FORM NO.F/CDD/004
Rev.00 Date 20.03.2020

# FACULTY OF COMPUTER APPLICATIONS

# LEARNING OUTCOME BASED CURRICULUM

## Curriculum and Syllabus

## BCA-DIGITAL TECHNOLOGY

## REGULATION 2022

## DEPARTMENT OF COMPUTER APPLICATIONS

# FACULTY OF COMPUTER APPLICATIONS

## VISION / MISSION / QUALITY POLICY

**Vision**

- To become a leading centre for computer applications, fostering an environment of constant learning and innovation.

**Mission**

| | |
|---|---|
| **M 1 :** | To create and maintain an environment for the pursuit of academic excellence with the use of computing technology. |
| **M 2 :** | To develop intellectual strength of students and guiding them towards technical, professional and entrepreneurship excellence. |
| **M 3 :** | To nurture analytical skills, inter- personal skills and build higher level of attitude, ethics and confidence. |
| **M 4 :** | To identify areas of cooperation with Industries and Institutions and implement them well within time-frame to mutual advantage and satisfaction. |
| **M 5 :** | Collaborate with industry and other agencies for academic and research programs. |

**Quality Policy**

- Imparting quality education and achieve academic excellence through planning, leadership, brilliance, inspiration and effectiveness.

# FACULTY OF COMPUTER APPLICATIONS

## PROGRAM EDUCATIONAL OBJECTIVE (PEO)

| | |
|---|---|
| PEO 1: | To demonstrate a sound knowledge in key areas of Computer Sciences and Industrial Computing |
| PEO 2: | To demonstrate a substantial understanding of concepts in key areas of Computer Sciences |
| PEO 3: | To carry out the required analysis and synthesis involved in Computer Systems, Information systems and Computer Applications |
| PEO 4: | To demonstrate professional competence in developing software and in its design and implementation. |
| PEO 5: | To develop sound Practical Skills to enable them to addressing problems which arise from Computer systems and Applications |

## MAPPING PEO WITH MISSION

| | M 1 | M2 | M3 | M4 | M5 |
|---|---|---|---|---|---|
| PEO 1 | 3 | 3 | 2 | 3 | 3 |
| PEO 2 | 3 | 3 | 1 | 3 | 3 |
| PEO 3 | 2 | 3 | 2 | 3 | 3 |
| PEO 4 | 2 | 3 | 3 | 3 | 3 |
| PEO 5 | 3 | 3 | 2 | 3 | 3 |

# FACULTY OF COMPUTER APPLICATIONS

## PROGRAM OUTCOMES (PO)

**PO1:Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

**PO2: Communication Skills: :** Ability to understand and express thoughts and ideas effectively in writing and orally; and present complex information in a clear and concise manner to different groups.

**PO3:Critical and Reflective thinking:** Capability to apply analytic thought to analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach. Critical sensibility, with self awareness and reflexivity of both self and society.

**PO4:Research-related skills**: Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, ability to plan, execute and report the results of an experiment or investigation.

**PO5: Team work and Leadership qualities** : Function effectively as an individual, and as a team member or leader in diverse teams, and in multidisciplinary environment.

**PO6: Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data and further presentation.

**PO7: Multicultural competence and knowledge of heritage:** Possess knowledge of the values and beliefs of multiple cultures to effectively engage globally in a multicultural society and interact respectfully with diverse groups. Ability to understand and propagate heritage values.

**PO8: Moral and ethical awareness:** Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

**PO9: Lifelong learning:** Ability to update knowledge and skills, participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.

## MAPPING PEO WITH PO

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 |
|---|---|---|---|---|---|---|---|---|---|
| PEO 1 | 2 | 3 | 1 | 3 | 2 | 3 | 3 | 2 | 3 |
| PEO 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| PEO 3 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |
| PEO 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |
| PEO 5 | 2 | 3 | 1 | 3 | 2 | 3 | 3 | 2 | 3 |

# FACULTY OF COMPUTER APPLICATIONS

## PROGRAM SPECIFIC OBJECTIVES

| | |
|---|---|
| **PSO 1:** | Ability to Demonstrate employability skills required by business and industry<br><br>Ability to Design, develop, test and implement programs using Digital Technologies |
| **PSO 2:** | Ability to Explore, research, and present findings on positions and career paths in technology and the impact of technology on chosen career area |
| **PSO 3:** | Use computational thinking procedures to analyze and solve problems<br><br>Ability to Create and organize web pages through the use of a variety of web programming design tools |
| **PSO 4:** | Ability to describe, analyze, develop and follow policies for managing ethical and legal issues in the business world and in a technology-based society<br><br>Ability to explore integral parts of career and technology education courses through leadership development, project based learning, entrepreneurship development, and competitive events |

## MAPPING PEO WITH PSO

| | PSO 1 | PSO 2 | PSO 3 | PSO 4 |
|---|---|---|---|---|
| **PEO 1** | 2 | 3 | 1 | 3 |
| **PEO 2** | 3 | 3 | 3 | 3 |
| **PEO 3** | 2 | 3 | 2 | 3 |
| **PEO 4** | 3 | 3 | 3 | 3 |
| **PEO 5** | 3 | 3 | 3 | 3 |

# BCA Digital Technology (Full Time)
# Curriculum & Syllabus
# 2022 Regulations

**Semester : 1 Theory:**

| Course Code | Course Title | C | L | T/SLr | P/R | Ty / Lb/ ETP/IE |
|---|---|---|---|---|---|---|
| HBTA22001/HBHI22001/ HBFR22001 | Language-Tamil-I /Hindi-I/French-I | 3 | 3 | 0/0 | 0/0 | Ty |
| HBEN22001 | Language - English – I | 3 | 3 | 0/0 | 0/0 | Ty |
| HBMA22ID1 | Allied – I - Mathematics-I | 3 | 2 | 1/0 | 0/0 | Ty |
| CBDT22001 | Programming in Java | 3 | 2 | 1/0 | 0/0 | Ty |
| HBCC22001 | Environmental Studies | 3 | 3 | 0/0 | 0/0 | Ty |

**Practical:**

| | | | | | | |
|---|---|---|---|---|---|---|
| HBCC22L01 | Computer Software Lab | 2 | 0 | 0/0 | 4/0 | Lb |
| CBDT22L01 | Programming in Java Lab | 2 | 0 | 0/0 | 4/0 | Lb |
| HBCC22I01 | Communication Skill Lab | 1 | 0 | 0/0 | 2/0 | IE |
| HBCC22I02 | Soft Skill-I | 1 | 0 | 0/0 | 2/0 | IE |

**Credits Sub Total: 21**

**Semester : 2 Theory:**

| Course Code | Course Title | C | L | T/SLr | P/R | Ty / Lb/ ETP/IE |
|---|---|---|---|---|---|---|
| HBTA22002/HBHI22002/ HBFR22002 | Language -Tamil-II/Hindi-II /French-II | 3 | 3 | 0/0 | 0/0 | Ty |
| HBEN22002 | Language -English – II | 3 | 3 | 0/0 | 0/0 | Ty |
| HBMA22ID2 | Allied – II - Mathematics-II | 3 | 2 | 1/0 | 0/0 | Ty |
| CBDT22002 | HTML-5 | 4 | 3 | 1/0 | 0/0 | Ty |
| CBCA22003 | Multimedia and Animation | 4 | 3 | 1/0 | 0/0 | Ty |

**Practical:**

| | | | | | | |
|---|---|---|---|---|---|---|
| CBDT22L02 | HTML -5 Laboratory | 2 | 0 | 0/0 | 4/0 | Lb |
| CBCA22IL1 | Allied – I Lab – Multimedia and Animation Laboratory Using Mathematical Applications | 2 | 0 | 0/0 | 4/0 | Lb |
| HBCC22I03 | Soft Skill –II | 1 | 0 | 0/0 | 2/0 | IE |

**Credits Sub Total: 22**

C : Credits L : Lecture T : Tutorial S.Lr : Supervised Learning P : Problem / Practical R : Research
T/L/ETL : Theory/Lab/Embedded Theory and Lab

**Semester : 3 Theory:**

| Course Code | Course Title | C | L | T/SLr | P/R | Ty / Lb/ ETP/IE |
|---|---|---|---|---|---|---|
| CBDT22ID1 | Allied – II Data Structures and Algorithms | 3 | 2 | 1/0 | 0/0 | Ty |
| CBDT22003 | Database Programming | 3 | 2 | 1/0 | 0/0 | Ty |
| CBDT22004 | Programming in Python | 4 | 3 | 1/0 | 0/0 | Ty |
| CBCA22005 | Computer Networks | 4 | 4 | 0/0 | 0/0 | Ty |
| CBCA22007 | Software Engineering | 3 | 2 | 1/0 | 0/0 | Ty |

**Practical:**

| | | | | | | |
|---|---|---|---|---|---|---|
| CBDT22L03 | Database Programming With My Sql Laboratory | 2 | 0 | 0/0 | 4/0 | Lb |
| CBDT22IL2 | Allied - III Lab Data Structures & Algorithms -Laboratory | 2 | 0 | 0/0 | 4/0 | Lb |
| HBCC22I04 | Statistical and Numerical Methods Lab | 2 | 0 | 0/0 | 4/0 | IE |
| HBCC22I05 | Soft Skill-III | 1 | 0 | 0/0 | 2/0 | IE |

**Credits Sub Total: 24**

**Semester: 4 Theory:**

| Course Code | Course Title | C | L | T/SLr | P/R | Ty / Lb/ ETP/IE |
|---|---|---|---|---|---|---|
| CBCA22ID1 | Allied – IV -Subject – II Digital Fundamentals | 3 | 2 | 1/0 | 0/0 | Ty |
| CBDT22005 | Server Side Programming | 4 | 3 | 1/0 | 0/0 | Ty |
| CBDT22006 | Test Driven Development | 4 | 3 | 1/0 | 0/0 | Ty |
| HBXX22OEX | Open Elective –I | 3 | 3 | 0/0 | 0/0 | Ty |
| CBCA22EXX | Program Elective –I | 3 | 3 | 0/0 | 0/0 | Ty |

**Practical:**

| | | | | | | |
|---|---|---|---|---|---|---|
| HBXX22OLX | Open Elective Lab | 2 | 0 | 0/0 | 4/0 | Lb |
| CBDT22L04 | Server Side Programming Using Jsp-Lab | 2 | 0 | 0/0 | 4/0 | Lb |
| HBCC22I06 | Critical Thinking Skill | 1 | 0 | 0/0 | 2/0 | IE |
| CBDT22I01 | Professional Skills- I | 1 | 0 | 0/0 | 2/0 | IE |

**Credits Sub Total: 23**

**Semester : 5 Theory:**

| Course Code | Course Title | C | L | T/SLr | P/R | Ty / Lb/ ETP/IE |
|---|---|---|---|---|---|---|
| CBDT22007 | Implementing JSF, Hibernet & Spring In Java EE | 4 | 3 | 1/0 | 0/0 | Ty |
| CBCA22EXX | Program Elective –II | 3 | 3 | 0/0 | 0/0 | Ty |
| CBDT22008 | Front End Development | 3 | 2 | 1/0 | 0/0 | Ty |
| HBXX22OEX | Open Elective –II | 3 | 3 | 0/0 | 0/0 | Ty |
| HBCC22002 | Entrepreneurship Development | 3 | 3 | 0/0 | 0/0 | Ty |

**Practical:**

| | | | | | | |
|---|---|---|---|---|---|---|
| CBDT22L05 | Angular & React Laboratory Using Java Script | 2 | 0 | 0/0 | 4/0 | Lb |
| CBDT22I02 | Professional Skills- II | 1 | 0 | 0/0 | 2/0 | IE |
| HBFL22IXX | Foreign Language | 1 | 0 | 0/0 | 2/0 | IE |
| HBCC22I07 | NCC/NSS/Internship | 1 | 0 | 0/0 | 2/0 | IE |

**Credits Sub Total: 21**

**Semester: 6 Theory:**

| Course Code | Course Title | C | L | T/SLr | P/R | Ty / Lb/ ETP/IE |
|---|---|---|---|---|---|---|
| CBCA22EXX | PROGRAM ELECTIVE –III | 3 | 3 | 0/0 | 0/0 | Ty |
| CBCA22012 | OBJECT ORIENTED MODELING AND DESIGN | 4 | 3 | 1/0 | 0/0 | Ty |

**Practical:**

| | | | | | | |
|---|---|---|---|---|---|---|
| HBCC22ET1 | UNIVERSAL HUMAN VALUES | 3 | 2 | 0/0 | 2/0 | ETP |
| CBDT22L06 | PROJECT WORK | 9 | 0 | 0/0 | 18/0 | Lb |

**Credits Sub Total: 19**

**SUMMARY OF CREDITS :**

| SEMESTER | CREDIT |
|---|---|
| 1st Semester | 21 |
| 2nd Semester | 22 |
| 3rd Semester | 24 |
| 4th Semester | 23 |
| 5th Semester | 21 |
| 6th Semester | 19 |
| **TOTAL** | **130** |

**Regulation 2022 -2023 (Optional for Honors Programme)**

## SEMESTER : 7

**Theory:**

| Course Code | Course Title | C | L | T/SLR | P/R | Ty/L/ET P/IE |
|---|---|---|---|---|---|---|
| HBCC22003 | Research methodology | 3 | 2 | 1/0 | 0/0 | Ty |
| CBCA22013 | Data Visualization | 4 | 3 | 1/0 | 0/0 | Ty |
| CBCA22014 | Soft Computing | 4 | 3 | 1/0 | 0/0 | Ty |
| CBCA22015 | Machine Learning | 4 | 3 | 1/0 | 0/0 | Ty |

Practical:

| | | | | | | |
|---|---|---|---|---|---|---|
| CBDT22I03 | Mini Project | 2 | 0 | 0/0 | 4/0 | IE |
| CBDT22I04 | Internship | 1 | 0 | 0/0 | 2/0 | IE |

**Total credits:18**

## SEMESTER : 8

**Theory:**

| Course Code | Course Title | C | L | T/SLR | P/R | Ty/L/ET P/IE |
|---|---|---|---|---|---|---|
| HBCC22004 | Startup strategies | 3 | 3 | 0/0 | 0/0 | Ty |
| HBCC22005 | Principles of Digital Marketing | 3 | 3 | 0/0 | 0/0 | Ty |
| HBCC22006 | Intellectual Property rights and patents | 3 | 3 | 0/0 | 0/0 | Ty |

**Practical:**

| | | | | | | |
|---|---|---|---|---|---|---|
| CBDT22L07 | Major Project | 6 | 0 | 0/0 | 12/0 | Lb |
| CBDT22I05 | Research Publication | 2 | 0 | 0/0 | 4/0 | IE |

**Total credits:17**

**Total no. of credits (I to VIII semesters):165**

# ELECTIVE LIST

| PROGRAM ELECVIE-I | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.NO** | **Sub.Code** | **Title of the Subject** | **C** | **L** | **T/SLR** | **P/R** | **Ty/L/ETP/IE** |
| 1. | CBCA22E01 | Data Mining and Ware Housing | **3** | **3** | **0/0** | **0/0** | **Ty** |
| 2. | CBCA22E02 | Information Security | **3** | **3** | **0/0** | **0/0** | **Ty** |
| 3. | CBCA22E03 | Professional Ethics | **3** | **3** | **0/0** | **0/0** | **Ty** |
| 4. | CBCA22E04 | Software Project Management | **3** | **3** | **0/0** | **0/0** | **Ty** |
| 5. | CBCA22E05 | Management Information System | **3** | **3** | **0/0** | **0/0** | **Ty** |

| PROGRAM ELECVIE-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.NO** | **Sub.Code** | **Title of the Subject** | **C** | **L** | **T/SLR** | **P/R** | **Ty/L/ETP/IE** |
| 6. | CBCA22E06 | Mobile Computing | **3** | **3** | **0/0** | **0/0** | **Ty** |
| 7. | CBCA22E07 | Image Processing | **3** | **3** | **0/0** | **0/0** | **Ty** |
| 8. | CBCA22E08 | Cloud Computing | **3** | **3** | **0/0** | **0/0** | **Ty** |
| 9. | CBCA22E09 | Open Source Programming | **3** | **3** | **0/0** | **0/0** | **Ty** |
| 10. | CBCA22E10 | Software Testing | **3** | **3** | **0/0** | **0/0** | **Ty** |

| PROGRAM ELECVIE-III | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.NO** | **Sub.Code** | **Title of the Subject** | **C** | **L** | **T/SLR** | **P/R** | **Ty/L/ETP/IE** |
| 11. | CBCA22E11 | Artificial Intelligence | **3** | **3** | **0/0** | **0/0** | **Ty** |
| 12. | CBCA22E12 | Design Thinking | **3** | **3** | **0/0** | **0/0** | **Ty** |
| 13. | CBCA22E13 | Block Chain Technology | **3** | **3** | **0/0** | **0/0** | **Ty** |
| 14. | CBCA22E14 | Internet of Things | **3** | **3** | **0/0** | **0/0** | **Ty** |
| 15. | CBCA22E15 | Data Analytics | **3** | **3** | **0/0** | **0/0** | **Ty** |

## List of OPEN ELECTIVE-2022 Regulations.

For All H&S, Management Studies and Computer application faculties- UG Programmes.

| Offering Department | S.NO | Theory/Lab | Subject Code | Subject Name |
|---|---|---|---|---|
| Mathematics | 1. | Theory | HBMA22OE1 | Graph Theory |
| | 2. | Theory | HBMA22OE2 | Optimization Techniques |
| Physics | 3. | Theory | HBPH22OE1 | Fundamentals of Optics and Sound |
| | 4. | Theory | HBPH22OE2 | Every day Physics |
| | 5. | Lab | HBPH22OL1 | Basic Physics lab |
| Computer Science | 6. | Theory | HBCS22OE1 | Office Automation |
| | 7. | Theory | HBCS22OE2 | Fundamentals of Computer and Internet |
| | 8. | Lab | HBCS22OL1 | Multimedia lab |
| Economics | 9. | Theory | HBEM22OE1 | Indian Economy |
| | 10. | Theory | HBEM22OE2 | Gender Economics |
| Chemistry | 11. | Theory | HBCH22OE1 | Chemistry in our Daily Life |
| | 12. | Theory | HBCH22OE2 | Food Chemistry |
| | 13. | Lab | HBCH22OL1 | General Chemistry Lab |
| English | 14. | Theory | HBEN22OE1 | English For Media |
| | 15. | Theory | HBEN22OE2 | Creative Writing |
| Geology | 16. | Theory | HBGE22OE1 | Disaster Mitigation and Management |
| | 17. | Theory | HBGE22OE2 | Remote Sensing and GIS |
| | 18. | Lab | HBGE22OL1 | Remote sensing and GIS lab |
| Psychology | 19. | Theory | HBPY22OE1 | Health & Yoga |
| | 20. | Theory | HBPY22OE2 | Organizational Behavior |
| | 21. | Lab | HBPY22OL1 | Understanding Self & Others |
| Fashion Design | 22. | Theory | HBFD22OE1 | Applications of Textiles |
| | 23. | Theory | HBFD22OE2 | Introduction to Fashion |

| | | | | |
|---|---|---|---|---|
| | 24. | Lab | HBFD22OL1 | Embroidery Practical Lab |
| Computer Applications | 25. | Theory | CBCA22OE1 | Web design |
| | 26. | Theory | CBCA22OE2 | E-Commerce |
| | 27. | Lab | CBCA22OL1 | Web Designing Laboratory |
| Food Science Nutrition and Dietetics | 28. | Theory | HBFS22OE1 | Principles of Nutrition |
| | 29. | Theory | HBFS22OE2 | Food Safety and Quality Control |
| | 30. | Lab | HBFS22OL1 | Community Nutrition Practical |
| Hotel Management and Catering Technology | 31. | Theory | HBHM22OE1 | Fundamentals of Food Production and Patisserie |
| | 32. | Theory | HBHM22OE2 | Bakery and Confectionery Basics |
| | 33. | Lab | HBHM22OL1 | Fundamentals Front office operation practical |
| Defense and Strategic Studies | 34. | Theory | HBDS22OE1 | Independent India |
| | 35. | Theory | HBDS22OE2 | Human Rights |
| Financial Planning | 36. | Theory | MBFP22OE1 | Marketing of Financial Services |
| | 37. | Theory | MBFP22OE2 | Business strategy |
| | 38. | Lab | MBFP22OL1 | Interview Techniques |
| Bio Technology | 39. | Theory | HBBT22OE1 | Food and Nutrition |
| | 40. | Theory | HBBT22OE2 | Human Physiology |
| | 41. | Theory | HBBT22OE3 | Basic Bioinformatics |
| | 42. | Lab | HBBT22OL1 | Basic Bioinformatics Lab |
| Physical Education and Sports | 43. | Theory | HBPE22OE1 | Rule of Games and Sports |
| | 44. | Theory | HBPE22OE2 | Health and Fitness |
| Human Resource | 45. | Theory | HBHR22OE1 | Workplace Counseling |
| | 46. | Theory | HBHR22OE2 | Corporate Social Responsibility |
| Information Science and Cyber forensics | 47. | Theory | HBCF22OE1 | Introduction to Data Science |
| | 48. | Theory | HBCF22OE2 | Data Mining |
| | 49. | Theory | HBCF22OE3 | Introduction to IoT |
| | 50. | Theory | HBCF22OE4 | Introduction to Big Data |
| | 51. | Lab | HBCF22OL1 | Data Science Lab |
| | 52. | Lab | HBCF22OL2 | Data Mining Lab |
| Management Studies | 53. | Theory | MBBA22OE1 | Principles of Management and Science |
| | 54. | Theory | MBBA22OE2 | Business Ethics |

## LIST OF FOREIGN LANGUAGES-2022 regulations

| S.NO | COURSE CODE | COURSE NAME |
|---|---|---|
| 1 | EBFL22I01/HBFL22I01 | French |
| 2 | EBFL22I02/ HBFL22I02 | German |
| 3 | EBFL22I03/ HBFL22I03 | Japanese |
| 4 | EBFL22I04/ HBFL22I04 | Arabic |
| 5 | EBFL22I05/ HBFL22I05 | Chinese |
| 6 | EBFL22I06/HBFL22I06 | Russian |
| 7 | EBFL22I07/HBFL22I07 | Spanish |

**Table 1:Credit Distribution**

| S. No | CATEGORY | Description | No.of Courses | Credits | Total | Credit Weightage | Contact hours |
|---|---|---|---|---|---|---|---|
| 1 | CORE COURSES | Core Theory | 15 | 55 | 65 | 39% | 825 |
| | | Core Lab | 5 | 10 | | | 300 |
| 2 | ELECTIVE COURSES | Department Core Electives/ Skill enhancement electives | 3 | 10 | 10 | 6% | 150 |
| 3 | OPEN ELECTIVES | Open Elective theory | 2 | 6 | 8 | 5% | 90 |
| | | Open Elective Lab | 1 | 2 | | | 30 |
| 4 | INTERDISCIPLINARY/ ALLIED COURSES | Theory | 4 | 12 | 16 | 9% | 180 |
| | | Lab | 2 | 4 | | | 60 |
| 5 | HUMANITIES & SOCIAL SCIENCES , LIFE SKILLS &SOFT SKILLS | Language 1 & 2 | 2 | 6 | 32 | 19% | 90 |
| | | English 1 & 2 | 2 | 6 | | | 90 |
| | | Soft Skills | 4 | 4 | | | 60 |
| | | Life Skill | -- | -- | | | -- |
| | | Foreign Language | 1 | 1 | | | 15 |
| | | Environmental Studies | 1 | 3 | | | 45 |
| | | Management Papers | 3 | 9 | | | 135 |
| | | Entrepreneurship Development | 1 | 3 | | | 45 |
| 6 | PROJECTS/INTERNSHIP / CORE SKILL | Project | 3 | 17 | 21 | 13% | 165 |
| | | Core Skills | 2 | 2 | | | 30 |
| | | Internship / NSS / NCC | 2 | 2 | | | 30 |
| 7 | ENGINEERING SCIENCES | | | | | | |
| 8 | ANY OTHER | Computer Software Lab | 1 | 2 | 13 | 9% | 195 |
| | | Statistical And Numerical Methods Lab | 1 | 2 | | | |
| | | Critical Thinking Skill : | 1 | 1 | | | |
| | | Universal Human Values | 1 | 3 | | | |
| | | Research Methodology | 1 | 3 | | | |
| | | Research Publications | 1 | 2 | | | |
| **Total** | | | | **165** | **165** | **100%** | **2535** |

**Table 2:**

**Revision/modification done in syllabus content:**

| S.No | Course(Subject ) Code | Course (Subject) Name | Concept/ topic if any, removed in current curriculum | Concept/topic added in the new curriculum | % of Revision/ Modification done |
|---|---|---|---|---|---|
| 1 | CBDT22001 | CoreI-Programming in Java | - | Unit 1, 2, 5 Modified from HBCA18D02 | 40 |
| 2 | CBDT22002 | CoreII– HTML5 | - | Unit 2, 4, 5 Modified from HBCA18D05 | 40 |
| 3 | CBDT22L03 | Core III–Database Programming with Mysql- Lab | - | Modified the content of SQL Lab programs from HBCA18D04 | 50 |
| 4 | CBDT22004 | CoreIV – Programming in Python | - | Modified Data structures from HBCA18DL03 | 10 |

**Table3:**

**List of New courses/ value added courses//life skills/Electives/interdisciplinary /courses focusing on employability/entrepreneurship/skill development.**

| S.No | New courses(Subjects) | Value added courses | Life skill | Electives | Inter Disciplinary | Focus on employability /entrepreneurship/skill development. |
|---|---|---|---|---|---|---|
| 1 | Multimedia And Animation | Open Source Programming | Professional Ethics | Data Mining And Ware Housing | Environmental Studies | Ncc/Nss/Internship |
| 2 | Allied – 1 Lab: Multimedia And Animation Lab Using Mathematical Applications | Block Chain Technology | Communication Skill Lab | Information Security | Mathematics | Project Work |
| 3 | Allied - II Lab Data Structures & Algorithms - Laboratory | Data Analytics | Soft Skill – I | Management Information System | Entrepreneurship Development | |
| 4 | Server Side Programming | | Soft Skill – II | Artificial Intelligence | Allied - IV: Digital Fundamentals | |
| 5 | Open Source Technologies | | Soft Skill – III | Design Thinking | | |
| 6 | Database Programming | | Critical Thinking Skill | Block Chain Technology | | |
| 7 | Server Side Programming Using Jsp-Lab | | Universal Human Values | Internet Of Things | | |
| 8 | Front End Development | | | Data Analytics | | |
| 9 | Angular & React Laboratory Using Java Script | | | | | |
| 10 | Machine Learning | | | | | |

| Subject Code: **HBTA22001** | Subject Name: **TAMIL - l** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Understand the aims and objectives of teaching Tamil.
- Understand the rational for learning Tamil.
- To motivate and stimulate the students to overcome their inferiority complex and improve fluency in the language& Learn significance of spoken skill.
- The relationship between language &culture and the implications for language teaching.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Tamil students are actively engaged in learning Tamil language and culture in a meaningful setting |
| **CO2** | Focus on applying the language in real life situations. |
| **CO3** | Use proficiency descriptors to motivate learners to progress to the next stage of learning. . |
| **CO4** | Lessons are customized to arouse students interest and ignite the joy of learning Tamil language. |
| **CO5** | Develop a strong foundation in listening & speaking skills. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 3 |
| **CO3** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 2 |
| **CO4** | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 2 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 3 |
| **CO2** | 2 | 2 | 3 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 2 | 2 | 3 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | √ | | | | | | | | |

| Subject Code: **HBTA22001** | Subject Name: **TAMIL - I** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**முதலாம் ஆண்டு - முதல் பருவம்**

கற்றல் நோக்கம்: 1.மாணவர்களின் கவிதை,கட்டுரை எழுதும் திறன் வளர்த்தல்

2. தமிழில் பிழையின்றி பேசும் எழுதும் திறன் வளர்த்தல்

**அலகு - 1** **11 மணி நேரம்**

**அ) மரபுக்கவிதை**

1. செந்தமிழ் நாடு - மகாகவி பாரதியார்
2.தமிழின் இனிமை, இன்பத்தமிழ், எங்கள் தமிழ், சங்கநாதம் - பாரதிதாசன்
3.தமிழ் வளர்க்க சபதம் - நாமக்கல் கவிஞர் வெ.இராமலிங்கம் பிள்ளை
4. கோயில் வழிபாடு, வாழ்க்கைத் தத்துவங்கள் - கவிமணி தேசிக விநாயகம் பிள்ளை
5.கும்மிப்பாடல் - சுத்தானந்த பாரதியார்
6. தமிழ்த்தாய் வாழ்த்து - மனோன்மணியம் பெ.சுந்தரம் பிள்ளை
7.விடுதலை விளைத்த உரிமை - கவியரசர் கண்ணதாசன்
8. அன்பெனும் பிடியுள்... ... ..., முரசறைத்தல் - வள்ளலார் இராமலிங்க அடிகள்

**ஆ) புதுக்கவிதை**

1.பாட்டாளிகளின் குரல் - பட்டுக்கோட்டை கலியாணசுந்தரம்
2. மகாத்மா காந்தியடிகள் - கவிஞர் வாலி
3. காகிதப் பூக்கள் - நா.காமராசு
4.வள்ளுவர் வழங்கும் விடுதலை - ஈரோடு தமிழன்பன்
5. உலகம் - வைரமுத்து
6. இன்னமுத மாமழை - பேரா. முனைவர் பொற்கோ
7.தமிழ்ப்பற்று - மீரா
8.ஐந்தாம் வகுப்பு அ பிரிவு - நா.முத்துக்குமார்

**அலகு - 2** **7 மணி நேரம்**

**நாட்டுப்புற இலக்கியம்**

1. பொது அறிமுகம்
2. நாட்டுப்புற இலக்கிய வகைகள்
3.நாட்டுப்புறக்கலைகள்

**அலகு - 3** **12 மணி நேரம்**

**அ) சிறுகதைகள்**

1. தேங்காய்த் துண்டுகள் (மு.வரதராசனார்)

2. அறம் (மாலன்)
3. நாற்காலியும் நான்கு தலைமுறைகளும் (திலகவதி)
4.அன்னையும் பிதாவும் (இராஜாஜி)
5. விடியுமா? (கு.ப.ராஜகோபாலன்)

**ஆ) உரைநடை**

1. மு.வ. என்னும் மந்திரம் (இரா.மோகன்)
2. தமிழிசை இயக்கம் (க.வெள்ளைவாரணனார்)
3. மதுரை மாநகரம் (ரா.பி.சேதுப்பிள்ளை)

**அலகு - 4** **6 மணி நேரம்**

1. புதுக்கவிதை - தோற்றமும் வளர்ச்சியும்
2. உரைநடை - தோற்றமும் வளர்ச்சியும்
3. சிறுகதை - தோற்றமும் வளர்ச்சியும்

**அலகு - 5** **9 மணி நேரம்**

**அ) இலக்கணம்**

1. வழக்கு
2. தொகாநிலைத் தொடர்
3. எழுத்துப் போலி
4. பதவியல்

**ஆ) மொழிப்பயிற்சி**

1. தன்வினை - பிறவினை
2. ஒருமை பன்மை மயக்கம்
3. பிறமொழிச் சொற்களை நீக்குதல்
4. விண்ணப்பம் எழுதுதல்

**45 மணி நேரம்**

| Subject Code: HBHI22001 | Subject Name: **HINDI 1** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : Knowledge of Language | T | 3 | 0 | 0 | 3 |

L : Lecture, T : Tutorial,SLr : Supervised Learning, P: Project, R : Research, C : Credits, T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

1. To Understand the Hindi Literature, culture and the usage of language in the various streams
2. To Build up the Confidence in conversing in Hindi language.
3. To acquire Knowledge of the usage of Hindi language in the various Government Offices.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | To understand the basic concepts and Origin of Hindi |
| **CO2** | To know about the roots of Hindi Literature ands its perspective and methods. |
| **CO3** | . Elaborating and understanding philosophical methods of Hindi Literature. |
| **CO4** | Evaluating the concept of Hindi from past to present and to study the society closely through Literature |
| **CO5** | To make the students understand the importance of Hindi in the contemporary world. |

Mapping of Course Outcome with Program Outcome (POs)

| **Sem** | **Coursecode: HBHI17001** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **I** | **ProgrammeOutcomes(Pos)** | | | | | | | | |
| **Cos** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** |
| **CO1** | **3** | **2** | **3** | **2** | **3** | **3** | **3** | **3** | **3** |
| **CO2** | **3** | **3** | **3** | **3** | **2** | **3** | **3** | **3** | **2** |
| **CO3** | **3** | **3** | **2** | **3** | **3** | **3** | **3** | **3** | **2** |
| **CO4** | **2** | **3** | **3** | **3** | **3** | **2** | **2** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **2** | **2** | **3** | **3** |

**3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low**

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | ✓ | | | | | | | | |

| Subject Code: **HBHI22001** | Subject Name: **HINDI -1** | **Ty/Lb /ETP/ IE** | **L** | **T / S.L r** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : Knowledge of Language | **Ty** | 3 | 0 | 0 | 3 |
| L : Lecture, T : Tutorial,SLr : Supervised Learning, P: Project, R : Research, C : Credits, T/L/ETL :Theory / Lab / Embedded Theory and Lab | | | | | | |

UNIT - I**Prose –Understanding the secret of the culture and how to draft the letters in Government offices, technical terms**

1. Sabhyata kaRahasya
2. PersonalApplications
3. LeaveLetters
4. Government Order
5. Administrative Terminology Hindi to English (25 Words)

UNIT - II**Prose-Understanding the human relations and also to know the procedures to open the account in the bank, technical terms**

1. Mitrata
2. Letter to theEditor
3. Opening anA/C
4. Demi OfficialLetter
5. Administrative Terminology English to Hindi ( 25 Words)

UNIT-III**Prose-the contribution of youth in developing India, drafting memo and technical things used in memo**

1. YuvavonSe
2. Application for Withdrawal
3. Circular
4. Memo
5. Administrative Terminology Hindi to English ( 25 Words)

UNIT-IV**Prose-The effect of Nuclear energy and usage of technical terms in offices**

1. Paramanu Oorja evam Khadya PadarthSanrakshan
2. Transfer of anA/C
3. Missing of Pass Book / ChequeLeaf
4. OfficialMemo
5. Administrative Terminology English to Hindi ( 25 Words)

UNIT-V**Prose-The Obstacles faced by the youth for getting employment, drafting complaint letters, technical terms**

1. Yougyata aur Vyavasay kaChunav
2. Complaints
3. Ordering forBooks
4. Notification
5. Official Noting Hindi to English ( 25 words)

BOOKS
FORREFERENCE:

1. Prayojan MoolakHindi: Dr. Syed Rahamathulla, PoornimaPrakashan
4/7, Begum III Street, Royapettah, Chennai – 14

2.Hindi Gadhya Mala Dr. Syed Rahamathulla, PoornimaPrakashan
4/7, Begum III Street, Royapettah, Chennai – 14

| Course /subject Code | HBFR22001 | Semester | 45 Hrs | | | I |
|---|---|---|---|---|---|---|
| Category | All UG Programs | | Ty/Lb/ETP/IE | L | T/SLr | P/R | C |
| Course Title | French I | | Ty | 3 | 0 | 0 | 3 |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

1. The students will acquire a different perspective of their own culture in relation to the French culture
2. The students will discover new attitudes towards familiar practices
3. The students will acquire a sense of the French language, its music and rhythms and basic usage.
4. The students will acquire a comprehensive view of the European Union and the member states

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Identify the French language from other European language and to show and tell French words and expression |
| **CO2** | Understand how the language works discovering the pronunciation |
| **CO3** | • Start writing short dialogues of greetings<br>• Try to interact with someone with life skill question –what where, who etc<br>• Describe persons and places |
| **CO4** | • Discover France and its physical tributes, develop an idea about the importance of France in the world affairs<br>• Analyze ideas in the content of short paragraphs, paintings etc., and everyday contexts.<br>• Appreciate the culture and uniqueness of France.<br>• Discuss in English various aspects of France and a new cultural events and compare with current scenario |
| **CO5** | • Develop enough confidence to introduce oneself and ask others simple questions about personal details. Interact as long as other person speaks slowly and clearly |
| **CO6** | Plan a rendezvous ,a casual meeting by Interacting with basic sentences and expressions as long as the person to with whom he/she speaks can help to reformulate the sentences |
| **CO7** | Write a simple message can fill a simple questionnaire .write ones names, nationality ,address etc. on a hotel registration card /passport etc. |

**Mapping of Course Outcome with Program Outcome (POs)**

| Cos/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 | PO8 | P09 |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 |
| **CO2** | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 2 | 3 |
| **CO3** | 2 | 3 | 2 | 3 | 1 | 1 | 2 | 2 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 |
| **CO5** | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 2 | 3 |
| **CO6** | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 |
| **CO7** | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | √ | | | | | | | | |

| Course /subject Code | HBFR22001 | Semester | 45 Hrs | | | I |
|---|---|---|---|---|---|---|
| Category | All UG Programs | | Ty/Lb/ETP/IE | L | T/SLr | P/R | C |
| Course Title | French I | | Ty | 3 | 0 | 0 | 3 |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**UNIT I** **9 Hrs**

**Se saluer, La Graphie- écrire (compréhension orale, expression orale)**

- Se Présenter-
- La langue française
- La Graphie – écrire L'alphabet, L'abécédaire
- Les Accents et les Ponctuations
- L'interaction de base.

  - **Clip audios** : Exercices orales, compositions orales et épreuves orales. (20 –durée moins de 2 minutes)
  - **Audio clips**- For oral expressions, oral assignments and oral test-20 duration less than 2 minutes (10 oral exercises, 6 audio reading compositions& 4 tests).

**UNIT II** **9 Hrs**

**S'informer-Interactions aidant des Compétences De base**

- Des modèles interrogatifs
- Les nombres, demander le cout /le prix
- Demander l'heure, Les jours, Les mois de l'année.

  - **Clip audios** : Exercices orales, compositions orales et épreuves orales. (20 –durée moins de 2 minutes)
  - **Audio clips**- For oral expressions, oral assignments and oral test-20 duration less than 2 minutes (10 oral exercises, 6 audio reading compositions& 4 tests).

**UNIT III** **9 Hrs**

**Localiser –La France**

- Quelque symbole de la France.
- La carte de l'Europe, La France dans le contexte international, La France et les Fuseaux horaires, La francophonie, L'union Européen
- La France physique, industrielle, touristique rt administrative
- Quelque symbole de Paris.

  - **Clip audios** : Exercices orales, compositions orales et épreuves orales. (20 –durée moins de 2 minutes)
  - **Audio clips**- For oral expressions, oral assignments and oral test-20 duration less than 2 minutes (10 oral exercises, 6 audio reading compositions& 4 tests).

**UNIT IV** **9 Hrs**

**Lire et prononcer Le française**

- Les son française, les voyelles françaises, les sons nasaux, les consonné, Quelque sons uniques.
- Les syllabus français, Les Rythme de la langue française.

  - **Clip audios** : Exercices orales, compositions orales et épreuves orales.(20 –durée moins de 2 minutes)
  - **Audio clips**- For oral expressions, oral assignments and oral test-20 duration less than 2 minutes (10 oral exercises ,6 audio reading

**UNIT V** **9 Hrs**

**Observer et Comprendre**

- La vie de la France quotidienne, En cas d'urgence.
- La grammaire initiale

  - **Clip audios** : Exercices orales, compositions orales et épreuves orales. (20 –durée moins de 2 minutes)
  - **Audio clips** - For oral expressions, oral assignments and oral test -20 duration less than 2 minutes (10 oral exercises, 6 audio Reading compositions& 4 tests).

**Total:45 Hrs**

***Reference Books :***

1. **Parlez-vous français? Partie 1 -** Dr.M.Chandrika.V.Unni & Mrs. Meena Mathews 2019 by Universal publisher

2. **CLE INTERNATIONAL** Lectures Clé en français facile. (2012) Hachette Paris

3. **Cosmopolite**: Livre d'élève A1 by Nathalie Hirsch sprung, Tony Tricot, Claude Le Ninan

4. **Latitudes-**1 - Régine Mérieux & Yves l'oiseau, Didier 2017

**Alter Ego 1** - Catherine Dolez, Sylvie Pons

| HBEN22001 | ENGLISH I (Common to all UG Courses under H&S | L | T | P | C |
|---|---|---|---|---|---|
| | Total contact hours – 45 | 3 | 0 | 0 | 3 |
| | Prerequisite – English Language | | | | |
| | Course designed by – Department of English | | | | |

**Course Objectives**

1. Develop English Language skills (LSRW) to communicate in English without any inhibition.
2. Learn vocabulary and syntax to be fluent in English for social and academic communication
3. Demonstrate content knowledge through appropriate language use for academic success.
4. Develop in them analytical and interpretative skills for research, projects, placement etc.,
5. Engage in academic and business writing with a focus on social and professional ethics.

**Course Outcomes (COs)**

1. Possess Language skills (LSRW) to communicate in English without any inhibition.
2. Express with appropriate lexis and syntax in English for social and academic communication
3. Demonstrate content knowledge through appropriate language use for academic success.
4. Analyse and interpret any genre of literature in English for research, projects, placement etc.,
5. Engage themselves in organized academic and business writing with professional ethics.

**Program Specific Outcomes (PSOs)**

1. Demonstrating mastery of the components of English language and literature.
2. Explaining through literature in English, diverse historical cultural and social ethics
3. Applying literary critical perspectives to generate original analysis of literature in English
4. Promoting cultural values and real-life skills through English language and Literature

**Mapping of course outcomes (COs) with Program Outcomes (POs)& Program Specific Outcomes**

(3/2/1 indicates the strength of correlation) 3= High; 2= Medium; 1= Low

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 |
| 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 |
| 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 |
| 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 |

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | √ | | | | | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **HBEN22001** | **ENGLISH I (Common to all UG Courses under H&S** | L | T | P | C |
| | Total contact hours – 45 | 3 | 0 | 0 | 3 |
| | Prerequisite – English Language | | | | |
| | Course designed by – Department of English | | | | |

**Course Objectives:**

The students will be facilitated to

1. Develop English Language skills (LSRW) to communicate in English without any inhibition.
2. Learn vocabulary and syntax to be fluent in English for social and academic communication
3. Demonstrate content knowledge through appropriate language use for academic success.
4. Develop in them analytical and interpretative skills for research, projects, placement etc.,
5. Engage in academic and business writing with a focus on social and professional ethics.

**Unit I: Prose**

1. Beware the loss of Biodiversity
2. The Urban - Rural Divide
3. Grading down Plastics
4. The Unsung Hero of Covid – 19 in India
5. From Aircrafts to Drones
6. My Vision for India

**Unit II: Poetry**

1. On Killing a Tree
2. The Road Not Taken
3. Anthem for Doomed Youth

**Unit III: Short Story**

1. Portrait of a Lady
2. The Connoisseur

**Unit IV: Drama**

1. The Never-Never Nest
2. Frederick Douglass

**Unit V: Functional Grammar – Charts & LSRW Development**

**Functional Grammar:** ***(Grammar exercises spread up in all four units)***

Parts of speech- use of articles- prepositions – their uses – verb + prepositions- words followed by prepositions – modals -tenses- active -passive- impersonal passive forms- concord- conditional sentences – question tags - Common errors - Punctuation

Vocabulary development- word formation - prefixes-suffixes – synonyms-antonyms – homophones -homonyms – words often confused

**Charts/Diagrams and their interpretation - their use**

Tables- Flow chart- Pie chart -Bar chart

**Letters:** Formal and Informal

**LSRW Development:** audio, video and tasks for the content of lessons under each unit.

**Course Outcomes:**

On completing the course the students will be able to

1. Possess Language skills (LSRW) to communicate in English without any inhibition.
2. Express with appropriate lexis and syntax in English for social and academic communication
3. Demonstrate content knowledge through appropriate language use for academic success.
4. Analyse and interpret any genre of literature in English for research, projects, placement etc.,
5. Engage themselves in organized academic and business writing with professional ethics.

**PrescribedText:**

1. M. Chandrasena Rajeswaran, R. Pushkala & S. Bhuvaneswari, Pinnacle: A Skills Integrated Textbook
2. V. Karpagavadivu, S. Bhuvaneswari, J. Valentina Rani , S. Magdelin Percy, English Workbook

**Suggested Reading:** Wren and Martin: Grammar and Composition, Chand & Co, 2006

| Subject Code: HBMA22ID1 | Subject Name: ALLIED MATHEMATICS-I | L | T | P | C |
|---|---|---|---|---|---|
| | Prerequisite: Higher Secondary Mathematics | 2 | 1 | 0 | 3 |

**L : Lecture T : Tutorial C: Credits P: Project**

**OBJECTIVES**

- To understand the concepts in Matrices and its operations
- To understand the Basic concepts in Trigonometry
- To understand the Basic concepts in Integration
- To understand the Basic concepts in Probability
- To understand the Basic concepts in Standard Distributions

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the basic concept of Rank matrices and Solving simultaneous equations . |
| **CO2** | Understand to solve the problem of Expansions of Sin nθ, Cos nθ in powers of Sinθ and Cosθ . Expansions of $Sin^n\theta$ and $Cos^n\theta$ in terms of Sines and Cosines of multiples of θ and also problem in Hyperbolic functions. |
| **CO3** | Learn how to solve problems in Methods of Integration, Integration by substitution , Integration by parts , Definite Integrals , Properties of Definite Integrals and Problems on finding Area |
| **CO4** | Understand the concept of Axioms of Probability , Conditional probability , Total probability Baye's Theorem , Random variable ,Probability mass function , Probability density function. |
| **CO5** | Analyses summation of series using Binomial, Exponential , Poisson and normal distribution |

**Mapping of Course Outcome with Program Outcome (POs)**

| Cos/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | | | |
| **CO2** | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | | | |
| **CO3** | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 1 | 2 | | | |
| **CO4** | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | | | |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | | | |

| COs /PSOs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CO1** | 3 | 3 | 3 |
| **CO2** | 2 | 3 | 2 |
| **CO3** | 3 | 2 | 3 |
| **CO4** | 2 | 3 | 2 |
| **CO5** | 3 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | √ | | | |

| Subject Code: HBMA22ID1 | Subject Name: ALLIED MATHEMATICS-I | L | T | P | C |
|---|---|---|---|---|---|
| | Prerequisite: Higher Secondary Mathematics | **2** | **1** | **0** | **3** |
| **L : Lecture T : Tutorial C: Credits P: Project** | | | | | |

**Course Outcomes:**

To understand the Basic concepts in Matrices
To understand the Basic concepts in Trigonometry
To understand the Basic concepts in Integration
To understand the Basic concepts in Probability
To understand the Basic concepts in Standard Distributions

**UNIT I MATRICES (12 hrs)**

Elementary operations on Matrices – Rank of a Matrix – Solving simultaneous equations (atmost three equations with three unknowns).

**UNIT II TRIGONOMETRY (12 hrs)**

Expansions of Sin nθ, Cos nθ in powers of Sinθ and Cosθ – Expansion of Tan nθ – Expansions of $\text{Sin}^n\theta$ and $\text{Cos}^n\theta$ in terms of Sines and Cosines of multiples of θ – Hyperbolic functions – Separation into real and imaginary parts.

**UNIT III INTEGRATION (12 hrs)**

Basic concepts of Integration – Methods of Integration– Integration by substitution – Integration by parts – Definite Integrals – Properties of Definite Integrals – Problems on finding Area using single integrals (simple problems).

**UNIT IV INTRODUCTION TO PROBABILITY (12 hrs)**

Axioms of Probability – Conditional probability – Total probability – Baye's Theorem – Random variable – Probability mass function – Probability density function – Properties (Definition and simple problems).

**UNIT V STANDARD DISTRIBUTIONS (12 hrs)**

Binomial – Poisson –Exponential –Normal distributions.

**Total no. of hrs: 60**

**Reference Books:**

**1)** Vittal.P.R, *Allied Mathematics*, Margham Publications., Chennai, (2012).
**2)** Venkatachalapathy.S.G, *Allied Mathematics*, Margham Publications., Chennai, (2007).
**3)** Singaravelu, *Allied Mathematics*, Meenakshi Agency., Chennai, (2001).
**4)** Gupta S.C., Kapoor V.K., *Fundamentals of Mathematical Statistics*, S.Chand & Co., (2007).
**5)** Vittal.P.R, Malini, *Statistical & Numerical Methods*, Margham Publications., Chennai,(2012).

| Subject Code: **CBDT22001** | Subject Name: **PROGRAMMING IN JAVA** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Rudimentary skill in Basic Programming** | **Ty** | **2** | **1** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To impart the basic concepts of programming in c.
- Explore the concepts on various I/O and control statements
- To demonstrate an understanding of functions, recursion and Storage Classes.
- To Understand and use the common data structures typically found in C programs — namely arrays, structures and pointers.
- To understand the concept of pointers and operations on files.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the fundamentals of c – keywords & identifiers, constants, variables, datatypes, expressions, operators and mathematical functions. |
| **CO2** | Develop readable C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators |
| **CO3** | Understand how to write and use functions, how the stack is used to implement function calls, and parameter passing options. Also to explore on storage classes. |
| **CO4** | Able to define arrays and use them in simple data processing applications. also he/she must be able to use the concept of array of structures. |
| **CO5** | Ability to develop and interpret the concept of pointers and its declaration. Also knowing the tactics of i/o operations on files. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | √ | | | | | | | |

| Subject Code: **CBDT22001** | Subject Name: **PROGRAMMING IN JAVA** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Rudimentary skill in Basic Programming** | **Ty** | **2** | **1** | **0** | **3** |

**OBJECTIVE:**

- It is required to understand Object Oriented Programming concept to develop any good application. Also Java itself run with various technology stack to build robust application which fulfills industry requirement in various ways.

- All application development support is available with java like web, mobile and stand alone. Platform independent feature and its secure API make it first choice of development.

**UNIT I** **9 Hrs**

**Implementation classes and introduction to Regular Expressions:**Regular Inner Class, Static Inner Class, Method-local Inner Class, Anonymous Inner Class,Type Casting Primitive Data Types, Type Casting Object, Working with the Pattern and Matcher Classes, Working with Character Classes, Working with Quantifiers,Localizing Date, Localizing Currency, Localizing Text.

**UNIT II** **9 Hrs**

**Java Collections and Generics:**Working with the HashSet Class,Working with the TreeSet Class, Working with the ArrayList Class, Working with the LinkedList Class, Working with the Vector Class, Working with the HashMap Class, Working with the TreeMap Class, Working with the Hashtable Class, Working with the ArrayDeque Class, Using the Comparable Interface, Using the Comparator Interface.

**UNIT III** **9 Hrs**

**Java Thread**:The Basic Concept of Multithreading, Advantages and Disadvantages of Multithreading, The Thread Class, The Life Cycle of a Thread, Creating a Thread by Extending the Thread Class, Creating a Thread by Implementing the Runnable Interface, Creating Multiple Threads, Identifying the Thread Priorities, Synchronizing Threads, Implementing Inter-threaded Communication, Implementing Atomic Variables and Locks, Identifying Concurrency Synchronizers, Identifying Concurrency Collections, Implementing ExecutorService, Implementing Fork/Join Framework.

**UNIT IV** **9 Hrs**

**Working with Streams**:Using the FileInputStream Class, Using the BufferedInputStream Class, Using the FileReader Class, Using the BufferedReader Class, Using the FileOutputStream Class, Using the BufferedOutputStream Class, Using the BufferedWriter Class, Using the FileWriter Class. Using the Path Interface and the Paths Class, Manipulating Files and Directories, Implementing Watch Service, Reading a File, Writing to a File.

**UNIT V** **9 Hrs**

**JDBC:**JDBC Architecture, The JDBC-ODBC Bridge Driver, The Native-API Driver, The Network Protocol Driver, The Native Protocol Driver, Loading a Driver, Connecting to a Database, Creating and Executing JDBC Statements, Creating and Executing JDBC Statements, Handling SQL Exceptions, Types of Result Sets,Methods of the ResultSet Interface, Methods of the PreparedStatement Interface, Retrieving Rows, Inserting Rows, Updating and Deleting Rows, Committing a Transaction, Exception Handling in Batch Updates, Creating Stored Procedures, Calling a Stored Procedure Without Parameters, Calling a Stored Procedure with Parameters, Using the DatabaseMetaData Interface, Using the ResultSetMetaData Interface

**Total No of Hrs : 45**

**TEXT BOOKS:**

1. Head First Java, Kathy Sierra, O'Reilly Media
2. Java 2- The Complete Reference, Publisher - McGraw-Hill/Osborne
3. Java: A Beginner's Guide, Publisher - McGraw Hill Education

**REFERENCES:**

1. Marty Hall and Larry Brown, —Core Servlets And Javaserver Pages‖, Second Edition
2. Bryan Basham, Kathy Siegra, Bert Bates, —Head First Servlets and JSP‖, Second Edition
3. Uttam K Roy, —Web Technologies‖, Oxford University Press, 2011

| Subject Code: **HBCC22001** | Subject Name : **ENVIRONMENTAL STUDIES** | **Ty/ Lb/ ETL** | **L** | **T/ S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite: NIL | Ty | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

**OBJECTIVES :**

- To acquire knowledge of the Environment and Ecosystem & Biodiversity
- To acquire knowledge of the different types of Environmental pollution
- To know more about Natural Resources and social issues and the Environment
- To attain familiarity of human population and Environment

**COURSE OUTCOMES (COs) : ( 3- 5)**

| | |
|---|---|
| CO1 | To known about Environment and Ecosystem & Biodiversity |
| CO2 | To clearly comprehend air, water, Soil, Marine, Noise, Thermal and Nuclear Pollutions and Solid Waste management and identify the importance of natural resources. |
| CO3 | To know about the natural resources and environmental problems associated with climate change, global warming, acid rain, ozone layer depletion etc., and explain possible solution. |

**Mapping of Course Outcomes with Program Outcomes (POs)**

| **COs/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **2** | 1 | 1 | **1** | 2 | 1 | 1 | **3** | **2** |
| **CO2** | **2** | 1 | 1 | **1** | 2 | 1 | 1 | **3** | **2** |
| **CO3** | **2** | 1 | 1 | **1** | 2 | 1 | 1 | **3** | **2** |

| **COs / PSOs** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|
| **CO1** | **1** | **1** | **3** |
| **CO2** | **1** | **1** | **3** |
| **CO3** | **1** | **1** | **3** |

**3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low**

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | √ | | | | | | | | |

| Subject Code : HBCC22001 | Subject Name : ENVIRONMENTAL STUDIES | Ty/Lb/ETP/IE | L | T | P | C |
|---|---|---|---|---|---|---|
| | Prerequisite : None | Ty | 3 | 0 | 0 | 3 |
| L : Lecture T : Tutorial P : Project C: Credits | | | | | | |

**UNIT I ENVIRONMENT AND ECOSYSTEMS** **9 Hrs**

Definition, scope and importance of environment – need for public awareness – concept, structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem. Biodiversity at National and local levels – India

**UNIT II ENVIRONMENTAL POLLUTION** **9 Hrs**

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Nuclear hazards (g) E-Wastes and causes, effects and control measures

**UNIT III NATURAL RESOURCES** **9 Hrs**

Forest resources: Use and over-exploitation, deforestation. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems.

**UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT** **9 Hrs**

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns climate change, global warming, acid rain, ozone layer depletion, nuclear accidents ,central and state pollution control boards- Public awareness.

**UNIT V HUMAN POPULATION AND THE ENVIRONMENT** **9 Hrs**

Population growth, variation among nations – population explosion, environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health

**Total no of Hours : 45**

**TEXT BOOKS**:

1. Gilbert M.Masters, ‘Introduction to Environmental Engineering and Science’, 2nd edition,
   Pearson Education (2004).
2. Benny Joseph, ‘Environmental Science and Engineering’, Tata McGrawHill,NewDelhi, (2006).

| Subject Code: **HBCC22L01** | Subject Name : **COMPUTER SOFTWARE LAB (WORD, EXCEL, POWERPOINT, PAINT, INTERNET)** | **Ty/ Lb/ ETL** | **L** | **T/ S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite: NIL | Lb | 0 | 0 | 4 | 2 |

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

**OBJECTIVES :**

- To train students how to use MS Office applications use in office work such as creating professional-quality documents; store, organize and analyze information; arithmetic operations and functions.
- MS Excel to enable the students for creating tables, scatter plots, and completing data analysis.
- Gain knowledge in practical applications of Word, Excel, Powerpoint, Paint and Internet.

**COURSE OUTCOMES (COs) : ( 3- 5)**

| | |
|---|---|
| CO1 | Demonstrate the usage of various operations in MS Word |
| CO2 | Perform calculations in Microsoft Excel using both manually inputting formulas and built-in functions. |
| CO3 | Develop dynamic slide presentations with animation, narration, images, and much more, digitally and effectively. |
| CO4 | To create drawings to include clipart, color, shape, size, text, enhance text |
| CO5 | Understanding how to search specific website, sending mails etc |

**Mapping of Course Outcomes with Program Outcomes (POs)**

| **COs/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **3** | **1** | **2** | **1** | **2** | **3** | **2** | **2** |
| **CO2** | **3** | **2** | **3** | **2** | **2** | **2** | **3** | **2** | **3** |
| **CO3** | **3** | **3** | **1** | **2** | **1** | **2** | **3** | **2** | **2** |
| **CO4** | **3** | **2** | **1** | **1** | **1** | **2** | **2** | **2** | **2** |
| **CO5** | **3** | **3** | **1** | **1** | **1** | **2** | **3** | **2** | **3** |

| **COs / PSOs** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|
| **CO1** | **3** | **2** | **1** |
| **CO2** | **3** | **3** | **2** |
| **CO3** | **2** | **2** | **1** |
| **CO4** | **3** | **1** | **1** |
| **CO5** | **3** | **1** | **1** |

**3/2/1 indicates Strength of Correlation 3- High, 2- Medium, 1-Low**

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | ✔ | |

| Subject Code: **HBCC22L01** | Subject Name : **COMPUTER SOFTWARE LAB (WORD, EXCEL, POWERPOINT, PAINT, INTERNET)** | **Ty/ Lb/ ETL** | **L** | **T/ S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite: NIL | Lb | 0 | 0 | 4 | 2 |
| L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab | | | | | | |

**(MS office-Word, Excel, Powerpoint, Paint and Internet )**

**UNIT 1:OFFICE APPLICATIONS – I**

**MS OFFICE: MS-WORD**

**UNIT 2:OFFICE APPLICATIONS - II**

**MS OFFICE: MS-EXCEL**

**UNIT 3:OFFICE APPLICATIONS - III**

**MS OFFICE: MS-POWER POINT**

**UNIT 4:MICROSOFT PAINT EXERCISES – IV**

**UNIT 5:INTERNET & ITS APPLICATIONS- V**

**Total No of Hrs : 60**

**OFFICE APPLICATIONS – I**

1. Preparing a Govt. Order / Official Letter / Business Letter / Circular Letter
   Covering formatting commands - font size and styles - bold, underline, upper case, lower case, superscript, subscript, indenting paragraphs, spacing between lines and characters, tab settings etc.

2. Preparing a news letter:
   To prepare a newsletter with borders, two columns text, header and footer and inserting a graphic image and page layout.

3. Creating and using styles and templates
   To create a style and apply that style in a document
   To create a template for the styles created and assemble the styles for the template.

4. Creating and editing the table
   To create a table using table menu
   To create a monthly calendar using cell editing operations like inserting, joining, deleting,splitting and merging cells
   To create a simple statement for math calculations viz. Totalling the column.

5. Creating numbered lists and bulleted lists
   To create numbered list with different formats (with numbers, alphabets, roman letters)To create a bulleted list with different bullet characters.

6. Printing envelopes and mail merge.
   To print envelopes with from addresses and to addresses
   To use mail merge facility for sending a circular letter to many personsTo use mail merge facility for printing mailing labels.

7. Using the special features of wordTo find and replace the text
   To spell check and correct.
   To generate table of contents for a documentTo prepare index for a document.

8. Create an advertisement
   Prepare a resume.

**OFFICE APPLICATIONS – II**

9. Using formulas and functions:
   To prepare a Worksheet showing the monthly sales of a company in different branchoffices (Showing Total Sales, Average Sales).
   Prepare a Statement for preparing Result of 10 students in 5 subjects (using formula toget Distinction, A Grade, B Grade, C Grade and Fail under Result column against each student).

10. Operating on the sheets:
    Finding, deleting and adding records, formatting columns, row height, merging, splittingcolumns etc. Connecting the Worksheets and enter the data.

11. Creating a Chart:
To create a chart for comparing the monthly sales of a company in different branch offices.

12. Using the data consolidate command:
To use the data consolidate command to calculate the total amount budgeted for all departments (wages, travel and entertainment, office supplies and so on) or to calculate the average amountbudgeted for – say, department office expenses.

13. Sorting Data, Filtering Data and creation of Pivot tables.

**OFFICE APPLICATIONS – III**

14. Creating a new Presentation based on a template – using Auto content wizard, design templateand Plain blank presentation.

15. Creating a Presentation with Slide Transition – Automatic and Manual with different effects.

16. Creating a Presentation applying Custom Animation effects –
Applying multiple effects to the same object and changing to a different effect and removingeffects.

17. Creating and Printing handouts.

**OFFICE APPLICATIONS – IV**

18. To show your understanding of Microsoft Paint, label the drawing with the following labels: zoom tool, eraser, line thickness, example clipart, arrow shape, line tool, get more colors, add text, document title, save icon, undo, select, rotate, icon, fill, freehand tool, copy, color 2. You only need to use each label once.

19. Microsoft Paint Exercise
A. Create a logo for a business.
B. Examples: for a computer shop, a greengrocer, a garage, an education centre, a restaurant, a sports club, or anything you choose!
C. Get ideas by looking at other business/popular logos.
D. You can insert clipart.
E. Save your drawing as Logo.
F. Print your logo. Use Page Setup to fit your logo to the page.
*Ensure your logo represents the business and contains some text.

**OFFICE APPLICATIONS – V**

1. Searching for a web site / application / text documents viewing and downloading.

2. Create an E-mail account, Retrieving messages from inbox, replying, attaching files filteringand forwarding

3. Operating on a Tablet / Smart Phone - browsing and practising on some important applications (UcBrowser, Skype) - operating on internet – creating and sending messages / mails using the applications like WhatsApp and WeChat - downloading text and media filesand video conferencing using Skype.

| Subject Code: **CBDT22L01** | Subject Name: **PROGRAMMIMG IN JAVA LABORATORY** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Rudimentary skill in Basic Programming Knowledge** | **Lb** | **0** | **0** | **4** | **2** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Develop an in-depth understanding of functional, logic, and programming paradigms
- Identify the problem given and design the algorithm using various algorithm design techniques to check for palindrome and gcd
- Implement and characterize various data by sorting in rows and columns.
- Perceive to handle structures and the concept of repeating items in a self-similar way.
  Apply the professional ethics and appropriate data location of an address memory and learn about file processing.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Scrutinize the execution of Finding Biggest number among three numbers and also find weather the given number is prime or not . |
| **CO2** | Analyse and compare the sequence of characters which reads the same backward as forward(palindrome) and find Greatest common divisor of given two numbers. |
| **CO3** | Illustrate and implement the series of numbers in which each number ( Fibonacci number ) is the sum of the two preceding numbers series and various types of matrix operations |
| **CO4** | Construct and execute the programs to demonstrate the c features like recursion for factorial and student marksheet using structures. |
| **CO5** | Compile the coding for Swapping using pointers and file operations in various sectors. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |
| **CO2** | 2 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | √ | |

| Subject Code: **CBDT22L01** | Subject Name: **PROGRAMMIMG IN JAVA LABORATORY** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Rudimentary skill in Basic Programming Knowledge** | **Lb** | **0** | **0** | **4** | **2** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**OBJECTIVE:**

It is required to understand Object Oriented Programming concept to develop any good application. Also Java itself run with various technology stack to build robust application which fulfills industry requirement in various ways.
All application development support is available with java like web, mobile and stand alone. Platform independent feature and its secure API make it first choice of development.

1. Write Java program to implement the concept of
   a. Inheritance
   b. Polymorphism.
   c. Abstraction
   d. Encapsulation.

2. Write Java program for implementing and manipulation with below mentioned Objects
   a. String Class.
   b. StringBuffer Class
   c. StringBuilder.

3. Write Java code for Exception Handling
   a. Pre defined Exception
   b. Custom Exception

4. Write Java Program for implementing the concept of Java Data Structure with Collections.
   a. List
   b. Set
   c. Map
   d. Write code based on Generics.

5. Write Java Program Multithreading and Concurrency API.
   a. Write code for Thread creation
   b. Write code for multithreading
   c. Write code based on java Concurrency API.

6. Regular Expression.
   a. Write code for taking string object and use of regular expression to extract information out of it.
   b. Use case of regular Expressions.

7. Java Memory Management.
   a. Write java code to avoid memory leak.
   b. Understanding String and String Buffer with memory perspective.

**Total No of Hrs : 60**

| HBCC22I01 | COMMUNICATION SKILL LAB | L | T | P | C |
|---|---|---|---|---|---|
| | Total contact hours – 30 | 0 | 0 | 2 | 1 |
| | Prerequisite – English Language | | | | |
| | Course designed by – Department of English | | | | |

**Course Objectives**

1. Use English as a medium of communication for academic and professional attainment
2. Shed off language anxieties and gain confidence to speak through communication practices.
3. Listen and speak for interpersonal communication and academic activities.
4. Read and write for lifelong learning, knowledge enhancement and research.
5. Communicate to work in teams and follow social ethics in the global culture.

**Course Outcomes (COs)**

1. Use English as a medium of communication for academic and professional attainment
2. Shed off language anxieties and gain confidence to speak through communication practices.
3. Listen and speak for interpersonal communication and academic activities.
4. Read and write for lifelong learning, knowledge enhancement and research.
5. Communicate to work in teams and follow social ethics in the global culture

**Program Specific Outcomes (PSOs)**

1. Demonstrating mastery of the components of English language and literature.
2. Explaining through literature in English, diverse historical cultural and social ethics
3. Applying literary critical perspectives to generate original analysis of literature in English
4. Promoting cultural values and real-life skills through English language and Literature

**1. Mapping of course outcomes (COs) with Program Outcomes (POs)& Program Specific Outcomes**

(H/M/L indicates the strength of correlation) 3= High; 2= Medium; 1= Low

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | **PSO1** | **PSO2** | **PSO3** | **PSO4** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | 1 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 2 |
| 2 | 3 | 3 | 3 | 1 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 | 1 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 |
| 4 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 |
| 5 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 |

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | √ | | |

| | | | | | |
|---|---|---|---|---|---|
| **HBCC22I01** | **COMMUNICATION SKILL LAB** | **L** | **T** | **P** | **C** |
| | Total contact hours – 30 | **0** | **0** | **2** | **1** |
| | Prerequisite – English Language | | | | |
| | Course designed by – Department of English | | | | |

**Prefatory note:**

The paper seeks to train students in communicative skills and also give a firm foundation in listening and speaking by engaging students with authentic audios and videos ; the students will immensely benefit from strategy instruction for effective reading and writing; they will be able to recognize the importance of grammar and vocabulary for effective reading and writing. The present global scenario requires increasing need for clear and cordial communication with people from different culture. Cultural Intelligence is given as a unit to help students learn about low and high context cultures. It aligns with the University's mission of disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.

