# SRI MANAKULA VINAYAGAR
# ENGINEERING COLLEGE
**(An Autonomous Institution)**

Puducherry

## B.TECH. - MECHATRONICS

## ACADEMIC REGULATIONS 2023
## (R-2023)

## CURRICULUM AND SYLLABI
## Volume – I

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## COLLEGE VISION AND MISSION

### VISION

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

### MISSION

**M1: Quality Education:**

To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices.

**M2: Research and Innovation:**

To foster value-based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

**M3: Employability and Entrepreneurship:**

To inculcate the employability and entrepreneurial skills through value and skill based training.

**M4: Ethical Values:**

To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

## DEPARTMENT VISION AND MISSION

### VISION

To be a department with outstanding competencies in education and research in interdisciplinary field of Mechatronics Engineering for the prosperity of students and society.

### MISSION

M1 - Quality Integration: To uphold excellence in education by integrating the teaching learning process with hands- on trainings in updated technologies.

M2 - Research Exploration: To maintain a dynamic balance between learning and research by encompassing activities related to Research, Industrial projects and Innovation Contests.

M3 – Personality Development: To enrich the team spirit and entrepreneurship skills through training programmes on personality development for career prospects.

M4 – Social Ethics: To enhance the principle of highest ethical values by inculcating code of conduct for the betterment of the Society.

## PROGRAMME OUTCOMES (POs)

**PO1: Engineering knowledge:**

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

**PO2: Problem analysis:**

Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3: Design/development of solutions:**

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

**PO4: Conduct investigations of complex problems:**

Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

**PO5**: **Modern tool usage:**

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

**PO6: The engineer and society:**

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

**PO7: Environment and sustainability:**

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

**PO8: Ethics:**

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9: Individual and team work:**

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10: Communication:**

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

**PO11: Project management and finance:**

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

**PO12: Life-long learning:**

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

## PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

**PEO1: Strong Knowledge**

To provide comprehensive knowledge on Science, Mathematics & multiple Engineering disciplines, along-with the ability to apply the gained knowledge.

**PEO2: Technical Competency**

To produce graduates who can demonstrate technical competence in the field **of Mechatronics Engineering and develop solutions to the complex problems.**

**PEO3: Task Orientation**

To produce graduates who function effectively in a multi-disciplinary environment, individually and within a society towards accomplishing tasks.

**PEO4: Team Work**

To produce graduates who would be able to take individual responsibility and work as a part of a team towards the fulfillment of both individual and organizational goals.

**PEO5: Professional Competency**

To produce graduates with professional competence by life-long learning on advanced studies, professional skills and other professional activities related to Mechatronics Engineering society.

## PROGRAM SPECIFIC OUTCOMES (PSOs)

**PSO1: Understanding the Concepts**

To comprehend the concepts of Mechatronics and their applications in the field of Automated Manufacturing Systems, Robotics, Automobile Technology, Aerial vehicles and other relevant areas.

**PSO2: Application of Knowledge**

To apply technical knowledge in modern hardware and software tools related to Mechatronics for solving real world problems.

**PSO3: Solution Development**

To develop the ability to analyze, comprehend and design mechatronics subsystems for a variety of engineering applications for the benefits of society.

## STRUCTURE FOR UNDERGRADUATE ENGINEERING PROGRAM

| S.No | Course Category | Breakdown of Credits |
|---|---|---|
| 1 | Humanities Social Science and Management courses (HS) | 15 |
| 2 | Basic Sciences (BS) | 20 |
| 3 | Engineering Sciences (ES) | 24 |
| 4 | Professional Core (PC) | 69 |
| 5 | Professional Electives (PE) | 18 |
| 6 | Open Electives (OE) | 09 |
| 7 | Professional Activities (PA) | 14 |
| 8 | Ability Enhancement Courses (AEC*) | - |
| 9 | Mandatory courses (MC*) | - |
| **Total** | | 169 |

## SCHEME OF CREDIT DISTRIBUTION – SUMMARY

| Sl. No | Course Category | Credits per Semester | | | | | | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| | | I | II | III | IV | V | VI | VII | VIII | |
| 1 | Humanities Social Sciences and Management courses (HS) | 3 | 5 | 1 | 1 | 2 | - | - | 3 | 15 |
| 2 | Basic Sciences(BS) | 7 | 4 | 5 | 4 | - | - | - | - | 20 |
| 3 | Engineering Sciences (ES) | 12 | 4 | 4 | 4 | - | - | - | - | 24 |
| 4 | Professional Core (PC) | - | 8 | 13 | 14 | 12 | 15 | 7 | - | 69 |
| 5 | Professional Electives (PE) | - | - | - | - | 3 | 3 | 6 | 6 | 18 |
| 6 | Open Electives (OE) | - | - | - | - | 3 | 3 | 3 | - | 09 |
| 7 | Professional Activities (PA) | - | - | - | - | 1 | 2 | 2 | 8 | 13 |
| 8 | Professional Activities for Internship (PA) | - | - | - | - | - | - | 1 | - | 1 |
| 8 | Ability Enhancement Courses (AEC*) | - | - | - | - | - | - | - | - | - |
| 10 | Mandatory courses (MC*) | - | - | - | - | - | - | - | - | - |
| **Total** | | **22** | **21** | **23** | **23** | **21** | **23** | **19** | **17** | **169** |

**** AEC and MC are not included for CGPA calculation***

## ANNEXURE I

| SEMESTER – I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23MATC01 | Engineering Mathematics - I | BS | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| 2 | U23BSTC01 | Physical Science for Engineers | BS | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U23CSTC01 | Programming in C | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U23ESTC01 | Basics of Civil and Mechanical Engineering | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U23ESTC02 | Engineering Mechanics | ES | 2 | 1 | 0 | 3 | 25 | 75 | 100 |
| **Theory cum Practical** | | | | | | | | | | |
| 6 | U23ENBC01 | Communicative English - I | HS | 2 | 0 | 2 | 3 | 20 | 80 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U23ESPC03 | Engineering Graphics using AutoCAD | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U23CSPC01 | Programming in C Laboratory | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U23ESPC02 | Design Thinking and IDEA Lab | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Ability Enhancement Course** | | | | | | | | | | |
| 10 | U23MCC1XX | Certification Course - I** | AEC | 0 | 0 | 4 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 11 | U23MCM101 | Induction Programme | MC | 2 Weeks | | | - | - | - | - |
| **TOTAL** | | | | | | | **22** | **415** | **585** | **1000** |

| SEMESTER – II | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23MATC02 | Mathematics - II | BS | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| 2 | U23ESTC03 | Basics of Electrical and Electronics Engineering | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U23MCT201 | Manufacturing Technology | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U23MCT202 | Thermodynamics and Heat Transfer | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U23HSTC01 | Universal Human Values-II | HS | 2 | 0 | 0 | 2 | 25 | 75 | 100 |
| **Theory cum Practical** | | | | | | | | | | |
| 6 | U23ENBC02 | Communicative English - II | HS | 2 | 0 | 2 | 3 | 20 | 80 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U23ESPC01 | Basic Electrical and Electronics Engineering Laboratory | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U23MCP201 | Thermal Engineering Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U23MCP202 | Manufacturing Technology Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Ability Enhancement Course** | | | | | | | | | | |
| 10 | U23MCC2XX | Certification Course - II** | AEC | 0 | 0 | 4 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 11 | U23MCM202 | Sports, Yoga and NSS | MC | 2 | 0 | 0 | - | 100 | - | 100 |
| **TOTAL** | | | | | | | **21** | **515** | **585** | **1200** |

***# Professional Electives are to be selected from the list given in Annexure I***

***$ Open electives are to be selected from the list Annexure III***

***** Certification courses are to be selected from the list given in Annexure II***

## SEMESTER – III

| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23MATC03 | Probability and Statistics | BS | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| 2 | U23ADTC01 | Programming in Python | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U23MCT303 | Analog and Digital Electronics | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U23MCT304 | Fluid Mechanics and Machinery | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U23MCT305 | Sensors, Transducers and Measurement systems | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Theory cum Practical** | | | | | | | | | | |
| 6 | U23MCB306 | Mechanics of Solids | PC | 2 | 0 | 2 | 3 | 20 | 80 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U23MAPC01 | Engineering Mathematics Laboratory | BS | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U23ENPC01 | General Proficiency - I | HS | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U23ADTP01 | Programming in Python Laboratory | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 10 | U23MCP303 | Analog and Digital Electronics Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Ability Enhancement Course** | | | | | | | | | | |
| 11 | U23MCC3XX | Certification Course - III** | AEC | 0 | 0 | 4 | - | 100 | - | 100 |
| 12 | U23MCS301 | Skill Enhancement Course- I | SEC | 0 | 0 | 2 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 13 | U23MCM303 | Environmental Science | MC | 2 | 0 | 0 | - | 100 | - | 100 |
| **TOTAL** | | | | | | | **23** | **665** | **635** | **1300** |

## SEMESTER – IV

| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23MATC04 | Numerical Methods and Optimization | BS | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| 2 | U23CSTC03 | Data Structures | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U23MCT407 | Power Electronics and Drives | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U23MCT408 | Microprocessors and controllers for Mechatronics Systems | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U23MCT409 | Theory of Machines | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Theory cum Practical** | | | | | | | | | | |
| 6 | U23MCB410 | IoT for Mechatronics | PC | 2 | 0 | 2 | 3 | 20 | 80 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U23ENPCO2 | General Proficiency - II | HS | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U23CSPC02 | Data Structures Laboratory | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U23MCP404 | Power Electronics and Drives Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 10 | U23MCP405 | Microprocessors and Controllers Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Ability Enhancement Course** | | | | | | | | | | |
| 10 | U23MCC4XX | Certification Course - IV** | AEC | 0 | 0 | 4 | - | 100 | - | 100 |
| 11 | U23MCS402 | Skill Enhancement Course- II | SEC | 0 | 0 | 2 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 12 | U23MCM404 | Indian Constitution | MC | 2 | 0 | 0 | - | 100 | - | 100 |
| **TOTAL** | | | | | | | **23** | **665** | **575** | **1200** |

**** Skill Enhancement Courses (I and II) are to be selected from the list given in Annexure III***

| SEMESTER – V | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23HSTC02 | Research Methodology | HS | 3 | 0 | 0 | 2 | 25 | 75 | 100 |
| 2 | U23MCT511 | PLC and Industrial Automation Systems | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U23MCT512 | Fluid Power System | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U23MCT513 | Control Systems for Mechatronics Systems | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U23MCE5XX | Professional Elective - I# | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 6 | U23MCO5XX | Open Elective - I$ | OE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U23MCP506 | Industrial Automation Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U23MCP507 | Virtual Instrumentation Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U23MCP508 | Fluid Power System Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Project Work** | | | | | | | | | | |
| 10 | U23MCW501 | Micro Project | PA | 0 | 0 | 2 | 1 | 100 | - | 100 |
| **Ability Enhancement Course** | | | | | | | | | | |
| 11 | U23MCC5XX | Certification Course - V** | AEC | 0 | 0 | 4 | - | 100 | - | 100 |
| 12 | U23MCS503 | Skill Enhancement Course- III | SEC | 0 | 0 | 2 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 13 | U23MCM505 | Essence of Indian Traditional Knowledge | MC | 2 | 0 | 0 | - | 100 | - | 100 |
| **TOTAL** | | | | | | | **21** | **700** | **600** | **1300** |

| SEMESTER – VI | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23MCT614 | Computer Aided Manufacturing | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 2 | U23MCTC02 | Embedded System Design | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U23MCT616 | Design of Mechanical Elements | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U23MCT617 | Industrial Robotics | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U23MCE6XX | Professional Elective - II# | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 6 | U23MCO6XX | Open Elective - II$ | OE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U23ECPC02 | Embedded System Design Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U23MCP610 | Computer Aided Manufacturing Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U23MCP611 | Industrial Robotics Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Project Work** | | | | | | | | | | |
| 10 | U23MCW602 | Mini Project | PA | 0 | 0 | 2 | 1 | 100 | - | 100 |
| **Ability Enhancement Course** | | | | | | | | | | |
| 11 | U23MCC6XX | Certification Course - VI** | AEC | 0 | 0 | 4 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 12 | U23MCM606 | Professional Ethics | MC | 0 | 0 | 2 | - | 100 | | 100 |
| **TOTAL** | | | | | | | **22** | **600** | **600** | **1600** |

| SEMESTER – VII | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23MCT718 | Automation in Manufacturing Systems | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 2 | U23MCT719 | Design of Mechatronics System | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U23MCE7XX | Professional Elective - III[#] | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U23MCE7XX | Professional Elective - IV[#] | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U23MCO7XX | Open Elective - III[$] | OE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Practical** | | | | | | | | | | |
| 6 | U23MCP712 | Seminar | PC | 0 | 0 | 2 | 1 | 100 | - | 100 |
| **Project Work** | | | | | | | | | | |
| 7 | U23MCW703 | Project Phase - I | PA | 0 | 0 | 4 | 2 | 50 | 50 | 100 |
| 8 | U23MCW704 | Internship / Inplant Training | PA | - | - | 2 | 1 | 100 | - | 100 |
| **TOTAL** | | | | | | | **19** | **375** | **425** | **800** |

| SEMESTER – VIII | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23HSTC03 | Entrepreneurship and Business Management | HS | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 2 | U23MCE8XX | Professional Elective - V[#] | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U23MCE8XX | Professional Elective - V I [#] | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Project Work** | | | | | | | | | | |
| 4 | U23MCW805 | Project Phase - II | PA | 0 | 0 | 16 | 8 | 50 | 100 | 150 |
| **Total** | | | | | | | **17** | **125** | **325** | **450** |

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## ANNEXURE II

## PROFESSIONAL ELECTIVE AND OPEN ELECTIVE COURSES

| **Professional Elective – I (Offered in Semester V)** | | |
|---|---|---|
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23MCE501 | Computer Integrated Manufacturing |
| 2 | U23MCE502 | Image Processing and Computer Vision |
| 3 | U23MCE503 | Computer Network and Cyber Security |
| 4 | U23MCE504 | Autonomous Mobile Robots |
| 5 | U23ICEC01 | Virtual Instrumentation |
| **Professional Elective – II (Offered in Semester VI)** | | |
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23MCE606 | Heating Ventilation and Air-Conditioning |
| 2 | U23ECO602 | Consumer Electronics |
| 3 | U23MCE608 | Introduction to Data Science |
| 4 | U23MCE609 | Robot Process Automation |
| 5 | U23MCE610 | Computer Vision using Python |
| **Professional Elective – III (Offered in Semester VII)** | | |
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23MCE711 | Sustainable Manufacturing |
| 2 | U23ECEC04 | Automotive Electronics Systems |
| 3 | U23MCE713 | Data Communication and Network Systems |
| 4 | U23MCE714 | Drone Technologies |
| 5 | U23MCE715 | Artificial Intelligence and Machine Learning |
| **Professional Elective – IV (Offered in Semester VII)** | | |
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23MCE716 | Operations Research |
| 2 | U23MCE717 | Product Lifecycle Management |
| 3 | U23MCE718 | Data Security and Privacy |
| 4 | U23MCE719 | Underwater Robots |
| 5 | U23MCE70 | Product Design and Development |
| **Professional Elective – V (Offered in Semester VIII)** | | |
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23MCE821 | Unconventional Machining processes |
| 2 | U23MCE822 | Automation Techniques & Tools - DevOps |
| 3 | U23MCE823 | Database Management Systems |
| 4 | U23ECEC02 | Wireless Sensor Networks |
| 5 | U23ITEC05 | Virtual Reality and Augmented Reality |
| **Professional Elective – VI (Offered in Semester VIII)** | | |
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23MCE826 | Non Destructive Testing |
| 2 | U23MCE827 | Supply Chain Management |
| 3 | U23MCE828 | Building Automation |
| 4 | U23MCE829 | Robots and Systems in Smart Manufacturing |
| 5 | U23MCE830 | Introduction to NLP |
| **Open Electives** | | |
| 1 | U23MCO501 | Computer Integrated Manufacturing |
| 2 | U23MCO502 | Automation in Manufacturing |
| 3 | U23MCO603 | Non-Destructive Testing |
| 4 | U23MCO604 | Building Automation |
| 5 | U23MCO705 | Robots and Systems in Smart Manufacturing |
| 6 | U23MCO706 | Unconventional Machining processes |

## ANNEXURE - II

## OPEN ELECTIVE COURSES

| Open Elective – I / Open Elective – II | | | | |
|---|---|---|---|---|
| **S. No** | **Course Code** | **Course Title** | **Offering Department** | **Eligible Department to opt OE course** |
| 1 | U23HSOC01 | Intellectual Property Rights | MBA | Common to B. Tech<br><br>(Offered in Semester V for EEE, ECE, ICE, CIVIL, BME, CCE, FT)<br><br>(Offered in Semester VI for CSE, IT, MECH, Mechatronics, AI&DS) |
| 2 | U23HSOC02 | New Product Development | | |
| 3 | U23HSOC03 | Finance for Engineers | | |
| 4 | U23HSOC04 | Economics for Engineers | | |
| 5 | U23HSOC05 | Marketing Management | | |
| **Open Elective – I / Open Elective – II**<br>(Offered in Semester V for CSE, IT, MECH, Mechatronics, AI&DS)<br>(Offered in Semester VI for EEE, ECE, ICE, CIVIL, BME, CCE, FT) | | | | |
| 1 | U23EEDC01 | Electrical Safety Engineering | EEE | ECE, ICE, MECH, CIVIL, MCTR, CCE, BME, IT, CSE, FT, AI&DS |
| 2 | U23EEOC02 | Solar Photovoltaic Fundamental and Applications | EEE | ECE, ICE, MECH, CIVIL, MCTR, CCE, BME, IT, CSE, FT, AI&DS |
| 3 | U23ECOC01 | Engineering Computation with MATLAB | ECE | EEE, ICE, MECH, CIVIL, CCE, BME, AI&DS, Mechatronics |
| 4 | U23ECOC02 | Consumer Electronics | ECE | EEE, ICE, CSE, MECH, IT, CIVIL, CCE, BME, Mechatronics, FT |
| 5 | U23CSOC01 | Structured Query Language | CSE | EEE, ECE, ICE, MECH, CIVIL, BME, Mechatronics |
| 6 | U23CSOC02 | Computer Peripherals and Networking | CSE | EEE, ECE, ICE, MECH, CIVIL, BME, Mechatronics |
| 7 | U23ITOC01 | Database System: Design & Development | IT | EEE, ECE, ICE, BME,MECH,CIVIL, MECHATRONICS |
| 8 | U23ITOC02 | Computer Hardware and Troubleshooting | IT | EEE, ECE, ICE, CCE, BME, MECH, MECHATRONICS |
| 9 | U23ICOC01 | Sensors and Transducers | ICE | EEE, ECE, CSE, IT, MECH, CIVIL, CCE, CSBS, AI&DS |
| 10 | U23ICOC02 | Instrumentation for Industry 4.0 | ICE | EEE, ECE, CSE, IT, MECH, CIVIL, CCE, CSBS, AI&DS, Mechatronics |
| 11 | U23MEOC01 | Rapid Prototyping | MECH | EEE, ECE, ICE, CIVIL, BME, FT |
| 12 | U23MEOC02 | Material Handling System | MECH | EEE, ICE, CIVIL, Mechatronics |
| 13 | U23MEOC03 | Industrial Engineering for Textile | MECH | FT |
| 14 | U23MEOC04 | Heating, ventilation and air conditioning system (HVAC) | MECH | EEE, ECE, ICE, CIVIL |
| 15 | U23CEOC01 | Energy and Environment | CIVIL | EEE, ECE, MECH, BME, IT, Mechatronics, FT, CSBS |
| 16 | U23CEOC02 | Building Science and Engineering | CIVIL | EEE, MECH, BME |
| 17 | U23CEOC03 | Disaster Management | CIVIL | EEE, ECE, CSE, IT, ICE, MECH, BME, CCE, AI&DS, FT |
| 18 | U23BMOC01 | Medical Electronics | BME | EEE, ECE, CSE, IT, ICE, CCE, MECH, Mechatronics, AI&DS |
| 19 | U23BMOC02 | Telemedicine | BME | EEE, ECE, CSE, IT, ICE, CCE, AI&DS |
| 20 | U23MCOC01 | Building Automation | MCTR | EEE,MECH, CIVIL |
| 21 | U23MCOC02 | Automation in Manufacturing | MCTR | EEE,MECH, CIVIL |
| 22 | U23CCOC01 | Introduction to Communication Technologies | CCE | EEE, MECH, CSE,IT, CIVIL, ICE, Mechatronics, BME, AIDS |
| 23 | U23CCOC02 | Introduction to Computer Networks | CCE | EEE, MECH, CIVIL, ICE, Mechatronics, |

| | | | | |
|---|---|---|---|---|
| | | | | BME, AIDS |
| 24 | U23ADOC01 | Knowledge Representation and Reasoning | AI&DS | EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE |
| 25 | U23ADOC02 | Introduction to Data Science | AI&DS | EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE, BME, Mechatronics |
| 26 | U23ADOC03 | Principles of Artificial Intelligence and Machine Learning | AI&DS | EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE, BME, Mechatronics. |
| 27 | U23CBOC01 | Business Applications of Game Theory | CSBS | EEE,ECE,ICE,CIVIL,MECH,Mechatronics,BME |
| 29 | U23CBOC02 | Cryptology and Analysis | CSBS | EEE,ECE,ICE,CIVIL,MECH,Mechatronics,BME |
| 31 | U23FTOC01 | Textile Arts and Crafts | FT | |
| 32 | U23FTOC02 | Garment Manufacturing Technology | FT | |
| **Open Elective – III (Offered in Semester VII)** | | | | |
| 1 | U23EEOC03 | Electric and Hybrid Vehicles | EEE | ECE, ICE, MECH, CIVIL, MCTR, CCE, BME, IT, CSE, AI&DS,CSBS |
| 2 | U23EEOC04 | Energy Conservation and Management | EEE | ECE, ICE, MECH, CIVIL, MCTR, CCE, BME, IT, CSE, AI&DS,CSBS |
| 3 | U23ECOC03 | IoT and its Applications | ECE | EEE, ICE, CSE, MECH, IT, CIVIL, CCE, FT |
| 4 | U23ECOC04 | Selected Topics in Communications | ECE | EEE, ICE, CSE, MECH, IT, CIVIL, CCE, BME, Mechatronics, FT |
| 5 | U23CSOC03 | Web Programming | CSE | EEE, ECE, ICE, MECH, CIVIL, BME, Mechatronics |
| 6 | U23CSOC04 | Cloud Technology | CSE | EEE, ICE, MECH, CIVIL, CCE, BME, Mechatronics |
| 7 | U23ITOC03 | Essentials of Data Science | IT | EEE, ECE, ICE, CSE, MECH, CIVIL, CCE, BME, Mechatronics |
| 8 | U23ITOC04 | Big Data Technologies | IT | EEE, ICE, MECH, CIVIL, CCE, BME |
| 9 | U23ICOC03 | Fuzzy Logic and Neural Networks | ICE | CSE, IT, MECH, CSBS, AI&DS, Mechatronics |
| 10 | U23ICOC04 | Industrial Automation | ICE | ECE, CSE, IT, MECH, CCE, CSBS, AI&DS |
| 11 | U23MEOC05 | Creativity Innovation and New Product Development | MECH | EEE, ECE, ICE, CIVIL, BME, Mechatronics |
| 12 | U23MEOC06 | Principles of Hydraulic and Pneumatic System | MECH | EEE, ECE, ICE, CIVIL |
| 13 | U23MEOC07 | Supply Chain Management | MECH | EEE, ECE, CIVIL, Mechatronics |
| 14 | U23CEOC04 | Air Pollution and Solid Waste Management | CIVIL | EEE, ECE, CSE, IT, ICE, MECH, BME, CCE, AI&DS, FT, CSBS |
| 15 | U23CEOC05 | Energy Efficient Buildings | CIVIL | EEE, ECE, MECH |
| 16 | U23CEOC06 | Global Warming and Climate Change | CIVIL | EEE,ECE, CSE, IT, ICE, MECH, BME, CCE, AI&DS, FT, CSBS |
| 17 | U23BMOC03 | Medical Robotics | BME | EEE, ECE, CSE, IT, ICE, CCE, MECH, Mechatronics, AI&DS,CSBS |
| 18 | U23BMOC04 | Telehealth Technology | BME | EEE,ECE, ICE, CCE |
| 19 | U23MCOC03 | Non-Destructive Testing | MCTR | |
| 20 | U23MCOC04 | Computer Integrated Manufacturing | MCTR | EEE |
| 21 | U23MCOC05 | Robots and Systems in Smart Manufacturing | MCTR | EEE |
| 22 | U23CCOC03 | Web App Development | CCE | EEE, ECE, MECH, CSE,IT, CIVIL, ICE, Mechatronics, BME, AIDS |
| 23 | U23CCOC04 | Network Essentials and Security | CCE | EEE, MECH, CSE,IT, CIVIL, ICE, Mechatronics, BME, AIDS |

| | | | | |
|---|---|---|---|---|
| 24 | U23ADOC03 | Data science Application of Vision | AI&DS | EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE, BME, Mechatronics |
| 25 | U23ADOC04 | Artificial Intelligence Applications | AI&DS | EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE, BME |
| 26 | U23CBOC03 | Engineering Economics | CSBS | EEE,ECE,CSE,IT,ICE,CIVIL,MECH,Mechatronics,CCE,BME,AIDS,FT |
| 27 | U23CBOC04 | Conversational AI | CSBS | EEE,ECE,ICE,CIVIL,MECH,Mechatronics,BME |
| 28 | U23FTOC03 | Fundamentals of Fashion Design | FT | |
| 29 | U23FTOC04 | Pattern Making | FT | |
| Open Elective – I / Open Elective – II / Open Elective – III<br>Open Elective Courses offered to all brach of Engineering | | | | |
| 1 | U23ESOC01 | Sustainable Engineering | All branch of Engineering | |
| 2 | U23ESOC02 | Water and Waste Water Treatment | | |
| 3 | U23ESOC03 | Technologies for Clean and Renewable Energy | | |
| 4 | U23ESOC04 | Economic Growth and Development | | |
| 5 | U23ESOC05 | Social Innovation in Industry 4.0 | | |
| 6 | U23ESOC06 | Urbanization and Environment | | |
| 7 | U23ESOC07 | Sustainable River Basin Management | | |
| 8 | U23ESOC08 | Environment and Development | | |

## Annexure – III

## EMPLOYABILITY ENHANCEMENT COURSES – (A) CERTIFICATION COURSES

| Sl. No. | Course Code | Course Title |
|---|---|---|
| 1 | U23MCCX01 | 3ds Max |
| 2 | U23MCCX02 | Advance Structural Analysis of Building using ETABS |
| 3 | U23MCCX03 | Advanced Java Programming |
| 4 | U23MCCX04 | Advanced Python Programming |
| 5 | U20MCCX05 | Analog System Lab Kit |
| 6 | U23MCCX06 | Android Medical App Development |
| 7 | U23MCCX07 | Android Programming |
| 8 | U23MCCX08 | ANSYS -Multiphysics |
| 9 | U23MCCX09 | Artificial Intelligence |
| 10 | U23MCCX10 | Artificial Intelligence and Edge Computing |
| 11 | U23MCCX11 | Artificial Intelligence in Medicines |
| 12 | U23MCCX12 | AutoCAD for Architecture |
| 13 | U20MCCX13 | AutoCAD for Civil |
| 14 | U23MCCX14 | AutoCAD for Electrical |
| 15 | U23MCCX15 | AutoCAD for Mechanical |
| 16 | U23MCCX16 | Azure DevOps |
| 17 | U23MCCX17 | Basic Course on ePLAN |
| 18 | U23MCCX18 | Basic Electro Pneumatics |
| 19 | U23MCCX19 | Basic Hydraulics |
| 20 | U23MCCX20 | Bio Signal and Image Processing Development System |
| 21 | U23MCCX21 | Blockchain |
| 22 | U23MCCX22 | Bridge Analysis |
| 23 | U20MCCX23 | Building Analysis and Construction Management |
| 24 | U23MCCX24 | Building Design and Analysis Using AECO Sim Building Designer |
| 25 | U23MCCX25 | CATIA |
| 26 | U23MCCX26 | CCNA (Routing and Switching) |
| 27 | U23MCCX27 | CCNA (Wireless) |
| 28 | U23MCCX28 | Cloud Computing |
| 29 | U23MCCX29 | Computer Programming for Medical Equipments |
| 30 | U23MCCX30 | Corel Draw |
| 31 | U23MCCX31 | Creo (Modeling and Simulation) |
| 32 | U23MCCX32 | Cyber Security |
| 33 | U23MCCX33 | Data Science and Data Analytics |
| 34 | U23MCCX34 | Data Science using Python |
| 35 | U23MCCX35 | Data Science using R |
| 36 | U23MCCX36 | Deep Learning |
| 37 | U23MCCX37 | Design and Documentation using ePLAN Electric P8 |

| | | |
|---|---|---|
| 38 | U23MCCX38 | Design of Biomedical Devices and Systems |
| 39 | U23MCCX39 | Digital Marketing |
| 40 | U23MCCX40 | Digital Signal Processing Development System |
| 41 | U23MCCX41 | DigSILENT Power Factory |
| 42 | U23MCCX42 | Electro Hydraulic Automation with PLC |
| 43 | U23MCCX43 | Embedded System using Arduino |
| 44 | U23MCCX44 | Embedded System using C |
| 45 | U23MCCX45 | Embedded System with IoT |
| 46 | U23MCCX46 | ePLAN Data Portal |
| 47 | U23MCCX47 | ePLAN Electric P8 |
| 48 | U23MCCX48 | ePLAN Fluid |
| 49 | U23MCCX49 | ePLAN PPE |
| 50 | U23MCCX50 | Fusion 360 |
| 51 | U23MCCX51 | Fuzzy Logic and Neural Networks |
| 52 | U23MCCX52 | Google Analytics |
| 53 | U23MCCX53 | Hydraulic Automation |
| 54 | U23MCCX54 | Industrial Automation |
| 55 | U23MCCX55 | Industry 4.0 |
| 56 | U23MCCX56 | Internet of Things |
| 57 | U23MCCX57 | Introduction to C Programming |
| 58 | U23MCCX58 | Introduction to C++ Programming |
| 59 | U23MCCX59 | IoT using Python |
| 60 | U23MCCX60 | Java Programming |
| 61 | U23MCCX61 | Machine Learning |
| 62 | U23MCCX62 | Machine Learning and Deep Learning |
| 63 | U23MCCX63 | Machine Learning for Medical Diagnosis |
| 64 | U23MCCX64 | Mechatronics |
| 65 | U23MCCX65 | Medical Robotics |
| 66 | U23MCCX66 | Microsoft Dynamics 365 ERP for HR , Marketing and Finance |
| 67 | U23MCCX67 | Mobile Edge Computing |
| 68 | U23MCCX68 | Modeling and Visualization using Micro station |
| 69 | U23MCCX69 | MX Road |
| 70 | U23MCCX70 | Photoshop |
| 71 | U23MCCX71 | PLC |
| 72 | U23MCCX72 | Pneumatics Automation |
| 73 | U23MCCX73 | Project Management |
| 74 | U23MCCX74 | Python Programming |
| 75 | U23MCCX75 | Revit Architecture |
| 76 | U23MCCX76 | Revit Inventor |
| 77 | U23MCCX77 | Revit MEP |
| 78 | U23MCCX78 | Robotics |
| 79 | U23MCCX79 | Search Engine Optimization |
| 80 | U23MCCX80 | Software Testing |

| | | |
|---|---|---|
| 81 | U23MCCX81 | Solar and Smart Energy System with IoT |
| 82 | U23MCCX82 | Solid Works |
| 83 | U23MCCX83 | Solid Works with Electrical Schematics |
| 84 | U23MCCX84 | Speech Processing |
| 85 | U23MCCX85 | STAAD PRO V8i |
| 86 | U23MCCX86 | Structural Design and Analysis using Bentley |
| 87 | U23MCCX87 | Total Station |
| 88 | U23MCCX88 | Video and Image Processing Development System |
| 89 | U23MCCX89 | VLSI Design |
| 90 | U23MCCX90 | Web Programming - I |
| 91 | U23MCCX91 | Web Programming - II |

## Annexure – IV

## EMPLOYABILITY ENHANCEMENT COURSES – (B) SKILL DEVELOPMENT COURSES

| Sl. No. | Course Code | Course Title |
|---|---|---|
| 1 | U23MCS301 | **Skill Development Course 1:** Demonstration in Engineering Practice Lab |
| 2 | **Skill Development Course 2** | |
| | U23MCS402 | 1) Excel for Statistical Approach |
| | U23MCS403 | 2) Training on Arduino |
| | U23MCS404 | 3) Computer Vision |
| 3 | **Skill Development Course 3** | |
| | U23MCS503 | 1) Power Transmission Systems |
| | U23MCS504 | 2) 3D Printing |
| | U23MCS505 | 3) Non-Destructive Testing |

# SEMESTER I

| Department | **Mathematics** | Programme : **B.Tech.** | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Semester | **I** | Course Category: **BS** | | | End Semester Exam Type: **TE** | | | |
| Course Code | **U23MATC01** | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **ENGINEERING MATHEMATICS – I** | **3** | **1** | **-** | **4** | **25** | **75** | **100** |

(Common to **All** Branches Except CSBS)

| Prerequisite | Basic Mathematics | |
|---|---|---|
| Course Outcome | **On completion of the course, the students will be able to** | BT Mapping (Highest Level) |
| | **CO1** Understand the concept of Eigen values and Eigen vectors, Diagonalization of a Matrix | **K3** |
| | **CO2** Solve higher order differential equations | **K3** |
| | **CO3** Understand the different types of partial differential equations | **K3** |
| | **CO4** Know about the Applications of double and triple integrals | **K2** |
| | **CO5** Gain the knowledge about Vector Calculus and its Applications | **K2** |

| **UNIT – I** | **Matrices** | **Periods:12** |
|---|---|---|
| Rank of a Matrix – Systems of Linear Equations – Characteristic equation – Cayley Hamilton Theorem – Eigen values and Eigen vectors of a real Matrix – Diagonalization of Matrices. | | **CO1** |
| **UNIT – II** | **Differential Equations (Higher Order)** | **Periods:12** |
| Linear Differential equations of higher order with constant coefficients - Euler's linear equation of higher order with variable coefficients – Method of Variation of parameters. | | **CO2** |
| **UNIT – III** | **Functions of Several Variables** | **Periods:12** |
| Partial derivatives - Total derivatives - Maxima and Minima of two variables - Lagrange's Method of multipliers. | | **CO3** |
| **UNIT – IV** | **Multiple Integrals** | **Periods:12** |
| Multiple Integrals - Change of order of integration (Cartesian form). Applications: Area as a double integral (Cartesian form) – Volume as a triple integral (Cartesian form). | | **CO4** |
| **UNIT – V** | **Vector Calculus** | **Periods:12** |
| Gradient - Divergence and Curl - Directional derivatives - Irrotational and Solenoidal vector fields - Properties (Statement only) - Gauss Divergence Theorem and Stoke's Theorem (without proofs). | | **CO5** |

| **Lecture Periods: 45** | **Tutorial Periods: 15** | **Practical Periods: -** | **Total Periods: 60** |
|---|---|---|---|

**Text Books**

1. M.K. Venkataraman, ¯Engineering Mathematics, The National Publishing Company, Madras, 2016.
2. N. P Bali and Manish Goyal, ¯A Text Book of Engineering Mathematics‖, Lkshmi Publications, New Delhi, 9th Edition, 2018.
3. S. Narayanan and Manicavachagom T.K. Pillay,‖ Differential Equations and Its Applications‖, Paperback, Viswanathan.S, Printers & Publishers Pvt Ltd, 2009.

**Reference Books**

1. Dr. G.Balaji, ¯Matrices and Calculus (Engineering Mathematics-1)‖ Balaji Publication, Paperback, June 2021 Edition
2. Dr. A. Singaravelu, ¯Engineering Mathematics - I‖, Meenakshi publications, Tamil Nadu, 2019.
3. Erwin Kreyszig, ¯Advanced Engineering Mathematics ¯, Wiley, 10th Edition, 2019.
4. B.V.Ramana,‖ Higher Engineering Mathematics‖, Tata McGraw - Hill, New Delhi, 6th Edition, 2018.
5. C W. Evans, ¯Engineering Mathematics‖, A Programmed Approach, 3rd Edition, 2019.

**Web References**

1. http://www.yorku.ca/yaoguo/math1025/slides/chapter/kuttler-linearalgebra -slides- systems of equation-handout.pdf
2. http://www.math.cum.edu/~wn0g/2ch6a.pdf
3. https://nptel.ac.in/courses/122/104/122104017/
4. https://nptel.ac.in/courses/111/106/111106051/
5. https://nptel.ac.in/courses/111/108/111108081/

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| **1** | 3 | 2 | 1 | - | 2 | 1 | 1 | - | - | - | - | 1 | 3 | - | - |
| **2** | 3 | 2 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 3 | - | - |
| **3** | 3 | 2 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 3 | - | - |
| **4** | 3 | 2 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 3 | - | - |
| **5** | 2 | 2 | 1 | - | - | - | 1 | - | - | - | - | 1 | 3 | - | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

## Evaluation Methods

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 5 | 75 | 100 |

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

| Department | Physics / Chemistry | | | Programme : **B.Tech.** | | | |
|---|---|---|---|---|---|---|---|
| Semester | I | | | Course Category: **BS** | | End Semester Exam Type: **TE** | |
| Course Code | **U23BSTC01** | Periods/Week | | | Credit | Maximum Marks | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **PHYSICAL SCIENCE FOR ENGINEERS** | **3** | **-** | **-** | **3** | **25** | **75** | **100** |

(Common to **All** Branches)

| Prerequisite | Physics of 12th standard or equivalent / Chemistry of 12th standard or equivalent. |
|---|---|

| Course Outcome | **On completion of the course, the students will be able to** | | BT Mapping (Highest Level) |
|---|---|---|---|
| | **CO1** | Understand the basic of properties of magnetic, dielectric and superconductors. | **K2** |
| | **CO2** | Identify the wave nature of the particles, physical significance of wave functions | **K3** |
| | **CO3** | Understand the basic principles of laser and fiber optics communication | **K2** |
| | **CO4** | Understand and familiar with the water treatment. | **K2** |
| | **CO5** | Understand the electrode potential for its feasibility in electrochemical reaction and uses of various batteries. | **K2** |
| | **CO6** | Understand the specific operating condition under which corrosion occurs and suggest a method to control corrosion. | **K2** |

## SECTION A - PHYSICS

| **UNIT- I** | **Magnetic, Dielectric and Superconducting Materials** | **Periods:08** |
|---|---|---|
| Introduction to magnetic materials, Ferromagnetism- Domain theory-Types of energy-Hysteresis-Hard and Soft magnetic materials-ferrites-Dielectric materials-Typesof polarization – Langevin-Debye equation-Frequency effects on polarization-Dielectric breakdown- Ferroelectric materials-Superconducting materials and their properties. | | **CO1** |

| **UNIT- II** | **Quantum Mechanics** | **Periods:07** |
|---|---|---|
| Matter Waves - de Broglie Wavelength - Uncertainty Principle -Physical Significance of wave functions - Schrodinger wave Equation - Time Dependent - Time Independent - Application to Particle in a One Dimensional Box - Tunnel Diode. | | **CO2** |

| **UNIT- III** | **Laser and Fiber Optics** | **Periods:07** |
|---|---|---|
| Lasers - Principles of Laser - Spontaneous and Stimulated Emissions - Einstein's Coefficients - Population Inversion and Laser Action – components of laser - Types of Lasers - NdYAG, $CO_2$ laser, GaAs Laser Fiber Optics - Principle and Propagation of light in optical fiber - Numerical aperture and acceptance angle - Types of optical fibers (material, refractive index, mode) | | **CO3** |

## SECTION B – CHEMISTRY

| **UNIT- IV** | **Water and its treatment** | **Periods:08** |
|---|---|---|
| Water: Sources and impurities, Water quality parameters: Definition and significance of-color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD. Desalination of brackish water: Reverse osmosis-disadvantages of using hard water in boiler - Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and Calgon conditioning) and External treatment-Ion exchange demineralization and zeolite process. | | **CO4** |

| **UNIT- V** | **Electrochemical Cells and Storage Devices** | **Periods:08** |
|---|---|---|
| Galvanic cells, single electrode potential, standard electrode potential, electrochemical series. EMF of a cell and its measurement. Nernst equation. Electrolyte concentration cell. Reference electrodes-hydrogen, calomel andAg/AgCl. Batteries and fuel cells: Types of batteries - alkaline battery-lead storage battery- nickel-cadmium battery- fuel cell H2 -O2 fuel cell-applications. | | **CO5** |

| **UNIT- VI** | **Corrosion** | **Periods:07** |
|---|---|---|
| Corrosion -Introduction - factors - types - chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects - electrochemical protection - sacrificial anode method and impressed current cathodic method. Uses of inhibitors, metallic coating – anodic coating, cathodic coating. Metal cladding, Electroplating of Copper and electroless plating of nickel. | | **CO6** |

| **Lecture Periods: 45** | **Tutorial Periods: -** | **Practical Periods: -** | **Total Periods: 45** |
|---|---|---|---|

**Text Books**


1. V Rajendran, ―Engineering Physics‖, 2nd Edition, TMH, New Delhi 2011.
2. S.S Dara - ―A text book of Engineering Chemistry‖ - 15th Edition, 2021. S.Chand Publications.
3. C.Jain, Monica Jain, ‖ Engineering Chemistry‖‖ 17thEd. DhanpatRai Pub. Co., NewDelhi, (2015).


**Reference Books**


1. R.Murugeshan, ―Modern Physics‖, S. Chand &Co, New Delhi 2006.

2. William D Callister Jr., ¯Material Science and Engineering‖, 6th Edition, John Wiley and sons, 2009.
3. Jain & Jain ¯Engineering chemistry‖, 23rd Edition, DhanpatRai Publishing Company. 2022
4. Mars Fontana ¯Corrosion Engineering‖, July 2017
5. JinaRedlin, ¯Handbook of Electrochemistry‖, March 28, 2005

**Web References**

1. https://www.sciencedaily.com/terms/materials_science.htm.
2. https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers/materials science.html.
3. https://study.com/academy/lesson/semiconductors-superconductors-definition-properties.html
4. https://mechanicalc.com/reference/engineering-materials
5. http://ndl.ethernet.edu.et/bitstream/123456789/89589/1/%5BPerez_N.%5D_Electrochemistry_and_corrosion%28BookZZ.org%29.pdf

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| 2 | 3 | 2 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| 3 | 3 | 2 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| 4 | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 5 | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 5 | 75 | 100 |

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Dr.G.Balamuruga Mohan Kaj,M.Tech.,Ph.D.,
Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.

| Department | Computer Science and Engineering | | | Programme : B.Tech. | | | |
|---|---|---|---|---|---|---|---|
| Semester | I | Course Category: ES | | | End Semester Exam Type: TE | | |
| Course Code | U23CSTC01 | Periods/Week | | | Credit | Maximum Marks | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | PROGRAMMING IN C | 3 | - | - | 3 | 25 | 75 | 100 |

(Common to ALL Branches)

Prerequisite: Nil

| Course Outcome | On completion of the course, the students will be able to | BT Mapping (Highest Level) |
|---|---|---|
| CO1 | Comprehend the basics of Computers. | K2 |
| CO2 | Illustrate the concepts of control structures and looping. | K2 |
| CO3 | Implement programs using arrays and functions. | K3 |
| CO4 | Demonstrate programs using Structure and Pointers. | K3 |
| CO5 | Build the programs using Union and File management Operations. | K3 |

| UNIT - I | Introduction | Periods: 09 |
|---|---|---|
| Generation and Classification of Computers - Block Diagram of a Computer –Categories of Software – Network Structure - Number System – Binary – Decimal – Conversion – Algorithm – Pseudo code – Flow Chart | | CO1 |

| UNIT - II | C Programming Basics | Periods: 09 |
|---|---|---|
| Introduction to ‘ C’ Programming – Basic structure of a ‘C’ program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in ‘C’ – Managing Input and Output operations – Decision Making and Branching – Looping statements. | | CO2 |

| UNIT - III | Arrays and Functions | Periods: 09 |
|---|---|---|
| Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String- String operations – String Arrays. Simple programs- sorting- searching – matrix operations- Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion | | CO3 |

| UNIT - IV | Structure and Pointers | Periods: 09 |
|---|---|---|
| Structure Introduction – Structure definition – Structure declaration – Structure within a structure – Self Referential Structure. Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays -Pointer to Function – Pointer and Structure- Simple programs. | | CO4 |

| UNIT - V | Unions and Files | Periods: 09 |
|---|---|---|
| Union Introduction - Programs Using Structures and Unions – Introduction to File - File Operations - File Input and Output Functions - Random Access to Files - File System Functions - Command Line Arguments- Storage Classes - Pre-Processor Directives- Dynamic Memory Functions. | | CO5 |

| Lecture Periods: 45 | Tutorial Periods: | Practical Periods: - | Total Periods: 45 |
|---|---|---|---|

**Text Books**

1. Balagurusamy. E, “Programming in ANSI C”, Tata McGraw Hill, 8th Edition, 2019.
2. Yashvant Kanetkar, “Let us C”, BPB Publications, 16th Edition, 2017
3. Herbert Schildt,” C: The Complete Reference”, McGraw Hill, FourthEdition, 2014

**Reference Books**

1. Vikas B. Agarwal Jyoti P. Mirani, “Computer Fundamentals, Nirali Prakashan Aug-2019,
2. Ashok N Kamthane, “Computer Programming”, Pearson education, Second Impression,2012.
3. VikasVerma, “A Workbook on C “, Cengage Learning, Second Edition,2012.
4. P.Visu, R.Srinivasan and S.Koteeswaran, “Fundamentals of Computing and Programming”, Fourth Edition, Sri Krishna Publications, 2012.
5. PradipDev, ManasGhoush, “Programming in C”, Second Edition, Oxford University Press, 2011.

**Web References**

1. https://www.programiz.com/c-programming
2. https://www.geeksforgeeks.org/c-language-set-1-introduction/
3. https://www.tutorialspoint.com/cprogramming
4. https://www.assignment2do.wordpress.com/.../solution-programming-in-ansi-c
5. https://nptel.ac.in/courses/106/104/106104128/

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 2 | 1 | - | - | 3 | - | - | - | - | - | - | - | 3 | - | 3 |
| 2 | 2 | 1 | - | - | 3 | - | - | - | - | - | - | - | 3 | - | 3 |
| 3 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | - | 3 |
| 4 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | - | 3 |
| 5 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | - | 3 |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 5 | 75 | 100 |

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Dr.G.Balamuruga Mohan M.Tech.,Ph.D.,
Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.

| Department | Civil / Mechanical | | | Programme : **B.Tech.** | | | |
|---|---|---|---|---|---|---|---|
| Semester | I | | | Course Category: **ES** | | End Semester Exam Type: **TE** | |
| Course Code | **U23ESTC01** | Periods / Week | | | Credit | Maximum Marks | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **BASICS OF CIVIL AND MECHANICAL ENGINEERING** | **3** | **-** | **-** | **3** | **25** | **75** | **100** |

**(Common to ECE, EEE, ICE, MECH, Civil, Mechatronics Branches)**

| Prerequisite | Basic Science | |
|---|---|---|
| Course Outcome | **On completion of the course, the students will be able to** | BT Mapping (Highest Level) |
| | **CO1** Understand the types of buildings and materials. | **K2** |
| | **CO2** Summarize on the various components of buildings and surveying concepts | **K2** |
| | **CO3** Identify the various infrastructure facilities | **K2** |
| | **CO4** Familiarize the working principles of IC engines and automobile systems | **K2** |
| | **CO5** Understand about the power generation systems and its components | **K2** |
| | **CO6** Acquire knowledge about the various machining process. | **K2** |

**SECTION A - CIVIL ENGINEERING**

| **UNIT - I** | **Buildings and Buildings Materials** | **Periods: 08** |
|---|---|---|
| Buildings – Definition – Classification according to NBC-plinth area, Floor area, carpet area, floor space index - Development of Smart cities - Green building, Benefits from green building. Building Materials - stone, brick, cement, cement mortar, concrete, steel, Timber - their properties and uses | | **CO1** |
| **UNIT - II** | **Buildings Components and Surveying** | **Periods: 08** |
| Various Buildings Components and their functions. Foundation: function and types - Brick masonry, Stone Masonry and its types – Floors, Roofs and its types. Surveying: Objects – Classification – Principles – Measurements of Distances and areas -Leveling | | **CO2** |
| **UNIT - III** | **Basic Infrastructure** | **Periods: 07** |
| Roads and Bridges – types, components advantage and disadvantages. Railways - Permanent way and its elements. Sources of Water - Quality of Water- Domestic sewage Treatment – Rain Water harvesting – Dams - site selection for dam construction, types of dams. | | **CO3** |

**SECTION B – MECHANICAL ENGINEERING**

| **UNIT- IV** | **Internal and External Combustion Systems** | **Periods: 08** |
|---|---|---|
| IC engines - Classification - Working principles - Diesel and Petrol Engines: Two stroke and four stroke engines - merits and demerits.<br>Steam generators (Boilers) - Classification - Constructional features (of only low-pressure boilers) - Boiler mountings and accessories - Merits and demerits - Applications. | | **CO4** |
| **UNIT- V** | **Power Generation Systems, Refrigeration and Air Conditioning System** | **Periods: 07** |
| Power plants: Thermal - Nuclear, Hydraulic, Solar, Wind, Geothermal, Wave, Tidal and Ocean Thermal Energy Conversion systems - Functions, Applications - Schemes and layouts (Description only)<br>Refrigeration and Air Conditioning System: Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner. | | **CO5** |
| **UNIT- VI** | **Manufacturing Process** | **Periods: 07** |
| Lathe - types, Specifications, Operations of a centre lathe. Casting - Pattern making, Allowances, Green sand and dry sand moulding, casting defects. Welding - Arc and Gas welding process, brazing and soldering (process description only). | | **CO6** |

| **Lecture Periods: 45** | **Tutorial Periods: -** | **Practical Periods: -** | **Total Periods: 45** |
|---|---|---|---|

**Text Books**

1. Dr. S. Jayakumar, ―Basic Civil Engineering‖, Aagash Nekaa Publications, 2011
2. G Shanmugam, MS Palanichamy, Basic Civil and Mechanical Engineering, McGraw Hill Education, 1st Edition, 2018.
3. Palanikumar, K. Basic Mechanical Engineering, ARS Publications, 2010.

**Reference Books**

1. M.P. Poonia, S.C. Sharma and T.R. Banga, Basic Mechanical Engineering, Khanna Publishing House 2018.
2. S.S.Bhavikatti, Basic Civil engineering, New Age International Ltd. 2018.

3. V. Rameshbabu, Basic Civil & Mechanical Engineering, VRB Publishers Private Limited, January 2017.
4. Serope Kalpakjian, Steven Schmid, Manufacturing Engineering and Technology, 7th Edition, Pearson Publication, 2014.
5. Gopi Satheesh, Basic Civil engineering, Pearson Publications, 3rd Edition, 2015.

**Web References**

1. https://nptel.ac.in/courses/112107291/
2. https://nptel.ac.in/courses/112/103/112103262/
3. https://ocw.mit.edu/courses/mechanical-engineering/2-61-internal-combustion-engines-spring-2017/ lecture-notes/
4. https://nptel.ac.in/courses/105102088/
5. https://nptel.ac.in/courses/105104101/

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 1 | 1 | - | 1 | - | - | - | - | - | - | 1 | - | - | - |
| 2 | 3 | 1 | 1 | - | 1 | - | - | - | - | - | - | 1 | - | - | - |
| 3 | 3 | 1 | 1 | - | 1 | - | - | - | - | - | - | 1 | - | - | - |
| 4 | 3 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 5 | 3 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | - | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 5 | 75 | 100 |

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Dr.G.Balamuruga Mohan Kay,M.Tech.,Ph.D.,
Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.

| Department | Mechanical Engineering | | | Programme : B.Tech. | | | | |
|---|---|---|---|---|---|---|---|---|
| Semester | I | | | Course Category: ES | | | End Semester Exam Type: TE | |
| Course Code | U23ESTC02 | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | ENGINEERING MECHANICS | 2 | 1 | - | 3 | 25 | 75 | 100 |

(Common to EEE, ECE, MECH, CIVIL, Mechatronics Branches)

| Prerequisite | Engineering Physics | |
|---|---|---|
| Course Outcome | **On completion of the course, the students will be able to** | BT Mapping (Highest Level) |
| | **CO1** Recognize the basics of equilibrium of particles in 2D and 3D | **K2** |
| | **CO2** Review the requirements of equilibrium of rigid bodies in 2D and 3D. | **K2** |
| | **CO3** Solve problem related to friction force. | **K3** |
| | **CO4** Compute the center of mass and moment of inertia of surfaces and solids. | **K3** |
| | **CO5** Predict displacement, velocity and acceleration of dynamic particles. | **K3** |

| **UNIT- I** | **Basics and Statics of Particles** | **Periods: 09** |
|---|---|---|
| Introduction - Units and Dimensions - Vectorial representation of forces and moments – Coplanar Forces - Lami's theorem, Parallelogram and triangular Law of forces -Resolution of forces - Equilibrium of a particle - Principle of transmissibility - Equivalent system of force - Free body diagram | | **CO1** |

| **UNIT- II** | **Equilibrium of Rigid Bodies** | **Periods: 09** |
|---|---|---|
| Types of supports and their reactions -requirements of stable equilibrium - Moments and Couples - Moment of a force about a point and about an axis -Vectorial representation of moments and couples - Scalar components of a moment - Varignon's theorem -Equilibrium of Rigid bodies in two dimensions – Forces in space -Equilibrium of a particle in space - Equivalent systems of forces - Equilibrium of Rigid bodies in three dimensions (Descriptive only). | | **CO2** |

| **UNIT - III** | **Structural Analysis of Trusses and Friction** | **Periods: 09** |
|---|---|---|
| Trusses - Definition of a truss - Simple Trusses - Analysis of Trusses - Method of joints - Method of sections - Friction force - Laws of sliding friction - equilibrium analysis of simple systems with sliding friction -wedge friction- Rolling resistance. | | **CO3** |

| **UNIT - IV** | **Properties of Surfaces and Solids** | **Periods: 09** |
|---|---|---|
| Determination of centroid of areas, volumes and mass - Pappus and Guldinus theorems - moment of inertia of plane and areas- Parallel axis theorem and perpendicular axis theorem, radius of gyration of area- product of inertia- mass moment of inertia. | | **CO4** |

| **UNIT - V** | **Dynamics of Particles** | **Periods: 09** |
|---|---|---|
| Displacements, Velocity and acceleration, their relationship - Relative motion - Curvilinear motion - Newton's law - Work Energy Equation of particles -Impulse and Momentum -Impact of elastic bodies. | | **CO5** |

| **Lecture Periods: 30** | **Tutorial Periods: 15** | **Practical Periods: -** | **Total Periods: 45** |
|---|---|---|---|

**Text Books**

1. Beer, and Johnston Jr. E.R. ―Vector Mechanics for Engineers‖, McGraw-Hill Education India Pvt Ltd., 11th Edition, 2016.
2. J.L. Meriam & L.G. Karidge, Engineering Volume I and Engineering Mechanics: Dynamics, 8th edition, Wiley student edition, 2016.
3. R.C, Hibbeller, ―Engineering Mechanics‖, Prentice Hall, 14th edition, 2016.

**Reference Books**

1. Arthur P. Boresi and Richard J. Schmidt, ―Engineering Mechanics: Statics and Dynamics‖, Thomson Asia Private Limited, Singapore, 2010.
2. D.P.Sharma ―Engineering Mechanics‖, Dorling Kindersley India Pvt. Ltd, New Delhi, 2010
3. S.Rajasekaran, Sankarasubramanian, G., Fundamentals of Engineering Mechanics, Vikas Publishing House Pvt., Ltd., 2012.
4. S.S.Bhavikatti and K.G. Rajashekarappa, Engineering Mechanics, New Age International(P) Ltd, New Delhi, 7th Edition, 2019.
5. Dr.I.SGujral, ―Engineering Mechanical‖ second edition, Lakshmi Publication (P), Ltd., 2011.

**Web References**

1. http://nptel.iitm.ac.in/video.php?subjectId=112103108
2. http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/Engineeringmechanics/Table of Contents.html

| | |
|---|---|
| 3. | https://nptel.ac.in/courses/112/106/112106286/ |
| 4. | https://www.coursera.org/learn/engineering-mechanics-statics |
| 5. | https://nptel.ac.in/courses/122/104/122104014/ |

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 2 | 2 | 3 | - | - | - | - | - | - | - | 1 | 2 | - | 2 |
| 2 | 3 | 2 | 2 | 3 | - | - | - | - | - | - | - | 1 | 2 | - | 2 |
| 3 | 3 | 2 | 2 | 3 | - | - | - | - | - | - | - | 1 | 2 | - | 2 |
| 4 | 3 | 2 | 2 | 3 | - | - | - | - | - | - | - | 1 | 2 | - | 2 |
| 5 | 3 | 2 | 2 | 3 | - | - | - | - | - | - | - | 1 | 2 | - | 2 |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 5 | 75 | 100 |

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Dr.G.Balamuruga Mohan Raj, M.Tech.,Ph.D.,
Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.

| Department | English | | | Programme : B.Tech. | | | | |
|---|---|---|---|---|---|---|---|---|
| Semester | I | | | Course Category: HS | | End Semester Exam Type: TE | | |
| Course Code | U23ENBC01 | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | COMMUNICATIVE ENGLISH - I | 2 | - | 2 | 3 | 50 | 50 | 100 |

(Common to ALL Branches except CSBS)

| Prerequisite | Basics of English Language | |
|---|---|---|
| Course Outcome | On completion of the course, the students will be able to | BT Mapping (Highest Level) |
| | CO1 Understand the communication flow in organization and its objectives | K2 |
| | CO2 Write the technical contents with grammatically precise sentences | K2 |
| | CO3 Articulate with correct pronunciation and overcome vernacular impact in speaking | K3 |
| | CO4 Express opinions confidently in formal and informal communicative contexts | K2 |
| | CO5 Attend interview with assertiveness | K3 |

| UNIT- I | Workstead Communication | Periods: 10 |
|---|---|---|
| Communication, Definition, Process, Channels, Barriers, Strategies for Effective Communication, Verbal and Nonverbal Communication - Listening, Types, Barriers, Enhancing Listening Skills - Bibliography: Book, Journal and Internet References | | CO1 |

| UNIT- II | Common Errors In Writing And Comprehension Strategies | Periods: 10 |
|---|---|---|
| Subject Verb Agreement, Misplaced Modifiers, Squinting Modifiers, Dangling Modifier, Fused Sentence, Comma Splice, Sentence Fragment - Reading Comprehension: Technical passage, Strategies: Skimming, Scanning, Intensive and Extensive Reading, Prediction, and Contextual Meaning | | CO2 |

| UNIT- III | Phonetics | Periods: 10 |
|---|---|---|
| Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non-silent Letters, Intonation, Spelling Rules and Words often misspelled, Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue | | CO3 |

| UNIT- IV | Communication Practice - I | Periods: 15 |
|---|---|---|
| **List of Exercises**<br>**Listening**: Self Introduction videos<br>**Speaking**: Self-Introduction, Extempore, and Role Play<br>**Reading**: Non-Technical Comprehension Passage<br>**Writing:** Common Errors in Writing | | CO4 |

| UNIT- V | Interpersonal Communication - I | Periods: 15 |
|---|---|---|
| **List of Exercises**<br>**Listening:** Speech Sounds, Interview Videos<br>**Speaking**: Debate, Structured Group Discussion, and Conversation<br>**Reading**: Commonly Confused Words<br>**Writing:** Transcription | | CO5 |

| Lecture Periods: 30 | Tutorial Periods: - | Practical Periods: 30 | Total Periods: 60 |
|---|---|---|---|

**Text Books**

1. Richa Mishra , RatnaRao, “A textbook of English Language Communication Skills”, Macmillan Publishers India Private Ltd., Revised Edition 2021.
2. Rizvi M. Ashraf, “Effective Technical Communication”, New Delhi: Tata-McGraw-Hill Publishing Company Limited, 4th Edition, 2010.
3. Balasubramanian T, “English Phonetics for Indian students workbook”, 2nd Edition, Trinity Press, 2016.

**Reference Books**

1. N.P.Sudharshana, C. Savitha,” English for Engineers”, Cambridge University Press, 2018.
2. Raman, Meenakshi, and Sharma, Sangeetha, “Technical Communication - Principles and Practice”, 3rd Edition, Oxford University Press, 2017.
3. Comfort, Jeremy,etal., “Speaking Effectively: Developing Speaking Skills for Business English”, Cambridge University Press, Cambridge, Reprint 2011.
4. Wren & Martin, “High School English Grammar and Composition”, S Chandh &Co. Ltd, 2015.
5. Boove, Courtland L, “Business Communication Today”, Pearson Education, New Delhi, 2002.

**Web References**

| | |
|---|---|
| 1. | https://lemongrad.com/subject-verb-agreement-rules/ |
| 2. | https://opentextbc.ca/advancedenglish/chapter/misplaced-and-dangling-modifiers/ |
| 3. | https://www.hitbullseye.com/Reading-Comprehension-Tricks.php |
| 4. | https://www.softwaretestinghelp.com/how-to-crack-the-gd/ |
| 5. | https://worldscholarshipvault.com/neutralize-mother-tongue-interference/ |

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |
| 2 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |
| 3 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |
| 4 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |
| 5 | 1 | - | - | - | - | - | - | - | 1 | 3 | - | 1 | - | - | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Theory | | | | | | |
|---|---|---|---|---|---|---|
| Assessment | Continuous Assessment Marks (CAM) | | | | End Semester Examination (ESE) Marks | Total Marks |
| | CAT 1 | CAT 2 | Model Exam | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 75 | 60 |
| | 20 ( to be weighted for 10 marks) | | | | (to be weighted for 50 marks) | |

| Practical | | | | |
|---|---|---|---|---|
| Continuous Assessment Internal Evaluation | | End Semester Internal Evaluation | | Total Marks |
| 30 (to be weighted for 10 marks) | | 30 marks | | 40 |
| Listening (L)* | 10 | Listening (L)* | 10 | |
| Speaking(S) | 5 | Speaking(S) | 5 | |
| Reading(R)* | 10 | Reading(R)* | 10 | |
| Writing(W)* | 5 | Writing(W)* | 5 | |

- **LRW components of Practical can be evaluated through Language Lab Software**

| Department | Mechanical | | | Programme : B.Tech. | | | |
|---|---|---|---|---|---|---|---|
| Semester | I | Course Category: ES | | | End Semester Exam Type: LE | | |
| Course Code | U23ESPC03 | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | ENGINEERING GRAPHICS USING AUTOCAD | - | - | 2 | 1 | 50 | 50 | 100 |

(Common to all Branches)

| Prerequisite | Nil | |
|---|---|---|
| Course Outcome | On completion of the course, the students will be able to | BT Mapping (Highest Level) |
| | CO1 Familiarize with the fundamentals and standards of engineering graphics. | K3 |
| | CO2 Perform drawing of basic geometrical constructions and multiple views of objects. | K2 |
| | CO3 Visualize the isometric and perspective sections of simple solids. | K3 |
| | CO4 Connect side view associate on front view. | K4 |
| | CO5 Correlate sectional views and lateral surface developments of various solids. | K4 |

**List of Experiments**

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing a Title Block with necessary text and projection symbol.
3. Drawing 2D sketch by applying modify tools like fillet, mirror, array, etc.,
4. Drawing front view and top view of simple solids like prism, pyramid, cylinder, cone, etc., and Dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. Simple stool, V-block, Mixie Base).
6. Drawing a plan of residential building (Two bed rooms, kitchen, hall, etc.)
7. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
8. Drawing lateral surface development of prism, pyramid, cylinder, cone, etc,
9. Drawing isometric projection of simple objects.
10. Creating 3D model of simple object and obtaining 2D multi-view drawings.
11. Note: Plotting of drawings must be made for each exercise and attached to the records written by Students.

| Lecture Periods: - | Tutorial Periods: - | Practical Periods: 30 | Total Periods: 30 |
|---|---|---|---|

**Reference Books**

1. James D. Bethune, Engineering Graphics with AutoCAD A Spectrum book 1st Edition, Macromedia Press, Pearson, 2020.
2. NS Parthasarathy and Vela Murali, Engineering Drawing, Oxford university press, 2015.
3. M.B Shah, Engineering Graphics, ITL Education Solutions Limited, Pearson Education Publication, 2011.
4. Bhatt N.D and Panchal V.M, Engineering Drawing: Plane and Solid Geometry, Charotar Publishing House, 2017.
5. Jeyapoovan T, Engineering Drawing and Graphics Using AutoCAD, Vikas Publishing House Pvt Ltd., 7th Edition, New Delhi, 2016.
6. C M Agrawal, Basant Agrawal, Engineering Graphics, McGraw Hill, 2012.
7. Dhananjay A. Jolhe, Engineering Drawing: With An Introduction To CAD McGraw Hill, 2016.
8. James Leach, AutoCAD 2017 Instructor, SDC Publications, 2016.

**Web References**

1. http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php
2. http://www.nptelvideos.in/2012/12/computer-aided-design.html
3. https://mech.iitm.ac.in/meiitm/course/cad-in-manufacturing/
4. https://autocadtutorials.com
5. https://dwgmodels.com

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 2 | 3 | 3 | 3 |
| 2 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 3 | 3 | 3 | 3 |
| 3 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 3 | 3 | 3 | 3 |
| 4 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 2 | 3 | 3 | 3 |
| 5 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 3 | 3 | 3 | 3 |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | Performance in practical classes | | | Model Practical Examination | Attendance | | |
| | Conduction of practical | Record work | viva | | | | |
| Marks | 15 | 5 | 5 | 15 | 10 | 50 | 100 |

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| Department | Mechatronics | | | Programme: B.Tech. | | | |
|---|---|---|---|---|---|---|---|
| Semester | I | Course Category: ES | | | End Semester Exam Type: LE | | |
| Course Code | U23CSPC01 | Periods/Week | | | Credit | Maximum Marks | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | PROGRAMMING IN C LABORATORY | - | - | 2 | 1 | 50 | 50 | 100 |

(Common to All Branches)

| Prerequisite | Nil | |
|---|---|---|
| Course Outcome | On completion of the course, the students will be able to | BT Mapping (Highest Level) |
| CO1 | Implement logical formulations to solve simple problems leading to specific applications. | K3 |
| CO2 | Execute C programs for simple applications making use of basic constructs, arrays and strings. | K3 |
| CO3 | Experiment C programs involving functions, recursion, pointers, and structures. | K3 |
| CO4 | Demonstrate applications using sequential and random access file processing. | K3 |
| CO5 | Build solutions for online coding challenges. | K3 |

**List of Experiments**

1. Write a C program to find the Area of the triangle.
2. Develop a C program to read a three digit number and produce output like

   1 hundreds

   7 tens

   2 units

   For an input of 172.
3. Write a C program to check whether a given character is vowel or not using Switch – Case statement.
4. Write a C program to Print the numbers from 1 to 10 along with their squares.
5. Demonstrate do—While loop in C to find the sum of 'n' numbers.
6. Find the factorial of a given number using Functions in C.
7. Write a C program to check whether a given string is palindrome or not?
8. Write a C program to check whether a value is prime or not?
9. Develop a C program to swap two numbers using call by value and call by reference.
10. Construct a C program to find the smallest and largest element in an array.
11. Implement matrix multiplication using C program.
12. Write a C program to perform various string handling functions like strlen, strcpy, strcat, strcmp.
13. Develop a C program to remove all characters in a string except alphabets.
14. Write a C program to find the sum of an integer array using pointers.
15. Write a C program to find the Maximum element in an integer array using pointers.
16. Construct a C program to display Employee details using Structures
17. Write a C program to display the contents of a file on the monitor screen.
18. Write a File by getting the input from the keyboard and retrieve the contents of the file using file operation commands.
19. Write a C program to create two files with a set of values. Merge the two file contents to form a single file
20. Write a C program to pass the parameter using command line arguments.

| Lecture Periods: - | Tutorial Periods: - | Practical Periods: 30 | Total Periods: 30 |
|---|---|---|---|

**Reference Books**

1. Zed A Shaw," Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (Like C)", Addison Wesley,2016.
2. Anita Goel and Ajay Mittal," Computer Fundamentals and programming in C", Pearson Education, First edition, 2011.
3. Maureen Sprankle, Jim Hubbard," Problem Solving and Programming Concepts," Pearson,9th Edition, 2011.
4. Yashwanth Kanethkar, "Let us C", BPB Publications,13th Edition,2008.
5. B.W.Kernighan and D.M. Ritchie, "The C Programming Language", Pearson Education, 2nd Edition, 2006.

**Web References**

1. https://alison.com/course/introduction-to-c-programming
2. https://www.geeksforgeeks.org/c-programming-language/
3. http://cad-lab.github.io/cadlab_data/files/1993_prog_in_c.pdf
4. https://www.tenouk.com/clabworksheet/clabworksheet.html
5. https://fresh2refresh.com/c-programming/

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| **1** | 2 | 1 | - | - | 3 | - | - | - | - | - | - | - | 3 | - | 3 |
| **2** | 2 | 1 | - | - | 3 | - | - | - | - | - | - | - | 3 | - | 3 |
| **3** | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | - | 3 |
| **4** | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | - | 3 |
| **5** | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | - | 3 |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | Performance in practical classes | | | Model Practical Examination | Attendance | | |
| | Conduction of practical | Record work | viva | | | | |
| Marks | 15 | 5 | 5 | 15 | 10 | 50 | 100 |

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| Department | Mechanical Engineering | | | | Programme : B.Tech. | | | |
|---|---|---|---|---|---|---|---|---|
| Semester | I | | | | Course Category: ES | | End Semester Exam Type: LE | |
| Course Code | U23ESPC02 | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | DESIGN THINKING AND IDEA LAB | - | - | 2 | 1 | 50 | 50 | 100 |
| (Common to ALL Branches) | | | | | | | | |
| Prerequisite | Basic Knowledge of Science | | | | | | | |

| Course Outcome | On completion of the course, the students will be able to | BT Mapping (Highest Level) |
|---|---|---|
| CO1 | Demonstrate a comprehensive understanding of the tools and inventory associated with the IDEA Lab. | K2 |
| CO2 | Develop proficiency in ideation techniques to generate creative and innovative solutions for various design challenges and problems | K3 |
| CO3 | Acquire practical knowledge of mechanical and electronic fabrication processes, including hands-on experience with machinery, tools, and techniques used in the manufacturing and assembly of physical components. | K3 |
| CO4 | Cultivate the skills necessary for developing innovative and desirable products, including the ability to integrate user needs, market trends, and technological advancements into the design process. | K4 |
| CO5 | Apply iterative design methodologies to refine and improve solutions based on feedback, user testing, and evaluation of functional, aesthetic, and usability aspects | K4 |

**Design process:** Traditional design, Design thinking, Existing sample design projects, Study on designs around us, Compositions/structure of a design, Innovative design: Breaking of patterns, Reframe existing design problems, Principles of creativity Empathy: Customer Needs, Insight-leaving from the lives of others/standing on the shoes of others, Observation

**Design team-Team formation, Conceptualization:** Visual thinking, Drawing/sketching, New concept thinking, