# VIVEKANANDHA
# COLLEGE OF ENGINEERING FOR WOMEN
## (Autonomous)
## Elayampalayam, Tiruchengode -637205

# CURRICULUM &

# SYLLABI -2019

# FOR

# POST GRADUATE (PG)

## M.TECH- INFORMATION TECHNOLOGY

## REGULATIONS - 2019

## CHOICE BASED CREDIT SYSTEM

***Applicable to the students admitted from the academic year 2021-2022 onwards***

# VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

**(Autonomous)**

**Elayampalayam, Tiruchengode – 637205.**

**M.Tech. Information Technology**

**Regulations – 2019**

**CHOICE BASED CREDIT SYSTEM**

## COLLEGE VISION

To impart value based education in Engineering and Technology to empower young women to meet the societal exigency with a global outlook

## COLLEGE MISSION

- To provide holistic education through innovative teaching-learning practices
- To instill self confidence among rural students by supplementing with co-curricular and extra-curricular activities
- To inculcate the spirit of innovation through training, research and development
- To provide industrial exposure to meet the global challenges
- To create an environment for continual progress through lifelong learning

## DEPARTMENT VISION

Providing quality education to transform students into technically competent skilled women to excel in IT profession, innovation and entrepreneurship.

## DEPARTMENT MISSION

- To empower knowledge on cutting-edge technologies in the field of Information Technology to develop innovative solutions for real-world problems.
- To create a platform for innovation, research and new technology development
- To inculcate ethical practices, life-long learning and sense of societal responsibilities to support the career and personal development of the learner

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) :

**PEO 1 :** The Leadership and team-player ability that enables the students to play a major role as innovators in product design and development related organizations and as an entrepreneur.

**PEO 2 :** Students are expertise to think creatively to discover the real time problems which cater the needs of the society.

**PEO 3 :** To deliver the fundamental responsibilities and progressive knowledge to the graduates that enables them to excellence in delivering lectures, to excel in diverse careers with integrity and ethics.

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**PROGRAMME OUTCOMES (POs):**

Postgraduate engineering programmes are designed to prepare graduates to attain the following program outcomes:

1. Enable the Students to distinguish, evaluate, explore and blend the existing and new technology for enhancement of knowledge in deploying Information technology as solutions.

2. Vest the Students with variety of skills to intricate problems and apply their result to conduct a quality research in a wider theoretical, practical and policy context in Information technology.

3. Aims to impart the skills to the students to think laterally to identify, formulate and interpret a real-time problem into a computationally solvable prototype and to utilize appropriate scientific and engineering techniques in the process.

4. Empowering students to apply appropriate research methodologies, techniques and tools,to demonstrate higher order problem solving skills to contribute a social cause either individually or in a group that hails the development of the society and beings.

5. Facilitate the students to apply strong mathematical and analytical skills from Differential equations, Transforms, optimization, probability, statistics, simulation and engineering economic analysis to predict chaos and uncertainties in the respective industries.

6. Develop the capability to acquire and employ recent technical tools and skills to formulate problem and projects and to design an appropriate Software Development Plan asa continual process for modifying the solution model for timely needs and evolution.

7. Ability to comprehend requirement specification and feasibility studies on complex engineering problems and to design an effective documentation report or manual by adhering to appropriate standards, make effective presentations and give and receive clear instructions.

8. Emphasize the students to engage in life – long learning by spotting contemporary research domains and to make innovative contributions to theses domains with a high level of enthusiasm and commitment to improve knowledge and competence continuously.

9. Cater skills to understand the relevance of the research to the society by the ethical and economic connotations of research outcomes on professional practices and an understanding of responsibility to contribute to the community for sustainable development of society.

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10. Ability to review and consolidate learning, to evaluate performance, to plan future learning based on past learning experience and Self learning.

**PROGRAM SPECIFIC OUTCOME**

1. Ability to solve complex Knowledge Engineering problems by building Systems across various domains including Systems Engineering, Software Development & Engineering.
2. Obtain an understanding of Qualitative and quantitative research and apply this knowledge in the context of professional future.

**Mapping of Program Educational Objectives with Program Outcomes**

A broad relation between the program objective and the outcomes is given in the following table

| Programme Educational Objectives | Programme Outcomes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
| I | √ | √ | √ | | √ | √ | | √ | √ | |
| II | | √ | | √ | | | √ | √ | √ | √ |
| III | | √ | √ | | √ | | √ | | √ | √ |

| CURRICULUM BREAKDOWN STRUCTURE | | | | | | |
|---|---|---|---|---|---|---|
| **Summary of Credit Distribution** | | | | | | |
| **Category** | **Semester** | | | | **Total No. of Credits** | **Curriculum Content (% of total number of credits of the program)** |
| | **SEM 1** | **SEM 2** | **SEM 3** | **SEM 4** | | |
| **HS** | 3 | | | | 3 | 4.23 |
| **BS** | | | | | 0 | 0.00 |
| **ES** | | | | | 0 | 0.00 |
| **PC** | 13 | 13 | | | 26 | 36.62 |
| **PE** | 3 | 6 | 6 | | 15 | 21.13 |
| **OE** | | | 3 | | 3 | 4.23 |
| **EC** | | | 8 | 16 | 24 | 33.80 |
| **Semester wise total** | 19 | 19 | 17 | 16 | **71** | **100.00** |

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## COURSE WITH PROGRAMME OUTCOMES:

| SEM | Subject Name | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SEM1 | Applied Probability & Statistics* | √ | √ | √ | | √ | | | | | |
| | Advanced Algorithms* | √ | √ | √ | √ | √ | | √ | | √ | √ |
| | Machine Learning Techniques* | √ | √ | √ | | √ | √ | | √ | √ | |
| | Advanced Database Technology | √ | √ | | √ | √ | √ | √ | | | √ |
| | Professional Elective-I | | | | | | | | | | |
| | Audit Course –I | | | | | | | | | | |
| | Algorithms and Analysis Laboratory* | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | Machine Learning Laboratory* | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| SEM 2 | Advanced Networks | √ | √ | √ | | √ | | √ | √ | | |
| | Internet of Things | √ | √ | √ | | √ | √ | | √ | | |
| | Advanced Operating Systems | √ | √ | √ | | √ | | √ | | | |
| | Professional Elective-II | | | | | | | | | | |
| | Professional Elective-III | | | | | | | | | | |
| | Audit Course-II | | | | | | | | | | |
| | Advanced Networks Laboratory | √ | √ | √ | √ | √ | √ | | | | |
| | Operating Systems Laboratory | | √ | √ | √ | √ | √ | | √ | √ | √ |
| SEM 3 | Professional Elective-IV | | | | | | | | | | |
| | Professional Elective-V | | | | | | | | | | |
| | Open Elective-I | | | | | | | | | | |
| | Project Phase-I | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| SEM 4 | Project Phase-II | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |

*Common to M.E – CSE & M.TECH - IT

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| | | | | | |
|---|---|---|---|---|---|
| | **VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**<br>(Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205 | | | | |
| Programme | **M.Tech.** | Programme Code | **204** | Regulation | **2019** |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **I** |

**CURRICULUM**

(Applicable to the students admitted from the academic year 2019 - 2020 onwards)

| Course Code | Course Name | Category | Periods / Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | C | CA | ESE | Total |
| **THEORY** | | | | | | | | | |
| P19MA101 | Applied Probability & Statistics* | HS | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| P19IT101 | Advanced Algorithms* | PCC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| P19IT102 | Machine Learning Techniques* | PCC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| P19IT103 | Advanced Database Technology | PCC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| - | Audit Course | AC | 2 | - | - | 0 | 100 | - | 100 |
| - | Professional Elective – I | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| **PRACTICAL** | | | | | | | | | |
| P19IT104 | Algorithms and Analysis Laboratory* | PCC | 0 | 0 | 4 | 2 | 60 | 40 | 100 |
| P19IT105 | Machine Learning Laboratory* | PCC | 0 | 0 | 4 | 2 | 60 | 40 | 100 |
| | | | | | **Total** | **19** | **420** | **380** | **800** |

*Common to M.E – CSE & M.TECH - IT

PCC - Professional Core Courses, PEC - Professional Elective Courses, AC - Audit Courses, HS - Humanities And Social Sciences

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**VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**
(Autonomous Institution, Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme Code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **II** |

**CURRICULUM**
(Applicable to the students admitted from the academic year 2019– 2020 onwards)

| Course Code | Course Name | Category | Periods / Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | C | CA | ESE | Total |
| **THEORY** | | | | | | | | | |
| P19IT206 | Advanced Networks | PCC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| P19IT207 | Internet of Things | PCC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| P19IT208 | Advanced Operating Systems | PCC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| - | Audit Course | AC | 2 | - | - | 0 | 100 | - | 100 |
| - | Professional Elective - II | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| - | Professional Elective - III | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| **PRACTICAL** | | | | | | | | | |
| P19IT209 | Advanced Networks Laboratory | PCC | 0 | 0 | 4 | 2 | 60 | 40 | 100 |
| P19IT210 | Operating Systems Laboratory | PCC | 0 | 0 | 4 | 2 | 60 | 40 | 100 |
| | | | | | **Total Credit** | **19** | **420** | **380** | **800** |

PCC - Professional Core Courses, PEC - Professional Elective Courses, AC - Audit Courses.

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| Programme | **M.Tech.** | Programme Code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **III** |

**CURRICULUM**
(Applicable to the students admitted from the academic year 2019– 2020 onwards)

| Course Code | Course Name | Category | Periods / Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | C | CA | ESE | Total |
| **THEORY** | | | | | | | | | |
| - | Professional Elective - IV | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| - | Professional Elective - V | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| - | Open Elective – I | OEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| **PRACTICAL** | | | | | | | | | |
| P19IT311 | Project Phase I | EEC | 0 | 0 | 16 | 8 | 60 | 40 | 100 |
| | | | | | **Total Credit** | **17** | **180** | **220** | **400** |

PEC - Professional Elective Courses, OEC - Open Elective Courses, EEC - Employability Enhancement Course.

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|---|---|---|---|---|---|
| | **VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**<br>(Autonomous Institution, Affiliated to Anna University, Chennai)<br>Elayampalayam, Tiruchengode – 637 205 | | | | |
| Programme | **M.Tech.** | Programme Code | **204** | Regulation | **2019** |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **IV** |

**CURRICULUM**

(Applicable to the students admitted from the academic year 2019– 2020 onwards)

| Course Code | Course Name | Category | Periods / Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | C | CA | ESE | Total |
| **PRACTICAL** | | | | | | | | | |
| P19IT412 | Project Phase II | EEC | 0 | 0 | 30 | 16 | 60 | 40 | 100 |
| | | | | | **Total Credit** | **16** | 60 | 40 | 100 |

EEC - Employability Enhancement Course.

**Course Cumulative Credits: 71**

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**TYPE OF COURSES**

| | |
|---|---|
| PCC : | Professional Core Courses |
| PEC : | Professional Elective Courses |
| OEC : | Open Elective Courses |
| AC : | Audit Courses |
| TRP&P : | Summer Industry Internship |
| EEC | Employability Enhancement Course |
| PROJ-II : | Project Phase II |
| HS : | Humanities And Social Sciences |

## PROFESSIONAL ELECTIVE COURSES (PEC)

| PROFESSIONAL ELECTIVE - I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **S.NO** | **COURSE CODE** | **COURSE NAME** | **CATEGORY** | **L** | **T** | **P** | **C** | **Maximum Marks** | | |
| | | | | | | | | **CA** | **ESE** | **T** |
| 1 | P19ITE01 | Soft Computing | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 2 | P19ITE02 | Introduction to Intelligent Systems | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 3 | P19ITE03 | Green Computing | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 4 | P19ITE04 | 3G and 4G Wireless Networks | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 5 | P19ITE05 | Mining Massive Datasets | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| **PROFESSIONAL ELECTIVE - II** | | | | | | | | | | |
| **S.NO** | **COURSE CODE** | **COURSE NAME** | **CATEGORY** | **L** | **T** | **P** | **C** | **Maximum Marks** | | |
| | | | | | | | | **CA** | **ESE** | **T** |
| 1 | P19ITE06 | Deep Learning | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 2 | P19ITE07 | Information Retrieval | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 3 | P19ITE08 | Bio Informatics Computing | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 4 | P19ITE09 | Grid Computing | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 5 | P19ITE10 | Multimedia Systems | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

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| PROFESSIONAL ELECTIVE - III | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **S.NO** | **COURSE CODE** | **COURSE NAME** | **CATEGORY** | **L** | **T** | **P** | **C** | **Maximum Marks** | | |
| | | | | | | | | **CA** | **ESE** | **T** |
| 1 | P19ITE11 | Advanced Software Engineering | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 2 | P19ITE12 | Ad-hoc & Sensor Networks | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 3 | P19ITE13 | Information Storage Management | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 4 | P19ITE14 | Knowledge Engineering | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 5 | P19ITE15 | Ethical Hacking and Digital Forensics | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**PROFESSIONAL ELECTIVE – IV**

| **S.NO** | **COURSE CODE** | **COURSE NAME** | **CATEGORY** | **L** | **T** | **P** | **C** | **Maximum Marks** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | **CA** | **ESE** | **T** |
| 1 | P19ITE16 | Human and Computer Interaction | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 2 | P19ITE17 | GPU Computing | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 3 | P19ITE18 | Digital Image Processing | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 4 | P19ITE19 | Energy Aware Computing | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 5 | P19ITE20 | Virtualization Techniques and Applications | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**PROFESSIONAL ELECTIVE – V**

| **S.NO** | **COURSE CODE** | **COURSE NAME** | **CATEGORY** | **L** | **T** | **P** | **C** | **Maximum Marks** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | **CA** | **ESE** | **T** |
| 1 | P19ITE21 | Social Network Analysis | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 2 | P19ITE22 | Information security | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 3 | P19ITE23 | Cyber Forensics | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 4 | P19ITE24 | Business Analytics | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 5 | P19ITE25 | Advanced Software Testing | PEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

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## LIST OF OPEN ELECTIVES

| S.NO | COURSE CODE | COURSE NAME | CATEGORY | L | T | P | C | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CA | ESE | T |
| 1 | P19ITOE1 | Internet of things | OEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 2 | P19ITOE2 | Cloud computing | OEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 3 | P19ITOE3 | Machine learning techniques | OEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 4 | P19ITOE4 | Mobile App Development | OEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 5 | P19ITOE5 | BlockchainTechnology | OEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

## LIST OF OPEN ELECTIVES OFFERED BY COMPUTER SCIENCE AND ENGINEERING

| S.NO | COURSE CODE | COURSE NAME | CATEGORY | L | T | P | C | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | CA | ESE | T |
| 1 | P19CSOE1 | Business Analytics | OEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 2 | P19CSOE2 | Machine Learning Techniques | OEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 3 | P19CSOE3 | Web Engineering | OEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 4 | P19CSOE4 | Cost Management of Engineering Projects | OEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 5 | P19CSOE5 | Internet of Things | OEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| 6 | P19CSOE6 | Data Science and Analytics | OEC | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

## LIST OF AUDIT COURSES

| Course Code | Course Name | Periods / Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| P19ITAC1 | Research Methodology and IPR | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| P19ITAC2 | English for Research Paper Writing | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| P19ITAC3 | Disaster Management | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| P19ITAC4 | Value Education | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| P19ITAC5 | Constitution of India | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| P19ITAC6 | Pedagogy Studies | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| P19ITAC7 | Personality Development through Life Enlightenment Skills. | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| P19ITAC8 | Online Courses | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| P19ITAC9 | Technical Report Writing | 2 | 0 | 0 | 0 | 100 | 0 | 100 |

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| Programme | **M.E. & M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **CSE & IT** | | | Semester | **I** |

| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19MA101** | **Applied Probability & Statistics** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,
- Understand the elementary aspects of statistics and probability theory
- Analyze and interpret statistical data using appropriate probability distribution
- Identify and demonstrate suitable sampling and data collection process.
- Identify testing of hypothesis for all size of samples
- Recognize the concept of multivariate analysis

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:** Inculcate the habit of statistical thinking | K2 |
| **CO2:** Enable to identify various probability distribution | K2 |
| **CO3:** Apply appropriate modern technology to explore probability/statistical concepts | K3 |
| **CO4:** Ability to test the hypothesis using suitable statistical test | K4 |
| **CO5:** Respond appropriate procedures for multivariate analysis | K2 |

**Pre-requisites**: Discrete Mathematics

**CO / PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| Cos | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PSO 1 | PSO 2 |
| CO 1 | 1 | 3 | 3 | 2 | 3 | 2 | - | 2 | - | 3 | 3 | 2 |
| CO 2 | 1 | 3 | 3 | 3 | 3 | - | - | - | 1 | 2 | 3 | 2 |
| CO 3 | 2 | 3 | 3 | 3 | 3 | 2 | - | - | - | 2 | 3 | 2 |
| CO 4 | 3 | 3 | 3 | 3 | 3 | 2 | - | 1 | 1 | 1 | 3 | 2 |
| CO 5 | 2 | 3 | 2 | 2 | 2 | 2 | - | - | 1 | 2 | 2 | 3 |

**Course Assessment Methods**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **ONE DIMENSIONAL RANDOM VARIABLES** | Periods | **9** |
|---|---|---|---|

Random Variables-Probability Function-Moments-Moment Generation Function and their Properties-Binomial-Poisson-Geometric, Uniform, Exponential and Normal Distributions.

| **Unit – II** | **TWO DIMENSIONAL RANDOM VARIABLES** | Periods | **9** |
|---|---|---|---|

Joint Distributions-Marginal and Conditional distributions-Functions of two dimensional random variables-Regression curve-Correlation

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| Unit – III | ESTIMATION THEORY | Periods | 9 |
|---|---|---|---|
| Unbiased Estimators-Methods of Moments-Maximum Likelihood Estimation-Curve Fitting by Principle of Least Squares-Regression lines. | | | |
| **Unit – IV** | **TESTING OF HYPOTHESIS** | Periods | **9** |
| Basic Definitions:- ( Population, Sampling, Tests of Significance, Testing a Hypothesis, Null Hypothesis, Alternative Hypothesis, Level of Significance, Types of Errors ) – Testing of Hypothesis using : ‗t'-Test , ‗F'-Test , Chi Square Test ( $\psi^2$) - Test for Independence of Attributes & Goodness of Fit. | | | |
| **Unit – V** | **MULTIVARIATE ANALYSIS** | Periods | **9** |
| Random Vectors and matrices-Mean vectors and Covariance matrices-Multivariate Normal density and its properties-Principal components Population Principal Components- Principal Components from Standardized variables | | | |
| | | **Total Periods** | **45** |

| **Text Books** | |
|---|---|
| 1. | Devore, J.L., Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage Learning, 2011. |
| 2. | Johnson, R.A., Miller, I. and Freund, J., Miller & Freund's Probability and Statistics for Engineers 8th Edition, Pearson Education, 2010. |
| **References** | |
| 1. | Johnson, R.A. and Wichern, D.W., Applied Multivariate Statistical Analysis, Pearson Education. Asia. 5th Edition, 2002. |
| 2. | Gupta S.C and Kapoor V.K, Fundamentals of Mathematical Statistics, Sultan & sons 2014. |
| 3. | Johnson, D.E., Applied Multivariate Methods for Data Analysis, Thomson and Duxbury Press,1998 |
| **E-Resources** | |
| 1. | http://www.maths.qmul.ac.uk/~pettit/MAS109/chp4.pdf |
| 2. | https://www.brainkart.com/article/Two-Dimensional-Random-Variables_6474/ |
| 3. | https://en.wikipedia.org/wiki/Multivariate_analysis |
| 4. | http://www.stat.columbia.edu/~liam/teaching/4107-fall05/notes3.pdf |

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| Programme | **M.E. &M.Tech.** | Programme code | **204** | Regulation | **2019** | | |
| Department | **CSE & IT** | | | Semester | **I** | | |

| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19IT101** | **Advanced Algorithms** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The student should be made to,<br>• Learn and use hierarchal data structures and its operations<br>• Learn the usage of graphs and its applications<br>• Select and design data structures and algorithms that is appropriate for problems<br>• Learn the operations of various sorting algorithms<br>• Know how to find the complexity among different algorithms | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:** Design and analyze algorithms using divide and conquer, dynamic programming, greedy algorithms. | K3 |
| | **CO2:** Perform probabilistic analysis and amortized analysis of algorithms. | K2 |
| | **CO3:** Use minimum spanning trees, shortest path algorithm, and Maximum flow in graphs to solve problems in networking. | K2 |
| | **CO4:** Solve problems using multithreaded algorithms and linear programming | K3 |
| | **CO5:** Apply String matching algorithms, Computational geometry algorithms to solve problem. | K3 |
| **Pre-requisites** | Data Structures | |

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| Cos | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 3 | - | 1 | 2 | - | - | 1 | - | 2 | 1 | 1 |
| **CO 2** | 3 | 1 | 2 | - | 3 | 2 | - | - | 2 | 1 | 2 | - |
| **CO 3** | - | 3 | 1 | 3 | 1 | - | - | 2 | 1 | 1 | - | 2 |
| **CO 4** | 1 | 1 | 2 | - | - | 2 | - | - | 3 | - | 1 | 1 |
| **CO 5** | 2 | - | 1 | 2 | 1 | 3 | - | 1 | - | 1 | - | 2 |

**Course Assessment Methods**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **INTRODUCTION** | Periods | **9** |
|---|---|---|---|

Role of Algorithms in Computing – Analyzing algorithms – Designing algorithms – Growth of functions – Divide and Conquer – Probabilistic analysis – Randomized algorithms.

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| Unit – II | DESIGN AND ANALYSIS TECHNIQUES | Periods | 9 |
|---|---|---|---|
| Dynamic programming: Rod cutting, Matrix-chain multiplication, Elements of dynamic programming, Optimal binary search trees– Greedy Algorithms: An activity-selection problem, Elements of the greedy strategy, Huffman codes – Amortized Analysis. | | | |
| **Unit – III** | **GRAPH ALGORITHMS** | Periods | **9** |
| Elementary Graph Algorithms – Minimum Spanning trees: Kruskal and Prims Algorithm –Single source shortest paths: – All pairs shortest paths: Floyd-Warshall algorithm, Johnson's algorithm for sparse graphs – Maximum Flow. | | | |
| **Unit – IV** | **ADVANCED ALGORITHMS I** | Periods | **9** |
| Multithreaded algorithms: Multithreaded matrix multiplication, Multithreaded merge sort –Matrix operations: Solving systems of linear equations, Inverting matrices, Symmetric positivedefinite matrices and least-squares approximation – Linear programming – Polynomials and FFT. | | | |
| **Unit – V** | **ADVANCED ALGORITHMS II** | Periods | **9** |
| String matching: Naive string-matching algorithm, Rabin-Karp algorithm, String matching with finite automata, Knuth-Morris-Pratt algorithm– Computational Geometry – NP-Completeness –Approximation algorithms. | | | |
| | | **Total Periods** | **45** |

| **Text Book** | |
|---|---|
| 1. | Thomas H. Cormen, Charles E. Leiseron, Ronald L.Rivest, Clifford Stein, -Introduction to Algorithms‖, Third Edition, PHI learning Pvt. Ltd., 2011. |
| 2. | Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, -Fundamentals of Computer Algorithms‖, Galgotia Publications Pvt. Ltd., 2008. |
| **References** | |
| 1. | Jon Kleinberg and Éva Tardos, Algorithm Design, Pearson, 2005. |
| 2. | Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Wiley, 2006. |
| **E-Resources** | |
| 1. | https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm |
| 2. | https://www.docsity.com/en/study-notes/computer-science/advanced-algorithms/ |
| 3. | https://www.tutorialspoint.com/parallel_algorithm/graph_algorithm.html |

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**VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**
(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.E. &M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **CSE & IT** | | | Semester | **I** |

| Course Code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19IT102** | **Machine Learning Techniques** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,

- Know the characteristics of machine learning that make it useful to real-world problems and the basic underlying concepts
- Know Characteristics of supervised machine learning algorithms
- Learn unsupervised algorithms for clustering, Instance-based learning and Principal Component Analysis
- The inference and learning algorithms for the hidden Markov model and Bayesian networks and few machine learning tools
- Various advanced machine learning algorithms in a range of real-world applications.

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:** Understand the basic concepts, fundamental issues and challenges of machine learning algorithms and the paradigms of supervised learning. | K2 |
| **CO2:** Understand the basic concepts of un-supervised machine learning. | K2 |
| **CO3:** Design and implement basic machine learning algorithms using tools. | K3 |
| **CO4:** Understand the basic concepts and architecture of reinforcement learning algorithms | K2 |
| **CO5:** Design and implement various advanced machine learning algorithms in a range of real world applications. | K3 |

**Pre-requisites**

Artificial Intelligence

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| Cos | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 3 | 2 | - | 1 | 2 | - | - | 1 | 2 | 2 | 1 |
| **CO 2** | 2 | 1 | - | 3 | 1 | 1 | - | - | 1 | 1 | 2 | - |
| **CO 3** | 2 | 2 | 1 | 2 | - | 1 | - | 2 | - | 1 | 1 | 2 |
| **CO 4** | 1 | - | 2 | - | 2 | 3 | - | - | 1 | - | - | 1 |
| **CO 5** | 3 | 2 | 1 | 2 | - | 1 | - | - | 1 | 2 | 2 | - |

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

1. Course - end survey

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**Content of the syllabus**

| Unit – I | INTRODUCTION | Periods | 9 |
|---|---|---|---|
| Introduction- Well-Posed learning problems, Basic concepts, Designing a learning system, Issues in machine learning. Types of machine learning: Learning associations, Supervised learning : Classification and Regression Trees, Support vector machines - Model Selection and feature selection – Decision trees- Ensemble methods :Bagging - Boosting - Real-world applications. | | | |
| **Unit - II** | **UNSUPERVISED LEARNING** | Periods | **9** |
| Unsupervised learning : Clustering, Instance-based learning- K-nearest Neighbor, Locally weighted regression, Radial Basis Function - EM- Mixtures of Gaussians - The Curse of Dimensionality - Dimensionality Reduction - Factor analysis -Principal Component Analysis - Probabilistic PCA-Independent components analysis. | | | |
| **Unit – III** | **PROBABILISTIC GRAPHICAL MODELS** | Periods | **9** |
| Graphical Models -Undirected graphical models - Markov Random Fields - Directed Graphical Models - Bayesian Networks - Conditional independence properties - Inference – Learning - Generalization - Hidden Markov Models – Machine learning tools – R, Scikit Learn, Octave,BigML , WEKA. | | | |
| **Unit – IV** | **REINFORCEMENT LEARNING** | Periods | **9** |
| Reinforcement Learning – Introduction -Elements of Reinforcement Learning – Learning Task – Q-learning – k-armed Bandit Elements – Model-Based learning – Value Iteration – Policy iteration – Temporal Difference Learning - Exploration Strategies – non-deterministic rewards and actions. | | | |
| **Unit – V** | **ADVANCED MACHINE LEARNING** | Periods | **9** |
| Introduction to learning theory - Modeling structured outputs: multi-label classification, introduction to Conditional Random Fields (CRFs)- Spectral clustering- Semi-supervised learning - Recommendation systems - Active Learning - Learning from streaming data, online learning - Deep learning. | | | |
| | | **Total Periods** | **45** |

**Text Books**

| | |
|---|---|
| 1. | Tom Mitchell, ―Machine Learning‖, McGraw-Hill, 1997 |
| 2. | Christopher Bishop, ―Pattern Recognition and Machine Learning‖, Springer, 2006 |

**References**

| | |
|---|---|
| 1. | Kevin P. Murphy, ―Machine Learning: A Probabilistic Perspective‖, MIT Press, 2012 |
| 2. | Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning", Second Edition ,Springer, 2011 |
| 3. | Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)‖, Third Edition, MIT Press, 2014 |

**E-Resources**

| | |
|---|---|
| 1. | https://en.wikipedia.org/wiki/Unsupervised_learning |
| 2. | https://blog.statsbot.co/probabilistic-graphical-models-tutorial-and-solutions-e4f1d72af189 |
| 3. | https://www.geeksforgeeks.org/what-is-reinforcement-learning/ |
| 4. | https://ml2.inf.ethz.ch/courses/aml/ |

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| | VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN<br>(Autonomous Institution, Affiliated to Anna University, Chennai)<br>Elayampalayam, Tiruchengode – 637 205 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Programme | **M.Tech** | Programme Code | | **204** | Regulation | | **2019** | |
| Department | **INFORMATION TECHNOLOGY** | | | | Semester | | **I** | |
| Course Code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ESE | Total |
| **P19IT103** | **Advanced Database Technology** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The student should be made to,<br>• Study the various models and understand the Relational model in detail.<br>• Write effective queries and optimize the queries.<br>• Understand concepts of unstructured database administration. | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:** Identify and prioritize database assets threats to database asset | K2 |
| | **CO2:** Analyze each type of databases and its necessity. | K4 |
| | **CO3:** Design faster algorithms in solving practical database problem. | K3 |
| | **CO4: U**nderstand the enhanced data models | K2 |
| | **CO5:** Understand and design mobile and web database | K2 |
| **Pre-requisites** | Database Management Systems | |

| **CO / PO Mapping**<br>(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | 2 | 2 |
| **CO 2** | 3 | 3 | 3 | 3 | 2 | - | - | 2 | - | - | 3 | 2 |
| **CO 3** | 3 | 3 | 3 | 3 | 2 | - | - | 2 | - | - | 3 | 2 |
| **CO 4** | 3 | 3 | 3 | 3 | 2 | - | - | 2 | - | - | 3 | 2 |
| **CO 5** | 3 | 3 | 3 | 3 | 2 | - | - | 2 | - | - | 3 | 2 |

**Course Assessment Methods**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **DATABASE SYSTEM CONCEPTS** | Periods | **9** |
|---|---|---|---|

File systems - Database systems - Database architecture - Data models: Relational model – Entity relationship model: Constraints - Removing redundant attributes in entity sets- Entity-relationship diagrams - Reduction to relational schemas - Entity-relationship design issue- Extended E-R features - Alternative notations for modeling - Data normalization and database design: First normal form, second normal form, third normal form- Boyce codd normal form.

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| Unit – II | PARALLEL AND DISTRIBUTED DATABASES | Periods | 9 |
|---|---|---|---|
| Parallel databases: I/O parallelism – Inter and intra query parallelism – Inter and intra operation -Parallelism – Distributed database: concepts - Distributed data storage – Distributed transactions –Commit protocols – Concurrency control – Distributed query processing. | | | |
| **Unit – III** | **OBJECT AND OBJECT RELATIONAL DATABASES** | Periods | **9** |
| Overview of Object Database Concepts - Object-Relational Features: Object Database Extensions to SQL - The ODMG Object Model and the Object Definition Language ODL -Object Database Conceptual Design - The Object Query Language OQL - Overview of the C++ Language Binding in the ODMG Standard. | | | |
| **Unit – IV** | **ENHANCED DATA MODELS** | Periods | **9** |
| Active database concepts and triggers – Temporal databases – Spatial databases – Multimedia Databases– Deductive databases – XML databases: XML data model – DTD - XML schema - Storing and Extracting XML Documents from Databases - XML Languages - Extracting XML Documents from Relational Databases. | | | |
| **Unit – V** | **MOBILE AND WEB DATABASE** | Periods | **9** |
| Mobile Database: Introduction to Mobile Databases - Issues with Mobile DBMS<br>Web Database: Introduction to the Internet and the Web - Scripting Languages - Common Gateway Interface - HTTP Cookies. | | | |
| | | | **45** |

| **Text Books** | |
|---|---|
| 1. | Abraham Silberschatz, Hanry F Korth, Sudarshan S, ―Database Systems Concepts‖, McGraw Hill, 2007. |
| 2. | Thomas Cannolly and Carolyn Begg, Database Systems, A Practical Approach to Design, Implementation and Management. New Delhi: Pearson Education, 2014. |
| **References** | |
| 1. | R. Elmasri, and S. B. Navathe, Fundamentals of Database Systems. New Delhi: Pearson Education/Addison Wesley, 2015. |
| 2. | Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems*. New Delhi: McGraw Hill, 2007 |
| 3. | Date C J, ―An Introduction to Database Systems‖, Pearson Education, 2003. |
| **E-Resources** | |
| 1. | https://www.geeksforgeeks.org/dbms/ |
| 2. | https://nptel.ac.in/courses/106/105/106105175/ |
| 3. | https://online-learning.harvard.edu/course/database-systems |

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Elayampalayam, Tiruchengode – 637 205

| Programme | **M.E. & M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **CSE & IT** | | | Semester | **I** |

| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19IT104** | **Algorithms and Analysis Laboratory** | 0 | 0 | 4 | 2 | 60 | 40 | 100 |

**Course Objective**

The student should be made to,

- Design of algorithms using Divide and Conquer, Dynamic programming approach.
- Design of algorithms using Greedy and Back Tracking Techniques.
- Implement Graph algorithms and Matrix operations.
- Implement String matching algorithms
- Implement computational geometry and approximation algorithms.

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:**Design and analyze algorithms using divide and conquer, dynamic programming, greedy algorithms. | K3 |
| **CO2:**Perform probabilistic analysis and amortized analysis of algorithms. | K4 |
| **CO3:**Use minimum spanning trees, shortest path algorithm, and Maximum flow in graphs to solve problems in networking. | K3 |
| **CO4:**Solve problems using multithreaded algorithms and linear programming | K3 |
| **CO5:**Apply String matching algorithms, Computational geometry algorithms to solve problem. | K3 |

**Pre-requisites**: Data Structures Laboratory

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak

| COs | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 1 | 2 | - | 1 | 1 | - | 1 | 2 | - | 2 | 2 |
| **CO 2** | 3 | 2 | - | 2 | 1 | 1 | - | - | 1 | 2 | - | 1 |
| **CO 3** | 1 | 3 | 2 | - | 1 | 3 | - | 1 | 3 | - | 1 | - |
| **CO 4** | 2 | - | 1 | 2 | 3 | 2 | - | 1 | - | 1 | 2 | 1 |
| **CO 5** | - | 3 | 1 | 1 | 1 | - | - | 2 | 1 | 2 | - | 2 |

**Course Assessment Methods**

**Direct**

1. Pre-Lab and Post-Lab Test for every experiment
2. Model Practical Examination
3. End-Semester Practical examinations

**Indirect**

1. Course - end survey

**Content of the syllabus**

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| SUGGESTED LIST OF EXPERIMENTS | Course Outcome |
|---|---|
| 1.Implement an algorithm that combines k sorted lists in time O(nlogk) where n is the total number of Elements. | CO1 |
| 2.Implement an algorithm to solve Matrix Multiplication problem and maximum value contiguous subsequence using dynamic programming approach. | CO1 |
| 3.Implement an algorithm based on greedy approach t osolve knapsack problem and Activity Selection Problem. | CO1 |
| 4.Implement Merge Sort algorithm using Divide and Conquer approach. | CO1 |
| 5.Implement stack operations and calculate the amortized cost. | CO2 |
| 6.Implement Graph Traversal algorithms. | CO3 |
| 7.Implement algorithms to construct Minimum Spanning Trees. | CO3 |
| 8.Implement shortest path and Maximum Flow algorithms. | CO3 |
| 9.Implement String Matching Algorithms. | CO5 |
| 10.Implement Computational Geometry algorithms. | CO5 |
| | **Total Periods:45** |

| **E-Resources** | |
|---|---|
| 1. | http://camelliait.ac.in/Lab%20Manual/ADA%20Lab%20Programs.pdf |
| 2. | https://iare.ac.in/sites/default/files/lab1/II%20YEAR_DAA_LAB_MANUAL.pdf |

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**VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**
(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.E. &M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **CSE & IT** | | | Semester | **I** |

| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19IT105** | **Machine Learning Laboratory** | 0 | 0 | 4 | 2 | 60 | 40 | 100 |

**Course Objective**

The student should be made to,

- Provide students with an in-depth introduction to two main areas of Machine Learning: supervised and unsupervised.
- Learn main models and algorithms for regression, classification, clustering and Markov decision processes.
- Know linear and logistic regression, regularization, MLE, probabilistic (Bayesian) inference,
- Know SVMs and kernel methods, ANNs, clustering, and dimensionality reduction.
- Know the Python programming language and assumes familiarity with linear algebra, probability theory, and programming in Python.

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:** understand the working of machine that involved in learning from data | K3 |
| **CO2:** Understand a machine learning algorithms such as ID3,EM etc | K2 |
| **CO3:** Understand the working of machine learning algorithms for sample data. | K2 |
| **CO4:** Understand about Bayesian classifier. | K2 |
| **CO5:** Understand the evaluation of learning algorithms and model selection. | K2 |

**Pre-requisites** -

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

**CO/PSO Mapping**

| Cos | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 2 | 2 | 3 | 2 | - | - | 1 | 2 | - | 2 | 2 |
| **CO 2** | 2 | 2 | 2 | 2 | 1 | - | - | - | 1 | - | 2 | 1 |
| **CO 3** | 2 | 3 | 2 | 2 | 1 | - | - | 1 | 2 | - | 1 | 1 |
| **CO 4** | 3 | 2 | 3 | 2 | 2 | - | - | 1 | 1 | - | 2 | 2 |
| **CO 5** | 3 | 3 | 2 | 2 | 1 | - | - | 1 | 1 | - | 2 | 2 |

**Course Assessment Methods**

**Direct**

1. Pre-Lab and Post-Lab Test for every experiment
2. Model Practical Examination
3. End-Semester Practical examinations

**Indirect**

1. Course - end survey

**Content of the syllabus**

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| SUGGESTED LIST OF EXPERIMENTS | Course outcome |
|---|---|
| 1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file. | CO1 |
| 2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples. | CO1 |
| 3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample. | CO2 |
| 4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets. | CO2 |
| 5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets. | CO4 |
| 6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set. | CO4 |
| 7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API. | CO3 |
| 8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results ofthese two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program. | CO2 |
| 9. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem | CO3 |
| 10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs. | CO5 |
| **Total Periods:45** | |

| **E-Resources** | |
|---|---|
| 1. | http://cittumkur.org/ads/csml1819.pdf |
| 2. | https://www.imperial.ac.uk/data-science/research/multidisciplinary-labs/machine-learning-lab/ |

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**VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**
(Autonomous Institution, Affiliated to Anna University ,Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **II** |

| Course code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19IT206** | **Advanced Networks** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,
- Learn the Technological networks
- Learn the fundamentals of network theory
- Learn the Computer algorithms for Networks
- Learn the Models of network information
- Learn the Processes on networks.

| **Course Outcomes** | At the end of the course, the student should be able to, | **KL** |
|---|---|---|
| | **CO1:** Understand the technological networks such as Internet, Distribution, Social and Biological networks. | K2 |
| | **CO2:** Represent the networks using appropriate data structure. | K3 |
| | **CO3:** Write algorithms for degree, degree distribution and graph partitioning. | K3 |
| | **CO4:** Identify suitable model for network information. | K2 |
| | **CO5:** Write algorithms for web search and distributive database | K3 |

**Pre-requisites** Computer Networks

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| **Cos** | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 2 | 3 | - | - | - | - | - | - | - | 2 | 3 |
| **CO 2** | - | 3 | - | - | - | - | - | - | - | - | 3 | 1 |
| **CO 3** | - | - | 3 | - | - | 2 | - | - | - | - | 3 | 2 |
| **CO 4** | 2 | - | 2 | - | - | - | - | - | - | - | 2 | 2 |
| **CO 5** | - | - | - | - | - | 3 | - | - | - | - | 3 | 1 |

**Course Assessment Methods**

**Direct**
1. Continuous Assessment Test I, II & III
2. Assignment: Conduct a study on various Network models
3. End-Semester examinations

**Indirect**
1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **EMPIRICAL STUDY OF NETWORKS** | Periods | **9** |
|---|---|---|---|

Properties of networks – The internet – the telephone network - Delivery And Distribution Networks - The Empirical Study Of Social Networks - The Small-World Experiment – the world wide web – information network - Biochemical Networks – Metabolic Networks**.**

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| Unit – II | FUNDAMENTALS OF NETWORK THEORY | Periods | 10 |
|---|---|---|---|
| **Mathematical networks:**Networks And Their Representation - The Adjacency Matrix -Weighted Networks - Directed Networks – Hypergraphs - Bipartite Networks – Trees - Planar Networks – Degree – Paths – Components -Independent Paths, Connectivity, And Cut Sets - The Graph Laplacia – Random walks. | | | |
| **Unit – III** | **COMPUTER ALGORITHMS** | Periods | **10** |
| **Running Time And Computational Complexity:** Storing Network Data - The Adjacency Matrix - The Adjacency List –Trees.**Fundamental Network Algorithms**: Algorithms For Degrees And Degree Distributions -Clustering Coefficients - Shortest Paths And Breadth-First Search - Shortest Paths In Networks With Varying Edge Lengths - Maximum Flows And Minimum Cuts. | | | |
| **Unit – IV** | **NETWORK MODELS** | Periods | **10** |
| **Random Graphs**: Random Graphs - Mean Number Of Edges And Mean Degree - Degree Distribution - Clustering Coefficient - Giant Component - Small Components - Path Lengths – problems<br>**Random Graphs With General Degree Distributions**: Generating Functions - The Configuration Model - Excess Degree Distribution - Clustering Coefficient - Generating Functions For Degree Distributions - Number Of Second Neighbors Of A Vertex. | | | |
| **Unit – V** | **PROCESSES ON NETWORKS** | Periods | **6** |
| **Percolation in Network Model:** Percolation - Types of Percolation - Computer Algorithms for Percolation - Percolation in Small World Network model. **Network Search:** Web Search - Searching Distributed Databases - Message Passing**.** | | | |
| | | **Total Period** | **45** |
| **Text Books** | | | |
| 1. | Mark Newman, ―Networks: An introduction‖, Oxford University Press, 2010. | | |
| **References** | | | |
| 1. | Ulrik Bandes, Thomas Erlebach, ―Network Analysis: Methodological foundations‖, Springer, 2004. | | |
| 2. | David Easey, John Kleinberg, ―Networks, Crowds and markets: Reasoning about a highly connected world‖, Cambridge University Press, 2010. | | |
| **E-Resources** | | | |
| 1. | http://math.sjtu.edu.cn/faculty/xiaodong/course/Networks%20An%20introduction.pdf | | |
| 2. | https://www.oxfordscholarship.com/view/10.1093/acprof:oso/9780199206650.001.0001/acprof-9780199206650 | | |
| 3. | http://www1.coe.neu.edu/~emelas/type.html | | |

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**VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**
(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | Semester | | **II** |

| Course Code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19IT207** | **Internet of things** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,

- Study the concept of Internet of Things.
- Understand the fundamentals of Internet of Things.
- Learn about the basics of IOT protocols.
- Build a small low cost embedded system using Raspberry Pi.
- Apply the concept of Internet of Things in the real world scenario.

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:** Understanding basics of IOT | K2 |
| **CO2:** Understand the architecture of IOT and Machine to Machine Communication. | K2 |
| **CO3:** Analyze various protocols for IoT | K4 |
| **CO4:** Design a portable IoT using Raspberry Pi | K3 |
| **CO5:** Analyze applications of IoT in real time scenario | K4 |

**Pre-requisites** -

**CO / PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

**CO/PSO Mapping**

| Cos | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 2 | 2 | - | - | - | - | 2 | - | - | 2 | 3 |
| **CO 2** | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | 3 |
| **CO 3** | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | 3 |
| **CO 4** | 3 | 3 | 3 | - | - | 3 | - | - | - | 3 | 3 | 2 |
| **CO 5** | 3 | 3 | 2 | 2 | - | 2 | - | - | - | 2 | 3 | 2 |

| **Unit – I** | **INTRODUCTION TO IoT** | Periods | **9** |
|---|---|---|---|

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates. Domain Specific: Home Automation-Cities-Environment-Energy-Retail-Logistics-Agriculture-Industry-Healthcare&Lifestyle.

| **Unit – II** | **IoT ARCHITECTURE AND M2M** | Periods | **9** |
|---|---|---|---|

IOt architecture: M2M high-level ETSI architecture - service capabilities–Interfaces – Resource management. M2M to IOT: Introduction- M2M communication- An Architectural Overview- Technology fundamentals – Data Management- Analytics – Knowledge management

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| Unit – III | IoT PROTOCOLS AND MIDDLEWARE | Periods | 9 |
|---|---|---|---|
| Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues.Middleware: Communication Middleware for IoT - LBS and Surveillance Middleware. | | | |
| **Unit – IV** | **BUILDING IoT WITH RASPBERRY PI** | Periods | **9** |
| IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi -Board - Linux on Raspberry Pi - Raspberry Pi Interfaces -Programming Raspberry Pi with Python - Other IoT Platforms | | | |
| **Unit – V** | **CASE STUDIES AND REAL-WORLD APPLICATIONS** | Periods | **9** |
| Real world design constraints - Applications - Asset management - Industrial automation - smart grid - Commercial building automation - Smart cities - participatory sensing – Tools for IOT-Chef-puppet | | | |
| | | **Total Periods** | **45** |

| **Text Books:** | |
|---|---|
| 1. | Arshdeep Bahga, Vijay Madisetti, ―Internet of Things – A hands-on approach‖, Universities Press, 2015 |
| 2. | Jan Holler, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014. |
| **References:** | |
| 1. | Honbo Zhou, ‐The Internet of Things in the Cloud: A Middleware Perspective‖, CRC Press, 2012. |
| 2. | Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), ‐Architecting the Internet of Things‖, Springer, 2011. |
| 3. | Olivier Hersent, David Boswarthick, Omar Elloumi , ―The Internet of Things – Key applications and Protocols‖, Wiley, 2012. |
| **E-Resources:** | |
| 1. | https://books.google.co.in/books/about/Internet_of_Things.html?id=JPKGBAAAQBAJ&printsec=frontcover&source=kp_read_button&redir_esc=y#v=onepage&q&f=false |
| 2. | https://www.springer.com/gp /book |
| 3. | https://www.crcpress.com/The-Internet-of-Things-in-the-Cloud-A-Middleware-Perspective/Zhou/p/book |
| 4. | https://pdfs.semanticscholar.org/85ae/6d8fd73beeeea1a0b8372b5af13ef8f2a105.pdf |
| 5. | https://www.wiley.com/enus/The+Internet+of+Things%3A+Key+Applications+and+Protocols%2C+2nd+Edition.pdf |

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**VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**
(Autonomous Institution Affiliated to Anna University,
Chennai)Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech** | Programme Code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **II** |

| Course Code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19IT208** | **Advanced Operating Systems** | 3 | 0 | 0 | 3 | 60 | 40 | 100 |

**Course Objective**

The student should be made to,

- Learn the fundamentals of Operating system.
- Gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols.
- Gain insight on to the distributed resource management components viz. the algorithms for implementation of distributed shared memory, recovery and commit protocols.
- Know the components and management aspects of Real time, Mobile operating systems.
- Learn about architecture, synchronization and Concurrency control in Multiprocessor and Database Operating Systems

| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
|---|---|---|
| | **CO1:** Analyze the structure of OS and basic architectural components involved in OS design | K4 |
| | **CO2:** Analyze and design the applications to run in parallel either using process or thread models of different OS | K4 |
| | **CO3:** Analyze the various device and resource management techniques for timesharing and distributed systems. | K4 |
| | **CO4:** Demonstrate the failure recovery and fault tolerance. | K2 |
| | **CO5:** Analyze the multiprocessor and database operating systems | K4 |

**Pre-requisites** Basics of Operating Systems

| **CO / PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 3 | 3 | 3 | 2 | - | 2 | - | - | - | 2 | 2 |
| **CO 2** | 3 | 3 | 3 | 3 | 2 | - | 2 | 2 | - | - | 3 | 2 |
| **CO 3** | 3 | 3 | 3 | 3 | 2 | - | 2 | 2 | - | - | 3 | 2 |
| **CO 4** | 3 | 3 | 3 | 3 | 2 | - | 2 | 2 | - | - | 3 | 2 |
| **CO 5** | 3 | 3 | 3 | 3 | 2 | - | 2 | 2 | - | - | 3 | 2 |

**Course Assessment Methods**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

1. Course - end survey

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| Content of the syllabus | | | |
|---|---|---|---|
| **Unit – I** | **INTRODUCTION** | Periods | **10** |
| Overview - Functions of an Operating System – Design Approaches – Types of Advanced Operating System - Synchronization Mechanisms – Concept of a Process, Concurrent Processes – The Critical Section Problem, Other Synchronization Problems – Language Mechanisms for Synchronization – Process Deadlocks - Preliminaries – Models of Deadlocks, Resources, System State – Necessary and Sufficient conditions for a Deadlock | | | |
| **Unit – II** | **DISTRIBUTED OPERATING SYSTEMS** | Periods | **10** |
| Introduction – Issues – Communication Primitives – Inherent Limitations - Lamport's Logical Clock- Vector Clock- Causal Ordering- Global State- Cuts- Termination Detection. Distributed Mutual Exclusion – Non-Token Based Algorithms – Lamport's Algorithm - Token-Based Algorithms – Suzuki- Kasami's Broadcast Algorithm – Distributed Deadlock Detection – Issues – Centralized Deadlock-Detection Algorithms - Distributed Deadlock-Detection Algorithms. | | | |
| **Unit – III** | **DISTRIBUTED RESOURCE MANAGEMENT** | Periods | **8** |
| Distributed File systems – Architecture – Mechanisms – Design Issues – Distributed Shared Memory – Architecture – Algorithm – Protocols - Design Issues. Distributed Scheduling – Issues – Components – Algorithms. | | | |
| **Unit – IV** | **FAILURE RECOVERY AND FAULT TOLERANCE** | Periods | **9** |
| Basic Concepts-Classification of Failures – Basic Approaches to Recovery- Recovery in Concurrent System- Synchronous and Asynchronous Check pointing and Recovery- Check pointing in Distributed Database Systems; Fault Tolerance-Issues - Two-phase and Non- blocking Commit Protocols- Voting Protocols- Dynamic Voting Protocols. | | | |
| **Unit – V** | **MULTIPROCESSOR AND DATABASE OPERATING SYSTEMS** | Periods | **8** |
| Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory Management – Reliability / Fault Tolerance- Database Operating Systems – Introduction – Concurrency Control – Distributed Database Systems – Concurrency Control Algorithms. | | | |
| | | | **45** |

| **Text Books** | |
|---|---|
| 1. | Mukesh Singhal and N. G. Shivaratri, ―Advanced Concepts in Operating Systems‖, McGraw-Hill, 2000 |
| **References** | |
| 1. | Abraham Silberschatz, Peter B. Galvin, G. Gagne, -Operating System Concepts‖, Sixth Edition, Addison Wesley Publishing Co., 2003. |
| 2. | Andrew S. Tanenbaum, ―Modern Operating Systems‖, Second Edition, Addison Wesley, 2001. |
| **E-Resources** | |
| 1. | https://www.geeksforgeeks.org/operating-systems/ |
| 2. | https://cs61.seas.harvard.edu/site/2019/ |
| 3. | https://swayam.gov.in/nd1_noc19_cs50/preview |

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**VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**
(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **II** |

| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19IT209** | **Advanced Networks Laboratory** | 0 | 0 | 4 | 2 | 60 | 40 | 100 |

**Course Objective**

The student should be made to,

- Understand the architecture and applications current network technologies
- Learn to simulate and analyze various medium access technologies
- Learn to design and analyze network layer routing protocols
- To understand the fundamental concepts of socket programming and network protocols
- To learn network simulation tools and develop applications.

| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
|---|---|---|
| | **CO1:** Able to simulate and analyze simple DHCP & IP Traffic for wired network | K4 |
| | **CO2:** Able to simulate and analyze simple DHCP & IP Traffic for wireless network | K4 |
| | **CO3:** Analyze the performance of different routing algorithms | K4 |
| | **CO4:** Understand the concept of file transfer using PUTTY | K2 |
| | **CO5:** Simulate the wireless sensor network model | K5 |

**Pre-requisites**: Computer Networks Laboratory

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

**CO/PSO Mapping**

| Cos | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 2 | 2 | 2 | 3 | 3 | 3 | - | - | 2 | 2 | 2 |
| **CO 2** | 3 | 2 | 2 | 2 | 3 | 3 | 3 | - | - | 2 | 3 | 2 |
| **CO 3** | 3 | 2 | 2 | 2 | 3 | 3 | 3 | - | - | 2 | 3 | 2 |
| **CO 4** | 3 | 2 | 2 | 2 | 3 | 3 | 3 | - | - | 1 | 3 | 2 |
| **CO 5** | 3 | 2 | 2 | 2 | 3 | 3 | 3 | - | - | 2 | 3 | 2 |

**Course Assessment Methods**

**Direct**

1. Pre-Lab and Post-Lab Test for every experiment
2. Model Practical Examination
3. End-Semester Practical examinations

**Indirect**

1. Course - end survey

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| Content of the syllabus | Course Outcome |
|---|---|
| 1.Study of system administration and network administration. | CO1 |
| 2. Study of socket programming and client server model using UDP and TCP. | CO1 |
| 3. Implementation of Sliding window protocol and stop and wait protocol | CO1 |
| 4. Write a code simulating PING and TRACEROUTE commands | CO3 |
| 5. Applications using TCP Sockets like<br>a.File transfer<br>b.Remote command execution<br>c.Chat<br>d.Concurrent server | CO1,CO2 |
| 6. Create a socket for HTTP for webpage upload and download | CO3 |
| 7. Implementation of Subnetting Applications<br>a.DNS<br>b.SNMP | CO5 |
| 8. Study of Network Simulator-3(NS3). | CO4 |
| 9. Study of PUTTY (NETWORK FILE TRANSFER APPLICATION). | CO4 |
| 10. Perform a case study about ETTERCAP(NETWORK SECURITY TOOL). | CO5 |
| **Total Periods** | **45** |

| Sl.no | SOFTWARE REQUIRMENTS |
|---|---|
| 1. | Freeware –Network Simulator NS3 |
| 2. | JAVA |
| 3. | Putty |

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|---|---|---|---|---|---|---|---|---|
| Programme | **M.Tech.** | Programme Code | **204** | Regulation | **2019** | | | |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **II** | | | |
| Course Code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ESE | Total |
| **P19IT210** | **OPERATING SYSTEMS LABORATORY** | 0 | 0 | 4 | 2 | 60 | 40 | 100 |

**Course Objective**

The student should be made to,

- Since this lab complements the operating systems course, the students will gain practical experience in designing and implementing concepts of operating systems such as system calls, CPU scheduling, process management, memory management, file systems and deadlock handling.
- Provides some advanced designing methods and implementation techniques for the core concepts of modern-day operating systems.
- Demonstrate on various system-level hardware operations that were carried out in modern processors and illustrate how to draft software designing approaches accordingly.
- Emphasize on system-level security aspects that includes the analysis of the correlation between hardware and software so as to formulate robust security policies.

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:** Understand and implement basic services and functionalities of theoperating system using system calls. | K2 |
| **CO2:** Analyze and simulate CPU Scheduling Algorithms like FCFS, RoundRobin, SJF, and Priority. | K4 |
| **CO3:** Implement memory management schemes and page replacement schemes. | K3 |
| **CO4**: Simulate file allocation and organization techniques. | K5 |
| **CO5:** Understand the concepts of deadlock in operating systems. | K2 |

**Pre-requisites**: Basics of Operating System and C or any System-level Programming

| **CO / PO Mapping**<br>(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 2 | 2 | 2 | 3 | 3 | 3 | - | - | - | 2 | 2 |
| **CO 2** | 3 | 2 | 2 | 2 | 3 | 3 | 3 | - | - | - | 3 | 2 |
| **CO 3** | 3 | 2 | 2 | 2 | 3 | 3 | 3 | - | - | - | 3 | 2 |
| **CO 4** | 3 | 2 | 2 | 2 | 3 | 3 | 3 | - | - | - | 3 | 2 |
| **CO 5** | 3 | 2 | 2 | 2 | 3 | 3 | 3 | - | - | - | 3 | 2 |

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Tests (Pre-lab & Post-lab)
2. Model Practical Examination
3. End-Semester Practical examinations

**Indirect**

1. Course - end survey

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| SUGGESTED LIST OF EXPERIMENTS | COURSE OUTCOMES |
|---|---|
| 1. Implementation of CPU scheduling algorithms to find turnaround time and waiting time. | CO2 |
| 2. Implementation of file allocation strategies. | CO4 |
| 3. Implementation of MVT and MFT memory management techniques. | CO3 |
| 4. Implementation of paging technique of memory management. | CO3 |
| 5. Implementation of file organization technique. | CO4 |
| 6. Implementation of Bankers algorithm for the purpose of deadlock avoidance. | CO5 |
| 7. Implementation of disk scheduling algorithms. | CO3 |
| 8. Implementation of page replacement algorithms. | CO3 |
| 9. Implementation of producer-consumer problem using semaphores. | CO1 |
| 10. Implementation of the concept of Dining-Philosophers problem. | CO1 |
| | **Total Periods : 45** |

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# PROFESSIONAL ELECTIVE I

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Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **I** |

| Course Code | Course name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | T |
| **P19ITE01** | **Soft Computing** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,
- Acquire knowledge in Neural networks
- Learn genetic programming
- Understand the fuzzy sets, fuzzy logic and optimization technique
- Be exposed to fuzzy logic
- Understand the design of various neural networks.

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:** Acquire knowledge in the fundamentals of Neuro-Fuzzy and Fuzzy sets | K1 |
| **CO2:** Know the fundamentals of genetic algorithm | K2 |
| **CO3:** Understand the concepts of Neural Networks | K2 |
| **CO4:** Describe the Fuzzy Inference Systems and Optimization | K2 |
| **CO5:** Explain the basic principles of Neuro-Fuzzy Modeling | K2 |

**Pre-requisites**: -

| **CO / PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 3 | 3 | 2 | 2 | 1 | - | 1 | 1 | 2 | 2 | 3 |
| **CO 2** | 2 | 1 | 1 | 1 | 2 | 2 | - | 1 | 1 | 2 | 3 | 2 |
| **CO 3** | 2 | 3 | 2 | 3 | 1 | 1 | - | 2 | 1 | 2 | 1 | 3 |
| **CO 4** | 1 | 2 | 1 | 2 | 1 | 2 | - | 1 | 1 | 2 | 2 | 1 |
| **CO 5** | 2 | 1 | 2 | 2 | 1 | 1 | - | 1 | 1 | 2 | 2 | 1 |

**Course Assessment Methods**

| **Direct** |
|---|
| 1. Continuous Assessment Test I, II & III<br>2. Assignment<br>3. End-Semester examinations |
| **Indirect** |
| 1. Course - end survey |

**Content of the syllabus**

| **Unit – I** | **INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS** | Periods | **9** |
|---|---|---|---|

Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

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| Unit – II | GENETIC ALGORITHMS | Periods | 9 |
|---|---|---|---|
| Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning - Machine Learning Approach to Knowledge Acquisition. | | | |
| **Unit – III** | **NEURAL NETWORKS** | Periods | **9** |
| Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks. | | | |
| **Unit – IV** | **FUZZY LOGIC** | Periods | **9** |
| Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions- Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making. | | | |
| **Unit – V** | **NEURO-FUZZY MODELING** | Periods | **9** |
| Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rulebase Structure Identification – Neuro-Fuzzy Control – Case studies. | | | |
| | | **Total Periods** | **45** |

**Text Books:**

| | |
|---|---|
| 1. | Jyh-Shing Roger Jang, Chuen-Tsai Sun, EijiMizutani, ―Neuro-Fuzzy and Soft Computing‖, Prentice-Hall of India, 2003. |
| 2. | George J. Klir and Bo Yuan, ―Fuzzy Sets and Fuzzy Logic-Theory and Applications‖, Prentice Hall, 1995. |

**References:**

| | |
|---|---|
| 1. | James A. Freeman and David M. Skapura, -Neural Networks Algorithms, Applications, and Programming Techniques‖, Pearson Edition., 2003. |
| 2. | Mitchell Melanie, ―An Introduction to Genetic Algorithm‖, Prentice Hall, 1998. |
| 3. | David E. Goldberg, ―Genetic Algorithms in Search, Optimization and Machine Learning‖, Addison Wesley, 1997. |
| 4. | S. N. Sivanandam, S. Sumathi and S. N. Deepa, ―Introduction to Fuzzy Logic using MATLAB‖, Springer, 2007. |
| 5. | S.N.Sivanandam · S.N.Deepa, ― Introduction to Genetic Algorithms‖, Springer, 2007. |
| 6. | Jacek M. Zurada, -Introduction to Artificial Neural Systems‖, PWS Publishers, 1992. |

**E-Resources:**

| | |
|---|---|
| 1. | https://towardsdatascience.com/soft-computing-6cef872f7704 |
| 2. | https://lecturenotes.in/subject/124/soft-computing-sc/124 |
| 3. | https://www.tutorialspoint.com/fuzzy_logic/index.htm |
| 4. | http://users.du.se/~jwe/fuzzy/NFL/F9.PDF |
| 5. | https://link.springer.com/chapter/10.1007/978-3-642-29387-0_25 |
| 6. | https://asmedigitalcollection.asme.org/gasturbinespower/article/117/1/161/408460/Soft-Computing-in-Design-and-Manufacturing-of |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**<br>(Autonomous Institution Affiliated to Anna University, Chennai)<br>Elayampalayam, Tiruchengode – 637 205 | | | | | | | |
| Programme | **M.Tech.** | Programme code | | **204** | Regulation | | **2019** | |
| Department | **INFORMATION TECHNOLOGY** | | | | Semester | | **I** | |
| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
| **P19ITE02** | **Introduction to Intelligent Systems** | L | T | P | C | CA | ESE | Total |
| | | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The student should be made to,<br>• Understand the concept of Artificial Intelligence (AI)<br>• Solve real world problems for using AI<br>• Express traditional algorithmic approach<br>• Explore the essential theory behind methodologies for developing systems<br>• Learning from experience and following problem solving strategies found in nature. | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:** Understand the fundamental principles of intelligent systems | K2 |
| | **CO2:** Analyze and compare the relative merits of a variety of AI problem solving techniques. | K4 |
| | **CO3:** Evaluate traditional algorithmic approach | K4 |
| | **CO4:** Understand the knowledge representation methods | K2 |
| | **CO5:** Apply intelligent behavior including dealing with uncertainty | K3 |
| **Pre-requisites** | - | |

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| Cos | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 2 | 1 | 1 | - | 2 | - | - | - | 2 | 1 | 3 |
| **CO 2** | 2 | - | 2 | 1 | 3 | 2 | - | - | - | 1 | 2 | 3 |
| **CO 3** | 3 | 3 | 2 | 2 | 3 | 1 | - | - | - | 3 | 1 | 2 |
| **CO 4** | 2 | - | 3 | 3 | - | 1 | - | - | - | 2 | 2 | 1 |
| **CO 5** | 1 | 3 | - | 3 | 3 | - | - | - | - | 1 | 3 | 2 |

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

**Indirect**

1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **INTRODUCTION** | Periods | **9** |
|---|---|---|---|

Biological foundations to intelligent systems I: Artificial neural networks, Back propagation networks, Radial basis function networks, and recurrent networks.

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| Unit – II | BIOLOGICAL FOUNDATIONS | Periods | 9 |
|---|---|---|---|
| Biological foundations to intelligent systems II: Fuzzy logic, knowledge Representation and inference mechanism, genetic algorithm, and fuzzy neural networks. | | | |
| **Unit – III** | **SEARCH METHODS** | Periods | **9** |
| Search Methods Basic concepts of graph and tree search. Three simple search methods: breadth-first search, depth-first search, iterative deepening search. Heuristic search methods: best-first search, admissible evaluation functions, hill climbing search. Optimization and search such as stochastic annealing and genetic algorithm. | | | |
| **Unit – IV** | **KNOWLEDGE REPRESENTATION METHODS** | Periods | **9** |
| Knowledge representation and logical inference Issues in knowledge representation. Structured representation, such as frames, and scripts, semantic networks and conceptual graphs. Formal logic and logical inference. Knowledge-based systems structures, its basic components. Ideas of Blackboard architectures. | | | |
| **Unit – V** | **LEARNING TECHNIQUES** | Periods | **9** |
| Reasoning under uncertainty and Learning Techniques on uncertainty reasoning such as Bayesian reasoning, Certainty factors and Dempster-Shafer Theory of Evidential reasoning, A study of different learning and evolutionary algorithms, such as statistical learning and induction learning. | | | |
| | | **Total Periods** | **45** |
| **Text Book :** | | | |
| 1. | Luger G.F. and Stubblefield W.A. (2008). Artificial Intelligence: Structures and strategies for Complex Problem Solving. Addison Wesley, 6th edition. | | |
| **References :** | | | |
| 1. | Russell S. and Norvig P. (2009). Artificial Intelligence: A Modern Approach. Prentice-Hall, 3rd edition. | | |
| **E-Resources:** | | | |
| 1. | https://courses.lumenlearning.com/wmopen-lifespandevelopment/chapter/biological-foundations-of-human-development/ | | |
| 2. | https://www.javatpoint.com/ai-techniques-of-knowledge-representation | | |
| 3. | https://www.academia.edu/37768072/Introduction_to_Intelligent_Systems | | |

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|---|---|---|---|---|---|---|---|---|---|
| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** | | | | |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **I** | | | | |
| Course Code | Course name | Periods Per Week | | | Credit | Maximum Marks | | | |
| | | L | T | P | C | CA | ESE | Total | |
| **P19ITE03** | **Green Computing** | 3 | 0 | 0 | 3 | 40 | 60 | 100 | |

| | | |
|---|---|---|
| **Course Objective** | The main objective of this course is to:<br>• Understand the concept of green computing.<br>• Identify energy efficient computing.<br>• Understand the power management in computing devices<br>• Analyze the consumption of power in datacenters | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:** Understand to minimize Energy consumption. | K2 |
| | **CO2:** Understand the fundamentals of Intelligent Systems | K2 |
| | **CO3:** Know the concepts of search algorithms | K2 |
| | **CO4:** Understand technologies applied in building a green system (especially green data centres), including networks, Virtual Machine (VM) management and storage systems | K2 |
| | **CO5: U**se tools to monitor and design green systems | K3 |
| **Pre-requisites** | - | |

| **CO / PO Mapping**<br>(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | - | - | 3 | 3 | - | - | - | - | 1 | 3 | - | 3 |
| **CO 2** | - | 2 | 2 | - | - | - | - | - | - | - | 2 | - |
| **CO 3** | - | 3 | 2 | - | - | - | - | - | - | - | - | 2 |
| **CO 4** | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 3 |
| **CO 5** | - | - | - | 3 | - | - | - | - | - | - | 2 | - |

**Course Assessment Methods**

| **Direct** |
|---|
| 1. Continuous Assessment Test I, II & III<br>2. Assignment: Communication Newton's cooling model, Power efficient and thermal aware computing<br>3.End-Semester examinations |
| **Indirect** |
| 1. Course - end survey |

**Content of the syllabus**

| **Unit – I** | **Introduction** | Periods | **9** |
|---|---|---|---|

Energy- efficient – power efficient and thermal aware computing and communication - Newton's cooling model and basic thermodynamics and sustainability.

| **Unit – II** | **Power Management** | Periods | **9** |
|---|---|---|---|

Operating system Directed power management – Power management history and motivation – key power management concepts – power management scenarios – ACPI desktop motherboard design

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| Unit – III | Development of Efficient Power Management System | Periods | 9 |
|---|---|---|---|
| Dual mode desktop power delivery – system BIOS – Designing mobile systems – Communication with peripheral devices – Drivers – Developing robust power managed applications | | | |
| **Unit – IV** | **Energy Efficient Data Center** | Periods | **9** |
| Data center power consumption – Power metrics – Energy efficient data center tuning – energy efficient server management – Industry vision and recommendations | | | |
| **Unit – V** | **Case Studies And Application** | Periods | **9** |
| Google green datacenter - IBM green technology - Microsoft – Case Studies – Applying Green IT Strategies and Applications to a Home – Hospital - Packaging Industry and Telecom Sector. | | | |
| | | **Total Periods** | **45** |

| **Text Books:** | |
|---|---|
| 1. | Jerzy Kolinski, Ram Chary, Andrew Henroid, and Barry Press, ―Building the Power-Efficient PC A Developer's Guide to ACPI Power Management‖, Intel Press August 2001. |
| 2. | Lauri Minas, Brad Ellison, ―Energy Efficiency for Information Technology: How to Reduce Power Consumption in Servers and Data Centers‖, Intel Press, 2009. |
| **References:** | |
| 1. | BhuvanUnhelkar, ―Green IT Strategies and Applications-Using Environmental Intelligence‖, CRC Press, June 2011. |
| 2. | Wu Chun Feng, ―Green Computing: Large-Scale Energy Efficiency‖, CRC Press INC, 2013. |
| **E-Resources:** | |
| 1. | https://www.reserachgate.net/publication/323871018_Green_Computing_A_Solution_to_E-Pollution |
| 2. | https://www.csi-sigegov.org/emerging_pdf/8_64-69.pdf |
| 3. | https://en.m.wikipedia.org/wiki/Green_computing |

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(Autonomous Institution, Affiliated to Anna University ,Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **I** |

| Course code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE04** | **3G and 4G Wireless Networks** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The main objective of this course is to:

- Learn various generations of wireless and cellular networks.
- Study about fundamentals of 3G Services, its protocols and applications.
- Study about evolution of 4G Networks, its architecture and applications.
- Study about Wi MAX networks, protocol stack and standards.
- Understand about the emerging applications of 3G Networks

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:** Understand the evolution of cellular networks. | K2 |
| **CO2:** Deploy 3GServices. | K3 |
| **CO3:** Explore the developments in 4GNetworks. | K2 |
| **CO4:** Implement Wi MAX networks, protocol stack and standards. | K3 |
| **CO5:** Implement the applications based on 3G. | K3 |

**Pre-requisites** -

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak

**CO/PSO Mapping**

| Cos | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | - | - | 3 | - | - | - | 2 | - | 2 | 2 | 3 |
| **CO 2** | - | - | - | 3 | - | 3 | 2 | 2 | - | 1 | 2 | 1 |
| **CO 3** | 3 | - | - | - | - | 3 | - | 2 | - | - | 3 | 2 |
| **CO 4** | - | 3 | 2 | - | - | 3 | - | - | - | - | 2 | 2 |
| **CO 5** | - | - | - | 2 | - | - | - | - | - | 1 | 1 | 3 |

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Test I, II & III
2. Assignment: Various applications in 3G,Technological Advancements of the Telecommunications sector
3. End-Semester examinations

**Indirect**

1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **INTRODUCTION** | Periods | **9** |
|---|---|---|---|

Introduction: History of Mobile Cellular Systems - First Generation - Second Generation - Generation 2.5 - Overview of 3G & 4G. 3GPP and 3GPP2 standards

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| | | | |
|---|---|---|---|
| **Unit – II** | **3G NETWORKS** | Periods | **9** |
| Evolution from GSM, 3G Services and Applications - UMTS network structure - Core network - UMTS Radioaccess-HSPA–HSUPA-HSDPA-CDMA1X-EVDORev-0,Rev-A,Rev-B,Rev-CArchitecture-Protocol stack. | | | |
| **Unit – III** | **4G LTE NETWORKS** | Periods | **9** |
| LTE: Introduction, Radio interface architecture - Physical layer, Access procedures – System Architecture Evolution (SAE) - Communication protocols – Interfaces. | | | |
| **Unit – IV** | **WIMAX NETWORKS** | Periods | **9** |
| Introduction – IEEE 802.16 – Frame Format – Protocols - OFDM – MIMO - IEEE 802.20- Applications. | | | |
| **Unit – V** | **3G APPLICATION** | Periods | **9** |
| Justification for 3G - Path into the Market - Applications As Competition Tools - Application Technologies-Multimedia -Traffic Characteristics of 3G Applications - M-commerce - Examples of 3G Applications. | | | |
| | | **Total Periods** | **45** |
| **Text Books** | | | |
| 1. | Juha Korhonen, ―Introduction to 3G Mobile Communication‖, Artech House, 2003 | | |
| 2. | Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming , ―3G Evolution HSPA and LTE for Mobile Broadband‖, Academic Press, 2008 | | |
| **References** | | | |
| 1. | Flavio Muratore, -UMTS Mobile Communication for the Future‖, John Wiley & Sons , 2001 | | |
| 2. | Harri Holma and Antti Toskala, ―HSDPA/HSUPA for UMTS‖, Johan Wiley & Sons, 2006. | | |
| 3. | Martin Sauter, ― 3G & 4G & Beyond: Bringing Networks, Devices and the Web together‖, second edition, Wiley, 2013. | | |
| **E-Resources** | | | |
| 1. | https://en.wikipedia.org/wiki/Wireless_network | | |
| 2. | https://www.cisco.com/c/en/us/solutions/small-business/resource-center/networking/wireless-network.html | | |
| 3. | https://www.squ.edu.om/libraries/Library-Services/Wireless-Computer | | |

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(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **I** |

| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE05** | **Mining Massive Datasets** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,
- Managing immense amounts of data quickly using MapReduce.
- Examining data for similar items.
- Efficient mining of data streams.
- Analyzing large-scale data derived from social-networks.
- Online advertising and Recommender systems

| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
|---|---|---|
| | **CO1:** Use Map Reduce to handle large amount of data. | K3 |
| | **CO2:** Analyze similarity problem as finding sets with large intersection and also to test the degree of similarity among data. | K4 |
| | **CO3:** Summarize data streams, filter it and efficiently store it for future use. | K3 |
| | **CO4:** Identify communities, similarity among nodes of a graph, measure the connectedness of community, and measure the neighborhood size of nodes in a graph. | K2 |
| | **CO5:** Use algorithms to address issues like matching problems and ad words problem. | K3 |

**Pre-requisites**: Data Warehousing and Data Mining

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

**CO/PSO Mapping**

| Cos | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | 2 | 2 |
| **CO 2** | 3 | 3 | 2 | 3 | 2 | - | - | 2 | - | - | 3 | 2 |
| **CO 3** | - | 3 | 3 | 3 | 2 | - | - | 2 | - | - | 3 | 2 |
| **CO 4** | 3 | - | 3 | 1 | 1 | - | - | 1 | - | - | 2 | 1 |
| **CO 5** | 3 | 3 | 3 | 3 | 2 | - | - | 2 | - | - | 3 | 2 |

**Courrse Assessment Methods**

**Direct**
1. Continuous Assessment Test I, II & III
2. Assignment: Simulation using tool
3. End-Semester examinations

**Indirect**
1. Course - end survey

**Content of the syllabus**

| **Unit - I** | **INTRODUCTION TO DATA WAREHOUSING** | Periods | **9** |
|---|---|---|---|

Introduction to Data Mining - Statistical limits on data mining - Introduction to Distributed FileSystems-

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| | | | |
|---|---|---|---|
| MapReduce - Algorithms using MapReduce - Communication cost model -Complexity Theory for MapReduce. | | | |
| **Unit - II** | **SIMILARITY SEARCH** | Periods | **9** |
| Similarity Search - Applications of nearest - neighbour search - Shingling of Documents –Similarity - preserving summaries of sets - Locality - Sensitivity hashing for documents -Distance measures - Theory of locality-Sensitive functions - Applications - Methods for high degrees of similarity. | | | |
| **Unit - III** | **MINING DATA STREAMS AND LINK ANALYSIS** | Periods | **9** |
| Mining Data streams - Stream data model - Sampling data in a Stream - Filtering streams -Counting distinct elements in a stream- Estimating moments - Link analysis – Page rank -Efficient computation of Page rank - Topic-sensitive page rank - Link spam - Hubs and Authorities. | | | |
| **Unit - IV** | **MINING SOCIAL NETWORKS** | Periods | **9** |
| Social networks as graphs - Clustering of social-network graphs - Direct discovery of communities - Partitioning of graphs - Finding overlapping communities - Simrank– Counting triangles - Neighborhood properties of graphs. | | | |
| **Unit - V** | **ONLINE ADVERTISING AND RECOMMENDATION SYSTEMS** | Periods | **9** |
| Advertising on Web: Issues- Online Algorithms- Matching Problems - Adwords Problem -Implementation – Recommendation Systems: Model – Content based Recommendation-Collaborative Filtering-Dimensionality Reduction. | | | |
| | | **Total Periods** | **45** |
| **Text Books:** | | | |
| 1. | Jure Leskovec, AnandRajaraman, Jeffrey D. Ullman, "Mining of massive Datasets", Cambridge University Press, 2014. | | |
| 2. | Jimmy Lin, Chris Dyer, ―Data-Intensive Text Processing with MapReduce‖, Cambridge University Press, 2013. | | |
| **References:** | | | |
| 1. | James Abello, Panos M. Pardalos, Mauricio G. C. Resende (editors), ―Handbook of Massive Data Sets‖, Kluwer Academic Publishers, 2002. | | |
| 2. | Lei Tang, Huan Liu, ―Community Detection and Mining in Social Media‖, Morgan & Claypool Publishers, 2010. | | |
| **E-Resources:** | | | |
| 1. | https://en.wikipedia.org/wiki/Data_stream_mining | | |
| 2. | https://www.digitalvidya.com/blog/introduction-to-data-warehousing/ | | |
| 3. | http://infolab.stanford.edu/~ullman/mmds/book.pdf | | |

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# PROFESSIONAL ELECTIVE II

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(Autonomous Institution, Affiliated to Anna University ,Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme Code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **II** |

| Course Code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE06** | **Deep Learning** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,
- To study the concepts of machine learning and neural network
- To understand the mathematical, statistical and computational challenges of deep learning
- To know about deep neural networks and regularization
- To learn about deep learning optimization and Convolutional networks
- To examine the case studies of deep learning techniques

| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
|---|---|---|
| | **CO1:** Understand basics of machine learning and neural network | K2 |
| | **CO2:** Understand the mathematical, statistical and computational challenges of deep learning | K2 |
| | **CO3:** Design basic deep learning models | K3 |
| | **CO4:** Optimize deep networks and understand the convolutional networks | K3 |
| | **CO5:** Explore the knowledge in deep learning applications like computer vision, speech recognition and natural language processing | K2 |

**Pre-requisites** -

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| **COs** | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | **1** | **-** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **CO 2** | **1** | **-** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** |
| **CO 3** | **2** | **-** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **CO 4** | **3** | **3** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **2** |
| **CO 5** | **3** | **3** | **3** | **3** | **-** | **-** | **-** | **2** | **-** | **-** | **2** | **3** |

**Course Assessment Methods**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **MACHINE LEARNING BASICS** | Periods | **9** |
|---|---|---|---|

Learning Algorithms - Capacity, Overfitting and Underfitting - Hyperparameters and Validation Sets - Estimators, Bias and Variance - Maximum Likelihood Estimation - Bayesian Statistics - Supervised Learning Algorithms - Unsupervised Learning Algorithms - Stochastic Gradient Descent - Building a Machine Learning

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| | | | |
|---|---|---|---|
| Algorithm -Challenges Motivating Deep Learning.<br>The Human Brain - Models of a Neuron - Neural Networks Viewed As Directed Graphs -Network Architectures - Learning Processes - Learning Tasks | | | |
| **Unit - II** | **PROBABILITY THEORY AND NUMERICAL COMPUTATION** | Periods | **9** |
| Random Variables-Probability Distributions - Marginal Probability - Conditional Probability –Independence - Expectation, Variance and Covariance – function - Bayes' Rule - Continuous Variables - Information Theory - Structured Probabilistic Models.<br>Numerical Computation: Overflow and Underflow - Poor Conditioning - Gradient-Based Optimization - Constrained Optimization - Linear Least Squares. | | | |
| **Unit – III** | **DEEP NETWORKS AND REGULARIZATION** | Periods | **9** |
| Deep Networks: Deep Feedforward Networks - Gradient-Based Learning -Hidden Units - Architecture Design - Back-Propagation –Differentiation Algorithms.<br>Regularization:Parameter Norm Penalties - Norm Penalties as Constrained Optimization - Regularization and Under-Constrained Problems - Dataset Augmentation -Noise Robustness - Semi-Supervised Learning - Multitask Learning. | | | |
| **Unit - IV** | **OPTIMIZATION AND CONVOLUTIONAL NETWORKS** | Periods | **9** |
| Optimization: Pure Optimization - Challenges in Neural Network Optimization - Basic Algorithms - Parameter Initialization Strategies - Algorithms with Adaptive Learning Rates - Approximate Second-Order Methods -Strategies and Meta-Algorithms.<br>Convolutional Networks:Convolution Operation –Pooling – Functions - Random or Unsupervised Feature | | | |
| **Unit – V** | **APPLICATIONS AND DEEP GENERATIVE MODELS** | Periods | **9** |
| Application: Large-Scale Deep Learning - Computer Vision - Speech Recognition - Natural Language Processing. Deep Generative Models-Boltzmann Machines, Deep Boltzmann Machines, Convolutional Boltzmann Machines, Directed Generative Nets | | | |
| | | **Total Periods** | **45** |

| **Text Books :** | |
|---|---|
| 1. | Ian Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning, MIT Press, 2016. |
| 2. | Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013. |
| **References :** | |
| 1. | Simon Haykin, Neural Networks and Learning Machines, 3rd ed, Pearson Prentice Hall, 2009 |
| 2. | Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015. |
| **E-Resources :** | |
| 1. | http://www.deeplearningbook.org/ |
| 2. | https://www.microsoft.com/en-us/research/wp-content/uploads/2016/02/DeepLearning-NowPublishing-Vol7-SIG-039.pdf |
| 3. | https://www.math.univ-toulouse.fr/~besse/Wikistat/pdf/st-m-hdstat-rnn-deep-learning.pdf |
| 4. | http://faculty.neu.edu.cn/yury/AAI/Textbook/Deep%20Learning%20with%20Python.pdf |
| 5. | http://deeplearning.net/tutorial/deeplearning.pdf |
| 6. | http://dai.fmph.uniba.sk/courses/NN/haykin.neural-networks.3ed.2009.pdf |

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| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** | | | |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **II** | | | |
| Course Code | Course name | Periods Per Week | | | Credit | Maximum Marks | | |
| **P19ITE07** | **Information Retrieval** | L | T | P | C | CA | ESE | Total |
| | | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The student should be made to,<br>• Discover the machine learning techniques for text classification and clustering.<br>• Understand the various applications of Information Retrieval giving emphasis to Multimedia IR, Web Search.<br>• Understand the concepts of digital libraries. | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:** Understand the basics of Information Retrieval | K2 |
| | **CO2:** Build an Information Retrieval system using the available tools. | K3 |
| | **CO3:** Identify and design the various components of an Information Retrieval system. | K2 |
| | **CO4:** Apply machine learning techniques to text classification and clustering | K3 |
| | **CO5:** Analyze the Web content structure. | K4 |
| **Pre-requisites** | Artificial intelligence | |

| **CO / PO Mapping**<br>(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 3 | 3 | 3 | 2 | - | - | | - | - | 3 | 2 |
| **CO 2** | 2 | 3 | 3 | 2 | 3 | 3 | - | 2 | - | - | 3 | 2 |
| **CO 3** | 3 | 2 | 3 | 3 | 2 | - | - | 2 | 2 | - | 2 | 2 |
| **CO 4** | 3 | 3 | 2 | 3 | 2 | - | - | 2 | - | - | 3 | 2 |
| **CO 5** | 3 | 2 | 2 | 3 | 2 | - | - | 2 | - | - | 3 | 2 |

**Course Assessment Methods**

| **Direct** |
|---|
| 1. Continuous Assessment Test I, II & III<br>2. Assignment: Simulation using tool<br>3.End-Semester examinations |
| **Indirect** |
| 1. Course - end survey |

**Content of the syllabus**

| **Unit – I** | **INTRODUCTION** | Periods | **9** |
|---|---|---|---|

Introduction - Goals and History of IR - The Impact of the Web on IR - The Role of Artificial Intelligence (AI) in IR - Basic IR Models - Boolean and Vector-Space Retrieval Models – Ranked Retrieval - Text- Similarity Metrics - TF-IDF (Term Frequency/Inverse Document Frequency) Weighting - Cosine Similarity.

| **Unit – II** | **PREPROCESSING** | Periods | **9** |
|---|---|---|---|

Basic Tokenizing Indexing and Implementation of Vector-Space Retrieval - Simple Tokenizing - Stop-Word Removal and Stemming - Inverted Indices - Efficient Processing with Sparse Vectors - Query Operations and Languages - Relevance Feedback - Query Expansion - Query Languages.

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| Unit – III | METRICS | Periods | 9 |
|---|---|---|---|
| Experimental Evaluation of IR - Performance Metrics – Recall - Precision and F Measure - Evaluations on Benchmark Text Collections - Text Representation - Word Statistics - Zipf's Law - Porter Stemmer – Morphology - Index Term Selection - Using Thesauri - Metadata and Markup Languages - Web Search - Search Engines – Spidering – Metacrawlers - Directed Spidering – Link Analysis Shopping Agents. | | | |
| **Unit – IV** | **CATEGORIZATION AND CLUSTERING** | Periods | **9** |
| Text Categorization and Clustering - Categorization Algorithms - Naive Bayes - Decision Trees and Nearest Neighbor - Clustering Algorithms - Agglomerative Clustering - K-Means – Expectation Maximization (EM) - Applications to Information Filtering – Organization and Relevance Feedback. | | | |
| **Unit – V** | **EXTRACTION AND INTEGRATION** | Periods | **9** |
| Recommender Systems - Collaborative Filtering and Content-Based Recommendation of Documents and Products Information Extraction and Integration - Extracting Data from Text – XML - Semantic Web - Collecting and Integrating Specialized Information on the Web. | | | |
| | | **Total Periods** | **45** |

| **Text Books:** | |
|---|---|
| 1. | Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, ―Introduction to InformationRetrieval‖, Cambridge University Press, 2008 |
| 2. | Ricci, F, Rokach, L. Shapira, B.Kantor, ―Recommender Systems Handbook‖, First Edition, 2011. |
| **References:** | |
| 1. | C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval , Cambridge University Press, 2008 |
| 2. | Ricardo Baeza -Yates and Berthier Ribeiro - Neto, Modern Information Retrieval: The Concepts and Technology behind Search 2 nd Edition, ACM Press Books 2011. |
| **E-Resources:** | |
| 1. | http://www.cfilt.iitb.ac.in |
| 2. | https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/106101007/lec22.pdf |
| 3. | https://nptel.ac.in/courses/106/101/106101007/ |
| 4. | https://cse.iitkgp.ac.in/~pawang/courses/IR16/lec1.pdf |

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**VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**
(Autonomous Institution, Affiliated to Anna University ,Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme Code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **II** |

| Course Code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE08** | **Bio Informatics Computing** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,
- Learn bio-informatics algorithms
- Understand pattern matching
- To demonstrate drugs discovery components and system biology

| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
|---|---|---|
| | **CO1:** Identify, formulate and solve problems related to bio informatics | K2 |
| | **CO2:** Develop programming skills and acquire deep understanding of the basic concepts | K3 |
| | **CO3:** Design and implement bio-informatics algorithms | K3 |
| | **CO4:** Explain the basics of bio informatics and computational biology | K2 |
| | **CO5:** Use bioinformatics search tools on the internet for mining data | K3 |

**Pre-requisites** -

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak

**CO/PSO Mapping**

| Cos | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PSO1 | PSO 2 |
| CO 1 | 1 | 2 | 1 | - | 1 | - | - | - | - | - | - | - |
| CO 2 | 1 | 2 | 1 | - | 2 | - | - | - | - | - | 1 | - |
| CO 3 | 1 | - | - | - | 2 | - | - | - | - | - | - | 2 |
| CO 4 | 1 | - | - | - | - | - | - | - | - | - | 1 | - |
| CO 5 | 1 | - | - | - | 1 | 1 | - | - | - | - | - | 1 |

**Course Assessment Methods**

**Direct**
1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

**Indirect**
1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **INTRODUCTORY CONCEPTS** | Periods | **9** |
|---|---|---|---|

The Central Dogma – The Killer Application – Parallel Universes – Watson‘s Definition – Top Down Versus Bottom up – Information Flow – Convergence – Databases – Data Management – Data Life Cycle –Database Technology – Interfaces – Implementation – Networks – Geographical Scope – Communication Models – Transmissions Technology – Protocols – Bandwidth – Topology–Hardware – Contents – Security – Ownership – Implementation – Management.

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| Unit - II | SEARCH ENGINES AND DATA VISUALIZATION | Periods | 9 |
|---|---|---|---|
| The search process – Search Engine Technology – Searching and Information Theory – Computational methods – Search Engines and Knowledge Management – Data Visualization – sequence visualization–structure visualization–userInterface–AnimationVersus simulation–General Purpose Technologies. | | | |
| **Unit – III** | **STATISTICS AND DATA MINING** | Periods | **9** |
| Statistical concepts – Microarrays – Imperfect Data – Randomness – Variability – Approximation – Interface Noise – Assumptions – Sampling and Distributions – Hypothesis Testing – Quantifying Randomness – Data Analysis – Tool selection statistics of Alignment – Clustering and Classification – Data Mining – Methods – Selection and Sampling – Preprocessing and Cleaning – Transformation and Reduction – Data Mining Methods – Evaluation – Visualization – Designing new queries – Pattern Recognition and Discovery – Machine Learning – Text Mining – Tools. | | | |
| **Unit - IV** | **PATTERN MATCHING** | Periods | **9** |
| Pair-wise sequence alignment – Local versus global alignment – Multiple sequence alignment – Computational methods – Dot Matrix analysis – Substitution matrices – Dynamic Programming – Word methods – Bayesian methods – Multiple sequence alignment – Dynamic Programming – Progressive strategies – Iterative strategies – Tools – Nucleotide Pattern Matching – Polypeptide pattern matching– Utilities – Sequence Databases. | | | |
| **Unit – V** | **MODELING AND SIMULATION** | Periods | **9** |
| Drug Discovery – components – process – Perspectives – Numeric considerations – Algorithms – Hardware – Issues – Protein structure – AbInitio Methods – Heuristic methods – Systems Biology – Tools – Collaboration and Communications –standards-Issues – Security – Intellectual property. | | | |
| | | **Total Periods** | **45** |

**Text Books:**


| | |
|---|---|
| 1. | Bryan Bergeron, ―Bio Informatics Computing‖, Second Edition, Pearson Education, 2003. |
| 2. | T.K.Attwood and D.J. Perry Smith, ―Introduction to Bio Informatics, Longman Essen, 1999. |


**References:**


| | |
|---|---|
| 1. | Arthur M Lesk, ―Introduction to Bioinformatics‖, Second Edition, Oxford University Press, 2005 |
| 2. | Zoe lacroix and Terence Critchlow, ―BioInformatics – Managing Scientific Data‖, First Indian Reprint, Elsevier, 2004 |


**E-Resources:**

| | |
|---|---|
| 1. | http://www.bio-nica.info/Biblioteca/Bergeron2002Bioinformatics.pdf |
| 2. | https://courses.cs.ut.ee/MTAT.03.242/2017_fall/uploads/Main/Basics_of_Bioinformatics.pdf |
| 3. | http://www.aun.edu.eg/molecular_biology/Procedure%20Bioinformatics22.23-4-2015/Xiong%20-%20Essential%20Bioinformatics%20send%20by%20Amira.pdf |

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| | VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN<br>(Autonomous Institution Affiliated to Anna University, Chennai)<br>Elayampalayam, Tiruchengode – 637 205 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** | | | | |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **II** | | | | |
| Course Code | Course name | Periods Per Week | | | Credit | Maximum Marks | | | |
| | | L | T | P | C | CA | ESE | Total | |
| **P19ITE09** | **Grid Computing** | 3 | 0 | 0 | 3 | 40 | 60 | 100 | |

| | | |
|---|---|---|
| **Course Objective** | The student should be made to,<br>• Understand Grid Architecture.<br>• Understand different types of grids.<br>• Learn about frameworks of grid.<br>• Know Grid standards.<br>• Acquire the knowledge of Grid computing in various areas. | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1 :** Recognize the necessity and an ability to engage in life-long learning. | K2 |
| | **CO2 :** Acquire the knowledge of contemporary issues | K2 |
| | **CO3 :** Create Grid Middleware architecture. | K3 |
| | **CO4 :** Develop algorithms for Grid Resource Management and Scheduling | K3 |
| | **CO5 :** Develop Tools for grid applications. | K3 |
| **Pre-requisites** | - | |

| **CO / PO Mapping**<br>(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 2 | 1 | - | - | 1 | - | 2 | - | 1 | 2 | 1 |
| **CO 2** | 1 | 2 | - | 2 | 1 | 3 | - | 2 | 1 | - | 2 | - |
| **CO 3** | 2 | - | - | 1 | 2 | 1 | - | 2 | - | 1 | - | 2 |
| **CO 4** | 2 | 1 | 3 | - | 2 | - | - | - | 2 | 1 | 1 | 2 |
| **CO 5** | - | 2 | 2 | 1 | - | 2 | - | 1 | - | 2 | 1 | 1 |

**Course Assessment Methods**

| **Direct** |
|---|
| 1. Continuous Assessment Test I, II & III<br>2. Assignment<br>3. End-Semester examinations |
| **Indirect** |
| 1. Course - end survey |

**Content of the syllabus**

| **Unit – I** | **INTRODUCTION** | Periods | **9** |
|---|---|---|---|

High Performance Computing, Cluster Computing, Meta-computing, Peer-to-Peer Computing, Internet Computing, Grid Computing – Types of grids - The Grid: Past, Present, Future - A New Infrastructure for 21st Century Science, Grid Applications

| **Unit – II** | **GRID COMPUTING TECHNOLOGY** | Periods | **9** |
|---|---|---|---|

The Evolution of the Grid - Desktop Grids - Cluster Grids – HPC Grids – Computational and Data Grids.

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| Unit – III | THE ANATOMY OF THE GRID | Periods | 9 |
|---|---|---|---|
| Virtual organizations, Grid architecture and its Relationship to other distributed technologies – autonomic computing – service on demand – SOA and the Grid – semantic grids - Service virtualization – Infrastructure and applications. | | | |
| **Unit – IV** | **THE OPEN GRID SERVICES ARCHITECTURE & INFRASTRUCTURE** | Periods | **9** |
| Evolution to OGSA, Physiology of the Grid: OGSA Infrastructure - OGSA Basic Services, Creating and Managing Grid Services, Managing Grid Environments - Grid-Enabling software applications, Grid-Enabling network services, Grid Security, Grid Resource Management and Scheduling - High-level Introduction to OGSI, Technical details of OGSI specification. | | | |
| **Unit – V** | **APPLICATION- CASE STUDY** | Periods | **9** |
| Globus Toolkit – Architecture, Programming model, Sample Implementation, High Level Services – Study of a cloud computing infrastructure. | | | |
| | | **Total Periods** | **45** |

| **Text Books:** | |
|---|---|
| 1. | Ahmar Abbas, ―Grid Computing Practical Guide to Technology andApplications‖, Firewall Media, New Delhi, 2008. |
| 2. | Ian Foster, Carl Kesselman, -The Grid : Blueprint for a New Computing Infrastructure‖, Morgan Kaufman, New Delhi, 2006. |
| **References:** | |
| 1. | Fran Berman, Geoffrey Fox, Anthony Hey J G, ―Grid Computing Making the Global Infrastructure a Reality‖, Wiley, USA, 2003 |
| 2. | Joshy Joseph, Craig Fallenstein, ―Grid Computing‖, Pearson Education, New Delhi, 2004. |
| 3. | Prabhu C S R, ―Grid and Cluster Computing‖, PHI Pvt Ltd, New Delhi, 2008. |
| 4. | Janakiraman, -Grid Computing-Models, A Research Monograph‖, Tata McGraw Hill, 2005. |
| **E-Resources:** | |
| 1. | https://www.geeksforgeeks.org/grid-computing/ |
| 2. | https://www.tutorialspoint.com/cloud_computing/cloud_computing_technologies.htm |
| 3. | https://searchdatacenter.techtarget.com/definition/grid-computing |
| 4. | https://www.guru99.com/cloud-computing-for-beginners.html |
| 5. | http://ecomputernotes.com/fundamental/introduction-to-computer/grid-computing |
| 6. | https://computer.howstuffworks.com/grid-computing1.htm |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
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| Programme | **M.Tech.** | Programme code | **204** | | Regulation | | | **2019** |
| Department | **INFORMATION TECHNOLOGY** | | | | Semester | | | **II** |
| Course Code | Course name | Periods Per Week | | | Credit | Maximum Marks | | |
| **P19ITE10** | **Multimedia Systems** | L | T | P | C | CA | ESE | Total |
| | | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| **Course Objective** | The student should be made to,<br>• Describe the ways in which multimedia information is captured, processed, and rendered.<br>• Identify multimedia quality of service (QoS) and to compare subjective and objective methods of assessing user satisfaction,<br>• Describe the ways in which multimedia data is transmitted across networks, and to discuss privacy and copyright issues in the context of multimedia. | | | | | | | |
| **Course Outcome** | At the end of the course, the student should be able to, | | | | | | | **KL** |
| | **CO1 :** Able to describe different realizations of multimedia tools and the way in which they are used. | | | | | | | K2 |
| | **CO2 :** Analyze the structure of the tools in the light of low-level constraints imposed by the adoption of various QoS schemes (ie bottom up approach) | | | | | | | K4 |
| | **CO3 :** Analyze the effects of scale and use on both presentation and lower-level requirements. | | | | | | | K4 |
| | **CO4** : Able to describe the properties of different media streams | | | | | | | K2 |
| | **CO5 :** Compare and contrast different network protocols and to describe mechanisms for providing QoS guarantees in the network | | | | | | | K2 |
| **Pre-requisites** | - | | | | | | | |

| **CO / PO Mapping**<br>(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 1 | 1 | 2 | - | 3 | 2 | - | - | - | 1 | 2 | - |
| **CO 2** | 1 | 2 | - | 2 | 2 | 2 | - | 1 | - | 2 | - | 1 |
| **CO 3** | 2 | - | 2 | 3 | 2 | 1 | - | 2 | - | 2 | - | 2 |
| **CO 4** | 2 | 2 | 1 | 2 | - | 2 | - | 2 | - | 2 | 2 | - |
| **CO 5** | 1 | 1 | - | - | 1 | 2 | - | - | 2 | 1 | 1 | - |

**Course Assessment Methods**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

1. Course - end survey

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| Content of the syllabus | | | |
|---|---|---|---|
| **Unit – I** | **INTRODUCTION** | Periods | **9** |
| An overview of multimedia system – media streams- Fourier Transform- Audio Basics | | | |
| **Unit – II** | **REPRESENTATION AND COMPRESSION TECHNIQUES** | Periods | **9** |
| Source representation and compression techniques text, speech and audio, still image and video – Graphics and animation. | | | |
| **Unit – III** | **MULTI-MODAL AND MULTIMEDIA COMMUNICATION** | Periods | **9** |
| Multi-modal communication –Multimedia communication, video conferencing, video-on-demand broadcasting issues, traffic shaping and networking support. | | | |
| **Unit – IV** | **IP-BASED TRANSPORT** | Periods | **9** |
| Networked multimedia applications- Streaming Media with TCP-Streaming Media with UDP Real-time Transport Protocol (RTP)-RTP header compression-Application-level adaptation-FEC and redundant coding. | | | |
| **Unit – V** | **SYNCHRONIZATION AND QoS** | Periods | **9** |
| Multimedia servers, databases and content management – Multimedia information system and applications. | | | |
| | | | |
| | | **Total Periods** | **45** |

| **Text Books:** | |
|---|---|
| 1. | Ralf Steinmetz and KlaraNahrstedt, Multimedia Systems, Springer. |
| 2. | J. D. Gibson, Multimedia Communications: Directions and Innovations, Springer. |
| **References:** | |
| 1. | Multimedia Technologies: Concepts, Methodologies, Tools, and Applications Syed Mahbubur Rahman Minnesota State University, Mankato, USA |
| 2. | Computer Graphics (C Version), Donald Hearn and M. Pauline Baker, Prentice Hall, |
| **E-Resources:** | |
| 1. | https://jianhua.cis.k.hosei.ac.jp/course/mm/Lecture_Note.html |
| 2. | https://www.scribd.com/doc/80550055/Introduction-to-Multimedia-Systems-Notes |
| 3. | https://www.studocu.com/en/document/monash-university/computer-science/lecture-notes/multimedia-systems-lecture-notes/1297610/view |
| 4. | https://www.tutorialspoint.com/multimedia/multimedia_systems.htm |
| 5. | https://www.encyclopedia.com/finance/finance-and-accounting-magazines/multimedia-systems |
| 6. | https://en.wikipedia.org/wiki/Multimedia |

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# PROFESSIONAL ELECTIVE III

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**<br>(Autonomous Institution Affiliated to Anna University, Chennai)<br>Elayampalayam, Tiruchengode – 637 205 | | | | | | | |
| Programme | **M.Tech.** | Programme code | | **204** | Regulation | | **2019** | |
| Department | **INFORMATION TECHNOLOGY** | | | | Semester | | **II** | |
| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
| **P19ITE11** | **Advanced Software Engineering** | L | T | P | C | CA | ESE | Total |
| | | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The student should be made to<br>• Understand Software Engineering Lifecycle Models<br>• Do project management and cost estimation<br>• Gain knowledge of the System Analysis and Design concepts.<br>• Understand software testing approaches<br>• Be familiar with Devops practices | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:** Understand the advantages of various Software Development Lifecycle Models | K2 |
| | **CO2:** Gain knowledge on project management approaches as well as cost and schedule estimation strategies Perform formal analysis on specifications | K2 |
| | **CO3:** Use UML diagrams for analysis and design | K2 |
| | **CO4:** Understand the different Testing Methods | K2 |
| | **CO5 :** Gain knowledge on Devops development Tools | K2 |
| **Pre-requisites** | Software Engineering and Object Oriented Analysis and Design | |

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

**CO/PSO Mapping**

| Cos | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 3 | 3 | 3 | 2 | - | - | - | - | - | 2 | 2 |
| **CO 2** | 3 | 3 | 2 | - | 2 | 2 | - | 2 | - | - | 3 | 2 |
| **CO 3** | 3 | 3 | 3 | 3 | 2 | - | - | 2 | - | - | 2 | 2 |
| **CO 4** | 3 | - | 3 | 2 | 3 | - | - | 1 | - | - | 3 | 1 |
| **CO 5** | 2 | 3 | 3 | 3 | - | 2 | - | 2 | 2 | - | 3 | 2 |

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Test I, II & III
2 Assignment
3 End-Semester examinations

**Indirect**

1. Course - end survey

| **Unit - I** | **INTRODUCTION** | Periods | **9** |
|---|---|---|---|

Software engineering concepts – Development activities – Software lifecycle models - Classical waterfall - Iterative waterfall – Prototyping – Evolutionary - Spiral – Software project management – Project planning – Estimation – Scheduling – Risk management – Software configuration management.

| **Unit - II** | **SOFTWARE REQUIREMENT SPECIFICATION** | Periods | **9** |
|---|---|---|---|

Requirement analysis and specification – Requirements gathering and analysis – Software Requirement Specification – Formal system specification – Finite State Machines – Petrinets – Object modelling using UML – Use case Model – Class diagrams – Interaction diagrams – Activity diagrams – State chart diagrams –

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| | | | |
|---|---|---|---|
| Functional modelling – Data Flow Diagram. | | | |
| **Unit - III** | **ARCHITECTURE AND DESIGN** | Periods | **9** |
| Software design – Design process – Design concepts – Coupling – Cohesion – Functional independence – Design patterns – Model-view-controller – Publish-subscribe – Adapter – Command – Strategy – Observer – Proxy – Facade – Architectural styles – Layered – Client server - Tiered - Pipe and filter.- User interface design | | | |
| **Unit - IV** | **TESTING** | Periods | **9** |
| Testing – Unit testing – Black box testing– White box testing – Integration and System testing– Regression testing – Debugging - Program analysis – Symbolic execution – Model Checking | | | |
| **Unit - V** | **DEVOPS** | Periods | **9** |
| DevOps: Motivation-Cloud as a platform-Operations- Deployment Pipeline: Overall Architecture Building and Testing-Deployment- Case study: Migrating to Micro services. | | | |
| | | **Total Periods** | **45** |
| **Text Book:** | | | |
| 1. | Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, 2nd edition, PearsonEducation, 2004. | | |
| **References:** | | | |
| 1. | Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, Fundamentals of Software Engineering, 2nd edition, PHI Learning Pvt. Ltd., 2010. | | |
| 2. | Len Bass, Ingo Weber and Liming Zhu, ―DevOps: A Software Architect_s Perspective‖, Pearson Education, 2016 | | |
| **E-Resources** | | | |
| 1. | https://nptel.ac.in/content/storage2/courses/108105057/Pdf/Lesson-33.pdf | | |
| 2. | https://nptel.ac.in/content/storage2/courses/108105057/Pdf/Lesson-34.pdf | | |
| 3. | https://www.slideshare.net/SaqibRaza21/architecture-design-71622681 | | |
| 4. | https://www.geeksforgeeks.org/most-popular-devops-tools/ | | |

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Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **II** |

| Course code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE12** | **Ad-Hoc & Sensor Networks** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,

- Learn about the issues in the design of ad hoc and wireless sensor networks
- Understand the working of protocols in different layers of ad hoc and sensor networks
- Expose the students to different aspects in ad hoc and sensor networks
- Understand various standards and applications in ad hoc and sensor networks

| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
|---|---|---|
| | **CO1 :** Identify different issues in ad hoc wireless networks | K2 |
| | **CO2 :** Identify different routing algorithms in ad hoc networks | K2 |
| | **CO3 :** Analyze the protocols developed for ad hoc and sensor networks | K4 |
| | **CO4 :** Identify and discuss the standards of routing algorithms | K2 |
| | **CO5 :** Develop the applications of ad hoc and sensor networks | K3 |

**Pre-requisites**: Fundamentals of data communications, Computer networks

| **CO / PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | 3 | 2 |
| **CO 2** | 3 | 2 | 3 | 3 | 2 | - | - | 2 | - | - | 3 | 2 |
| **CO 3** | 3 | 3 | 3 | 3 | 2 | - | - | 2 | - | - | 2 | 2 |
| **CO 4** | 3 | 3 | 2 | 3 | 2 | - | - | 2 | - | - | 3 | 2 |
| **CO 5** | 3 | 3 | 3 | 3 | 2 | - | - | 2 | - | - | 3 | 2 |

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

**Indirect**

1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **AD-HOC MAC** | Periods | **9** |
|---|---|---|---|

Introduction – Issues in Ad-Hoc Wireless Networks. MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

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| | | | |
|---|---|---|---|
| **Unit – II** | **AD-HOC NETWORK ROUTING & TCP** | Periods | **9** |
| Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast routing – Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc – Feedback based, TCP with explicit link, TCP-BuS, Ad Hoc TCP, and Split TCP. | | | |
| **Unit – III** | **WSN –MAC** | Periods | **9** |
| Introduction – Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC. | | | |
| **Unit – IV** | **WSN ROUTING, LOCALIZATION & QOS** | Periods | **9** |
| Issues in WSN routing – OLSR, AODV. Localization – Indoor and Sensor Network Localization. QoS in WSN. | | | |
| **Unit – V** | **MESH NETWORKS** | Periods | **9** |
| Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture –Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks. | | | |
| | | **Total Periods** | **45** |
| **Text Books:** | | | |
| 1. | C.Siva Ram Murthy and B.Smanoj, ―Ad Hoc Wireless Networks – Architectures and Protocols‖, Pearson Education, 2004. | | |
| **References:** | | | |
| 1. | Waltenegus Dargie,Christian Poellabauer, ―Fundamentals of Wireless Sensor Networks‖, John Wiley & Sons, 2010. | | |
| 2. | C.K.Toh, ―Ad Hoc Mobile Wireless Networks‖, Pearson Education, 2002. | | |
| 3. | Thomas Krag and Sebastin Buettrich, -Wireless Mesh Networking‖, O'Reilly Publishers, 2007 | | |
| **E-Resources:** | | | |
| 1. | https://www.slideshare.net/shashi712/mac-protocols-of-adhoc-network | | |
| 2. | https://nptel.ac.in/courses/106/105/106105160/ | | |
| 3. | https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/106105160/lec19.pdf | | |

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**VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**
(Autonomous Institution, Affiliated to Anna University ,Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **II** |

| Course code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE13** | **Information Storage Management** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,
- Understand the storage architecture and available technologies.
- Learn to establish & manage datacenter.
- Learn security aspects of storage& data center.
- Understand the importance of information
- Learn how to provide security to information

| **Course Outcomes** | At the end of the course, the student should be able to, | **KL** |
|---|---|---|
| | **CO1:** Understand different storage technology | K2 |
| | **CO2:** Analyze different storage systems architecture | K4 |
| | **CO3:** Select from various storage technologies to suit for required application. | K2 |
| | **CO4:** Apply security measures to safeguard storage& farm. | K4 |
| | **CO5:** Analyse QoS on Storage. | K4 |

**Pre-requisites** Database Management System

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| Cos | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | - | - | 2 | - | 1 | - | - | - | - | 2 | 2 |
| **CO 2** | - | - | 3 | - | 3 | - | - | - | - | - | 3 | 2 |
| **CO 3** | - | 3 | - | 2 | 1 | - | - | - | - | - | 3 | 2 |
| **CO 4** | - | - | - | - | - | - | - | - | 2 | - | 3 | 2 |
| **CO 5** | 3 | 3 | 3 | 3 | 2 | - | - | 2 | - | - | 3 | 2 |

**Course Assessment Methods**

**Direct**
1. Continuous Assessment Test I, II & III
2. Assignment: Various applications
3. End-Semester examinations

**Indirect**
1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **STORAGE TECHNOLOGY** | Periods | **9** |
|---|---|---|---|

Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities

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| | | | |
|---|---|---|---|
| **Unit – II** | **STORAGE SYSTEMS ARCHITECTURE** | Periods | **9** |
| Hardware and software components of the host environment, Key protocols and concepts used by each component ,Physical and logical components of a connectivity environment ,Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, Concept of RAID and its levels. | | | |
| **Unit – III** | **INFORMATION AVAILABILITY** | Periods | **9** |
| Planned/unplanned outages and the impact of downtime, Impact of downtime -Business continuity (BC) and disaster recovery (DR), RTO and RPO. | | | |
| **Unit – IV** | **MONITORING & MANAGING DATACENTERS** | Periods | **9** |
| Identify single points of failure in a storage infrastructure, architecture of backup/recovery, replication technologies, Remote replication technologies. Identify key areas to monitor in a data center, Industry standards data center monitoring and management. | | | |
| **Unit – V** | **SECURING STORAGE AND STORAGE VIRTUALIZATION** | Periods | **9** |
| Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain, Virtualization technologies, block-level and file-level virtualization technologies and processes. | | | |
| | | **Total Period** | **45** |
| **Text Books:** | | | |
| 1. | EMC Corporation, "Information Storage and Management: Storing, Managing, and Protecting Digital Information", Wiley, India, 2010 | | |
| **References:** | | | |
| 1. | Marc Farley, ―Building Storage Networks‖, Tata McGraw Hill ,Osborne, 2001. | | |
| 2. | Robert Spalding, ―Storage Networks: The Complete Reference―, Tata McGraw Hill , Osborne, 2003. | | |
| **E-Resources:** | | | |
| 1. | https://nptel.ac.in/courses/106/108/106108058/ | | |
| 2. | https://www.slideshare.net/datacenters/storage-virtualization | | |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**<br>(Autonomous Institution, Affiliated to Anna University ,Chennai)<br>Elayampalayam, Tiruchengode – 637 205 | | | | | | | |
| Programme | **M.Tech.** | Programme Code | | **204** | Regulation | | **2019** | |
| Department | **INFORMATION TECHNOLOGY** | | | | Semester | | **II** | |
| Course Code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE14** | **Knowledge Engineering** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The student should be made to,<br>• Understand knowledge representation and reasoning techniques.<br>• Understand the application of knowledge representation and reasoning in actions and planning. | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:** Analyze the need of formal languages for representing knowledge | K4 |
| | **CO2:** Implement knowledge representation and reasoning techniques. | K3 |
| | **CO3:** Modal and non monotonic logics | K2 |
| | **CO4:** Design object oriented representation | K3 |
| | **CO5:** Apply knowledge engineering for the development of intelligent applications | K3 |
| **Pre-requisites** | Artificial Intelligence | |

| **CO / PO Mapping**<br>(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 1 | 2 | 2 | 2 | - | - | - | 1 | 2 | 2 | 1 |
| **CO 2** | 2 | 2 | 2 | 2 | 2 | - | - | - | 2 | 1 | 2 | 1 |
| **CO 3** | 2 | 1 | 2 | 2 | 2 | - | - | - | 1 | 1 | 1 | 1 |
| **CO 4** | 2 | 2 | 2 | 2 | 2 | - | - | - | 2 | 1 | 1 | 1 |
| **CO 5** | 2 | 2 | 2 | 2 | 2 | - | - | - | 1 | 1 | 1 | 1 |

**Course Assessment Methods**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **INTRODUCTION AND FIRST-ORDER LOGIC** | Periods | **9** |
|---|---|---|---|

Introduction: Knowledge, Representation, Reasoning - Knowledge-Based Systems -The Role of Logic- First-Order Logic: Introduction - The Syntax- The Semantics - The Pragmatics- Logical Consequence - Explicit and Implicit Belief.-Expressing Knowledge: Knowledge Engineering -Basic Facts -Complex Facts - Terminological Facts.

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| Unit - II | RESOLUTION AND REASONING WITH HORN CLAUSES | Periods | 9 |
|---|---|---|---|
| Resolution: The Propositional Case- Handling Variables and Quantifiers- First-Order Resolution- Dealing with Computational Intractability- SAT Solvers-Reasoning with Horn Clause- Horn Clauses-SLD - Computing SLD Derivations- The First-Order Case. | | | |
| **Unit – III** | **OBJECT-ORIENTED REPRESENTATION** | Periods | **9** |
| Object Oriented Representations :Object and frames– Frame Formalism – Structured Descriptions – Meaning and Entailment – Computing Entailment-Taxonomies and Classification – Inheritance: Inheritance Networks-Strategies. | | | |
| **Unit - IV** | **DEFAULT, EXPLANATION AND DIAGNOSIS** | Periods | **9** |
| Defaults: Introduction-Closed World Reasoning-Circumscription-Default, Auto epistemic Logic. Explanation and Diagnosis: Diagnosis- Explanation-A circuit-Extension. | | | |
| **Unit – V** | **ACTION AND PLANNING** | Periods | **9** |
| Actions – Situational Calculus – Frame Problem solution–Complex Actions – Planning - Situational Calculus – STRIPS– Planning as Reasoning – Hierarchical and Conditional Planning. | | | |
| | | **Total Periods** | **45** |

**Text Book:**

| | |
|---|---|
| 1. | Ronald Brachman, Hector Levesque, -Knowledge Representation and Reasoning‖, The Morgan Kaufmann Series in Artificial Intelligence, 2004. |

**References:**

| | |
|---|---|
| 1. | Elaine Rich, S.Nair, ―Artificial intelligence‖, Third edition, Tata McGraw-Hill Education, 2010 |
| 2. | Johan van Benthem, Hans van Ditmarsch, Jan van Eijck and Jan Jaspars, Logic in Action, A new introduction to Logic, Available in http://www.logicinaction.org/, 2014. |
| 3. | Arthur B. Markman, -Knowledge Representation‖, Lawrence Erlbaum Associates, 1998. |
| 4. | S.C. Mehrotra, Ratnadeep R. Deshmukh, Sachin N. Deshmukh, Ramesh R. Manza, -Knowledge Engineering‖ , Alpha Science, 2011. |

**E-Resources:**

| | |
|---|---|
| 1. | https://www.javatpoint.com/first-order-logic-in-artificial-intelligence |
| 2. | https://web.stanford.edu/class/cs227/Lectures/lec08a.pdf |
| 3. | https://web.stanford.edu/class/cs227/Lectures/lec02.pdf |
| 4. | https://www.cs.ubc.ca/~poole/papers/arch.pdf |
| 5. | https://www.researchgate.net/publication/329191637_A_Review_of_Learning_Planning_Action_Models |

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(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.TECH.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **II** |

| Course Code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE15** | **Ethical Hacking and Digital Forensics** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,

- Learn various hacking techniques and attacks.
- Understand the benefits of strategic planning process.
- Evaluate where information networks are most vulnerable.
- Perform penetration tests into secure networks for evaluation purposes.
- Enable students to understand issues associated with the nature of forensics.

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:** Defend hacking attacks and protect data assets. | K2 |
| **CO2:** Defend a computer against a variety of different types of security attacks using a number of hands-on techniques. | K2 |
| **CO3:** Defend a LAN against a variety of different types of security attacks using a number of hands-on techniques. | K2 |
| **CO4:** Practice and use safe techniques on the World Wide Web. | K3 |
| **CO5:** Understand computer Digital forensics | K2 |

**Pre-requisites** -

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

**CO/PSO Mapping**

| Cos | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 2 | 2 | 3 | 2 | 2 | - | 1 | 2 | - | 1 | 2 |
| **CO 2** | 2 | 1 | 3 | 2 | 2 | 2 | - | - | 1 | 2 | 2 | 2 |
| **CO 3** | 1 | 3 | 2 | 2 | 1 | 1 | - | 1 | 1 | 2 | 1 | 2 |
| **CO 4** | 2 | 3 | 2 | 2 | 2 | 2 | - | 1 | 3 | 3 | 3 | 2 |
| **CO 5** | 2 | 1 | 3 | 2 | 2 | 2 | - | - | 1 | 2 | 2 | 2 |

**Course Assessment Methods**

| **Direct** |
|---|
| 1. Continuous Assessment Test I, II & III<br>2. Assignment<br>3. End-Semester examinations |
| **Indirect** |
| 1. Course - end survey |

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| Content of the syllabus | | | |
|---|---|---|---|
| **Unit – I** | **HACKING WINDOWS** | Periods | **9** |
| Hacking windows – Network hacking – Web hacking – Password hacking. A study on various attacks – Input validation attacks – SQL injection attacks – Buffer overflow attacks - Privacy attacks. | | | |
| **Unit - II** | **TCP/IP** | Periods | **9** |
| TCP / IP – Checksums – IP Spoofing port scanning, DNS Spoofing. Dos attacks – SYN attacks, Smurf attacks, UDP flooding, DDOS – Models. Firewalls – Packet filter firewalls, Packet Inspection firewalls – Application Proxy Firewalls. Batch File Programming. | | | |
| **Unit – III** | **FUNDAMENTALS OF COMPUTER FRAUD** | Periods | **9** |
| Fundamentals of Computer Fraud – Threat concepts – Framework for predicting inside attacks – Managing the threat – Strategic Planning Process. | | | |
| **Unit – IV** | **ARCHITECTURE** | Periods | **9** |
| Architecture strategies for computer fraud prevention – Protection of Web sites – Intrusion detection system – NIDS, HIDS – Penetrating testing process – Web Services– Reducing transaction risks. | | | |
| **Unit – V** | **KEY FRAUD INDICATOR SELECTION PROCESS CUSTOMIZED** | Periods | **9** |
| Forensics – Computer Forensics – Journaling and it requirements – Standardized logging criteria – Journal risk and control matrix – Neural networks – Misuse detection and Novelty detection. | | | |
| | | **Total Periods** | **45** |
| **Text Books:** | | | |
| 1. | Kenneth C.Brancik ―Insider Computer Fraud‖ Auerbach Publications Taylor & Francis Group–2008. | | |
| 2. | Ankit Fadia ― Ethical Hacking‖ second edition Macmillan India Ltd, 2006 | | |
| **E-Resources** | | | |
| 1. | https://null-byte.wonderhowto.com/how-to/hacking-windows-10-break-into-somebodys-computer-without-password-setting-up-payload-0183584/ | | |
| 2. | https://www.acfe.com/uploadedFiles/Shared_Content/Products/SelfStudy_CPE/Fundamentals%20of%20Computer%20and%20Internet%20Fraud%202017_Extract.pdf | | |
| 3. | https://oseven.in/files/5936c2ad22cae.pdf | | |

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# PROFESSIONAL ELECTIVE IV

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**VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**
(Autonomous Institution Affiliated to Anna University,
Chennai)Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme Code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **III** |

| Course Code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE16** | **Human and Computer Interaction** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The main objective of this course is to:

- Learn the principles and fundamentals of human computer interaction(HCI).
- Analyze HCI theories, as they relate to collaborative or social software.
- Establish target users, functional requirements, and interface requirements for a given computer application.
- Understand user interface design principles, and apply them to designing an interface.
- Learn user interface designs through usability inspection and user models.
- Know the applications of multimedia on HCI.

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:**Interpret the contributions of human factors and technical constraints on human computer interaction. | K1 |
| **CO2:**Evaluate the role of current HCI theories in the design of software. | K6 |
| **CO3:**Apply HCI techniques and methods to the design of software. | K3 |
| **CO4:**Categorize and carefully differentiate various aspects of multimedia interfaces. | K2 |
| **CO5:**Design and develop issues related to HCI for real application. | K5 |

**Pre-requisites** User Interface Design

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak

**CO/PSO Mapping**

| COs | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO7** | **PO8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 3 | 3 | - | 3 | 2 | - | 3 | - | 2 | 3 | 3 |
| **CO 2** | 3 | 2 | 2 | - | 2 | | - | - | 2 | 2 | 2 | 3 |
| **CO 3** | 3 | 3 | - | - | 3 | 3 | - | 1 | - | 2 | 1 | 3 |
| **CO 4** | - | 2 | 2 | 3 | 1 | 2 | - | - | 1 | 1 | 3 | 1 |
| **CO 5** | 2 | 3 | 3 | 3 | 1 | 3 | - | 1 | 1 | 2 | 3 | 3 |

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Test I, II & III
2. Assignment: Develop their presentation skills, presentation of research topic.
3. End-Semester examinations

1. Course - end survey

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| Content of the syllabus | | | |
|---|---|---|---|
| **Unit – I** | **DESIGN PROCESS** | Periods | **9** |
| Humans – Information Process – Computer – Information Process – Differences and Similarities – Need for Interaction – Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms- Design Process – Scenarios – Users Need –Complexity of Design Interaction. | | | |
| **Unit – II** | **DESIGN AND EVALUATION OF INTERACTIVESYSTEMS** | Periods | **9** |
| Software Process – Usability Engineering – Issue based Information Systems – Iterative Design Practices – Design Rules – Maximum Usability – Principles – Standards and Guidelines – Design Patterns – Programming Tools – Windowing Systems – Interaction Tool Kit – User Interface Management System –Evaluation Techniques – Evaluation Design. | | | |
| **Unit – III** | **MODELS** | Periods | **9** |
| Universal Design Principles – Multimodal Systems – User Support – Presentation and Implementation Issues –Types–Requirements–Approaches–Cognitive Model–Hierarchical Model– Linguistic Model– Physical and Device Models – Socio technical Models – Communication and Collaboration Models – Task Models. | | | |
| **Unit – IV** | **EXPERIMENTAL DESIGN AND STATISTICALANALYSIS OF HCI** | Periods | **9** |
| Basic Design Structure – Single Independent Variable – Multiple Independent Variable – Factorial Design – Split-Plot Design – Random Errors – Experimental Procedure – Statistical Analysis – Tests – Analysis of Variance Test – Regression – Chi-Square Test – Survey – Probabilistic Sampling – Non-Probabilistic Sampling. | | | |
| **Unit – V** | **THEORIES** | Periods | **9** |
| Dialogue Notations and Design – Dialogue Need – Dialogue Design Notations – Graphical – Textual - Representing Dialogue – Formal Descriptions – Dialogue Analysis – System Models – Interaction Models – Relationship with Dialogue – Formalisms – Formal Notations – Interstitial Behavior – Virtual Reality. | | | |
| | | **Total Periods** | **45** |

**Text Books:**

| | |
|---|---|
| 1. | Ben Shneiderman and Catherine Plaisant, ‐Designing the User Interface: Strategies for Effective Human-Computer Interaction‖, Fifth Edition, Addison-Wesley Publishing Co, 2009 |
| 2. | Jonathan Lazar Jinjuan Heidi Feng, Harry Hochheiser, ‐Research Methods in Human-Computer Interaction‖, Wiley, 2010 |

**References:**

| | |
|---|---|
| 1. | Gerard Jounghyun Kim,‖ Human–Computer Interaction: Fundamentals and Practice‖,Auerbach Publications; 1 edition ,2005 |
| 2. | Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, ―Human Computer Interaction‖, Third Edition, Prentice Hall, 2004. |

**E-Resources**

| | |
|---|---|
| 1. | https://www.researchgate.net/publication/300673474_Teaching_Human-Computer_Interaction |
| 2. | https://www.interaction-design.org/literature/topics/human-computer-interaction |
| 3. | https://aisel.aisnet.org/thci/vol8/iss4/2/ |

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| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **III** |

| Course Code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE17** | **GPU Computing** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,

- Learn about GPU, Parallel programming, CUDA OpenCL / OpenACC
- Explore different memories and its performance
- Study about Memory Consistency and CPU and GPU Functions
- Learn the Debugging GPU Programs
- Learn the basics of image processing, graph and deep learning

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:** Express the knowledge through simple GPU programming. | K2 |
| **CO2:** Analyse the performance of memories. | K3 |
| **CO3:** Differentiate CPU and GPU Functions. | K4 |
| **CO4:** Analyze various debugging programs | K4 |
| **CO5:** Apply GPU in image processing, graph and deep learning | K3 |

**Pre-requisites** -

**CO / PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| Cos | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 1 | 1 | - | 1 | - | - | - | - | - | - | 1 |
| **CO 2** | 2 | 1 | - | 3 | 2 | 1 | - | - | - | - | - | 1 |
| **CO 3** | 2 | 2 | 1 | 2 | - | 1 | - | - | - | - | - | 1 |
| **CO 4** | 2 | 1 | 2 | - | - | 2 | - | - | - | 1 | 1 | 1 |
| **CO 5** | 3 | 2 | 3 | 2 | - | 3 | - | - | - | 2 | 2 | 1 |

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

**Indirect**

1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **INTRODUCTION** | Periods | **9** |
|---|---|---|---|

History, Graphics Processors, Graphics Processing Units, GPGPUs. Clock speeds, CPU / GPU comparisons, Heterogeneity, Accelerators, Parallel programming, CUDA OpenCL / OpenACC, Hello World Computation Kernels, Launch parameters, Thread hierarchy, Warps / Wavefronts, Thread

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| | | | |
|---|---|---|---|
| blocks / Workgroups, Streaming multiprocessors, 1D / 2D / 3D thread mapping, Device properties, Simple Programs | | | |
| **Unit – II** | **MEMORY** | Periods | **9** |
| Memory hierarchy, DRAM / global, local / shared, private / local, textures, Constant Memory, Pointers, Parameter Passing, Arrays and dynamic Memory, Multi-dimensional Arrays, Memory Allocation, Memory copying across devices, Programs with matrices, Performance evaluation with different memories | | | |
| **Unit – III** | **SYNCHRONIZATION AND FUNCTIONS** | Periods | **9** |
| Memory Consistency, Barriers (local versus global), Atomics, Memory fence. Prefix sum, Reduction. Programs for concurrent Data Structures such as Worklists, Linked-lists. Synchronization across CPU and GPU, Functions: Device functions, Host functions, Kernels functions, Using libraries (such as Thrust), and developing libraries. | | | |
| **Unit – IV** | **SUPPORT AND STREAMS** | Periods | **9** |
| Debugging GPU Programs. Profiling, Profile tools, Performance aspects, Streams: Asynchronous processing, tasks, Task-dependence, Overlapped data transfers, Default Stream, Synchronization with streams. Events, Event-based-Synchronization - Overlapping data transfer and kernel execution, pitfalls. | | | |
| **Unit – V** | **ADVANCED TOPICS** | Periods | **9** |
| Advanced topics: Dynamic parallelism, Unified Virtual Memory, Multi-GPU processing, Peer access, Heterogeneous processing.<br>Case Studies: Nvidiagpu, Video Image Processing, Medical Image Processing, Deep Neural Networks, Tensorflow Processing Units (TPUs), Nervana neural network processor | | | |
| | | **Total Periods** | **45** |

| **Text Books** | |
|---|---|
| 1. | David B. Kirk and Wen-mei W. Hwu,, Programming Massively Parallel Processors A Hands-on Approach, Second Edition, 2013. |
| 2. | Wen-Mei w. Hwu, Morgan Kaufmann, GPU Computing Gems, Emerald Edition, 2011. |
| **References** | |
| 1. | CUDA Programming: A Developer's Guide to Parallel Computing with GPUs; Shane Cook; Morgan Kaufman; 2012 (ISBN: 978-0124159334) |
| 2. | Janson Anders edwardKandrot, CUDA by Example – An Introduction to General purpose GPU Programming, Pearson Education, Inc, 2011. |
| 3. | GerassimosBarlas, Multicore and GPU Programming: An Integrated Approach, MK Publications, 2014. |
| **E-Resources** | |
| 1. | http://digilib.stmikbanjarbaru.ac.id/data.bc/18.%20Programming/2013%20Programming%20Massively%20Parallel%20Processors%20A%20Hands-on%20Approach%202nd.pdf |
| 2. | http://www.hds.bme.hu/~fhegedus/C++/GPU.Computing.Gems.Emerald.Edition.pdf |
| 3. | http://www.hds.bme.hu/~fhegedus/C++/Shane%20Cook%20-%20CUDA%20Programming%20-olvasOM.pdf |
| 4. | http://www.mat.unimi.it/users/sansotte/cuda/CUDA_by_Example.pdf |
| 5. | https://www.comp.nus.edu.sg/~cs2100/2_resources/AppendixA_Graphics_and_Computing_GPUs.pdf |

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(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** | | | |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **III** | | | |
| Course Code | Course name | Periods per week | | | Credit | Maximum Marks | | |
| **P19ITE18** | **Digital Image Processing** | L | T | P | C | CA | ESE | Total |
| | | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,

- Understand the image fundamentals and mathematical transforms necessary for image processing and to study the image enhancement techniques.
- Understand the image segmentation and representation techniques.
- Understand how image are analyzed to extract features of interest.
- Learn the concepts of image registration and image fusion.
- Analyze the constraints in image processing when dealing with 3D data sets.

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:** Understand the image fundamentals and mathematical transforms necessary for image processing and to study the image enhancement techniques. | K2 |
| **CO2:** Understand the image segmentation and representation techniques. | K2 |
| **CO3:** Design and implement how image are analyzed to extract features of interest. | K3 |
| **CO4:** Understand the concepts of image registration and image fusion. | K2 |
| **CO5:** Analyze the constraints in image processing when dealing with 3D data sets. | K3 |

**Pre-requisites**

-

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| Cos | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PSO1 | PSO 2 |
| CO 1 | 2 | 3 | 2 | - | 1 | 2 | - | - | 1 | 2 | 2 | 1 |
| CO 2 | 2 | 1 | - | 3 | 1 | 1 | - | - | 1 | 1 | 2 | - |
| CO 3 | 2 | 2 | 1 | 2 | - | 1 | - | 2 | - | 1 | 1 | 2 |
| CO 4 | 1 | - | 2 | - | 2 | 3 | - | - | 1 | - | - | 1 |
| CO 5 | 3 | 2 | 1 | 2 | - | 1 | - | - | 1 | 2 | 2 | - |

**CO/PSO Mapping**

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

**Indirect**

1. Course - end survey

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| Content of the syllabus | | | |
|---|---|---|---|
| **Unit – I** | **DIGITAL IMAGE FUNDAMENTALS** | Periods | **9** |
| Elements of visual perception – Brightness – Contrast – Hue – Saturation – Mach band effect – 2D image transforms – DFT – DCT – KLT – SVD – Image enhancement in spatial and frequency domain – Review of morphological image processing. | | | |
| **Unit - II** | **RESTORATION AND SEGMENTATION** | Periods | **9** |
| Image restoration- degradation model, constrained restoration, Inverse filtering, Weiner filtering, Geometrical transforms. Edge detection – Thresholding – Region growing – Fuzzy clustering – Watershed algorithm – Active contour. | | | |
| **Unit – III** | **FEATURE EXTRACTION** | Periods | **9** |
| First and second order edge detection operators – Phase congruency – Localized feature extraction detecting image curvature – Shape features Hough transform – Shape skeletonization – Boundary descriptors – Moments – Texture descriptors. | | | |
| **Unit – IV** | **REGISTRATION** | Periods | **9** |
| Registration – Preprocessing – Feature selection – Points – Lines – Regions and templates Feature correspondence – Point pattern matching – Line matching – Region matching Template matching – Transformation functions – Similarity transformation and Affine Transformation – Resampling – Nearest Neighbour and Cubic Splines Image Fusion. | | | |
| **Unit – V** | **3D IMAGE VISUALIZATION** | Periods | **9** |
| Sources of 3D Data sets – Slicing the Data set – Arbitrary section planes – The use of color – Volumetric display – Stereo Viewing – Ray tracing – Reflection – Surfaces – Multiply connected surfaces – Image processing in 3D. | | | |
| | | **Total Periods** | **45** |
| **Text Books** | | | |
| 1. | Rafael C. Gonzalez and Richard E. Woods, ‑Digital Image Processing‖, Pearson education, 2nd Edition,2004. | | |
| 2. | A. K. Jain, ‑Fundamentals of digital image processing‖, Prentice Hall of India, 2002. | | |
| **References** | | | |
| 1. | John C.Russ, ―The Image Processing Handbook‖, CRC Press, 2007. | | |
| 2. | Mark Nixon, Alberto Aguado, ‑Feature Extraction and Image Processing‖, Academic Press,2008. | | |
| 3. | Ardeshir Goshtasby, ― 2D and 3D Image registration for Medical, Remote Sensing and Industrial Applications‖, John Wiley and Sons,2005. | | |
| **E-Resources** | | | |
| 1. | http://www.eie.polyu.edu.hk/~enyhchan/imagef.pdf | | |
| 2. | http://www.cs.bgu.ac.il/~klara/ATCS111/gonzales_10.1_10.2.pdf | | |
| 3. | http://www.lsv.uni-saarland.de/dsp_ss05_chap8.pdf | | |

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Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **III** |

| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE19** | **Energy Aware Computing** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,
- Learn the concepts of Energy efficient storage
- Learn energy efficient algorithms
- Know energy efficient techniques involved to support real- time systems.
- Learn Energy aware applications

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:**Design Power efficient architecture Hardware and Software. | K3 |
| **CO2:**Analyze power and performance tradeoff between various energy aware storage devices. | K4 |
| **CO3:**Implement various energy aware algorithms. | K3 |
| **CO4:** Restructure the software and Hardware for Energy aware applications. | K2 |
| **CO5:**Explore the Energy aware applications | K3 |

**Pre-requisites**: PC Hardware Troubleshooting, ComputerArchitecture

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| Cos | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 3 | - | 1 | 2 | - | - | 1 | - | 2 | 1 | 1 |
| **CO 2** | 3 | 1 | 2 | - | 3 | 2 | - | - | 2 | 1 | 2 | - |
| **CO 3** | - | 3 | 1 | 3 | 1 | - | - | 2 | 1 | 1 | - | 2 |
| **CO 4** | 1 | 1 | 2 | - | - | 2 | - | - | 3 | - | 1 | 1 |
| **CO 5** | 2 | - | 1 | 2 | 1 | 3 | - | 1 | - | 1 | - | 2 |

**Course Assessment Methods**

**Direct**
1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

**Indirect**
1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **INTRODUCTION** | Periods | **9** |
|---|---|---|---|

Energy efficient network on chip architecture for multi core system-Energy efficient MIPS CPU core with fine grained run time power gating – Low power design of Emerging memory technologies.

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| | | | |
|---|---|---|---|
| **Unit – II** | **ENERGY EFFICIENT STORAGE** | Periods | **9** |
| Disk Energy Management-Power efficient strategies for storage system-Dynamic thermal management for high performance storage systems-Energy saving technique for Disk storage systems. | | | |
| **Unit – III** | **ENERGY EFFICIENT ALGORITHMS** | Periods | **9** |
| Scheduling of Parallel Tasks – Task level Dynamic voltage scaling – Speed Scaling – Processor optimization- Memetic Algorithms – Online job scheduling Algorithms. | | | |
| **Unit – IV** | **REAL TIME SYSTEMS** | Periods | **9** |
| Multi processor system – Real Time tasks- Energy Minimization – Energy aware scheduling- Dynamic Reconfiguration- Adaptive power management. | | | |
| **Unit – V** | **ENERGY AWARE APPLICATIONS** | Periods | **9** |
| Video codec Design: H.264/AVC Video Codec Architecture-Computational Complexity of H.264/AVC Codec–Design of Low Power H.264/AVC Codec-Power Scalability of H.264/AVC Codec.<br>Surveillance camera: Target System Architecture-Energy-Rate-Distortion Relationship of Target System-Lifetime Maximization ofWireless Surveillance Camera. | | | |
| | | **Total Periods** | **45** |
| **Text Book** | | | |
| 1. | Ishfaq Ahmad, Sanjay Ranka,Handbook of Energy Aware and Green Computing,Chapman and Hall/CRC, 2012. | | |
| 2. | Chong-Min Kyung, Sungiooyoo, Energy Aware system design Algorithms and Architecture, Springer, 2011. | | |
| **References** | | | |
| 1. | Bob steigerwald ,ChrisLuero, Energy Aware computing, Intel Press,2012. | | |
| **E-Resources** | | | |
| 1. | https://www.nersc.gov/research-and-development/exascale-computing/energy-aware-computing/ | | |
| 2. | https://www.hpl.hp.com/news/2003/oct_dec/energy_talk.html | | |
| 3. | https://www.geeksforgeeks.org/energy-efficiency-in-cloud-computing/ | | |

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| Programme | **M.Tech** | Programme Code | | **204** | Regulation | | **2019** | |
| Department | **INFORMATION TECHNOLOGY** | | | | Semester | | **III** | |
| Course Code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE20** | **Virtualization Techniques and Applications** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| **Course Objective** | The student should be made to,<br>• Understand about Computing Virtualization tools, applications and techniques.<br>• Understand Server Virtualization and Virtualization Platform.<br>• Understand the technologies of Virtualization and Network Virtualization.<br>• Understand the concepts of Virtualization storage.<br>• Learn the virtual machine products. | | | | | | | |
| **Course Outcome** | At the end of the course, the student should be able to, | | | | | | | **KL** |
| | **CO1:**Understand about Computing Virtualization tools, applications and techniques | | | | | | | K1 |
| | **CO2:**Interpret the operations of Server Virtualization and Virtualization Platform. | | | | | | | K2 |
| | **CO3:**Examine the technologies of Virtualization and Network Virtualization. | | | | | | | K3 |
| | **CO4:**Inspect the different ways of Virtualization storage. | | | | | | | K3 |
| | **CO5:**Demonstrate the virtual machine products.. | | | | | | | K3 |
| **Pre-requisites** | - | | | | | | | |

| **CO / PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO7** | **PO8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | - | - | - | - | - | - | - | - | - | 1 | - |
| **CO 2** | - | 2 | - | - | - | - | - | - | - | - | 2 | - |
| **CO 3** | - | 2 | - | - | 1 | - | - | - | - | - | - | 1 |
| **CO 4** | - | 2 | - | 3 | 1 | - | - | - | - | - | - | 2 |
| **CO 5** | - | - | - | 3 | 1 | - | - | - | - | - | - | 1 |

**Course Assessment Methods**

| **Direct** |
|---|
| 1. Continuous Assessment Test I, II & III<br>2. Assignment<br>3. End-Semester examinations |
| |
| 1. Course - end survey |

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| Content of the syllabus | | | |
|---|---|---|---|
| **Unit – I** | **OVERVIEW OF VIRTUALIZATION** | Periods | **09** |
| Basics of Cloud: Introduction to Cloud - Types of Clouds - Cloud Computing Services - Cloud Computing Architecture - Virtualization and Cloud Computing.Basics of Virtualization - Virtualization Types – Desktop Virtualization – Network Virtualization – Server and Machine Virtualization – Storage Virtualization – System-level or Operating Virtualization – Application Virtualization-Virtualization Advantages – Virtual Machine Basics – Taxonomy of Virtual machines - Process Virtual Machines – System Virtual Machines – Hypervisor - Key Concepts. | | | |
| **Unit - II** | **SERVER CONSOLIDATION** | Periods | **09** |
| Hardware Virtualization – Virtual Hardware Overview - Sever Virtualization – Physical and Logical Partitioning - Types of Server Virtualization – Business cases for Sever Virtualization – Uses of Virtual server Consolidation – Planning for Development – Selecting server Virtualization Platform. | | | |
| **Unit – III** | **NETWORK VIRTUALIZATION** | Periods | **09** |
| Design of Scalable Enterprise Networks - Virtualizing the Campus WAN Design – WAN Architecture - WAN Virtualization - Virtual Enterprise Transport Virtualization–VLANs and Scalability - Theory Network Device Virtualization Layer 2 - VLANs Layer 3 VRF Instances Layer 2 - VFIs Virtual Firewall Contexts Network Device Virtualization - Data- Path VirtualizationLayer 2: 802.1q - Trunking Generic Routing Encapsulation – Ipsec L2TPv3 Label Switched Paths -Control-Plane Virtualization–Routing Protocols- VRF - Aware Routing MultiTopology Routing. | | | |
| **Unit - IV** | **VIRTUALIZING STORAGE** | Periods | **09** |
| SCSI- Speaking SCSI- Using SCSI buses – Fiber Channel – Fiber Channel Cables – Fiber Channel Hardware Devices – iSCSI Architecture – Securing iSCSI – SAN backup and recovery techniques – RAID – SNIA Shared Storage Model – Classical Storage Model – SNIA Shared Storage Model – Host based Architecture – Storage based architecture – Network based Architecture – Fault tolerance to SAN – Performing Backups – Virtual tape libraries. | | | |
| **Unit – V** | **VIRTUAL MACHINES PRODUCTS** | Periods | **09** |
| Xen Virtual machine monitors- Xen API – VMware Cloud – VMware products: VMWARE VCLOUD NFV - VMWARE VCLOUD NFV OPENSTACK - VMWARE VCLOUD SUITE – Vmware Features – Microsoft Virtual Server – Features of Microsoft Virtual Server. | | | |
| | | **Total Periods** | **45** |
| **CASE STUDY** - Virtualization System Administration - Server Migration to Virtualized Environment (KVM), Deploying the virtualized servers, AnArchitectural firm uses storage area network technology in its virtualization. | | | |
| **Text Books** | | | |
| 1. | William von Hagen, Professional Xen Virtualization, WroxPublications,January, 2008. | | |
| 2. | Chris Wolf , Erick M. Halter, Virtualization: From the Desktop to the Enterprise, APress 2005. | | |
| **References** | | | |
| 1. | Kumar Reddy, Victor Moreno, Network virtualization, Cisco Press, July, 2006. | | |
| 2. | James E. Smith, Ravi Nair, Virtual Machines: Versatile Platforms for Systems and Processes, Elsevier/Morgan Kaufmann, 2005. | | |
| 3. | David Marshall, Wade A. Reynolds, Advanced Server Virtualization:VMware and Microsoft Platform in the Virtual Data Center, Auerbach Publications, 2006. | | |
| **E-Resources** | | | |
| 1. | https://edux.fit.cvut.cz/oppa/MI-POA/prednasky/MI-POA10 | | |
| 2. | https://cs.nju.edu.cn/distribute-systems/lecture-notes/c11 | | |
| 3. | https:// www.cs.otago.ac.nz/cosc440/lectures/lecture%2010 | | |

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# PROFESSIONAL ELECTIVE V

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|---|---|---|---|---|---|---|---|
| | **VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN** (Autonomous Institution Affiliated to Anna University, Chennai)<br>Elayampalayam, Tiruchengode – 637 205 | | | | | | |
| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** | | |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **III** | | |

| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE21** | **Social Network Analysis** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,

- Gain knowledge about the current Web development and emergence of Social Web.
- Learn about the modeling, aggregating and knowledge representation of Semantic Web.
- Learn about the extraction and mining tools for Social networks.
- Gain knowledge on Web personalization and Web Visualization of Social networks.

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:**Apply knowledge for current Web development in the era of Social Web. | K4 |
| **CO2:**Model, aggregate and represent knowledge for Semantic Web. | K3 |
| **CO3:**Design extraction and mining tools for Social networks. | K3 |
| **CO4:**Develop personalized web sites and visualization for Social networks. | K3 |
| **CO5:**visualize thesocial networks | K3 |

**Pre-requisites**: High Speed Networks, Distributed System

| **CO / PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 3 | - | 1 | 2 | - | - | 1 | - | 2 | 1 | 1 |
| **CO 2** | 3 | 1 | 2 | - | 3 | 2 | - | - | 2 | 1 | 2 | - |
| **CO 3** | - | 3 | 1 | 3 | 1 | - | - | 2 | 1 | 1 | - | 2 |
| **CO 4** | 1 | 1 | 2 | - | - | 2 | - | - | 3 | - | 1 | 1 |
| **CO 5** | 2 | - | 1 | 2 | 1 | 3 | - | 1 | - | 1 | - | 2 |

**Course Assessment Methods**

| **Direct** |
|---|
| 1. Continuous Assessment Test I, II & III<br>2. Assignment<br>3. End-Semester examinations |
| |
| 1. Course - end survey |

**Content of the syllabus**

| **Unit – I** | **INTRODUCTION TO SOCIAL NETWORK ANALYSIS** | Periods | **9** |
|---|---|---|---|

Introduction to Web - Limitations of current Web – Development of Semantic Web – Emergence of the Social Web - Network analysis - Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis - Electronic discussion

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| | | | |
|---|---|---|---|
| networks, Blogs and online communities, Web-based networks - Applications of Social Network Analysis. | | | |
| **Unit – II** | **MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION** | Periods | **9** |
| Ontology and their role in the Semantic Web - Ontology-based Knowledge Representation - Ontology languages for the Semantic Web – RDF and OWL - Modelling and aggregating social network data - State-of-the-art in network data representation, Ontological representation of social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data, Advanced Representations. | | | |
| **Unit – III** | **EXTRACTION AND MINING COMMUNITITES IN WEB SOCIAL NETWROKS** | Periods | **9** |
| Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Definition of Community - Evaluating Communities - Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Tools for Detecting Communities Social Network Infrastructures and Communities - Decentralized Online Social Networks- Multi-Relational Characterization of Dynamic Social Network Communities. | | | |
| **Unit – IV** | **PREDICTING HUMAN BEHAVIOR AND PRIVACY ISSUES** | Periods | **9** |
| Understanding and Predicting Human Behaviour for Social Communities - User Data Management, Inference and Distribution - Enabling New Human Experiences - Reality Mining - Context-Awareness - Privacy in Online Social Networks - Trust in Online Environment - Trust Models Based on Subjective Logic - Trust Network Analysis - Trust Transitivity Analysis - Combining Trust and Reputation - Trust Derivation Based on Trust Comparisons - Attack Spectrum and Countermeasures | | | |
| **Unit – V** | **VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS** | Periods | **9** |
| Graph Theory- Centrality- Clustering - Node-Edge Diagrams, Matrix representation, Visualizing Online Social Networks, Visualizing Social Networks with Matrix-Based Representations- Matrix + Node-Link Diagrams, Hybrid Representations - Applications - Covert Networks - Community Welfare - Collaboration Networks - Co-Citation Networks. | | | |
| | | **Total Periods** | **45** |
| **Text Book** | | | |
| 1. | Peter Mika, ―Social networks and the Semantic Web‖, Springer, 1st edition 2007. | | |
| 2. | BorkoFurht, ―Handbook of Social Network Technologies and Applications‖, Springer, 1st edition, 2010. | | |
| **References** | | | |
| 1. | GuandongXu , Yanchun Zhang and Lin Li, ―Web Mining and Social Networking Techniques and applications‖, Springer, 1st edition, 2011. | | |
| **E-Resources** | | | |
| 1. | http://www.orgnet.com/sna.html | | |
| 2. | http://www.analytictech.com/networks/whatis.htm | | |
| 3. | https://www.datacamp.com/community/tutorials/social-network-analysis-python | | |

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| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **III** |

| Course Code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE22** | **Information Security** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The student should be made to,<br>• Understand the technical aspects of Information security and balance the risk management.<br>• Explain risk management and professional issues in information security<br>• Describe the various security technologies and security tools<br>• Explain the basic principles of cryptography and algorithms. | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:** Apply fundamental concepts of Information Security threats and vulnerabilities to adopt right security measures and design real time scenarios | K2 |
| | **CO2:**Analyze the possible security attacks in complex real time systems and their effective countermeasures. | K2 |
| | **CO3:**Identify the security issues in the network and resolve it | K3 |
| | **CO4:**Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modeling, and simulations | K2 |
| | **CO5:**Formulate research problems in the computer security field | K3 |
| **Pre-requisites** | Computer Networks | |

| **CO / PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 3 | 2 | 1 | 1 | 2 | - | 1 | 1 | 2 | 2 | 1 |
| **CO 2** | 1 | 1 | 1 | 3 | 2 | 1 | - | - | 1 | 1 | 2 | - |
| **CO 3** | 2 | 2 | - | 2 | - | 1 | - | 2 | - | 1 | 1 | 2 |
| **CO 4** | 2 | 1 | 2 | - | 2 | 3 | - | - | 1 | - | - | 1 |
| **CO 5** | 3 | 2 | 1 | 2 | - | 1 | - | - | 1 | 2 | 2 | - |

**Course Assessment Methods**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

1. Course - end survey

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**Content of the syllabus**

| **Unit – I** | **INFORMATION ASSET CLASSIFICATION** | Periods | **9** |
|---|---|---|---|

Threats - Frauds, Thefts, Malicious Hackers, MaliciousCode, Denial-of-Services Attacks and Social EngineeringInformation Asset – Owner, Custodian, User - Information Classification - Secret,Confidential, Private and Public – Methodology - Declassification or Reclassification - Retention and Disposal of Information Assets - Provide Authorization for Access .IPSec, SSL, IKH, AH and ESP - Security Associations (SAs) - Security Parameter Index (SPI) - Authentication Header (AH) - Encapsulation SecurityPayload (ESP) - Tunneling and Transport Mode - Internet Key Exchange (IKE) – ISAKMP

| **Unit - II** | **RISK ANALYSIS & RISK MANAGEMENT** | Periods | **9** |
|---|---|---|---|

Risk Analysis Process - Asset Definition -Threat Identification - Determine Probability of Occurrence - Determine the Impact of theThreat -Declassification or Reclassification -Retention and Disposal of Information Assets - User Controls Recommended - Risk Mitigation - Control Types/Categories - Cost/BenefitAnalysis- Port Scanning, Fingerprinting, Packet Sniffing, Services, Code-Managing Identity and Authentication - Controlling access to assets – Comparingidentification to Authentication- Implementing Identity Access Management – Accessprovisioning life cycle management – Physical Security

| **Unit – III** | **NETWORK INTRUSION DETECTION & PREVENTION SYSTEMS** | Periods | **9** |
|---|---|---|---|

Network Intrusion Detection Basics, the Roles of Network IDS in a Perimeter Defence,IDS SensorPlacement,IPS,IPSLimitations,NIPS,HostBasedIntrusionPreventionSystems,TrafficMonitoring,SecurityPolicy,Securingtheperimeter,physicalsecurity,securingthenetwork,securingdevices,securingapplications,OSUpdatesWorkingofStatefulFirewall,TheConceptofState,StatefulFilteringandStateful Inspection -Tools forProxying

| **Unit – IV** | **SYSTEM IMPLEMENTATION** | Periods | **9** |
|---|---|---|---|

Design Principles, Representing Identity, Access Control Mechanisms, Information Flow and Confinement Problem Secure Software Development: Secured Coding - OWASP/SANS Top Vulnerabilities -Buffer Overflows - Incomplete mediation - XSS - Anti Cross Site Scripting Libraries - Canonical Data Format - Command Injection - Redirection - Inference – Application Controls

| **Unit – V** | **ACCESS CONTROL** | Periods | **9** |
|---|---|---|---|

User Identity and Access Management - Account Authorization -Access and Privilege Management - System and Network Access Control - OperatingSystems Access Controls - Monitoring Systems Access Controls - Intrusion DetectionSystem - Event Logging – Cryptography.

**Case Studies:** Methods of War gaming, Drone wars, Mitigating attacks for Electric Smart grid, Automating Security incident response.

| | **Total Periods** | **45** |
|---|---|---|

**Text Books**

| | |
|---|---|
| 1. | W. Stallings, Network Security Essentials (3rd Edition), Prentice Hall, |
| 2. | W. R. Stevens, TCP/IP Illustrated, Vol. 1: TheProtocols,Addison-Wesley |
| 3. | D. E. Comer, Internetworking with TCP/IP, Vol.1 (4th Edition),Prentice Hall, |

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| References | |
|---|---|
| 1. | Wade Trappe and Lawrence C. Washington, –Introduction to Cryptography with Coding Theory‖ SecondEdition,PearsonEducation,2007 |
| 2. | Jonathan Katz, and Yehuda Lindell, Introduction to Modern Cryptography, CRC Press, 2007 |
| 3. | Douglas R. Stinson, –Cryptography Theory and Practice‖, Third Edition, Chapman & Hall/CRC, 2006 |
| **E-Resources** | |
| 1. | https://en.wikipedia.org/wiki/Cybersecurity_information_technology_list |
| 2. | https://securityscorecard.com/blog/the-7-best-cyber-security-websites |
| 3. | https://onlinedegrees.sandiego.edu/top-cyber-security-blogs-websites/ |

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|---|---|---|---|---|---|---|---|---|
| | **VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**<br>(Autonomous Institution, Affiliated to Anna University ,Chennai)<br>Elayampalayam, Tiruchengode – 637 205 | | | | | | | |
| Programme | **M.Tech** | Programme Code | | **204** | Regulation | | **2019** | |
| Department | **INFORMATION TECHNOLOGY** | | | | Semester | | **III** | |
| Course Code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE23** | **Cyber Forensics** | 3 | 0 | 0 | 3 | 40 | 50 | 100 |
| **Course Objective** | The student should be made to,<br>• Study the fundamentals of computer forensics.<br>• Have an overview of techniques for Data Recovery and Evidence Collection.<br>• Study various threats associated with security and information warfare.<br>• Study the tools and tactics associated with cyber forensics<br>• Study the forensic capabilities. | | | | | | | |
| **Course Outcome** | At the end of the course, the student should be able to, | | | | | | | **KL** |
| | **CO1:** Apply the concepts of computer forensics. | | | | | | | K3 |
| | **CO2:** Handle data recovery and authentication process. | | | | | | | K2 |
| | **CO3:** Handle threats associated with security and information warfare. | | | | | | | K3 |
| | **CO4:** Design tools and tactics associated with cyber forensics. | | | | | | | K4 |
| | **CO5:** Develop forensic capabilities | | | | | | | K4 |
| **Pre-requisites** | Cyber Security and Ethical Hacking, Information Security | | | | | | | |

| **CO / PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 3 | 2 | 2 | 1 | - | - | 2 | 1 | 2 | 1 | 3 |
| **CO 2** | 2 | 2 | 3 | 3 | 1 | 1 | - | - | 2 | 1 | 2 | 2 |
| **CO 3** | 3 | 2 | 3 | 3 | 1 | 1 | - | - | 2 | 1 | 2 | 2 |
| **CO 4** | 3 | 2 | 3 | 3 | 3 | 3 | - | - | 2 | 1 | 3 | 2 |
| **CO 5** | 2 | 2 | 2 | 2 | 3 | 3 | - | - | 2 | 1 | 3 | 2 |

**Course Assessment Methods**

| **Direct** |
|---|
| 1. Continuous Assessment Test I, II & III<br>2. Assignment<br>3. End-Semester examinations |
| **Indirect** |
| 1. Course - end survey |

**Content of the syllabus**

| **Unit – I** | **INTRODUCTION** | Periods | **9** |
|---|---|---|---|

Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Vendor and Computer Forensics Services.

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| Unit - II | COMPUTER FORENSICS EVIDENCE AND CAPTURE | Periods | 9 |
|---|---|---|---|
| Data Recovery – Evidence Collection and Data Seizure –Duplication and Preservation of Digital Evidence – Computer Image Verification and Authentication. | | | |
| **Unit – III** | **COMPUTER FORENSIC ANALYSIS** | Periods | **9** |
| Discover of Electronic Evidence – Identification of Data – Reconstructing Past Events Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military–Tactics of Terrorist and Rogues – Tactics of Private Companies. | | | |
| **Unit - IV** | **INFORMATION WARFARE** | Periods | **9** |
| Arsenal – Surveillance Tools- Hackers and Theft of Components- Contemporary Computer Crime Identity Theft and Identity Fraud-Organized Crime & Terrorism Avenues Prosecution and Government Efforts- Applying the First Amendment to Computer Related Crime-The Fourth Amendment and Other Legal Issues.. | | | |
| **Unit – V** | **COMPUTER FORENSIC CASES** | Periods | **9** |
| Developing Forensic Capabilities- Searching and Seizing Computer Related Evidence-Processing Evidence and Report Preparation - Future Issues. | | | |
| | | **Total Periods** | **45** |

| **Text Books** | |
|---|---|
| 1. | John R. Vacca, -Computer Forensics: Computer Crime Scene Investigation, Volume1, Cengage Learning, 2005(Unit 1,2,3) |
| 2. | Marjie T Britz , -Computer Forensics and Cyber Crime: An Introduction, 3/E,Pearson Education,2013(Unit 4,5) |
| **References** | |
| 1. | Marie-Helen Maras, —Computer Forensics: Cybercriminals, Laws, and Evidence‖, Jones & Bartlett Publishers, 2011. |
| 2. | Chad Steel, —Windows Forensics‖, Wiley India, 2006.Majid Yar, -Cybercrime and Society‖, Sage Publications, 2006.Robert M Slade, -Software Forensics‖, Tata McGraw Hill, 2004. |
| **E-Resources** | |
| 1. | https://www.certconf.org/presentations/2006/files/WD4.pdf |
| 2. | https://mrcet.com/pdf/Lab%20Manuals/IT/R15A0533%20CF.pdf |
| 3. | https://en.wikipedia.org/wiki/Information_warfare |

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**VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**
(Autonomous Institution Affiliated to Anna University,Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **III** |

| Course Code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE24** | **Business Analytics** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,

- Learn the fundamentals of business analytics.
- Acquire in Business Models.
- Perform Planning for success.
- Explore Analytical Processing.
- Explore about Enterprise Application.

| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
|---|---|---|
| | **CO1:** Describe the need for Business Analytics | K3 |
| | **CO2:** Identify the metrics, indicators and make recommendations to achieve the business goal | K3 |
| | **CO3:** Understand the process in business analytics. | K3 |
| | **CO4:** Understand about quality of data need in business analytics | K3 |
| | **CO5:** Understand about knowledge discovery and privacy of data | K5 |

**Pre-requisites**: Data Warehouse and Data Mining.

| **CO / PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | - | 1 | - | - | - | - | - | - | - | - | - |
| **CO 2** | - | 2 | 3 | - | - | - | - | - | - | - | - | 2 |
| **CO 3** | 1 | - | - | 1 | - | - | - | - | - | 2 | 1 | - |
| **CO 4** | - | 3 | - | - | - | - | - | - | - | - | - | - |
| **CO 5** | 2 | - | 1 | - | - | 2 | - | 2 | - | - | - | 3 |

**Course Assessment Methods**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **Business Intelligence and Information Exploitation** | Periods | **9** |
|---|---|---|---|

Business Intelligence – History - The Information Asset - Exploiting Information - Actionable Knowledge - Value of Business Intelligence - Data Valuation - Applications - The Intelligence Dashboard

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| Unit – II | Business Models and Information Flow | Periods | 9 |
|---|---|---|---|
| The Business Case - Information Processing and Information Flow - Information Flow Model - Usage in Practice - Modeling Frameworks - Management Issues | | | |
| **Unit – III** | **Analytical Processing** | Periods | **9** |
| Data Models - Data Warehouse - Data Mart - Online Analytical Processing – Metadata - Management Issues - Business Rules Approach - Sources of Business Rules – Issue - Business Case - Data Profiling Activities - Data Model Inference - Attribute Analysis - Relationship Analysis | | | |
| **Unit – IV** | **Data Quality and Information Compliance** | Periods | **9** |
| Business Case - Names and Addresses - Types of Errors - Data Cleansing - Business Rule-Based Information Compliance - ETL: Extract, Transform, Load - Enterprise Application Integration and Web Services - Record Linkage and Consolidation - Value of Parallelism - Parallel Processing Systems | | | |
| **Unit – V** | **Knowledge Discovery and Data Mining** | Periods | **9** |
| Data Mining and the Data Warehouse - Virtuous Cycle - Directed versus Undirected Knowledge Discovery - Tasks of Data Mining - Data Mining Techniques - Management Issues - Publicly Available Data - Management Issues - Public Data - Data Resources - Semi structured Data - Privacy | | | |
| | | **Total Periods** | **45** |
| **Text Books** | | | |
| 1. | DavidLoshin, Business Intelligence, Morgan Kaufmann, 2nd Edition, 2012. | | |
| **References** | | | |
| 1. | Mike Biere, Business intelligence for the enterprise, Prentice Hall Professional, 2003. | | |
| 2. | Montgomery, Douglas C., and George C. Runger, Applied statistics and probability for engineers, John Wiley & Sons, 2010 | | |
| **E-Resources** | | | |
| 1. | http://ebooks.lpude.in/computer_application/mca/term_6/DCAP606_BUSINESS_INTELLIGENCE.pdf | | |
| 2. | https://www.win.tue.nl/~mpechen/courses/TIES443/handouts/lecture02.pdf | | |

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| Programme | **M.Tech.** | Programme Code | | **204** | Regulation | | **2019** | |
| Department | **INFORMATION TECHNOLOGY** | | | | Semester | | **III** | |
| Course Code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ESE | Total |
| **P19ITE25** | **Advanced Software Testing** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The student should made to,<br>• Understand the different types of software testing.<br>• Know about the implementation of testing process and management.<br>• Gain knowledge of the test techniques.<br>• Understand software testing tools and Automation<br>• Practice with DevOps practices | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:**Understand the advantages of various Software Testing. | K2 |
| | **CO2:**Gain knowledge of implementation of the process of testing as well as management. | K3 |
| | **CO3:**Use Testing techniques for analysis . | K5 |
| | **CO4:** Management and execute the testing use testing tools and automation. | K6 |
| | **CO5:**Able to understand Devops and understand the overall architecture building and testing. | K6 |
| **Pre-requisites** | Software Engineering,Software Testing | |

| **CO / PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO 1** | **PSO 2** |
| **CO 1** | 1 | - | - | 2 | - | - | - | - | - | - | 2 | - |
| **CO 2** | 3 | - | - | - | 1 | 2 | - | - | - | - | - | 1 |
| **CO 3** | 1 | - | 3 | - | - | - | - | - | - | - | 2 | 2 |
| **CO 4** | 2 | 2 | 3 | - | 1 | - | - | - | - | 1 | 2 | - |
| **CO 5** | 3 | - | - | - | - | - | - | - | - | - | 2 | - |

**Course Assessment Methods**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **INTRODUCTION** | Periods | **8** |
|---|---|---|---|

Testing – Unit testing – Black box testing– White box testing – Integration and System testing– Regression testing – Debugging - Program analysis – Symbolic execution – Model Checking

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| Unit – II | TESTING PROCESS AND MANAGEMENT | Periods | 12 |
|---|---|---|---|
| Test process models-Test planning and control-Test Analysis and Design-Test implementation and Execution-Evaluating Exit Criteria and Reporting-Test Management Documentation-Test Plan Documentation Templates-Test Estimation-Scheduling and Test Planning-Test Progress Monitoring and Control-Business Vale Testing-Distributed and Outsourced and insourced Testing-Risk Based Testing-Failure Mode and Effect Analysis-Test Management Issues. | | | |
| **Unit – III** | **TEST TECHNIQUES** | Periods | **9** |
| Specification Based-Structure Based-Defect and Experience Based-Static Analysis-Dynamic Analysis. | | | |
| **Unit – IV** | **TESTING TOOLS AND AUTOMATION** | Periods | **8** |
| Testing Tool Acquisition-Testing Tool Introduction and Deployment-Test Tool Concepts-Test Tool Categories-Keyword Driven Test Automation-Performance Testing. | | | |
| **Unit – V** | **DEVOPS** | Periods | **8** |
| DevOps: Motivation-Cloud as a platform-Operations- Deployment Pipeline: Overall Architecture Building and Testing-Deployment- Case study: Migrating to Micro services. | | | |
| | | **Total Periods** | **45** |

**Text Books:**

| | |
|---|---|
| 1. | Jamie L Mitchel, Rex Black--Advanced Software Testing - Vol. 3,Guide to the ISTQB Advanced Certification as an Advanced Technical Test Analyst‖, 2nd Edition, Kindle Edition. |

**Reference:**

| | |
|---|---|
| 1. | Anne MetteJonassen Hass, ―Guide to-Advanced Software Testing‖ Artech Hose,Inc-2008 |

**E-Resources**

| | |
|---|---|
| 1. | https://www.kobo.com/us/en/ebook/advanced-software-testing-vol-3-2nd-edition-1 |
| 2. | http://160592857366.free.fr/joe/ebooks/ShareData/Guide%20to%20the%20ISTQB%20Advanced%20Certification%20as%20an%20Advanced%20Technical%20Test%20Analyst%20Volume%203.pdf |
| 3. | http://index-of.co.uk/Software-Testing/Guide%20to%20Advanced%20Software%20Testing.pdf |

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# OPEN ELECTIVES

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| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **III** |

| Course Code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITOE1** | **Internet of things** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,

- Understand the fundamentals of Internet of Things Applications.
- Learn about the basics of IOT protocols.
- Understand the concepts of Web of Things.
- Access the IoT data from cloud using mobile computing devices.
- Learn about the cloud based security services of IOT

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:** Describe the application models and enabling technologies of IOT | K2 |
| **CO2:** Describe the Protocols used in IoT | K2 |
| **CO3:** Design a middleware for IoT | K3 |
| **CO4:** Design mobile computing device to access IoT data from cloud | K3 |
| **CO5:** Understand the cloud based security services on IOT | K2 |

**Pre-requisites**: Cloud computing

**CO / PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

**CO/PSO Mapping**

| Cos | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 2 | 2 | - | - | - | - | 2 | - | - | 2 | 3 |
| **CO 2** | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | 3 |
| **CO 3** | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | 3 |
| **CO 4** | 3 | 3 | 3 | - | - | 3 | - | - | - | 3 | 3 | 2 |
| **CO 5** | 3 | 3 | 2 | 2 | - | 2 | - | - | - | 2 | 3 | 2 |

## Unit – I: INTRODUCTION TO IOT APPLICATIONS — Periods: 9

Things in IOT – Enabling Technologies –IOT applications: Home, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health, Life style, M2M Machine to Machine, Difference between IoT and M2M. Industry 4.0 concepts - cyber physical system.

## Unit – II: IOT PROTOCOLS — Periods: 9

IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data

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| | | | |
|---|---|---|---|
| Acquisition – Application Layer Protocols: CoAP and MQTT | | | |
| **Unit – III** | **WEB OF THINGS** | Periods | **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 AT CLOUD OFFERINGS** | Periods | **9** |
| Introduction to Cloud Storage Models and Communication APIs, PHP and MySQL for data processing ,WAMP, Python Web Application Framework , Designing a RESTful Web API, MQTT, Amazon Web Services for IoT | | | |
| **Unit – V** | **SECURITY** | Periods | **9** |
| Threads to cloud IOT services – Security services : Device onboarding - Key and certificate management - Policy management - Persistent configuration management - Gateway security - Device management - Security monitoring - Compliance monitoring | | | |
| | | **Total Periods** | **45** |
| **Text Books:** | | | |
| 1. | Honbo Zhou, ‑The Internet of Things in the Cloud: A Middleware Perspective‖, CRC Press, 2012 | | |
| 2. | Practical Internet of Things Security - Second Edition By Brian Russell, Drew Van Duren November 2018. | | |
| **References:** | | | |
| 1. | Internet of Things - A Hands-on-Approach by ArshdeepBahga, Vijay Madisetti, 2014 | | |
| 2. | IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things by David Hanes, Gonzalo Salgueiro, Rob Barton cisco press. | | |
| **E-Resources:** | | | |
| 1. | http://ptgmedia.pearsoncmg.com/images/9781587144561/samplepages/9781587144561_CH08.pdf | | |
| 2. | https://books.google.co.in/books/about/Internet_of_Things.html?id=JPKGBAAAQBAJ&printsec=frontcover&source=kp_read_button&redir_esc=y#v=onepage&q&f=false | | |
| 3. | https://www.oreilly.com/library/view/practical-internet-of/9781788625821/ | | |

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| Programme | **M.Tech** | Programme Code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **Information Technology** | | | Semester | **III** |

| Course Code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITOE2** | **Cloud Computing** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,
- Understand the key elements of cloud platform
- Explore cloud services and infrastructure
- Impart knowledge in applications of cloud computing

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:** Identify the systems and mechanisms to support cloud computing | K1 |
| **CO2:** Apply the concept of virtualization to create shared resource pool environment | K3 |
| **CO3:** Categorize the different types of available cloud web services | K3 |
| **CO4:** Analyze the cloud infrastructures with data security | K2 |
| **CO5:** Explain SOA, Cloud applications and its APIs | K2 |

**Pre-requisites** -

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| Cos | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 1 | 2 | - | - | 1 | - | 1 | - | 1 | 2 | 1 |
| **CO 2** | 3 | 2 | 2 | 3 | 1 | 1 | - | 1 | - | 1 | 2 | - |
| **CO 3** | 3 | 2 | 2 | 3 | 2 | 1 | - | 1 | 1 | 2 | 2 | 2 |
| **CO 4** | 3 | - | 1 | 1 | 2 | 1 | - | 1 | 1 | 2 | 2 | 1 |
| **CO 5** | 3 | 2 | 2 | 2 | 2 | 1 | - | 1 | 1 | 2 | 2 | - |

**Course Assessment Methods**

**Direct**
1. Continuous Assessment Test I, II & III
2. Assignment (Case studies)
3. End-Semester examinations

**Indirect**
1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **Introduction** | Periods | **09** |
|---|---|---|---|

Defining cloud computing -Cloud types -Characteristic of computing -benefits and disadvantages of cloud computing -Accessing the role of open standards -Measuring the cloud value -Exploring the cloud computing Stack-Connecting to the cloud -Understanding services and applications by type.

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| Unit – II | Cloud Platforms | Periods | 09 |
|---|---|---|---|
| Understanding Abstraction and Virtualization -Using virtualization technique -Load balancing and virtualization -Understanding hypervisors -Undemanding machine imaging -Porting applications – Capacity planning -Baseline and metrics -Network capacity -Scaling -Exploring Platform as a Service – Defining Services -Using PaaS Application Frameworks | | | |
| **Unit – III** | **Cloud Computing Web Services** | Periods | **09** |
| Using Google Web service -Surveying the Google application portfolio -Google toolkit -Amazon web services - Components and services –Working with Elastic Compute Cloud(EC2)- Working with Amazon Storage systems -Database services- Microsoft cloud services –Windows azure platform -Windows live. | | | |
| **Unit – IV** | **Cloud Infrastructures** | Periods | **09** |
| Managing the Cloud -Administrating the Clouds -Cloud Management Products -Emerging Cloud Management Standards -Understanding Cloud Security -Securing the Cloud -Securing Data –Establishing Identity and Presence | | | |
| **Unit – V** | **Cloud Services and Applications** | Periods | **09** |
| Understanding Service Oriented Architecture -Introducing Service Oriented Architecture –Managing and Monitoring SOA -Relating SOA and Cloud Computing -Moving Applications to the Cloud –Applications in the Clouds -Applications and Cloud APIs -Working with Cloud-Based Storage | | | |
| | | **Total Periods** | **45** |

**Text Books:**

| | |
|---|---|
| 1. | Barrie Sosinsky, Cloud Computing Bible, Wiley Publishing, Inc, 2011 |
| 2. | RajkumarBuyya, Christian Vecchiola and ThamariSelvi S , Mastering in Cloud Computing, McGraw Hill Education (India) Private Limited, 2013 |

**References**

| | |
|---|---|
| 1. | Michael Miller,Cloud Computing, Pearson Education, New Delhi, 2012. |
| 2. | Anthony T Velte, Cloud Computing: A practical Approach, Tata McGraw Hill, 2010. |
| 3. | Fern Halper, Marcia Kaufman, Bloor Robin and Judith Hurwit, Cloud Computing for Dummies, Wiley India, 2009 |

**E-Resources**

| | |
|---|---|
| 1. | www.cse.iitb.ac.in/~abhirup09/Docs/cloud_computing_final_report.pdf |
| 2. | https://cloudacademy.com/blog/learn-cloud-computing-from-scratch-a-step-by-step-path/ |
| 3. | www.getmyuni.com/computer-science-engineering/notes/cloud-computing/introduction-to-cloud-computing |

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**VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**
(Autonomous Institution, Affiliated to Anna University ,Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **III** |

| Course Code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITOE3** | **Machine Learning Techniques** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,

- Learn the characteristics of machine learning that make it useful to real-world problems and the basic underlying concepts, Characteristics of supervised machine learning algorithms
- Gain knowledge about Unsupervised algorithms for clustering, Instance-based learning and Principal Component Analysis
- Learn the inference and learning algorithms for the hidden Markov model and Bayesian networks and few machine learning tools
- Learn about reinforcement learning algorithms
- Learn about advanced machine learning algorithms in a range of real-world applications

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:** Discuss thefundamental issues and challenges of machine learning algorithms and the paradigms of supervised learning. | K2 |
| **CO2:** Analyze the basic concepts of un-supervised machine learning | K4 |
| **CO3:**Modify existing machine learning algorithms to improve classification efficiency | K3 |
| **CO4:** Inference the basic concepts and architecture of reinforcement learning algorithms | K4 |
| **CO5:** Design and implement various advanced machine learning algorithms in a range of real world applications. | K4 |

**Pre-requisites** -

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| Cos | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 1 | 2 | - | - | 1 | - | 1 | - | 1 | 2 | 1 |
| **CO 2** | 3 | 2 | 2 | 3 | 1 | 1 | - | 1 | - | 1 | 2 | - |
| **CO 3** | 3 | 2 | 2 | 3 | 2 | 1 | - | 1 | 1 | 2 | 2 | 2 |
| **CO 4** | 3 | - | 1 | 1 | 2 | 1 | - | 1 | 1 | 2 | 2 | 1 |
| **CO 5** | 3 | 2 | 2 | 2 | 2 | 1 | - | 1 | 1 | 2 | 2 | - |

**Course Assessment Methods**

| **Direct** |
|---|
| 1. Continuous Assessment Test I, II & III<br>2. Assignment<br>3. End-Semester examinations |
| **Indirect** |
| 1. Course - end survey |

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| Content of the syllabus | | | |
|---|---|---|---|
| **Unit – I** | **FUNDAMENTALS OF MACHINE LEARNING** | Periods | **9** |
| Introduction about Artificial Intelligence-Machine Learning- Components of Learning- Learning Models: Geometric Models, Probabilistic Models, Logic Models – Grouping and Grading – Learning Versus Design – Types of Learning – Supervised – Unsupervised – Reinforcement.<br>Supervised learning : Classification and Regression Trees, Support vector machines - Model Selection and feature selection – Decision trees-Ensemble methods :Bagging - Boosting - Real-world applications. | | | |
| **Unit – II** | **UNSUPERVISED LEARNING** | Periods | **9** |
| Clustering- K-means - EM - Mixtures of Gaussians - The EM Algorithm in General -Model selection for latent variable models - high-dimensional spaces - The Curse of Dimensionality -Dimensionality Reduction - Factor analysis - Principal Component Analysis - Probabilistic PCA- Independent components analysis. | | | |
| **Unit – III** | **PROBABILISTIC GRAPHICAL MODELS** | Periods | **9** |
| Directed Graphical Models - Bayesian Networks - Markov Random Fields - Inference in Graphical Models - Learning –Naive Bayes classifiers-Markov Models – Hidden Markov Models – Inference – Learning Generalization<br>Undirected graphical models- Markov random fields- Conditional independence properties - Parameterization of MRFs - Examples - Learning - Conditional random fields (CRFs) - Structural SVMs. | | | |
| **Unit – IV** | **REINFORCEMENT LEARNING** | Periods | **9** |
| Reinforcement Learning – Introduction -Elements of Reinforcement Learning – Learning Task – Q-learning – k-armed Bandit Elements – Model-Based learning – Value Iteration – Policy iteration – Temporal Difference Learning - Exploration Strategies – non-deterministic rewards and actions. | | | |
| **Unit – V** | **ADVANCED MACHINE LEARNING** | Periods | **9** |
| Introduction to learning theory - Modeling structured outputs: multi-label classification, introduction to Conditional Random Fields (CRFs)- Spectral clustering- Semi-supervised learning - Recommendation systems - Active Learning - Learning from streaming data, online learning - Deep learning.<br>*Case Studies: Speech Recognition, Medical diagnosis, Learning associations, Statistical Arbitrage, Virtual Personal Assistants, Traffic Predictions, Online Transportation Networks, Videos Surveillance, Email Spam and Malware Filtering, Search Engine Result Refining, Online Customer Support* | | | |
| | | **Total Periods** | **45** |

| **Text Books** | |
|---|---|
| 1. | EthemAlpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)‖, Third Edition, MIT Press, 2014 |
| 2. | Tom Mitchell, ―Machine Learning‖, McGraw-Hill, 1997 |
| **References** | |
| 1. | Christopher Bishop, ―Pattern Recognition and Machine Learning‖, Springer, 2006 |
| 2. | Kevin P. Murphy, ―Machine Learning: A Probabilistic Perspective‖, MIT Press, 2012 |
| 3. | Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning", Second Edition ,Springer, 2011 |
| **E-Resources** | |
| 1. | http://profsite.um.ac.ir/~monsefi/machine-learning/pdf/Machine-Learning-Tom-Mitchell.pdf |
| 2. | https://cse.iitkgp.ac.in/~pabitra/course/cs674.html |
| 3. | http://noiselab.ucsd.edu/ECE228/Murphy_Machine_Learning.pdf |
| 4. | https://doc.lagout.org/science/Artificial%20Intelligence/Machine%20learning/Machine%20Learning_%20A%20Probabilistic%20Perspective%20%5BMurphy%202012-08-24%5D.pdf |
| 5. | https://faculty.ucmerced.edu/mcarreira-perpinan/teaching/CSE176/lecturenotes.pdf |

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(Autonomous Institution Affiliated to Anna University,Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **III** |

| Course code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITOE4** | **Mobile App Development** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The student should be made to,<br>• Understand system requirements for mobile applications.<br>• Generate suitable design using specific mobile development frameworks.<br>• Generate mobile application design.<br>• Implement the design using specific mobile development frameworks.<br>• Deploy the mobile applications in marketplace for distribution. | |
| **Course Outcome** | Upon completion of the course, the students should be able to | **KL** |
| | **CO1:**Describe the requirements for mobile applications | K3 |
| | **CO2:**Explain the challenges in mobile application design and development | K5 |
| | **CO3:**Develop design for mobile applications for specific requirements | K6 |
| | **CO4:**Implement the design using Objective C and iOS. | K5 |
| | **CO5:**Deploy mobile applications in Android and iPhone marketplace for Distribution | K6 |
| **Pre-requisites** | Mobile Communication | |

| **CO / PO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | - | - | - | - | - | - | - | 2 | 2 | 2 | 3 |
| **CO 2** | - | - | 3 | 3 | - | - | - | 1 | - | - | - | 3 |
| **CO 3** | - | 2 | - | - | 2 | 3 | - | - | - | - | 2 | - |
| **CO 4** | - | - | - | 2 | - | - | - | - | - | - | 3 | - |
| **CO 5** | - | - | - | - | - | - | - | 3 | 2 | 1 | 3 | - |

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Test I, II & III
2. Assignment-Design the various Mobile Application
3. End-Semester examinations

**Indirect**

1. Course - end survey

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| Content of the syllabus | | | |
|---|---|---|---|
| **Unit - I** | **INTRODUCTION** | Periods | **9** |
| Introduction to mobile applications –Embedded systems -Market and business drivers for mobile applications –Publishing and delivery of mobile applications –Requirements gathering and validation for mobile applications | | | |
| **Unit - II** | **ANDROID** | Periods | **9** |
| Introduction –Establishing the development environment –Android architecture –Activities and views –Interacting with UI –Persisting data using SQLite –Packaging and deployment –Interaction with server side applications –Using Google Maps, GPS and Wifi –Integration with social media applications. | | | |
| **Unit - III** | **ANDROID APPLICATION DESIGN ESSENTIALS** | Periods | **9** |
| Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings. | | | |
| **Unit - IV** | **ANDROID USER INTERFACE DESIGN ESSENTIALS** | Periods | **9** |
| User Interface Screen elements: Android Views and Layouts- Displaying Text to Users with TextView- Retrieving Data from Users, Designing User Interfaces with Layouts: Built-In Layout Classes- Built-In View Container Classes, Drawing and Working with Animation. | | | |
| **Unit - V** | **IOS** | Periods | **9** |
| Introduction to Objective C –iOS features –UI implementation –Touch frameworks –Data persistence using Core Data and SQLite –Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application. | | | |
| | | **Total Periods** | **45** |

| **Text Books:** | |
|---|---|
| 1. | Lauren Darcey and Shane Conder, ―Android Wireless Application Development‖, Pearson Education, 3rd ed.2012 |
| 2. | David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, ―Beginning iOSDevelopment: Exploring the iOS SDK‖, Apress, 2013. |
| **Reference Books :** | |
| 1. | James Dovey and Ash Furrow, ―Beginning Objective C‖, Apress, 2012. |
| 2. | Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox,2012. |
| 3. | Reto Meier, ―PProfessional android Development‖, Wiley-India Edition, 2012 |
| **E-Resources** | |
| 1. | https://www.technosip.com/mobile-application-development/ |
| 2. | https://polygant.net/mobiledev/mobile-application-development/ |
| 3. | https://mindster.com/mobile-app-development-services/ |

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(Autonomous Institution, Affiliated to Anna University
,Chennai)Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech** | Programme Code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **III** |

| Course Code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITOE5** | **Blockchain Technology** | 3 | 0 | 0 | 3 | 40 | 60 | 100 |

**Course Objective**

The student should be made to,

- Understand how blockchain systems (mainly Bitcoin and Ethereum)work,
- To securely interact with them,
- Design, build, and deploy smart contracts and distributed applications,
- Integrate ideas from blockchain technology into their own projects.

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:**Explain design principles of Blockchain Technology, Bitcoin, Ethereum and Nakamoto consensus. | K2 |
| **CO2:**To learn about the architecture of Blockchain technology. | K2 |
| **CO3:**Interact with a blockchain system by sending and reading transactions | K3 |
| **CO4:**Design, build, and deploy a distributed application. | K3 |
| **CO5:**Evaluate security, privacy, and efficiency of a given blockchain system | K3 |

**Pre-requisites** -

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

**CO/PSO Mapping**

| Cos | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 2 | 2 | 3 | - | 2 | - | 2 | 3 | 2 | 3 | 2 |
| **CO 2** | 3 | 2 | 2 | 2 | 1 | 1 | - | 1 | - | 1 | 2 | 1 |
| **CO 3** | 3 | 2 | 2 | 2 | - | 1 | - | 1 | 1 | 2 | 2 | 2 |
| **CO 4** | 3 | 1 | 1 | 1 | 1 | 1 | - | 1 | 1 | 2 | 2 | 1 |
| **CO 5** | 3 | 2 | 2 | 2 | 2 | 1 | - | 1 | 1 | 2 | 2 | 2 |

**Course Assessment Methods**

**Direct**
1. Continuous Assessment Test I, II & III
2. Assignment (Case studies)
3. End-Semester examinations

**Indirect**
1. Course - end survey

**Content of the syllabus**

| **Unit – I** | **Basics** | Periods | **08** |
|---|---|---|---|

Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.

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| Unit - II | Blockchain Architecture | Periods | 10 |
|---|---|---|---|
| Blockchain : Blockchain-Based Applications, Functionality , Non-functional Properties, Fundamental Properties of Blockchain , Ledger Structure, Consensus Protocol, Block Configuration, Blockchain as an Architectural Element, Storage Element, Computational Element, Communication Mechanism, Asset Management and Control Mechanism, Integrating Blockchain into a System as a Component | | | |
| **Unit – III** | **Blockchain** | Periods | **09** |
| Distributed Database, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain. | | | |
| **Unit - IV** | **Distributed Consensus** | Periods | **09** |
| Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate | | | |
| **Unit – V** | **Cryptocurrency** | Periods | **09** |
| History, Distributed Ledger, Dapp, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin<br><br>Case Study :Agricultural Supply Chains , Open Data, International Money Transfers, Electricity Contract Selection and Continuous Reporting. | | | |
| | | **Total Periods** | **45** |

**Text Book:**

| | |
|---|---|
| 1. | XiweiXu, Ingo Weber, Mark Staples, Architecture for Blockchain Applications, Springer Nature 2019. |
| 2. | Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016). |

**Reference**

| | |
|---|---|
| 1. | Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies |
| 2. | Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic CashSystem |
| 3. | DR. Gavin Wood, ―ETHEREUM: A Secure Decentralized Transaction Ledger,‖Yellow paper.2014. |
| 4. | Nicola Atzei, Massimo Bartoletti, and TizianaCimoli, A survey of attacks on Ethereum smart contracts |

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# AUDIT COURSES

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Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **I & II** |

| Course code | Course Name | Periods Per Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITAC1** | **Research Methodology and IPR** | 2 | 0 | 0 | 0 | 100 | 0 | 100 |

**Course Objective**

- To understand the importance of Research
- To acquire knowledge in Data Collection and Analysis of Data
- To effectively write reports

| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
|---|---|---|
| | **CO1:** Understand research problem types and data collection methods. | K2 |
| | **CO2:** Understand research design methodologies | K2 |
| | **CO3:** Analyze research related information | K4 |
| | **CO4:** Follow research ethics | K3 |
| | **CO5:** Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity. | K2 |

**Pre-requisites** -

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| Cos | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 2 | 3 | 1 | 1 | 1 | - | 2 | - | 1 | 2 | - |
| **CO 2** | 3 | 1 | - | 2 | 1 | 2 | 1 | 1 | 2 | - | 1 | 1 |
| **CO 3** | 2 | 2 | 1 | - | 1 | 3 | - | 1 | 3 | 2 | 2 | 1 |
| **CO 4** | 1 | - | 1 | 3 | 1 | - | 2 | 1 | 2 | 1 | - | 2 |
| **CO 5** | - | 2 | 1 | 3 | - | 1 | 2 | - | 1 | 2 | 1 | 1 |

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

**Indirect**

1. Course - end survey

**Content of the syllabus**

| **Unit - I** | **INTRODUCTION TO RESEARCH** | Periods | **9** |
|---|---|---|---|

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research Meaning of Research- Types of Research- Research Process- Problem definition- Objectives of Research- Research design Approaches to Research- Quantitative vs. Qualitative Approach- Research Methods versus Methodology -Research and Scientific Method-Research Process-Criteria of Good Research.

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| Unit – II | RESEARCH DESIGN | Periods | 9 |
|---|---|---|---|
| Meaning of Research Design-Need for Research Design- Features of a Good Design-Important Concepts Relating to Research Design-Different Research Designs-Basic Principles of Experimental Designs | | | |
| **Unit – III** | **DATA COLLECTION** | Periods | **9** |
| Data Collection :Collection of Primary Data-Observation Method-Interview Method-Collection of Data through Questionnaires-Collection of Data through Schedules-Difference between Questionnaires and Schedules-Collection of Secondary Data- Processing Operations-Elements/Types of Analysis-Statistics in Research | | | |
| **Unit – IV** | **REPORT WRITING** | Periods | **9** |
| Report Writing: Meaning of Interpretation- Technique of Interpretation-Precaution in Interpretation-Significance of Report Writing-Different Steps in Writing Report-Layout of the Research Report-Types of Reports-Oral Presentation-Mechanics of Writing a Research Report-Precautions for Writing Research Reports | | | |
| **Unit - V** | **INTELLECTUAL PROPERTY RIGHTS (IPR)** | Periods | **9** |
| Nature of Intellectual Property: Patents, Designs, Trade and Copyright-IPR History-Patent Law—Trade Secret Law -Geographical Indications. | | | |
| | | **Total Period** | **45** |
| **Text Books:** | | | |
| 1 | C. R. Kothari, ―Research Methodology – Methods and Techniques‖, 2nd Edition, New Age International Publishers | | |
| 2 | Robert P. Merges, Peter S. Menell, Mark A. Lemley, ‖Intellectual Property in New Technological Age‖. Aspen Law & Business; 6 edition July 2012 | | |
| **References:** | | | |
| 1 | Bordens, K. S. and Abbott, B. B., ―Research Design and Methods – A Process Approach‖, 8th Edition, McGraw-Hill, 2011 | | |
| 2 | Robert P. Merges, Peter S. Menell, Mark A. Lemley, ― Intellectual Property in New Technological Age‖, 2016. | | |
| 3 | Davis, M., Davis K., and Dunagan M., ―Scientific Papers and Presentations‖, 3rd Edition, Elsevier Inc. | | |
| **E-Resources:** | | | |
| 1. | https://www.oreilly.com/library/view/research-methodology/9789353067090/ | | |
| 2. | https://bbamantra.com/research-methodology/ | | |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
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| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** | | |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **I & II** | | |

| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITAC2** | **English for Research Paper Writing** | 2 | 0 | 0 | 0 | 100 | 0 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The student should be made to,<br>• Understand that how to improve your writing skills<br>• Understand that how to improve your level of readability<br>• Learn about what to write in each section<br>• Understand the skills needed when writing a Title<br>• Ensure the good quality of paper at very first-time submission | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:** Understand forming and brake up sentences | K2 |
| | **CO2:** Analyze and finding plagiarism | K4 |
| | **CO3:** Conduct reviews | K3 |
| | **CO4:** Focus on skill development activities | K2 |
| | **CO5:** Identify the importance of quality of paper | K2 |
| **Pre-requisites** | - | |

| **CO / PO Mapping**<br>(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 3 | 3 | 3 | 2 | - | 1 | - | 2 | - | 3 | 2 |
| **CO 2** | 2 | 1 | - | 2 | 2 | - | - | - | 1 | 2 | 1 | 2 |
| **CO 3** | 3 | - | - | 3 | 1 | - | - | - | 1 | 2 | 1 | 3 |
| **CO 4** | 1 | - | 2 | 3 | 2 | - | 2 | - | 3 | 3 | 2 | 3 |
| **CO 5** | 2 | 1 | 3 | 2 | 2 | - | - | - | 1 | 2 | 3 | 3 |

**Course Assessment Methods**

| **Direct** |
|---|
| 1. Continuous Assessment Test I, II & III<br>2. Assignment<br>3. End-Semester examinations |
| **Indirect** |
| 1. Course - end survey |

**Content of the syllabus**

| **Unit - I** | **PLANNING AND PREPARATION** | Periods | **9** |
|---|---|---|---|

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.

| **Unit – II** | **CLARIFICATIONS** | Periods | **9** |
|---|---|---|---|

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction.

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| | | | |
|---|---|---|---|
| **Unit – III** | **LITERATURE REVIEW** | Periods | **9** |
| Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check. | | | |
| **Unit – IV** | **SKILL DEVELOPMENT - I** | Periods | **9** |
| Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature. | | | |
| **Unit - V** | **SKILL DEVELOPMENT - II** | Periods | **9** |
| Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions, useful phrases, how to ensure paper is as good as it could possibly be the first- time submission | | | |
| | | **Total Periods** | **45** |
| **Text Books:** | | | |
| 1. | Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books) | | |
| 2. | Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press | | |
| **References:** | | | |
| 1. | Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011 | | |
| **E-Resources:** | | | |
| 1. | https://www.umgc.edu/current-students/learning-resources/writing-center/online-guide-to-writing/tutorial/chapter4/ch4-11.html | | |
| 2. | http://crie.org.nz/research-papers/C.Griffiths_OP5.pdf | | |
| 3. | https://www.adelaide.edu.au/rsd/docs/rsd_Handbook_Dec09.pdf | | |

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**VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**
(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** |
|---|---|---|---|---|---|
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **I & II** |

| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITAC3** | **Disaster Management** | 2 | 0 | 0 | 0 | 100 | 0 | 100 |

**Course Objective**

The student should be made to,

- Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work.

**Course Outcome**

| At the end of the course, the student should be able to, | **KL** |
|---|---|
| **CO1:** Understand the effects of disaster | K2 |
| **CO2:** Analyze differences between disasters and hazards | K4 |
| **CO3:** Know disaster management techniques | K2 |
| **CO4:** Identify risk management techniques | K3 |
| **CO5:** Analyze risk assessment techniques | K4 |

**Pre-requisites**: -

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| Cos | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | - | - | 3 | 2 | - | - | - | 2 | - | 1 | 3 |
| **CO 2** | 2 | 1 | 3 | 2 | 1 | - | - | - | 3 | 2 | 1 | 2 |
| **CO 3** | 3 | 2 | 2 | 2 | 3 | - | - | - | 2 | 2 | 1 | 3 |
| **CO 4** | 1 | 2 | 2 | 3 | 1 | - | - | - | 3 | 2 | 2 | 2 |
| **CO 5** | 2 | 1 | 3 | 2 | 1 | - | - | - | 1 | 2 | 1 | 1 |

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

**Indirect**

1. Course - end survey

**Content of the syllabus**

| **Unit - I** | **INTRODUCTION** | Periods | **9** |
|---|---|---|---|

Introduction Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

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| | | | |
|---|---|---|---|
| **Unit – II** | **REPERCUSSIONS OF DISASTERS AND HAZARDS** | Periods | **9** |
| Repercussions Of Disasters And Hazards: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts. | | | |
| **Unit – III** | **DISASTER PRONE AREAS IN INDIA** | Periods | **9** |
| Disaster Prone Areas In India Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics | | | |
| **Unit – IV** | **DISASTER PREPAREDNESS AND MANAGEMENT PREPAREDNESS** | Periods | **9** |
| Disaster Preparedness And Management Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness. | | | |
| **Unit - V** | **RISK ASSESSMENT** | Periods | **9** |
| Risk Assessment Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People‘s Participation In Risk Assessment. Strategies for Survival. Disaster Mitigation Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India. | | | |
| | | **Total Periods** | **45** |
| **Text Books:** | | | |
| 1. | R. Nishith, Singh AK, ―Disaster Management in India: Perspectives, issues and strategies ―‘New Royal book Company. | | |
| 2. | Sahni, PardeepEt.Al. (Eds.),‖ Disaster Mitigation Experiences And Reflections‖, Prentice Hall Of India, New Delhi. | | |
| **References:** | | | |
| 1. | Goel S. L., Disaster Administration And Management Text And Case Studies‖,Deep &Deep Publication Pvt. Ltd., New Delhi. | | |
| **E-Resources:** | | | |
| 1. | https://wiki.seg.org/wiki/Natural_disasters_and_hazards | | |
| 2. | https://en.wikipedia.org/wiki/Natural_disasters_in_India | | |
| 3. | https://media.ifrc.org/ifrc/what-we-do/disaster-and-crisis-management/disaster-preparedness/ | | |

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|---|---|---|---|---|---|---|---|
| | **VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**<br>(Autonomous Institution Affiliated to Anna University, Chennai)<br>Elayampalayam, Tiruchengode – 637 205 | | | | | | |
| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** | | |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **I & II** | | |

| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITAC4** | **Value Education** | 2 | 0 | 0 | 0 | 100 | 0 | 100 |

| | |
|---|---|
| **Course Objective** | The student should be made to,<br>• Understand value of education<br>• Understand value of self- development<br>• Understand value of behavior assessment<br>• Imbibe good values in students<br>• Let the should know about the importance of character |

| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
|---|---|---|
| | **CO1:** Understand education values | K2 |
| | **CO2:** Analyze importance of cultivation values | K4 |
| | **CO3:** Importance of personality development | K3 |
| | **CO4:** Analyze relationship maintenance | K4 |
| | **CO5:** Analyze character maintenance | K4 |

| **Pre-requisites** | - |
|---|---|

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

**CO/PSO Mapping**

| Cos | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 3 | 2 | 2 | 2 | - | - | - | 2 | - | 3 | 2 |
| **CO 2** | 2 | 1 | 3 | 2 | 2 | - | - | - | 1 | 3 | 1 | 2 |
| **CO 3** | 3 | 2 | 2 | 2 | 1 | - | - | - | 1 | 2 | 1 | 3 |
| **CO 4** | 1 | 3 | 2 | 2 | 2 | - | - | - | 3 | 2 | 2 | 1 |
| **CO 5** | 2 | 1 | 3 | 2 | 2 | - | - | - | 1 | 2 | 3 | 1 |

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

**Indirect**

1. Course - end survey

**Content of the syllabus**

| **Unit - I** | **INTRODUCTION** | Periods | **9** |
|---|---|---|---|

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation, Standards and principles, Value judgments.

| **Unit – II** | **IMPORTANCE OF CULTIVATION OF VALUES** | Periods | **9** |
|---|---|---|---|

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline.

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| | | | |
|---|---|---|---|
| **Unit – III** | **PERSONALITY AND BEHAVIOR DEVELOPMENT** | Periods | **9** |
| Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. | | | |
| **Unit – IV** | **RELATIONSHIP MANAGEMENT** | Periods | **9** |
| Universal brotherhood and religious tolerance True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature. | | | |
| **Unit - V** | **CHARACTER AND COMPETENCE** | Periods | **9** |
| Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively. | | | |
| | | **Total Periods** | **45** |
| **Text Book:** | | | |
| 1. | Chakroborty, S.K. ―Values and Ethics for organizations Theory and practice‖, Oxford University Press, New Delhi 2011. | | |
| **E-Resources:** | | | |
| 1. | https://www.valuescentre.com/values-are-important/ | | |
| 2. | http://www.healthofchildren.com/P/Personality-Development.html | | |
| 3. | https://www.investopedia.com/terms/r/relationship-management.asp | | |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**<br>(Autonomous Institution Affiliated to Anna University, Chennai)<br>Elayampalayam, Tiruchengode – 637 205 | | | | | | | |
| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** | | | |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **I & II** | | | |
| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ESE | Total |
| **P19ITAC5** | **Constitution of India** | 2 | 0 | 0 | 0 | 100 | 0 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The student should be made to,<br>• Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.<br>• Address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role<br>• Address the entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.<br>• Address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution. | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:** Understand the history of Indian Constitution | K2 |
| | **CO2:** Understand the Philosophy of Indian Constitution | K2 |
| | **CO3:** Importance of constitutional rights and duties | K3 |
| | **CO4:** Analyze about the different organs of goverance | K4 |
| | **CO5:**Understand the functions of Local administration | K2 |
| **Pre-requisites** | - | |

| **CO / PO Mapping**<br>(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 3 | 2 | 2 | 2 | - | - | - | 2 | 2 | 3 | 2 |
| **CO 2** | 2 | - | 3 | - | 3 | 3 | - | - | 2 | 3 | 2 | 1 |
| **CO 3** | 1 | 1 | 1 | - | 3 | 3 | - | - | 2 | 3 | 2 | 1 |
| **CO 4** | 1 | 3 | 2 | 2 | 2 | - | - | - | 3 | 2 | 2 | 1 |
| **CO 5** | 2 | 1 | 3 | 2 | 2 | - | - | - | 1 | 2 | 3 | 1 |

**Course Assessment Methods**

| **Direct** |
|---|
| 1. Continuous Assessment Test I, II & III<br>2. Assignment<br>3. End-Semester examinations |
| **Indirect** |
| 1. Course - end survey |

**Content of the syllabus**

| **Unit - I** | **INTRODUCTION** | Periods | **9** |
|---|---|---|---|

History of Making of the Indian Constitution: History Drafting Committee, ( Composition & Working)

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| Unit – II | PHILOSOPHY OF THE INDIAN CONSTITUTION | Periods | 9 |
|---|---|---|---|
| Philosophy of the Indian Constitution: Preamble, Salient Features | | | |
| **Unit – III** | **CONTOURS OF CONSTITUTIONAL RIGHTS& DUTIES** | Periods | **9** |
| Contours of Constitutional Rights& Duties: Fundamental Rights- Right to Equality- Right to Freedom Right against Exploitation- Right to Freedom of Religion ,Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties | | | |
| **Unit – IV** | **ORGANS OF GOVERNANCE** | Periods | **9** |
| Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions. | | | |
| **Unit - V** | **LOCAL ADMINISTRATION** | Periods | **9** |
| Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments) Village level: Role of Elected and Appointed officials, Importance of grass root democracy | | | |
| | | **Total Periods** | **45** |

| **Text Books:** | |
|---|---|
| 1. | The Constitution of India, 1950 (Bare Act), Government Publication. |
| 2. | Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015. |
| **References:** | |
| 1. | M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014. |
| **E-Resources:** | |
| 1. | http://ncert.nic.in/textbook/pdf/keps210.pdf |
| 2. | https://en.wikipedia.org/wiki/Fundamental_Rights,_Directive_Principles_and_Fundamental_Duties_of_India |
| 3. | https://www.enotes.com/homework-help/what-organs-government-legislative-executive-1146133 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**<br>(Autonomous Institution Affiliated to Anna University, Chennai)<br>Elayampalayam, Tiruchengode – 637 205 | | | | | | |
| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** | | |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **I & II** | | |

| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITAC6** | **Pedagogy Studies** | 2 | 0 | 0 | 0 | 100 | 0 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The student should be made to,<br>• Review existing evidence on the review topic to inform programme design<br>• Know policy making undertaken by the DFID, other agencies and researchers<br>• Identify critical evidence gaps to guide the development<br>• Know the importance of professional development<br>• Know about research gaps | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:** Understand the concept of programme design through evidences | K2 |
| | **CO2**: Understand the concept of policy making | K2 |
| | **CO3:** Understand the concept of gap analysis | K2 |
| | **CO4:** Understand the importance of professional development | K2 |
| | **CO5:** Understand future directions of research | K2 |
| **Pre-requisites** | - | |

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| Cos | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 3 | 2 | 2 | 2 | - | - | - | 2 | 2 | 3 | 2 |
| **CO 2** | 2 | 2 | 3 | 3 | 3 | 3 | - | - | 2 | 3 | 2 | 1 |
| **CO 3** | 1 | 1 | 1 | 3 | 3 | 2 | 2 | - | 2 | 3 | 2 | 3 |
| **CO 4** | 1 | 3 | 2 | 2 | 2 | 1 | 1 | - | 3 | 2 | 2 | 3 |
| **CO 5** | 2 | 1 | 3 | 2 | 2 | - | - | - | 1 | 2 | 3 | 3 |

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

**Indirect**

1. Course - end survey

**Content of the syllabus**

| **Unit - I** | **INTRODUCTION** | Periods | **9** |
|---|---|---|---|

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology, Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

| **Unit – II** | **THEMATIC OVERVIEW** | Periods | **9** |
|---|---|---|---|

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

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| Unit – III | PEDAGOGICAL PRACTICES | Periods | 9 |
|---|---|---|---|
| Evidence on the effectiveness of pedagogical practices Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies. | | | |
| **Unit – IV** | **PROFESSIONAL DEVELOPMENT** | Periods | **9** |
| Professional development: alignment with classroom practices and follow-up support -Peer support from the head teacher and the community. Curriculum and assessment Barriers to learning: limited resources and large class sizes. | | | |
| **Unit - V** | **RESEARCH GAPS AND FUTURE DIRECTIONS** | Periods | **9** |
| Research gaps and future directions, Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact. | | | |
| | | **Total Periods** | **45** |

| **Text Books:** | |
|---|---|
| 1. | Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261. |
| 2. | Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379. |
| **References:** | |
| 1. | Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID. |
| **E-Resources:** | |
| 1. | https://en.wikipedia.org/wiki/Pedagogy |
| 2. | https://www.scribbr.com/methodology/thematic-analysis/ |

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|---|---|---|---|---|---|---|---|---|
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| Programme | **M.Tech.** | Programme code | **204** | | Regulation | **2019** | | |
| Department | **INFORMATION TECHNOLOGY** | | | | Semester | **I & II** | | |
| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ESE | Total |
| **P19ITAC7** | **Personality Development Through Life Enlightenment Skills** | 2 | 0 | 0 | 0 | 100 | 0 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The student should be made to,<br>• Learn to achieve the highest goal happily<br>• Become a person with stable mind<br>• Become pleasing personality<br>• Become determinate<br>• Awaken wisdom in students | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:** Able to identify goals | K2 |
| | **CO2:** Learn about the Personality development | K2 |
| | **CO3:** Ability to manage the mind at stable | K2 |
| | **CO4:** Able to be a determinate person | K2 |
| | **CO5: I**mprove self growth | K3 |
| **Pre-requisites** | - | |

| **CO / PO Mapping**<br>(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 3 | 2 | 2 | 2 | - | - | - | 2 | 2 | 3 | 2 |
| **CO 2** | 1 | 1 | 1 | 2 | 2 | 1 | - | - | 2 | 3 | 2 | 1 |
| **CO 3** | 1 | 3 | 2 | 2 | 2 | - | - | - | 3 | 2 | 2 | 1 |
| **CO 4** | 2 | 1 | 3 | 2 | 2 | - | - | - | 1 | 2 | 3 | 1 |
| **CO 5** | 3 | 3 | 2 | 2 | 1 | 1 | - | - | 3 | 3 | 3 | 3 |

**Course Assessment Methods**

| **Direct** |
|---|
| 1. Continuous Assessment Test I, II & III<br>2. Assignment<br>3. End-Semester examinations |
| **Indirect** |
| 1. Course - end survey |

**Content of the syllabus**

| **Unit - I** | **NEETISATAKAM - I** | Periods | **9** |
|---|---|---|---|

Neetisatakam-Holistic development of personality
Verses- 19,20,21,22 (wisdom)
Verses- 29,31,32 (pride & heroism)
Verses- 26,28,63,65 (virtue)

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| Unit – II | NEETISATAKAM - II | Periods | 9 |
|---|---|---|---|
| Neetisatakam-Holistic development of personality<br>Verses- 52,53,59 (dont's)<br>Verses- 71,73,75,78 (do's) | | | |
| **Unit – III** | **APPROACH TO DAY TO DAY WORK AND DUTIES** | Periods | **9** |
| Approach to day to day work and duties.<br>Shrimad Bhagwad Geeta :<br>Chapter 2-Verses 41, 47,48,<br>Chapter 3-Verses 13, 21, 27, 35,<br>Chapter 6-Verses 5,13,17, 23, 35,<br>Chapter 18-Verses 45, 46, 48. | | | |
| **Unit – IV** | **STATEMENTS OF BASIC KNOWLEDGE** | Periods | **9** |
| Statements of basic knowledge.<br>Shrimad Bhagwad Geeta:<br>Chapter2-Verses 56, 62, 68<br>Chapter 12 -Verses 13, 14, 15, 16,17, 18 | | | |
| **Unit - V** | **PERSONALITY OF ROLE MODEL** | Periods | **9** |
| Personality of Role model.<br>Shrimad Bhagwad Geeta:<br>Chapter2-Verses 17,<br>Chapter 3-Verses 36,37,42,<br>Chapter 4-Verses 18, 38,39<br>Chapter18 – Verses 37,38,63 | | | |
| | | **Total Periods** | **45** |
| **Text Books:** | | | |
| 1. | Srimad Bhagavad Gitaॷ by Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata | | |
| 2. | Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, | | |
| **References :** | | | |
| 1. | Rashtriya Sanskrit Sansthanam, New Delhi. | | |
| **E-Resources:** | | | |
| 1. | http://vbu.ac.in/wp-content/uploads/2016/02/SEC_Study-Material-on-life-skill.pdf | | |
| 2. | https://leaderonomics.com/functional/the-power-of-role-models | | |

Signature of BoS Chairman

| | | | | | |
|---|---|---|---|---|---|
| | **VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**<br>(Autonomous Institution Affiliated to Anna University, Chennai)<br>Elayampalayam, Tiruchengode – 637 205 | | | | |
| Programme | **M.Tech.** | Programme code | **201** | Regulation | **2019** |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **I & II** |

| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CA | ESE | Total |
| **P19ITAC8** | **Online Course** | 2 | 0 | 0 | 0 | 100 | 0 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The student should be made to,<br>• Know about various online certification courses<br>• Know the importance of online courses<br>• Identify the needs of certification<br>• Understand the importance of online certification courses<br>• Know about job opportunities | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:** Know the importance of online courses | K2 |
| | **CO2:** Improve the programming skills | K2 |
| | **CO3:** Know the current industrial trends | K2 |
| | **CO4:** Choose the domain career | K2 |
| | **CO5:** Apply the programming skills in various real time applications | K3 |
| **Pre-requisites** | - | |

**CO / PO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

| Cos | Programme Outcomes (POs) | | | | | | | | | | **CO/PSO Mapping** PSOs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 3 | 3 | 3 | 3 | 2 | 2 | 2 | - | 1 | 2 | 3 | 2 |
| **CO 2** | 3 | 2 | 3 | 2 | 1 | 2 | - | - | 1 | 2 | 1 | 1 |
| **CO 3** | 3 | 3 | 2 | 2 | 1 | 2 | - | - | 1 | 2 | 2 | 2 |
| **CO 4** | 3 | 2 | 3 | 2 | 2 | 2 | 1 | - | 1 | 2 | 2 | 2 |
| **CO 5** | 2 | 3 | 2 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 3 |

**Course Assessment Methods**

**Direct**

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

**Indirect**

1. Course - end survey

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**Content of the syllabus**

**LIST OF COURSES**

**Online Courses :**

1. NPTEL SWAYAM Courses
2. IIT-B Spoken Tutorials
3. UDEMY Courses
4. CCNA Courses
5. MOOC Courses
6. Microsoft Virtual Academy Certification courses

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN**<br>(Autonomous Institution Affiliated to Anna University,<br>Chennai)Elayampalayam, Tiruchengode – 637 205 | | | | | | | |
| Programme | **M.Tech.** | Programme code | **204** | Regulation | **2019** | | | |
| Department | **INFORMATION TECHNOLOGY** | | | Semester | **I & II** | | | |
| Course code | Course name | Periods per week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ESE | Total |
| **P19ITAC9** | **Technical Report Writing** | 2 | 0 | 0 | 0 | 100 | 0 | 100 |

| | | |
|---|---|---|
| **Course Objective** | The main objective of the course is to:<br>• Encourage the students to study advanced engineering developments<br>• Prepare the students to present technical reports.<br>• Encourage the students to use various teaching aids such as over head projectors,power point presentation and demonstrative models. | |
| **Course Outcome** | At the end of the course, the student should be able to, | **KL** |
| | **CO1:** Review, prepare and present technological developments | K2 |
| | **CO2:** Face the placement interviews easily. | K2 |
| | **CO3:** Develop the personality to improve the progress | K2 |
| | **CO4:** Use various teaching aids such as over head projectors, power point presentation and demonstrative models. | K2 |
| | **CO5:** The students to study advanced engineering developments | K3 |
| **Pre-requisites** | - | |

| **CO / PO Mapping**<br>(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak | | | | | | | | | | | **CO/PSO Mapping** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cos** | Programme Outcomes (POs) | | | | | | | | | | PSOs | |
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PSO1** | **PSO 2** |
| **CO 1** | 2 | 3 | 3 | 3 | 2 | - | 1 | - | 2 | - | 3 | 2 |
| **CO 2** | 2 | 1 | - | 2 | 2 | - | - | - | 1 | 2 | 1 | 2 |
| **CO 3** | 3 | - | - | 3 | 1 | - | - | - | 1 | 2 | 1 | 3 |
| **CO 4** | 1 | - | 2 | 3 | 2 | - | 2 | - | 3 | 3 | 2 | 3 |
| **CO 5** | 2 | 1 | 3 | 2 | 2 | - | - | - | 1 | 2 | 3 | 3 |

**METHOD OF EVALUATION :**

- During the technical report session each student is expected to prepare and present a topic on engineering/ technology, for duration of about 8 to 10 minutes.
- In a session of three periods per week, Each student is expected to present the seminar. Each student is expected to present at least twice during the semester and the student is evaluated based on that.
- At the end of the semester, she can submit a report on her topic of seminar and marks are given based onthe report.
- A Faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also. Evaluation is 100% internal.

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