**Methodology: Flipped Classrooms and Mobile Assisted Language Learning**

**Course Objective**

**The students will be facilitated to**

1. Use English as a medium of communication for academic and professional attainment
2. Shed off language anxieties and gain confidence to speak with different kinds of people in varied contexts.
3. Listen and speak for interpersonal communication and academic activities.
4. Read and write for lifelong learning, knowledge enhancement and research.
5. Communicate to work in teams and follow social ethics in the global culture.

**Unit-I Listening**

- Listening for Social and Academic purposes
- Non-verbal and coverbal communication
- Imitating for pronunciation, intonation, word stress, etc.,

**Cognitive Activity:** Note taking during lecture sessions

**Unit-II Speaking**

The art of speaking and negotiating

**Interpersonal Communication**

1. Opening conversation
2. Introducing oneself
3. Asking about others
4. Making small talk
5. Asking for directions
6. Enquiring
7. Thanking
8. Appreciating
9. Offering help
10. Requesting
11. Persuading
12. Warning
13. Expressing regret
14. Agreeing
15. Disagreeing
16. Ending a conversation
17. Saying what you intend to do
18. Expressing dislikes
19. Comparing
20. Complaining

**Academic Communication**

1. Instructional conversations
2. Power Point Presentation
3. Narrating about incidents
4. Public speaking / Debate
5. Group Discussion
6. Interview for Projects and Placement

**Unit-III Reading skills**

1. Types and mechanics of reading
2. Tips for effective reading
3. Reading Strategies
4. Cognitive Strategy: Note Making, Comprehension exercise, oral and written review,

**Unit- IV Writing Skills**

- The Process of Writing
  1. Grammar, vocabulary, discourse markers and sentence construction
  2. Writing& Rewriting: drafting, revising, editing.
- Writing as a scaffolding activity
  1. Summarising
  2. Paraphrasing
  3. Precis writing
  4. Short notes and Essay writing

**Unit -V Intercultural communication skills**

1. Go local
2. Group behaviour
3. E mail and intercultural communication
4. High and low context cultures
5. Cultural diversity in terms of time and space

**ASSESSMENT**

Clubbed with each unit in the form of Audio listening, watching Videos, quiz, roleplay – public speaking, PPT presentation, reading and writing.

**Course Outcome**

**On completing the course, the students will be able to**

- Use English as a medium of communication for academic and professional attainment
- Shed off language anxieties and gain confidence to speak with different kinds of people in varied contexts.
- Listen to and speak for interpersonal communication and academic activities.
- Read and write for lifelong learning, knowledge enhancement and research.
- Communicate to work in teams and follow social ethics in the global culture.

**Prescribed Text**

J. C. Richards with J. Hull & S.Proctor, Interchange, Level 3, Cambridge University Press, 2022

| Subject Code: HBCC22I02 | Subject Name: **SOFT SKILL I** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : English Language | **IE** | 0 | 0 | 2 | 1 |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

1. Become good listeners to get engaged in interactive communication for effective team building.
2. Develop assertive and adaptive behaviour to be leaders
3. Develop peer interaction for a successful lifelong learning.
4. Learn skills necessary for a cooperative living in academic and professional environments
5. Use soft skills for the purposes of research and follow ethics in society and profession.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Become good listeners to get engaged in interactive communication for effective team building. |
| **CO2** | Develop assertive and adaptive behaviour to be leaders |
| **CO3** | Develop peer interaction for a successful lifelong learning. |
| **CO4** | Learn skills necessary for a cooperative living in academic and professional environments |
| **CO5** | Use soft skills for the purposes of research and follow ethics in society and profession |

**Mapping of Course Outcome with Program Outcome (POs)**

| | |
|---|---|
| PSO1 | Demonstrating mastery of the components of English language and literature. |
| PSO2 | Explaining through literature in English, diverse historical cultural and social ethics |
| PSO3 | Applying literary critical perspectives to generate original analysis of literature in English |
| PSO4 | Promoting cultural values and real-life skills through English language and Literature |

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 1 | 2 | 3 | 2 | 2 | 3 |
| **CO2** | 3 | 3 | 3 | 1 | 2 | 3 | 2 | 2 | 3 |
| **CO3** | 3 | 3 | 3 | 1 | 2 | 3 | 2 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 2 |
| **CO2** | 2 | 2 | 2 | 2 |
| **CO3** | 3 | 2 | 2 | 2 |
| **CO4** | 3 | 2 | 2 | 2 |
| **CO5** | 3 | 2 | 2 | 2 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | √ | | |

| Subject Code: HBCC22I02 | Subject Name: **SOFT SKILL I** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : English Language | **IE** | 0 | 0 | 2 | 1 |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL :Theory / Lab / Embedded Theory and Lab | | | | | | |

**Prefatory Note**

This paper aims to equip students with skills essential for work place and global environment to which they will move on from the university, once they complete the course. As such, this paper provides students with a set of ten interlinked soft skills: Listening, team work, emotional intelligence, assertiveness, learning to learn, problem solving, attending interviews, adaptability, non-verbal communication and written communication. Students will get engaged in pair work, group work, role play, discussion, presentation, story telling, writing assignments etc.,

**Course Objective**

The students will be facilitated to

1. Become good listeners to get engaged in interactive communication for effective team building.
2. Develop assertive and adaptive behaviour to be leaders
3. Develop peer interaction for a successful lifelong learning.
4. Learn to learn skills necessary for a cooperative living in academic and professional environments
5. Use soft skills for the purposes of research and follow ethics in society and profession.

**Unit -I**

Listening, Speaking, Reading and Writing skills (LSRW)

**Unit -II**

Team work skills: adaptability, emotional intelligence, learning skills

**Unit -III**

Leadership Qualities: assertiveness, reasoning, compassion and compatibility

**Unit -IV**

Problem solving: willingness to learn, creative thinking, developing observation skills

**Unit -V**

Interview skills: employability skills, resume writing

**Course outcome**

**On completion of the course the students will**

1. Become good listeners to get engaged in interactive communication for effective team building.
2. Develop assertive and adaptive behaviour to be leaders
3. Develop peer interaction for a successful lifelong learning.
4. Learn skills necessary for a cooperative living in academic and professional environments
5. Use soft skills for the purposes of research and follow ethics in society and profession.

**Suggested reading**

S.P. Dhanavel, English and Soft Skills, Vol. 1, Orient Blackswan Pvt. Ltd. 2010

| Subject Code: **HBTA22002** | Subject Name: **TAMIL PAPER - ll** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Communicating with friends from around the world via social networking opportunities.
- To develop 21st century learners who love & appreciate Tamil language. Learn significance of spoken skill.1
- The relationship between language &culture and the implications for language teaching
- Travelling to other countries and learning about other cultures..

**COURSE OUTCOMES (Cos)** Students completing this course were able to

| | |
|---|---|
| **CO1** | Strengthen literacy skills |
| **CO2** | Engage in learning Tamil language and culture in a meaningful setting |
| **CO3** | Engross in independent and life-long learning |
| **CO4** | Develop a strong foundation in listening & speaking skills. |
| **CO5** | Arouse students interest and ignite the joy of learning Tamil language. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 3 |
| **CO3** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 2 |
| **CO4** | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 2 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 3 |
| **CO2** | 2 | 2 | 3 | 3 |
| **CO3** | 3 | 3 | 3 | 3 |
| **CO4** | 2 | 2 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 2 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | √ | | | | | | | | |

| Subject Code: **HBTA22002** | Subject Name: **TAMIL PAPER - ll** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**முதலாம் ஆண்டு - இரண்டாம் பருவம்**

கற்றல் நோக்கம்: 1.தமிழர் பண்பாட்டினை அறியச் செய்தல்

2. கடிதம் எழுதும் திறன் வளர்த்தல்

3.தமிழ் இலக்கிய வரலாற்றினை அறிதல்

**அலகு - 1 சங்க இலக்கியம் 9 மணி நேரம்**

1. புறநானூறு - பா.எண் - 183,184,192

2. குறுந்தொகை - பா. எண் 2,40,167

3. நெடுநல்வாடை - 1 முதல் 44 வரிகள் வரை

4.கலித்தொகை - பா.எண் 102,133

**அலகு - 2 காப்பியம் 9 மணி நேரம்**

1. சிலப்பதிகாரம் - வழக்கு உரை காதை முழுவதும்

**அலகு - 3 நீதி இலக்கியம் 9 மணி நேரம்**

1.திருக்குறள் - 34,72,96,102,103,116,124,136,158,395 (10 குறள்கள்)

2.நாலடியார் - 1,11,29,32,43,51,74,103,116,135 ( 10 பாடல்கள்)

3.ஆசாரக்கோவை - 20,23,25,76,96 ( 5 பாடல்கள்)

4.திரிகடுகம் - 7,12,27,31,38,(5 பாடல்கள்)

**அலகு - 4 தமிழ் இலக்கிய வரலாறு 9 மணி நேரம்**

1. பக்தி இலக்கியம்

2. சிற்றிலக்கியம்

**அலகு - 5 இலக்கணம் 9 மணி நேரம்**

1.வல்லினம் மிகும் இடங்கள்

2. வல்லினம் மிகா இடங்கள்

3. வினா வகைகள்

4. விடை வகைகள்

**மொழிப்பயிற்சி**

1. கடிதம் எழுதும் முறை

2.செய்வினை - செயப்பாட்டு வினை

3.மயங்கொலிப் பிழையைநீக்குக

| Subject Code: **HBH122002** | Subject Name: **HINDI II** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : Knowledge of Hindi | T | 3 | 0 | 0 | 3 |

L : Lecture, T : Tutorial,SLr : Supervised Learning, P: Project, R : Research, C : Credits,
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

1. To Understand the Ancient Hindi plays and its aspects.
2. To understand the medival stories and well known novels
3. To know the techniques in writing Annotationand Translation

**COURSE OUTCOMES (Cos)**
Students completing this course were able to

| | |
|---|---|
| **CO1** | To introduce students to the real world situation with the help of Plays and stories written by various poets and writers. |
| **CO2** | To make students understand the Literature in broader areas than merely confined to the subject |
| **CO3** | . Evaluating the concept of Hindi from past to present and to study the society closely through Literature. |
| **CO4** | .To make the best use of Hindi language in various streams.. |
| **CO5** | Helps in their Career acquiring knowledge in a language |

Mapping of Course Outcome with Program Outcome (POs)

| **Sem II** | **Coursecode: HBHI22002** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **ProgrammeOutcomes(Pos)** | | | | | | | | |
| **Cos** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** |
| **CO1** | **CO1** | **3** | **2** | **3** | **2** | **3** | **3** | **3** | **3** |
| **CO2** | **CO2** | **3** | **3** | **3** | **3** | **2** | **3** | **3** | **3** |
| **CO3** | **CO3** | **3** | **3** | **2** | **3** | **3** | **3** | **3** | **3** |
| **CO4** | **CO4** | **2** | **3** | **3** | **3** | **3** | **2** | **2** | **3** |
| **CO5** | **CO5** | **3** | **3** | **3** | **3** | **3** | **2** | **2** | **3** |

**3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low**

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | ✓ | | | | | | | | |

| Subject Code: **HBH122002** | Subject Name: **HINDI II** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : Knowledge of Hindi | T | 3 | 0 | 0 | 3 |

L : Lecture, T : Tutorial,SLr : Supervised Learning, P: Project, R : Research, C : Credits,
T/L/ETL :Theory / Lab / Embedded Theory and Lab

UNIT – I**One Act Play – novel and translation of hindi language)**

1. Auranzeb ki AakhiriRaat

2. Auranzeb ki AakhiriRaat
3. Mukthidhan
4. Practice of AnnotationWriting
5. Practice of Summary and Literary evaluationWriting

UNIT – II**One Act Play – novel and translation of hindi language)**

6. Auranzeb ki AakhiriRaat

1. Laksmi kaSwagat
2. Mithayeewala
3. Practice of AnnotationWriting
4. Practice of Summary and Literary evaluationWriting

UNIT-III**One Act Play – novel and translation of hindi language)**

7. Auranzeb ki AakhiriRaat

1. Basant Ritu kaNatak
2. Seb Aur Dev
3. Practice of AnnotationWriting
4. Practice of Summary and Literary evaluationWriting

UNIT-IV**One Act Play – novel and translation of hindi language)**

8. Auranzeb ki AakhiriRaat

1. Bahut BadaSawal
2. Vivah ki TeenKathayen
3. Practice of AnnotationWriting
4. Practice of Summary and Literary evaluationWriting

UNIT-V**Translation of Hindi Lanaguage to English language-paragraph, technical terms)**

1. Translation Practice. (English

Book Reference: 1. Aath Ekanki, Edited by Devendra Raj Ankur, Mahesh Anand
Vaani prakashan, 4695, 21- A Dariyagunj, New Delhi-110002

2. Swarna Manjari, Edited by Dr.Chitti Annapurna, Rajeshwari Publications
21/3, Mothilal street, (opp.Ranganthan Street) T.Nagar, Chennai-600017

3. Prayojan Mulak Hindi : Dr.Syed Rahmathullah, Poornima Prakashan,
4/7, Begum III street, Royapettah, Chennai-14

4. Anuvad Abhyas Part III Dakshin Hindi Prachar Sabha, T.Nagar ,Chennai -17

| Course /subject Code | HBFR22002 | Semester | II | | 45 hrs | |
|---|---|---|---|---|---|---|
| Category | All UG Programs | | L | T/SLr | Category | All UG Programs |
| Course Title | French -II | | 3 | 0 | Course Title | French II (THEORY) |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

1.. Students will be able to understand the familiar words and expressions when someone talks slowly and distinctly.
2. The students will be able to reads; he/she will be able to understand the posters, advertisements or catalogues.
3. The students will be able to communicate and ask and reply to simple questions on familiar subjects
4. The students will be able to use expressions and write simple sentences without faults to describe their living spaces

**FRENCH-II(THEORY) LANGUAGE-II**
**New subject code**

| COURSE OUTCOMES | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 |
|---|---|---|---|---|---|---|---|---|---|
| COURSE OUTCOME 1 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 |
| COURSE OUTCOME 2 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 2 | 3 |
| COURSE OUTCOME 3 | 2 | 3 | 2 | 3 | 1 | 1 | 2 | 2 | 3 |
| COURSE OUTCOME 4 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 3 |
| COURSE OUTCOME 5 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 3 |
| COURSE OUTCOME 6 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 |
| COURSE OUTCOME 7 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 |

**MAPPING OF Cos WITH POs**

**H/M/L indicates strength of correlation H- High M- Medium L- Low**

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ✓ | | | | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Course /subject Code** | **HBFR22002** | **Semester** | **II** | | | **45 hrs** |
| **Category** | **All UG Programs** | | **L** | **T/SLr** | **Category** | **All UG Programs** |
| **Course Title** | **French -II** | | **3** | **0** | **Course Title** | **French II (THEORY)** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** 9hrs

**Compétences communicatives, phonologiques, linguistiques, grammaticales et culturelles**

- Se saluer, prendre congé, se présenter quelqu'un/quelque chose, Salutations, présentatifs, détails d'identité, professions, quartiers
- Genres, nombres, articles, présentatifs, pluriels des noms, c'est/il est, pronoms toniques
- Salutations française, comportement des salutations, les quartiers parisiens, le peintre Monet

➢ **Clip audios** : Exercices orales, compositions orales et épreuves orales. (20 –durée moins de 2 minutes)

➢ **Audio clips**- For oral expressions, oral assignments and oral test-20- duration less than 2 minutes (10 oral exercises, 6 audio reading compositions& 4 tests).

**UNIT II** 9hrs

**Compétences communicatives, phonologiques, linguisiques, grammaticales et culturelles**

- Dialogue de la vie d'étudiant, des liens familiaux, de l'appartenance, des habitudes ; poème, le son « eu » énonces a répéter, lecture guidée.
- S'exprimer de la fréquence, des habitudes, articles, present de l'indicatif, verbes a la terminaison – er, adjectifs possessifs et qualificatifs, locutions avec « avoir »
- Demander l'heure, Les jours, Les mois de l'année.

➢ **Clip audios** : Exercices orales, compositions orales et épreuves orales.(20 –durée moins de 2 minutes)

➢ **Audio clips**- For oral exercises, oral assignments and oral test-20 duration less than 2 minutes (10 oral excercises ,6 audio reading compositions& 4 tests).

**UNIT III** 9hrs

**Compétences communicatives, phonologiques, linguistiques, grammaticales et culturelles**

- Parler des voyages, identifier les vêtements, caractériser de personnes, faire des exclamations, s'informer sur la vie d'étudiant français.
- Poème, le « son i », décrire des personnes, prononcer le nom des pays et des nationalités, appréciation/exclamation
- Transport et voyages, les pays, nationalités, la mode, la partie du corps ,Adjectifs de nationalités et genres,

adjectifs réguliers/irréguliers, prépositions de lieux, verbes aller- venir et verbes a la terminaison –ir

- L'aéroport de Roissy, a la douane, les vêtements, a mode a paris, quelques professions, le sport et la sante ; a Joconde, la BD,

➢ **Clip audios** : Exercices orales, compositions orales et épreuves orales. (20 –durée moins de 2 minutes)

➢ **Audio clips**- For oral expressions, oral assignments and oral test-20-duration less than 2 minutes (10 oral exercises ,6 audio Reading compositions& 4 tests)

**UNIT IV** 9hrs

**Compétences communicatives, phonologiques, linguistiques, grammaticales et culturelles**

- Communication au restaurant, des recettes, le gout et les préférences identifier le type des restaurants.
- Poème, le son « o » énonces simples, des sons nasaux, exercices de répétition
- Les repas français recette activités et sportives

➢ **Clip audios** : Exercices orales, compositions orales et épreuves orales.(20 –durée moins de 2 minutes)

➢ **Audio clips**- For oral expressions, oral assignments and oral test-20 duration less than 2 minutes (10 oral exercises ,6 audio reading

**UNIT V** 9hrs

**Compétences communicatives, phonologiques, linguistiques, grammaticales et culturelles**

- Planifier des vacances, parler des concours, du sport, du temps qu'il fait, s'exprimer au comparatif
- Poème le son « yu », répétition d'énonces, lire de noms de quelques villes
- Activités de vacances, mots de localisation, plan de Paris, le climat et l'écologie, un concours international, les saisons
- Adjectifs de couleur, nombres ordinaux, quelques verbes irréguliers,
- 3 temps autour du présent « de » et « a » et des verbes. Différentes formes du négatif, « il fait » le comparaient le superlatif absolu
- Auberges de jeunesse, vacance, plan de Parise arrondissements quelques monuments parisiens, tourisme fluvial français

➢ **Clip audios** : Exercices orales, compositions orales et épreuves orales. (20 –durée moins de 2 minutes)

➢ **Audio clips**- For oral expressions, oral assignements and oral test-20 duration less than 2 minutes (10 oral exercices ,6 audio Reading compositions& 4 tests).

***Reference Books :***

1. **Parlez-vous français?Partie 1 -** Dr.M.Chandrika.V.Unni &Mrs. Meena Mathews 2019 by Universal publisher
2. **CLE INTERNATIONAL** Lectures Clé en français facile. (2012) Hachette Paris
3. **Cosmopolite**: Livre de eleve A1 by Nathalie Hirsch sprung, Tony Tricot, Claude Le Ninan
4. **Latidudes**-1 by Régine Mérieux & Yves l'oiseau, Didier 2017
5. **Alter Ego 1 -** Catherine Dolez, Sylvie Pons : (2014) Hachette, Paris

| HBEN22002 | **LANGUAGE II - ENGLISH II (Common to all UG Courses under H&S)** | Ty/Lb/ ETP | **L** | **T/ S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Total contact hours – 45 | Ty | 3 | 0/0 | 0 | 3 |
| | Prerequisite – English Language | | | | | |
| | T/L/:Theory/LabL:LectureT:TutorialP:Practical/ProjectR:ResearchC:Credits | | | | | |

**Course Objectives**

1. Develop four language skills appropriate to the level of education.
2. Demonstrate knowledge of vocabulary and sentence construction in appropriate contexts.
3. Express diverse forms of knowledge in different social and cultural contexts.
4. Attain a comprehensive knowledge of communication skills to use ethically.
5. Develop organized academic and business writing for professional careers.

**Course Outcomes (COs)**

1. Develop four language skills appropriate to the level of education.
2. Demonstrate knowledge of vocabulary and sentence construction in appropriate contexts.
3. Express diverse forms of knowledge in different social and cultural contexts.
4. Attain a comprehensive knowledge of communication skills to use ethically.
5. Develop organized academic and business writing for professional careers.

**Program Specific Outcomes (PSOs)**

- Demonstrating mastery of the components of English language and literature.
- Explaining through literature in English, diverse historical cultural and social ethics
- Applying literary critical perspectives to generate original analysis of literature in English
- Promoting cultural values and real-life skills through English language and Literature

**Mapping of course outcomes (COs) with Program Outcomes (POs)& Program Specific Outcomes**

(3/2/1 indicates the strength of correlation) 3= High; 2= Medium; 1= Low

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO 1 | PSO 2 | PSO 3 | PSO 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 |
| 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 |
| 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 |
| 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 |

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project / Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | √ | | | | | | | | |

| HBEN22002 | LANGUAGE II - ENGLISH II (Common to all UG Courses under H&S) | Ty/Lb/ ETP | L | T/ S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Total contact hours – 45 | Ty | 3 | 0/0 | 0 | 3 |
| | Prerequisite – English Language | | | | | |
| | T/L/:Theory/LabL:LectureT:TutorialP:Practical/ProjectR:ResearchC:Credits | | | | | |

**Course Objective**

1. Develop four language skills appropriate to the level of education.
2. Demonstrate knowledge of vocabulary and sentence construction in appropriate contexts.
3. Express diverse forms of knowledge in different social and cultural contexts.
4. Attain a comprehensive knowledge of communication skills to use ethically.
5. Develop organized academic and business writing for professional careers.

**Unit I:** **9 Hours**

1. All the World's a Stage – William Shakespeare
2. Speech of Barack Obama
3. The Verger- Somerset Maugham

**Unit II:** **9 Hours**

1. Spider and the Fly - Mary Howitt
2. "They thought that a bullet would silence us, but they failed". - Malala Yousafzai
3. Refund – Fritz Karinthy

**Unit III:** **9 Hours**

1. Night of the Scorpion-Nissim Ezekiel
2. On Running after one's hat- G.K.Chesterton
3. The Last Leaf – O. Henry

**Unit IV:** **9 Hours**

1. Polonius Advice to Laertes-William Shakespeare
2. 'We Must Continue to Dream Big': An open letter from Serena Williams
3. The Necklace - Guy de Maupassant

**Unit V:** **9 Hours**

1. Functional English: Letter Writing (Formal, Informal, Email)
2. Resume
3. Précis
4. Reading Comprehension
5. Developing the hints

**Course Outcome: On completion of the course, the students will be able to**

1. Develop four language skills appropriate to the level of education.
2. Demonstrate knowledge of vocabulary and sentence construction in appropriate contexts.
3. Express diverse forms of knowledge in different social and cultural contexts.
4. Attain a comprehensive knowledge of communication skills to use ethically.
5. Develop organized academic and business writing for professional careers.

**Prescribed Text**:


- 'Greatest Speeches of the Modern World', Rupa Publications India, 2018.
- Woudhuysen H.R. 'The Arden Shakespeare third series', the Arden Shakespeare Publishers, 2020.
- Karinthy. Fritz, 'Refund: A Play in One Act', French. Samuel, 1938.
- Simpson H. C & Wilson E. H, 'A Senior Anthology of Poetry', Macmillan Education, 1952.
- O'Brien. Terry, '50 Greatest Short Stories', Rupa Publications India; First Edition, 2015.
- J.C.RichardswithJ.Hull&S.Proctor,Interchange,Level3,CambridgeUniversityPress,2021.
- MarkHancock,EnglishPronunciation inUse,CUP,2016.
- M.ChandrasenaRajeswaran&R.Pushkala,CommunicationLabWorkbook2022.
- M.ChandrasenaRajeswaran,R.Pushkala & S.BhuvaneswariPinnacle: ASkillsIntegratedText,2022
- Dutt,K,Rajeevan,G&Prakash,,*ACourseonCommunicationSkills*,1stedn,CUP,Chennai,2008


**Suggested Links:**

- https://www.poetrybyheart.org.uk/poems/the-spider-and-the-fly/Reference.
- https://poets.org/poem/unknown-citizen

| Subject Code: **HBMA22ID2** | Subject Name: **ALLIED MATHEMATICS-II** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : Higher Secondary Mathematics | **T** | **2** | **1** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To understand the Basic concepts in Ordinary Differential equations
- To understand the Basic concepts in Partial Differentiation
- To understand the Basic concepts in Multiple integrals
- To understand the Basic concepts in Linear programming
- To understand the Basic concepts in Transportation and Assignment

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the basic concept First order differential equations – Second and higher order linear differential equations with constant coefficients. |
| **CO2** | Understand how to solve the Problem in Partial derivatives ,Jacobians ,Maxima and Minima of functions of two variables and Lagrange's multipliers. |
| **CO3** | Learn how to solve problems in Cartesian and Polar Co-ordinates (Double and Triple integral) and Change of order of integration. |
| **CO4** | Understand the concept in Formulation of LPP, Standard form of LPP, Graphical method and Simplex method. |
| **CO5** | Learn to solve problems in Transportation using MODI method and Assignment problem using Hungarian method. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | √ | | | |

| Subject Code: **HBMA22ID2** | Subject Name: **ALLIED MATHEMATICS-II** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : Higher Secondary Mathematics | **T** | **2** | **1** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**Course Outcomes:**

To understand the Basic concepts in Ordinary Differential equations
To understand the Basic concepts in Partial Differentiation
To understand the Basic concepts in Multiple integrals
To understand the Basic concepts in Linear programming
To understand the Basic concepts in Transportation and Assignment

**UNIT I ORDINARY DIFFERENTIAL EQUATIONS (12 hrs)**

First order differential equations – Second and higher order linear differential equations with constant coefficients and with RHS of the form: $e^{ax}$, $x^n$, Sin ax, Cos ax, $e^{ax}f(x)$, x f(x) where f(x) is Sin bx or Cos bx(simple problems).

**UNIT II PARTIAL DIFFERENTIATION (12 hrs)**

Partial derivatives – Jacobians – Maxima and Minima of functions of two variables – Lagrange's multipliers.

**UNIT III MULTIPLE INTEGRALS (12 hrs)**

Double integrals in Cartesian and Polar Co-ordinates – Change of order of integration – Triple integrals in Cartesian Co-ordinates (simple problems).

**UNIT IV LINEAR PROGRAMMING (12 hrs)**

Formulation of LPP – Standard form of LPP – Graphical method – Simplex method.

**UNIT V TRANSPORTATION AND ASSIGNMENT (12 hrs)**

Formulation of Transportation problem – North West corner method – Least cost method – Vogel's approximation method – Optimality test – MODI method – Degeneracy – Assignment problem: Hungarian method.

**Total no. of hrs: 60**

**Reference Books:**

**1)** Vittal.P.R, *Allied Mathematics*, Margham Publications., Chennai, (2012).
**2)** Venkatachalapathy.S.G, *Allied Mathematics*, Margham Publications., Chennai, (2007).
**3)** Singaravelu, *Allied Mathematics*, Meenakshi Agency., Chennai, (2001).
**4)** Hamdy A. Taha, *Operations Research: An Introduction (10th ed.)*, Pearson, (2017).
**5)** Hira D.S., Gupta P.K., *Operations Research*, S.Chand& Co., (2014).

| Subject Code: | Subject Name: **HTML-5** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| **CBDT22002** | Prerequisite : **Rudimentary skill in Basic HTMLProgramming** | **Ty** | **3** | **1** | **0** | **4** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To impart the basic concepts of programming in HTML.
- Any web application required interface to interact with user. Interaction with user is not the only requirement To demonstrate an understanding of functions, recursion and Storage Classes.
- Alsogives you more feature like offline browsing, fast data processing with respect to application requirement. It gives you high compatibility with browsers
- Html 5 code is much clear and clean than before html code, it come up with improved video and audio support.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the fundamentals of basic tags, Graphic editors, Text editors &basic in CSS |
| **CO2** | Creating Web Pages Using Frames, Styling Frames, Types of Scripting, Defining Variables, Using Operators, Using Conditional Constructs, Using Loop Constructs, Break and Continue Statements |
| **CO3** | Understand how to write and use functions, Creating Functions, Accessing Functions. Designing an HTML Form, Creating Forms, Exploring Form Elements, Working with Browser Objects, Working with Form Objects. |
| **CO4** | Creating a Canvas, Working with Color, Shapes, and Styles, Working with Path, Text, and Images, Transforming Canvas Elements, Animating Canvas Elements, Implementing Toggle Effect, Implementing Slide Effect, Implementing Fade Effect, Implementing Animate Effect, Creating Image Rollover, Creating Backward Compatible Rollover, Preloading Images, Using Color box Plugin, Using galleria Plugin.. |
| **CO5** | Ability to Implementing the Geo-location API, Handling Errors, Implementing Client-side Storage, Implementing Application Cache. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | √ | | | | | | | |

| Subject Code: | Subject Name: **HTML-5** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| **CBDT22002** | Prerequisite : **Rudimentary skill in Basic HTMLProgramming** | **Ty** | **3** | **1** | **0** | **4** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**OBJECTIVE:**

- Any web application required interface to interact with user. Interaction with user is not the only requirement. That interface is capable enough to interact with user but also gives you the capability to run faster, having compatibility with different platform and API.
- Also gives you more feature like offline browsing, fast data processing with respect to application requirement. It gives you high compatibility with browsers.
- It supports mobile devices, it lets you do things previously impossible. Html 5 code is much clear and clean than before html code, it come up with improved video and audio support.
- It gives you robust feature, which not only makes your application robust and fast but also reduce the development time using HTML 5.

**UNIT I** **12 Hrs**

**HTML Understanding**:Introducing HTML, Text Editor, Graphic Editor, Identifying the Basic Structure of an HTML Page, Exploring the <HEAD>Tag, Exploring the <BODY>Tag, Identifying the Syntax of CSS, Identifying the Types of Style Sheets, Applying Multiple Style Sheets, Identifying CSS Selectors, Styling HTML Elements, Grouping and Nesting Styles, Controlling the Visibility of Elements, Positioning HTML Elements, Applying Transitions, Applying Animations, Applying Transformations, Identifying the Basic Structure of a Table, Enhancing Tables,

**UNIT II** **12 Hrs**

**Creating Web Pages**:Creating Web Pages Using Frames, Styling Frames, Types of Scripting, Identifying the Benefits of JavaScript, Embedding a Script into a Web Page, Creating and Using an External File, Identifying Rules and Conventions Used in JavaScript, Defining Variables, Using Operators, Using Conditional Constructs, Using Loop Constructs, Break and Continue Statements,

**UNIT III** **12 Hrs**

**Functions**:Introducing Functions, Creating Functions, Accessing Functions. Designing an HTML Form, Creating Forms, Exploring Form Elements, Working with Browser Objects, Working with Form Objects.

**UNIT IV** **12 Hrs**

**Working with Graphics**:Creating a Canvas, Working with Color, Shapes, and Styles, Working with Path, Text, and Images, Transforming Canvas Elements, Animating Canvas Elements. Manipulating HTML Elements by Using jQuery, Handling jQuery Events, Implementing Hide Effect, Implementing Show Effect, Implementing Toggle Effect, Implementing Slide Effect, Implementing Fade Effect, Implementing Animate Effect, Creating Image Rollover, Creating Backward Compatible Rollover, Preloading Images, Using Color box Plugin, Using galleria Plugin.

**UNIT V** **12 Hrs**

**Introducing Geolocation and Offline Support for Data:**Implementing the Geolocation API, Handling Errors, Implementing Client-side Storage, Implementing Application Cache.

**Total No of Hrs : 60**

**TEXT BOOKS:**

1. HTML5 for Masterminds, Authors: J D Gauchat, Publisher: CreateSpace Independent Publishing Platform; 3 edition
2. Head First HTML5 Programming: Building Web Apps, Authors: Eric Freeman, Elisabeth Robson Publisher: O'Reilly Media; 1 edition
3. HTML5 Pocket Reference: Quick, Comprehensive, Indispensable, Authors: Jennifer Robbins, Publisher: O'Reilly Media; 5 edition

**REFERENCES:**

1. GottapuSasibhushana Rao, "Mobile Cellular Communication", Pearson, 2012.
2. R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014.

| Subject Code: **CBCA22003** | Subject Name: **MULTIMEDIA AND ANIMATION** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic knowledge in Computers** | **Ty** | **3** | **1** | **0** | **4** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To understand the characteristics, requirements, uses of Multimedia presentations with different platforms.
- To determine various tools and its types of multimedia system
- To discuss fundamentals, types of file formats, media and data streams and text media.
- To demonstrate the use of digitized audio, video control, and scanned images.
  To gain knowledge in Animation, Key frames, Tweening, Media Technologies.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Create a multimedia presentation with different platforms and promoting the hardware and software of multimedia. |
| **CO2** | Expose the different Tools available in 3-D Modeling and Animation at par with various industries like film, animation and gaming, interior design and architecture. |
| **CO3** | Demonstrate the purpose of using audio in multimedia, identify sources of audio, identify different types of file format. Developed various Multimedia Systems applicable in real time. |
| **CO4** | Illustrate various file formats for text media, as the characters that are used to create words, sentences and paragraphs. Source of information as open source Image Processing viz.,Digital Cameras and Scanners. |
| **CO5** | Designed interactive multimedia software by applying various networking protocols for multimedia applications and evaluate for its optimum performance |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 3 |
| **CO3** | 3 | 2 | 1 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 1 | 3 | 3 | 1 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 2 | 3 |
| **CO3** | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 1 | 3 |
| **CO5** | 2 | 3 | 1 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | √ | | | | | | | |

| Subject Code: **CBCA22003** | Subject Name: **MULTIMEDIA AND ANIMATION** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic knowledge in Computers** | **Ty** | **3** | **1** | **0** | **4** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **12 Hrs**

Introduction to Multimedia, characteristics of a Multimedia,Hardware and software requirements, Uses of multimedia, Promotion of multimedia based content, steps for creating Multimedia presentation. Platforms: Macintosh Versus PC - The Macintosh Platform - The Windows Multimedia PC platform- Input Devices - Output Hardware - Communication Devices.

**UNIT II** **12 Hrs**

Basic Tools:Text Editing and Word Processing Tools - OCR Software - Painting and Drawing Tools - 3-D Modeling and Animtion Tools - Image - Editing Tools - Sound Editing Tools - Animation, Video and Digital Movies Tools - Multimedia Authoring Tools: Types of Authoring Tools - Card and page Based Authoring Tools - Icon - Based Authorised Tools - Time Based Authoring Tools - Object - Oriented Authoring Tools - Cross - Platform Authoring Notes.

**UNIT III:** **12 Hrs**

Text: Introduction, Types of Text, Unicode Standard, Font, Insertion of Text, Text compression, File Formats-Hypermedia and Hypertext. Image: Introduction, Image Types, Seeing color, color models, Basic steps for Image Processing, Scanner, Digital Camera, Interface Standards, Image Processing software, File formats, Image output on monitor, Image output on printer.

**UNIT IV:** **12 Hrs**

Audio: Introduction, Fundamentals Characteristics of sound, Elements of Audio systems, Microphone, Amplifier, Loudspeaker, Audio mixer, Musical Instrument Digital Interface(MIDI), MIDI messages, MIDI connections,Sound card, Audio File Format and CODECs, Software Audio Players, Audio Recording Systems, Audio and multimedia, Audio Processing software.
Video: Introduction, Analog video camera, Transmission of video signals, Video signal format, Digital video, Digital Video Standards, PC Video, Video File Format and CODECs, Video editing, Video editing software.

**UNIT V:** **12 Hrs**

Animation: Introduction, Uses of animation, Key frames and Tweening, Types of animation, Computer Assisted Animation, Creating movements, Principles of animation :SpecialEffects - SurveyOfAnimationTools-VideoTechnologies: AnalogVideo -CcdCamera, Broadcasting - RecordingFormats - StoragePrinciple andRetrivalTechnologies - MagneticMediaTechnologies and StorageDevices

**Total No of Hrs : 60**

**Text Book:**

Principles of Multimedia By Ranjan Parekh- The Tata McGraw Hill companies. -Sixth Reprint 2008

| Subject Code: **CBDT22L02** | Subject Name: **HTML-5 LABORATORY** | T/L / ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Rudimentary skill in HTML-5** | **Lb** | **0** | **0** | **4** | **2** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To impart the basic concepts of programming in HTML.
- Any web application required interface to interact with user. Interaction with user is not the only requirement To demonstrate an understanding of functions, recursion and Storage Classes.
- Alsogives you more feature like offline browsing, fast data processing with respect to application requirement. It gives you high compatibility with browsers
  Html 5 code is much clear and clean than before html code, it come up with improved video and audio support.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | How toCreate a Web page for Basic, Element, attribute ,Image, Table, Classes |
| **CO2** | Creating HTML-5 forms, Form element, and Input types. |
| **CO3** | Creating web page for new element, Semantics, Migrations |
| **CO4** | Create a Web page for HTML Graphics |
| **CO5** | Create a Web page for HTML Media |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |
| **CO2** | 2 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | √ | |

| Subject Code: **CBDT22L02** | Subject Name: **HTML-5 LABORATORY** | T/L / ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Rudimentary skill in HTML-5** | **Lb** | **0** | **0** | **4** | **2** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**OBJECTIVE:**

- Any web application required interface to interact with user. Interaction with user is not the only requirement. That interface is capable enough to interact with user but also gives you the capability to run faster, having compatibility with different platform and API.

- Also gives you more feature like offline browsing, fast data processing with respect to application requirement. It gives you high compatibility with browsers.
- It supports mobile devices, it lets you do things previously impossible. Html 5 code is much clear and clean than before html code, it come up with improved video and audio support.

- It gives you robust feature, which not only makes your application robust and fast but also reduce the development time using HTML 5.

1. Create a Web page for the following
   a. Basic
   b. Element
   c. Attribute.
   d. Image
   e. Table
   f. List, Block
   g. Classes
2. Create a Web page for the following HTML Forms
   a. Form
   b. Form Elements
   c. Input Types
3. Create a Web page for the following
   a. HTML 5 support
   b. New Elements
   c. Semantics
   d. Migration.
4. Create a Web page for HTML Graphics.
5. Create a Web page for HTML Media

**Total No of Hrs : 60**

| Subject Code: **CBCA22IL1** | Subject Name: **MULTIMEDIA AND ANIMATION LAB USING MATHEMATICAL FUNCTIONS** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic theoretical knowledge in Multimedia and Animation** | **Lb** | **0** | **0** | **4** | **2** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To understand the different components, different file formats.
- To determine various tools of multimedia system
- To provide knowledge about multimedia media and data streams and text media in Photoshop.
- To demonstrate the use of digitized video control, and scanned images in Flash
- To gain knowledge in animation and images using Flash.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Identify the various tools, components, file formats that enables to handle and complete a multimedia project. |
| **CO2** | Apply basic elements and principles of Photoshop to achieve a great photo effect by applying effects like colour, shadows, background, cropping and collage making. |
| **CO3** | Create simple shapes using animation by streaming the data in various dimensions that creates a dynamic effect on the object as expected. |
| **CO4** | Apply 3D models in an enhanced format with digitized video control by using Flash by giving advanced animation effect. |
| **CO5** | Prepare different web applications through flash with audio and floating text to make the website more interactive and expressive that ensures efficient problem solving skills. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 3 |
| **CO3** | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 3 |
| **CO3** | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 3 | 1 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | √ | | √ | |

| Subject Code: **CBCA22IL1** | Subject Name: **MULTIMEDIA AND ANIMATION LAB USING MATHEMATICAL FUNCTIONS** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic theoretical knowledge in Multimedia and Animation** | **Lb** | **0** | **0** | **4** | **2** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**LIST OF EXPERIMENTS**

**Photoshop :**

1. Create an image using different properties.
2. Picture manipulation using filter.
3. Design pictures using layers.
4. Design our college ID Card
5. Design Marriage Invitation.

**Flash :**

6. Design a car.
7. Move a Ball.
8. Human Movement using animation.
9. Create an Advertisement.
10. Develop a webpage using Photoshop and flash.

**Total no. of Hrs needed to complete the Lab: 60**

| Subject Code: **HBCC22I03** | **Soft Skills-II** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **English Language** | **IE** | **0** | **0** | **2** | **1** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

1. Cultivate employability skills that they get employed even before they leave the university.
2. Build self-esteem and a sense of self-worth to be good team members
3. Cultivate empathy to think from others' point of view to be good team leaders.
4. Evolve as good global citizens with insights into social and professional ethics.
5. Develop lifelong learning skills to adapt in the multicultural context of workplaces.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Cultivate employability skills that they get employed even before they leave the university. |
| **CO2** | Build self-esteem and a sense of self-worth to be good team members |
| **CO3** | Cultivate empathy to think from others' point of view to be good team leaders. |
| **CO4** | Evolve as good global citizens with insights into social and professional ethics. |
| **CO5** | Develop lifelong learning skills to adapt in the multicultural context of workplaces. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 1 | 2 | 3 | 2 | 2 | 3 |
| **CO2** | 3 | 3 | 3 | 1 | 2 | 3 | 2 | 2 | 3 |
| **CO3** | 3 | 3 | 3 | 1 | 2 | 3 | 2 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 2 |
| **CO2** | 2 | 2 | 2 | 2 |
| **CO3** | 3 | 2 | 2 | 2 |
| **CO4** | 3 | 2 | 2 | 2 |
| **CO5** | 3 | 2 | 2 | 2 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | √ | | |

| Subject Code: **HBCC22I03** | **Soft Skills-II** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **English Language** | **IE** | **0** | **0** | **2** | **1** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**Prefatory Note**

This paper aims to equip the advanced learners with skills essential for work place and global environment to which they will move on from the university, once they complete the course. As such, it covers a range of indispensable soft skills and values such as, self-esteem, empathy, public relations, positivity, reliability, professionalism, leadership and intercultural communication, interview skills, etc.. Together with the effective English communication in global contexts, these skills, if cultivated and strengthened, can immensely help the students become employable in the multinational companies as good global citizens abiding the social and professional ethics in cross-cultural diversity.

**Course Objective**

The students will be facilitated to

1. Cultivate employability skills that they get employed even before they leave the university.
2. Build self-esteem and a sense of self-worth to be good team members
3. Cultivate empathy to think from others' point of view to be good team leaders.
4. Evolve as good global citizens with insights into social and professional ethics.
5. Develop lifelong learning skills to adapt in the multicultural context of workplaces.

**Unit -I**

Conversational skills, Self-esteem skills, empathy, public relations

**Unit -II**

Positivity, reliability, professionalism

**Unit -III**

Leadership

Problem solving

**Unit -IV**

Intercultural communication skills

Global Manthra: Go local, Cultural sensitivity, Group behaviour

Cultural intelligence : Low and High context, e mail and inter cultural communication

**Unit -V**

Group discussion &Interview skills

**Course Outcome**

On completion of the course the students will be able to

1. cultivate employability skills that they get employed even before they leave the university.
2. build self-esteem and a sense of self-worth to be good team members
3. Cultivate empathy to think from others' point of view to be good team leaders.
4. Evolve as good global citizens with insights into social and professional ethics.
5. Develope lifelong learning skills to adapt in the multicultural context of workplaces.

**Suggested reading**

1. S.P. Dhanavel, English and Soft Skills, Vol.2 Orient Blackswan Pvt. Ltd. 2010
2. P.D. Chaturvedi and M. Chaturvedi, Communication Skills , Pearson, 2012

| Subject Code: **CBDT22ID1** | Subject Name: **DATA STRUCTURE AND ALGORITHMS** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : Basic Skill in Data structure & Algorithms | **Ty** | **2** | **1** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Data Structure plays very important role while implementing any programming concept precisely with respect to user requirement.
- In any application data is being used in application in various way. It is the data which actually confirm your application robustness, application features and all about your application
- To developing application, how will you deal with your application data.
- The data structure is the components which actually do the needful for your application data according to application requirement. Understanding data structure means, understanding ways to deal with data in various ways according to application requirement.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the fundamentals Problem Solving, Role of Algorithms and Their Efficiency, Identifying Techniques for Designing Algorithms, Designing Algorithms Using Recursion, Determining the Efficiency of an Algorithm |
| **CO2** | Types of Sorting Algorithms, Sorting Data by Using Bubble Sort, Implementing the Bubble Sort Algorithm, Implementing the Insertion Sort Algorithm,. Sorting Data by Using Quick Sort, Implementing the Quick Sort Algorithm, |
| **CO3** | Linear Search, Implementing Linear Search, Performing Binary Search, Implementing Binary Search, Implementing Hashing, Defining Hashing, Limitations of Hashing, Resolving Collision, Determining the Efficiency of Hashing. |
| **CO4** | Implementing Singly-Linked Lists, Representing a Singly-Linked List, Traversing a Singly-Linked List, Inserting a Node in a Singly-Linked List, Deleting a Node from a Singly-Linked List. |
| **CO5** | Implementing a Doubly-Linked List, Representing a Doubly-Linked List, Traversing a Doubly-Linked List, Inserting a Node in a Doubly-Linked List, Deleting Nodes from a Doubly-Linked List. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | √ | | | |

| Subject Code: **CBDT22ID1** | Subject Name: **DATA STRUCTURE AND ALGORITHMS** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : Basic Skill in Data structure & Algorithms | **Ty** | **2** | **1** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES:**

- Data Structure plays very important role while implementing any programming concept precisely with respect to user requirement.
- In any application data is being used in application in various way. It is the data which actually confirm your application robustness, application features and all about your application.
- So developing application, how will you deal with your application data, data structure is the components which actually do the needful for your application data according to application requirement.
- Understanding data structure means, understanding ways to deal with data in various ways according to application requirement.

**UNIT I** **9 Hrs**

**Introducing Algorithms and Data Structures**: Problem Solving, Role of Algorithms, Role of Data Structures, Types of Data Structures. Designing Algorithms and Measuring Their Efficiency, Identifying Techniques for Designing Algorithms, Designing Algorithms Using Recursion, Determining the Efficiency of an Algorithm.

**UNIT II** **9 Hrs**

**Implementing Sorting Algorithms**: Sorting Data, Selecting a Sorting Algorithm, Types of Sorting Algorithms, Sorting Data by Using Bubble Sort, Implementing the Bubble Sort Algorithm, Determining the Efficiency of the Bubble Sort Algorithm, Sorting Data by Using Insertion Sort, Implementing the Insertion Sort Algorithm, Determining the Efficiency of the Insertion Sort Algorithm. Sorting Data by Using Quick Sort, Implementing the Quick Sort Algorithm, Determining the Efficiency of the Quick Sort Algorithm.

**UNIT III** **9 Hrs**

**Implementing Searching Algorithms**: Performing Linear Search, Implementing Linear Search, Determining the Efficiency of Linear Search, Performing Binary Search, Implementing Binary Search, Determining the Efficiency of Binary Search. Implementing Hashing, Defining Hashing, Limitations of Hashing, Resolving Collision, Determining the Efficiency of Hashing.

**UNIT IV** **9 Hrs**

**Solving Programming Problems Using Linked Lists**: Introduction to Linked Lists, Dynamic Memory Allocation, Defining Linked Lists, Identifying Different Types of Linked Lists, Implementing Singly-Linked Lists, Representing a Singly-Linked List, Traversing a Singly-Linked List, Inserting a Node in a Singly-Linked List, Deleting a Node from a Singly-Linked List.

**UNIT V** **9 Hrs**

Implementing a Doubly-Linked List, Representing a Doubly-Linked List, Traversing a Doubly-Linked List, Inserting a Node in a Doubly-Linked List, Deleting Nodes from a Doubly-Linked List.

**Total 45 Hrs**

| Subject Code: **CBDT22003** | Subject Name: **DATABASE PROGRAMMING** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic skill in database with MySQL** | **Ty** | **2** | **1** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Every application works on data and data can be managed effectively by various ways
- One of the good way to manage data for your application is to store your application data into database
- SQL Server, solve all the required purposes with respect to application data.
- It would be storage of data, security to data, and availability of data, querying the data precisely, and viewing the data based on different requirement.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Introduction to SQL Server, Role of a Database Server, SQL Server Components, SQL Server Integration with the .NET Framework, Features of SQL Server, SQL, Identifying SQL Server Tools, SQL Server Management Studio. |
| **CO2** | Querying Data by Using Joins, Using an Inner Join, Using an Outer Join, Using a Cross Join, Using an Equi Join, Using a Self-Join. Querying Data by Using Sub queries |
| **CO3** | Managing Tables, Creating a Table, Implementing Data Integrity, Creating a Partitioned Table, Modifying a Table, Renaming a Table, Dropping a Table. Manipulating Data in Tables. |
| **CO4** | Implementing Batches, Creating Batches, Using Constructs, Handling Errors and Exceptions, Implementing Stored Procedures, Creating Stored Procedures, Creating Parameterized Stored Procedures |
| **CO5** | Managed Code, Introduction to SQL Server CLR Integration, Identifying the Need for Managed Code, Implementing Managed Database Objects, Importing and Configuring Assemblies, Creating Managed Database Objects. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | √ | | | | | | | |

| Subject Code: **CBDT22003** | Subject Name: **DATABASE PROGRAMMING** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic skill in database with MySQL** | **Ty** | **2** | **1** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL :Theory / Lab / Embedded Theory and Lab | | | | | | |

**OBJECTIVE:**

- Every application works on data and data can be managed effectively by various ways. One of the good way to manage data for your application is to store your application data into database.
- SQL Server, solve all the required purposes with respect to application data. It would be storage of data, security to data, and availability of data, querying the data precisely, and viewing the data based on different requirement.

**UNIT I** **9 Hrs**

**Overview of SQL Server:** Introduction to SQL Server, Role of a Database Server, SQL Server Components, SQL Server Integration with the .NET Framework, Features of SQL Server, SQL, Identifying SQL Server Tools, SQL Server Management Studio, SQL Server Business Intelligence Development Studio, Database Engine Tuning Advisor, SQL Server Configuration Manager, SQL Server Profiler. Querying Data, Retrieving Data, Identifying Data Types, Retrieving Specific Attributes, Retrieving Selected Rows, Using Functions to Customize the Result Set, Using String Functions, Using Date Functions, Using Mathematical Functions, Using Ranking Functions, Using System Functions.

**UNIT II** **9 Hrs**

**Querying Data by Using Joins and Subqueries:** Querying Data by Using Joins, Using an Inner Join, Using an Outer Join, Using a Cross Join, Using an Equi Join, Using a Self-Join. Querying Data by Using Subqueries, Using the IN and EXISTS Keywords, Using Modified Comparison Operators, Using Aggregate Functions, Using Nested Subqueries, Using Correlated Subqueries, Using the APPLY Operator, Managing Result Sets, Combining Result Sets, Working with Temporary Result Sets.

**UNIT III** **9 Hrs**

**Managing Databases and Tables.**: Managing Databases, Identifying System Databases in SQL Server, Identifying the Database Files, Creating a User-Defined Database, Renaming a User-Defined Database, Dropping a User-Defined Database, Managing Tables, Creating a Table, Implementing Data Integrity, Creating a Partitioned Table, Modifying a Table, Renaming a Table, Dropping a Table.

Manipulating Data in Tables, Manipulating Data by Using DML Statements, Storing Data in a Table, Updating Data in a Table, Deleting Data from a Table, Retrieving the Modified Data, Comparing and Updating Data, Manipulating XML Data, Storing XML Data in a Table, Retrieving Table Data into XML Format, Modifying XML Data.

Implementing Indexes, Views, and Full-Text Search, Creating and Managing Indexes, Identifying the Types of Indexes, Creating Indexes, Creating XML Indexes, Creating Partitioned Indexes, Managing Indexes, Displaying Execution Plan, Controlling Execution Plan, Creating and Managing Views,

Creating Views, Managing Views, Indexing Views, Creating Distributed Partitioned Views, Understanding Catalog Views. Implementing a Full-Text Search, Configuring Full-Text Search, Searching Data by Using a Full-Text Search.

**UNIT IV** **9 Hrs**

**Implementing Stored Procedures and Functions:** Implementing Batches, Creating Batches, Using Constructs, Handling Errors and Exceptions, Implementing Stored Procedures, Creating Stored Procedures, Creating Parameterized Stored Procedures, Returning Values from Stored Procedures, Calling a Procedure from Another Procedure, Implementing Functions, Creating UDFs.

Working with Triggers and Transactions, Implementing Triggers, Identifying Types of Triggers, Creating Triggers, Managing Triggers, Implementing Transactions, Creating Transactions, Reverting Transactions, Implementing Transactional Integrity, Resolving Deadlocks.

**UNIT V** **9 Hrs**

**Implementing Managed Code:**Understanding Managed Code, Introduction to SQL Server CLR Integration, Identifying the Need for Managed Code, Implementing Managed Database Objects, Importing and Configuring Assemblies, Creating Managed Database Objects.

Implementing Services for Message-Based Communication, Introduction to Service Broker, Introduction to Service Broker Conversation Process, Implementing Service Broker, Creating Messages, Creating Queues, Creating Contracts, Creating Services, Beginning a Conversation, Sending and Receiving Messages.

**Total No of Hrs : 45**

**Text Books:**

1. *Beginning Microsoft SQL Server 2012 Programming*, Authors: Paul Atkinson, Robert Viera, Publisher: Wrox; 1 edition
2. *Microsoft SQL Server 2012 Step by Step*, Authors: Petricl LeBlanc, Publisher: Microsoft Press; 1 edition
3. *Professional Microsoft SQL Server 2008 Programming*, Authors: Robert Viera, Publisher: Wrox; 1 edition

**References:**

1. SQL & PL/SQL for Oracle 10g, Black Book, Dr.P.S.Deshpande, Dream Tech.

| Subject Code: **CBDT22004** | Subject Name: **PROGRAMMING IN PYTHON** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic Knowledge in C and C++ Programming** | **Ty** | **3** | **1** | **0** | **4** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To understand the basic concept of Python Programming and to learn how to write loops and decision statements in Python.
- To introduce the concepts of functions and pass arguments in Python.
- To provide knowledge about lists, tuples, indexing and slicing to access data and dictionaries in Python programs.
- To understand the file concepts in Python.
- To familiarize object-oriented concepts such as encapsulation, polymorphism, inheritance in Python.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the basic concepts of python programming such as data types, variables, operators, keywords, looping statements, conditional statements. |
| **CO2** | Capable of understand the functions, built-in function, scope and lifetime of variable, built in functions used in strings and lists.. |
| **CO3** | Develop to access and modify key:value Pairs in Dictionaries,Built-In Functions -dictionaries, lists and tuples ,methods-dictionaries, tuples and sets, operations on tuples. |
| **CO4** | Implement the use of Files, Creating, reading and writing Text, Binary data files and csv files.os and os.path Modules, Regular Expression Methods.n. |
| **CO5** | Determine the different Object oriented concepts in real time problem that helps us to reduce development time because of Code Reusability, encapsulation, polymorphism etc. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 1 | 2 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 3 | 2 | 3 |
| **CO3** | 3 | 2 | 1 | 3 |
| **CO4** | 3 | 3 | 1 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | √ | | | | | | | |

| Subject Code: **CBDT22004** | Subject Name: **PROGRAMMING IN PYTHON** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic Knowledge in C and C++ Programming** | **Ty** | **3** | **1** | **0** | **4** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**UNIT I** **12 Hrs**

**Parts of Python Programming Language:** Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language. **Control Flow Statements:** The if statement, The if…else Statement, The if…elif…else Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement,

**UNIT II** **12 Hrs**

**Functions:** Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments. **Strings:** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, **Lists,** Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement.

**UNIT III** **12 Hrs**

**Dictionaries:** Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, **Tuples and Sets:** Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozenset.

**UNIT IV** **12 Hrs**

**Files:** Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules, **Regular Expression Operations:** Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.

**UNIT V** **12 Hrs**

**Object-Oriented Programming:** Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism

**Total No of Hrs : 60**

**TEXT BOOK**

1. Gowrishankar S, Veena A, **"Introduction to Python Programming",** 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372

**REFERENCE BOOKS / WEBLINKS:**

1. Jake VanderPlas, **"Python Data Science Handbook: Essential Tools for Working with Data",** 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
2. AurelienGeron, **Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems",** 1st Edition,O'Reilly Media, 2017. ISBN – 13: 978-1491962299.

| Subject Code: **CBCA22005** | Subject Name: **COMPUTER NETWORKS** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic knowledge in Networking** | **Ty** | **4** | **0** | **0** | **4** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To introduce the basic concept of Computer Networks and OSI layers.
- To learn about Media transmission and Perform with errors.
- To provide the knowledge about Multiplexing techniques, Ethernet and Token Ring and Bus.
- To understand the concepts of Switching techniques, FDDI and IEEE802.6.
  To impart the topics ISDN, TCP/IP Network and WWW.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the fundamental concept of Networking and Characterizes and standardizes the communication functions of a telecommunication system using OSI Model. |
| **CO2** | Explore knowledge about Transmission media which act as a Physical interface for communication networks and its types Guided and Unguided. Able to study in Error detection and correction. |
| **CO3** | Expose a method by which multiple analog or digital signals are combined into one signal over a shared medium using Multiplexing. Study on a system for connecting a number of computer systems to form a LAN using Ethernet. Learn Network Protocol Token bus used to transmit data and token ring works around physical ring. |
| **CO4** | Directing a signal or data element toward a particular hardware destination using Switching. Provide a standard governed by the ANSI for MAN using IEEE8062.6an for LAN using FDDI. |
| **CO5** | Develop to get Better voice quality ISDN provides access to packet switched networks, designed to allow digital transmission of voice and data over ordinary telephone wires. Provide knowledge in TCP/IP Networks and World Wide Web. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | 3 | 1 | 3 | 3 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 1 | 3 | 2 | 1 | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 3 |
| **CO2** | 2 | 3 | 1 | 3 |
| **CO3** | 3 | 2 | 3 | 2 |
| **CO4** | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | √ | | | | | | | |

| Subject Code: **CBCA22005** | Subject Name: **COMPUTER NETWORKS** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic knowledge in Networking** | **Ty** | **4** | **0** | **0** | **4** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**OBJECTIVES:**

- To introduce the students the functions of different layers.
- To understand the layering concepts in computer networks.
- Be exposed to the required functionality at each layer.
- To have knowledge in different applications that use computer networks.

**UNIT I** **12 Hrs**

Introduction to Computer Network - Protocols and standards - standards organizations - Topology - Transmission mode -Classification of Network - OSI Model - Layers of OSI Model.

**UNIT II** **12 Hrs**

Media of Transmission - Guided Media - Unguided Media - Performance Types of Error - Error Detection - Error Corrections.

**UNIT III** **12 Hrs**

Multiplexing - Types of Multiplexing - Multiplexing Application - Telephone system - Project 802 - Ethernet Token Bus - Token Ring.

**UNIT IV** **12 Hrs**

FDDI- IEEE 802.6-Circuit Switching - Packet Switching - Message switching - Connection Oriented and Connectionless services.

**UNIT V** **12 Hrs**

Analog and Digital Network-Access to ISDN – ISDN layers – TCP/IP Network- Transport and Application layers of TCP/IP-WWW.

**Total No of Hrs : 60**

**TEXT BOOK :**

1. Behrouz and Forouzan(2001), " Data Communication and Networks", (2nd ed), TMH.
2. Tanenbaum A.S (2003 ), "Computer Networks",(4th ed),PHI.

**REFERENCES:**

1. Jean Wairand (1998), " *Communication Networks (A first Course)* " , (2nd ed.), WCB/ McGraw Hill8.
2. Olivier Bonaventure(2011), "*Computer Networking : Principles, Protocols and Practice*", The Saylor Foundation .
3. Iresh A. Dhotre, Vilas S. Bagad (2013), "*Computer Networks An Illustrated Guide to Computer Networking*", Technical Publications.

| Subject Code: **CBCA22007** | Subject Name: **SOFTWARE ENGINEERING** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic knowledge in Computer Science and Creative thinking.** | **Ty** | **2** | **1** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- It's the application of theories, methods, Planning a software project and Development process and tools to design build a software.
- To emphasis notation used to specify the external characteristic , architectural structure and design Concepts.
- To access the current status of a test process, and strategies to work on testing propose step-wise improvements and show how these are linked to achieving.
- To apply software dynamic testing to verify and validate behavior of the code is analyzed**.**
- Software functional quality reflects how well it complies with or conforms to a given design.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Deliver basic and advanced concepts of Software Engineering, designed to help beginners and professionals |
| **CO2** | Design notations are used when planning and design concepts should be able to communicate the purpose of a program. |
| **CO3** | Test as the process of **validating that a piece of software meets its business and technical requirements**. |
| **CO4** | Provide Dynamic Testing can reveal the uncovered defects that are considered to be too difficult or complicated and which cannot be covered through static Analysis increases the quality of a product and project |
| **CO5** | Learn Functional requirements could be calculations, technical details, data manipulation and processing. The strategy to confess the software quality assurance. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 |
| **CO2** | 2 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 3 | 3 | 1 | 3 | 3 | 1 |
| **CO4** | 2 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 3 |
| **CO3** | 3 | 3 | 1 | 2 |
| **CO4** | 3 | 1 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | √ | | | | | | | |

| Subject Code: **CBCA22007** | Subject Name: **SOFTWARE ENGINEERING** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic knowledge in Computer Science and Creative thinking.** | **Ty** | **2** | **1** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **9 Hrs**

**Introduction to Software Engineering:** Definition- size factor – quality and productivity factors. Planning a software project: Development process – Organizational structure. Software cost factors: Estimation techniques – Staffing level estimation – Estimating software estimation costs.

**UNIT II** **9 Hrs**

**Design Notations & Techniques:** Software Requirements Definition: specification – Formal Specification. Software Design: Design Concepts – Modules and Modularization Criteria - Notation – Techniques. Implementation issues: Concepts – coding.

**UNIT III** **9 Hrs**

**Testing and Processes:** Software Testing – Test case design – White Box testing – Block box testing – Software testing strategies – Software life cycle.

**UNIT IV** **9 Hrs**

**Dynamic Testing :** Verification and validation analyzing and reporting templates – Post implementation analysis – Functionality testing – Performance testing – Compatibility testing – Case study.

**UNIT V** **9 Hrs**

**Software Quality Assurance:** Concepts - Movement – Back ground- SQA activities – Software Review – Formal technical reviews. Statistical software quality assurance – Reliability.

**Total No of Hrs : 45**

**TEXT BOOK:**

1. Roger S. Pressman (Fifth Edition) Software Engineering, Mc Graw Hill.

**REFERENCES:**

1. Fairley,R(1997) *Software Engineering Concepts*, Tata McGraw-Hill.
2. 2., Jeff Tian, *Software Quality Engineering*, Student Edition, 2006, Wiley India

| Subject Code: **CBDT22L03** | Subject Name: **DATABASE PROGRAMMING WITH MYSQL LABORATORY** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic skill in database with MySQL** | **Lb** | **0** | **0** | **4** | **2** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Every application works on data and data can be managed effectively by various ways
- One of the good way to manage data for your application is to store your application data into database
- SQL Server, solve all the required purposes with respect to application data.
- It would be storage of data, security to data, and availability of data, querying the data precisely, and viewing the data based on different requirement.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Introduction to SQL Server, Role of a Database Server, SQL Server Components, SQL Server Integration with the .NET Framework, Features of SQL Server, SQL, Identifying SQL Server Tools, SQL Server Management Studio. |
| **CO2** | Querying Data by Using Joins, Using an Inner Join, Using an Outer Join, Using a Cross Join, Using an Equi Join, Using a Self-Join. Querying Data by Using Sub queries |
| **CO3** | Managing Tables, Creating a Table, Implementing Data Integrity, Creating a Partitioned Table, Modifying a Table, Renaming a Table, Dropping a Table. Manipulating Data in Tables. |
| **CO4** | Implementing Batches, Creating Batches, Using Constructs, Handling Errors and Exceptions, Implementing Stored Procedures, Creating Stored Procedures, Creating Parameterized Stored Procedures |
| **CO5** | Managed Code, Introduction to SQL Server CLR Integration, Identifying the Need for Managed Code, Implementing Managed Database Objects, Importing and Configuring Assemblies, Creating Managed Database Objects. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | √ | |

| Subject Code: **CBDT22L03** | Subject Name: **DATABASE PROGRAMMING WITH MYSQL LABORATORY** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic skill in database with MySQL** | **Lb** | **0** | **0** | **4** | **2** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credit T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**OBJECTIVE:**

- Every application works on data and data can be managed effectively by various ways. One of the good way to manage data for your application is to store your application data into database.
- SQL Server, solve all the required purposes with respect to application data. It would be storage of data, security to data, and availability of data, querying the data precisely, and viewing the data based on different requirement.

**UNIT I** **12 Hrs**

**Overview of SQL Server:**Introduction to SQL Server, Role of a Database Server, SQL Server Components, SQL Server Integration with the .NET Framework, Features of SQL Server, SQL, Identifying SQL Server Tools, SQL Server Management Studio, SQL Server Business Intelligence Development Studio, Database Engine Tuning Advisor, SQL Server Configuration Manager, SQL Server Profiler. Querying Data, Retrieving Data, Identifying Data Types, Retrieving Specific Attributes, Retrieving Selected Rows, Using Functions to Customize the Result Set, Using String Functions, Using Date Functions, Using Mathematical Functions, Using Ranking Functions, Using System Functions.

**UNIT II** **12 Hrs**

**Querying Data by Using Joins and Subqueries:**Querying Data by Using Joins, Using an Inner Join, Using an Outer Join, Using a Cross Join, Using an Equi Join, Using a Self-Join. Querying Data by Using Subqueries, Using the IN and EXISTS Keywords, Using Modified Comparison Operators, Using Aggregate Functions, Using Nested Subqueries, Using Correlated Subqueries, Using the APPLY Operator, Managing Result Sets, Combining Result Sets, Working with Temporary Result Sets.

**UNIT III** **12 Hrs**

**Managing Databases and Tables.**:Managing Databases, Identifying System Databases in SQL Server, Identifying the Database Files, Creating a User-Defined Database, Renaming a User-Defined Database, Dropping a User-Defined Database, Managing Tables, Creating a Table, Implementing Data Integrity, Creating a Partitioned Table, Modifying a Table, Renaming a Table, Dropping a Table.

Manipulating Data in Tables, Manipulating Data by Using DML Statements, Storing Data in a Table, Updating Data in a Table, Deleting Data from a Table, Retrieving the Modified Data, Comparing and Updating Data, Manipulating XML Data, Storing XML Data in a Table, Retrieving Table Data into XML Format, Modifying XML Data.

Implementing Indexes, Views, and Full-Text Search, Creating and Managing Indexes, Identifying the Types of Indexes, Creating Indexes, Creating XML Indexes, Creating Partitioned Indexes, Managing Indexes, Displaying Execution Plan, Controlling Execution Plan, Creating and Managing Views,

Creating Views, Managing Views, Indexing Views, Creating Distributed Partitioned Views, Understanding Catalog Views. Implementing a Full-Text Search, Configuring Full-Text Search, Searching Data by Using a Full-Text Search.

**UNIT IV** **12 Hrs**

**Implementing Stored Procedures and Functions:**Implementing Batches, Creating Batches, Using Constructs, Handling Errors and Exceptions, Implementing Stored Procedures, Creating Stored Procedures, Creating Parameterized Stored Procedures, Returning Values from Stored Procedures, Calling a Procedure from Another Procedure, Implementing Functions, Creating UDFs.

Working with Triggers and Transactions, Implementing Triggers, Identifying Types of Triggers, Creating Triggers, Managing Triggers, Implementing Transactions, Creating Transactions, Reverting Transactions, Implementing Transactional Integrity, Resolving Deadlocks.

**UNIT V** **12 Hrs**

**Implementing Managed Code:**Understanding Managed Code, Introduction to SQL Server CLR Integration, Identifying the Need for Managed Code, Implementing Managed Database Objects, Importing and Configuring Assemblies, Creating Managed Database Objects.

Implementing Services for Message-Based Communication, Introduction to Service Broker, Introduction to Service Broker Conversation Process, Implementing Service Broker, Creating Messages, Creating Queues, Creating Contracts, Creating Services, Beginning a Conversation, Sending and Receiving Messages.

**Total No of Hrs : 60**

**Text Books:**

1. *Beginning Microsoft SQL Server 2012 Programming*, Authors: Paul Atkinson, Robert Viera, Publisher: Wrox; 1 edition
2. *Microsoft SQL Server 2012 Step by Step*, Authors: Petricl LeBlanc, Publisher: Microsoft Press; 1 edition
3. *Professional Microsoft SQL Server 2008 Programming*, Authors: Robert Viera, Publisher: Wrox; 1 edition

**References:**

SQL & PL/SQL for Oracle 10g, Black Book, Dr.P.S.Deshpande, Dream Tech

| Subject Code: **CBDT22IL02** | Subject Name: **DATA STRUCTURE AND ALGORITHMS LABORATORY** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : practical skill in in Data structure & Algorithms | **Lb** | **0** | **0** | **4** | **2** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Data Structure plays very important role while implementing any programming concept precisely with respect to user requirement.
- In any application data is being used in application in various way. It is the data which actually confirm your application robustness, application features and all about your application
- To developing application, how will you deal with your application data.
- The data structure is the components which actually do the needful for your application data according to application requirement.
  Understanding data structure means, understanding ways to deal with data in various ways according to application requirement

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Lab Exercise based on OOPS Concepts, Namespaces and Object-Orientation, Shallow and Deep Copying |
| **CO2** | Lab Exercise based on Algorithm Analysis, Asymptotic Analysis, Simple Justification Technique |
| **CO3** | Lab Exercise based on Recursion, Designing Recursive Algorithms , Eliminating Tail Recursion |
| **CO4** | Lab Exercise based on Stacks, Queues, and Deques |
| **CO5** | Lab Exercise based on Linked List |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |
| **CO2** | 2 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | √ | | √ | |

| Subject Code: **CBDT22IL02** | Subject Name: **DATA STRUCTURE AND ALGORITHMS LABORATORY** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : practical skill in in Data structure & Algorithms | **Lb** | **0** | **0** | **4** | **2** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

1. Lab Exercise based on OOPS Concepts.
   - Goals, Principles, and Patterns
   - Software Development
   - Class Definitions
   - Inheritance
   - Namespaces and Object-Orientation
   - Shallow and Deep Copying
2. Lab Exercise based on Algorithm Analysis
   - Experimental Studies
   - Moving Beyond Experimental Analysis
   - Asymptotic Analysis
   - Simple Justification Techniques
3. Lab Exercise based on Recursion
   - Illustrative Examples
   - Analyzing Recursive Algorithms
   - Designing Recursive Algorithms
   - Eliminating Tail Recursion
4. Lab Exercise based on Array-Based Sequences
   - Python's Sequence Types
   - Low-Level Arrays
   - Dynamic Arrays and Amortization
   - Efficiency of Python's Sequence Types
   - Using Array-Based Sequences
   - Multidimensional Data Sets
5. Lab Exercise based on Stacks, Queues, and Deques.
   - Stacks
   - Queues
   - Double-Ended Queues
6. Lab Exercise based onLinked List
   - Singly Linked Lists
   - Circularly Linked Lists
   - Doubly Linked Lists
   - the Positional List ADT
   - Sorting a Positional List
   - Case Study: Maintaining Access Frequencies
   - Link-Based vs Array-Based Sequences
7. Lab Exercise based onTrees
   - General Trees
   - Binary Trees
   - Implementing Trees
   - Tree Traversal Algorithms
8. Lab Exercise based onPriority Queues
   - The Priority Queue Abstract Data Type
   - Heaps.
   - Sorting with a Priority Queue
   - Adaptable Priority Queues
9. Lab Exercise based onMaps, Hash Tables, and Skip Lists
   - Maps and Dictionaries
   - Hash Tables
   - Sorted Maps
   - Skip Lists
   - Sets, Multisets, and Multimaps

**Total No of Hrs : 60**

| Subject Code: **HBCC22I04** | Subject Name: **Statistical and Numerical Methods Lab** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Higher Secondary Mathematics** | **IE** | 0 | 0 | 4 | 2 |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To understand the Basic concepts in Measures of Central Tendency
- To understand the Basic concepts in Correlation and Regression
- To understand the methods of solving Algebraic and Transcendental equations
- To understand the basic concepts in R Programming language

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the basic concepts in Measures of Central Tendency |
| **CO2** | Understand the basic concepts in Correlation and Regression |
| **CO3** | Try to solve Algebraic equations |
| **CO4** | Try to solve system of Linear Equations |
| **CO5** | Learn how to apply R programming to solve Statistical and Numerical problems |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 1 | 2 | 3 |
| **CO2** | 3 | 2 | 2 | 3 | 3 | 1 | 1 | 2 | 3 |
| **CO3** | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 1 | 2 |
| **CO4** | 3 | 2 | 3 | 3 | 3 | 2 | 1 | 1 | 3 |
| **CO5** | 2 | 2 | 3 | 3 | 2 | 1 | 1 | 2 | 2 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 3 | 1 | 3 |
| **CO3** | 3 | 2 | 3 | 1 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | √ | |

| Subject Code: **HBCC22I04** | Subject Name: **Statistical and Numerical Methods Lab** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Higher Secondary Mathematics** | **IE** | 0 | 0 | 4 | 2 |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I MEASURES OF CENTRAL TENDENCY & VARIABILITY**
Mean, Median, Mode – Range, Quartile Deviation – Mean Deviation - Standard Deviation

**UNIT II CORRELATION AND REGRESSION**
Correlation Coefficient – Spearman's Rank Correlation – Linear Regression

**UNIT III SOLUTION OF EQUATIONS**
Solution of Algebraic equations – Method of false position – Iteration method – Newton-Raphson method.

**UNIT IV SOLUTION OF LINEAR SYSTEM OF EQUATIONS**
Solution of Linear system of equations – Gauss Elimination method – Gauss-Jordan method.

**UNIT V PROGRAMMING IN R**
Algorithm to find Mean, Median, Mode and Standard Deviation Using R, Algorithm to find Correlation coefficient using R, Algorithm to solve System of Equations.

References

**1)** Veerarajan T., *Probability, Statistics and, Random Processes*, Tata McGraw Hill Publishing Co., (2008).
**2)** Gupta S.C., Kapoor V.K., *Fundamentals of Mathematical Statistics*, S.Chand& Co., (2007).
**3)** Sastry S.S., *Introductory Methods of Numerical Analysis*, Prentice Hall of India, (2012).
**4)** Kandasamy P., Thilagavathy, Gunavathy K., *Numerical Methods (Vol.IV)*, S.Chand& Co., (2008).
**5)** Victor A. Bloomfield, Using R for Numerical Analysis in Science and Engineering, CRC Press, Taylor & Series Group(2014).

**Total No of Hrs : 60**

| Subject Code: **HBCC22I05** | Subject Name: Soft Skill-III | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Higher Secondary Mathematics** | **IE** | 0 | 0 | 2 | 1 |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To understand the Basic concepts in Logical Reasoning
- To understand the Basic concepts in Arithmetical Reasoning
- To understand the Basic concepts in Data Interpretation

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the basic concepts of Logical Statements and Arguments |
| **CO2** | Understand the concept of Logical conclusions |
| **CO3** | Understand the Basic concepts in Number system |
| **CO4** | Understand the basic concepts of Permutations and Combinations |
| **CO5** | Learn how to analyze the data using Pictorial representation |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 3 |
| **CO3** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO5** | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 3 |
| **CO2** | 2 | 2 | 2 | 3 |
| **CO3** | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | | | | |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | √ | | |

| Subject Code: **HBCC22I05** | Subject Name:Soft Skill-III | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Higher Secondary Mathematics** | **IE** | 0 | 0 | 2 | 1 |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT 1 Logical Reasoning I**

Logical Statements – Arguments – Assumptions – Courses of Action.

**UNIT 2 Logical Reasoning II**

Logical conclusions – Deriving conclusions from passages – Theme detection.

**UNIT 3 Arithmetical Reasoning I**

Number system – H.C.F & L.C.M – Problem on ages – Percentage – Profit & Loss – Ratio & Proportion – Partnership.

**UNIT 4 Arithmetical Reasoning II**

Time & Work – Time & Distance – Clocks – Permutations & Combinations – Heights & Distances – Odd man out and Series.

**UNIT 5 Data Interpretation**

Tabulation – Bar graphs – Pie graphs – Line graphs.

**Reference Book:**

1. R.S.Agarwal, A modern approach to Logical Reasoning, S.Chand& Co., (2017).
2. R.S.Agarwal, A modern approach to Verbal and Non verbal Reasoning, S.Chand& Co., (2017).
3. R.S.Agarwal, Quantitative Aptitude for Competitive Examinations, S.Chand& Co., (2017).
4. A.K.Gupta, Logical and Analytical Reasoning, Ramesh Publishing House, (2014).
5. B.S.Sijwali, Indusijwali, A new approach to Reasoning (Verbal and Non verbal), Arihant Publishers, (2014).

| Subject Code: **CBCA22ID1** | Subject Name: **Allied Paper :DIGITAL FUNDAMENTALS** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Knowledge of Basic Electronics** | **Ty** | **2** | **1** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To Introduce different Number System and codes
- To impart a great deal of Knowledge in minimization Boolean functions
- Ability to understand, analyze and design various combinational circuits
- To Understand the sequential digital circuits like flip-flops, register
- To determine the characteristics of memory and their classification &different types of Counters

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand number representation and conversion between different representations in digital electronic circuits. |
| **CO2** | Apply the Boolean minimization techniques like K-map method, Don't care conditions & different logic gates |
| **CO3** | Implement the Boolean functions techniques for combinational circuits such as Adder, Subtractor, Multiplexer , Decoder & Encoder etc. |
| **CO4** | Analyze logic processes and implement logical operations using sequential logic circuits such as RS, JK, Master-Slave ,D and T flipflops & Shift registers |
| **CO5** | Ability to identify basic requirements for a design application such as Counters, Ripple Counters, Synchronous Counter, Cascade counters & Classify different semiconductor memories. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 3 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO3** | 3 | 3 | 1 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO5** | 3 | 2 | 2 | 3 | 1 | 3 | 3 | 1 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 3 | 1 | 3 |
| **CO3** | 3 | 2 | 3 | 1 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | √ | | | |

| Subject Code: **CBCA22ID1** | Subject Name: **Allied Paper :DIGITAL FUNDAMENTALS** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Knowledge of Basic Electronics** | **Ty** | **2** | **1** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **9 Hrs**

**Binary Systems** : Digital Computers and Digital Systems – Binary Numbers – Number Based Conversions – Octal and Hexadeciamal Numbers - Complements - Binary codes - Binary logic

**UNIT II** **9 Hrs**

**Logic Gates and Simplification of Boolean Functions :** Digital Logic Gates - Truth tables. K- map method (upto 5 Variables) – Product of Sums Simplifications – Don't Care Conditions - Mc-Clausky Tabulation method.

**UNIT III** **9 Hrs**

**Combinational Logic** : Adders - Subtractors - Decoders - Encoders - Multiplexer - Demultiplexer - Design of Circuits using decoders/Multiplexers - ROM - PLA (Programmable Logic Array)– PAL(Programmable Array Logic).

**UNIT IV** **9 Hrs**

**Sequential logic** : Flip flops : RS, JK,Master-Slave flipflop, D and T Flip flops - Registers – Shift Registers – Types of shift registers : SIPO, SISO,PISO,PIPO.

**UNIT V** **9 Hrs**

**Couters and Memory** : Counters - Ripple Counters - Synchronous Counter-asynchronous counter, Up/down synchronous counters, Cascaded counters –Basics of Memory- RAM-ROM-PROM-EPROM

**Total No of Hrs: 45**

**TEXT BOOKS:**

1. Morris Mano,M(1984), *Digital Logic and Computer Design*(2nd ed.), Prentice Hall of India
2. Thomas L.Floyd & R.P. Jain,(2009), Digital Fundamentals(8th ed.), Pearson Education

**REFERENCE :**

1. Bartee,T,C(1991) *Computer Architecture and logical Design* McGraw Hill,

| Subject Code: **CBDT22005** | Subject Name: **SERVER SIDE PROGRAMMING USING JSP** | T/L / ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic Skills in server side programming with JSP** | **Ty** | **3** | **1** | **0** | **4** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- We are working on web based application now a days.
- Developing web application we need to have server components which perform the basic feature and functionality of any web application
- Servlet API is one which helps you to develop server components which can be deployed on any server and also give you feature of platform independence.
- JSTL as name specified, standard tag library to do specific functionalities, which is tested and approved by corresponding API.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Identifying the Components of the Web Architecture, Understanding the HTTP Protocol, Identifying the Various Web Application Architectures, Identifying the Various Web Application Technologies. |
| **CO2** | Identifying the Components of a JSP Page, Lifecycle of a JSP Page, Processing of a JSP Page, Working with JSTL and EL |
| **CO3** | Introducing MVC,the Model, theView, theController, Introducing the Struts Framework, Exploring the Struts Architecture, Implementing the Struts Framework. |
| **CO4** | Storing and Manipulating Data Using JDBC, the JDBC API,the Data SourceObject, Storing and Manipulating Data Using JPA,Object-Relational Mapping, PA. |
| **CO5** | Exploring AJAX, DefiningAJAX, Working of an AJAX-enabled Web Page, Application Areas of AJAX, Advantages and Limitations of AJAX |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | √ | | | | | | | |

| Subject Code: **CBDT22005** | Subject Name: **SERVER SIDE PROGRAMMING USING JSP** | T/L / ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic Skills in server side programming with JSP** | **Ty** | **3** | **1** | **0** | **4** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**OBJECTIVE:**

- We are working on web based application now a days. Developing web application we need to have server components which perform the basic feature and functionality of any web application.
- Servlet API is one which helps you to develop server components which can be deployed on any server and also give you feature of platform independence.
- JSTL as name specified, standard tag library to do specific functionalities, which is tested and approved by corresponding API.

**UNIT I** **12 Hrs**

**Web Application Development and Servlet API:**Identifying the Components of the Web Architecture, Understanding the HTTP Protocol, Identifying the Various Web Application Architectures, Identifying the Various Web Application Technologies, The Servlet API, Understanding the Web Container, Life Cycle of a Servlet, Processing of a Servlet Request, Creating a Servlet, Configuring a Servlet, Compiling and Packaging a Servlet, Deploying a Servlet, Accessing the Servlet from a Browser, Dispatching a Request, Transferring Data, Introduction to Filters, Implementing Filters, Application Areas of Filters, Managing Sessions Using Hidden Form Fields, Managing Sessions Using Cookies, Managing Sessions Using the HttpSession API, Managing Sessions Using URL Rewriting, Server Cluster, Session Migration Techniques.

**UNIT II** **12 Hrs**

**Exploring Java Server Pages Technologies:**Identifying the Components of a JSP Page, Lifecycle of a JSP Page, Processing of a JSP Page, Working with JSTL and EL, Identifying the Tag Library, Implementing EL, Creating Custom Tags, Using Custom Tags

**UNIT III** **12 Hrs**

**Developing MVC-Based Web Applications Using the Struts Framework:**Introducing MVC,the Model,the View,the Controller,Introducing the Struts Framework, Exploring the Struts Architecture,Implementing the Struts Framework.

**UNIT IV** **12 Hrs**

**Storing and Manipulating Data in a Web Application:**Storing and Manipulating Data Using JDBC, the JDBC API,the DataSource Object,Storing and Manipulating Data Using JPA,Object-Relational Mapping,JPA

**UNIT V** **12 Hrs**

**Developing Asynchronous Web Applications and Web Application Security:**Exploring AJAX,Defining AJAX,Working of an AJAX-enabled Web Page,Application Areas of AJAX,Advantages and Limitations of AJAX,The AsyncContext Object, Identifying Security Threats,Identifying Security Techniques,Implementing Authentication Using JAAS,Implementing Authorization Using JAAS.

**Total No of Hrs : 60**

**TEXT BOOKS:**

1. Head First Servlet and JSP, Kathy Sierra – O'Reilly Media
2. Murach's Java Servlets and JSP, 3rd Edition, Publisher - Mike Murach& Associates; 2 edition
3. Servlet & JSP: A Tutorial, Second Edition, Budi Kumiawan, Brainy Software; 2 edition

| Subject Code: **CBDT22006** | Subject Name: **TEST DRIVEN DEVELOPMENT** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : Basic Skills in Test Driven Development | **Ty** | **3** | **1** | **0** | **4** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- The principle objective of software testing is to ensure that a quality product is delivered to the customer.
- To achieve this, a developer must test each module/method/unit of code written to create the software application
- To achieve this, a developer must test each module/method/unit of code written to create the software application.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Introducing Software Testing, Software Testing Life Cycle, Different Types of Testing. |
| **CO2** | Introducing Unit Testing, Exploring IDEs for Unit Testing, Identifying JUnit as a Testing Tool |
| **CO3** | Writing Tests Cases in JUnit, Identifying JUnit Annotations, Identifying JUnit Assert Statements. |
| **CO4** | Adding Behaviors to Test Cases, Handling Exceptions. |
| **CO5** | Testing Multiple Tests in JUnit, Creating Parameterized Tests, Implementing Test Suites. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | √ | | | | | | | |

| Subject Code: **CBDT22006** | Subject Name: **TEST DRIVEN DEVELOPMENT** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : Basic Skills in Test Driven Development | **Ty** | **3** | **1** | **0** | **4** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL :Theory / Lab / Embedded Theory and Lab | | | | | | |

**Objective**

- The principle objective of software testing is to ensure that a quality product is delivered to the customer.
- To achieve this, a developer must test each module/method/unit of code written to create the software application.
- Unit testing is a good way to check that the code is functional and delivers as expected.

**UNIT I** **12 Hrs**

Introducing Software Testing, Software Testing Life Cycle, Different Types of Testing,.

**UNIT II** **12 Hrs**

Introducing Unit Testing, Exploring IDEs for Unit Testing, Identifying JUnit as a Testing Tool.

**UNIT III** **12 Hrs**

Writing Tests Cases in JUnit, Identifying JUnit Annotations, Identifying JUnit Assert Statements.

**UNIT IV** **12 Hrs**

Adding Behaviors to Test Cases, Handling Exceptions.

**UNIT V** **12 Hrs**

Testing Multiple Tests in JUnit, Creating Parameterized Tests, Implementing Test Suites.

**Total No of Hrs: 60**

**TEXT BOOKS:**

1. Test Driven Development with JUnit 5 -Shekhar Gulati, Rahul Sharma

2. Test-Driven Java Development Second Edition: Invoke TDD principles for end-to-end application development

**REFERENCES:**

1. Test Driven TDD and Acceptance TDD for Java Developers-Alex Garcia, Viktor Farcic

| Subject Code: **CBDT22L04** | Subject Name: **SERVER SIDE PROGRAMMING USING JSPLABORATORY** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic Knowledge in server side programming with JSP** | **Lb** | **0** | **0** | **4** | **2** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- We are working on web based application now a days.
- Developing web application we need to have server components which perform the basic feature and functionality of any web application
- Servlet API is one which helps you to develop server components which can be deployed on any server and also give you feature of platform independence.
  JSTL as name specified, standard tag library to do specific functionalities, which is tested and approved by corresponding API..

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Program for understanding Web Application, program for understanding Web Server and Installation of web server and configuration.. |
| **CO2** | Program for understanding web server directory and how to deploy application on web server. |
| **CO3** | program for understanding Server Components, program for understanding Java Servlet API |
| **CO4** | program for understanding Java Server Pages |
| **CO5** | program to deploy web application using java server components, Building complete web based login utility using servlet and JSP |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |
| **CO2** | 2 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | √ | |

| Subject Code: **CBDT22L04** | Subject Name: **SERVER SIDE PROGRAMMING USING JSPLABORATORY** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic Knowledge in server side programming with JSP** | **Lb** | **0** | **0** | **4** | **2** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

1. Write a program for understanding Web Application.
2. Write a program for understanding Web Server and Installation of web server and configuration.
3. Write a program for understanding web server directory and how to deploy application on web server.
4. Write a program for understanding Server Components.
5. Write a program for understanding Java Servlet API.
6. Write a program for understanding Java Server Pages.
7. Write a program to deploy web application using java server components.
8. Building complete web based login utility using servlet and JSP.

**Total no. of Hrs. needed to complete the Lab : 60**

| Subject Code: HBCC22I06 | Subject Name: CRITICAL THINKING SKILL | Ty/Lb/ETP /IE | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | **Prerequisite: Basic Knowledge in computer** | **IE** | **0** | **0** | **2** | **1** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

1. Promote Critical Thinking as a Valuable Process in the Workplace
2. Use Critical Thinking Skills When Making Business Decisions and Taking Action
3. Select Specific Tools to Use When Conducting Critical Thinking

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Explaining an Issue or Problem |
| **CO2** | Employing Evidence/Information Effectively |
| **CO3** | Analyzing Contexts |
| **CO4** | Describing Your and Others Perspectives |
| **CO5** | Drawing Logical Conclusions |

**Mapping of Course Outcome with Program Outcome (POs)**

| Cos/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | P07 | PO8 | P09 |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |
| **CO2** | 2 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| Cos/PSOs | PS01 | PS02 | PS03 | PS04 |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | √ | | |

| Subject Code: HBCC22I06 | Subject Name: CRITICAL THINKING SKILL | Ty/Lb/ETP /IE | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite: Basic Knowledge in computer | IE | 0 | 0 | 2 | 1 |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

1. Case Study Analysis of a specific Computer Applications Domain.
    1. System Requirements
    2. Analysis
    3. Design
    4. Test Cases
2. Debugging programs from Computer Applications languages
3. Prediction of Output for Minimum 10 Problems.

| Subject Code: **CBDT22I01** | Subject Name: **PROFESSIONAL SKILLS I** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic skill in Professional Skills-I** | **IE** | **0** | **0** | **2** | **1** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Basic concepts of Communication Skills.
- Explore the concepts on Oral speaking capability, Written, Presenting, Listening
- To demonstrate an understanding Work effectively in a team environment: Team Building Skills, Goals, Roles and Processes, The Leaders Role, Definitions.
- To Understand Demonstrate critical thinking.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Communication Skills: Understanding how communications work, Oral speaking capability, Written, Presenting, Listening. |
| **CO2** | Improve self-presentation skills: Oral speaking capability, Written, Presenting, Listening |
| **CO3** | Work effectively in a team environment: Team Building Skills, Goals, Roles and Processes, The Leaders Role, Definitions, What Teams Need, Your Best and Worst Experiences, Team Building Stages, Team Requirements. |
| **CO4** | Demonstrate critical thinking |
| **CO5** | Understand the need for values and ethics at the workplace |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | √ | | |

| Subject Code: **CBDT22I01** | Subject Name: **PROFESSIONAL SKILLS I** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic skill in Professional Skills-I** | **IE** | **0** | **0** | **2** | **1** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL :Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **6 Hrs**

Communication Skills: Understanding how communications work, Oral speaking capability, Written, Presenting, L listening

**UNIT II** **6 Hrs**

Improve self-presentation skills: Oral speaking capability, Written, Presenting, Listening

**UNIT III** **6 Hrs**

Work effectively in a team environment: Team Building Skills, Goals, Roles and Processes, The Leaders Role, Definitions, What Teams Need, Your Best and Worst Experiences, Team Building Stages, Team Requirements, Team Connections, Team Roles and Resources, Ground Rules, Utilizing Team Resources, Team Building Process, Symptoms of Team Stress, The Five Dysfunctions of Teams, Team Meetings, Facilitation Skills, Decision Strategies, Goal Setting and Problem Solving, Team Assessment.

**UNIT IV** **6 Hrs**

Demonstrate critical thinking

**UNIT V** **6 Hrs**

Understand the need for values and ethics at the workplace

**Total No of Hrs : 30**

| Subject Code: **CBDT22007** | Subject Name: **IMPLEMENTING JSF, HIBERNET &SPRING IN JAVA EE** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic skills of JSF ,Hibernate ,Spring** | **Ty** | **3** | **1** | **0** | **4** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Both spring and JSF, will take you through web application perspective. It gives user full tested API which is responsible for doing all the required functionalities based on Spring and JSF specification.
- Spring as container does various task, which your application needs to run properly as application.
- These features is fully tested and we can use these features based on requirement we have in our requirement.
- It also gives you feature like MVC, to develop web based application using spring MVC.
  To understand the concept of pointers and operations on files.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Introduction to JSF, Role of JSF in an Enterprise Application, Design Goals of JSF, Advantages of JSF, Comparing JSF with Struts, Exploring the JSF Framework, Overview of JSF Architecture, Life Cycle of a JSF Page, Components of a JSF Application. Exploring JSF Tag Libraries. |
| **CO2** | Introducing ORM, Features of Hibernate, Comparing Hibernate with EJB, Overview of Hibernate Architecture, Configuring Hibernate, Creating a Hibernate Session.<br>Mapping Classes with Relational Database, Hibernate Types, Identifying Various Mapping Elements, Mapping Value Type Objects, Mapping Collections, Mapping Entity Associations |
| **CO3** | Features of Spring, Comparing Spring with Struts and EJB, Core, DAO, ORM, AOP, MVC, Application Context, Web Context. Managing Application Objects, Introducing Bean Factory, Introducing Application Context, Injecting Application Objects, Applying Explicit Wiring, Applying Auto wiring. |
| **CO4** | Configuring Transactions Introducing AOP, Features of AOP, Describing Aspects, Creating Advice, Defining Point cut, Creating Proxy |
| **CO5** | Integrating Spring with JSF, Resolving JSF Beans, Adding the Spring Framework, Resolving Spring Beans, Integrating Spring with Hibernate. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | √ | | | | | | | |

| Subject Code: **CBDT22007** | Subject Name: **IMPLEMENTING JSF, HIBERNET &SPRING IN JAVA EE** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic skills of JSF ,Hibernate ,Spring** | **Ty** | **3** | **1** | **0** | **4** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL :Theory / Lab / Embedded Theory and Lab | | | | | | |

**OBJECTIVE:**

- Both spring and JSF, will take you through web application perspective. It gives user full tested API which is responsible for doing all the required functionalities based on Spring and JSF specification.
- Spring as container does various task, which your application needs to run properly as application. These features is fully tested and we can use these features based on requirement we have in our requirement. It also gives you feature like MVC, to develop web based application using spring MVC.
- On the other hand JSF gives you solution for building web interface as a whole.

**UNIT I** **12 Hrs**

**Overview of JSF:**Introduction to JSF, Role of JSF in an Enterprise Application, Design Goals of JSF, Advantages of JSF, Comparing JSF with Struts, Exploring the JSF Framework, Overview of JSF Architecture, Life Cycle of a JSF Page, Components of a JSF Application. Exploring JSF Tag Libraries, The HTML Tag Library The Core Tag Library. Creating a JSF Page, Creating a JSF Page Using JSP, Creating a JSF Page Using Facelets. Managing User Input, Defining Managed Beans, Identifying Managed Bean Scope, Configuring Managed Beans, Binding Managed Beans with UI Components, Introducing Converters, Introducing Validators, Managing Page Flow in a Web Application, Introducing the Navigation Model, Identifying Types of Navigation, Implementing Navigation, Understanding Request Dispatch Mechanism, Creating a Global Navigation Rule, Creating a Conditional Navigation.

Handling Events, Introducing the JSF Event Model, Identifying Event Classes and Event Listeners, Implementing Event Handler, Attaching the Event Listener, Working with Styles, Using Inline Styles, Using an Embedded Style Sheet, Using an External Style Sheet, Creating a Template File, Creating a Template Client. Introduction to Composite Components, Exploring the Composite Tag Library, Referring to a Composite Component, Creating a Composite Component, Adding Behavior to a Composite Component, Using a Composite Component.

Exploring AJAX, Defining AJAX, Working of an AJAX-enabled Web Page, Application Areas of AJAX, Advantages and Limitations of AJAX, Exploring the <f:ajax> Tag, Attaching AJAX Behavior to a Component.

**UNIT II** **12 Hrs**

**Introduction to Hibernate:**Introducing ORM, Features of Hibernate, Comparing Hibernate with EJB, Overview of Hibernate Architecture, Configuring Hibernate, Creating a Hibernate Session.

Mapping Classes with Relational Database, Hibernate Types, Identifying Various Mapping Elements, Mapping Value Type Objects, Mapping Collections, Mapping Entity Associations, Mapping Class Inheritance, Implementing Query Languages, Using HQL, Using Native SQL, Building a Criteria Query, Adding Restrictions, Persisting Objects, Identifying the Object States, The Transient State, The Persistent State, The Detached State, Persisting Objects, Retrieving Objects, Updating Objects, Deleting Objects.

Implementing Transactions and Concurrency, Properties of a Transaction, States of a Transaction, Configuring Transactions, Identifying the Concurrency Issues, Controlling the Concurrency Issues.

**UNIT III** **12 Hrs**

**Overview of Spring**:Features of Spring, Comparing Spring with Struts and EJB, Core, DAO, ORM, AOP, MVC, Application Context, Web Context. Managing Application Objects, Introducing Bean Factory, Introducing Application Context, Injecting Application Objects, Applying Explicit Wiring, Applying Autowiring.

**UNIT IV** **12 Hrs**

**Integrating Spring with Web Layer:**Configuring Transactions Introducing AOP, Features of AOP, Describing Aspects, Creating Advice, Defining Point cut, Creating Proxy.

**UNIT V** **12 Hrs**

**Integrating Spring with Business and Presentation Layers:**Integrating Spring with JSF, Resolving JSF Beans, Adding the Spring Framework, Resolving Spring Beans, Integrating Spring with Hibernate, Introducing ORM, Implementing ORM, Managing Transactions, Introducing Transactions, Features of Transactions, Identifying Transaction Attributes, Defining a Transaction Manager, Configuring Transactions.

**Total No of Hrs : 60**

**TEXT BOOKS:**

1. Spring and Hibernate, Authors: Mr. Santosh Kumar K, Publisher: McGraw Hill Education (India) Private Limited; 2 edition (June 6, 2013)
2. Core JavaServer Faces (3rd Edition), Authors: David Geary, Cay S. Horstmann, Publisher: Prentice Hall; 3 edition (June 6, 2010)
3. Spring Parsistance with Hibernate, Authors: Paul Fisher, Brain D. Murphy,Publisher: Apress; 2nd ed. edition (June 1, 2016)

**REFERENCES:**

1. Ed Roman, Rima Patel Sriganesh, Gerald Brose, Mastering Enterprise JavaBeans, 3rd Edition, WILEY publication,2005.
2. Jim Keogh, J2EE: The Complete Reference, TATA Mc-Graw Hill, 2002

| Subject Code: **CBDT22008** | Subject Name: **FRONT END DEVELOPMENT** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Rudimentary skill in Basic Front Development** | **Ty** | **2** | **1** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- In today's scenario, developers are choosing Angular framework in order to develop interactive and dynamic applications.
- Angular helps in building Single Page Applications (SPA) that uses Typescript
- which makes the applications more secured. It defines declarative UIs and enables object manipulation using POJO

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Exploring the Need of Angular, Creating the Initial Application, Identifying Angular Versions, Features of Angular, TypeScript: Features, Identifiers, Keywords, Data Types, and Variables, Functions, Lambda Functions and Function Overloading. |
| **CO2** | Angular Basics, Interpolation, Expressions, Data Binding, Structural Directives, Building our First App, Module, Bootstrapping, SPA and Routing |
| **CO3** | Introduction to RxJS and Observable, Understanding an Observable, Operators, Creating Observables, Differentiating EventEmitter and Observable, The Basics of HTTPClient Module, HTTP Requests. |
| **CO4** | Angular Directives in Depth, Async Validators, Implementing Async Validators, Optional Decorator, Injecting Optional Dependencies with @Optional Decorator, Directive Injection, Injecting Descendant Directive(s), Implementing Ajax-Button. |
| **CO5** | Getting Started with Unit Testing, Setting up Karma and Jasmine for Unit Testing, Naming Conventions of Testing, Unit Testing Pipes, Debugging Unit Tests in Karma, Introducing Protractor, Setting up Protractor for E2E Testing. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | √ | | | | | | | |

| Subject Code: **CBDT22008** | Subject Name: **FRONT END DEVELOPMENT** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Rudimentary skill in Basic Front Development** | **Ty** | **2** | **1** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL :Theory / Lab / Embedded Theory and Lab | | | | | | |

**Objective**

- In today's scenario, developers are choosing Angular framework in order to develop interactive and dynamic applications.
- Angular helps in building Single Page Applications (SPA) that uses TypeScript, which makes the applications more secured. It defines declarative UIs and enables object manipulation using POJO.

