R-21

# CURRICULUM ESSENTIALS

## Handbook on Outcome Based Education

COMPUTER SCIENCE AND BUSINESS SYSTEMS

NARULA INSTITUTE OF TECHNOLOGY

WWW.NIT.AC.IN

# Institute Vision

To make the Institute excellent in technological education and research by imparting equitable, inclusive, ethical, flexible and multidisciplinary knowledge to budding technologists to serve the society.

# Institute Mission

- To establish continuously improving academic ambience in the Institute in order to prepare the students with beyond curriculum knowledge, creativity, innovation, problem solving abilities, teamwork, communication skills etc. for their holistic development.
- To collaborate with Institutes of higher education, Professional Societies, R&D and Industrial organisations for continuous improvement of academic, research environment in the Institute and to build a strong Industry-Institute interface.
- To promote and nurture entrepreneurial and innovative quality of the students providing proper education, training and supportive facilities so that future entrepreneurs emerge with flying colors.
- To strengthen quality and knowledge-base of faculty through faculty development programmes for continuous upgradation to remain in tune with dynamically changing technology.
- To become a responsible contributor in the socio-economic development of the society through excellence in education and research.

# Institute Quality Policy

- Adoption of appropriate standards and practices for good governance, to bring in transparency of all operations and thereby improve credibility at all levels.
- Industry-ready professionals to be developed through interactive teaching learning process involving state of the art class rooms, laboratories, libraries, corporate exposure and innovative project work.
- Higher studies/research for faculty & staff to be encouraged for up gradation of knowledge through participation in Quality Improvement Programs, Seminars, Workshops, Webinars etc.
- Laboratory facilities would be upgraded in emerging areas to promote R&D activities including participation in Govt. and Industry funded projects.
- Industrial consultancy to be carried out in an effective manner for developing sense of accomplishment.
- Interaction with Professional Societies would be encouraged for the professional growth and development of the students, faculties and staff for mutual benefit.
- NBA Accreditation for all AICTE approved programs to be obtained at the earliest and maintained on a long-term basis.
- The innovative and entrepreneurial skills of the students to be nurtured through Innovation & Incubation centre, finally culminating in start-ups.

# Department Vision

To develop knowledge of Computer Technologies with managerial skills, human and social values.

# Department Mission

**M1:** To prepare students for successful professional careers both in industry, academics with Strong human ethics and values.

**M2:** To explore business discipline with the knowledge of Computer Science.

**M3:** To nurture lifelong learning practices, knowledge and skills with focus on entrepreneurship research and innovation.

# Program Educational Objectives (PEOs)

## B. Tech in
Computer Science and Business Systems

**PEO1.** Graduates will be able to pursue fundamental knowledge in Basic Sciences, Computer Sciences and Management Sciences.

**PEO2.** Graduates will be able to introduce strong problem solving skills, to design, implement, test and maintain Software Systems.

**PEO3.** Graduates will be able to communicate efficiently while working as a member or leader in a group and as an entrepreneur with ethical practices, right professional conduct.

**PEO4.** Graduates are prepared to be good entrepreneur and responsible social representatives.

# Program outcomes (POs)

## Engineering Graduates will be able to:

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

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

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

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

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

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

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

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

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

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

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

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

# Program Specific Outcomes (PSOs)

## B. Tech in
Computer Science and Business Systems

**PSO1:** The ability to solve the problem of Computer Science by applying engineering knowledge and analysis tools.

**PSO2:** The ability to understand professional, legal, managerial and financial issues with the collaboration of design implement and integrate Engineering Solutions.

**PSO3:** The ability to introduce industry related emerging trends to create innovative software professionals.

# Curriculum Structure

## B. Tech in
Computer Science and Business Systems

| 1st Semester | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Sl. No.** | **Category** | **Course Code** | **Course Title** | **Hours per week** | | | | **Credits** |
| **A. THEORY** | | | | L | T | P | Total | |
| **1** | Basic Science course | M101 | Discrete Mathematics | 3 | 0 | 0 | 3 | 3 |
| **2** | Basic Science course | M102 | Introductory Topics in Statistics, Probability and Calculus | 3 | 0 | 0 | 3 | 3 |
| **3** | Engineering Science Courses | CB101 | Fundamentals of Computer Science | 3 | 0 | 0 | 3 | 3 |
| **4** | Engineering Science Courses | EE101 | Principles of Electrical Engineering | 2 | 0 | 0 | 2 | 2 |
| **5** | Basic Science course | PH101 | Physics for Computing Science | 2 | 0 | 0 | 2 | 2 |
| **6** | Humanities and Social Sciences | HU 101 | Business Communication and Value Science-I | 1 | 0 | 0 | 2 | 2 |
| **B. PRACTICAL** | | | | | | | | |
| **7** | Engineering Science Courses | CB191 | Fundamentals of Computer Science Lab | 0 | 0 | 3 | 3 | 1.5 |
| **8** | Engineering Science Courses | EE 191 | Principles of Electrical Engineering Lab | 0 | 0 | 2 | 2 | 1 |
| **9** | Basic Science course | PH191 | Physics for Computing Science Lab | 0 | 0 | 2 | 2 | 1 |
| | **TOTAL** | | | | | | | 18.5 |

| 2nd Semester | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Sl. No.** | **Category** | **Course Code** | **Course Title** | **Hours per week** | | | | **Credits** |
| **A. THEORY** | | | | L | T | P | Total | |
| 1 | Basic Science courses | M201 | Linear Algebra | 3 | 0 | 0 | 3 | 3 |
| 2 | Basic Science courses | M202 | Statistical Methods | 3 | 0 | 0 | 3 | 3 |
| 3 | Engineering Science Course | CB201 | Data Structures and Algorithms | 3 | 1 | 0 | 4 | 4 |
| 4 | Engineering Science Course | EC201 | Principles of Electronics | 2 | 0 | 0 | 2 | 2 |
| 5 | Basic Science courses | BS201 | Fundamentals of Economics | 2 | 0 | 0 | 2 | 2 |
| 6 | Humanities and Social Sciences | HU201 | Business Communication and Value | 2 | 0 | 0 | 2 | 2 |
| 7 | Basic Science courses | MC201 | Environmental Sciences (Non-Credit) | | | | | |
| **B. PRACTICAL** | | | | | | | | |
| 8 | Basic Science course | M292 | Statistical Methods Lab | 0 | 0 | 2 | 2 | 1 |
| 9 | Engineering Science Course | CB291 | Data Structures and Algorithms Lab | 0 | 0 | 3 | 3 | 1.5 |
| 10 | Engineering Science Course | EC291 | Principles of Electronics Lab | 0 | 0 | 2 | 2 | 1 |
| | **TOTAL CREDIT** | | | | | | | 19.5 |

| 3rd Semester | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sl. No. | Category | Course Code | Course Title | Hours per week | | | | Credits |
| | | | | L | T | P | Total | |
| A. THEORY | | | | | | | | |
| 1 | Basic Science course | CB301 | Formal Language and | 3 | 0 | 0 | 3 | 3 |
| 2 | Engineering Science Courses | CB302 | Computer Organization and | 3 | 0 | 0 | 3 | 3 |
| 3 | Engineering Science Courses | CB303 | Object Oriented | 3 | 0 | 0 | 3 | 3 |
| 4 | Program Core Course | CB304 | Computational Statistics | 3 | 0 | 0 | 3 | 3 |
| 5 | Program Core Course | CB305 | Software Engineering | 3 | 0 | 0 | 3 | 3 |
| 6 | Humanities and Social Sciences | MC301 | Indian Constitution (Non- Credit) | | | | | |
| B. PRACTICAL | | | | | | | | |
| 7 | Engineering Science Courses | CB391 | Computer Organization and | 0 | 0 | 3 | 3 | 1.5 |
| 8 | Engineering Science Courses | CB393 | Object Oriented Programming Lab | 0 | 0 | 3 | 3 | 1.5 |
| 9 | Program Core Course | CB394 | Computational Statistics Lab | 0 | 0 | 2 | 2 | 1 |
| 10 | Program Core Course | CB395 | Software Engineering Lab | 0 | 0 | 2 | 2 | 1 |
| TOTAL CREDIT | | | | | | | | 20 |

| 4th Semester | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Sl. N** | **Category** | **Course Code** | **Course Title** | **Hours per** | | | | **Credits** |
| | | | | **L** | **T** | **P** | **Total** | |
| **A. THEORY** | | | | | | | | |
| 1 | Program Core Course | CB401 | Operating Systems (Unix) | 3 | 0 | 0 | 3 | 3 |
| 2 | Program Core Course | CB402 | Database Management Systems | 3 | 0 | 0 | 3 | 3 |
| 3 | Program Core Course | CB403 | Software Design with UML | 3 | 0 | 0 | 3 | 3 |
| 4 | Program Core Course | BS401 | Introduction to Innovation, IP Management and Entrepreneurship | 3 | 0 | 0 | 3 | 3 |
| 5 | Humanities and Social Sciences including Management courses | BS402 | Business Communication and Value | 2 | 0 | 0 | 2 | 2 |
| 6 | Basic Science course | M401 | Operations Research | 2 | 0 | 0 | 2 | 2 |
| 7 | Humanities and Social Sciences including Management courses | MC401 | Essen<br>Essence of Indian Traditional Knowledge<br>(Non- Credit) | | | | | |
| **B. PRACTICAL** | | | | | | | | |
| 8 | Program Core Course | CB491 | Operating Systems Lab (Unix) | 0 | 0 | 2 | 2 | 1 |
| 9 | Program Core Course | CB492 | Database Management Systems Lab | 0 | 0 | 2 | 2 | 1 |
| 10 | Program Core Course | CB493 | Software Design with UML Lab | 0 | 0 | 2 | 2 | 1 |
| 11 | Engineering Science Courses | M491 | Operations Research Lab | 0 | 0 | 2 | 2 | 1 |
| **TOTAL CREDIT** | | | | | | | | **20** |

| 5th Semester | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sl. No. | Category | Course Code | Course Title | Hours per week | | | | Credits |
| | | | | L | T | P | Total | |
| A. THEORY | | | | | | | | |
| 1 | Program Core Course | CB501 | Design and Analysis of | 3 | 0 | 0 | 3 | 3 |
| 2 | Program Core Course | CB502 | Compiler Design (LEX & | 3 | 0 | 0 | 3 | 3 |
| 3 | Program Core Course | BS501 | Fundamentals of Management | 2 | 0 | 0 | 2 | 2 |
| 4 | Program Core Course | BS502 | Business Strategy | 2 | 0 | 0 | 2 | 2 |
| 5 | Program Core Course | BS503 | Design Thinking | 2 | 1 | 0 | 3 | 3 |
| 6 | Professional Elective courses | PE-B503 (A/B/C) | Elective I + Lab** | 2 | 0 | 0 | 2 | 2 |
| B. PRACTICAL | | | | | | | | |
| 7 | Program Core Course | CB591 | Design and Analysis of Algorithms | 0 | 0 | 3 | 3 | 1.5 |
| 8 | Program Core Course | CB592 | Compiler Design Lab (LEX & | 0 | 0 | 3 | 3 | 1.5 |
| 9 | Program Core Course | BS593 | Design Thinking Lab | 0 | 0 | 2 | 2 | 1 |
| 10 | Professional Elective courses | PE-CB593 | Elective I Lab** | 0 | 0 | 2 | 2 | 1 |
| 11 | PROJECT | PR 591 | Minor Project I | 0 | 0 | 2 | 2 | 1 |
| TOTAL CREDIT | | | | | | | | 21 |

| 6th Semester | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Sl. No.** | **Category** | **Course Code** | **Course Title** | **Hours per** | | | | **Credits** |
| | | | | **L** | **T** | **P** | **Total** | |
| **A. THEORY** | | | | | | | | |
| **1** | Program Core Course | CB601 | Computer Networks | 3 | 0 | 0 | 2 | 3 |
| **2** | Program Core Course | CB602 | Information Security | 3 | 0 | 0 | 3 | 3 |
| **3** | Program Core Course | CB601 | Artificial Intelligence | 3 | 0 | 0 | 3 | 3 |
| **4** | Humanities and Social Sciences including Management courses | BS601 | Financial and Cost | 2 | 0 | 0 | 3 | 3 |
| **5** | Humanities and Social Sciences including Management courses | HU601 | Business Communication and | 2 | 0 | 0 | 2 | 2 |
| **6** | Professional Elective courses | PE-CB603 | Elective II ** | 2 | 0 | 0 | 2 | 2 |
| **B. PRACTICAL** | | | | | | | | |
| **7** | Program Core Course | CB691 | Computer Networks Lab | 0 | 0 | 3 | 3 | 1.5 |
| **8** | Program Core Course | CB692 | Information Security Lab | 0 | 0 | 2 | 2 | 1 |
| **9** | Program Core Course | CB691 | Artificial Intelligence Lab | 0 | 0 | 3 | 3 | 1.5 |
| **10** | Professional Elective courses | PE-CB693 | Elective II Lab** | 0 | 0 | 0 | 2 | 1 |
| **TOTAL CREDIT** | | | | | | | | **21** |

| 7th Semester | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sl No | Course Code | Paper Code | Theory | Contact Hours | | | | Credit Points |
| | | | | L | T | P | Total | |
| **A. THEORY** | | | | | | | | |
| 1 | Professional Elective courses | CB701 | Usability Design of Software | 2 | 0 | 0 | 2 | 2 |
| 2 | Professional Elective courses | CB702 | IT Workshop Skylab / Matlab | 2 | 0 | 0 | 2 | 2 |
| 3 | Professional Elective courses | BS701 | Financial Management | 3 | 0 | 0 | 3 | 3 |
| 4 | Humanities and Social Sciences | BS702 | Human Resource Management | 2 | 0 | 0 | 2 | 2 |
| 5 | Professional Elective courses | PE-CB703 (A/B/C) | Elective III** | 2 | 1 | 0 | 3 | 3 |
| 6 | Professional Elective courses | PE-CB704 (A/B/C) | Elective IV ** | 2 | 1 | 0 | 3 | 3 |
| **B. PRACTICAL** | | | | | | | | |
| 7 | Professional Elective courses | CB791 | Usability Design of Software | 0 | 0 | 2 | 2 | 1 |
| 8 | Professional Elective courses | CB792 | IT Workshop Skylab / Matlab Lab | 0 | 0 | 2 | 2 | 1 |
| 9 | Professional Elective courses | PE-CB793 (A/B/C) | Elective III Lab** | 0 | 0 | 2 | 2 | 1 |
| 10 | Professional Elective courses | PE-CB794 (A/B/C) | Elective IV Lab** | 0 | 0 | 2 | 2 | 1 |
| 11 | PROJECT | CB781 | Project Evaluation I | 0 | 0 | 4 | 4 | 2 |
| **TOTAL** | | | | | | | | **21** |

| 8th Semester | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sl No | Course Code | Paper Code | Theory | Contact Hours /Week | | | | Credit Points |
| | | | | L | T | P | Total | |
| A. THEORY | | | | | | | | |
| 1 | Professional Elective courses | BS801 | Services Science and Service Operational | 3 | 0 | 0 | 3 | 3 |
| 2 | Professional Elective courses | BS802 | IT Project Management | 2 | 0 | 0 | 2 | 2 |
| 3 | Professional Elective courses | BS803 | Marketing Research and Marketing | 2 | 0 | 0 | 2 | 2 |
| 4 | Open Elective courses | PE-CBS804 (A/B/C) | Elective V ** | 3 | 0 | 0 | 3 | 3 |
| 5 | Open Elective courses | PE-BS805 (A/B/C) | Elective VI ** | 3 | 0 | 0 | 3 | 3 |
| B. PRACTICAL | | | | | | | | |
| 6 | Professional Elective courses | BS891 | Services Science and Service Operational | 0 | 0 | 0 | 2 | 1 |
| 7 | Professional Elective courses | BS892 | IT Project Management Lab | 0 | 0 | 0 | 2 | 1 |
| 8 | Open Elective courses | PE-BS894 (A/B/C) | Elective V Lab ** | 0 | 0 | 2 | 2 | 1 |
| 9 | Open Elective courses | PE-CS895 (A/B/C) | Elective VI Lab** | 0 | 0 | 2 | 2 | 1 |
| 10 | Project | BS881 | Project Evaluation II | 0 | 0 | 12 | 12 | 6 |
| TOTAL CREDIT | | | | | | | | 23 |

**FOR MORE DETAILS SCAN THE QR CODE**

https://www.nit.ac.in/curriculum-essentials.php

**Course Name: Discrete Mathematics**
**Course Code: M101**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credits: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to matrix algebra, differential calculus, |
| **CO2** | Determine the solutions of the problems related to matrix algebra, differential calculus, multivariable calculus, vector calculus and infinite series. |
| **CO3** | Apply the appropriate mathematical tools of matrix algebra, differential calculus, multivariable calculus, vector calculus and infinite series for the solutions of the problems. |
| **CO4** | Analyze different engineering problems linked with matrix algebra, differential calculus, multivariable calculus, vector calculus |
| **CO5** | Apply different engineering problems linked with matrix algebra, differential calculus, multivariable calculus, vector calculus |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **M101.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **M101.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **M101.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **M101.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **M101.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **M101.1** | 2 | 2 | 2 |
| **M101.2** | 2 | 2 | 2 |
| **M101.3** | 2 | 2 | 2 |
| **M101.4** | 2 | 2 | 2 |
| **M101.5** | 2 | 2 | 2 |

**Course Name: STATISTICS, PROBABILITY AND CALCULUS**
**Course Code: M102**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credits: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to statistics, probability and calculus |
| **CO2** | Determine the solutions of the problems related to statistics, probability and calculus |
| **CO3** | Apply the appropriate mathematical tools of statistics, probability and calculus |
| **CO4** | Analyze different engineering problems linked with statistics, probability and calculus |
| **CO5** | Apply different engineering problems linked with statistics, probability and calculus |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **M102.1** | 3 | 2 | 2 | 2 | | | | | | | | 2 |
| **M102.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **M102.3** | 3 | 3 | 2 | 3 | | | | | | | | 2 |
| **M102.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **M102.5** | 3 | 3 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **M102.1** | 2 | 2 | 2 |
| **M102.2** | 2 | 2 | 3 |
| **M102.3** | 2 | 3 | 2 |
| **M102.4** | 3 | 2 | 2 |
| **M102.5** | 2 | 2 | 2 |

**Course Name: Fundamentals of Computer Science**
**Course Code: CB101**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credits: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to basic computing |
| **CO2** | Determine the solutions of the problems related to basic computing. |
| **CO3** | Apply the appropriate mathematical tools of basic computing |
| **CO4** | Analyze different engineering problems linked with basic computing |
| **CO5** | Apply different engineering problems linked with basic computing |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB101.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **CB101.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB101.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB101.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB101.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB101.1** | 2 | 2 | 2 |
| **CB101.2** | 2 | 2 | 2 |
| **CB101.3** | 2 | 2 | 2 |
| **CB101.4** | 2 | 2 | 2 |
| **CB101.5** | 2 | 2 | 2 |

**Course Name: Principles of Electrical Engineering**
**Course Code: EE101**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to electrical engineering |
| **CO2** | Determine the solutions of the problems related to electrical engineering |
| **CO3** | Apply the appropriate mathematical tools of electrical engineering |
| **CO4** | Analyze different engineering problems linked electrical engineering |
| **CO5** | Apply different engineering problems linked with electrical engineering |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **EE101.1** | 3 | 2 | 2 | 2 | | | | | | | | 2 |
| **EE101.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **EE101.3** | 3 | 3 | 2 | 3 | | | | | | | | 2 |
| **EE101.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **EE101.5** | 3 | 3 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **EE101.1** | 2 | 2 | 2 |
| **EE101.2** | 2 | 2 | 3 |
| **EE101.3** | 2 | 3 | 2 |
| **EE101.4** | 3 | 2 | 2 |
| **EE101.5** | 2 | 2 | 2 |

**Course Name: Physics for Computing Science**
**Course Code: PH101**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to basic computing in physics |
| **CO2** | Determine the solutions of the problems related to basic computing in physics |
| **CO3** | Apply the appropriate mathematical tools of basic computing in physics |
| **CO4** | Analyze different engineering problems linked with basic computing in physics |
| **CO5** | Apply different engineering problems linked with basic computing in physics |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PH101.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PH101.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PH101.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PH101.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PH101.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PH101.1** | 2 | 2 | 2 |
| **PH101.2** | 2 | 2 | 2 |
| **PH101.3** | 2 | 2 | 2 |
| **PH101.4** | 2 | 2 | 2 |
| **PH101.5** | 2 | 2 | 2 |

**Course Name: Business Communication and Value Science-I**
**Course Code: HU101**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to communication and value science |
| **CO2** | Determine the solutions of the problems related to communication and value science |
| **CO3** | Apply the appropriate mathematical tools of communication and value science |
| **CO4** | Analyze different engineering problems linked communication and value science |
| **CO5** | Apply different engineering problems linked with communication and value science |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **HU101.1** | 3 | 2 | 2 | 2 | | | | | | | | 2 |
| **HU101.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **HU101.3** | 3 | 3 | 2 | 3 | | | | | | | | 2 |
| **HU101.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **HU101.5** | 3 | 3 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **HU101.1** | 2 | 2 | 2 |
| **HU101.2** | 2 | 2 | 3 |
| **HU101.3** | 2 | 3 | 2 |
| **HU101.4** | 3 | 2 | 2 |
| **HU101.5** | 2 | 2 | 2 |

**Course Name: Fundamentals of Computer Science Lab**
**Course Code: CB191**
**Contact: 0:0:3**
**Total Contact Hours: 24**
**Credits: 1.5**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to basic computing lab |
| **CO2** | Determine the solutions of the problems related to basic computing lab |
| **CO3** | Apply the appropriate mathematical tools of basic computing lab |
| **CO4** | Analyze different engineering problems linked with basic computing lab |
| **CO5** | Apply different engineering problems linked with basic computing lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB191.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **CB191.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB191.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB191.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB191.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB191.1** | 2 | 2 | 2 |
| **CB191.2** | 2 | 2 | 2 |
| **CB191.3** | 2 | 2 | 2 |
| **CB191.4** | 2 | 2 | 2 |
| **CB191.5** | 2 | 2 | 2 |

**Course Name: Principles of Electrical Engineering Lab**
**Course Code: EE191**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credits: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to electrical engineering lab |
| **CO2** | Determine the solutions of the problems related to electrical engineering lab |
| **CO3** | Apply the appropriate mathematical tools of electrical engineering lab |
| **CO4** | Analyze different engineering problems linked electrical engineering lab |
| **CO5** | Apply different engineering problems linked with electrical engineering lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **EE191.1** | 3 | 2 | 2 | 2 | | | | | | | | 2 |
| **EE191.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **EE191.3** | 3 | 3 | 2 | 3 | | | | | | | | 2 |
| **EE191.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **EE191.5** | 3 | 3 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **EE191.1** | 2 | 2 | 2 |
| **EE191.2** | 2 | 2 | 3 |
| **EE191.3** | 2 | 3 | 2 |
| **EE191.4** | 3 | 2 | 2 |
| **EE191.5** | 2 | 2 | 2 |

**Course Name: Physics for Computing Science Lab**
**Course Code: PH191**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credits: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to basic computing in physics lab |
| **CO2** | Determine the solutions of the problems related to basic computing in physics lab |
| **CO3** | Apply the appropriate mathematical tools of basic computing in physics lab |
| **CO4** | Analyze different engineering problems linked with basic computing in physics lab |
| **CO5** | Apply different engineering problems linked with basic computing in physics lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PH191.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PH191.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PH191.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PH191.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PH191.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PH191.1** | 2 | 2 | 2 |
| **PH191.2** | 2 | 2 | 2 |
| **PH191.3** | 2 | 2 | 2 |
| **PH191.4** | 2 | 2 | 2 |
| **PH191.5** | 2 | 2 | 2 |

**Course Name: Linear Algebra**
**Course Code: M201**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credits: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to matrix algebra, differential calculus, |
| **CO2** | Determine the solutions of the problems related to matrix algebra, differential calculus, multivariable calculus, vector calculus and infinite series. |
| **CO3** | Apply the appropriate mathematical tools of matrix algebra, differential calculus, multivariable calculus, vector calculus and infinite series for the solutions of the problems. |
| **CO4** | Analyze different engineering problems linked with matrix algebra, differential calculus, multivariable calculus, vector calculus |
| **CO5** | Apply different engineering problems linked with matrix algebra, differential calculus, multivariable calculus, vector calculus |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **M201.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **M201.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **M201.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **M201.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **M201.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **M201.1** | 2 | 2 | 2 |
| **M201.2** | 2 | 2 | 2 |
| **M201.3** | 2 | 2 | 2 |
| **M201.4** | 2 | 2 | 2 |
| **M201.5** | 2 | 2 | 2 |

**Course Name: Statistical Methods**
**Course Code: M202**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credits: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to statistics, probability and calculus |
| **CO2** | Determine the solutions of the problems related to statistics, probability and calculus |
| **CO3** | Apply the appropriate mathematical tools of statistics, probability and calculus |
| **CO4** | Analyze different engineering problems linked with statistics, probability and calculus |
| **CO5** | Apply different engineering problems linked with statistics, probability and calculus |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **M202.1** | 3 | 2 | 2 | 2 | | | | | | | | 2 |
| **M202.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **M202.3** | 3 | 3 | 2 | 3 | | | | | | | | 2 |
| **M202.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **M202.5** | 3 | 3 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **M202.1** | 2 | 2 | 2 |
| **M202.2** | 2 | 2 | 3 |
| **M202.3** | 2 | 3 | 2 |
| **M202.4** | 3 | 2 | 2 |
| **M202.5** | 2 | 2 | 2 |

**Course Name: Data Structures and Algorithms**
**Course Code: CB201**
**Contact: 3:1:0**
**Total Contact Hours: 48**
**Credits: 4**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand the concept of data structure and create new data structure to propose efficient solution by writing appropriate algorithm and program for engineering and mathematical problem after analyzing the efficiency of the same. |
| **CO2** | Identify and differentiate different types of data structures and implement the appropriate data structure after analyzing complex engineering problem leading to their lifelong |
| **CO3** | Understand and implement stack, queue and dequeue by selecting appropriate methods and use it for solving real life and engineering problem choosing appropriate modern |
| **CO4** | Understand and implement different non-linear data structures by selecting appropriate methods and apply it for solving complex engineering problem and also argue and judge maintaining the professional ethics to validate the same. |
| **CO5** | Understand different factors of sorting and searching algorithm and select the appropriate algorithm for solving complex engineering problem and also implement and analyze the algorithm. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB201.1** | 3 | 3 | 3 | 3 | 2 | | | | | | | |
| **CB201.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **CB201.3** | 3 | 3 | 3 | 3 | | | | | | | | |
| **CB201.4** | 3 | 3 | 3 | 3 | 2 | | | 2 | | | | |
| **CB201.5** | 3 | 3 | 3 | 3 | 2 | | | | | | | |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB201.1** | 3 | 3 | 3 |
| **CB201.2** | 3 | 3 | 3 |
| **CB201.3** | 3 | 3 | 2 |
| **CB2012.4** | 3 | 3 | 3 |
| **CB201.5** | 3 | 2 | 3 |

**Course Name: Principles of Electronics**
**Course Code: EC201**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to electronics |
| **CO2** | Determine the solutions of the problems related to electronics |
| **CO3** | Apply the appropriate mathematical tools of electronics |
| **CO4** | Analyze different engineering problems linked with electronics |
| **CO5** | Apply different engineering problems linked with electronics |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **EC201.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **EC201.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **EC201.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **EC201.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **EC201.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **EC201.1** | 2 | 2 | 2 |
| **EC201.2** | 2 | 2 | 2 |
| **EC201.3** | 2 | 2 | 2 |
| **EC201.4** | 2 | 2 | 2 |
| **EC201.5** | 2 | 2 | 2 |

**Course Name: Fundamentals of Economics**
**Course Code: BS201**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to economics |
| **CO2** | Determine the solutions of the problems related to economics |
| **CO3** | Apply the appropriate mathematical tools of economics |
| **CO4** | Analyze different engineering problems linked with economics |
| **CO5** | Apply different engineering problems linked with economics |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS201.1** | 3 | 2 | 2 | 2 | | | | | | | | 2 |
| **BS201.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **BS201.3** | 3 | 3 | 2 | 3 | | | | | | | | 2 |
| **BS201.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS201.5** | 3 | 3 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS201.1** | 2 | 2 | 2 |
| **BS201.2** | 2 | 2 | 3 |
| **BS201.3** | 2 | 3 | 2 |
| **BS201.4** | 3 | 2 | 2 |
| **BS201.5** | 2 | 2 | 2 |

**Course Name: Business Communication and Value Science-II**
**Course Code: HU201**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to communication and value science |
| **CO2** | Determine the solutions of the problems related to communication and value science |
| **CO3** | Apply the appropriate mathematical tools of communication and value science |
| **CO4** | Analyze different engineering problems linked communication and value science |
| **CO5** | Apply different engineering problems linked with communication and value science |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **HU201.1** | 3 | 2 | 2 | 2 | | | | | | | | 2 |
| **HU201.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **HU201.3** | 3 | 3 | 2 | 3 | | | | | | | | 2 |
| **HU201.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **HU201.5** | 3 | 3 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **HU201.1** | 2 | 2 | 2 |
| **HU201.2** | 2 | 2 | 3 |
| **HU201.3** | 2 | 3 | 2 |
| **HU201.4** | 3 | 2 | 2 |
| **HU201.5** | 2 | 2 | 2 |

**Course Name: Environmental Sciences**
**Course Code: MC201**
**Contact:**
**Total Contact Hours:**
**Credits:**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to environmental sciences |
| **CO2** | Determine the solutions of the problems related to environmental sciences |
| **CO3** | Apply the appropriate mathematical tools of environmental sciences |
| **CO4** | Analyze different engineering problems linked with environmental sciences |
| **CO5** | Apply different engineering problems linked with environmental sciences |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MC201.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **MC201.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **MC201.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **MC201.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **MC201.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **MC201.1** | 2 | 2 | 2 |
| **MC201.2** | 2 | 2 | 2 |
| **MC201.3** | 2 | 2 | 2 |
| **MC201.4** | 2 | 2 | 2 |
| **MC201.5** | 2 | 2 | 2 |

**Course Name: Statistical Methods Lab**
**Course Code: M292**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credits: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to statistics, probability and calculus lab |
| **CO2** | Determine the solutions of the problems related to statistics, probability and calculus lab |
| **CO3** | Apply the appropriate mathematical tools of statistics, probability and calculus lab |
| **CO4** | Analyze different engineering problems linked with statistics, probability and calculus lab |
| **CO5** | Apply different engineering problems linked with statistics, probability and calculus lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **M292.1** | 3 | 2 | 2 | 2 | | | | | | | | 2 |
| **M292.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **M292.3** | 3 | 3 | 2 | 3 | | | | | | | | 2 |
| **M292.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **M292.5** | 3 | 3 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **M292.1** | 2 | 2 | 2 |
| **M292.2** | 2 | 2 | 3 |
| **M292.3** | 2 | 3 | 2 |
| **M292.4** | 3 | 2 | 2 |
| **M292.5** | 2 | 2 | 2 |

**Course Name: Data Structures and Algorithms Lab**
**Course Code: CB291**
**Contact: 0:0:3**
**Total Contact Hours: 36**
**Credits: 1.5**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Identify and propose appropriate data structures and data types to implement list using array and linked list and design effective programs to solve complex engineering problem using list and modern tools. |
| **CO2** | Design and develop effective programs for engineering and mathematical problems using stack, queue and recursive functions after implementing stack and queue using modular programming approach possibly as a team maintaining proper ethics of |
| **CO3** | Implement different data structures like binary tree, heap and use them to explain and organize data and manipulate them through programs leading to solution of complex engineering problem. |
| **CO4** | Implement different sorting and searching algorithm selecting appropriate data structures and analyze the efficiency of the resulting program using modern engineering tools and methods leading to lifelong learning. |
| **CO5** | Prepare laboratory reports on interpretation of experimental results and analyze it for validating the same maintaining proper ethics of collaboration. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB291.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **CB291.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB291.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB291.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB291.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB291.1** | 2 | 2 | 2 |
| **CB291.2** | 2 | 2 | 2 |
| **CB291.3** | 2 | 2 | 2 |
| **CB291.4** | 2 | 2 | 2 |
| **CB291.5** | 2 | 2 | 2 |

**Course Name: Principles of Electronics Lab**
**Course Code: EC291**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credits: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to electronics lab |
| **CO2** | Determine the solutions of the problems related to electronics lab |
| **CO3** | Apply the appropriate mathematical tools of electronics lab |
| **CO4** | Analyze different engineering problems linked with electronics lab |
| **CO5** | Apply different engineering problems linked with electronics lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **EC291.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **EC291.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **EC291.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **EC291.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **EC291.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **EC291.1** | 2 | 2 | 2 |
| **EC291.2** | 2 | 2 | 2 |
| **EC291.3** | 2 | 2 | 2 |
| **EC291.4** | 2 | 2 | 2 |
| **EC291.5** | 2 | 2 | 2 |

**Course Name: Formal Language and Automata Theory**
**Course Code: CB301**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Understand the fundamental concepts of Finite State Automata to Explain or Illustrate and Identify problems where students can Apply the concept appropriately to Solve them. |
| **CO2** | Understand the fundamental concepts of Regular Expressions and its relation with DFA so that they can Develop regular expression for a specified language and Validate it. |
| **CO3** | Understand the fundamental concepts of Context Free Grammar so that they can Design grammar for a specified language and Validate it. |
| **CO4** | Explain or Illustrate the fundamental operating principles of Push Down Automata and Use it appropriately to Solve problems. |
| **CO5** | Understand the operating principles of Turing Machine and Design Turing Machines to Propose solutions to the related problems appropriately and validate the effectiveness as well as limitations of computations making the students aware of its utilitarian importance for further explorations leading towards lifelong learning. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB301.1** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **CB301.2** | 2 | 2 | 2 | 2 | | | | | | | | 3 |
| **CB301.3** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **CB301.4** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **CB301.5** | 3 | 3 | 3 | 3 | | | | | 2 | 2 | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB301.1** | 3 | 3 | 3 |
| **CB301.2** | 3 | 3 | 3 |
| **CB301.3** | 3 | 3 | 3 |
| **CB301.4** | 3 | 3 | 3 |
| **CB301.5** | 3 | 3 | 3 |

**Course Name: Computer Organization and Architecture**
**Course Code: CB302**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Illustrate the basic concept of computer architecture and its performance measurement, parallel processing, Flynn's classification and Amdahl's law and apply this knowledge in designing solution for real life engineering problem. |
| **CO2** | Summarize the basic concept of pipeline, instruction pipeline, arithmetic pipeline, hazards detection and prevention and use this knowledge for designing and implementing mathematical and engineering problem leading to lifelong learning. |
| **CO3** | Identify the concept of Instruction-Level Parallelism to solve engineering problem. |
| **CO4** | Illustrate and Compare concept of Multiprocessor architecture and parallel architecture and apply this knowledge for developing an approach by means of existing and new methods as a team work. |
| **CO5** | Understand the concept of message passing architecture and interconnection network and design an optimized model for building a new solution as a professional engineering practice as a team. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB302.1** | 3 | 3 | 3 | 2 | | | | | | | | |
| **CB302.2** | 3 | 3 | 3 | 3 | | | | | 2 | 2 | 2 | 3 |
| **CB302.3** | 2 | 2 | 2 | 3 | | | | | | | | |
| **CB302.4** | 3 | 3 | 3 | 3 | | | | | | | | |
| **CB302.5** | 3 | 3 | 3 | 3 | | | | | | | | |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB302.1** | 3 | 3 | 3 |
| **CB302.2** | 3 | 3 | 3 |
| **CB302.3** | 3 | 3 | 3 |
| **CB302.4** | 3 | 3 | 3 |
| **CB302.5** | 3 | 3 | 3 |

**Course Name: Object Oriented Programming**
**Course Code: CB303**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Design the process of interaction between Objects, classes & methods w.r.t. Object Oriented Programming. |
| **CO2** | Acquire a basic knowledge of Object Orientation with different properties as well as different features of C++. |
| **CO3** | Analyze various activities of different string handling functions with various I/O |
| **CO4** | Discuss basic code reusability feature w.r.t. Inheritance, Package and Interface. |
| **CO5** | Implement Exception handling. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB303.1** | 3 | 3 | 2 | 3 | 2 | | | | | | | |
| **CB303.2** | 3 | 3 | 3 | 3 | 2 | | | | | | | |
| **CB303 3** | 3 | 3 | 3 | 3 | 2 | | | | | | | |
| **CB303 .4** | 3 | 3 | 3 | 3 | 2 | | | | | | | |
| **CB303.5** | 3 | 3 | 3 | 3 | 2 | | | | | | | |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB303.1** | 3 | 3 | 3 |
| **CB303.2** | 3 | 3 | 3 |
| **CB303.3** | 3 | 3 | 3 |
| **CB303.4** | 3 | 3 | 3 |
| **CB303.5** | 3 | 3 | 3 |

**Course Name: Computational Statistics**
**Course Code: CB304**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credits: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to statistics, probability and calculus |
| **CO2** | Determine the solutions of the problems related to statistics, probability and calculus |
| **CO3** | Apply the appropriate mathematical tools of statistics, probability and calculus |
| **CO4** | Analyze different engineering problems linked with statistics, probability and calculus |
| **CO5** | Apply different engineering problems linked with statistics, probability and calculus |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB304.1** | 3 | 2 | 2 | 2 | | | | | | | | 2 |
| **CB304.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **CB304.3** | 3 | 3 | 2 | 3 | | | | | | | | 2 |
| **CB304.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB304.5** | 3 | 3 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB304.1** | 2 | 2 | 2 |
| **CB304.2** | 2 | 2 | 3 |
| **CB304.3** | 2 | 3 | 2 |
| **CB304.4** | 3 | 2 | 2 |
| **CB304.5** | 2 | 2 | 2 |

**Course Name: Software Engineering**
**Course Code: CB305**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Understand the basic concept of Software Engineering and mathematical knowledge and apply them in designing solution to engineering problem including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements |
| **CO2** | Analyze, elicit and specify software requirements through a productive working relationship with various stakeholders of the project |
| **CO3** | Design applicable solutions in one or more application domains using software engineering approaches that integrates ethical, social, legal and economic concerns. |
| **CO4** | Develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice team work. |
| **CO5** | Identify and Use modern engineering tools necessary for software project management time management and software reuse, and an ability to engage in life-long learning. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB305.1** | 3 | 3 | 3 | 2 | | | | | | | | 3 |
| **CB305.2** | 3 | 3 | 3 | 2 | | | | | | | | 3 |
| **CB305.3** | 3 | 3 | 3 | 2 | | | | | | | | 3 |
| **CB3054** | 3 | 3 | 3 | 2 | | | | | | | | 3 |
| **CB305.5** | 3 | 3 | 3 | 2 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB305.1** | 3 | 3 | 3 |
| **CB305.2** | 3 | 3 | 3 |
| **CB305.3** | 3 | 3 | 3 |
| **CB305.4** | 3 | 3 | 3 |
| **CB305.5** | 3 | 3 | 3 |

**Course Name: Indian Constitution**
**Course Code: MC301**
**Contact:**
**Total Contact Hours:**
**Credits:**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to Indian Constitution |
| **CO2** | Determine the solutions of the problems related to Indian Constitution |
| **CO3** | Apply the appropriate mathematical tools Indian Constitution |
| **CO4** | Analyze different engineering problems linked with Indian Constitution |
| **CO5** | Apply different engineering problems linked with Indian Constitution |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MC301.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **MC301.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **MC301.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **MC301.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **MC301.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **MC301.1** | 2 | 2 | 2 |
| **MC301.2** | 2 | 2 | 2 |
| **MC301.3** | 2 | 2 | 2 |
| **MC301.4** | 2 | 2 | 2 |
| **MC301.5** | 2 | 2 | 2 |

**Course Name: Computer Organization and Architecture Lab**
**Course Code: CB391**
**Contact: 0:0:3**
**Total Contact Hours: 36**
**Credit: 1.5**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Illustrate and use proper syntax in appropriate platform for developing program to solve problems related to Mathematics and Engineering field leading to lifelong learning. |
| **CO2** | Apply the knowledge of algorithms in the computational area to efficient programming codes to design the problem using modern tools for solving complex engineering problems. |
| **CO3** | Outline different types of digital electronic circuits such as adder, subtract or, encoder, decoder, multiplexer, de-multiplexer, flip-flops, register, counter using various mapping and modern tools to prepare the most simplified circuit and optimize using various mapping and mathematical methods for solving the problem as a professional engineering practice as a team. |
| **CO4** | Apply the knowledge of digital electronic circuits to design memory and ALU and analyse the same to solve engineering-related computational problems as a team. |
| **CO5** | Interpret the result of the experiments, prepare laboratory reports based on observed output and analyse it to validate professional ethics and responsibilities and norms of the engineering practice. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB391.1** | 3 | 3 | 3 | 2 | 3 | | | | 3 | | | |
| **CB391.2** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | |
| **CB391.3** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | |
| **CB391.4** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | |
| **CB391.5** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB391.1** | 3 | 3 | 3 |
| **CB391.2** | 3 | 3 | 3 |
| **CB391.3** | 3 | 3 | 3 |
| **CB391.4** | 3 | 3 | 3 |
| **CB391.5** | 3 | 3 | 3 |

**Course Name: Object Oriented Programming Lab**
**Course Code CB393**
**Contact: 0:0:3**
**Total Contact Hours: 36**
**Credit: 1.5**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Create the procedure of communication between Objects, classes & methods. |
| **CO2** | Understand the elementary facts of Object Orientation with various characteristics as well as several aspects of C++. |
| **CO3** | Analyze distinct features of different string handling functions with various I/O |
| **CO4** | Discuss simple Code Reusability notion w.r.t. Inheritance, Package and Interface. |
| **CO5** | Apply Exception handling |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB393.1** | 3 | 3 | 2 | 3 | 2 | | | | 3 | | | 2 |
| **CB393.2** | 3 | 3 | 3 | 3 | 2 | | | | 3 | | | 2 |
| **CB393.3** | 3 | 3 | 3 | 3 | 2 | | | | 3 | | | 2 |
| **CB393.4** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | 2 |
| **CB393.5** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB393.1** | 3 | 2 | 2 |
| **CB393.2** | 3 | 2 | 2 |
| **CB393.3** | 3 | 2 | 3 |
| **CB393.4** | 3 | 2 | 3 |
| **CB393.5** | 3 | 3 | 3 |

**Course Name: Computational Statistics Lab**
**Course Code: CB394**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credits: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to statistics, probability and calculus lab |
| **CO2** | Determine the solutions of the problems related to statistics, probability and calculus lab |
| **CO3** | Apply the appropriate mathematical tools of statistics, probability and calculus lab |
| **CO4** | Analyze different engineering problems linked with statistics, probability and calculus lab |
| **CO5** | Apply different engineering problems linked with statistics, probability and calculus lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB394.1** | 3 | 2 | 2 | 2 | | | | | | | | 2 |
| **CB394.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **CB394.3** | 3 | 3 | 2 | 3 | | | | | | | | 2 |
| **CB394.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB394.5** | 3 | 3 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB394.1** | 2 | 2 | 2 |
| **CB394.2** | 2 | 2 | 3 |
| **CB394.3** | 2 | 3 | 2 |
| **CB394.4** | 3 | 2 | 2 |
| **CB394.5** | 2 | 2 | 2 |

**Course Name: Software Engineering Lab**
**Course Code: CB395**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**
After attending the course students should be able to

| | |
|---|---|
| **CO1** | Understand the basic knowledge of how to apply Software Engineering and mathematical knowledge and designing solution to software engineering problem including the specification. |
| **CO2** | Analyze the cost-benefit trade-off. |
| **CO3** | Design solutions to the one or more application domains using software engineering approaches that integrates ethical. |
| **CO4** | Develop the code from the design and effectively apply relevant standards and perform testing . |
| **CO5** | Identify and use of modern software engineering tools necessary for software project management. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB395.1** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | 3 |
| **CB395.2** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | 3 |
| **CB395.3** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | 3 |
| **CB395.4** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | 3 |
| **CB395.5** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB395.1** | 3 | 3 | 3 |
| **CB395.2** | 3 | 3 | 3 |
| **CB395.3** | 3 | 3 | 3 |
| **CB395.4** | 3 | 3 | 3 |
| **CB395.5** | 3 | 3 | 3 |

**Course Name: Operating Systems (Unix)**
**Course Code: CB401**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Understand the fundamental concepts of Operating System, Protection & Security and differentiate different types of Operating System. |
| **CO2** | Understand and implement process & thread; understand, apply, compare different process synchronization algorithm and inter process communication to solve engineering problems. |
| **CO3** | Understand/explain/analyze different synchronization techniques, critical section problems and deadlock and apply them to solve engineering problems. |
| **CO4** | Understand/explain different memory management techniques including virtual memory management; also able to apply, compare, and implement different page replacement algorithms to solve engineering problems. |
| **CO5** | Understand/explain different I/O mechanisms, File structures and disk management techniques and solving engineering problem applying different disk scheduling algorithm. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB401.1** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **CB401.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **CB401.3** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **CB401.4** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **CB401.5** | 3 | 3 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB401.1** | 3 | 3 | 3 |
| **CB401.2** | 3 | 3 | 3 |
| **CB401.3** | 3 | 3 | 3 |
| **CB401.4** | 3 | 3 | 3 |
| **CB401.5** | 3 | 3 | 3 |

**Course Name: Database Management Systems**
**Course Code: CB402**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | To Understand and Describe the basic concepts and utility of Database management system, different data models of Database management system. |
| **CO2** | To Design an Entity Relationship (E-R) Diagram and relational model for any kind of real-life application and able to Apply relational algebra operations, SQL, Neo4j for solving |
| **CO3** | To Analyze and Create the relational database for any real-life applications based on normalization. |
| **CO4** | To Apply the query optimization techniques, different file organization techniques and Determine whether the transaction satisfies the ACID properties. |
| **CO5** | To Implement and organize the database of an organization as a team. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB402.1** | 3 | 3 | 2 | 2 | | | | | | | | 3 |
| **CB402.2** | 3 | 3 | 2 | 2 | | | | | | | | 3 |
| **CB402.3** | 3 | 3 | 2 | 2 | | | | | | | | 3 |
| **CB402.4** | 3 | 3 | 2 | 2 | | | | | | | | 3 |
| **CB402.5** | 3 | 3 | 2 | 2 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB402.1** | 3 | 3 | 3 |
| **CB402.2** | 3 | 3 | 3 |
| **CB402.3** | 3 | 3 | 3 |
| **CB402.4** | 3 | 3 | 3 |
| **CB402.5** | 3 | 3 | 3 |

**Course Name: Software Design with UML**
**Course Code: CB403**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credits: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to software design with UML |
| **CO2** | Determine the solutions of the problems related to software design with UML. |
| **CO3** | Apply the appropriate mathematical tools of software design with UML |
| **CO4** | Analyze different engineering problems linked with software design with UML |
| **CO5** | Apply different engineering problems linked with software design with UML |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB403.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **CB403.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB403.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB403.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB403.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB403.1** | 2 | 2 | 2 |
| **CB403.2** | 2 | 2 | 2 |
| **CB403.3** | 2 | 2 | 2 |
| **CB403.4** | 2 | 2 | 2 |
| **CB403.5** | 2 | 2 | 2 |

**Course Name: Introduction to Innovation, IP Management and Entrepreneurship**
**Course Code: BS401**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credits: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to innovation, IP Management and entrepreneurship |
| **CO2** | Determine the solutions of the problems related to innovation, IP Management and entrepreneurship |
| **CO3** | Apply the appropriate mathematical tools of innovation, IP Management and entrepreneurship |
| **CO4** | Analyze different engineering problems linked innovation, IP Management and entrepreneurship |
| **CO5** | Apply different engineering problems linked with innovation, IP Management and entrepreneurship |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS401.1** | 3 | 2 | 2 | 2 | | | | | | | | 2 |
| **BS401.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **BS401.3** | 3 | 3 | 2 | 3 | | | | | | | | 2 |
| **BS401.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS401.5** | 3 | 3 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS401.1** | 2 | 2 | 2 |
| **BS401.2** | 2 | 2 | 3 |
| **BS401.3** | 2 | 3 | 2 |
| **BS401.4** | 3 | 2 | 2 |
| **BS401.5** | 2 | 2 | 2 |

**Course Name: Business Communication and Value Science-III**
**Course Code: BS402**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to communication and value science |
| **CO2** | Determine the solutions of the problems related to communication and value science |
| **CO3** | Apply the appropriate mathematical tools of communication and value science |
| **CO4** | Analyze different engineering problems linked communication and value science |
| **CO5** | Apply different engineering problems linked with communication and value science |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS402.1** | 3 | 2 | 2 | 2 | | | | | | | | 2 |
| **BS402.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **BS402.3** | 3 | 3 | 2 | 3 | | | | | | | | 2 |
| **BS402.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS402.5** | 3 | 3 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS402.1** | 2 | 2 | 2 |
| **BS402.2** | 2 | 2 | 3 |
| **BS402.3** | 2 | 3 | 2 |
| **BS402.4** | 3 | 2 | 2 |
| **BS402.5** | 2 | 2 | 2 |

**Course Name: Operations Research**
**Course Code: M401**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to operations research |
| **CO2** | Determine the solutions of the problems related to operations research |
| **CO3** | Apply the appropriate mathematical tools of operations research |
| **CO4** | Analyze different engineering problems linked with operations research |
| **CO5** | Apply different engineering problems linked with operations research |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **M401.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **M401.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **M401.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **M401.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **M401.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **M401.1** | 2 | 2 | 2 |
| **M401.2** | 2 | 2 | 2 |
| **M401.3** | 2 | 2 | 2 |
| **M401.4** | 2 | 2 | 2 |
| **M401.5** | 2 | 2 | 2 |

**Course Name: Essence of Indian Traditional Knowledge**
**Course Code: MC401**
**Contact:**
**Total Contact Hours:**
**Credits:**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to Indian traditional knowledge |
| **CO2** | Determine the solutions of the problems related to Indian traditional knowledge |
| **CO3** | Apply the appropriate mathematical tools of Indian traditional knowledge |
| **CO4** | Analyze different engineering problems linked with Indian traditional knowledge |
| **CO5** | Apply different engineering problems linked with Indian traditional knowledge |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MC401.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **MC401.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **MC401.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **MC401.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **MC401.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **MC401.1** | 2 | 2 | 2 |
| **MC401.2** | 2 | 2 | 2 |
| **MC401.3** | 2 | 2 | 2 |
| **MC401.4** | 2 | 2 | 2 |
| **MC401.5** | 2 | 2 | 2 |

**Course Name: Operating System Lab (Unix)**
**Course Code: CB491**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority. |
| **CO2** | Understand the concepts of deadlock in operating systems. |
| **CO3** | Implement them in Multiprogramming system. |
| **CO4** | Create process creation and implement inter process communication |
| **CO5** | Analyze the performance of the various page replacement schemes |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB491.1** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | |
| **CB491.2** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | |
| **CB491.3** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | |
| **CB491.4** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | |
| **CB491** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB491.1** | 3 | 3 | 3 |
| **CB491.2** | 3 | 3 | 3 |
| **CB491.3** | 3 | 3 | 3 |
| **CB491.4** | 3 | 3 | 3 |
| **CB491.5** | 3 | 3 | 3 |

**Course Name: Data Base Management System Lab**
**Course Code: CB492**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | To Understand and Describe the basic concepts and utility of Database management system, different data models of Database management system. |
| **CO2** | To Design an Entity Relationship (E-R) Diagram and relational model for any kind of real-life application and able to Apply relational algebra operations, SQL, Neo4j for solving query. |
| **CO3** | To Analyze and Create the relational database for any real-life applications based on normalization. |
| **CO4** | To Apply the query optimization techniques, different file organization techniques and Determine whether the transaction satisfies the ACID properties. |
| **CO5** | To Implement and organize the database of an organization as a team. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB492.1** | 3 | 2 | 2 | 2 | 2 | | | | 3 | | | 3 |
| **CB492.2** | 3 | 2 | 2 | 2 | 2 | | | | 3 | | | 3 |
| **CB492.3** | 3 | 3 | 2 | 2 | 2 | | | | 3 | | | 3 |
| **CB492.4** | 3 | 2 | 2 | 2 | 2 | | | | 3 | | | 3 |
| **CB492.5** | 3 | 2 | 2 | 2 | 2 | | | | 3 | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB492.1** | 3 | 3 | 3 |
| **CB492.2** | 3 | 3 | 3 |
| **CB492.3** | 3 | 3 | 3 |
| **CB492.4** | 3 | 3 | 3 |
| **CB492.5** | 3 | 3 | 3 |

**Course Name: Software Design with UML Lab**
**Course Code: CB493**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to software design with UML lab |
| **CO2** | Determine the solutions of the problems related to software design with UML lab |
| **CO3** | Apply the appropriate mathematical tools of software design with UML lab |
| **CO4** | Analyze different engineering problems linked with software design with UML lab |
| **CO5** | Apply different engineering problems linked with software design with UML lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB493.1** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | |
| **CB493.2** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | |
| **CB493.3** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | |
| **CB493.4** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | |
| **CB493** | 3 | 3 | 3 | 3 | 3 | | | | 3 | | | |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB493.1** | 3 | 3 | 3 |
| **CB493.2** | 3 | 3 | 3 |
| **CB493.3** | 3 | 3 | 3 |
| **CB493.4** | 3 | 3 | 3 |
| **CB493.5** | 3 | 3 | 3 |

**Course Name: Operations Research Lab**
**Course Code: M491**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to operations research lab |
| **CO2** | Determine the solutions of the problems related to operations research lab |
| **CO3** | Apply the appropriate mathematical tools of operations research lab |
| **CO4** | Analyze different engineering problems linked with operations research lab |
| **CO5** | Apply different engineering problems linked with operations research lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **M491.1** | 3 | 2 | 2 | 2 | 2 | | | | 3 | | | 3 |
| **M491.2** | 3 | 2 | 2 | 2 | 2 | | | | 3 | | | 3 |
| **M491.3** | 3 | 3 | 2 | 2 | 2 | | | | 3 | | | 3 |
| **M491.4** | 3 | 2 | 2 | 2 | 2 | | | | 3 | | | 3 |
| **M491.5** | 3 | 2 | 2 | 2 | 2 | | | | 3 | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **M491.1** | 3 | 3 | 3 |
| **M491.2** | 3 | 3 | 3 |
| **M491.3** | 3 | 3 | 3 |
| **M491.4** | 3 | 3 | 3 |
| **M491.5** | 3 | 3 | 3 |

**Course Name: Design and Analysis of Algorithms**
**Course Code: CB501**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | To understand and illustrate the concepts of time and space complexity, worst case, average case and best-case complexities and the asymptotic notation. |
| **CO2** | To analyze and apply the design principles and concepts to various basic algorithm design viz. dynamic programming, greedy method etc. |
| **CO3** | To understand and analyze various string matching and graph algorithms. |
| **CO4** | To understand, illustrate and analyze the different complexity classes |
| **CO5** | To discuss, implement and analyze, verify the efficiency of the randomized and approximation algorithms. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB501.1** | 2 | 2 | 2 | 2 | | | | | | | | 2 |
| **CB501.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB501.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB501.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB501.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB501.1** | 3 | 3 | 3 |
| **CB501.2** | 3 | 3 | 3 |
| **CB501.3** | 3 | 3 | 3 |
| **CB501.4** | 3 | 3 | 3 |
| **CB501.5** | 3 | 3 | 3 |

**Course Name: Compiler Design (LEX & YACC)**
**Course Code: CB502**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Illustrate the basic concept of compilers and discuss on the components as well as the strengths and weaknesses of various phases of designing a compiler. |
| **CO2** | Design and analyze algorithms for syntactic or parsing techniques and semantic analysis of the process of designing compilers. |
| **CO3** | Develop the parsers and experiment the knowledge of activation tree, activation record and dynamic storage allocation techniques |
| **CO4** | Construct the intermediate code representations and generation. |
| **CO5** | Apply for various optimization techniques for dataflow analysis. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB502.1** | 3 | 3 | 2 | 3 | | | | | | | | 3 |
| **CB502.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **CB502.3** | 3 | 2 | 2 | 3 | | | | | | | | 3 |
| **CB502.4** | 2 | 2 | 3 | 3 | | | | | | | | 3 |
| **CB502.5** | 3 | 2 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB502.1** | 3 | 3 | 3 |
| **CB502.2** | 3 | 3 | 3 |
| **CB502.3** | 3 | 3 | 3 |
| **CB502.4** | 3 | 3 | 3 |
| **CB502.5** | 3 | 3 | 3 |

**Course Name: Fundamentals of Management**
**Course Code: BS501**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credit: 2**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Understand the basic concepts and technologies used in the field of management information systems |
| **CO2** | Have the knowledge of the different types of management information systems |
| **CO3** | Understand the processes of developing and implementing information systems. |
| **CO4** | Be aware of the ethical, social, and security issues of information systems. |
| **CO5** | An ability to effectively integrate IT-based solutions into the user environment |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS501.1** | 3 | 2 | 2 | 2 | | | | | | | 3 | |
| **BS501.2** | 3 | 2 | 2 | 2 | | | | | | | 3 | |
| **BS501.3** | 3 | 3 | 2 | 2 | | | | | | | 3 | |
| **BS501.4** | 3 | 2 | 2 | 2 | | | | | | | 3 | |
| **BS501.5** | 3 | 2 | 2 | 2 | | | | | | | 3 | |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS501.1** | 2 | 2 | 2 |
| **BS501.2** | 2 | 2 | 2 |
| **BS501.3** | 2 | 2 | 2 |
| **BS501.4** | 2 | 2 | 2 |
| **BS501.5** | 2 | 2 | 2 |

**Course Name: Business Strategy**
**Course Code: BS502**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credit: 2**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Understand the basic concepts and technologies used in the field of business strategy systems |
| **CO2** | Have the knowledge of the different types of business strategy |
| **CO3** | Understand the processes of developing and business strategy |
| **CO4** | Be aware of the ethical, social, and security issues business strategy |
| **CO5** | An ability to effectively integrate IT-based solutions into the business strategy |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS502.1** | 3 | 2 | 2 | 2 | | | | | | | 3 | |
| **BS502.2** | 3 | 2 | 2 | 2 | | | | | | | 3 | |
| **BS502.3** | 3 | 3 | 2 | 2 | | | | | | | 3 | |
| **BS502.4** | 3 | 2 | 2 | 2 | | | | | | | 3 | |
| **BS502.5** | 3 | 2 | 2 | 2 | | | | | | | 3 | |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS502.1** | 2 | 2 | 2 |
| **BS502.2** | 2 | 2 | 2 |
| **BS502.3** | 2 | 2 | 2 |
| **BS502.4** | 2 | 2 | 2 |
| **BS502.5** | 2 | 2 | 2 |

**Course Name: Design Thinking**
**Course Code: BS503**
**Contact: 2:1:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Understand the basic concepts and technologies used in the field of design thinking systems |
| **CO2** | Have the knowledge of the different types of design thinking |
| **CO3** | Understand the processes of developing and design thinking |
| **CO4** | Be aware of the ethical, social, and security issues design thinking |
| **CO5** | An ability to effectively integrate IT-based solutions into the design thinking |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS503.1** | 3 | 2 | 2 | 2 | | | | | | | 3 | |
| **BS503.2** | 3 | 2 | 2 | 2 | | | | | | | 3 | |
| **BS503.3** | 3 | 3 | 2 | 2 | | | | | | | 3 | |
| **BS503.4** | 3 | 2 | 2 | 2 | | | | | | | 3 | |
| **BS503.5** | 3 | 2 | 2 | 2 | | | | | | | 3 | |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS503.1** | 2 | 2 | 2 |
| **BS503.2** | 2 | 2 | 2 |
| **BS503.3** | 2 | 2 | 2 |
| **BS503.4** | 2 | 2 | 2 |
| **BS503.5** | 2 | 2 | 2 |

**Course Name: CONVERSATIONAL SYSTEMS**
**Course Code: PE-CB503A**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to conversational system |
| **CO2** | Determine the solutions of the problems related to conversational system |
| **CO3** | Apply the appropriate mathematical tools of conversational system |
| **CO4** | Analyze different engineering problems linked with conversational system |
| **CO5** | Apply different engineering problems linked with conversational system |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB503A.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB503A.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB503A.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB503A.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB503A.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CB503A.1** | 2 | 2 | 2 |
| **PE-CB503A.2** | 2 | 2 | 2 |
| **PE-CB503A.3** | 2 | 2 | 2 |
| **PE-CB503A.4** | 2 | 2 | 2 |
| **PE-CB503A.5** | 2 | 2 | 2 |

**Course Name: CLOUD, MICROSERVICES & APPLICATION**
**Course Code: PE-CB503B**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to cloud system |
| **CO2** | Determine the solutions of the problems related to cloud system |
| **CO3** | Apply the appropriate mathematical tools of cloud system |
| **CO4** | Analyze different engineering problems linked with cloud system |
| **CO5** | Apply different engineering problems linked with cloud system |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB503B.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB503B.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB503B.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB503B.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB503B.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CB503B.1** | 2 | 2 | 2 |
| **PE-CB503B.2** | 2 | 2 | 2 |
| **PE-CB503B.3** | 2 | 2 | 2 |
| **PE-CB503B.4** | 2 | 2 | 2 |
| **PE-CB503B.5** | 2 | 2 | 2 |

**Course Name: MACHINE LEARNING**
**Course Code: PE-CB503C**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to machine learning |
| **CO2** | Determine the solutions of the problems related to machine learning |
| **CO3** | Apply the appropriate mathematical tools of machine learning |
| **CO4** | Analyze different engineering problems linked with machine learning |
| **CO5** | Apply different engineering problems linked with machine learning |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB503C.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB503C.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB503C.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB503C.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB503C.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CB503C.1** | 2 | 2 | 2 |
| **PE-CB503C.2** | 2 | 2 | 2 |
| **PE-CB503C.3** | 2 | 2 | 2 |
| **PE-CB503C.4** | 2 | 2 | 2 |
| **PE-CB503C.5** | 2 | 2 | 2 |

**Course Name: Design and Analysis of Algorithms Lab**
**Course Code: CB591**
**Contact: 0:0:3**
**Total Contact Hours: 36**
**Credit: 1.5**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | To identify and prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains. |
| **CO2** | To understand and illustrate methods for analyzing the efficiency and correctness of algorithms (such as exchange arguments, recurrence, induction, and average case analysis) |
| **CO3** | To analyze and design algorithms using the dynamic programming, greedy method, Backtracking, Branch and Bound strategy, and recite algorithms that employ this strategy. |
| **CO4** | To understand, compare, contrast, and choose appropriate implementation of the algorithmic design techniques to present an algorithm that solves a given problem. |
| **CO5** | To Identify and analyze criteria and specifications appropriate to new problems. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB591.1** | 3 | 3 | 2 | 2 | 3 | | | | 3 | | | 3 |
| **CB591.2** | 3 | 3 | 3 | 2 | 3 | | | | 3 | | | 3 |
| **CB591.3** | 3 | 3 | 2 | 3 | 3 | | | | 3 | | | 3 |
| **CB591.4** | 3 | 3 | 2 | 2 | 3 | | | | 3 | | | 3 |
| **CB591.5** | 3 | 3 | 3 | 2 | 3 | | | | 3 | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB591.1** | 3 | 3 | 3 |
| **CB591.2** | 3 | 3 | 3 |
| **CB591.3** | 3 | 3 | 3 |
| **CB591.4** | 3 | 3 | 3 |
| **CB591.5** | 3 | 3 | 3 |

**Course Name: Compiler Design Lab (LEX & YACC)**
**Course Code: CB592**
**Contact: 0:0:3**
**Total Contact Hours: 36**
**Credit: 1.5**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Ability to design, develop, and implement a compiler for any language |
| **CO2** | Able to use lex and yacc tools for developing a scanner and a parser |
| **CO3** | Able to design and implement LL and LR parsers |
| **CO4** | To understand syntax directed translation schemes |
| **CO5** | To provide hands-on experience on web technologies |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB592.1** | 3 | 3 | 3 | 3 | 3 | | | | | | | |
| **CB592.2** | 3 | 3 | 3 | 3 | 3 | | | | | | | |
| **CB592.3** | 3 | 3 | 3 | 3 | 3 | | | | | | | |
| **CB592.4** | 3 | 3 | 3 | 3 | 3 | | | | | | | |
| **CB592.5** | 3 | 3 | 3 | 3 | 3 | | | | | | | |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB592.1** | 3 | 3 | 3 |
| **CB592** | 3 | 3 | 3 |
| **CB592.3** | 3 | 3 | 3 |
| **CB592.4** | 3 | 3 | 3 |
| **CB592.5** | 3 | 3 | 3 |

**Course Name: Design Thinking Lab**
**Course Code: BS593**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Understand the basic concepts and technologies used in the field of design thinking lab |
| **CO2** | Have the knowledge of the different types of design thinking lab |
| **CO3** | Understand the processes of developing and design thinking lab |
| **CO4** | Be aware of the ethical, social, and security issues design thinking lab |
| **CO5** | An ability to effectively integrate IT-based solutions into the design thinking lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS593.1** | 3 | 2 | 2 | 2 | | | | | | | 3 | |
| **BS593.2** | 3 | 2 | 2 | 2 | | | | | | | 3 | |
| **BS593.3** | 3 | 3 | 2 | 2 | | | | | | | 3 | |
| **BS593.4** | 3 | 2 | 2 | 2 | | | | | | | 3 | |
| **BS593.5** | 3 | 2 | 2 | 2 | | | | | | | 3 | |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS593.1** | 2 | 2 | 2 |
| **BS593.2** | 2 | 2 | 2 |
| **BS593.3** | 2 | 2 | 2 |
| **BS593.4** | 2 | 2 | 2 |
| **BS593.5** | 2 | 2 | 2 |

**Course Name: CONVERSATIONAL SYSTEMS LAB**
**Course Code: PE-CB593A**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to conversational system lab |
| **CO2** | Determine the solutions of the problems related to conversational system lab |
| **CO3** | Apply the appropriate mathematical tools of conversational system lab |
| **CO4** | Analyze different engineering problems linked with conversational system lab |
| **CO5** | Apply different engineering problems linked with conversational system lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB593A.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB593A.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB593A.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB593A.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB593A.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CB593A.1** | 2 | 2 | 2 |
| **PE-CB593A.2** | 2 | 2 | 2 |
| **PE-CB593A.3** | 2 | 2 | 2 |
| **PE-CB593A.4** | 2 | 2 | 2 |
| **PE-CB593A.5** | 2 | 2 | 2 |

**Course Name: CLOUD, MICROSERVICES & APPLICATION LAB**
**Course Code: PE-CB593B**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to cloud system lab |
| **CO2** | Determine the solutions of the problems related to cloud system lab |
| **CO3** | Apply the appropriate mathematical tools of cloud system lab |
| **CO4** | Analyze different engineering problems linked with cloud system lab |
| **CO5** | Apply different engineering problems linked with cloud system lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB593B.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB593B.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB593B.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB593B.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB593B.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CB593B.1** | 2 | 2 | 2 |
| **PE-CB593B.2** | 2 | 2 | 2 |
| **PE-CB593B.3** | 2 | 2 | 2 |
| **PE-CB593B.4** | 2 | 2 | 2 |
| **PE-CB593B.5** | 2 | 2 | 2 |

**Course Name: MACHINE LEARNING LAB**
**Course Code: PE-CB593C**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to machine learning lab |
| **CO2** | Determine the solutions of the problems related to machine learning lab |
| **CO3** | Apply the appropriate mathematical tools of machine learning lab |
| **CO4** | Analyze different engineering problems linked with machine learning lab |
| **CO5** | Apply different engineering problems linked with machine learning lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB593C.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB593C.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB593C.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB593C.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB593C.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CB593C.1** | 2 | 2 | 2 |
| **PE-CB593C.2** | 2 | 2 | 2 |
| **PE-CB593C.3** | 2 | 2 | 2 |
| **PE-CB593C.4** | 2 | 2 | 2 |
| **PE-CB593C.5** | 2 | 2 | 2 |

**Course Name: Minor Project I**
**Course Code: PR 591**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to minor project |
| **CO2** | Determine the solutions of the problems related to minor project |
| **CO3** | Apply the appropriate mathematical tools of minor project |
| **CO4** | Analyze different engineering problems linked with minor project |
| **CO5** | Apply different engineering problems linked with minor project |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PR 591.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PR 591.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PR 591.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PR 591.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PR 591.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PR 591.1** | 2 | 2 | 2 |
| **PR 591.2** | 2 | 2 | 2 |
| **PR 591.3** | 2 | 2 | 2 |
| **PR 591.4** | 2 | 2 | 2 |
| **PR 591.5** | 2 | 2 | 2 |

**Course Name: Computer Networks**
**Course Code: CB601**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | Understand basics of computer network and different architecture and topologies of computer network and analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies. |
| **CO2** | Understand/analyze different protocol of data link layer and apply them to solve engineering problems. |
| **CO3** | Understand/analyze different protocol of Network and Transport Layer and apply them to solve engineering problems. |
| **CO4** | Understand/analyze different protocol of session and application layer and apply them to solve engineering problems. |
| **CO5** | Develop Analyze, specify and design the topological and routing strategies using socket programming. |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB601.1** | 3 | 3 | 2 | 2 | 2 | | | | 2 | 2 | | 3 |
| **CB601.2** | 3 | 3 | 3 | 3 | 3 | | | | 2 | 2 | | 3 |
| **CB601.3** | 3 | 3 | 3 | 3 | 3 | | | | 2 | 2 | | 3 |
| **CB601.4** | 3 | 3 | 3 | 3 | 3 | | | | 2 | 2 | | 3 |
| **CB601.5** | 2 | 3 | 3 | 3 | 3 | | | | 2 | 2 | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB601.1** | 3 | 3 | 3 |
| **CB601.2** | 3 | 3 | 3 |
| **CB601.3** | 3 | 3 | 3 |
| **CB601.4** | 3 | 3 | 3 |
| **CB601.5** | 3 | 3 | 3 |

**Course Name: Information Security**
**Course Code: CB602**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to information security |
| **CO2** | Determine the solutions of the problems related to information security |
| **CO3** | Apply the appropriate mathematical tools of information security |
| **CO4** | Analyze different engineering problems linked with information security |
| **CO5** | Apply different engineering problems linked with information security |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB602.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **CB602.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB602.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB602.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB602.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB602.1** | 2 | 2 | 2 |
| **CB602.2** | 2 | 2 | 2 |
| **CB602.3** | 2 | 2 | 2 |
| **CB602.4** | 2 | 2 | 2 |
| **CB602.5** | 2 | 2 | 2 |

**Course Name: Artificial Intelligence**
**Course Code: CB603**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to AI |
| **CO2** | Determine the solutions of the problems related to AI |
| **CO3** | Apply the appropriate mathematical tools of AI |
| **CO4** | Analyze different engineering problems linked with AI |
| **CO5** | Apply different engineering problems linked with AI |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB603.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **CB603.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB603.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB603.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB603.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB603.1** | 2 | 2 | 2 |
| **CB603.2** | 2 | 2 | 2 |
| **CB603.3** | 2 | 2 | 2 |
| **CB603.4** | 2 | 2 | 2 |
| **CB603.5** | 2 | 2 | 2 |

**Course Name: Financial and Cost Accounting**
**Course Code: BS601**
**Contact: 2:1:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to financial and cost accounting |
| **CO2** | Determine the solutions of the problems related to financial and cost accounting |
| **CO3** | Apply the appropriate mathematical tools of financial and cost accounting |
| **CO4** | Analyze different engineering problems linked with financial and cost accounting |
| **CO5** | Apply different engineering problems linked with financial and cost accounting |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS601.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **BS601.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS601.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS601.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS601.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS601.1** | 2 | 2 | 2 |
| **BS601.2** | 2 | 2 | 2 |
| **BS601.3** | 2 | 2 | 2 |
| **BS601.4** | 2 | 2 | 2 |
| **BS601.5** | 2 | 2 | 2 |

**Course Name: Business Communication and Value Science-IV**
**Course Code: HU601**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to communication and value science |
| **CO2** | Determine the solutions of the problems related to communication and value science |
| **CO3** | Apply the appropriate mathematical tools of communication and value science |
| **CO4** | Analyze different engineering problems linked communication and value science |
| **CO5** | Apply different engineering problems linked with communication and value science |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **HU601.1** | 3 | 2 | 2 | 2 | | | | | | | | 2 |
| **HU601.2** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **HU601.3** | 3 | 3 | 2 | 3 | | | | | | | | 2 |
| **HU601.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **HU601.5** | 3 | 3 | 3 | 3 | | | | | | | | 3 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **HU601.1** | 2 | 2 | 2 |
| **HU601.2** | 2 | 2 | 3 |
| **HU601.3** | 2 | 3 | 2 |
| **HU601.4** | 3 | 2 | 2 |
| **HU601.5** | 2 | 2 | 2 |

**Course Name: ROBOTICS AND EMBEDDED SYSTEMS**
**Course Code: PE-CB603A**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to robotics and embedded system |
| **CO2** | Determine the solutions of the problems related to robotics and embedded system |
| **CO3** | Apply the appropriate mathematical tools robotics and embedded system |
| **CO4** | Analyze different engineering problems linked with robotics and embedded system |
| **CO5** | Apply different engineering problems linked with robotics and embedded system |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB603A.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB603A.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB603A.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB603A.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB603A.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CB503A.1** | 2 | 2 | 2 |
| **PE-CB503A.2** | 2 | 2 | 2 |
| **PE- CB603A.3** | 2 | 2 | 2 |
| **PE- CB603A.4** | 2 | 2 | 2 |
| **PE- CB603A.5** | 2 | 2 | 2 |

**Course Name: MODERN WEB APPLICATIONS**
**Course Code: PE-CB603B**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to web application in latest trends |
| **CO2** | Determine the solutions of the problems related to web application in latest trends |
| **CO3** | Apply the appropriate mathematical tools web application in latest trends |
| **CO4** | Analyze different engineering problems linked with web application in latest trends |
| **CO5** | Apply different engineering problems linked with web application in latest trends |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB603B.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB603B.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB603B.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB603B.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB603B.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE- CB603B.1** | 2 | 2 | 2 |
| **PE- CB603B.2** | 2 | 2 | 2 |
| **PE- CB603B.3** | 2 | 2 | 2 |
| **PE- CB603B.4** | 2 | 2 | 2 |
| **PE- CB603B.5** | 2 | 2 | 2 |

**Course Name: DATA MINING AND ANALYTICS**
**Course Code: PE-CB603C**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credits: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to data mining |
| **CO2** | Determine the solutions of the problems related to data mining |
| **CO3** | Apply the appropriate mathematical tools data mining |
| **CO4** | Analyze different engineering problems linked with data mining |
| **CO5** | Apply different engineering problems linked with data mining |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB603C.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB603C.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB603C.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB603C.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB603C.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE- CB603C.1** | 2 | 2 | 2 |
| **PE- CB603C.2** | 2 | 2 | 2 |
| **PE- CB603C.3** | 2 | 2 | 2 |
| **PE- CB603C.4** | 2 | 2 | 2 |
| **PE- CB603C.5** | 2 | 2 | 2 |

**Course Name: Computer Network Lab**
**Course Code: CB691**
**Contact: 0:0:3**
**Total Contact Hours: 36**
**Credit: 1.5**

**Course Outcomes (COs):**

After attending the course students should be able to

| | |
|---|---|
| **CO1** | To design and implement small size network and to understand various networking commands. |
| **CO2** | To provide the knowledge of various networking tools and their related concepts. |
| **CO3** | To understand various application layer protocols for its implementation in client/server environment |
| **CO4** | Understand the TCP/IP configuration for Windows and Linux |
| **CO5** | Learn the major software and hardware technologies used on computer networks |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB691.1** | 3 | 3 | 3 | 2 | 3 | | | | | | | 2 |
| **CB691.2** | 3 | 3 | 3 | 3 | 3 | | | | | | | 2 |
| **CB691.3** | 3 | 3 | 3 | 3 | 3 | | | | | | | 2 |
| **CB691.4** | 3 | 3 | 3 | 3 | 3 | | | | | | | 2 |
| **CB691.5** | 2 | 3 | 2 | 2 | 3 | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB691.1** | 3 | 3 | 3 |
| **CB691.2** | 3 | 3 | 3 |
| **CB691.3** | 3 | 3 | 3 |
| **CB691.4** | 3 | 3 | 3 |
| **CB691.5** | 3 | 3 | 3 |

**Course Name: Information Security Lab**
**Course Code: CB692**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to information security lab |
| **CO2** | Determine the solutions of the problems related to information security lab |
| **CO3** | Apply the appropriate mathematical tools of information security lab |
| **CO4** | Analyze different engineering problems linked with information security lab |
| **CO5** | Apply different engineering problems linked with information security lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB692.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **CB692.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB692.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB692.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB692.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB692.1** | 2 | 2 | 2 |
| **CB692.2** | 2 | 2 | 2 |
| **CB692.3** | 2 | 2 | 2 |
| **CB692.4** | 2 | 2 | 2 |
| **CB692.5** | 2 | 2 | 2 |

**Course Name: Artificial Intelligence Lab**
**Course Code: CB693**
**Contact: 0:0:3**
**Total Contact Hours: 36**
**Credit: 1.5**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to AI lab |
| **CO2** | Determine the solutions of the problems related to AI lab |
| **CO3** | Apply the appropriate mathematical tools of AI lab |
| **CO4** | Analyze different engineering problems linked with AI lab |
| **CO5** | Apply different engineering problems linked with AI lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB693.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **CB693.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB693.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB693.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB693.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB693.1** | 2 | 2 | 2 |
| **CB693.2** | 2 | 2 | 2 |
| **CB693.3** | 2 | 2 | 2 |
| **CB693.4** | 2 | 2 | 2 |
| **CB693.5** | 2 | 2 | 2 |

**Course Name: ROBOTICS AND EMBEDDED SYSTEMS LAB**
**Course Code: PE-CB693A**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credits: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to robotics and embedded system lab |
| **CO2** | Determine the solutions of the problems related to robotics and embedded system lab |
| **CO3** | Apply the appropriate mathematical tools robotics and embedded system lab |
| **CO4** | Analyze different engineering problems linked with robotics and embedded system lab |
| **CO5** | Apply different engineering problems linked with robotics and embedded system lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB693A.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB693A.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB693A.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB693A.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB693A.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE- CB693A.1** | 2 | 2 | 2 |
| **PE- CB693A.2** | 2 | 2 | 2 |
| **PE- CB693A.3** | 2 | 2 | 2 |
| **PE- CB693A.4** | 2 | 2 | 2 |
| **PE- CB693A.5** | 2 | 2 | 2 |

**Course Name: MODERN WEB APPLICATIONS LAB**
**Course Code: PE-CB693B**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credits: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to web application in latest trends lab |
| **CO2** | Determine the solutions of the problems related to web application in latest trends lab |
| **CO3** | Apply the appropriate mathematical tools web application in latest trends lab |
| **CO4** | Analyze different engineering problems linked with web application in latest trends lab |
| **CO5** | Apply different engineering problems linked with web application in latest trends lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB693B.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB693B.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB693B.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB693B.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB693B.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE- CB693B.1** | 2 | 2 | 2 |
| **PE- CB693B.2** | 2 | 2 | 2 |
| **PE- CB693B.3** | 2 | 2 | 2 |
| **PE- CB693B.4** | 2 | 2 | 2 |
| **PE- CB693B.5** | 2 | 2 | 2 |

**Course Name: DATA MINING AND ANALYTICS LAB**
**Course Code: PE-CB693C**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credits: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to data mining lab |
| **CO2** | Determine the solutions of the problems related to data mining lab |
| **CO3** | Apply the appropriate mathematical tools data mining lab |
| **CO4** | Analyze different engineering problems linked with data mining lab |
| **CO5** | Apply different engineering problems linked with data mining lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB693C.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB693C.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB693C.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB693C.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB693C.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE- CB693C.1** | 2 | 2 | 2 |
| **PE- CB693C.2** | 2 | 2 | 2 |
| **PE- CB693C.3** | 2 | 2 | 2 |
| **PE- CB693C.4** | 2 | 2 | 2 |
| **PE- CB693C.5** | 2 | 2 | 2 |

**Course Name: Usability Design of Software Applications**
**Course Code: CB701**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credit: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to design of software applications |
| **CO2** | Determine the solutions of the problems related to design of software applications |
| **CO3** | Apply the appropriate mathematical tools of design of software applications |
| **CO4** | Analyze different engineering problems linked with design of software applications |
| **CO5** | Apply different engineering problems linked with design of software applications |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB701.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **CB701.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB701.3** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **CB701.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB701.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB701.1** | 2 | 2 | 2 |
| **CB701.2** | 2 | 2 | 3 |
| **CB701.3** | 2 | 3 | 2 |
| **CB701.4** | 2 | 2 | 2 |
| **CB701.5** | 2 | 2 | 3 |

**Course Name: IT Workshop Skylab / Matlab**
**Course Code: CB702**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credit: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to IT workshop |
| **CO2** | Determine the solutions of the problems related to design of IT workshop |
| **CO3** | Apply the appropriate mathematical tools of design of IT workshop |
| **CO4** | Analyze different engineering problems linked with design of IT workshop |
| **CO5** | Apply different engineering problems linked with design of IT workshop |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB702.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **CB702.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB702.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB702.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB702.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB702.1** | 2 | 2 | 2 |
| **CB702.2** | 2 | 2 | 2 |
| **CB702.3** | 2 | 2 | 2 |
| **CB702.4** | 2 | 2 | 2 |
| **CB702.5** | 2 | 2 | 2 |

**Course Name: Financial Management**
**Course Code: BS701**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to financial management |
| **CO2** | Determine the solutions of the problems related to design of financial management |
| **CO3** | Apply the appropriate mathematical tools of design of financial management |
| **CO4** | Analyze different engineering problems linked with design of financial management |
| **CO5** | Apply different engineering problems linked with design of financial management |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS701.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **BS701.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS701.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS701.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS701.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS701.1** | 2 | 2 | 2 |
| **BS701.2** | 2 | 2 | 2 |
| **BS701.3** | 2 | 2 | 2 |
| **BS701.4** | 2 | 2 | 2 |
| **BS701.5** | 2 | 2 | 2 |

**Course Name: Human Resource Management**
**Course Code: BS702**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credit: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to human resource management |
| **CO2** | Determine the solutions of the problems related to design of to human resource management |
| **CO3** | Apply the appropriate mathematical tools of design of to human resource management |
| **CO4** | Analyze different engineering problems linked with design of to human resource management |
| **CO5** | Apply different engineering problems linked with design of to human resource management |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS702.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **BS702.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS702.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS702.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS702.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS702.1** | 2 | 2 | 2 |
| **BS702.2** | 2 | 2 | 2 |
| **BS702.3** | 2 | 2 | 2 |
| **BS702.4** | 2 | 2 | 2 |
| **BS702.5** | 2 | 2 | 2 |

**Course Name: Introduction to IoT**
**Course Code: PE-CB703A**
**Contact: 2:1:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to IOT |
| **CO2** | Determine the solutions of the problems related to design of IOT |
| **CO3** | Apply the appropriate mathematical tools of design of to IOT |
| **CO4** | Analyze different engineering problems linked with design of to IOT |
| **CO5** | Apply different engineering problems linked with design of to IOT |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB703A.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB703A.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB703A.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB703A.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB703A.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CB703A.1** | 2 | 2 | 2 |
| **PE-CB703A.2** | 2 | 2 | 2 |
| **PE-CB703A.3** | 2 | 2 | 2 |
| **PE-CB703A.4** | 2 | 2 | 2 |
| **PE-CB703A.5** | 2 | 2 | 2 |

**Course Name: Advanced Social, Text and Media Analytics**
**Course Code: PE-CB703B**
**Contact: 2:1:0**
**Total Contact Hours: 36**
**Credit: 3**
**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to advanced social, text and media analytics |
| **CO2** | Determine the solutions of the problems related to design of to advanced social, text and media analytics |
| **CO3** | Apply the appropriate mathematical tools of design of to advanced social, text and media analytics |
| **CO4** | Analyze different engineering problems linked with design of advanced social, text and media analytics |
| **CO5** | Apply different engineering problems linked with design of to advanced social, text and media analytics |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB703B.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB703B.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB703B.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB703B.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB703B.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CB703B.1** | 2 | 2 | 2 |
| **PE-CB703B.2** | 2 | 2 | 2 |
| **PE-CB703B.3** | 2 | 2 | 2 |
| **PE-CB703B.4** | 2 | 2 | 2 |
| **PE-CB703B.5** | 2 | 2 | 2 |

**Course Name: Cognitive Science & Analytics**
**Course Code: PE-CB703C**
**Contact: 2:1:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to cognitive science |
| **CO2** | Determine the solutions of the problems related to design of to cognitive science |
| **CO3** | Apply the appropriate mathematical tools of design of to cognitive science |
| **CO4** | Analyze different engineering problems linked with design of to cognitive science |
| **CO5** | Apply different engineering problems linked with design of to cognitive science |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB703C.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB703C.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB703C.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB703C.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB703C.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CB703C.1** | 2 | 2 | 2 |
| **PE-CB703C.2** | 2 | 2 | 2 |
| **PE-CB703C.3** | 2 | 2 | 2 |
| **PE-CB703C.4** | 2 | 2 | 2 |
| **PE-CB703C.5** | 2 | 2 | 2 |

**Course Name: Cryptology**
**Course Code: PE-CB704A**
**Contact: 2:1:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to cryptology |
| **CO2** | Determine the solutions of the problems related to design of to cryptology |
| **CO3** | Apply the appropriate mathematical tools of design of to cryptology |
| **CO4** | Analyze different engineering problems linked with design of to cryptology |
| **CO5** | Apply different engineering problems linked with design of to cryptology |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB704A.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB704A.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB704A.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB704A.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB704A.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CB704A.1** | 2 | 2 | 2 |
| **PE-CB704A.2** | 2 | 2 | 2 |
| **PE-CB704A.3** | 2 | 2 | 2 |
| **PE-CB704A.4** | 2 | 2 | 2 |
| **PE-CB704A.5** | 2 | 2 | 2 |

**Course Name: Quantum Computation & Quantum Information**
**Course Code: PE-CB704B**
**Contact: 2:1:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to quantum computation and information |
| **CO2** | Determine the solutions of the problems related to design of quantum computation and information |
| **CO3** | Apply the appropriate mathematical tools of design of to quantum computation and information |
| **CO4** | Analyze different engineering problems linked with design of to quantum computation and information |
| **CO5** | Apply different engineering problems linked with design of to quantum computation and information |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB704B.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB704B.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB704B.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB704B.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB704B.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CB704B.1** | 2 | 2 | 2 |
| **PE-CB704B.2** | 2 | 2 | 2 |
| **PE-CB704B.3** | 2 | 2 | 2 |
| **PE-CB704B.4** | 2 | 2 | 2 |
| **PE-CB704B.5** | 2 | 2 | 2 |

**Course Name: Mobile Computing**
**Course Code: PE-CB704C**
**Contact: 2:1:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to mobile computing |
| **CO2** | Determine the solutions of the problems related to design of to mobile computing |
| **CO3** | Apply the appropriate mathematical tools of design of to mobile computing |
| **CO4** | Analyze different engineering problems linked with design of to mobile computing |
| **CO5** | Apply different engineering problems linked with design of to mobile computing |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB704C.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB704C.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB704C.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB704C.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB704C.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CB704C.1** | 2 | 2 | 2 |
| **PE-CB704C.2** | 2 | 2 | 2 |
| **PE-CB704C.3** | 2 | 2 | 2 |
| **PE-CB704C.4** | 2 | 2 | 2 |
| **PE-CB704C.5** | 2 | 2 | 2 |

**Course Name: Usability Design of Software Applications Lab**
**Course Code: CB791**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to design of software applications lab |
| **CO2** | Determine the solutions of the problems related to design of software applications lab |
| **CO3** | Apply the appropriate mathematical tools of design of software applications lab |
| **CO4** | Analyze different engineering problems linked with design of software applications lab |
| **CO5** | Apply different engineering problems linked with design of software applications lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB791.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **CB791.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB791.3** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **CB791.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB791.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB791.1** | 2 | 2 | 2 |
| **CB791.2** | 2 | 2 | 3 |
| **CB791.3** | 2 | 3 | 2 |
| **CB791.4** | 2 | 2 | 2 |
| **CB791.5** | 2 | 2 | 3 |

**Course Name: IT Workshop Skylab / Matlab Lab**
**Course Code: CB792**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to IT workshop lab |
| **CO2** | Determine the solutions of the problems related to design of IT workshop lab |
| **CO3** | Apply the appropriate mathematical tools of design of IT workshop lab |
| **CO4** | Analyze different engineering problems linked with design of IT workshop lab |
| **CO5** | Apply different engineering problems linked with design of IT workshop lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB792.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **CB792.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB792.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB792.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB792.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB792.1** | 2 | 2 | 2 |
| **CB792.2** | 2 | 2 | 2 |
| **CB792.3** | 2 | 2 | 2 |
| **CB792.4** | 2 | 2 | 2 |
| **CB792.5** | 2 | 2 | 2 |

**Course Name: Introduction to IoT Lab**
**Course Code: PE-CB793A**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to IOT lab |
| **CO2** | Determine the solutions of the problems related to design of IOT lab |
| **CO3** | Apply the appropriate mathematical tools of design of to IOT lab |
| **CO4** | Analyze different engineering problems linked with design of to IOT lab |
| **CO5** | Apply different engineering problems linked with design of to IOT lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB793A.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB793A.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB793A.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB793A.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB793A.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE- CB793A.1** | 2 | 2 | 2 |
| **PE- CB793A.2** | 2 | 2 | 2 |
| **PE- CB793A.3** | 2 | 2 | 2 |
| **PE- CB793A.4** | 2 | 2 | 2 |
| **PE- CB793A.5** | 2 | 2 | 2 |

**Course Name: Advanced Social, Text and Media Analytics Lab**
**Course Code: PE-CB793B**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to advanced social, text and media analytics lab |
| **CO2** | Determine the solutions of the problems related to design of to advanced social, text and media analytics lab |
| **CO3** | Apply the appropriate mathematical tools of design of to advanced social, text and media analytics lab |
| **CO4** | Analyze different engineering problems linked with design of advanced social, text and media analytics lab |
| **CO5** | Apply different engineering problems linked with design of to advanced social, text and media analytics lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB793B.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB793B.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB793B.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB793B.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB793B.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE- CB793B.1** | 2 | 2 | 2 |
| **PE- CB793B.2** | 2 | 2 | 2 |
| **PE- CB793B.3** | 2 | 2 | 2 |
| **PE- CB793B.4** | 2 | 2 | 2 |
| **PE- CB793B.5** | 2 | 2 | 2 |

**Course Name: Cognitive Science & Analytics Lab**
**Course Code: PE-CB793C**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to cognitive science lab |
| **CO2** | Determine the solutions of the problems related to design of to cognitive science lab |
| **CO3** | Apply the appropriate mathematical tools of design of to cognitive science lab |
| **CO4** | Analyze different engineering problems linked with design of to cognitive science lab |
| **CO5** | Apply different engineering problems linked with design of to cognitive science lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB793C.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB793C.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB793C.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB793C.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB793C.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE- CB793C.1** | 2 | 2 | 2 |
| **PE- CB793C.2** | 2 | 2 | 2 |
| **PE- CB793C.3** | 2 | 2 | 2 |
| **PE- CB793C.4** | 2 | 2 | 2 |
| **PE- CB793C.5** | 2 | 2 | 2 |

**Course Name: Cryptology Lab**
**Course Code: PE-CB794A**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to cryptology lab |
| **CO2** | Determine the solutions of the problems related to design of to cryptology lab |
| **CO3** | Apply the appropriate mathematical tools of design of to cryptology lab |
| **CO4** | Analyze different engineering problems linked with design of to cryptology lab |
| **CO5** | Apply different engineering problems linked with design of to cryptology lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB794A.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB794A.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB794A.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB794A.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB794A.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE- CB794A.1** | 2 | 2 | 2 |
| **PE- CB794A.2** | 2 | 2 | 2 |
| **PE- CB794A.3** | 2 | 2 | 2 |
| **PE- CB794A.4** | 2 | 2 | 2 |
| **PE- CB794A.5** | 2 | 2 | 2 |

**Course Name: Quantum Computation & Quantum Information Lab**
**Course Code: PE-CB794B**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to quantum computation and information lab |
| **CO2** | Determine the solutions of the problems related to design of quantum computation and information lab |
| **CO3** | Apply the appropriate mathematical tools of design of to quantum computation and information lab |
| **CO4** | Analyze different engineering problems linked with design of to quantum computation and information lab |
| **CO5** | Apply different engineering problems linked with design of to quantum computation and information lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB794B.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB794B.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB794B.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB794B.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB794B.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE- CB794B.1** | 2 | 2 | 2 |
| **PE- CB794B.2** | 2 | 2 | 2 |
| **PE- CB794B.3** | 2 | 2 | 2 |
| **PE- CB794B.4** | 2 | 2 | 2 |
| **PE- CB794B.5** | 2 | 2 | 2 |

**Course Name: Mobile Computing Lab**
**Course Code: PE-CB794C**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to mobile computing lab |
| **CO2** | Determine the solutions of the problems related to design of to mobile computing lab |
| **CO3** | Apply the appropriate mathematical tools of design of to mobile computing lab |
| **CO4** | Analyze different engineering problems linked with design of to mobile computing lab |
| **CO5** | Apply different engineering problems linked with design of to mobile computing lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CB794C.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CB794C.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB794C.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB794C.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CB794C.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE- CB794C.1** | 2 | 2 | 2 |
| **PE- CB794C.2** | 2 | 2 | 2 |
| **PE- CB794C.3** | 2 | 2 | 2 |
| **PE- CB794C.4** | 2 | 2 | 2 |
| **PE- CB794C.5** | 2 | 2 | 2 |

**Course Name: Project Evaluation I**
**Course Code: CB781**
**Contact: 0:0:4**
**Total Contact Hours: 48**
**Credit: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to project evalution |
| **CO2** | Determine the solutions of the problems related to project evalution |
| **CO3** | Apply the appropriate mathematical tools of project evalution |
| **CO4** | Analyze different engineering problems linked with project evalution |
| **CO5** | Apply different engineering problems linked with project evalution |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CB781.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **CB781.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB781.3** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **CB781.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **CB781.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **CB781.1** | 2 | 2 | 2 |
| **CB781.2** | 2 | 2 | 3 |
| **CB781.3** | 2 | 3 | 2 |
| **CB781.4** | 2 | 2 | 2 |
| **CB781.5** | 2 | 2 | 3 |

**Course Name: Services Science and Service Operational Management**
**Course Code: BS801**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to service oriented management |
| **CO2** | Determine the solutions of the problems related to service oriented management |
| **CO3** | Apply the appropriate mathematical tools service oriented management |
| **CO4** | Analyze different engineering problems linked with service oriented management |
| **CO5** | Apply different engineering problems linked with service oriented management |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS801.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **BS801.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS801.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS801.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS801.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS801.1** | 2 | 2 | 2 |
| **BS801.2** | 2 | 2 | 2 |
| **BS801.3** | 2 | 2 | 2 |
| **BS801.4** | 2 | 2 | 2 |
| **BS801.5** | 2 | 2 | 2 |

**Course Name: IT Project Management**
**Course Code: BS802**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credit: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to IT project management |
| **CO2** | Determine the solutions of the problems related to IT project management |
| **CO3** | Apply the appropriate mathematical tools IT project management |
| **CO4** | Analyze different engineering problems linked with IT project management |
| **CO5** | Apply different engineering problems linked with IT project management |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS802.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **BS802.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS802.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS802.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS802.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS802.1** | 2 | 2 | 2 |
| **BS802.2** | 2 | 2 | 2 |
| **BS802.3** | 2 | 2 | 2 |
| **BS802.4** | 2 | 2 | 2 |
| **BS802.5** | 2 | 2 | 2 |

**Course Name: Marketing Research and Marketing Management**
**Course Code: BS803**
**Contact: 2:0:0**
**Total Contact Hours: 24**
**Credit: 2**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to marketing research management |
| **CO2** | Determine the solutions of the problems related to marketing research management |
| **CO3** | Apply the appropriate mathematical tools marketing research management |
| **CO4** | Analyze different engineering problems linked with marketing research management |
| **CO5** | Apply different engineering problems linked with marketing research management |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS803.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **BS803.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS803.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS803.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS803.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS803.1** | 2 | 2 | 2 |
| **BS803.2** | 2 | 2 | 2 |
| **BS803.3** | 2 | 2 | 2 |
| **BS803.4** | 2 | 2 | 2 |
| **BS803.5** | 2 | 2 | 2 |

**Course Name: Advanced Finance / Financial Modeling**
**Course Code: PE-CBS804A**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to advanced finance modeling |
| **CO2** | Determine the solutions of the problems related to design of advanced finance modeling |
| **CO3** | Apply the appropriate mathematical tools of design of to advanced finance modeling |
| **CO4** | Analyze different engineering problems linked with design of to advanced finance modeling |
| **CO5** | Apply different engineering problems linked with design of to advanced finance modeling |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CBS804A.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CBS804A.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS804A.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS804A.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS804A.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CBS804A.1** | 2 | 2 | 2 |
| **PE-CBS804A.2** | 2 | 2 | 2 |
| **PE-CBS804A.3** | 2 | 2 | 2 |
| **PE-CBS804A.4** | 2 | 2 | 2 |
| **PE-CBS804A.5** | 2 | 2 | 2 |

**Course Name: Behavioral Economics**
**Course Code: PE-CBS804B**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**
**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to behavioral economics |
| **CO2** | Determine the solutions of the problems related to behavioral economics |
| **CO3** | Apply the appropriate mathematical tools of behavioral economics |
| **CO4** | Analyze different engineering problems linked with behavioral economics |
| **CO5** | Apply different engineering problems linked with behavioral economics |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CBS804B.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CBS804B.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS804B.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS804B.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS804B.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CBS804B.1** | 2 | 2 | 2 |
| **PE-CBS804B.2** | 2 | 2 | 2 |
| **PE-CBS804B.3** | 2 | 2 | 2 |
| **PE-CBS804B.4** | 2 | 2 | 2 |
| **PE-CBS804B.5** | 2 | 2 | 2 |

**Course Name: Computational Finance &Modeling**
**Course Code: PE-CBS804C**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to computational finance & modeling |
| **CO2** | Determine the solutions of the problems related to computational finance & modeling |
| **CO3** | Apply the appropriate mathematical tools of computational finance & modeling |
| **CO4** | Analyze different engineering problems linked computational finance & modeling |
| **CO5** | Apply different engineering problems linked with computational finance & modeling |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CBS804C.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CBS804C.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS804C.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS804C.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS804C.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CBS804C.1** | 2 | 2 | 2 |
| **PE-CBS804C.2** | 2 | 2 | 2 |
| **PE-CBS804C.3** | 2 | 2 | 2 |
| **PE-CBS804C.4** | 2 | 2 | 2 |
| **PE-CBS804C.5** | 2 | 2 | 2 |

**Course Name: Psychology**
**Course Code: PE-CBS805A**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to psychology |
| **CO2** | Determine the solutions of the problems related to design of to psychology |
| **CO3** | Apply the appropriate mathematical tools of design of to psychology |
| **CO4** | Analyze different engineering problems linked with design of to psychology |
| **CO5** | Apply different engineering problems linked with design of to psychology |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CBS805A.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CBS805A.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS805A.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS805A.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS805A.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CBS805A.1** | 2 | 2 | 2 |
| **PE-CBS805A.2** | 2 | 2 | 2 |
| **PE-CBS805A.3** | 2 | 2 | 2 |
| **PE-CBS805A.4** | 2 | 2 | 2 |
| **PE-CBS805A.5** | 2 | 2 | 2 |

**Course Name: Enterprise Systems**
**Course Code: PE-CBS805B**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to enterprise systems |
| **CO2** | Determine the solutions of the problems related to design of enterprise systems |
| **CO3** | Apply the appropriate mathematical tools of design of to enterprise systems |
| **CO4** | Analyze different engineering problems linked with design of to enterprise systems |
| **CO5** | Apply different engineering problems linked with design of to enterprise systems |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CBS805B.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CBS805B.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS805B.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS805B.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS805B.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CBS805B.1** | 2 | 2 | 2 |
| **PE-CBS805B.2** | 2 | 2 | 2 |
| **PE-CBS805B.3** | 2 | 2 | 2 |
| **PE-CBS805B.4** | 2 | 2 | 2 |
| **PE-CBS805B.5** | 2 | 2 | 2 |

**Course Name: Image Processing and Pattern Recognition**
**Course Code: PE-CBS805C**
**Contact: 3:0:0**
**Total Contact Hours: 36**
**Credit: 3**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to image processing and pattern recognition |
| **CO2** | Determine the solutions of the problems related to design of to image processing and pattern recognition |
| **CO3** | Apply the appropriate mathematical tools of design of to image processing and pattern recognition |
| **CO4** | Analyze different engineering problems linked with design of to image processing and pattern recognition |
| **CO5** | Apply different engineering problems linked with design of to image processing and pattern recognition |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CBS805C.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CBS805C.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS805C.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS805C.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS805C.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CBS805C.1** | 2 | 2 | 2 |
| **PE-CBS805C.2** | 2 | 2 | 2 |
| **PE-CBS805C.3** | 2 | 2 | 2 |
| **PE-CBS805C.4** | 2 | 2 | 2 |
| **PE-CBS805C.5** | 2 | 2 | 2 |

**Course Name: Services Science and Service Operational Management Lab**
**Course Code: BS891**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to service oriented management lab |
| **CO2** | Determine the solutions of the problems related to service oriented management lab |
| **CO3** | Apply the appropriate mathematical tools service oriented management lab |
| **CO4** | Analyze different engineering problems linked with service oriented management lab |
| **CO5** | Apply different engineering problems linked with service oriented management lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS891.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **BS891.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS891.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS891.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS891.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS891.1** | 2 | 2 | 2 |
| **BS891.2** | 2 | 2 | 2 |
| **BS891.3** | 2 | 2 | 2 |
| **BS891.4** | 2 | 2 | 2 |
| **BS891.5** | 2 | 2 | 2 |

**Course Name: IT Project Management Lab**
**Course Code: BS892**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to IT project management lab |
| **CO2** | Determine the solutions of the problems related to IT project management lab |
| **CO3** | Apply the appropriate mathematical tools IT project management lab |
| **CO4** | Analyze different engineering problems linked with IT project management lab |
| **CO5** | Apply different engineering problems linked with IT project management lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BS892.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **BS892.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS892.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS892.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **BS892.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **BS892.1** | 2 | 2 | 2 |
| **BS892.2** | 2 | 2 | 2 |
| **BS892.3** | 2 | 2 | 2 |
| **BS892.4** | 2 | 2 | 2 |
| **BS892.5** | 2 | 2 | 2 |

**Course Name: Advanced Finance / Financial Modeling Lab**
**Course Code: PE-CBS894A**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to advanced finance modelling lab |
| **CO2** | Determine the solutions of the problems related to design of advanced finance modelling lab |
| **CO3** | Apply the appropriate mathematical tools of design of to advanced finance modeling lab |
| **CO4** | Analyze different engineering problems linked with design of to advanced finance modeling lab |
| **CO5** | Apply different engineering problems linked with design of to advanced finance modeling lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CBS894A.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CBS894A.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS894A.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS894A.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS894A.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CBS894A.1** | 2 | 2 | 2 |
| **PE-CBS894A.2** | 2 | 2 | 2 |
| **PE-CBS894A.3** | 2 | 2 | 2 |
| **PE-CBS894A.4** | 2 | 2 | 2 |
| **PE-CBS894A.5** | 2 | 2 | 2 |

**Course Name: Behavioral Economics Lab**
**Course Code: PE-CBS894B**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**
**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to behavioral economics lab |
| **CO2** | Determine the solutions of the problems related to behavioral economics lab |
| **CO3** | Apply the appropriate mathematical tools of behavioral economics lab |
| **CO4** | Analyze different engineering problems linked with behavioral economics lab |
| **CO5** | Apply different engineering problems linked with behavioral economics lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CBS894B.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CBS894B.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS894B.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS894B.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS894B.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CBS894B.1** | 2 | 2 | 2 |
| **PE-CBS894B.2** | 2 | 2 | 2 |
| **PE-CBS894B.3** | 2 | 2 | 2 |
| **PE-CBS894B.4** | 2 | 2 | 2 |
| **PE-CBS894B.5** | 2 | 2 | 2 |

**Course Name: Computational Finance &Modeling Lab**
**Course Code: PE-CBS894C**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to computational finance & modeling lab |
| **CO2** | Determine the solutions of the problems related to computational finance & modeling lab |
| **CO3** | Apply the appropriate mathematical tools of computational finance & modeling lab |
| **CO4** | Analyze different engineering problems linked computational finance & modeling lab |
| **CO5** | Apply different engineering problems linked with computational finance & modeling lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CBS894C.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CBS894C.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS894C.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS894C.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS894C.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CBS894C.1** | 2 | 2 | 2 |
| **PE-CBS894C.2** | 2 | 2 | 2 |
| **PE-CBS894C.3** | 2 | 2 | 2 |
| **PE-CBS894C.4** | 2 | 2 | 2 |
| **PE-CBS894C.5** | 2 | 2 | 2 |

**Course Name: Psychology Lab**
**Course Code: PE-CBS895A**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to psychology lab |
| **CO2** | Determine the solutions of the problems related to design of to psychology lab |
| **CO3** | Apply the appropriate mathematical tools of design of to psychology lab |
| **CO4** | Analyze different engineering problems linked with design of to psychology lab |
| **CO5** | Apply different engineering problems linked with design of to psychology lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CBS895A.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CBS895A.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS895A.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS895A.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS895A.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CBS895A.1** | 2 | 2 | 2 |
| **PE-CBS895A.2** | 2 | 2 | 2 |
| **PE-CBS895A.3** | 2 | 2 | 2 |
| **PE-CBS895A.4** | 2 | 2 | 2 |
| **PE-CBS895A.5** | 2 | 2 | 2 |

**Course Name: Enterprise Systems Lab**
**Course Code: PE-CBS895B**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to enterprise systems lab |
| **CO2** | Determine the solutions of the problems related to design of enterprise systems lab |
| **CO3** | Apply the appropriate mathematical tools of design of to enterprise systems lab |
| **CO4** | Analyze different engineering problems linked with design of to enterprise systems lab |
| **CO5** | Apply different engineering problems linked with design of to enterprise systems lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CBS895B.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CBS895B.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS895B.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS895B.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS895B.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CBS895B.1** | 2 | 2 | 2 |
| **PE-CBS895B.2** | 2 | 2 | 2 |
| **PE-CBS895B.3** | 2 | 2 | 2 |
| **PE-CBS895B.4** | 2 | 2 | 2 |
| **PE-CBS895B.5** | 2 | 2 | 2 |

**Course Name: Image Processing and Pattern Recognition Lab**
**Course Code: PE-CBS895C**
**Contact: 0:0:2**
**Total Contact Hours: 24**
**Credit: 1**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to image processing and pattern recognition lab |
| **CO2** | Determine the solutions of the problems related to design of to image processing and pattern recognition lab |
| **CO3** | Apply the appropriate mathematical tools of design of to image processing and pattern recognition lab |
| **CO4** | Analyze different engineering problems linked with design of to image processing and pattern recognition lab |
| **CO5** | Apply different engineering problems linked with design of to image processing and pattern recognition lab |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PE-CBS895C.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **PE-CBS895C.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS895C.3** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS895C.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **PE-CBS895C.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **PE-CBS895C.1** | 2 | 2 | 2 |
| **PE-CBS895C.2** | 2 | 2 | 2 |
| **PE-CBS895C.3** | 2 | 2 | 2 |
| **PE-CBS895C.4** | 2 | 2 | 2 |
| **PE-CBS895C.5** | 2 | 2 | 2 |

**Course Name: Project Evaluation II**
**Course Code: B881**
**Contact: 0:0:12**
**Total Contact Hours: 144**
**Credit: 6**

**Course Outcomes (COs):**

After completion of the course students would be able to

| | |
|---|---|
| **CO1** | Understand and recall the properties and formula related to final project evalution |
| **CO2** | Determine the solutions of the problems related to final project evalution |
| **CO3** | Apply the appropriate mathematical tools of final project evalution |
| **CO4** | Analyze different engineering problems linked with final project evalution |
| **CO5** | Apply different engineering problems linked with final project evalution |

**CO-PO Mapping**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **B881.1** | 3 | 2 | 3 | 2 | | | | | | | | 2 |
| **B881.2** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **B881.3** | 3 | 3 | 3 | 3 | | | | | | | | 3 |
| **B881.4** | 3 | 3 | 3 | 3 | | | | | | | | 2 |
| **B881.5** | 3 | 3 | 3 | 3 | | | | | | | | 2 |

**CO-PSO Mapping**

| COs | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **B881.1** | 2 | 2 | 2 |
| **B881.2** | 2 | 2 | 3 |
| **B881.3** | 2 | 3 | 2 |
| **B881.4** | 2 | 2 | 2 |
| **B881.5** | 2 | 2 | 3 |

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