentials - Lexical syntax- Morphology and Finite State Transducers - Part of speech Tagging - Rule-Based Part of Speech Tagging - Markov Models - Hidden Markov Models – Transformation based Models - Maximum Entropy Models. Conditional Random Fields

## UNIT III SYNTAX PARSING 9

Syntax Parsing - Grammar formalisms and treebanks - Parsing with Context Free Grammars - Features and Unification -Statistical parsing and probabilistic CFGs (PCFGs)-Lexicalized PCFGs.

## UNIT IV SEMANTIC ANALYSIS 9

Representing Meaning – Semantic Analysis - Lexical semantics –Word-sense disambiguation - Supervised – Dictionary based and Unsupervised Approaches - Compositional semantics Semantic Role Labeling and Semantic Parsing – Discourse Analysis.

## UNIT V APPLICATIONS 9

Named entity recognition and relation extraction- IE using sequence labeling-Machine Translation (MT) – Basic issues in MT-Statistical translation-word alignment- phrase-based translation –Question Answering

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Roland R. Hausser | Foundations of Computational Linguistics: | MIT Press | 2011 |
| 2. | Daniel Jurafsky and James H. Martin | Martin Speech and Language Processing | McGraw Hill | 2008 |

**REFERENCE BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Christopher D. Manning and Hinrich Schuetze | Foundations of Statistical Natural Language Processing | MIT Press | 1999 |
| 2. | Steven Bird, Ewan Klein and Edward Loper | Natural Language Processing with Python | O'Reilly Media | 2009 |
| 3. | Pierre M. Nugues | An Introduction to Language Processing with Perl and Prolog: An Outline of Theories, Implementation, and Application with Special | Soft cover reprint | 2010 |
| 4. | James Allen, | Natural Language Understanding | Addison Wesley | 1994 |
| 5. | Nitin Indurkhya, Fred J. Damerau | Handbook of Natural Language Processing | CRC Press | 2010 |

**WEB URLs**

1. www.nltk.org/
2. www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_natural_language_processing.htm
3. www.analyticsvidhya.com/blog/2017/01/ultimate-guide-to-understand-implement-natural-language- processing-codes-in-python/
4. www.kdnuggets.com/2015/12/natural-language-processing-101.html
5. www.youtube.com/watch?v=w9OUpjiu_zg

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**19ITE21** **BIG DATA ANALYTICS** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To Learn tips and tricks for Big Data.
2. To Learn to build and maintain reliable, scalable, distributed systems with Apache Hadoop
3. To Learn the Hadoop Architecture
4. To apply Hadoop ecosystem components
5. To Learn to build Hadoop Advanced Data base Systems

## COURSE OUTCOMES

1. Understand the basic concepts of Big Data.
2. Explain the basics of Hadoop.
3. Describe the architecture of Hadoop.
4. Design Hadoop Ecosystem and yarn.
5. Explain the techniques of HIVE AND HIVEQL, HBASE.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE21.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE21.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE21.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE21.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |
| 19ITE21.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | X | - |

## UNIT I – INTRODUCTION TO BIG DATA 9

Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

## UNIT II – INTRODUCTION HADOOP 9

Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.

## UNIT- III HADOOP ARCHITECTURE 9

Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

## UNIT-IV HADOOP ECOSYSTEM AND YARN 9

Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features- NameNode High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.

## UNIT-V HIVE AND HIVEQL, HBASE 9

Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Subqueries, HBase concepts- Advanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Boris lublinsky, Kevin t. Smith, Alexey Yakubovich | Professional Hadoop Solutions | Wiley | 2015 |
| 2. | Chris Eaton, Dirk deroos | Understanding Big data | McGraw Hill | 2012 |

**REFERENCE BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Tom White | HADOOP: The definitive Guide Everything | O Reilly | 2012 |
| 2. | Vignesh Prajapati | Big Data Analytics with R and Haoop | Packet Publishing | 2013 |
| 3. | Tom Plunkett, Brian Macdonald | Oracle Big Data Handbook | Oracle Press | 2014 |
| 4. | Jy Liebowitz, | Big Data and Business analytics | CRC press | 2013 |
| 5. | Seema Acharya and Subhashini C | Big Data and Analytics | Wiley India | 2015 |

**WEB URLs**

1. www.bigdatauniversity.com/
2. www.tutorialspoint.com/big_data_tutorials.htm
3. www.intellipaat.com › Big Data
4. www.lynda.com/Big-Data-training-tutorials/2061-0.html
5. www.edureka.co/blog/big-data-tutorial

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**19ITE22** **AD-HOC AND SENSOR NETWORKS** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To Understand the design issues in ad hoc and sensor networks
2. To learn the different types of MAC protocols.
3. Be familiar with different types of adhoc routing protocols.
4. Be expose to the TCP issues in adhoc networks.
5. To Learn the architecture and protocols of wireless sensor network

## COURSE OUTCOMES

1. Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks.
2. Analyze the protocol design issues of ad hoc and sensor networks
3. Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues
4. Evaluate the QoS related performance measurements of ad hoc and sensor networks.
5. Explain the techniques of protocols networks

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE22.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |
| 19ITE22.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |
| 19ITE22.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |
| 19ITE22.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |
| 19ITE22.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | X | - | - |

**UNIT I INTRODUCTION** 9

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs): concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

**UNIT II MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS** 9

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols- Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

**UNIT III ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS** 9

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

**UNIT IV WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS** 9

Single node architecture: hardware and software components of a sensor node – WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

**UNIT V WSN ROUTING, LOCALIZATION & QOS** 9

Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | C. Siva Ram Murthy, and B. S. Manoj | Ad Hoc Wireless Networks: Architectures and Protocols | Prentice Hall Professional Technical Reference | 2008 |

**REFERENCE BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Carlos De Morais Cordeiro, Dharma Prakash Agrawa | Ad Hoc & Sensor Networks: Theory and Applications | World Scientific Publishing Company | 2006. |
| 2. | Feng Zhao and Leonides Guibas | Wireless Sensor Networks | Elsevier Publication | 2002. |
| 3. | Holger Karl and Andreas Willig | Protocols and Architectures for Wireless Sensor Networks | Wiley | 2005 |
| 4. | Kazem Sohraby, Daniel Minoli, & Taieb Znati | Wireless Sensor Networks-Technology, Protocols, and Applications | John Wiley | 2007. |
| 5. | Anna Hac | Wireless Sensor Network Designs | John Wiley, | 2003. |

**WEB URLs**

1. www.bigdatauniversity.com/
2. www.tutorialspoint.com/big_data_tutorials.htm
3. www.intellipaat.com › Big Data
4. www.lynda.com/Big-Data-training-tutorials/2061-0.html
5. www.edureka.co/blog/big-data-tutorial

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**19ITE23** **MANAGEMENT INFORMATION SYSTEM** **L T P C**
**3 0 0 3**

**COURSE OBJECTIVES**

1. To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
2. To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
3. To enable students understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive.
4. To enable the students to use information to assess the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.
5. To provide the theoretical models used in database management systems to answer business questions.

**COURSE OUTCOMES**

1. Relate the basic concepts and technologies used in the field of management information systems;
2. Compare the processes of developing and implementing information systems.
3. Outline the role of the ethical, social, and security issues of information systems.
4. Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.
5. Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE23.CO1 | X | X | X | X | - | - | - | - | X | - | X | X | X | - | - | - |
| 19ITE23.CO2 | X | X | X | X | - | - | - | - | X | - | X | X | X | - | - | - |
| 19ITE23.CO3 | X | X | X | X | - | - | - | - | X | - | X | X | X | - | - | - |
| 19ITE23.CO4 | X | X | X | X | - | - | - | - | X | - | X | X | X | - | - | - |
| 19ITE23.CO5 | X | X | X | X | - | - | - | - | X | - | X | X | X | - | - | - |

**UNIT 1: Management information system in a digital firm** 9

MIS concept - Definition –Role of the MIS - Impact of the MIS-MIS and the user - Management as a control system - MIS a support to management - Development process of the MIS.

**UNIT 2: System analysis and design** 9

System - Need for system analysis - System analysis of the existing system - System analysis of a new requirements - System Development Model - Structured System Analysis and Design - Object Oriented Analysis.

**UNIT 3: Information system applications** 9

MIS applications, DSS – GDSS - DSS applications in E enterprise - Knowledge Management System and Knowledge Based Expert System- Enterprise Model System and E-Business, E- Commerce, E-communication, Business Process Reengineering.

**UNIT 4: Technology of information system** 9

Data process- Transaction and application process- Information system process; Unified communication and network; Security challenges in E-enterprises; Security threats and vulnerability-Controlling security threat and vulnerability.

**UNIT 5: Data base management system** 9

Objectives of data base approach- Characters of database Management systems- Data processing system-Components of DBMS packages- Data base administration- Data models - Data warehouse.

**TOTAL HOURS: 45**

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**REFERENCE BOOKS**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Jawadekar, W.S | Management Information Systems | Tata McGrawHill Private Limited | 2009 |
| 2 | Kenneth C. Laudon and Jane P. Laudon | Management Information Systems | Pearson Education | - |
| 3 | Alex Leon and Mathew Leon | Data Base Management Systems | Vikas Publishing House | - |
| 4 | Goyal, D.P | Management Information System | MACMILLAN India Limited | 2008 |
| 5 | Panneerselvam R | Database Management System | PHI Private Limited | 2008 |

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**19ITE24** **SOFTWARE QUALITY ASSURANCE** **L T P C**
3 0 0 3

**COURSE OBJECTIVES**

The student should be made to:

1. Understand the basic tenets of software quality and quality factors.
2. Be exposed to the Software Quality Assurance (SQA) architecture and the details of SQA components.
3. Understand of how the SQA components can be integrated into the project life cycle.
4. Be familiar with the software quality infrastructure.
5. Be exposed to the management components of software quality.

**COURSE OUTCOMES**

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

1. Utilize the concepts in software development life cycle.
2. Demonstrate their capability to adopt quality standards.
3. Assess the quality of software product.
4. Apply the concepts in preparing the quality plan & documents.
5. Demonstrate testing a software and apply management principles on decision making

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE24.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE24.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE24.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE24.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE24.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

**UNIT- I: Software Quality:** Introduction, Constraints of Software Product Quality Assessment, Customer is a King, Quality and Productivity Relationship, Requirements of a Product, Organisation Culture, Characteristics of Software, Software Development Process, Types of Products, Schemes of Criticality Definitions, Problematic Areas of Software Development Life Cycle, Software Quality Management, Why Software Has Defects? Processes Related to Software Quality, Quality Management System Structure, Pillars of Quality Management System, and Important Aspects of Quality Management.

**UNIT- II: Fundamentals of testing:** Introduction, Necessity of testing, what is testing? Fundamental test process, The psychology of testing, Historical Perspective of Testing, Definitions of Testing, Approaches to Testing, Testing During Development Life Cycle, Requirement Traceability Matrix, Essentials of Software Testing, Workbench, Important Features of Testing Process, Misconceptions About Testing, Principles of Software Testing, Salient Features of Good Testing, Test Policy, Test Strategy or Test Approach, Test Planning, Testing Process and Number of Defects Found in Testing, Test Team Efficiency, Mutation Testing, Challenges in Testing.

**UNIT- III: Testing Strategies: Unit Testing- Boundary Value Testing-** Normal Boundary Value Testing, Robust Boundary Value Testing, Worst-Case Boundary Value Testing, Special Value Testing, Examples, Random Testing, Guidelines for Boundary Value Testing-**Equivalence Class Testing:** Equivalence Classes, Traditional Equivalence Class Testing, Improved Equivalence Class Testing, Edge Testing, Guidelines and Observations-**Decision Table–Based Testing:** Decision Tables, Decision Table Techniques, Cause-and-Effect Graphing, Guidelines and Observations- **Path Testing:** Program Graphs, DD-Paths, Test Coverage Metrics, Basis Path Testing, Guidelines and Observations- **Data Flow Testing:** Define/Use Testing, Slice-Based Testing, Program Slicing Tools. **9**

**UNIT- IV: Software Verification and Validation:** Introduction, Verification, Verification Workbench, Methods of Verification, Types of reviews on the basis od Stage Phase, Entities involved in verification, Reviews in testing lifecycle, Coverage in Verification, Concerns of Verification, Validation, Validation Workbench, Levels of Validation, Coverage in Validation, Acceptance Testing, Management of Verification and Validation, Software development verification and validation activities. V-test Model: Introduction, V-model for software, Testing during Proposal stage, Testing during requirement stage, Testing during test planning phase, Testing during design phase, Testing during coding, VV Model, Critical Roles and Responsibilities. **Levels of Testing:** Introduction, Proposal Testing, Requirement Testing, Design Testing, Code Review, Unit Testing, Module Testing, Integration Testing, Big-Bang Testing, Sandwich Testing & Critical Path First.

**UNIT- V: Special Tests:** Introduction, GUI testing, Compatibility Testing, Security Testing, Performance Testing, Volume Testing, Stress Testing, Recovery Testing, Installation Testing, Requirement Testing, Regression Testing, Error Handling Testing, Manual Support Testing, Intersystem Testing, Control Testing, Smoke Testing, Adhoc Testing, Parallel Testing, Execution Testing, Operations Testing, Compliance Testing, Usability Testing, Decision Table Testing, Documentation Testing, Training testing, Rapid Testing, Control flow graph, Generating tests on the basis of Combinatorial Designs, State Graph, Risk Associated with New Technologies, Process maturity level of Technology, Testing Adequacy of Control in New technology usage, Object Oriented Application Testing, Testing of Internal Controls, COTS Testing, Client Server Testing, Web Application Testing, Mobile Application Testing, eBusiness eCommerce Testing, Agile Development Testing, Data Warehousing Testing.

**TOTAL HOURS: 45**

**REFERENCE BOOKS:**

| S.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | William E. Lewis | Software Testing and Continuous Quality Improvement | CRC Press | 2016 |
| 2. | M. G. Limaye | Software Testing: Principles, Techniques and Tools | TCH | 2017 |
| 3 | Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black | Foundations of Software Testing | Cengage Learning | - |
| 4 | Paul C. Jorgenson | Software Testing: A Craftsman's Approach | CRC Press | 2017 |

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**19ITE25** **BIOINFORMATICS** **L T P C**

**3 0 0 3**

**COURSEOBJECTIVES**

1. To improve the programming skills of the student
2. To let the students know the recent evolution in biological science.
3. To learn about Phylogenetics and its applications
4. To know about inference problems in biology and its applications
5. To learn how to perform RNA modeling

**COURSEOUTCOMES**

Upon completion of this course, students will be able to

1. Develop bioinformatics tools with programming skills.
2. Apply computational based solutions for biological perspectives.
3. Able to understand phylogenetics and its applications
4. Able to apply engineering techniques in the field of molecular biology
5. Able to create RNA models using various algorithms

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE25.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE25.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE25.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE25.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE25.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

**UNIT I INTRODUCTION** 9

Introduction to Operating systems, Linux commands, File transfer protocols ftp and telnet, Introduction to Bioinformatics and Computational Biology, Biological sequences, Biological databases, Genome specific databases, Data file formats, Data life cycle, Database management system models, Basics of Structured Query Language (SQL).

**UNIT II SEQUENCE ANALYSIS** 9

Sequence Analysis, Pair-wise alignment, Dynamic programming algorithms for computing edit distance, string similarity, shotgun DNA sequencing, end space free alignment. Multiple sequence alignment, Algorithms for Multiple sequence alignment, Generating motifs and profiles, Local and Global alignment, Needleman and Wunsch algorithm, Smith Waterman algorithm, BLAST, PSIBLAST and PHIBLAST algorithms.

**UNIT III PHYLOGENETICS** 9

Introduction to phylogenetics, Distance based trees UPGMA trees, Molecular clock theory, Ultrametric trees, Parsimonious trees, Neighbour joining trees, trees based on morphological traits, Bootstrapping. Protein Secondary structure and tertiary structure prediction methods, Homology modeling, abinitio approaches, Threading, Critical Assessment of Structure Prediction, Structural genomics.

**UNIT IV MOLECULAR BIOLOGY** 9

Inference problems and techniques for molecular biology- Overview of key inference problems in biology: Homology identification, Genomic sequence annotation (Genes and ORFs identification), Protein structure prediction (Secondary and Tertiary structure prediction), Protein function prediction, Biological network identification, Next generation sequencing.

**UNIT V RNA Modeling** 9

Basics of RNA Structure prediction and its limitations, Features of RNA Secondary Structure,RNA structure prediction methods: Based on self-complementary regions in RNA sequence, Minimum free energy methods, Suboptimal structure prediction by MFOLD, Prediction based on finding most probable structure and Sequence co-variance method. Application of RNA structure modeling.

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Lesk, A. K. | Introduction to Bioinformatics | Oxford University Press | 2013 |
| 2. | Dan Gusfield | Algorithms on Strings, Trees and Sequences: Computer Science and Computational Biology | Cambridge University Press | 1997 |

**REFERENCE BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Durbin, R., Eddy, S., Krogh, A., and Mitchison, G. | Biological Sequence Analysis Probabilistic Models of proteins and nucleic acids | Cold Spring Harbor Laboratory Press | 2004 |
| 2. | Baldi, P. and Brunak, S | Bioinformatics: The Machine Learning Approach | Cambridge University Press | 1998 |

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**19ITE26** **DOCKER AND KUBERNETES** **L T P C**

**3 0 0 3**

## COURSE OBJECTIVES

1. To Understand Kubernetes Architecture
2. To Know the Principles of cluster And Image Management
3. To Define Network And data Management using containers
4. To Develop a Docker Essentials
5. To deploy stateful and stateless apps on the cluster

## COURSE OUTCOMES

1. Installing & creating an account with docker Hub
2. Develop interactive Scaling control and Networking Services using docker
3. Expose the Build Comprehensive Hands-on with Kubernetes Components
4. Kubernetes Cluster installation on Virtualbox, AWS & Google Cloud Platforms
5. Develop interactive app outside the cluster and to autoscale apps

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 | PSO 4 |
| 19ITE26.CO 1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE26.CO 2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE26.CO 3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE26.CO 4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE26.CO 5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |

## UNIT I INTRODUCTION 9

Introduction to Docker-requirements –Docker containers-listing-searching-pulling for an image-Starting containers-listing containers-stopping containers,deleting containers-setting and getting privileged access inside a container- run container images in Kubernetes-injecting new process to a running container-labelling filtering containers.

## UNIT II NETWORK AND DATA MANAGEMENT FOR CONTAINERS 9

Introduction-Accessing containers from outside-Managing data in containers-linking two or more containers-LAMP-application by linking containers-networking of multihost containers with Flannel-Assigning IPv6 addresses to containers.

## UNIT III DOCKER PERFORMANCE AND ORCHESTRATION 9

Introduction-Benchmarking CPU performance,Benchmarking disk performance, Benchmarking network performance-Performance monitoring.Orchestration-Introduction-Applications with docker compose-cluster with docker Swarm-CoreOS for docker Orchestration-docker in project atomic.

## UNIT IV INTRODUCTION TO KUBERNETES 9

Introduction- Kubernetes Architecture- Components of kubernetes cluster -cluster management - Deploy Kubernetes- deploy Kubernetes on AWS and Google cloud platforms- Pods and Deployments -Kubernetes Master- master nodes.

## UNIT V KUBERNETES USING DOCKER 9

Kubernetes Management Design Patterns with Docker, CoreOS Linux- Kubernetes docker containers-Nodes-Cluster-Service-pod-Replication controller-label-selector-name-namespace-volume-Service proxy-listing service-listing nodes- Kubernetes Cluster-Scaling-Testing-wordpress with kubernetes cluster.

**TOTAL HOURS: 45**

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**TEXT BOOK**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Deepak Vohra | Kubernetes Microservices with Docker | Apress | 2016 |
| 2. | | Docker Cookbook | Packt Publishing | 2015 |

**REFERENCE BOOK**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Deepak Vohra | Kubernetes Management Design Patterns | Apress | 2017 |
| 2. | | Kubernetes on AWS | Packt Publishing | 2018 |
| 3. | Karl Matthias, Sean P. Kane | Docker: Up and Running | O'Reilly Media | 2015 |

**WEB REFERENCE(s)**

1. https://www.google.co.in/books/edition/Docker_Up_Running/IDvcCQAAQBAJ?hl=en&gbpv=0
2. https://www.google.co.in/books/edition/Kubernetes_on_AWS/bC59DwAAQBAJ?hl=en&gbpv=0&kptal=sideways
3. https://www.knowledgehut.com/devops/kubernetes
4. https://azure.microsoft.com/en-us/topic/kubernetes-vs-docker/
5. https://www.coursera.org/lecture/cloud-computing-basics/vms-docker-and-kubernetes-LgZKo

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**19ITE27** **OPEN STACK ESSENTIALS** **L T P C**

**3 0 0 3**

**COURSE OBJECTIVES**

1. To Understand Open Stack Architecture
2. To Know The Principles Of Identity And Image Management
3. To Define Network And Instance Management
4. To Develop A Block And Object Storage
5. To Design And Build Simple Nodes

**COURSE OUTCOMES**

1. Installing Pack stack and generating an answer file
2. Develop Glance as a Registry of images
3. Build Web Interface External Network Setup
4. Develop Object file management in the web interface
5. Develop interactive Scaling control and Networking Services

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE27.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE27.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE27.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE27.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE27.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |

**UNIT I ARCHITECTURE AND COMPONENT OVERVIEW** **9**

Open Stack Architecture- Dashboard- Keystone- Glance- Neutron- Nova- Cinder-Shift- Ceilometer-Heat.RDO Installation: Installing RDO using Packstack -Installing Packstack and generating an answer file.

**UNIT I I IDENTITY AND IMAGE MANAGEMENT** **9**

Services and Endpoints: Hierarchy of users-roles-Creating an User-Creating an role-Interacting with Keystone in the dashboard-Endpoints in the Dashboard.Glance as a Registry of images -Using the Web Interface-Building an Image.

**UNIT II NETWORK AND INSTANCE MANAGEMENT** **9**

Networking And Neutron-Network Fabric-Open VSwitch Configuration-VLAN –GRE tunnels-VXLAN tunnels- Creating a Network- Web interface Management-External Network access – Preparing a network – Creating an External network-Web Interface External Network Setup.Managing flavors –Managing key pairs – Launching an Instance-Managing floating IP addresses-Managing Security Groups.

**UNIT IV BLOCK AND OBJECT STORAGE** **9**

Use case – Creating and using Block Storage – Attaching the block storage to an Instance - Backing Storage – Cinder types. Object Storage- Use case Architecture of Swift Cluster – Creating and using object storage – Object file management in the web interface – Ring Files.

**UNIT V SCALING AND MONITORING** **9**

Scaling Compute nodes – Control and Networking – Scaling control and Networking Services – Load – Balancing Key stone – Additional Key stone tuning – Glance Load Balancing.Monitoring – Methods – Commands – Non open stack Service checks – Monitoring control services – Network Services – Compute services – Trouble Shooting.

**TOTAL HOURS:45**

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**TEXT BOOK**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Dan Radez | OpenStack Essentials, Second Edition | Packt Publishing | 2015 |
| 2. | | Docker Cookbook | Packt Publishing | 2013 |

**REFERENCE BOOK**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Omar Khedher | Learning Openstack Networking - Third Edition | Packt Publishing | 2014 |
| 2. | Cody Bumgardner | Open Stack in Action | Packt Publishing | 2011 |
| 3. | Tom Fifield | Open stack Operations Guide | Packt Publishing | 2000 |

**WEB REFERENCE(s)**

1. https://superuser.openstack.org/articles/openstack-basics-beginner/
   https://www.coursera.org/lecture/networking-security-architecture-vmware-nsx/process-evolution-vmware-integrated-openstack-and-nsx-2-of-5-T2Ncr
3. https://www.oreilly.com/library/view/openstack-essentials/9781783987085/
4. https://books.google.co.in/books/about/OpenStack_Essentials.html?id=lqGrCQAAQBAJ&redir_esc=y
5. https://www.packtpub.com/product/openstack-essentials-second-edition/9781786462664

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**19ITE28** **USER CENTRIC DESIGN** **L T P C**
**3 0 0 3**

**COURSE OBJECTIVES**

1. Given a problem setting, critically discuss the appropriateness of potential design methods such as contextual design,
   prototyping, ideation, etc.
2. Describe the issues and challenges to achieving a human-centered design process.
3. Gather useful information about users and activities through observation or systematic in-quiry.
4. Use, adapt and extend design standards, guidelines, and patterns.
5. Create a prototype for a small system and plan and perform a usability evaluation.

**COURSE OUTCOMES**

1. Develop an appreciation for the theory and sensibilities of user-centered design
2. Develop skills in the use and application of a variety of design methods, specifically Applicable to user-centered
   design
3. Improve individual and collaborative skills in design-based problem solving
4. Develop UCD is an Iterative process
5. Develop Multidisciplinary Design Teams for User Centered Design

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE28.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE28.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE28.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE28.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE28.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |

**UNIT I USER CENTERED DESIGN OVERVIEW** 9

User centered Design- UCD Principle - Iterative Process-Phase of the design process—Investigative Methods and Tools- Example: Brainstorming- Apply User Centered Design – Understand context of use – Specify user Requirements – Design Solutions – Evaluate against requirements – Hardware UCD - Working with Users.

**UNIT I I MULTIDISCIPLINARY DESIGN TEAMS** 9

Multidisciplinary Design Teams for User Centered Design: Engineer-Designer-Researcher- Marketer – Stakeholder – Investment in UCD Pays off – Benefits of User centered Design – Approach of User centered Design – UX and Interactive Design. Design Principle : Hick's Law – Fitt's Law – Visibility – Visual Feedback – Gestalt Principle – Mobile UCD – UCD Terms.

**UNIT III ESTABLISISHING A BASELINE ABOUT UCD** 9

Introduction to UCD – UCD and User Experience – User Experience versus User Interface – UX is more than a Buzz word – User Research – Interviews – Surveys – Focus Groups – Observational Usability Research – Scenarios - UCD Process –Storyboards - Creating a personal Manifesto – Balance and Filter Design Features – MVP .

**UNIT IV USER CENTRIC TOOLS AND TECHNIQUES** 9

Introduction to UCD Tools and Techniques – Activity: Personas and Target Audience – UX One sheet – Journey Mapping – Wire framing – Ideation –Prototyping – Evaluation – Design specification - Sketching: Open ended vs Highly Constrained Sketching – Scribble Sketching – Stretch your imagination – Combining Sketching with images – Final Reflection – Pendo – Survey Monkey- Axure – POP - Silverback.

**UNIT V TRENDS IN UCD** 9

Personalization - Material design - Designing for content - Designing for content - Animation and micro-interactions - Accessible design - AI for testing design options and making decisions - Data and design collaboration -
Minimalistic Simple Designs - Stellar 3D Animation & Graphic – RIDE (Report – Iterate – Deploy – Evaluate).

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**TEXT BOOK**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Travis Lowdermilk | User-Centered Design: A Developer's Guide to Building User-Friendly Applications, First Edition | O'Reilly Media | 2013 |
| 2. | Brian Still and Kate Crane | Fundamentals of User-Centered Design: A Practical Approach | CRC Press | 2016 |

**REFERENCE BOOK**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Elizabeth F. Churchill, Frank Ritter, and Gordon D. Baxter | Foundations for Designing User-Centered Systems: What System Designers Need to Know about People | Springer | 2014 |
| 2. | Amir Shevat | Designing Bots: Creating Conversational Experiences | O'Reilly Media | 2017 |
| 3. | Westley Knight | UX for Developers: How to Integrate User-Centered Design Principles Into Your Day-to-Day Development Work | Apress | 2018 |

**WEB REFERENCE(s)**

1. https://www.google.co.in/books/edition/User_Centered_Design/nklr2hZ_wsYC?hl=en&gbpv=1&printsec=front cover
2. https://www.google.co.in/books/edition/UX_for_Beginners/6LhRCwAAQBAJ?hl=en&gbpv=1&printsec=front cover
3. https://www.youtube.com/watch?v=dKziavNRuis
4. https://www.google.co.in/books/edition/Designed_for_Use/mA9QDwAAQBAJ?hl=en&gbpv=1&printsec=front cover
5. https://www.justinmind.com/blog/user-centered-design/

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**19ITE29** **SOFTWARE TESTING** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To understand the basic software testing principles.
2. To understand the working principles of various testing methodologies.
3. To Understand knowledge of techniques for system testing and functional testing
4. To understand the ways and means of controlling and monitoring testing activity.
5. To understand the concept of modern software testing tools.

## COURSE OUTCOMES

1. Explain the basic software testing principles.
2. Classify the types of testing
3. Differentiate operation of system testing & functional testing
4. Analyze the techniques in testing in planning, automation & execution management.
5. Implement the testing using modern software testing tools.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE29.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE29.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE29.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE29.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE29.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |

## UNIT I INTRODUCTION 9

Basic Concepts and preliminaries –Objectives of Testing-Testing Activities-Testing Levels-Role of Testing- Verification and Validation-Test Case-Theory of Program Testing- Theory of Good enough and Gerhart- Weyuker and Ostrand- Gourlay- Adequacy of Testing- Limitations of Testing.

## UNIT II TYPES OF TESTING 9

Unit Testing-Static and Dynamic Unit Testing-Defect Prevention-Mutation Testing and Debugging-Control Flow Testing- Control Flow Graph- Paths in a Control Flow Graph- Path Selection Criteria- Generating Test Input- Data Flow Testing- Data Flow Graph- Data Flow Terms- Data Flow Testing Criteria- Comparison of Data Flow Test Selection Criteria- Feasible Paths and Test Selection Criteria- Comparison of Testing Techniques-Domain Testing.

## UNIT-III SYSTEM TESTING & FUNCTIONAL TESTING 9

System Testing- Different Types of Interfaces and Interface Errors- System Integration Techniques- Software and Hardware Integration- Test Plan for System Integration- Test Categories- Basic Tests- Functionality Tests- Robustness Tests- Functional Testing- Functional Testing Concepts of Howden- Pairwise Testing- Equivalence Class Partitioning- Boundary Value Analysis- Decision Tables- Random Testing- Error Guessing- Category Partition.

## UNIT-IV PLANNING, AUTOMATION & EXECUTION 9

Planning And Automation- Approach- Suite Structure- Environment- Execution Strategy- Effort Estimation- System Test Automation- Evaluation and Selection of Test Automation Tools- Characteristics of Automated Test Cases- Structure of an Automated Test Case- Test Execution- Modeling Defects- Metrics for Tracking System Test- Orthogonal Defect Classification- Defect Causal Analysis- Beta Testing- First Customer Shipment- System Test Report- Product Sustaining-Measuring Test Effectiveness

## UNIT-V M O D E R N SOFTWARE TESTING TOOLS 9

Evolution of Automated Testing Tools-Variable Capture/Replay Tools-Extreme Programming-Software Testing Trends-Taxonomy of Testing Tools-Methodology to Evaluate Automated Testing Tools-Case Study

**TOTAL HOURS:45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Kshirsagar Naik, Priyadarshi Tripathy | Software Testing & Quality Assurance | A JOHN WILEY & SONS | 2011 |
| 2. | William E.Lewis, Gunasekaran Veerapillai | Software Testing & Continuous Quality Improvement | AUERBACH PUBLICATIONS | 2011 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Alan C Gillies | Software Quality Theory and Management | Cengage Learning | 2011 |
| 2. | Srinivasan Desikan, Gopalaswamy Ramesh | Software Testing – Principles and Practices | Pearson Education | 2009. |
| 3. | Ron Patton | Software testing | Pearson Education | 2007 |
| 4. | William E. Perry | Effective Methods for Software Testing | Wiley India | 2006. |
| 5. | Renu Rajani and Pradeep Oak | Software Testing – Effective Methods, Tools and Techniques | Tata McGraw Hill PublishingCompany Limited | 2005 |

**WEB URLs**

1. www.tutorialspoint.com/software_testing/software_testing_qa_qc_testing.htm
2. www.etestinghub.com/introduction_to_testing.php
3. www.guru99.com/automation-testing.html
4. www.softwaretestinghelp.com/automation-testing-tutorial-1/
5. www.softwaretestingtimes.com/2010/04/software-testing- tutorials-for.html

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**19ITE30** **ETHICAL HACKING AND CYBER SECURITY** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To understand the concept of Hacking.
2. To understand the Hacking methods and types.
3. To understand the Hacking tools.
4. To understand the Concept of Cyber Security
5. To understand the Cyber Security tools

## COURSE OUTCOMES

1. Explain the basic concept of Ethical hacking.
2. Implement the techniques for system hacking wireless hacking and web server hacking.
3. Explain the basic concept of Cyber Security and Penetration testing.
4. Implement the Cyber Security by using its tools.
5. Implement the cyber Forensic analysis

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE30.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE30.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE30.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE30.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE30.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |

## UNIT I INTRODUCTION TO ETHICAL HACKING 9

Introduction-Ethical hacking Terminology-types of hacking technologies-phases of ethical hacking-Foot printing- Social Engineering-Scanning and enumeration. Understanding the password hacking techniques-Root kits- Trojans-Backdoors-Viruses and worms-sniffers-denial of service-Session hijacking.

## UNIT II WEB SERVER HACKING 9

Hacking web servers-web application vulnerabilities –Buffer overflow-Wireless hacking Physical Security. WEP, WPA Authentication mechanism-wireless sniffers-Physical Security-factors affecting physical security- honey pots-Firewall types

## UNIT III PENETRATION TESTING AND CYBER SECURITY 9

Cryptography-overview of MD5, SHA, RC4-penetration testing methodologies- steps pen Test legal framework- penetration testing tools. Cyber crime: Mobile and Wireless devices-Trend mobility-authentication service security-Attacks on mobile phones-mobile phone security Implications for organizations-Organizational measurement for Handling mobile-Security policies and measures in mobile computing era.

## UNIT IV CYBER SECURITY TOOLS 9

Tools and methods used in cyber crime-Proxy servers and Anonymizers- Phishing- Password cracking-Key loggers and Spy wares-Virus and worms-Trojan Horse and Backdoors-Steganography-SQL Injection-Buffer overflow-Attacks on wireless network. Understanding computer forensic-Historical background of cyber forensic Analysis of e-mail-Digital forensic life cycle-Network forensic-Setting up a computer forensic Laboratory- Relevance of the OSI 7 Layer model to computer Forensic-Computer forensic from compliance perspectives

## UNIT V FORENSIC OF HAND HELD DEVICES 9

Forensic of Hand –Held Devices-Understanding cell phone working characteristics-Hand-Held devices and digital forensic- Toolkits for Hand-Held device-Forensic of i-pod and digital music devices-Techno legal Challenges with evidence from hand-held Devices. Cyber Security – Organizational implications-cost of cybercrimes and IPR issues Web threats for organizations: the evils and Perils-Social media marketing- Security and privacy Implications-Protecting people privacy in the organizations Forensic best practices for organizations.

**TOTAL HOURS: 45**

**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Michael T. Simpson | Hands-On Ethical Hacking and Network Defense | James Corley | 2012 |
| 2. | Nina Godbole & Sunit Belapure | Cyber Security | Wiley India | 2012 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1 | Patrick Engebretson | The Basics of Hacking and Penetration Testing | Elsevier | 2011 |
| 2 | Harish Chander | Cyber laws & IT protection | PHI | 2012 |
| 3 | Dhiren R Patel | Information security y theory & practice | PHI | 2010 |
| 4 | MS.M.K.Geetha & Ms.Swapne Raman | Cyber Crimes and Fraud Management | MACMILLAN | 2012 |
| 5 | Vivek Sood | Cyber Law Simplified | TMH | 2012 |

**WEB URLs**

1. www.tutorialspoint.com/ethical_hacking/
2. www.tutorialspoint.com/ethical_hacking/
3. www.breakthesecurity.cysecurity.org/category/ethical-hacking /
4. www.cybrary.it

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**19ITE31** **SOFT COMPUTING** **L T P C**
**3 0 0 3**

**COURSE OBJECTIVES**

1. To understand thebasic concepts of soft computing,
2. To understand the fundamentals of artificial and neural networks
3. To understand the fundamentals Unsupervised Learning Network
4. To understand the fuzzy sets and fuzzy logic and genetic algorithms.
5. To understand the fuzzy Fuzzy Arithmetic and Fuzzy Measures

**COURSE OUTCOMES**

1. Build intelligent machines using soft computing techniques.
2. Design a Neural Networks for the real timeproblems.
3. Implement various learning techniques
4. Apply fuzzy logic and Develop fuzzy sets for real time problems.
5. Develop genetic algorithms for various real time applications

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 | PSO 4 |
| 19ITE31.CO 1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE31.CO 2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE31.CO 3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE31.CO 4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE31.CO 5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

**UNIT-I AI PROBLEMS AND SEARCH** 9

AI problems, Techniques, Problem Spaces and Search, Heuristic Search Techniques- Generate and Test, Hill Climbing, Best First Search Problem reduction, Constraint Satisfaction and Means End Analysis. Approaches to Knowledge Representation- Using Predicate Logic 2nd Rules.

**UNIT-II ARTIFICIAL NEURAL NETWORKS** 9

Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perception Networks, Adaptive Linear Neuron, Back propagation Network. Associative Memory Networks, Training Algorithms for pattern association, BAM and Hopfield Networks.

**UNIT-III UNSUPERVISED LEARNING NETWORK** 9

Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various i networks.

**UNIT- IV FUZZY LOGIC** 9

Introduction to Classical Sets ( crisp Sets)and Fuzzy Sets- operations and Fuzzy sets. Classical Relations -and Fuzzy Relations- Cardinality, Operations, Properties and composition. Tolerance and equivalence relations. Membership functions- Features, Fuzzification, membership value assignments, Defuzzification.

**UNIT-V APPLICATIONS** 9

Fuzzy Arithmetic and Fuzzy Measures, Fuzzy Rule Base and Approximate Reasoning Fuzzy Decision making Fuzzy Logic Control Systems. Genetic Algorithm- Introduction and basic operators and terminology. Applications: Optimization of TSP, Internet Search technique.

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | S N Sivanandam, S N Deepa | Principles of Soft Computing | Wiley India | 2007 |
| 2. | Fakhreddine 0 Karray, Clarence D Silva | Soft Computing and Intelligent System Design | Pearson Edition | 2004 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Amit Konar | Artificial Intelligence and Soft Computing- Behavioral and Cognitive Modeling of the Human Brain | CRC press | 2000 |
| 2. | Elaine Rich and Kevin Knight | Artificial Intelligence | TMH | 2008 |
| 3. | Stuart J. Russell and Peter Norvig | Artificial Intelligence A Modern Approach | Prentice Hall | 2010 |
| 4. | Hung T. Nguyen, Elbert A. Walker | A first course in Fuzzy Logic | CRC. Press | 2005 |
| 5. | N. P. Padhy | Artificial Intelligence and Intelligent Systems | Oxford Universi ty Press | 2005 |

**WEB URLs**

1. www.slideshare.net/ganeshpaul6/soft-computing-14879490
2. www.myreaders.info/html/soft_computing.html
3. www.nptel.ac.in/courses/106106046/41
4. www2.cs.uh.edu/~ceick/6367/Soft-Computing.pdf
5. www.soft-computing.de/def.html

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**19ITE32** **REAL TIME SYSTEMS** **L T PC**
**3 0 0 3**

## COURSE OBJECTIVES

1. To understand the basic concepts of real-time computing
2. To understand the major issues real-time scheduling and real-time kernels. To write Real-time scheduling algorithms
3. To understand timing analysis and resource control in realtime system
4. To design the real time database and faulttolerant techniques
5. To implementation the real-timeoperating systems.

## COURSE OUTCOMES

1. Apply the knowledge of operating system concepts to understand real time system.
2. Implement the tasks scheduling of Real time systems.
3. Define various protocols for effective resource sharing.
4. Find out the fault in real time system by using various techniques.
5. Design real time system for various real time applications.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE32.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE32.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE32.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE32.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE32.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

## UNIT-I INTRODUCTION TO REAL TIME SYSTEM 9

Typical RT applications - Hard and soft Real Time constraints - Hard and soft RTS - Reference Modeling RTS - Issues in RTS - Structure of RTS

## UNIT II REAL TIME SCHEDULING 9

Task, processes, processors - Task allocation algorithm - Single processor and multi processor Scheduling - Clock driven and priority based scheduling algorithm

## UNIT III TIMING ANALYSIS AND RESOURCE CONTROL 9

Prediction of Execution Time - Worst Case Execution Time (WCET) analysis – Assumptions on Resources and Their Usage – Resource Contention and Resource Access Control – Priority Ceiling Protocol – Priority Inheritance Protocol – Stack Based Priority Ceiling Protocol – Preemption Ceiling Protocol.

## UNIT IV REAL TIME DATABASE AND FAULT TOLERANT TECHNIQUES 9

Transaction priority and concurrency control issues - Disk scheduling - Fault type and Detection Techniques - Redundancy management – Integration issues

## UNIT V REAL TIME SYSTEM CASE STUDIES 9

Examples of Hard, Soft and Firm real time systems like automatic chocolate vending machine, Smart Card and Adaptive Cruise Control System in a car or flight.

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Jane .W. S. Liu | Real Time Systems | Pearson Education | 2012 |
| 2. | Krishna .C.M | Real Time Systems | Mc-Graw Hill | 2010 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1 | Prasad K.V.K.K | Embedded/Real-Time Systems: Concepts, Design and Programming Cognitive Modeling of the Human Brain | Dream Tech Press | 2014 |
| 2 | Sriram V Iyer , Pankaj Gupta | Embedded Real Time Systems Programming | McGraw Hill | 2010 |
| 3 | Phillip A. Laplante | Real-Time Systems Design & Analysis | John Wiley & Sons | 2006 |
| 4 | Maryline Chetto | Real-time Systems Scheduling | John Wiley & Sons | 2014 |
| 5 | Rajib Mall | Real-Time Systems: Theory and Practice | Pearson | 2006 |

**WEB URLs**

1. www.freevideolectures.com/Course/3049/Real-Time-Systems
2. www.nptel.ac.in/courses/106105036/
3. www.bogotobogo.com/cplusplus/embeddedSystemsProgramming.php
4. www.cse.unsw.edu.au/~cs9242/08/lectures/09-realtimex2.pdf
5. www.youtube.com/watch?v=BxYwjdrdnQg

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| 19ITE33 | MACHINE LEARNING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**COURSE OBJECTIVES**

1. To learn about learning systems
2. To understand Decision Tree Learning and Ensemble Learning
3. To understand Computational Learning Theory
4. To understand ANN
5. To differentiate Supervised and Unsupervised learning

**COURSE OUTCOMES**

1. Knowledge about learning systems
2. Differentiate Decision tree and ensemble learning
3. Analyze the performance of various learning systems.
4. Design an learning system
5. Distinguish Supervised and Unsupervised learning

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE33.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE33.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE33.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE33.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE33.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |

**UNIT- I: Introduction.** 9

Definition of learning systems- Goals and applications of machine learning- Aspects of developing a learning system: training data, concept representation and function approximation- Inductive Classification- Version spaces and the candidate elimination algorithm- Learning conjunctive concepts.

**UNIT- II: Decision Tree Learning and Ensemble Learning** 9

Representing concepts as decision trees- Recursive induction of decision trees- Picking the best splitting attribute: entropy and information gain- Searching for simple trees and computational complexity- Occam's razor- Overfitting, noisy data, and pruning- Ensemble Learning- Active learning with ensembles- Measuring the accuracy of learned hypotheses- Comparing learning algorithms: cross-validation- learning curves and statistical hypothesis testing.

**UNIT- III: Computational Learning Theory** 9

Models of learn ability: learning in the limit; probably approximately correct (PAC) learning. Sample complexity: quantifying the number of examples needed to PAC learn. Computational complexity of training. Sample complexity for finite hypothesis spaces. PAC results for learning conjunctions, kDNF, and kCNF. Sample complexity for infinite hypothesis spaces, Vapnik-Chervonenkis dimension.

**UNIT- IV: Artificial Neural Networks** 9

Neurons and biological motivation. Linear threshold units. Perceptrons: representational limitation and gradient descent training. Multilayer networks and backpropagation. Hidden layers and constructing intermediate, distributed representations. Overfitting, learning network structure, recurrent networks.

**UNIT V: Clustering and Unsupervised Learning** 9

Learning from unclassified data. Clustering. Hierarchical Aglomerative Clustering. k-means partitional clustering. Expectation maximization (EM) for soft clustering. Semi-supervised learning with EM using labeled and unlabled data.

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Tom Mitchell | Machine Learning | Tata Mc Grill | 1997 |

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**19ITE34** **HIGH SPEED NETWORKS**

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**COURSE OBJECTIVES**

1. To learn High speed networks and ATM Architecture
2. To understand resource allocation and s congestion management approaches
3. To understand ATM Congestioncontrol management
4. To understand the integrated and differentiated services
5. To learn protocols for QOS support

**COURSE OUTCOMES**

1. Summarize the mechanisms to provide high speed networking through case studies of ATM and frame relay networks
2. Construct queuing system with different arrival and service rates
3. Analyze the performance of various congestion controls in ATM.
4. Design the integrated and differentiated servicesExplain the protocols needed for QoS support

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE34.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE34.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE34.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE34.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE34.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

**UNIT I HIGH PERFORMANCE NETWORKS** 9

Frame Relay Networks – Asynchronous Transfer Mode (ATM) – ATM Protocol Architecture - ATM logical connection - ATM cell – ATM service categories – ATM Adaptation Layer (AAL) - High Speed LANs: Fast ethernet - Gigabit ethernet - Fiber channel.

**UNIT II QUEUINGMODELS AND CONGESTION MANAGEMENT** 9

Queuing analysis- Queuing models – Single server queues – Effects of congestion – Congestion control – Traffic management – Congestion control in packet switching networks

**UNIT III ATM CONGESTION CONTROL** 9

Performance of TCP over ATM - Traffic and congestion control in ATM – Requirements – Attributes – Traffic management frame work - Traffic control – Available Bit Rate (ABR) Traffic management – ABR rate control - Resource Management (RM) Cell formats – ABR capacity allocations.

**UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES** 9

Integrated services architecture – Approach - Components - Services - Queuing discipline – Fair admission control - Traffic shaping - Resource reservation queuing (FQ) - Processor Sharing (PS) - Bit-Round Fair Queuing (BRFQ) - Generalized Processor Sharing (GPS) - Weighted Fair Queuing (WFQ) – Random early detection - Differentiated services DS code points – Per Hop Behavior

**UNIT V PROTOCOLS FOR QOS SUPPORT** 9

Resource Reservation (RSVP) – Goals & characteristics - Data flow - RSVP operations - Protocol mechanisms – Multiprotocol label switching – Operations - Label stacking – Protocol details – Real Time Protocol (RTP) – Protocol architecture - Data transfer protocol - Real Time Control Protocol (RTCP)

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | William Stallings | High Speed Networks and | Pearson Education | 2002 |
| 2. | Warland & PravinVaraiya | High Performance Communication Networks | Jean Harcourt Asia Pvt. Ltd | 2001 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | IrvanPepelnjk, et al | MPLS and VPN architecture□ | Cisco Press | 2003 |
| 2. | Behrouz A. Forouzan, Sophia Chung Fegan | Data Communications and Networking | McGraw-Hill Higher Education | 2003 |

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**19ITE35** **ANGULAR JS**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**COURSE OBJECTIVES**

1. Understand Angular Technology Stack and Components
2. Outline the layout for dynamic web sites
3. Explain the use of Angular framework, directives
4. Define the basics for pipeline and forms creation
5. Interpret routing methods and testing tools

**COURSE OUTCOMES- Student will be able to**

1. Develop Angular Components, Web components and Custom Elements
2. Design dynamic Web sites using SystemJS and Webpack
3. Build applications using Angular framework and Directives
4. Create pipes and forms using model driven approach
5. Test Angular applications and Services

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE35.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE35.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE35.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE35.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE35.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |

**UNIT I INTRODUCTION TO ANGULAR** 9

Angular Features and Advantages-Understanding the Angular technology stack and Angular library components-Type Script - Features of Angular - Angular Components: Building with Angular Components, Building Web Components, Custom Elements, Angular CLI, ng-package, The Lifecycle Of Angular Components, Creating A Component, and Deeper Nesting.

**UNIT II WEB DESIGNING AND EVENT BINDING** 9

Building Responsive Web Design With Angular-Introduction To Bootstrap-Creating Responsive Layouts With Bootstrap-Code Design For Responsive Websites. Event Binding - Event Binding In Angular- Building directives, Template Model- SystemJS and Webpack.

**UNIT III DEPENDENCY INJECTION, DIRECTIVES IN ANGULAR** 9

Understanding dependency injection- The dependency injection API-Angular framework for dependency injection-coding pattern for dependencies- overview of service. Directives in Angular-The function of a directive in Angular-Various Types Of Directives- Custom Directive-Built-In Directives And Custom Structural Directives.

**UNIT IV PIPES AND FORMS IN ANGULAR** 9

Pipes in angular - features- various built-in pipes in angular, creating a custom pipe in angular. Forms in angular -Advantages Of Forms- Template-Driven Forms-Reactive Forms, Angular Validation-Model Driven Approach.

**UNIT V ANGULAR ROUTING, TESTING ANGULAR APPLICATIONS** 9

What is Angular Routing- Fundamentals, Benefits, and Features-Building A Single Page Application And Updating It Dynamically With Angular Routing - Parameter Routing- Router Lifecycle Hooks and Child Routes.Testing Angular applications- Setup and Tools For Testing-Deploying Angular Test Bed For Testing On The Angular Framework-Testing Services In Angular.

**TOTAL HOURS: 45**

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**TEXT BOOK**

| Sl.No | AUTHOR(s) | TITLE OF THE BOOK | PUBLISHER | YEAR OF PUBLICATION |
|---|---|---|---|---|
| 1. | Ray Yao | ANGULARJS: In 8 Hours, For Beginners, Learn Coding Fast! | CreateSpace Independent Publishing Platform | 2016 |
| 2. | Felix Alvaro | ANGULARJS: Easy AngularJS For Beginners | CreateSpace Independent Publishing Platform | 2016 |
| 3. | Matt Frisbie | AngularJS Web Application Development Cookbook | Packt Publishing | 2014 |

**REFERENCE BOOK**

| Sl.No | AUTHOR(s) | TITLE OF THE BOOK | PUBLISHER | YEAR OF PUBLICATION |
|---|---|---|---|---|
| 1. | Shyam Seshadri | AngularJS: Up and Running: Enhanced Productivity with Structured Web Apps | Paper back | 2014 |
| 2. | Adam Freeman | Pro AngularJS | Paper back | 2018 |
| 3. | Istan Novak | Unraveling AngularJS 1.5: With Over 140 Complete Samples | CreateSpace Independent Publishing Platform | 2015 |
| 4. | Brad Green , Shyam Seshadri | AngularJS | O'Reilly Media, Inc. | 2013 |
| 5. | Jeffry Houser | Learn With AngularJS, Bootstrap, and ColdFusion | DotComIt, LLC; 2nd edition | 2016 |

**WEB REFERENCE(s)**

1. http://tutorial.techaltum.com/angularjs-tutorial.html
2. https://www.w3schools.com/angular/
3. https://docs.angularjs.org/tutorial
4. https://thinkster.io/a-better-way-to-learn-angularjs
5. https://jasonwatmore.com/

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**19ITE36** **ANGULAR JS LABORATORY** **L T P C**
**0 0 2 1**

**COURSE OBJECTIVES**

1. Understand Angular Technology Stack and Components
2. Outline the layout for dynamic web sites
3. Explain the use of Angular framework, directives
4. Define the basics for pipeline and forms creation
5. Interpret routing methods and testing tools

**COURSE OUTCOMES- Student will be able to**

1. Develop Angular Components, Web components and Custom Elements
2. Design dynamic Web sites using SystemJS and Webpack
3. Build applications using Angular framework and Directives
4. Create pipes and forms using model driven approach
5. Test Angular applications and Services

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITE35.CO1 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE35.CO2 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE35.CO3 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE35.CO4 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |
| 19ITE35.CO5 | X | X | X | X | X | - | - | - | - | - | X | X | X | - | - | - |

**LIST OF EXPERIMENTS**

1. Creating a Data bound Component
2. Communicating with Child Components
3. Communicating with Parent Components
4. Hiding and Showing Elements with ngSwitch
5. Adding Style with ngClass
6. Creating and Injecting Services
7. Create a Directive
8. Using the Lowercase Pipe
9. Using the Date Pipe with Parameters
10. Creating a Custom Pipe
11. Creating and Validating a Template-based Form
12. Creating and Validating a Reactive Form
13. Write a Basic Test
14. Test a Service

**Total Hours : 30**

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# EMPLOYABILITY ENHANCEMENT COURSES (EEC)

**19ITP01** **PROJECT WORK PHASE I** **L T P C**
**0 0 10 5**

**COURSE OBJECTIVES**

1. To practical implementation of theoretical knowledge gained during the study from First year to Third year
2. To implement their ideas/real time industrial problem/ current application of their engineering branch which they have studied in curriculum
3. To build confidence in the student what he has learnttheoretically.
4. T o identify the appropriate problem solving methodology
5. T o Analyze and process the experimental information

**COURSE OUTCOMES**

1. Prepare a literature survey in a specific domain as a team / individual to motivate lifelong learning.
2. Identify the problem which needs to be provided a sustainable solution using modern tools
3. Analyze the problem definition and design its impact on the society and environment.
4. Document the literature and bindings.
5. Chose the domain of Information Technology and programming languages and apply to variety of real time problem scenarios.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITP01.CO1 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 19ITP01.CO2 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 19ITP01.CO3 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 19ITP01.CO4 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 19ITP01.CO5 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |

**Content:**

- Project helped students to gather, organize, summarize and interpret technical literature with the purpose of formulating a project proposal.
- B.E. Projects can be two types: Projects based on implementation of anyapplicationoriented
- problem, which will be more or less experimental in nature, and the others will be based on some innovative/ theoretical work.
- In Project Phase-I the student will undertake project over the academic year, which will involve the analysis, design of a system or sub system in the area identified earlier in the field of Information Technology.
- The topic must be formulated in consultation with the guide and projectcoordinator.
- The project will be undertaken preferably by a group of 1-3 students who will jointly work and implement the project.
- The group will select a project with approval from a committee formed by the department of senior faculty to check the feasibility and approve the topic.

**Review Committee:**

- The Head of the department/Project coordinator shall constitute a reviewcommittee for project work for project group.
- Project guide would be one member of that committee by default.
- The students or project group shall make presentation on the progress made by them before the committee.
- The record of the remarks/suggestions of the review committee should be properly maintained and should be made available at the time ofexamination.
- Each student/group is required to give presentation as part of review for 10 to 15 minutes followed by
- a detailed discussion.

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## PROJECT WORK REVIEWS

- Project work phases will have a minimum of three internal reviews by an appointed committee of faculty.
- The final review will be done by an external faculty

**Review 1: Finalization of scope** – the objectives and scope of the project should be finalized in second week of their academic semester. Should finalize list of required hardware, software or other equipment for executing the project, test environment/tools.
**Review 2: Finalization** – High level design, planning.**Guidelines for Students and Faculty: Project Review Committee:**

1. This committee will be responsible for evaluating the timely progress of the projects and communicating the progress report to the students.
2. As far as possible Students should finalize the same project titletaken for Project.
3. Review committee should conduct "Feasibility Review" in first week after commencement of the term. Review committee should finalize the scope of theproject.
4. If change in project topic is unavoidable then the students should complete the process of project approval by submitting synopsis along with the review of important papers. This new project topic should be approved by review committee.

**Term Work:**

1. The term work will consist of a report prepared by the student on the project allotted to them.
2. They should use appropriate tools for the preparation of the report like project planning, UML diagram, testing tools, referencing tools etc.

**Report Structure**

- Contents
- List of Abbreviations
- List of Figures
- List of Graphs
- List of Table

1. Introduction and aims/motivation and objectives
2. Literature Survey
3. Problem Statement
4. Project Requirements
5. System Analysis Proposed Architecture/ high level design of the project
6. Verification Validation
7. Project plan
8. Conclusion
9. References
10. Appendices

**Evaluation Guidelines:**

- A panel of examiner will evaluate the viability of project / project scope.
- The panel will also verify that all the suggestions/comments in the review document are taken care and accordingly allot the term workmarks.
- Oral examination in the form of presentation will be based on the project work completed by the candidates. Preliminary report must also be presented during the oral examination.

**TOTAL HOURS: 150**

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**19ITP02** **PROJECT WORK - PHASE II** **L T P C**
**0 0 20 10**

## COURSE OBJECTIVES

1. To Plan an experimental design to solve Engineering problems
2. To develop an attitude of team work and independent working on real time problems
3. To Analyze and process the experimentalinformation
4. To evaluate, interpret and justifythe experimental results
5. To develop a dissertation report

## COURSE OUTCOMES

1. Plan an experimental design to solve engineering / societal problems using modern tools
2. Develop lifelong learning to keep abreast of latest technologies.
3. Analyze and implement the design to provide sustainable solutions.
4. Evaluate and interpret the experimental results and analyze the impact on society and environment.
5. Implement and test the application for the real time problems.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITP02.CO1 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 19ITP02.CO2 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 19ITP02.CO3 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 19ITP02.CO4 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 19ITP02.CO5 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |

## PROJECT WORK REVIEWS

- Project work phases will have a minimum of three internal reviews by an appointed committee of faculty.
- The final review will be done byan external faculty

**Review 3:** Implementation Status and testing document.
**Review 4:** Final Project Demonstration, Project Report and proper Result analysis

The group will submit at the end of semester II.

**a.** The Workable project.

**b.** Project report ( Word Document) in the form of bound journal complete in all respect – 1 copy for the Institute, 1 copy for guide and 1 copy of each student in the group for certification. The project report contains the details.

1. Problem definition
2. Requirement specification
3. System design details (UML diagrams)
4. System implementation – code documentation – dataflow diagrams/ algorithm, protocols used.
5. Test result and procedure
6. Conclusions.
7. Appendix a. Tools used b. References c. Base papers.

**TOTAL HOURS: 300**

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**16ITP03** **COMPREHENSION** **L T P C**
**0 0 2 1**

## COURSE OBJECTIVES

1. To write effective and coherent paragraphs
2. To comprehend the overall and internal organization of an academic essay
3. To write an effective thesis statement
4. To use pre-writing strategies to plan writing
5. To Produce coherent and unified paragraphs with adequate support and detail of the topic

## COURSE OUTCOMES

1. Write a paragraph with a topic sentence, support, and concludingsentence
2. Write an effective introduction thesis statement that addresses the writing prompt and conclusion
3. Produce a well-organized academic essay and use a variety of accurate sentence structures
4. Produce appropriate vocabulary and correct wordforms
5. Produce accurate grammatical structures for the paragraph writing

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITP03.CO1 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP03.CO2 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP03.CO3 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP03.CO4 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP03.CO5 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |

## COMPREHENSION TOPICS:

1. Cloud Computing for Small Businesses
2. Role of Information Technology in Corporate Functions
3. Knowledge Management
4. The Impact of Cloud Computing
5. Cluster computing
6. Computer Forensics
7. The Internet of Things
8. Data Security
9. Green Computing
10. Issue on eGovernment Development and Applications
11. Big Data
12. Design of Reversible Computing Systems
13. Social Platforms

**TOTAL HOURS: 30**

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**19ITP04** **TECHNICAL SEMINAR** **L T P C**
**0 4 0 2**

**COURSE OBJECTIVES**

1. To expose students to the 'real' working environment and get acquainted with the organization structure, Business operations and administrative functions
2. To promote and develop presentation skills and import a knowledgeable society
3. To set the stage for future recruitment by potential employers
4. To develop the presentation skill for employability
5. To Utilize available technical resources in efficient manner

**COURSE OUTCOMES**

1. Develop a skill for work in actual working environment.
2. Utilize available technical resources in efficient manner.
3. Write technical documents and give oral presentations related to the work completed.
4. Prepare a presentation in latest trends in Information Technology.
5. Implement the presentation in latest trends in Information Technology

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITP04.CO1 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP04.CO2 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP04.CO3 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP04.CO4 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP04.CO5 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |

**Seminar Topic:**

Seminar topic should relate to the Information Technology, Some of the seminar topics are listed below:

1. FreeNet
2. Linear Programming in Cloud
3. Blackberry Technology
4. Biometric Security Systems
5. Credit Card Fraud Detection
6. Vehicle Management System
7. Smartshader Technology
8. Digital Piracy
9. Google Glass
10. Data Recovery
11. Cyber and Social Terrorism
12. Space Mouse
13. Pill Camera
14. Ambient Intelligence
15. Mind Reading Computer
16. Honeypots
17. Security through Obscurity
18. Electronic Banking
19. Gi-Fi

**Scheme of Evaluation:**

The Course is evaluated based on:

- Presentation
- Student's reports
- PPT presentation
- Presentation will take place in the weekly class. The presentation is evaluation by your class in charge.
- Report must be submitted during presentation. The report evaluation is done by your class in charge.
- A Viva voce comprising comprehensive questions basedon the presentation.

**TOTAL HOURS: 60**

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**19ITP05** **ENTREPRENEURSHIP DEVELOPMENT** **L T P C**
**3 0 0 3**

**COURSE OBJECTIVES**

1. To promote strong entrepreneurship among Engineers, Managers and Science students.
2. To promote entrepreneurship among relevant sectors in the state.
3. To collaborate with other organizations andinstitutions.
4. To organize entrepreneurship development and awarenessprograms.
5. To undertake research studies to identify high technology areas having entrepreneurship opportunities.

**COURSE OUTCOMES**

1. Identifying real problems and a solutions people want pitching solutions, such as products and services.
2. Achieve high degree of productivity in a small team via agile, high quality practices and team organization approaches
3. Create a production software developmentenvironment.
4. Prepare landscape and approaches for attracting investors and securing funding Communicating with customer
5. Achieve customer satisfaction in the development of IT products and services

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITP05.CO1 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP05.CO2 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP05.CO3 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP05.CO4 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP05.CO5 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |

**UNIT I** 9

**CONCEPT OF ENTREPRENEURSHIP**: Meaning and characteristics of entrepreneurship, entrepreneurial culture, socio-economic origin of entrepreneurship, factors affecting entrepreneurship, conceptual model of entrepreneurship, traits of a good entrepreneur, entrepreneur, intra-preneur and manager ENTREPRENEURIAL MOTIVATION: motivating, compelling and facilitating factors, entrepreneurial ambition, achievement motivation theory and Kakinada experiment

**UNIT II** 9

**ESTABLISHMENT OF ENTREPRENEURIAL SYSTEMS**: search, processing and selection of idea, Input requirements SMALL SCALE INDUSTRY: meaning, importance, characteristics, advantages and problems of SSIs. Steps for starting a small industry, guidelines for project report, registration as SSI.

**UNIT III** 9

**ASSISTANCE TO SSI**: need for incentives & subsidies, need for institutional support, role of government and other institutions.

**UNIT IV** 9

**FUNCTIONAL PLANS**: Marketing plan- marketing research for the new venture, steps in preparing marketing plan, contingency planning; Organizational plan- Forms of ownership, designing organizational structure, job design, manpower planning; Financial plan- cash budget, working capital, proforma income statement, Proforma cash flow, proforma balance sheet, break even analysis.

**UNIT V** 9

**SOURCES OF FINANCE**: Debt or Equity financing, commercial banks, venture capital; financial institutions supporting entrepreneurs; legal issues- intellectual property rights, patents, trademarks, copy rights, trade secrets, licensing, franchising.

**TOTAL HOURS: 45**

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**TEXT BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Gupta C. B. and Srinivasan N. P | Entrepreneurial Development | Sultan Chand & Sons | 2014 |
| 2. | Vasant Desai | Management of a Small Scale Industry | Himalaya Publishing House | 2011 |

**REFERENCE BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1 | Sangeetha Sharma | Entrepreneurship Development | PHI Learning Pvt. Ltd | 2016 |
| 2 | K Ramachandran | Entrepreneurship Development | Tata McGraw-Hill | 2009 |
| 3 | Abhishek Nirjar | Entrepreneurship Development | CBS Publishers | 2014 |
| 4 | S. Anil Kumar | Entrepreneurship Development | New Age International | 2008 |
| 5 | Fang Zhao | Information Technology Entrepreneurship and Innovation | O'Reilly | 2008 |

**WEB URLs**

1. https://www.tutorialspoint.com/entrepreneurship_development/index.htm
2. https://www.entrepreneur.com/article/244279
3. https://ocw.mit.edu/courses/entrepreneurship/
4. http://freevideolectures.com/Course/3645/Technology-Entrepreneurship
5. http://articles.bplans.com/11-excellent-free-online-courses-for-entrepreneurs

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**19ITP06** **PROFESSIONAL PRACTICES** **L T P C**
**0 0 6 3**

## COURSE OBJECTIVES

1. To examine important professional issues in contemporary practice and to help students become an effective participant in a team of IT professionals.
2. To have gained a thorough understanding of the various issues/factors an IT professional faces and how one should respond.
3. To have learned what are considered professional behavior in the IT field
4. To have learned about the current IT practices.
5. To Develop professional attitude from the perspectives of experienced IT practitioners

## COURSE OUTCOMES

1. Describe the various issues/factors an information technology professional
2. Describe professional behavior in the information technology.
3. Recognize what are the current issues in IT and the emerging technology
4. Write properly formatted and organized technical reports
5. Acquire and integrate knowledge to appreciate industry practices

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ITP06.CO1 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP06.CO2 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP06.CO3 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP06.CO4 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |
| 19ITP06.CO5 | - | - | - | - | - | - | - | X | X | X | X | X | - | - | - | - |

## CONTENT:

1. **Discipline-specific knowledge and capabilities**: appropriate to the level of study related to an Information Technology profession.
2. **Communication**: using oral, written and interpersonal communication to inform, motivate and effect change
3. **Digital literacy:** using technologies to find, use and disseminate information
4. **Critical thinking**: evaluating information using critical and analytical thinking and judgment
5. **Problem solving:** creating solutions to authentic (real world and ill-defined) problems
6. **Self-management:** working and learning independently, and taking responsibility for personal actions.
7. **Teamwork**: working and learning with others from different disciplines and backgrounds
8. **Global citizenship:** engaging ethically and productively in the professional context and with diverse communities and cultures in a global context

### Information Technology Professionalism

A. Privacy and confidentiality
B. Computer ethics
C. Intellectual property issues
D. Computer crime and fraud
E. Professional bodies
F. Impact of information technology on society

### Information Technology Practices

A. Effects of standardization
B. Effectiveness vs efficiency
C. Distributed systems issues
D. Emerging technologies
E. Quality issues
F. Current issues

**TOTAL HOURS: 90**

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**TEXT BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Schultz, Robert A | Contemporary Issues in Ethics and Information Technology | IRM Press | 2006 |
| 2. | Baase S | A Gift of Fire, Social, Legal and Ethical Issues for Computers and the Internet | Prentice Hall | 2003 |

**REFERENCE BOOKS:**

| S.No. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1 | Johnson DG | Computer Ethics | Prentice Hall | 2001 |
| 2 | Spinello RA | CyberEthics: Morality and Law in Cyberspace | Jones and Bartlett | 2000 |

**WEB URLs**

1. www.infosec.gov.hk
2. www.pcpd.org.hk
3. www.ipd.gov.hk
4. www.ogcio.gov.hk
5. www.hkcs.org.h

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# OPEN ELECTIVE COURSES (OEC)

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**19MEE07** **INDUSTRIAL AUTOMATION & ROBOTICS** **L T P C**
**3 0 0 3**

**COURSE OBJECTIVES**

- To learn the levels of automation and production economics
- To impart the knowledge on Material handling and Identification Technologies.
- To know the Automated Assembly System
- To impart clear knowledge about the techniques and applications of Automation and Robotics Programming in an industrial environment.
- To understand robotic systems and apply what they learned to a career in the Automation and Robotics field.

**COURSE OUTCOMES**

- Understand levels of automation and production economics.
- Understand the Material handling and Identification Technologies.
- Explain the Automated Assembly Systems.
- Understand the techniques and applications of Automation and Robotics Programming in an industrial environment.
- Design and implement robotic systems and apply what they learned to a career in the Automation and Robotics field.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19MEE07.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19MEE07.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19MEE07.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19MEE07.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19MEE07.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

**UNIT I: INTRODUCTION** **9**

Automation in Production System, Principles and Strategies of Automation, Basic Elements of an Automated System,
Advanced Automation Functions, Levels of Automations. Production Economics: Methods of Evaluating Investment
Alternatives, Costs in Manufacturing, Break Even Analysis, Unit cost of production, Cost of Manufacturing Lead time and Work-in-process.

**UNIT II: MATERIAL HANDLING AND IDENTIFICATION TECHNOLOGIES** **9**

The material handling function, Types of Material Handling Equipment, Analysis for Material Handling Systems, Design of the System, Conveyor Systems, Automated Guided Vehicle Systems. Automated Storage Systems: Storage System Performance, Automated Storage/Retrieval Systems, Work-in-process Storage, Interfacing Handling and Storage with Manufacturing. Product identification system: Barcode, RFID etc.

**UNIT III: AUTOMATED ASSEMBLY SYSTEMS** **9**

Design for Automated Assembly, Types of Automated Assembly Systems, Part Feeding Devices, Analysis of Multi-station Assembly Machines, Analysis of a Single Station Assembly Machine.

**UNIT IV: FUNDAMENTALS OF ROBOT AND END EFFECTORS** **9**

Robot - Definition - Robot Anatomy - Co ordinate Systems, Work Envelope Types and Classification-Specifications-Pitch,Yaw, Roll, Joint Notations, Speed of Motion, Pay Load- Robot Parts and their Functions-Need for Robots-Different Applications. End Effectors-Grippers-Mechanical Grippers, Pneumatic and Hydraulic- Grippers, Magnetic Grippers,Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

**UNIT V: ROBOT KINEMATICS AND ROBOT PROGRAMMING** **9**

Forward Kinematics, Inverse Kinematics and Difference; Forward Kinematics and Reverse Kinematics of manipulators with Two, Three Degrees of Freedom (in 2 Dimension), Velocity and Forces-Manipulator Dynamics, Trajectory Generator. Lead through Programming, Robot programming Languages-VAL Programming-Motion Commands, Sensor Commands, End Effector commands and simple Programs.

**TOTAL = 45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | M.P.Grover | Automation, Production Systems and Computer Integrated Manufacturing | Pearson Education | 2015 |
| 2 | Krishna Kant | Computer Based Industrial Control | EEE-PHI | 2017 |

**REFERENCE BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1 | Tiess Chiu Chang & Richard A. Wysk | An Introduction to Automated Process Planning Systems | PHI | 1985 |
| 2 | Amber G.H & P.S. Amber | Anatomy of Automation | Prentice Hall | 2009 |
| 3 | S.R. Deb | Robotics Technology and flexible automation | Tata McGraw-Hill Education | 2009 |

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**19MEE18** **POWER PLANT ENGINEERING** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To provide an overview of Power Plants and detailing the role of Mechanical Engineers in their operation and maintenance.
2. To understand about Thermal power plants and working
3. To know about Diesel engine power plants and working
4. To know the working of Nuclear power plants and other power plants
5. To understand Environmental problems related to power plants

## COURSE OUTCOMES

1. Comprehend the working principles of coal based thermal power plants
2. Illustrate the working principles of diesel, gas turbine and combined cycle power plants
3. Illustrate and explain the working principle and components of nuclear power plants
4. Explain the techniques to extract power from renewable energy sources
5. Understand the economic and environmental issues of power plants.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19MEE18.CO1 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19MEE18.CO2 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19MEE18.CO3 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19MEE18.CO4 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |
| 19MEE18.CO5 | X | X | X | X | - | - | - | - | - | - | X | X | X | - | - | - |

## UNIT I: COAL BASED THERMAL POWER PLANTS 9

Rankine cycle - improvisations, Layout of modern coal power plant, Super Critical Boilers, FBC Boilers, Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants – Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogeneration systems.

## UNIT II: DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS 9

Otto, Diesel, Dual & Brayton Cycle - Analysis & Optimisation. Components of Diesel and Gas Turbine power plants. Combined Cycle Power Plants. Integrated Gasifier based Combined Cycle systems.

## UNIT III: NUCLEAR POWER PLANTS 9

Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors : Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANada Deuterium-Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measuresfor Nuclear Power plants.

## UNIT IV: POWER FROM RENEWABLE ENERGY 9

Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, *Solar* Photo Voltaic (SPV), SolarThermal, Geo Thermal, Biogas and Fuel Cell power systems.

## UNIT V: ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS 9

Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria,relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants.

**TOTAL: 45**

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**TEXT BOOKS:**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Nag. P.K., | Power Plant Engineering | Tata McGraw – Hill | 2010 |
| 2 | C. Elanchezhian, L. Saravanakumar, B. Vijaya Ramnath | Power Plant Engineering | I.K.International Publishing house pvt ltd | 2007 |

**REFERENCE BOOKS:**

| | | | | |
|---|---|---|---|---|
| 1. | El-Wakil. M.M | Power Plant Technology | Tata McGraw – Hill Publishing Company Ltd., | 2010 |
| 2. | Thomas C. Elliott | Power Plant Engineering | Standard Handbook of McGraw – Hill | 2003 |
| 3. | Godfrey Boyle | Renewable energy | Oxford University Press | 2004 |
| 4 | R.K.Rajput | Power Plant Engineering | Laxmi Publications | 2016 |
| 5 | S. C. Arora and S. Domkundwar | A COURSE in Power Plant Engineering | Dhanpatrai & Sons, | 2008 |

**WEB URLs**

1. www.youtube.com/watch?v=IdPTuwKEfmA
2. www.youtube.com/watch?v=Uhjhufhg3Xk
3. www.youtube.com/watch?v=9q7_n2E32_g
4. www.youtube.com/watch?v=riRzpm0u81I
5. www.youtube.com/watch?v=hrFeyue--g

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**19MEC26** **TOTAL QUALITY MANAGEMENT** **L T P C**

**3 0 0 3**

## COURSE OBJECTIVES

1. To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management
2. To understand the application of statistical approach for quality control
3. To create an awareness about the ISO and QS certification process and its need for the industries
4. To apply the quality concepts in product design, manufacturing etc in order to maximize customer Satisfaction
5. Human involvement to improve quality and the development and transformation

## COURSE OUTCOMES

1. Understand the concept of total quality management
2. Comprehend and illustrate the TQM principles
3. Solve quality related problems using statistical process control
4. Understand proven methodologies to enhance management processes
5. Illustrate the salient features of quality systems

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19MEC26.CO1 | X | X | X | X | - | - | - | X | - | - | X | X | X | - | - | - |
| 19MEC26.CO2 | X | X | X | X | - | - | - | X | - | - | X | X | X | - | - | - |
| 19MEC26.CO3 | X | X | X | X | - | - | - | X | - | - | X | X | X | - | - | - |
| 19MEC26.CO4 | X | X | X | X | - | - | - | X | - | - | X | X | X | - | - | - |
| 19MEC26.CO5 | X | X | X | X | - | - | - | X | - | - | X | X | X | - | - | - |

## UNIT I: INTRODUCTION 9

Definition of Quality – Dimensions of Quality – Quality Planning – Quality costs – Analysis Techniques for Quality Costs – Basic concepts of Total Quality Management – Historical Review – Quality Statements – Strategic Planning, Deming Philosophy – Crosby philosophy – Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen-Obstacles to TQM Implementation

## UNIT II: TQM PRINCIPLES 9

Principles of TQM, Leadership – Concepts – Role of Senior Management – Quality Council, Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits– Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure

## UNIT III: STATISTICAL PROCESS CONTROL (SPC) 9

The seven tools of quality – Statistical Fundamentals – Measures of central Tendency and Dispersion,Population and Sample, Normal Curve, Control Charts for variables X bar and R chart and attributes P, nP, C, and u charts, Industrial Examples, Process capability, Concept of six sigma – New seven Management tools

## UNIT IV: TQM TOOLS 9

Benchmarking – Reasons to Benchmark – Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, and Benefits – Taguchi Quality Loss Function – Total Productive Maintenance (TPM) – Concept, Improvement Needs, and FMEA – Stages of FMEA- Case studies

## UNIT V: QUALITY SYSTEMS 9

Need for ISO 9000 and Other Quality Systems – ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, ISO 9000:2005 (definitions), ISO 9001:2008 (requirements) and ISO 9004:2009 (continuous improvement), TS 16949, ISO 14000, AS9100 – Concept, Requirements and Benefits- Case studies

**Total L: 45**

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**TEXT BOOKS:**

| S.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Dale H. Besterfiled | Total Quality Management | Pearson Education Inc, New Delhi | 2003 |
| 2. | James R. Evans and William M. Lidsay, | The Management and Control of Quality | South-Western | 2002 |

**REFERENCE BOOKS:**

| S.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | N. Gupta and B. Valarmathi, | Total Quality Management | Tata McGraw-Hill Publishing Company Pvt Ltd., New Delhi | 2009 |
| 2 | Dr S. Kumar | Total Quality Management, | Laxmi Publications Ltd., New Delhi | 2006 |
| 3 | P. N. Muherjee | Total Quality Management | Prentice Hall of India, New Delhi | 2006 |
| 4 | James R. Evans and William M. Lindsay | The Management and Control of Quality | 8th Edition, First Indian Edition, Cengage Learning | 2012 |
| 5 | Suganthi.L and Anand Samuel | Total Quality Management | Prentice Hall (India) Pvt. Ltd | 2006 |

**WEB URLs**

1. www.nptel.iitm.ac.in/COURSEs/WebCOURSE-contents/IIT-roorkee/industrial engineering/index.htm
2. www.statit.com/services/SPCOverview_mfg.pdf
3. www.3.ha.org.hk/qeh/wiser/doc/7bqt.pdf
4. www.directory.umm.ac.id/Data%20Elmu/pdf/TQMTools.pdf
5. www.pqm-online.com/assets/files/lib/books/holye2.pdf

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**19ECE06 TELECOMMUNICATION SWITCHING NETWORKS** **L P T C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To introduce fundamentals functions of a telecom switching Systems
2. To provide statistical modeling of telephone traffic and characteristics of blocking and queuing system
3. To learn the various switching networks
4. To introduce the concepts of Digital Switching Systems
5. To study signaling, packet switching and networks.

## COURSE OUTCOMES

1. Describe the Basic Switching concepts of telecommunication.
2. Analyze and evaluate fundamental telecommunication traffic models
3. Solve problems in switching networks
4. Understand the concepts of Digital switching
5. Understand the signaling and packet switching techniques

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 | PSO4 |
| 19ECE06.CO1 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19ECE06.CO2 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19ECE06.CO3 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19ECE06.CO4 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19ECE06.CO5 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |

## UNIT I SWITCHING SYSTEMS 9

Evolution of Telecommunications; Basics of a Switching System; Functions of a Switching System; Crossbar Switching-Principle of Crossbar Switching; Crossbar Switch Configurations; Cross-Point Technology; Crossbar Exchange Organization; A General Trunking; Electronic Switching; Digital Switching Systems.

## UNIT II TRAFFIC ENGINEERING 9

Congestion – Network traffic load and Parameters – Traffic measurement – Lost-call system – Grade of Service and Blocking probability – Modeling switching systems – Incoming traffic and service time characterization – Blocking models and loss estimates – Queuing systems – Simulation models.

## UNIT III SWITCHING NETWORKS 9

Single Stage Networks; Gradings-Principle; Two Stage Networks; Three Stage Networks; Four Stage Networks – Gradings – Link systems – Grades of service of link systems – Application of graph theory to link systems – Use of expansion – Call packing – Rearrangeable networks – Strict-sense non-blocking networks –Sectionalized switching networks.

## UNIT IV DIGITAL SWITCHING SYSTEMS 9

Space and time switching – Time-division switching networks – Grades of service of time-division switching networks– hybrid time and space division multiplexes – Non-blocking networks – Synchronization – Call-processing functions – Common control – Reliability, availability and security – Stored program control.

## UNIT V SIGNALING AND PACKET SWITCHING 9

Customer line signaling – FDM carrier systems – PCM signaling – Inter-register signaling – Common-channel signaling principles – CCITT signaling – Digital customer line signaling – Statistical multiplexing – Local area and wide area networks – Large scale and Broadband networks.

**Total:45 Hrs**

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**TEXT BOOKS**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Thiagarajan Viswanathan | elecommunication Switching Systems and Networks | Prentice Hall of India Pvt.Ltd | 2006 |
| 2. | William Stallings | ireless Communication and Networks | Pearson Education, New Delhi | Second edition 2004 |

**REFERENCE BOOKS**

| Sl.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | J.E. . Flood | Telecommunications Switching, Traffic and Networks | Pearson Education Ltd | 2006 |
| 2. | John C Bellamy | Digital Telephony | John Wiley | 3rd Edition, 2000 |
| 3. | Behrouz Forouzan | Introduction to Data Communication and Networking | Tata Mc-Graw Hill New York | 1996 |
| 4. | Tomasi | Introduction to Data Communication and Networking | Pearson Education | 1st Edition, 2007 |
| 5. | R.A.Thomson | Telephone switching Systems | Artech House Publishers | 2000 |

**WEB URLs**

1. www.nptel.ac.in/courses/117104128/12
2. www nptel.ac.in/courses/106105082/20
3. www nptel.ac.in/courses/117104104/
4. www nptel.ac.in/courses/117101050/25
5. www nptel.ac.in/courses/106105080/pdf/M4L1.pdf

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**19ECE08** **MOBILE AD-HOC NETWORKS** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To gain knowledge in wireless network protocol and standards.
2. To study the MAC, Routing protocols for ad hoc networks.
3. To gain knowledge about Network Simulator.
4. To learn the concept of security mechanism for wireless networks.
5. To study about Characteristics of security protocols.

## COURSE OUTCOMES

1. Demonstrate the current ad-hoc/sensor technologies by researching key areas such as algorithms, protocols and applications
2. Identify the major issues associated with ad-hoc/sensor networks and supporting software in adhoc/sensor networks.
3. Create a wireless network scenario and analyze its performance using network simulator
4. Choose security component for five layers of networks
5. Analyze the characteristics of different security protocols

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ECE08.CO1 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19ECE08.CO2 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19ECE08.CO3 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19ECE08.CO4 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19ECE08.CO5 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |

## UNIT I INTRODUCTION 9

Introduction to Ad-Hoc wireless networks- Packet radio networks-Key definitions of ad-hoc and sensor networks- Advantages of ad-hoc and sensor networks -Unique constraints and challenges and Vulnerabilities- Wireless Communications/Radio Characteristics. Applications of Ad-Hoc/Sensor Network and Future Directions: Driving Applications- Ultra wide band radio communication- Wireless fidelity systems-optical wireless networks - Simulation of Wi-Fi using QUALNET simulator.

## UNIT II MEDIA ACCESS CONTROL (MAC) PROTOCOLS 9

Issues in designing MAC protocols-Bandwidth efficiency-Quality of service support-Synchronization hidden node-exposed node problems. Classifications of MAC protocols: Contention based protocols-MACAW- Media access protocol for wireless LAN-media access with reduced handshake- contention based with reservation mechanisms- Distributed priority-scheduling. Mac protocols using directional antenna. Simulation of 802.11using QUALNET

## UNIT III ROUTING PROTOCOLS 9

Issues in designing routing protocols-Mobility-bandwidth constraint-Table driven routing protocols :DSDV,WRP,
CHGSRP, - On demand routing protocol : AODV,DSR, TORA,LAR,ANODR- zone routing protocol-Fish eye
state routing protocol-power aware routing protocol. Simulation of routing protocols using QUALNET simulator.

## UNIT IV WIRELESS SENSOR NETWORKS 9

Introduction-sensor network architecture-Data dissemination-data gathering-self organizing, MAC Protocols for Sensor Networks - Location discovery- Quality of a Sensor Network - Evolving Standards - Energy efficient issues- Transport layer. Synchronization issues.

## UNIT V SECURITY ISSUES IN AD HOC / SENSOR NETWORK 9

Introduction -Need for Security- classification of attack-MAC layer attacks-Network layer attacks-Wired Equivalent Privacy(WEP)-Intrusion prevention scheme- Confidentiality : Symmetric Encryption- DES and Triple DES detection systems- Authentication :Digital Signatures, Certificates, User Authentication, Elliptic Curve Cryptosystems. Intrusion detection systems : behavior based detection knowledge based detection-watch dog-path rater. Reputation based system: CORE, CONFIDENT

**Total: 45**

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Department of Information Technology
Muthayammal Engineering College (Autonomous)
Rasipuram, Namakkal Dist

**TEXT BOOKS**

| Sl.N. | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | Siva Ram Murthy C. and Manoj B S, | Ad Hoc Wireless Networks: Architectures and Protocols | Prentice Hall, | 2014. |
| 2. | Toh C K, | Ad Hoc Mobile Wireless Networks: Protocols and Systems | Prentice Hall | 2008 |

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|---|---|---|---|---|
| 1. | Charles Perkins, Addision Wesley, | Ad hoc Networking | Pearson | 2008 |
| 2. | Toh C.K, | Ad Hoc Mobile wireless Networks : protocol and Systems | Prentice Hall PTR, | 2008 |
| 3. | Feng zhao, Leonidas Guibas | Wireless sensor network, | Morgan Kaufmann publishers, | 2015 |
| 4. | Kazem sohraby, Daniel minoli and Taieb Znati, | Wireless sensor networks- Technology, Protocols and Applications | Wiley | 2007 |
| 5. | T.L.Singhal | Wireless Communication | TMH, | 2012 |

**WEB URLs**

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2. www.nptel.ac.in/courses/106105160/3
3. www.nptel.ac.in/courses/106105080/pdf/M5L7.pdf
4. www.ece.rochester.edu/courses/ECE586/lectures/MANETS_MAC.pdf
5. www.onlinecourses.nptel.ac.in/noc17_cs07/announcements

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**19PC-CED11** **WATER SUPPLY ENGINEERING** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVE

1. To make the students conversant with sources, demand and characteristics of water
2. To expose the students to understand the concept of various water supply lines.
3. To provide adequate knowledge about the water treatment processes.
4. To prefer the suitable advanced treatment techniques.
5. To provide knowledge on water distribution and plumbing system

## COURSE OUTCOMES

At the end of the course the student will be able to

1. Identify the quantity and quality of water from various sources.
2. Explain the processes involved in the water conveyance systems
3. Infer the design principles of unit operations and unit processes for water treatment
4. Justify the suitable advanced treatment techniques for water treatment
5. Choose the appropriate water distribution network for a city and plumbing systems for a building

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19ECE06.CO1 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19ECE06.CO2 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19ECE06.CO3 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19ECE06.CO4 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19ECE06.CO5 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |

## UNIT I PLANNING FOR WATER SUPPLY SYSTEM 9

Public water supply system - Planning - Objectives -Design period - Population forecasting -Water demand -Sources of water and their characteristics - Surface and Groundwater- Impounding Reservoir - Development and selection of source-Water quality - Characterization and standards.

## UNIT II CONVEYANCE SYSTEM 9

Water supply -intake structures -Functions and drawings -Pipes and conduits for water- Pipe materials - Hydraulics of
flow in pipes -Transmission main design -Laying, jointing and testing of pipes - Drawings appurtenances - Types and capacity of pumps -Selection of pumps and pipe materials.

## UNIT III WATER TREATMENT 9

Objectives - Unit operations and processes - Principles, functions design and drawing of chemical feeding, Flash mixers, flocculators, sedimentation tanks and sand filters - Disinfection- Residue Management - Construction and Operation & Maintenance aspects of Water Treatment Plants.

## UNIT IV ADVANCED WATER TREATMENT 9

Principles and functions of Aeration - Iron and manganese removal, Defluoridation and demineralization -Water softening - Desalination - Membrane Systems - Recent advances.

## UNITV WATER DISTRIBUTION AND SUPPLY TO BUILDINGS 9

Requirements of water distribution -Components -Service reservoirs - Functions and drawings - Network design - Analysis of distribution networks - Appurtenances -operation and maintenance -Leak detection, Methods. Principles of design of water supply in buildings -House service connection - Fixtures and fittings -Systems of plumbing and drawings of types of plumbing.

**TOTAL: 45**

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| S.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1. | S.K. Garg | Water Supply Engineering | Khanna Publications Pvt.Ltd. New Delhi. | 2010 |
| 2 | Modi, P.N | Environmental Engineering I | Standard Book House, Delhi | 2015 |

**REFERENCE BOOKS:**

| S.No | Author(s) | Title of the Book | Publisher | Year of Publication |
|---|---|---|---|---|
| 1 | Cpheeco Manual | Manual on Water supply and Treatment | Government of India, New Delhi | 2016 |
| 2 | Birdie.G | Water Supply and Sanitary Engineering | Dhanpat Rai and sons | 2011 |
| 3 | Syed R Qasim, Motley E M | Water Works Engineering – Planning, Design and Operation | Prentice- hall of India, New Delhi, | 2013 |
| 4 | Babbit. H. E., and Donald. J. J | Water Supply Engineering | McGraw Hill book Co | 2012 |

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2. www.sswm.info/content/water-distribution-pipes
3. www.who.int/water_sanitation_health/dwq/S12.pdf
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**19PE-EE05 HEALTH MONITORING OF STRUCTURES** **L T P C**
**3 0 0 3**

## COURSE OBJECTIVES

1. To Study about maintenance and repair of structure
2. To impart the quality and durability of concrete
3. To Study about special materials for repair of structures.
4. To learn about repair and demolition technique.
5. To gain the knowledge about rehabilitation and strengthening of structures.

## COURSE OUTCOMES

At the end of the course the student will able to,

1. Obtain the knowledge of maintenance and repair of structures.
2. Obtain the knowledge serviceability and durability of concrete
3. Select suitable material for repair.
4. Select appropriate techniques for repair and demolition
5. Know about repair, rehabilitation and strengthening of structures.

| Course Outcomes | Program Outcomes | | | | | | | | | | | | PSOs | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
| 19PE-EE05.CO1 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19PE-EE05.CO2 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19PE-EE05.CO3 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19PE-EE05.CO4 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |
| 19PE-EE05.CO5 | X | X | X | X | - | - | - | X | - | - | X | X | X | X | - | - |

## UNIT I MAINTENANCE AND REPAIR STRATEGIES 9

Maintenance, repair and rehabilitation - Facts of Maintenance - importance of Maintenance various aspects of Inspection-Assessment procedure for evaluating a damaged structure - causes of deterioration - Diagnosis of causes and preventive measures.

## UNIT II SERVICEABILITY AND DURABILITY OF CONCRETE 9

Quality assurance for concrete construction concrete properties - strength, permeability, thermal properties and cracking - Effects due to climate, temperature, chemicals, corrosion - design and construction errors - Effects of cover thickness and cracking.

## UNIT III SPECIAL MATERIALS FOR REPAIR 9

Special concretes and mortar - concrete chemicals - special elements for accelerated strength gain - Expansive cement - polymer concrete - sulphur infiltrated concrete - ferro cement - Fibre reinforced concrete.

## UNIT IV TECHNIQUES FOR REPAIR AND DEMOLITION 9

Rust eliminators and polymers coating for rebars during repair - foamed concrete - mortar and dry pack - vacuum concrete - Gunite and Shotcrete - Epoxy injection - Mortar repair for cracks - shoring and underpinning - Methods of corrosion protection - corrosion inhibitors - coating and cathodic protection - Engineered demolition techniques for Dilapildated structures - case studies.

## UNIT V REPAIRS, REHABILITATION & STRENGTHENING OF STRUCTURES 9

Repairs to overcome low member strength - Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure - Strengthening of Super Structures - plating - Conversion to composite construction post stressing - Jacketing - Reinforcement addition, strengthening the substructures - Increasing the load capacity of footing.

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|---|---|---|---|---|
| 1. | Denison Campbell, Allen and Harold Roper | Concrete Structures, Materials, Maintenance and Repair | Longman Scientific and Technical UK | 2006 |
| 2. | R.T.Allen and S.C.Edwards | Repair of Concrete structures | Blakie and Sons, UK | 2007 |

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| S.No | Author(s) | Title of the Book | Publisher | Year of Publication |
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| 1. | Dr.B Vidivelli | Rehabilitation of Concrete Structures | Standard Publishers Distributors | 2013 |
| 2. | M.S.Shetty | Concrete Technology -Theory and Practice | S.Chand and Company, New Delhi | 2006 |
| 3. | M.L. Gambhir | Concrete Technology | Tata McGraw Hill Company, Noida | 2011 |
| 4. | Santhakumar, A.R | Training Course notes on Damage Assessment and repairs in Low Cost Housing,"RHDC–NBO" | Anna University | 1995 |
| 5. | Lakshmipathy, M | Lecture notes of Workshop on "Repairs and Rehabilitation of Structures" | - | 1999 |

**WEB URLs**

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3. www.iitk.ac.in/nicee/wcee/article/11_2089.PDF
4. www.brainkart.com/.../Important-Questions-and-Answers--Techniques-for-Repair-an...
5. www.ijiert.org/download-file?file=1490447458_Volume%204%20Issue%203...

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