**UNIT I** **9 Hrs**

Exploring the Need of Angular, Creating the Initial Application, Identifying Angular Versions, Features of Angular, TypeScript: Features, Identifiers, Keywords, Data Types, and Variables, Functions, Lambda Functions and Function Overloading, Exploring the Object-Oriented Features.

**UNIT II** **9 Hrs**

Angular Basics, Interpolation, Expressions, Data Binding, Structural Directives, Building our First App, Module, Bootstrapping, SPA and Routing, Angular Dependency Injection, Sorting and Filtering Using Pipes, Understanding Angular Forms, Understanding Angular Validation, Understanding Reactive Forms.

**UNIT III** **9 Hrs**

Introduction to RxJS and Observable, Understanding an Observable, Operators, Creating Observables, Differentiating EventEmitter and Observable, The Basics of HTTPClient Module, HTTP Requests, The Async Pipe, Cross-Domain Access and Angular.

**UNIT IV** **9 Hrs**

Angular Directives in Depth, Async Validators, Implementing Async Validators, Optional Decorator, Injecting Optional Dependencies with @Optional Decorator, Directive Injection, Injecting Descendant Directive(s), Implementing Ajax-Button.

**UNIT V** **9 Hrs**

Getting Started with Unit Testing, Setting up Karma and Jasmine for Unit Testing, Naming Conventions of Testing, Unit Testing Pipes, Debugging Unit Tests in Karma, Introducing Protractor, Setting up Protractor for E2E Testing.

**Total No of Hrs: 45**

**TEXT BOOKS:**

1. **Angular: Up and Running: Learning Angular, Step by Step book written by Shyam Seshadri.**

**REFERENCES:**

1. **Angular 2 Development with Typescript is a book written by Yakov Fain and Anton Moiseev.**

| Subject Code: HBCC220022 | Subject Name: **ENTREPRENEURSHIP DEVELOPMENT** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : Basic knowledge in entrepreneurship development | **Ty** | 3 | 0 | 0 | 3 |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

1. To enrich the students towards the knowledge of entrepreneurial skills and to make the students understand the approaches to attain the goals of the business.
2. To recognize the value of problem solving, effective business management and entrepreneurial thinking to business development.
3. To identify the key factors and be able to apply the key entrepreneurial process – command and control, calculated risk-taking and opportunity recognition to business development

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Provide information related to entrepreneurship |
| **CO2** | Make students state the importance of entrepreneurial development |
| **CO3** | State the importance of business idea generations |
| **CO4** | Gain knowledge on various EDP organized by Government Sectors |
| **CO5** | Provide them the nature of economic development and entrepreneurial growth. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO3** | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 2 |
| **CO4** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** |
|---|---|---|---|
| **CO1** | 3 | 3 | 2 |
| **CO2** | 2 | 2 | 3 |
| **CO3** | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 3 |
| **CO5** | 3 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | ✓ | | | | | | | | |

| Subject Code: HBCC220022 | Subject Name: **ENTREPRENEURSHIP DEVELOPMENT** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : Basic knowledge in entrepreneurship development | **Ty** | 3 | 0 | 0 | 3 |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL :Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I: Concept of Entrepreneurship** **9 Periods**

Entrepreneurship - Meaning - Types - Qualities of an Entrepreneur - Classification of Entrepreneurs - Factors influencing Entrepreneurship - Functions of Entrepreneurs.

**UNIT II: Entrepreneurial Development Agencies.** **9 Periods**

Commercial Banks - District Industries Centre - National Small Industries Corporation Small Industries Development Organisation - Small Industries Service Institute.All India Financial Institutions.SIPCOT and its objectives.MSME Sector and its coverage Objectives of Ministry of MSME.Role and Functions of MICRO Small and Medium Enterprises - Development Organisation (MSME - DO) - Objectives of SIDCO - Functions of Tamil Nadu SIDCO - IRBI and its Role. NABARD and its role in the Rural Development of India - Introduction to Micro Units Development Refinance Agency (MUDRA)

**UNIT III: Project Management** **9 Periods**

Business idea generation techniques - Identification of Business opportunities – Feasibility study - Marketing, Finance, Technology & Legal Formalities - Preparation of Project Report- Tools of Appraisal.

**UNIT IV - Entrepreneurial Development Programmes** **9 Periods**

Entrepreneurial Development Programmes (EDP) - Role, relevance and achievements – Roleof Government in organizing EDPs- Critical evaluation

**UNIT V - Economic Development and Entrepreneurial growth** **9 Periods**

Role of Entrepreneur in Economic growth - Strategic approaches in the changing Economicscenario for small scale Entrepreneurs - Networking, Niche play, Geographic Concentration,Franchising / Dealership - Development of Women Entrepreneurship. Self-help groups andempowerment of Women in India - Financing SHG and their role in Micro-financing.Financial inclusion and its penetration in India, Challenges and Government role in Financialinclusion–PradhanMantri Jan-DhanYojana - Six Pillars of Its Mission objectives

| **Total Hours :** | **45** |
|---|---|

**Books for Study :**

1. Saravanavel, P. Entrepreneurial Development, Principles, Policies and Programmes, EssPee Kay Publishing House - 1997, Chennai.
2. Tulsian, P.C & Vishal Pandey, Business Organization and Management, PearsonEducation India, 2002, Delhi.

**Books for Reference :**

1. Janakiram, B, and Rizwana, M, Entrepreneurship Development, Text and Cases, ExcelBooks India, 2011, Delhi.
2. Arun Mittal & Gupta, S.L - Entrepreneurship Development, International Book HousePvt. Ltd, 2011, Mumbai.
3. Anil Kumar, S, Poornima, S, Abraham, K, Jayashree, K - Entrepreneurship Development, Newage International (P) Ltd, 2012, Delhi
4. Gupta C B and Srinivasan NP, Entrepreneurial Development, Sul

| Subject Code: | Subject Name: **ANGULAR & REACT LABORATORY USING JAVA SCRIPT** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| **CBDT22L05** | Prerequisite :**Basic skill in Angular & React using JS** | **Lb** | **0** | **0** | **4** | **2** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Develop an in-depth understanding typescripts and iterate the value of array
- Identify the typescript using switch case
- Implement Angular form.
- React Component by translating the HTML to JSX.

**COURSE OUTCOMES (Cos)**
Students completing this course were able to

| | |
|---|---|
| **CO1** | A program in typescript to store and iterate the value of an array. |
| **CO2** | A program in typescript using switch case. |
| **CO3** | A program to implement Angular form |
| **CO4** | A program for creating a workout application. |
| **CO5** | A program to implement React in "to-do " app. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |
| **CO2** | 2 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | √ | |

| Subject Code: **CBDT22L05** | Subject Name: **ANGULAR & REACT LABORATORY USING JAVA SCRIPT** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite :**Basic skill in Angular & React using JS** | **Lb** | **0** | **0** | **4** | **2** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

1. Write a program in typescript to store and iterate the value of an array.
2. Write a program in typescript using switch case.
3. Write a program to implement Angular form.
4. Write a angular program to develop guess the number application.
5. Write a program for creating a workout application.
6. Write a program to develop a application that perform two-way binding using angular.
7. Write a program to implement React in “to-do “ app.
8. Create a React Component by translating the HTML to JSX.

**Total no. of Hrs. needed to complete the Lab : 60**

| Subject Code: **CBDT22I02** | Subject Name: **PROFESSIONAL SKILLS II** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite :**Basic skill in Professional Skills-II** | **IE** | **0** | **0** | **2** | **1** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Basic concepts of Communication Skills.
- Explore the concepts on Oral speaking capability, Written, Presenting, Listening
- To demonstrate an understanding Work effectively in a team environment: Team Building Skills, Goals, Roles and Processes, The Leaders Role, Definitions.
- To Understand Demonstrate critical thinking.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Business writing skills and ability to provide data in standard formats is a key skill. |
| **CO2** | Organizations recognize the importance and ability of the individual to learn and develop their knowledge, skills, and competence while at work |
| **CO3** | This course will enable students to enhance their Interview handling skills. |
| **CO4** | Identify and develop knowledge and skills they need for the job and learn to present data/information in relevant business formats. |
| **CO5** | Understand the fundamental concepts of sales, accounting, and customer service. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | √ | | |

| Subject Code: **CBDT22I02** | Subject Name: **PROFESSIONAL SKILLS II** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite :**Basic skill in Professional Skills-II** | **IE** | **0** | **0** | **2** | **1** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **6 Hrs**

Business writing skills and ability to provide data in standard formats is a key skill.

**UNIT II** **6 Hrs**

Organizations recognize the importance and ability of the individual to learn and develop their knowledge, skills, and competence while at work

**UNIT III** **6 Hrs**

This course will enable students to enhance their Interview handling skills.

**UNIT IV** **6 Hrs**

Identify and develop knowledge and skills they need for the job and learn to present data/information in relevant business formats.

**UNIT V** **6 Hrs**

Understand the fundamental concepts of sales, accounting, and customer service.

***Total No of Hrs : 30***

| Subject Code: **HBFL22IXX** | Subject Name: **FOREIGN LANGUAGE** | **Ty/Lb/ ETP/IE** | **L** | **T / S.L r** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **NIL** | **Lb** | **0** | **0** | **2** | **1** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

Foreign language is introduced in the curriculum to make the students globally employable. Students should select and register for any one of the foreign languages from the given list. At the end of the course students should be able to read, write and converse the language in the basic level. At the end of the semester the assessment will be done through internal examination by the examiner duly appointed by the head of the department.

| S.NO | COURSE CODE | COURSE NAME |
|---|---|---|
| 1 | EBFL22I01/HBFL22I01 | FRENCH |
| 2 | EBFL22I02/ HBFL22I02 | GERMAN |
| 3 | EBFL22I03/ HBFL22I03 | JAPANESH |
| 4 | EBFL22I04/ HBFL22I04 | ARABIC |
| 5 | EBFL22I05/ HBFL22I05 | CHINESE |
| 6 | EBFL22I06/HBFL22I06 | RUSSIAN |
| 7 | EBFL22I07/HBFL22I07 | SPANISH |

| Subject Code: **CBCA22012** | Subject Name: **OBJECT ORIENTED MODELING AND DESIGN** | **Ty/Lb/ ETP/IE** | **L** | **T / S.L r** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Programming fundamentals with C++** | **Ty** | **3** | **1** | **0** | **4** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Develop a working understanding of formal object-oriented analysis and design processes.
- Develop an appreciation for and understanding of the risks inherent to large-scale software development-
- Develop the skills to determine which processes and OOAD techniques should be applied to a given project.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | To understand the Basic concepts of object oriented system development. |
| **CO2** | To understand the methodology and UML. |
| **CO3** | To understand the concept of object oriented analysis identifying use case. |
| **CO4** | To understand the concept of object oriented design. |
| **CO5** | To understand the concept of software quality assurance. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 2 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | √ | | | | | | | |

| Subject Code: **CBCA22012** | Subject Name: **OBJECT ORIENTED MODELING AND DESIGN** | **Ty/Lb/ ETP/IE** | **L** | **T / S.L r** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Programming fundamentals with C++** | **Ty** | **3** | **1** | **0** | **4** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**OBJECTIVES:**

- Develop a working understanding of formal object-oriented analysis and design processes.
- Develop an application and understanding of the risks inherent to large-scale software development.
- Develop the skills to determine which processes and OOAD techniques should be applied to a given project.

**UNIT I** **12 Hrs**

Introduction OOSD Methodology - Unified approach – Object basics – Object state and properties – Behavior – Methods – Messages – Information hiding – Class hierarchy – Relationships – Associations – Aggregations- Identity – Dynamic binding – Persistence – Meta classes – Object oriented system development life cycle – S/W device process- High quality Software Object Oriented System Development- Reusability.

**UNIT II** **12 Hrs**

Methodology and UML Introduction – Survey – Rumbugh- Booch- Jacobson methods – Patterns – Frameworks – Unified approach – Unified modeling language – Static and Dynamic models – UML diagrams – Class diagram – Use case diagrams – Dynamic modeling diagrams – Interaction Diagrams- sequence diagrams.

**UNIT III** **12 Hrs**

Object Oriented Analysis Identifying Usecase – Business object analysis – Usecase driven object oriented analysis – Usecase model – Documentation – Introduction- classification theory- Approaches for Identifying classes – Identifying object-relationships- attributes- methods – Super-sub class – Aggregation Class Responsibility – Object responsibility.

**UNIT IV** **12 Hrs**

Object Oriented Design -Design process – Axioms – Corollaries – Designing classes – Class visibility – Refining attributes – Methods and protocols – Object storage and object interoperability – DBMS – Object relational systems – Designing interface objects – Macro and Micro level processes – The purpose of a view layer interface

**UNIT V** **12 Hrs**

Software Quality assurance – Testing strategies – Object orientation testing – Test cases – Test Plan – Debugging principles – Usability – Satisfaction – Usability testing – Satisfaction testing.

**Total no. of Hrs : 60**

**REFERENCES:**

1. Ali Bahrami(2003),*Object Oriented System Development*, McGraw Hill International Edition.
2. Craig Larman(2002) *Applying UML and Patterns*(2nd ed.) Pearson.
3. James Rumbaugh(2004) *Object Oriented Modeling Language* (2nd ed. ), PHI.

| Subject Code : HBCC22ET1 | Subject Name UNIVERSAL HUMAN VALUES | Ty/Lb/ ETL | L | T/ SLr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : None | ETP | 2 | 0 | 2 | 3 |

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Describe meaning, purpose, and relevance of universal human values.
- Understand the importance of values in individual, social, career, and national life.
- Learn from lives of great and successful people who followed and practiced human values and achieved self-actualization.
- Understand and practice professional ethics with the goal for the universal wellness

COURSE OUTCOMES (Cos) :
Students completing the course were able to

| | |
|---|---|
| CO1 | Become conscious practitioners of values |
| CO2 | Realize their potential as human beings and conduct themselves properly in the ways of the world. |
| CO3 | Develop integral life skills with values |
| CO4 | Inculcate and practice them consciously to be good human beings. |
| CO5 | Practice professional ethics with the goal for the universal wellness |

Mapping of Course Outcomes with Program Outcomes (POs)

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 |
|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| CO2 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| CO3 | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| CO5 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | √ | | |

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 |
|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 2 | 3 | 3 | 2 |
| CO2 | 2 | 2 | 1 | 3 | 2 | 2 | 1 |
| CO3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 2 | 3 | 3 | 3 | 2 |
| CO5 | 3 | 2 | 2 | 3 | 3 | 2 | 2 |
| | 3 | 3 | 2 | 2 | 3 | 3 | 2 |

| Subject Code : HBCC22ET1 | Subject Name UNIVERSAL HUMAN VALUES | Ty/Lb/ETL | L | T/SLr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : None | ETP | 2 | 0 | 2 | 3 |
| L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: CreditsT/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**COURSE NAME: UNIVERSAL HUMAN VALUES**

Unit 1 Love and Compassion:

Love and its forms: love for self, parents, family, friend, spouse, community, nation, humanity, nature and other beings—living and non-living. Love and compassion and inter-relatedness, Individuals who are remembered in history for love and compassion and what will learners gain if they practice love and compassion

Related activities: Sharing learner's individual and/or group experience(s), community outreach program to manifest love and compassion toward people and nature, Simulated Situations, Case studies

UNIT 2:

Truth and Righteousness: Universal truth, truth as value (artha), truth as fact (satya), veracity, sincerity, honesty among others. Understanding righteousness, Righteousness and dharma, righteousness and propriety, Individuals who are remembered in history for practicing truth and righteousness and what will learners gain if they practice Truth and Righteousness

Sharing learner's individual and/or group experience(s), exercises on ease with truth can be recalled consistently, Simulated Situations, Case studies

Unit 3:

Non-Violence and Peace; pre-requisites for non-violence- Love, compassion, empathy, and sympathy, Ahimsa as non-violence and non-killing, the impact of practicing non-violence-Peace, harmony and balance, Individuals and organizations that are known for their commitment to non- violence and peace, and what will learners gain if they practice non-violence and work towards peace

Sharing learner's individual and/or group experience(s), Simulated Situations, Case studies

Unit 4:

Renunciation (Sacrifice) Tyaga: Renunciation and sacrifice, developing a balance between enjoyment and sacrifice, Bhoga(enjoyment) with tyagabhava and tyaga (Sacrifice) with bhogabhava is the root of all human and literary values, enjoying life and freedom with responsibility and What will learners learn/gain if they practice renunciation and sacrifice

Social outreach programs for sharing and caring experience, expressing gratitude, Sharing learner's individual and/or group experience(s), Simulated Situations , Case studies

Unit 5:

**Professional Ethics:** Understanding Acceptance of human values and Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Developing Competence in professional ethics and practicing it, to utilize the professional competence for augmenting universal human order and create people friendly eco-friendly identify the scope and characteristics of people friendly and eco-friendly systems for the wellness of the universe as a whole. Exercises to propagate people friendly eco-friendly activities both creative and functional, Brain storming, Sharing learner's individual and/or group experience(s), Simulated Situations , Case studies

**References and Suggested Readings:**

Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books,New Delhi, 2010

The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

Basham, A.L. 1954. The Wonder That Was India. London: Picador Press.

Basu, D.D. 2015. Workbook on the Constitution of India, Paperback Edition. Nagpur: Lexisnexis.

Ghosh, Sri Aurobindo. 1998. The Foundations of Indian Culture. Pondicherry: Sri Aurobindo Ashram.

Joshi, Kireet. 1997. Education for Character Development. Delhi: Dharam Hinduja Centre of Indic Studies.

Milton, Rokeach. 1973. The Nature of Human Values. New York: The Free Press.

Mookerji, Radha K. 1989. Ancient Indian Education. Delhi: Motilal Banarasidass

Saraswati, Swami Satyananda .2008. Asana Pranayama Mudra Bandha. Munger, India: Bihar School of Yoga.

| Subject Code: CBDT22L06 | Subject Name: **PROJECT WORK** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : : **Basic knowledge in Programming ,Computer Applications and its Concepts** | **Lb** | **0** | **0** | **18** | **9** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To investigate the ability on ideas and transformations.
- To implement the technologies or its combinations.
- To analyze on modeling the concepts to bring it to real time.
- To create a database models that is going to be the store house of information.
- To develop an executable application.
- To prepare project report that is going to be the referral document for the complete project.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the concepts , use them in ideas and transform it to applications. |
| **CO2** | Implement the technology to bring a new product. |
| **CO3** | Apply different algorithms and derive coding modules for execution. |
| **CO4** | Complete knowledge of database concepts pertaining to product developed. |
| **CO5** | Illustrate the completed project as document that stands as the source of reference. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 3 | 3 | 1 | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO5** | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 2 | 2 |
| **CO3** | 2 | 3 | 1 | 3 |
| **CO4** | 3 | 2 | 3 | 3 |
| **CO5** | 3 | 3 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | √ | |

| Subject Code: CBDT22L06 | Subject Name: **PROJECT WORK** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : : **Basic knowledge in Programming ,Computer Applications and its Concepts** | **Lb** | **0** | **0** | **18** | **9** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**Students will be able to develop an application in specific domains. Students are expected to carry out the following:**

i. Implementing the technologies or its combinations

ii. Analysing and modeling the concepts of system engineering

iii. Generate Database Models

iv. Develop an executable application

v. Prepare project report

| Subject Code: CBCA22E01 | Subject Name: **Data Mining and Ware Housing** | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Familiarity with data analysis tools, especially SQL, NoSQL, SAS, and Hadoop.** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Be familiar with mathematical foundations of data mining tools.
- To Understand and implement classical models and algorithms in data warehouses and data mining.
- To Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- To Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the functionality of the various data mining and data warehousing component |
| **CO2** | Appreciate the strengths and limitations of various data mining and data warehousing models. |
| **CO3** | Explain the analyzing techniques of various data |
| **CO4** | Describe different methodologies used in data mining and data ware housing. |
| **CO5** | Compare different approaches of data ware housing and data mining with various technologies. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | √ | | | | | | |

| Subject Code: CBCA22E01 | Subject Name: **Data Mining and Ware Housing** | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Familiarity with data analysis tools, especially SQL, NoSQL, SAS, and Hadoop.** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT – I** **9 Hrs**

**Introduction:** Data mining application – data mining techniques – data mining case studies- the future of data mining – data mining software - **Association rules mining: Introduction**- basics- task and a naïve algorithm- apriori algorithm – improve the efficient of the apriori algorithm – mining frequent pattern without candidate generation (FP-growth) – performance evaluation of algorithms.

**UNIT – II** **9 Hrs**

**Classification :** Introduction – decision tree – over fitting and pruning - DT rules-- naïve bayes method- estimation predictive accuracy of classification methods - other evaluation criteria for classification method – classification software

**UNIT – III** **9 Hrs**

**Cluster analysis**: cluster analysis – types of data – computing distances-types of cluster analysis methods - partitioned methods – hierarchical methods – density based methods – dealing with large databases – quality and validity of cluster analysis methods - cluster analysis software.

**UNIT – IV** **9 Hrs**

**Web data mining:** Introduction- web terminology and characteristics- locality and hierarchy in the web- web content mining-web usage mining- web structure mining – web mining software - **Search engines:** Search engines functionality- search engines architecture – ranking of web pages.

**UNIT – V** **9 Hrs**

**Data warehousing:** Introduction – Operational data sources- data warehousing - Data warehousing design – Guidelines for data warehousing implementation - Data warehousing metadata - **Online analytical processing (OLAP):** Introduction – OLAP characteristics of OLAP system – Multidimensional view and data cube - Data cube implementation - Data cube operations OLAP implementation guidelines

**Total 45 Hrs**

**BOOK FOR STUDY: —**Introduction to Data mining with case studies‖, G.K. Gupta, PHI Private limited, New Delhi, 2008**.** 2nd Edition, PHI , 2011

**BOOK FOR REFERENCE**

Data Mining Techniques, Arun K Pujari , University Press

| Subject Code: CBCA22E02 | Subject Name: **INFORMATION SECURITY** | **Ty/Lb/ETP/IE** | **L** | **T / SLr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : : **Concept of Information handling** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To introduce the concepts of Information Security, and its Characteristics.
- To impart the basic concepts of Security Investigation and its Ethical and Professional Issues.
- To familiarize the concepts of Security Analysis and Risk Management.
- To provide knowledge about Information Security Policy Standards and NIST framework
- To understand the Physical design and cryptography and its technology.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the basic concepts of Information Security. |
| **CO2** | Applying the concepts of security investigation in Business needs, Legal and professional ethics. |
| **CO3** | Expose the ongoing process of identifying security risks and implementing plans to address them. |
| **CO4** | Implement ISO17799 (Indian Standard) and BS 7799 (British Standard) Information Security Policy standards establish guidelines and general principles for maintaining and improving Information Security Management. Protect Industrial assets from Cyber threats using NIST frame work. |
| **CO5** | Detecting vulnerability exploits against a target Computer by Intrusion Detection System. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 2 | 1 | 3 |
| **CO4** | 3 | 3 | 3 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | √ | | | | | | |

| Subject Code: CBCA22E02 | Subject Name: **INFORMATION SECURITY** | **Ty/Lb/ETP/IE** | **L** | **T / SLr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : : **Concept of Information handling** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **9 Hrs**

**Introduction:** History, What is Information Security? Critical Characteristics of Information - NSTISSC Security Model - Components of an Information System - Securing the Components - Balancing Security and Access - The SDLC - The Security SDLC

**UNIT II** **9 Hrs**

**Security Investigation**: Need for Security - Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

**UNIT III** **9 Hrs**

**Security Analysis** : Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

**UNIT IV** **9 Hrs**

**Logical Design**: Blueprint for Security - Information Security Poicy - Standards and Practices - ISO 17799/BS 7799 - NIST Models - VISA International Security Model - Design of Security Architecture - Planning for Continuity

**UNIT V** **9 Hrs**

**Physical Design** : Security Technology – IDS - Scanning and Analysis Tools – Cryptography - Access Control Devices - Physical Security - Security and Personnel

**Total No of Hrs : 45**

**TEXT BOOK:**

1. 1.Michael E Whitman and Herbert J Mattord(2003) , "*Principles of Information Security*", Vikas Publishing House, New Delhi.

**REFERENCES:**

1. Micki Krause, Harold F. Tipton(2004), " *Handbook of Information Security Management*", Vol 1-3 CRC Press LLC.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz(2003), "*Hacking Exposed*", Tata McGraw-Hill.
3. Matt Bishop(2002), *" Computer Security Art and Science*", Pearson/PHI.

| Subject Code:**CBCA 22E03** | Subject Name: **PROFESSIONAL ETHICS** | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : : **A Glance in Commercial awareness and Communication** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits T/L/ETL : Theory / Lab

**OBJECTIVES**

- It is the field of system in moral principles that applies in practice of engineering.
- It is the process which lets you to go through the social and engineering experiments to balance the outlook of law.
- To enhance engineering calculation, assessment of safety and risk, in technical process.
- To develop ethical values, honestly applied and recognized as the part of corporate dialogue.
- In an international business it involves employment practice, human rights and moral obligation

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Learn the purpose of engineering ethics is to identify specific ethical issues, technical issues can help engineers to learn from both previous failures and successes. professional ideals, theories about right action |
| **CO2** | Process of developing a product, an engineer generally learns through experimentation. To simply put, a trial and error method is the mostly used one to obtain results |
| **CO3** | Meet the organizational goals, safety the professionals should possess respect for authority. The levels of authority maintained by the organization provides a means for identifying areas of personal responsibility and accountability without any risk |
| **CO4** | Understand Engineering codes of ethics mention collegiality, they generally cite acts that constitute disloyalty. The disloyalty of professionals towards an organization. |
| **CO5** | Know Conflicts that occur over technical, economic, and time factors such as cost, time, logistics required to make it in a possible way of coding in international commercial market. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 3 | 3 | 1 | 3 | 3 | 1 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 1 |
| **CO3** | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 2 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | √ | | | | | | |

| Subject Code:**CBCA 22E03** | Subject Name: **PROFESSIONAL ETHICS** | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : : **A Glance in Commercial awareness and Communication** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits T/L/ETL : Theory / Lab | | | | | | |

**UNIT I** **9 Hrs**

**ENGINEERING ETHICS** : Senses of 'engineering ethics' – variety of moral issues – types of inquiry – moral dilemmas – moral autonomy – kohlberg's theory – gilligan's theory – consensus and controversy – professions and professionalism – professional ideals and virtues – theories about right action – self-interest – customs and religion – uses of ethical theories.

**UNIT II** **9 Hrs**

**ENGINEERING AS SOCIAL EXPERIMENTATION**: Engineering as experimentation – engineers as responsible experimenters – codes of ethics – a balanced outlook on law – the challenger case study.

**UNIT III** **9 Hrs**

**ENGINEER'S RESPONSIBILITY FOR SAFETY**: Safety and risk – assessment of safety and risk – risk benefit analysis – reducing risk – the three mile island and chernobyl case studies.

**UNIT IV** **9 Hrs**

**RESPONSIBILITIES AND RIGHTS** : Collegiality and loyalty – respect for authority – collective bargaining – confidentiality – conflicts of interest – occupational crime – professional rights – employee rights – intellectual property rights (ipr) – discrimination

**UNIT V** **9 Hrs**

**GLOBAL ISSUES** : Multinational corporations – environmental ethics – computer ethics – weapons development – engineers as managers – consulting engineers – engineers as expert witnesses and advisors – moral leadership – sample code of conduct

**Total No of Hrs : 45**

**TEXT BOOK:**

1. Mike Martin and Roland SchinzingeR(1996), "*Ethics in Engineering*", McGraw Hill, New York.

**REFERENCES:**

1. Charles D Fleddermann(1999), *"Engineering Ethics*", prentice Hall, New Mexico.
2. Laura Schlesinger(1996), "*How Could You Do That: The Abdication of Character, Courage, and Conscience*", Harper Collins, New York.
3. Stephen Carter(1996), "*Integrity", Basic Books*, New York.
4. Tom Rusk(1993), "*The Power of Ethical Persuasion: From Conflict to Partnership at Work and in Private Life*", Viking, New York.

| Subject Code: CBCA22E04 | Subject Name: **SOFTWARE PROJECT MANAGEMENT** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic knowledge in Software Engineering.** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To impart the basic concepts of Project Management Framework.
- To provide project planning and scheduling project monitoring and selection of appropriate project approach.
- To Learn about the Project Management Knowledge to discuss the notion of risks and the risk management and to study Resource allocation.
- To follow International standards for Software Quality& To examine case study for the Project.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Develop the model from the conventional software product to the modern framework, function of project management is to ensure that all the activities in a project are scheduled and achieved efficiently. |
| **CO2** | Apply schedule and cost control techniques for project monitoring and design the software architecture have an exposure for organizing, selecting and managing a software project. |
| **CO3** | Explore the knowledge in Risk Management that comprises Risk Identification, Analysis and Risk Planning and to study Resource allocation that comprises a process of assigning and scheduling available resources in the most effective and economic manner. |
| **CO4** | Implement the Quality Standards ISO:9000 which is used to effective QA system and to expose CMM model which is a methodology used to develop and refine an organization software process. |
| **CO5** | Examine the case study for the Project Prince Project Management is a Process based approach that focus on organization and control througWhout the project from start to end and to illustrate British standard BS:6079 helps the organization to get project management consistently right, |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO3** | 2 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 2 | 3 |
| **CO3** | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 1 | 3 | 3 |
| **CO5** | 2 | 3 | 3 | 2 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | √ | | | | | | |

| Subject Code: CBCA22E04 | Subject Name: **SOFTWARE PROJECT MANAGEMENT** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic knowledge in Software Engineering.** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **9 Hrs**

**Introduction to Software Projects** : An Overview of Project Planning – Project Management and Evaluation .

**UNIT II** **9 Hrs**

**Selection of an appropriate Project approach** : Software effort Estimation -Activity Planning :- Project Schedules – Sequencing and Scheduling Projects – Network Planning Model – forward and backward pass-Identifying the Critical path-Activity float-Shortening Project Duration – Identifying Critical Activities-precedence networks.

**UNIT III** **9 Hrs**

**Software quality assurance plan & Risk Management** : Resource Allocation – Monitoring and Control, Reviews and Audits – Management.

**UNIT IV** **9 Hrs**

**Models** : ISO 9000 model, CMM model – Comparisons - ISO 9000 weaknesses - Managing People and Organizing Teams – Software Quality -Planning for Small Projects.

**UNIT V** **9 Hrs**

Case Study – PRINCE Project Management, BS 6079:1996

**Total No of Hrs : 45**

**TEXT BOOK**:

1. Mike Cotterell, Bob Hughes , “Software Project Management”, Inclination/Thomas Computer Press, 4th Edition, 2004. Chapters : 1-13

**REFERENCES:**

1. Darrel Ince, H.Sharp and M.Woodman,” Introduction to Software Project Management and Quality Assurance”, Tata McGraw Hill, 1995.
2. Philip.B.Crosby, Quality is Free: The Art of Making Quality Certain, Mass Market, 1992.

| Subject Code: **CBCA22E05** | Subject Name: **MANAGEMENT INFORMATION SYSTEM** | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic Knowledge in Information System** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Enables to know the basic purpose of studying MIS and how it is important in the field of computer applications.
- Briefing about how MIS plays key role in communicating the information in efficient manner.
- To identify the challenges and enabling to choose the best course of action.
- Enabling MIS to bring out the strength of the management & making it as opportunity for overall growth of the organization.
- Imparting knowledge on how MIS is making decision as effective, quick & timely manner.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | To know how MIS using its scientific way of collecting, processing, storing and communicating information relating to the different activities to the various levels of management. |
| **CO2** | To understand how Information Technology and Information system is interdependent, and how IT helps Information system to reach its goal by using various tools in database management system. |
| **CO3** | A bird view on how conceptual design framework is useful in identifying the problems, setting objectives, finding best alternatives for the effective operations. |
| **CO4** | Emphasizing on how to prepare a blue print of a system that meets the goals of the conceptual system design requirements by involving various phases like Project planning and control, Involve the user, define the detailed sub-system, I /O design, obtaining feedback, database design, procedure design, documentation etc,. |
| **CO5** | A detailed view of how MIS is implemented, evaluated, & maintained by means of various steps like planning the implementation, allotting tasks, acquiring layout facility, organizing & training personnel, Acquiring software & hardware, generating files, testing, documenting & evaluating. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | √ | | | | | | |

| Subject Code: **CBCA22E05** | Subject Name: **MANAGEMENT INFORMATION SYSTEM** | **Ty/Lb/E TP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic Knowledge in Information System** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits T/L/ETL :Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **9 Hrs**

**Foundation of Information System** : Introduction to Information System and MIS – Decision support and decision making systems - systems approach - the systems view of business - MIS organization within company - Management information and the systems approach

**UNIT II** **9 Hrs**

**Information Technology** : A manager's overview - managerial overviews - computer hardware and software - DBMS - RDBMS - Telecommunication

**UNIT III** **9 Hrs**

**Conceptual system design**: Define the problems - set systems objective - establish system – constraints - determine information needs determine information sources - develop alternative conceptual design and select one document the system concept - prepare the conceptual design report

**UNIT IV** **9 Hrs**

**Detailed system design** : Inform and involve the organization - aim of detailed design - project management of MIS detailed design - identify dominant and trade of criteria - define the sub systems - sketch the detailed operating sub systems and information flow - determine the degree of automation of each operation - inform and involve the organization again - inputs outputs and processing - early system testing – software - hardware and tools propose an organization to operate the system - document the detailed design - revisit the manager user

**UNIT V** **9 Hrs**

**Implementation evaluation and maintenance of the MIS :** Plan the implementation - acquire floor space and plan space layouts - organize for implementation - develop procedures for implementation - train the operating personnel - computer related acquisitions - develop forms for data collection and information dissemination - develop the files test the system - cut-over - document the system - evaluate the MIS control and maintain the system - Pitfalls in MIS development

**Total no. of Hrs : 45**

**TEXT BOOK:**

1. W. S. Jawadekar(2002), *Management Information System*, Tata McGraw Hill.

**REFERENCES:**

1. Robert G. Murdick, Loel E. Ross &James R. Claggett, *Information System for Modern Management* (3rd Ed), PHI.
2. Brian,O, *Management Information System*, TMH.
3. Davis Olson, *Management Information System*, McGraw Hill.

| Subject Code: CBCA22E06 | Subject Name: **MOBILE COMPUTING** | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Mobile Communication and Network Security** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To introduce the concepts of Mobile Computing and its Principle.
- To impart the basic concepts of Radio Frequency and the Transmission of Radio Signals.
- To familiarize the concepts of Telecommunication and its Networks.
- To provide the knowledge of Wireless LAN and its architecture.
- To understand the Mobile Network and Transport Layer and its technology.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the basic concepts of Mobile Computing. |
| **CO2** | Applying the radio frequency in mobile computing are used in communication devices such as transmitters, receiver, etc. waves are a form of electromagnetic radiation with identified radiofrequencies**.** |
| **CO3** | Implement the basic concept of Medium access or multiplexing methods are FDMA, CDMA, TDMA and SDMA the mechanism. |
| **CO4** | Evaluate the Wireless LAN-Design goals-Wireless transmission technology, Settings for wireless LAN-IEEE 802.11- Architecture. Simultaneously use of equipment and reduce the wiring expense. |
| **CO5** | Create Physical design, Technology, Alter the Transmission and physical security. A conceptual division of methods in the layered architecture of protocols in the network stack in the Internet protocol. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 2 | 3 | 1 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 2 |
| **CO2** | 2 | 1 | 2 | 3 |
| **CO3** | 3 | 3 | 1 | 1 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 1 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | √ | | | | | | |

| Subject Code: CBCA22E06 | Subject Name: **MOBILE COMPUTING** | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Mobile Communication and Network Security** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **9 Hrs**

**Fundamentals of Wireless Transmission:** Wireless-Wireless networks in comparison to fixed networks-Mobile communication: Development – Principles of mobile communication – Overview of mobility and portability- Issues for portability- Effects of device portability – Applications-Reference model

**UNIT II** **9 Hrs**

**Radio Transmission:** Frequency – Signals – antennas –Signal propagation- Multiplexing – Modulation-Spread Spectrum(DSSS,FHSS).

**UNIT III** **9 Hrs**

**Medium access control:** Motivation for specialized MAC,SDMA,FDMA,TDMA,CDMA, Comparison of the Medium access mechanism-Telecommunication Networks –GSM, Satellite communication.

**UNIT IV** **9 Hrs**

**Wireless LAN**: Advantages of Wireless LAN-Design goals-Wireless transmission technology-Settings for wireless LAN-IEEE 802.11: System architecture-Bluetooth

**UNIT V** **9 Hrs**

**Mobile Network Layer and Transport Layer**: Mobile IP-DHCP-Traditional TCP-Congestion control – mechanism to alter the transmission – Classical TCP Improvements

**Total No of Hrs : 45**

**TEXT BOOK:**

1. JochenSchiller (2014) *MobileCommunications*(2nd ed.), PearsonEducation
2. Nithyanandam .S,Ambika.M,Gayathri K.S., “Mobile Computing”, Dhanpat Rai &co.(P)Ltd

**REFERENCE:**

**1.** WilliamC.Y.Lee(1995) *MobileCellularTelecommunications*(2nd ed.) , Mc-Graw- Hill.

| Subject Code: CBCA22E07 | Subject Name: **IMAGE PROCESSING** | **Ty/Lb/ ETP/IE** | **L** | **T / S.L r** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic knowledge in Computer Graphics** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To introduce the basic principles of Image Processing
- To discuss different techniques employed for the enhancement of Images.
- To describe different causes of for Image degradation and Image restoration techniques.
- To know the need for Image Compression and to learn different techniques for Image Compression.
- To gain knowledge in various methods of Image Segmentation and Representation

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Review the fundamentals concepts of an Image processing system and to transform 2D special domain image into 2D frequency domain Image which is used for processing. |
| **CO2** | Implement direct manipulation of pixels in an image using different Spatial domain methods for Image Enhancement. |
| **CO3** | Operating a noisy Image and estimating the clean, original image by using Least mean square filtering and Blind Image Restoration techniques. |
| **CO4** | Examine to retain the image quality remains the same after compression using Lossless Compression and to eliminate redundant information of an image using Lossy Compression. |
| **CO5** | Locate objects and boundaries in images using Edge detection and Region Based Segmentation |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 |
| **CO2** | 3 | 3 | 2 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO4** | 3 | 2 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 1 | 3 |
| **CO2** | 2 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | 3 |
| **CO4** | 2 | 3 | 1 | 3 |
| **CO5** | 3 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | √ | | | | | | |

| Subject Code: CBCA22E07 | Subject Name: **IMAGE PROCESSING** | **Ty/Lb/ ETP/IE** | **L** | **T / S.L r** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Basic knowledge in Computer Graphics** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **9 Hrs**

**DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS**: Elements of visual perception – Image sampling and quantization Basic relationship between pixels – Basic geometric transformations-Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform – FFT

**UNIT II** **9 Hrs**

**IMAGE ENHANCEMENT TECHNIQUES**: Spatial Domain methods: Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters.

**UNIT III** **9 Hrs**

**IMAGE RESTORATION**: Model of Image Degradation/restoration process – Noise models – Inverse filtering - Least mean square filtering – Constrained least mean square filtering – Blind image restoration –

**UNIT IV** **9 Hrs**

**IMAGE COMPRESSION**: Lossless compression: Variable length coding – LZW coding – Bit plane coding predictive coding-DPCM. Lossy Compression: Transform coding – Wavelet coding – Basics of Image compression standards

**UNIT V** **9 Hrs**

**IMAGE SEGMENTATION AND REPRESENTATION**: Edge detection – Thresholding - Region Based segmentation – Boundary representation: chair codes- Polygonal approximation –Boundary segments –boundary descriptors: Simple descriptors-Fourier descriptors - Regional descriptors

**Total No of Hrs : 45**

**TEXT BOOK:**

1. Rafael C Gonzalez, Richard E Woods(2003), "*Digital Image Processing*(2nd. ed.), Pearson Education.

**REFERENCES:**

1. William K Pratt(2001), "*Digital Image Processing*", John Willey (2001) .

| Subject Code: CBCA22E08 | Subject Name: **CLOUD COMPUTING** | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : : **Rudimentary skill in Cloud concept** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- The basic ideas behind Cloud Computing, the evolution of the paradigm, cloud based services and its platforms.
- Explore the concept , characteristics, delivery models and benefits of cloud computing and its applicability, scalability & reliability.
- Understand the cloud networking options, basics of python and its characteristics, python for cloud
- Understand the cloud resource management and cloud based services along with application development in python and its key security,key technical compliance.
- Broadly educate to know the impact of cloud benchmarking and tuning on legal and societal issues involved in health care industry and education and addressing it.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Articulate the main concepts, key technologies& terminologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing mainly focusing on compute, storage and database services. |
| **CO2** | Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc and its storage approaches. |
| **CO3** | Illustrate the fundamental concepts of cloud storage and demonstrate the control flow, modules and functions such as python for windows azure, Amazon and Google cloud services. |
| **CO4** | Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application and python web application framework. |
| **CO5** | Expose to frontier areas of Cloud Computing using mobile cloud, cloud security, multimedia cloud and information systems, while providing sufficient foundations to enable further study and research. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 2 |
| **CO2** | 2 | 3 | 3 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO3** | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 3 |
| **CO4** | 3 | 2 | 3 | 3 | 1 | 3 | 3 | 1 | 3 |
| **CO5** | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 1 |
| **CO2** | 3 | 2 | 3 | 2 |
| **CO3** | 2 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | √ | | | | | | |

| Subject Code: CBCA22E08 | Subject Name: **CLOUD COMPUTING** | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : : **Rudimentary skill in Cloud concept** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT 1** **9 Hrs**

**Introduction and Concepts**: Defining cloud computing – Cloud models- Characteristics of Cloud Computing – Cloud based services and Applications - Cloud services and platforms: Compute Services, Storage Services, Database services, Application Services, Content Delivery Services

**UNIT II** **9 Hrs**

**Cloud Application Design**: Introduction- Scalibility- Reliability – Reference Architectures for Cliud Applications- Cloud Application Design Methodlogies : Service Oriented Arcitecture, Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications- Data Storage Approches

**UNIT III** **9 Hrs**

**Phython Basics** : Introduction – Installing Python – Python Data types and Data Structures- control flow – functions – modules- Python for Cloud : Phthon for Amzon Web Services , Python for Google Cloud Platform – Python for windows Azure

**UNIT IV** **9 Hrs**

**Cloud Application Development in Python** : Python Packages of Interest – Python Web Application Framework (Django) – Designing RESTful API - Design Approaches – Image Processing App

**UNIT V** **9 Hrs**

**Advanced Topics** : Multimedia Cloud - Using the Mobile Cloud – Cloud Application Benchmarking and Tuning – Cloud Security – Cloud for Industry, Healthcare and Education

**Total No of Hrs : 45**

**TEXT BOOK:**

1. Arshdeep Bahga & Vijay Madisetti(2016), "*Cloud Computing A Hands – on Approach*", Universities Press

**REFERENCES:**

1. Kris Jamsa**(2013), "*Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More*", Jones & Bartlett Learning , Publisher.**
**2.** Barrie Sosinsky**(2011), "*Cloud Computing Bible* ", Wiley Publishing.**

| Subject Code: CBCA22E09 | Subject Name: **OPEN SOURCE PROGRAMMING** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Concept of Information handling** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Understand concepts, strategies, and methodologies related to open source software development.
- Impart the business, economy, societal and intellectual property issues of open source software.
- Be familiar with open source software products and development tools currently available on the market.
- To provide knowledge about IoT.
- To understand knowledge about Big Data through case studies.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the basic concepts of Open Source Programming. |
| **CO2** | Applying the Principles and Methodologies of Free Open Source Software(FOSS)allow users to freely run, modify and also to freely distribute copies of either the original version or their modified version. |
| **CO3** | Implement the case studies like Apache, BSD, Linux, Mozilla (Firefox), Wikipedia, Joomla, GCC, Open Office |
| **CO4** | Imparting the Definitions, overview, definitions and concepts of IoT, things that are embedded with software, electronics, network, and sensors that allows these objects to collect and exchange data. |
| **CO5** | Understand the Introduction to Big Data, Distributed file system gets analytics using the map reduce algorithms. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | √ | | | | | | |

| Subject Code: CBCA22E09 | Subject Name: **OPEN SOURCE PROGRAMMING** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Concept of Information handling** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **9 Hrs**

**Introduction to Open Source**: Definition, Open Source History, Initiatives , Free Software, Free Software vs. Open Source software, Public Domain Software, FOSS does not mean no cost. History : BSD, The Free Software Foundation and Open Source GNU Project.

**UNIT II** **9 Hrs**

**Principle and methodologies** : Philosophy : Software Freedom, Open Source Development Model Licences and Patents: What Is A License, Important FOSS Licenses (Apache,BSD,GPL, LGPL), copyrights and copylefts, Patents Economics of FOSS : Zero Marginal Cost, Income-generation opportunities

**UNIT III** **9 Hrs**

**Case Studies** : Apache, BSD, Linux, Mozilla (Firefox), Wikipedia, Joomla, GCC, Open Office. Starting and Maintaining an Open Source Project, Open Source Hardware, Open Source Design, Open source Teaching. and Open source media.

**UNIT IV** **9 Hrs**

**IoT** : Definitions - overview, applications, potential & challenges, and architecture. IoT examples: Case studies, e.g. sensor body-area-network and control of a smart home.

**UNIT V** **9 Hrs**

**INTRODUCTION TO BIG DATA**: Distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

**Total No of Hrs : 45**

**TEXT BOOK:**

1. https://tavaana.org/sites/default/files/introduction_to_opensource.pdf
2. Chris Eaton, Dirk deroos et al.(2012) , "*Understanding Big data* ", McGraw Hill.

**REFERENCES:**

**1.** Greg Elmer, Ganaele Langlois , Dr. Joanna Redden(2015), "*Compromised Data: From Social Media to Big Data*", Bloomsbury Academic Publishing.

| Subject Code: CBCA22E10 | Subject Name: **SOFTWARE TESTING** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **OOAD & Programming Knowledge in Software** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To introduce the fundamental concept of Software Testing
- To describe the principles, issues and solutions of Black box, White box and various types of Testing
- To illustrate Software Testing Life cycle Model and RAD, Web and Database Testing
- To impart the essential characteristics of Automation Testing Tools
- To discuss the function of quality factors

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the fundamental concepts of Software Testing objectives, Software Testing Environment, Process, Criteria and Strategies |
| **CO2** | Demonstrate the testing of Software's behavior using Black box testing, testing internal Structure of the Software using White box Testing and finding uncover interaction and compatibility problems as early as possible using Integration testing. |
| **CO3** | Design and develop a high quality software using the following stages – planning, defining, designing, building, testing and deployment in SDLC. To make the complete product for faster product delivery using RAD. Before going to Live a complete checking will be done in WEB. |
| **CO4** | Implement the Software Testing Automation tools - Load Runner and Win Runner tool from Micro focus to execute the entire test case suit. |
| **CO5** | Ensure to produce best possible product and the product meet out our expectations using Quality Assurance and Quality Control Methodology. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | Basic Sciences | Engg.Science | Humanities & social Science | Program Core | Program Elective | Open Elective | Practical/ Project | Internships/ Technical Skills | Soft Skills |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | √ | | | | |

| Subject Code: CBCA22E10 | Subject Name: **SOFTWARE TESTING** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **OOAD & Programming Knowledge in Software** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **9 Hrs**

**Testiing Environment And Test Processes**: Introduction – World Class Software Testing Model – Building a Software Testing Environment - Overview of Software Testing Process – Organizing for Testing : Requirement Specifications ( Software, User, market, Business) – Static & Dynamic Testing : Verification & Validation - Analyzing and Reporting Test Results – Post Implementation Analysis

**UNIT II** **9 Hrs**

**Developing the Test Plan** : Using White Box Approach to Test design – Code Functional Testing – Coverage and Control Flow Graphs –Using Black Box Approaches to Test Case Design – Random Testing – Requirements based testing –Decision tables –State-based testing – Cause-effect graphing – Error guessing – Compatibility testing – Levels of Testing : Functionality Testing - Performance Testing - Unit Testing - Integration Testing - System Testing – User Acceptance Testing - Compatibility Testing

**UNIT III** **9 Hrs**

**Software Testing Life Cycle :** Software Testing Life Cycle: SDLC & STLC , Stages – System Study – Test case design, Review, Approval, Execution - Test case Templates: Header - Body & Footer Templates – Traceability Matrix - Defect Tracking Templates – Postmortem Report (Achievements & Comments) – Rapid Application Development Testing – Testing in a Multiplatform Environment – Testing Software System Security - Testing Web Applications – Web based system – Web Technology Evolution – Testing a Data base

**UNIT IV** **9 Hrs**

**TEST AUTOMATION : Introduction :** Software Testing Tools (Win Runner, Load Runner) - Software Test Automation – Skills needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements for a Test Tool – Challenges in Automation – Tracking the Bug

**UNIT V** **9 Hrs**

**Quality Assurance & Quality Control** : Complexity Metrics and Models – Quality Management Metrics - Defect Removal Effectiveness Quality Function Deployment – Taguchi Quality Loss Function.

**Total No of Hrs : 45**

**TEXT BOOK:**

1. Srinivasan Desikan and Gopalaswamy Ramesh(2007) “Software Testing – Principles and Practices”,Pearson Education.

**REFERENCES:**

1. William Perry(2007), “*Effective Methods of Software Testing*”, Third Edition,Wiley Publishing 2007
2. Naresh Chauhan(2010) , “*Software Testing Principles and Practices* ” Oxford University Press , New Delhi , 2010.

| Subject Code: CBCA22E11 | Subject Name: **Artificial Intelligence** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Strong knowledge of Mathematics, Good command over programming languages and Good Analytical Skills.** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To gain a historical perspective of AI and its foundations
- To become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- To experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool.
- To explore the current scope, potential, limitations, and implications of intelligent systems.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations. |
| **CO2** | Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning. |
| **CO3** | Demonstrate profciency developing applications in an 'AI language', expert system shell, or data mining tool. |
| **CO4** | Demonstrate profciency in applying scientifc method to models of machine learning. |
| **CO5** | Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 1 | 2 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 3 | 2 | 3 |
| **CO3** | 3 | 2 | 1 | 3 |
| **CO4** | 3 | 3 | 1 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | √ | | | | | | |

| Subject Code: CBCA22E11 | Subject Name: **Artificial Intelligence** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Strong knowledge of Mathematics, Good command over programming languages and Good Analytical Skills.** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **9 Hrs**

**Introduction:** AI Problems – AI techniques – Criteria for success. Problems, Problem Spaces, Search: State space search – Production Systems – Problem Characteristics – Issues in design of Search.

**UNIT II** **9 Hrs**

**Heuristic Search techniques:** Generate and Test – Hill Climbing – Best-Fist, Problem Reduction, Constraint Satisfaction, Means-end analysis.

**UNIT III** **9 Hrs**

**Knowledge representation issues:** Representations and mappings – Approaches to Knowledge representations – Issues in Knowledge representations – Frame Problem.

**UNIT IV** **9 Hrs**

**Using Predicate Logic:** Representing simple facts in logic – Representing Instance and Isa relationships - Computable functions and predicates – Resolution – Natural deduction

**UNIT V** **9 Hrs**

**Representing knowledge using rules:** Procedural Vs Declarative knowledge – Logic programming – Forward Vs Backward reasoning – Matching – Control knowledge Brief explanation of Expert Systems.

**Total No of Hrs : 45**

**TEXT BOOK:**

1. Elaine Rich and Kevin Knight, Shiva Shankar Nair, “Artificial Intelligence”, McGraw-Hill Companies, 3rd edition.

**REFERENCE BOOKS:**

1. Stuart Russell & Peter Norvig , “Artificial Intelligence A Modern Approach”, Perason, 2nd Edition.
2. George F Luger , “Artificial Intelligence”, Pearson 2002, 4th Edition.
3. V S Janaki Raman, K Sarukesi, P Gopalakrishnan, “Foundations of Artificial Intelligent and Expert Systems”, MacMillan India limited.

**WEB REFERENCES:**

- NPTEL & MOOC courses titled Artificial Intelligence and Expert Systems
- https://nptel.ac.in/courses/106106140/
- https://nptel.ac.in/courses/106106126/

| Subject Code: CBCA22E12 | Subject Name: **Design Thinking** | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Understanding the needs, problems, and challenges of the end user.** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Understand the concepts of design thinking approaches
- Create design thinking teams and conduct design thinking sessions
- Apply both critical thinking and design thinking in parallel to solve problems
- Apply some design thinking concepts to their daily work

**COURSE OUTCOMES (Cos)**
Students completing this course were able to

| | |
|---|---|
| **CO1** | Define the concepts related to design thinking. |
| **CO2** | Explain the fundamentals of Design Thinking and innovation. |
| **CO3** | Apply the design thinking techniques for solving problems in various sectors. |
| **CO4** | Analyse to work in a multidisciplinary environment. |
| **CO5** | Evaluate the value of creativity. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 3 | 2 | 2 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | √ | | | | | | |

| Subject Code: CBCA22E12 | Subject Name: **Design Thinking** | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Understanding the needs, problems, and challenges of the end user.** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**Unit One: Introduction to Design Thinking** **9 Hrs**

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

**Unit Two : Design thinking for innovation** **9 Hrs**

**Design Thinking Process**

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking -person, costumer, journey map, brain storming, product developmentActivity:Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

**Unit Three Design thinking for innovation** **9 Hrs**

**Innovation**

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.Activity:Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

**Unit Four Design thinking for innovation** **9 Hrs**

**Product Design**

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.Activity:Importance of modelling, how to set specifications, Explaining their own product design.

**Unit Five : Design thinking for innovation** **9 Hrs**

**Design Thinking in Business Processes**

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business –Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs.Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.Activity:How to market our own product, About maintenance, Reliability and plan for startup.

**Design thinking for innovation Course Objectives**

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

**Design thinking for innovation Course Outcomes**

• Define the concepts related to design thinking
.•Explain the fundamentals of Design Thinking and innovation
•Apply the design thinking techniques for solving problems in various sectors
.•Analyse to work in a multidisciplinary environment
•Evaluate the value of creativity
•Formulate specific problem statements of real time issues

**Design thinking for innovation Text Books**

1. Change by design, Tim Brown, Harper Bollins (2009) 2. Design Thinking for Strategic Innovation, Idris Mootee, 2013, John Wiley & Sons.

**Design thinking for innovation Reference Books**

1. Design Thinking in the Classroom by David Lee, Ulysses press 2. Design the Future, by Shrrutin N Shetty, Norton Press 3. Universal principles of design-William lidwell, kritinaholden, Jill butter. 4. The era of open innovation – chesbrough.H **Total 45 Hrs**

| Subject Code: CBCA22E13 | Subject Name: **Block Chain Technology** | **Ty/Lb /ETP/ IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Be well versed in concepts such as cryptography, consensus, hash functions, distributed ledgers, smart contracts and any other concepts integral to understanding blockchain's inner workings.** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To assess blockchain applications in a structured manner
- To impart knowledge in block chain techniques and able to present the concepts clearly and structured.
- To get familiarity with future currencies and to create own crypto token.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the various technologies and its business use. |
| **CO2** | Analyse the block chain applications in a structure manner. |
| **CO3** | Explain the modern concepts of block chain technology systematically. |
| **CO4** | Handle the cryptocurrency. |
| **CO5** | Understand the modern currencies and its market usuage |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 2 | 1 | 3 |
| **CO4** | 3 | 3 | 3 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | √ | | | | | | |

| Subject Code: CBCA22E13 | Subject Name: **Block Chain Technology** | **Ty/Lb /ETP/ IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Be well versed in concepts such as cryptography, consensus, hash functions, distributed ledgers, smart contracts and any other concepts integral to understanding blockchain's inner workings.** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT - 1 Introduction:** **9 Hrs**

Need for Distributed Record Keeping, Modeling faults and adversaries, Byzantine Generals problem, Consensus algorithms and their scalability problems, Nakamoto's concept with Blockchain based cryptocurrency, Technologies Borrowed in Blockchain – hash pointers, consensus, byzantine fault-tolerant distributed computing, digital cash etc.

**UNIT - 2 Basic Distributed Computing & Crypto primitives:** **9 Hrs**

Atomic Broadcast, Consensus, Byzantine Models of fault tolerance, Hash functions, Puzzle friendly Hash, Collison resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems

**UNIT - 3 Bitcoin basics:** **9 Hrs**

Bitcoin blockchain, Challenges and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use

**UNIT - 4 Ethereum basics:** **9 Hrs**

Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges, Using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts, Writing smart contracts using Solidity & JavaScript

**UNIT - 5 Privacy, Security issues in Blockchain:** **9 Hrs**

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

**UNIT - 6 Case Studies:**

Block chain in Financial Service, Supply Chain Management and Government Services

**Total 45 Hrs**

**List of References:**

1. Narayanan, Bonneau, Felten, Miller and Goldfeder, "Bitcoin and Cryptocurrency Technologies – A Comprehensive Introduction", Princeton University Press.
2. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017.
3. Imran Bashir, "Mastering Blockchain: Distributed ledger technology, decentralization, and smart contracts explained", Packt Publishing.
4. Merunas Grincalaitis, "Mastering Ethereum: Implement Advanced Blockchain Applications Using Ethereum-supported Tools, Services, and Protocols", Packt Publishing.
5. Prof. Sandip Chakraborty, Dr. Praveen Jayachandran, "Blockchain Architecture Design And Use Cases"[MOOC], NPTEL: https://nptel.ac.in/courses/106/105/106105184/

| Subject Code: CBCA22E14 | Subject Name: **INTERNET OF THINGS** | **Ty/Lb/ ETP/IE** | **L** | **T / S.L r** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : : **Basic knowledge in Networks and Internet Concepts** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To impart the basic design and communication model of Internet of Things.
- To understand State of the Art - Internet of Things Architecture.
- To provide knowledge about protocols used in Internet of Things.
- To introduce about various interfaces applied in Internet of Things.
- To classify the real world Internet of Things Design constraints and its implementation.
- To provide ideas of automation and its applications using Internet of Things.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Apply the basic concepts of Internet of Things, design and communication model that will ensure and render most efficient smart system for any applications. |
| **CO2** | Thorough knowledge of Internet of Things Architecture that leads to effective implementation. |
| **CO3** | Capacity to analyze and evaluate protocols to be used in any Internet of Things application. |
| **CO4** | Design and develop any smart real time application in Internet of Things. |
| **CO5** | Identify various technologies and incorporate them in Internet of Things to enhance Industrial Automation that gives a complete solution for stakeholders. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 3 | 2 | 3 | 1 | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO5** | 3 | 2 | 3 | 1 | 3 | 2 | 1 | 3 | 2 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 3 |
| **CO2** | 2 | 1 | 2 | 2 |
| **CO3** | 2 | 3 | 2 | 2 |
| **CO4** | 3 | 3 | 3 | 3 |
| **CO5** | 3 | 3 | 2 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | √ | | | | | | |

| Subject Code: CBCA22E14 | Subject Name: **INTERNET OF THINGS** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : : **Basic knowledge in Networks and Internet Concepts** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **9 Hrs**

**IOT INTRODUCTION :** Introduction - Physical Design - Logical Design - IOT Communication Model - IOT Enabling Technologies - IOT Levels and Deployment Templates.

**UNIT II** **9 Hrs**

**IOT NETWORK ARCHITECTURE :** One M2M IOT Standardized Network Architecture- IOTWF (IOT World Forum) - IOT Architecture- M2M (Machine to Machine) –SDN (Software Defined Network) –NFV (Network Function Virtualization).

**UNIT III** **9 Hrs**

**IOT PROTOCOLS :** NFC (Near Field Communication)- RFID (Radio Frequency Identification System) -ZIGBEE-SPMI (System Power Management Interface)-SPI (Serial Peripheral Interface)-Wireless vs. Wired Communication-GSM-GPRS-LTE (Long Term Evolution).

**UNIT IV** **9 Hrs**

**IOT DESIGN :** Design Methodology-Microcontroller- System on Chip (SoC)-IOT System Building Blocks- Arduino-Raspberry-pi

**UNIT V** **9 Hrs**

**DOMAIN SPECIFIC IOT :** Home Automation- Cities- Agriculture- Environment-Health and Life Style- Industry

**Total No of Hrs : 45**

**TEXT BOOKS**

1. From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence by Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos and David Boyle
2. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014.

**REFERENCES**

1. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013

| Subject Code: CBCA22E15 | Subject Name: **Data Analytics** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Knowledge in SQL, Proficient in Microsoft Excel, R or Python, Presentation and critical thinking skills, Data visualization** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To apply statistical analysis and technologies on data to find trends and solve problems
- To understand storage, retrieval and processing of big data
- To helps a student to perform a variety of "analytics" on different data sets and to arrive at positive conclusions.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand Big Data and its analytics in the real world. |
| **CO2** | Analyze the Big Data framework like Hadoop and NOSQL to efficiently store and process Big Data to generate analytics. |
| **CO3** | Design of Algorithms to solve Data Intensive Problems using Map Reduce Paradigm. |
| **CO4** | Design and Implementation of Big Data Analytics using pig and spark to solve data intensive problems and to generate analytics. |
| **CO5** | Implement Big Data Activities using Hive |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 2 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 3 | 3 | 1 | 3 | 3 | 1 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 3 | 1 |
| **CO3** | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 2 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | √ | | | | | | |

| Subject Code: CBCA22E15 | Subject Name: **Data Analytics** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Knowledge in SQL, Proficient in Microsoft Excel, R or Python, Presentation and critical thinking skills, Data visualization** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**UNITI INTRODUCTION TOBIGDATA 9 Hrs**

Big Data – Definition, Characteristic Features – Big Data Applications - Big Data vs Traditional Data - Risks of Big Data - Structure of Big Data - Challenges of Conventional Systems - Web Data – Evolution of Analytic Scalability - Evolution of Analytic Processes, Tools and methods - Analysis vs Reporting - Modern Data Analytic Tools.

**UNITII HADOOPFRAMEWORK 9 Hrs**

Distributed File Systems - Large-Scale Fil System Organization – HDFS concepts - MapReduce Execution, Algorithms using Map Reduce, Matrix-Vector Multiplication – Hadoop YARN.

**UNITIII DATA ANALYSIS 9 Hrs**

Statistical Methods: Regression modelling, Multivariate Analysis - Classification: SVM & Kernel Methods - Rule Mining - Cluster Analysis, Types of Data in Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods, Clustering High Dimensional Data - Predictive Analytics – Data analysis using R.

**UNITIV MININGDATASTREAMS 9 Hrs**

Streams: Concepts – Stream Data Model and Architecture - Sampling data in a stream - Mining Data Streams and Mining Time-series data - Real Time Analytics Platform (RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

**UNITV BIGDATAFRAMEWORKS 9 Hrs**

Introduction to NoSQL – Aggregate Data Models – Hbase: Data Model and Implementations – Hbase Clients – Examples – .Cassandra: Data Model – Examples – Cassandra Clients – Hadoop Integration. Pig – Grunt – Pig Data Model – Pig Latin – developing and testing Pig Latin scripts. Hive – Data Types and File Formats – HiveQL Data Definition – HiveQL Data Manipulation – HiveQLQueries.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**At the end of this course, the students will be able to:**

- Understand how to leverage the insights from big dataanalytics
- Analyze data by utilizing various statistical and data miningapproaches
- Perform analytics on real-time streamingdata
- Understand the various NoSql alternative databasemodels

| Subject Code: CBCA22OE1 | Subject Name: **WEB DESIGN** | **Ty/Lb/ ETP/IE** | **L** | **T / S.L r** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Recognize good visual design** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- Understand the importance of the web as a medium of communication.
- Understand the principles of creating an effective web page, including an in-depth consideration of information architecture.
- Learn the language of the web: HTML and CSS.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Develop an understanding of the formalistic (aesthetic) aspects of design and visual communication |
| **CO2** | Demonstrate cross-platform storytelling skills. |
| **CO3** | To develop and understanding of information design and usability as it applies to interactive media projects. |
| **CO4** | Utilize coding and software tools to analyze and present data in a professional manner that could be translated to web-based or app-based media. |
| **CO5** | Become familiar with graphic design and/or game theory and be able to apply this theory to real world projects. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 1 | 3 |
| **CO5** | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 |
| **CO2** | 2 | 2 | 1 | 3 |
| **CO3** | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | √ | | | | | |

| Subject Code: CBCA22OE1 | Subject Name: **WEB DESIGN** | **Ty/Lb/ ETP/IE** | **L** | **T / S.L r** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Recognize good visual design** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL :Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT I** **9 Hrs**

**Web Publishing**: Web browser – WWW - Web design process: Implementation, Maintenance Phases of Website - Web Publishing - HTML Documents: Overview, rules guidelines, structure of HTML documents, document types.

**UNIT II** **9 Hrs**

**HTML Tags**: <HTML> - <HEAD> - <TITLE> , <BODY>,<Marquee> - Paragraphs - Lists - Text Formatting, <Font>, Text Styles - Adding Graphics to HTML Docuements- Linking Documents.

**UNIT III** **9 Hrs**

**Tables, Frame and Forms:** Table tag and its Attributes - Frame: Overview of frame, Frameset - Simple frame, Frame targeting - Forms: Form objects and Methods.

**UNIT IV** **9 Hrs**

**DHTML**: Introduction to Dynamic HTML – CSS – Addition Style to a Document : Linking to a Style Sheet - Embedding and Importing Style Sheet.

**UNIT V** **9 Hrs**

**Introduction to PHP** : Including PHP in a page - Data types - Arrays -Regular expressions - Functions- Managing Cookies - Maintaining Sessions.

**Total No of Hrs: 45**

**TEXT BOOK:**

Thomas A. Powell(1999), *HTML: The Complete Reference*(2nd. ed.), Bpb Publication.

**REFERENCES:**

Ed. Wilson (2006), *Microsoft VBScript: Step by Step*, Microsoft Press.

Sterling Hughes(2001) *PHP:Developers's Cook book*,BPB publications.

Ivan N Bayross(2000), Web Enabled Commercial Applications Development Using, HTML, DHTML, Java Script, Perl CGI(2nd ed.), BPB Publications.

| Subject Code: CBCA22OE2 | Subject Name: **E-Commerce** | **Ty/Lb/ ETP/IE** | **L** | **T / S.L r** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Know the usage of internet.** | **Ty** | **3** | **0** | **0** | **3** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To obtain knowledge of Internet hardware associated with E-commerce systems.
- Gain knowledge of selected Standard application commonly used in business.
- Ability to design, a fundamental E-Business concept.
- Gain knowledge of the issues of network security and business-tech protocols.
- Introduction to Business graphics – with focus on advertising philosophy.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Ability to effectively integrate IT-based solutions into the user environment. |
| **CO2** | Demonstrate the ability to perform complex data management and analysis. |
| **CO3** | Understand the processes of developing and implementing information systems. |
| **CO4** | Be aware of the ethical, social, and security issues of information systems. |
| **CO5** | Have the knowledge of the different types of management information systems. |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 |
| **CO2** | 2 | 3 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 3 |
| **CO5** | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 1 | 2 |
| **CO2** | 2 | 3 | 2 | 3 |
| **CO3** | 3 | 2 | 1 | 3 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | √ | | | | | |

| Subject Code: CBCA22OE2 | Subject Name: **E-Commerce** | **Ty/Lb/ ETP/IE** | **L** | **T / S.L r** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Know the usage of internet.** | **Ty** | **3** | **0** | **0** | **3** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**UNIT-I:** **9 Hrs**

Electronic Commerce Framework - Electronic Commerce and Media Convergence - The anatomy of E-Commerce Applications - Electronic Commerce Consumer Applications - Electronic Commerce Organization Applications. Market forces influencing the I-Way - Components of the I-Way - Net work Access Equipment - The Last Mile: Local Roads and Access Ramps - Global Information Distribution Networks - Public Policy issues shaping the IWay.

**UNIT-II** **9 Hrs**

Architectural Framework for Electronic Commerce - World Wide Web (WWW) as the Architecture- Web Background: Hypertext Publishing - Technology behind the Web Security and the Web. - Consumer-Oriented Applications – Mercantile models form the consumer's perspective – Mercantile models from the merchant's perspective.

**UNIT-III** **9 Hrs**

Types of Electronic Payment systems - Digital token based electronic payment systems - Smart Cards and Electronic Payment Systems - Credit card based electronic Payment Systems - Risk and Electronic Payment Systems - Risk and Electronic Payment Systems - Designing Electronic Payment Systems. Electronic Data Interchange - EDI Applications in business - EDI: Legal, Security and Privacy issues - EDI and electronic Commerce.

**UNIT-IV** **9 Hrs**

Internet information systems - Macroforces and internal commerce - Works flows automation and Co-ordination - Customization and internal commerce - Supply chain commerce system - Making a business case for a document library - Types of digital documents - Issues behind Document infrastructure - Corporate data warehouse.

**UNIT-V** **9 Hrs**

The new age of information - based marketing - Advertising on the internet - Charting the On-Line Marketing process - Market research - search and resource Discovery Paradigms - Information Search and Retrieval - Electronic Commerce Catalogs or directories - Information Filtering - Consumer Data Internet Emerging Tools.

**Total 45 Hrs**

**TEXT BOOKS**

1. Jeffery F.Rayport, Bernard J.Jaworski, "E-Commerc e", TMCH, 2002.
2.P.T. Joseph, "E-commerce – A Managerial Perspecti ve", PHI, 2003.

**REFERENCE BOOKS**: 1.Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Pearson Edu., 2003

| Subject Code: CBCA22OL1 | Subject Name: **WEB DESIGN LABORATORY** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Have the knowledge of the foundations of UX** | **Lb** | **0** | **0** | **4** | **2** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES:**

- Understand the principles of creating an effective web page, including an in-depth consideration of information architecture.
- Become familiar with graphic design principles that relate to web design and learn how to implement theories into practice.
- Learn techniques of responsive web design, including media queries.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Discover how does web works really, what makes web sites work. |
| **CO2** | Make Forms and validations for your website. |
| **CO3** | Writing valid and concise code for webpages. |
| **CO4** | Pro level skills in SEO with keyword research and content stratergy for your website. |
| **CO5** | Setting up page layout, color schemes, contract, typography in the designs |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 |
| **CO4** | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 3 |
| **CO5** | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 1 | 2 |
| **CO2** | 2 | 3 | 2 | 3 |
| **CO3** | 3 | 2 | 1 | 3 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | | | √ | | | | √ | |

| Subject Code: CBCA22OL1 | Subject Name: **WEB DESIGN LABORATORY** | **Ty/Lb/ ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite : **Have the knowledge of the foundations of UX** | **Lb** | **0** | **0** | **4** | **2** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**List of experiments**

1.Program to illustrate Text Formatting tags.

2. Create a web page using ordered list and unordered list.

3. A program to illustrate Hyperlink tag(Anchor tag) .

4. Create a webpage which contains table with its Attributes.

5. Create a Web Page using frame tag with its attributes.

6. Create a webpage using img tag..

7. Create a web page using form tag.

8. Use Cascading Style Sheet to create web page.

9. Write a PHP program for Login Validation.

10. Finding page hit count and setting page expiry using PHP.

**Total No of Hrs needed to complete the Lab : 60**

| Subject Code : HBCC22003 | Subject Name : Research Methodology | Ty/Lb/ETL | L | T/ SLr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : None | Ty | 2 | 1/0 | 0/0 | 3 |

**L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits**
**T/L/ETL : Theory / Lab / Embedded Theory and Lab**

**OBJECTIVES :**

- Design and formulation of research problem.
- Analyze research related information and statistical methods in research.
- Carry out research problem individually in a perfect scientific method
- Understand the filing patent applications processes, Patent search, and various tools of IPR, Copyright, and Trademarks.

**COURSE OUTCOMES (Cos) : (3 – 5)**
Students completing the course were able to

| | |
|---|---|
| **CO1** | Design and Formulation of research problem. |
| **CO2** | Analyze research related information and statistical methods in research. |
| **CO3** | Carry out research problem individually in a perfect scientific method |
| **CO4** | Understand Patent Filing application Process. |
| **CO5** | Patent Search and various tools used. |

**Mapping of Course Outcomes with Program Outcomes (POs)**

| COs/ POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO2 | 3 | 2 | 1 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| CO3 | 3 | 3 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 1 |
| CO4 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 2 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 |

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | ✓ | | | | | | | | |

| Subject Code : HBCC22003 | Subject Name : Research Methodology | Ty/Lb/ETL | L | T/ SLr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : None | Ty | 2 | 1/0 | 0/0 | 3 |
| L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**Course objective:**

- Learn the meaning of interpretation, techniques of interpretation, precautions is to be taken in interpretation for research process,
- Application of statistical methods in research.
- Learn intellectual property rights and its constituents.

**Unit 1** **9 Hrs**

Introduction to research, Definitions and characteristics of research, Types of Research, Research Process, Problem definition, Objectives of Research, Research Questions, Research design, Quantitative vs. QualitativeApproach,BuildingandValidatingTheoreticalModels,Exploratoryvs.ConfirmatoryResearch, Experimental vs. Theoretical Research, Importance of reasoning in research.

**Unit 2** **9 Hrs**

ProblemFormulation,UnderstandingModeling&Simulation,LiteratureReview,Referencing,Information Sources, Information Retrieval, Indexing and abstracting services, Citation indexes, Development of Hypothesis, Measurement Systems Analysis, Error Propagation, Validity of experiments, Statistical Design of Experiments, Data/Variable Types & Classification, Data collection, Numerical and Graphical Data Analysis: Sampling, Observation, Interpretation ofResults.

**Unit 3 ( This Unit has to be handled by Mathematics Faculty )** **9 Hrs**

Statistics:Probability&Samplingdistribution,Estimation,MeasuresofcentralTendency,Arithmeticmean, Median, Mode, Standard deviation, Co efficient of variation (Discrete serious and continuous serious), Hypothesis testing & application, Correlation & regression analysis, Orthogonal array, ANOVA, Standard error, Concept of point and interval estimation, Level of significance, Degree of freedom, Analysis of variance, One way and two way classified data, 'F'test.

**Unit 4** **9 Hrs**

PreparationofDissertationandResearchPapers,Tablesandillustrations,Guidelinesforwritingtheabstract, introduction,methodology,resultsanddiscussion,conclusionsectionsofamanuscript.References,Citation and listing system ofdocuments.

**Unit 5** **9 Hrs**

Intellectual property rights (IPR) patents copyrights Trademarks Industrial design geographical indication. Ethics of Research Scientific Misconduct Forms of Scientific Misconduct. Plagiarism, Unscientific practices in thesis work, Ethics in science.

**Total 45 Hrs**

**Text Book:**

1. K. S. Bordens, and B. B.Abbott, , "Research Design and Methods – A Process Approach", 8th Edition, McGraw Hill,2011.
2. C. R. Kothari, "Research Methodology – Methods and Techniques", 2nd Edition, NewAgeInternational Publishers

| Subject Code: CBCA22013 | Subject Name: **DATA VISUALIZATION** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Knows Digital Marketing Metrics,Social Media Metrics.** | **L** | **3** | **1** | **0** | **4** |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To interpret data plots and understand core data visualization concepts such as correlation, linear relationships, and log scales.
- To explore the relationship between two continuous variables using scatter plots and line plots.
- To translate and present data and data correlations in a simple way, data analysts use a wide range of techniques — charts, diagrams, maps, etc.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Demonstrate understanding of Data Visualization and key Terms. |
| **CO2** | Design Effective Data Visualization for viual Mapping and Design. |
| **CO3** | Will demonstrate skills on creating visual representation of Data. |
| **CO4** | Will demonstrate understanding of Visualization classification and its techniques. |
| **CO5** | Will demonstrate skills in creating different types of Representation Mapping with Programme Outcomes |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 |
| **CO4** | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 3 |
| **CO5** | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 1 | 2 |
| **CO2** | 2 | 3 | 2 | 3 |
| **CO3** | 3 | 2 | 1 | 3 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | √ | | | | | | | |

| Subject Code: CBCA22013 | Subject Name: **DATA VISUALIZATION** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : **Knows Digital Marketing Metrics,Social Media Metrics.** | **L** | **3** | **1** | **0** | **4** |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**OBJECTIVES:**

- To interpret data plots and understand core data visualization concepts such as correlation, linear relationships, and log scales.
- To explore the relationship between two continuous variables using scatter plots and line plots.
- To translate and present data and data correlations in a simple way, data analysts use a wide range of techniques — charts, diagrams, maps, etc.

**Unit I** **12 Hrs**

Introduction of visual perception, visual representation of data, Gestalt principles, information overloads.

**Unit II** **12 Hrs**

Creating visual representations, visualization reference model, visual mapping, visual analytics, Design of visualization applications.

**Unit III** **12 Hrs**

Classification of visualization systems, Interaction and visualization techniques misleading, Visualization of one, two and multi-dimensional data, text and text documents.

**Unit IV** **12 Hrs**

Visualization of groups, trees, graphs, clusters, networks, software, Metaphorical visualization

**Unit V** **12 Hrs**

Visualization of volumetric data, vector fields, processes and simulations, Visualization of maps, geographic information, GIS systems, collaborative visualizations, evaluating visualizations.

**Total 60 Hrs**

**Reference Books**

1) Bateman, S., R. Mandryk, C. Gutwin, A. Genest, D. McDine, and C. Brooks. 2010.
2) Becker, R. A., W. S. Cleveland, and M.-J. Shyu. 1996.
3) Bergstrom, C. T., and J. West. 2016. “The Principle of Proportional Ink.” *http://callingbullshit.org/tools/tools_proportional_ink.html*.
4) Brewer, Cynthia A. 2017. “ColorBrewer 2.0. Color Advice for Cartography.” *http://www.ColorBrewer.org*.
5) Cleveland, W. S. 1979. “Robust Locally Weighted Regression and Smoothing Scatterplots.” ...

| Subject Code: CBCA22014 | Subject Name: **Soft Computing** | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite **: BASIC COMPUTER KNOWDEGE & BASIC MATHEMATHICS** | **Ty** | 3 | 1 | 0 | 4 |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- To learn the key aspects of Soft computing
- To know about the components and building block hypothesis of Genetic algorithm.
- To understand the features of neural network and its applications
- To study the fuzzy logic components
- To gain insight onto Neuro Fuzzy modeling and control.
- To gain knowledge in machine learning through Support vector machines.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understanding the Soft Computing Constituents |
| **CO2** | Getting enriched the Building block hypothesis, working principle and the operators |
| **CO3** | Understand the Machine Learning using Neural Network, Adaptive Networks |
| **CO4** | Capable of performing the Operations on Fuzzy Sets and Fuzzy Relations |
| **CO5** | Computing the Fuzzy Inference Systems |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 2 |
| **CO2** | 3 | 3 | 3 | 1 | 3 | 3 | 1 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 |
| **CO4** | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 3 |
| **CO5** | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |

| **Cos/PSOs** | **PS01** | **PS02** | **PS03** | **PS04** |
|---|---|---|---|---|
| **CO1** | 3 | 3 | 1 | 2 |
| **CO2** | 2 | 3 | 2 | 3 |
| **CO3** | 3 | 2 | 1 | 3 |
| **CO4** | 3 | 3 | 2 | 3 |
| **CO5** | 2 | 3 | 3 | 3 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | √ | | | | | | | |

| Subject Code: CBCA22014 | Subject Name: **Soft Computing** | **Ty/Lb/ETP/IE** | **L** | **T / S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite **: BASIC COMPUTER KNOWDEGE & BASIC MATHEMATHICS** | **Ty** | 3 | 1 | 0 | 4 |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL : Theory / Lab / Embedded Theory and Lab | | | | | | |

**OBJECTIVES:**

- To learn the key aspects of Soft computing
- To know about the components and building block hypothesis of Genetic algorithm.
- To understand the features of neural network and its applications
- To study the fuzzy logic components
- To gain insight onto Neuro Fuzzy modeling and control.
- To gain knowledge in machine learning through Support vector machines.

**UNIT I INTRODUCTION TO SOFT COMPUTING** **12 Hrs**

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

**UNIT II GENETIC ALGORITHMS** **12 Hrs**

Introduction, Building block hypothesis, working principle, Basic operators and Terminologies likeindividual, gene, encoding, fitness function and reproduction, Genetic modeling: Significance of Genetic operators, Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwiseoperator, GA optimization problems, JSPP (Job Shop Scheduling Problem), TSP (TravellingSalesman Problem),Differences & similarities between GA & other traditional methods, Applications of GA.

**UNIT III NEURAL NETWORKS** **12 Hrs**

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 NeuralNetworks.

**UNIT IV FUZZY LOGIC** **12 Hrs**

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions-Fuzzy Rules andFuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making

**UNIT V NEURO-FUZZY MODELING** **12 Hrs**

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification andRegression Trees – Data Clustering Algorithms – Rule base Structure Identification – Neuro-FuzzyControl – Case Studies.

**Total no. of Hrs : 60**

**REFERENCES:**

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, EijiMizutani(2003), *Neuro-Fuzzy and Soft Computing*, Prentice-Hall of India.
2. Kwang H.Lee(2005), *First course on Fuzzy Theory and Applications*, Springer–Verlag Berlin Heidelberg.
3. George J. Klir & Bo Yuan(1995),*Fuzzy Sets and Fuzzy Logic-Theory and Applications*, Prentice Hall.
4. James A. Freeman and David M. Skapura(2003), *Neural Networks Algorithms, Applications, and Programming Techniques*, Pearson Edn.
5. David E. Goldberg(2007), *Genetic Algorithms in Search, Optimization and Machine Learning*, Addison Wesley..
6. Mitsuo Gen & RunweiCheng(2000),*Genetic Algorithms and Engineering Optimization*, Wiley Publishers.

| Subject Code: CBCA22015 | Subject Name: Machine Learning | Ty/Lb/ETP/IE | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite: Basic Computer Knowledge and Basic Mathematics | Ty | 3 | 1 | 0 | 4 |

L:LectureT:TutorialSLr:SupervisedLearningP:ProjectR:ResearchC:CreditsT/L/ETL:Theory/Lab/EmbeddedTheoryand Lab

**OBJECTIVE:**

- To introduce students to the basic concepts and techniques of Machine Learning.
- TohaveathoroughunderstandingoftheSupervisedandUnsupervisedlearningtechniques
- To study the various probability based learning techniques
- To understand graphical models of machine learning algorithms
- To understand GUI optimization for neural networks

**COURSEOUTCOMES(COs): (3- 5)**

| | |
|---|---|
| CO1 | Distinguishbetween,supervised,unsupervisedandsemi-supervisedlearning |
| CO2 | Apply the apt machine learning strategy for any given problem |
| CO3 | Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem |
| CO4 | Design systems that uses the appropriate graph models of machine learning |
| CO5 | Modifyexistingmachinelearningalgorithmstoimproveclassificationefficiency |

**Mapping of Course Outcomes with Program Outcomes (POs)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 2 |
| CO2 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 1 | 2 |
| CO3 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 1 |
| CO4 | 2 | 3 | 2 | 2 | 3 | 3 | 1 | 2 | 3 | 3 | 2 | 1 |
| CO5 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 |

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | | | |
|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 1 | 1 | | | |
| CO2 | 2 | 3 | 3 | 1 | 3 | | | |
| CO3 | 2 | 2 | 2 | 2 | 1 | | | |
| CO4 | 2 | 2 | 2 | 1 | 2 | | | |
| CO5 | 3 | 2 | 1 | 1 | 1 | | | |

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/ Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | | ✓ | | | | | | | |
| Approval | | | | | | | | | |

| Subject Code: CBCA22015 | Subject Name: Machine Learning | Ty/Lb/ETP/IE | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite: Basic Computer Knowledge and Basic Mathematics | Ty | 3 | 1 | 0 | 4 |
| L:LectureT:TutorialSLr:SupervisedLearningP:ProjectR:ResearchC:CreditsT/L/ETL:Theory/Lab/EmbeddedTheoryand Lab | | | | | | |

**Unit 1** **12 Hrs**

Introduction to Machine Learning, Examples of Machine Learning applications - Learning associations, Classification, Regression, Unsupervised Learning, Reinforcement Learning. Supervised learning- Input representation, Hypothesis class, Version space, Vapnik-Chervonenkis(VC) Dimension.

**Unit 2** **12 Hrs**

Advanced machine learning topics: Bayesian modelling and Gaussian processes, randomized methods,Bayesian neural networks, approximate inference.

**Unit 3** **12 Hrs**

Deep learning: regularization, convolutional neural networks, recurrent neural networks, variationalautoencoders, generative models, applications.

**Unit 4** **12 Hrs**

Applications of machine learning in natural language processing: recurrent neural networks, backpropagation through time, long short term memory, attention networks, memory networks, neural Turing machines, machine translation, question answering, speech recognition, syntactic and semantic parsing, GPU optimization for neural networks.

**Unit 5** **12 Hrs**

Evaluation in ML: metrics, cross-validation, statistics, addressing the multiple comparisons problem.

**Total No. of Hrs: 60**

**Reference Book:**

1. KevinP.Murphy. Machine Learning: AProbabilisticPerspective.MITPress2012
2. Ian Good fellow, Yoshua Bengio and Aaron Courville. Deep Learning. MITPress2016.
3. BayesianReasoningandMachineLearningDavidBarber,CambridgeUniversityPress,2012.

| SubjectCode: CBDT22I03 | Subject Name : Mini Project | Ty/Lb/ETP/IE | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite: Nil | IE | 0 | 0/0 | 4/0 | 2 |
| L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab | | | | | | |

Students will have an opportunity to expose their knowledge and talent to make an innovative project. Students are supposed to do innovative projects useful to industries/society in the area of relevant field, inter and multi-disciplinary areas, under the guidance of a staff member . They have to prepare a project report and submit to the department.

At the end of the semester Viva-Voce examination will be conducted by the internal Examiner duly appointed by the Head of the department and the students will be evaluated.

| SubjectCode: CBDT22I04 | Subject Name : Internship | Ty/Lb/ETP/IE | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite: Nil | IE | 0 | 0/0 | 2/0 | 1 |
| L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits<br>T/L/ETL : Theory/Lab/Embedded Theory and Lab | | | | | | |

Students are supposed to undergo internship in related Industries for a minimum period of 15days cumulatively during the semester. They have to prepare a report on the Internship with a certificate in proof from competent authority in the industry. At the end of the semester Viva-Voce examination will be conducted by the Examiners duly appointed by the Head of the department and the students will be evaluated.

| **SubjectCode:** HBCC22004 | **Subject Name: START UP STRATEGIES** | **Ty/Lb** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite: Nil | Ty | 3 | 0 | 0 | 3 |

**T/L/:Theory/LabL:LectureT:TutorialP:Practical/ProjectR:ResearchC:Credits**

**OBJECTIVE:**
To understand new venture creation opportunities, its resources and requirements for Enterprise Start-up.

**COURSEOUTCOMES(COs):The students will be able to**

| | |
|---|---|
| **CO1** | Develop a start-up Enterprise with Big Idea Generation. |
| **CO2** | Analyze start-up capital requirement by analyzing legal factors. |
| **CO3** | Interpret feasibility Analysis towards funding issues. |
| **CO4** | Access growth stages in new venture and reasons for scaling ventures. |
| **CO5** | Evaluate financial stability and decide on expansion possibilities. |

**Mapping of Course Outcomes with Program Outcomes(POs)**

| **COs/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | | | |
| **CO2** | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | | | |
| **CO3** | 1 | 2 | 3 | 2 | 1 | 3 | 3 | 3 | 2 | | | |
| **CO4** | 1 | 2 | 3 | 2 | 1 | 3 | 3 | 2 | 2 | | | |
| **CO5** | 1 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | | | |

**1/2/3indicatesStrength ofCorrelation1-High,2-Medium,3-Low**

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | ✓ | | | | | | | | |

| SubjectCode: HBCC22004 | Subject Name: START UP STRATEGIES | Ty/Lb | L | T | P | C |
|---|---|---|---|---|---|---|
| | Prerequisite: Nil | Ty | 3 | 0 | 0 | 3 |
| T/L/:Theory/LabL:LectureT:TutorialP:Practical/ProjectR:ResearchC:Credits | | | | | | |

**Unit I: Start-up opportunities:**

The New Industrial Revolution - The Big Idea -Generate Ideas with Brainstorming- Business Start-up - Ideation- Venture Choices - The Rise of the startup Economy- The Six Forces of Change - The Start-up Equation- The Entrepreneurial Ecosystem- Entrepreneurship in India. Government Initiatives.

**Unit II: Startup Capital Requirements and Legal Environment:**

Identifying Startup capital Resources requirements- Estimating startup cash requirements- Develop financial assumptions- Constructing a Process Map- Positioning the venture in the value chain- Launch strategy to reduce risks- Startup financing metrics- The Legal Environment- Approval for New Ventures- Taxes or duties payable for new ventures.

**Unit III: Startup Financial Issues: Feasibility Analysis-**

The cost and process of raising capital- Unique funding issues of a high- tech ventures – Funding with Equity- Financing with Debt- Funding Startup with bootstrapping- crowd funding- strategic alliances.

**Unit IV: Startup survival and Growth:**

Stages of growth in a new venture- Growing with the market- Growth within the industry- Venture life patterns- Reasons for new venture failures- preparing for change- Leadership succession. Support for the growth and sustainability of the venture.

**Unit V: Planning for Harvest and Exit:**

Dealing with Failure: Bankruptcy, Exit Strategies- Selling the Business- Cashing out but staying in being- Going Public (IPO)- Liquidation.

**Reference Books:**

1. Kathleen R Allen, Launching New Ventures, An Entrepreneurial Approach, Cengage Learning 2016.
2. Anjan Raichaudhuri, Managing New Venture Concepts and Cases, Prentice Hall International 2010.
3. S. R. Bhowmika& M. Bhowmik, Entrepreneurship, New Age International, 2007.
4. Steven Fisher, Ja-nae Duane, The Startup Equation- A Visual Guidebook for Building your Startup, Indian Edition, Mc Graw Hill Education India Pvt. Ltd, 2016.
5. Donald F Kuratko, Jeffrey S. Hornsby, New Venture Management: The Entrepreneur's Road Map, 2e, Routledge,2017.
6. Vijay Sathe, Corporate Entrepreneurship, le, Cambridge, 2009

| Subject Code: HBCC22005 | Subject Name: **PRINCIPLES OF DIGITAL MARKETING** | Ty/Lb/ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : Nil | Ty | 3 | 0/0 | 0/0 | 3 |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

- This course helps the students to understand the fundamental principles of Digital marketing, the past, present and future potential of Digital marketing.
- At the end of the course students will be able to identify the role of e-marketing in the present context and develop an e-marketing plan with appropriate e-marketing strategies.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Understand the concepts and uses of Digital Marketing |
| **CO2** | Develop Strategic Planning for the Market |
| **CO3** | Evaluate the Ethical and Legal Values |
| **CO4** | Predict the Marketing Trends |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **2** | **2** | **1** | **1** | **1** | **3** | **1** | **1** |
| **CO2** | **3** | **2** | **1** | **2** | **2** | **2** | **3** | **2** | **1** |
| **CO3** | **2** | **2** | **2** | **1** | **2** | **2** | **3** | **3** | **2** |
| **CO4** | **2** | **2** | **2** | **3** | **3** | **2** | **3** | **1** | **2** |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | ✔ | | | | | | | | |

| Subject Code: HBCC22005 | Subject Name : **PRINCIPLES OF DIGITAL MARKETING** | **Ty/ Lb/ ETL** | **L** | **T/ S.Lr** | **P/R** | **C** |
|---|---|---|---|---|---|---|
| | Prerequisite: Nil | Ty | 3 | 0/0 | 0/0 | 3 |

L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits
Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab

**OBJECTIVES:**

- This course helps the students to understand the fundamental principles of Digital marketing, the past, present and future potential of Digital marketing.
- At the end of the course students will be able to identify the role of e-marketing in the present context and develop an e-marketing plan with appropriate e-marketing strategies.

**UNIT I: INTRODUCTION** **9 Hrs**

Digital-Marketing Past, Present & Future – Digital-Marketing Landscape, Digital-marketing's Past - Web 1.0, Digital Marketing Present - Web 2.0, Future -Web 3.0, Strategic Digital-Marketing, and Digital -Business Models – Online Revenue Models, Value Models, and Strategic Digital-Business Models.

**UNIT II: DIGITAL MARKETING PLAN** **9 Hrs**

Process, Creating a Digital-Marketing Plan, Seven Steps –Situation Analysis, Strategic Planning, Objectives, Digital-Marketing Strategies – Product, Price, Distribution, Communication, Relationship Management; Implementation plan, Budget, Evaluation.

**UNIT III: DIGITAL -MARKETING ENVIRON MENT** **9 Hrs**

Overview of Digital-Marketing Environment, Global Digital -Markets, Wireless Internet Access, Digital divide, Building inclusive Digital markets, social networking, Ethical and Legal Issues – Overview, Digital Property, Emerging issues.

**UNIT IV:DIGITAL-MARKETING MANAGEMENT** **9 Hrs**

Online offer – Creating customer value online, Product Benefits, Digital Marketing enhanced product development, Payment options, Pricing Strategies; Internet as distribution, Digital Marketing Communication – Owned Media, Paid media, Earned Media.

**UNIT V: EMERGING TRENDS** **9 Hrs**

Emerging trends in Digital-marketing, Content Marketing, Social Media Marketing, Email Marketing, Affiliate Marketing, Video Marketing, Mobile Marketing, Interactive advertising, International Online Marketing, Search Engine Marketing, Online Partnership, Viral Marketing, E-CRM, E-Business, E-Tailing.

**Total Hours: 45**

**TEXT BOOK:**

1. Strauss Judy, Frost Raymond (2013), E-Marketing, 7/e; New Delhi: Prentice Hall.

**REFERENCE BOOKS:**

1. Chaffey Dave and Smith PR (2013), Emarketing Excellence: Planning and Optimizing your Digital Marketing; 4/e; Routledge.
2. Ryan Damian, (2014), Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, 3/e; Kogan Page Limited.

| Subject Code: HBCC22006 | Subject Name: **INTELLECTUAL PROPERTY RIGHTS AND PATENTS.** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : Nil | Ty | 3 | 0 | 0 | 3 |

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits
T/L/ETL :Theory / Lab / Embedded Theory and Lab

**OBJECTIVES**

To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.
To develop expertise in the learners in IPR related issues and sensitize the learners with the emerging issues in IPR and the rationale for the protection of IPR.

**COURSE OUTCOMES (Cos)**

Students completing this course were able to

| | |
|---|---|
| **CO1** | Imbibe the knowledge of Intellectual Property and its protection through various laws. |
| **CO2** | apply the knowledge of IPR for professional development |
| **CO3** | develop a platform for protection and compliance of Intellectual Property Rights & knowledge |
| **CO4** | create awareness amidst academia and industry of IPR and Copyright compliance |
| **CO5** | deliver the purpose and function of IPR and patenting |

**Mapping of Course Outcome with Program Outcome (POs)**

| **Cos/POs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **P07** | **PO8** | **P09** |
|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 1 | 2 | 3 | 2 | 2 | 2 | 3 |
| **CO3** | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 1 | 2 |
| **CO5** | 3 | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 2 |

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

| Category | H&S | Program core | Program Elective | Open elective | Skill enhancing elective | Interdisciplinary/Allied | Skill component | Practical Project/ Internship | others |
|---|---|---|---|---|---|---|---|---|---|
| | √ | | | | | | | | |

| Subject Code: HBCC22006 | Subject Name: **INTELLECTUAL PROPERTY RIGHTS AND PATENTS.** | T/L/ ETL | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite : Nil | Ty | 3 | 0 | 0 | 3 |
| L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits<br>T/L/ETL :Theory / Lab / Embedded Theory and Lab | | | | | | |

UNIT – I: 9Hrs

Introduction to IPRs, Basic concepts and need for Intellectual Property – Meaning and practical aspects of Patents, Copyrights, Geographical Indications, IPR in India and Abroad. Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT – II: 9Hrs

Intellectual Property Rights. The IPR tool kit, Patents, the patenting process, Patent cooperation treaties: International Treaties and conventions on IPRs: Trade Related Aspects of Intellectual Property Rights Agreement, Patent Cooperation Treaty, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT – III: 9Hrs

Intellectual Property Protections IPR of Living Species, protecting inventions in biotechnology, protections of traditional knowledge, biopiracy and documenting traditional knowledge, Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection. Case studies: The basmati rice issue, revocations of turmeric patent, revocation of neem patent.

UNIT – IV: 9Hrs

Exercising and Enforcing of Intellectual Property Rights Rights of an IPR owner, licensing agreements, criteria for patent infringement. Case studies of patent infringement, IPR – contract, unfair competitions and control, provisions in TRIPS,

UNIT- V: 9Hrs

Role of Patents in Product Development & Commercialization Recent changes in IPR laws impacting patents and copy rights, intellectual cooperation in the science and allied industry. Patentable and non-patentable research. Case studies .

**Text book:** Total hours:45

1. Nithyananda, K.V. (2019). Intellectual Property Rights : Protection and Management. India, IN: Cengage Learning India Private Limited.
2. Neeraj, P., & Khusdeep, D. (2014). Intellectual Property Rights. India, IN: PHI learning Private Limited.

**References**:

1.P.B. Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy. Tata Mc Graw Hill, 2001. Steve Smith, The Quality Revolution.1st ed., Jaico Publishing House, 2002.
2. Kompal Bansal and Praishit Bansal. Fundamentals of IPR for Engineers, 1st Edition, BS Publications, 2012.
3.Prabhuddha Ganguli. Intellectual Property Rights. 1st Edition, TMH, 2012.
4.R Radha Krishnan & S Balasubramanian. Intellectual Property Rights. 1st Edition, Excel Books, 2012.
5. M Ashok Kumar & Mohd. Iqbal Ali. Intellectual Property Rights. 2nd Edition, Serial Publications, 2011. VinodV. Scople, Managing Intellectual Property. Prentice Hall of India PvtLtd, 2012.
6.Deborah E. Bouchoux. Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets. Cengage Learning, 3rd ed. Edition, 2012.
7. Prabuddha Ganguli. Intellectual Property Rights: Unleashing the Knowledge Economy. McGraw Hill Education, 2011. Edited by Derek Bosworth and Elizabeth Webster.The Management of Intellectual Property. Edward Elgar Publishing Ltd., 2013.
8.Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
9.Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House

**E-resources:**

1.Subramanian, N., & Sundararaman, M. (2018). Intellectual Property Rights – An Overview. Retrieved from http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf
2.World Intellectual property Organisation. (2004). WIPO Intellectual property Handbook. Retrieved from https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf

**Reference Journal:**

1.Journal of Intellectual Property Rights (JIPR): NISCAIR

**Useful Websites:**

1.Cell for IPR Promotion and Management (http://cipam.gov.in/)
2.World Intellectual Property Organisation (https://www.wipo.int/about-ip/en/)
3.Office of the Controller General of Patents, Designs & Trademarks (http://www.ipindia.nic.in/)

| SubjectCode: CBDT22L07 | Subject Name : Major Project | Ty/Lb/ETP/IE | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite: Nil | Lb | 0 | 0/0 | 12/0 | 6 |
| L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits<br>T/L/ETL : Theory/Lab/Embedded Theory and Lab | | | | | | |

To make the students to make use of the knowledge and skill developed during their four years of study and to apply them for making an innovative product/process for the development of society and industries.

Students are expected to do a Project work either in an Industry or at the University in the field of relevant field /inter-disciplinary /multi-disciplinary area . The work to be carried out in Phase II should be continuation of Phase I. Each student will be allotted a guide based on the area of Project work. In case of industrial Project external guide has to be allotted from Industry. Inter disciplinary/multi-disciplinary project can be done with guidance of relevant department. Monthly reviews will be conducted during the semester to monitor the progress of the project by the project review committee. Students have to submit the Project thesis at the end of the semester and appear for the Project Viva-Voce examination conducted by the examiners duly appointed by the Controller of Examination. In case of industrial project certificate in proof has to be included in the report along with the bonofide certificate.

| SubjectCode: CBDT22I05 | Subject Name : Research Publication | Ty/Lb/ETP/IE | L | T / S.Lr | P/R | C |
|---|---|---|---|---|---|---|
| | Prerequisite: Nil | IE | 0 | 0/0 | 4/0 | 2 |
| L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab | | | | | | |

Students are supposed to prepare and publish the article based on his/her area of research in peer reviewed referred journal. Code of research publication ethics should be followed. After publishing the article students should present a seminar in presence of department faculties and PG students. At the end of semester viva examination will be conducted by the examiners appointed by the Head of the department.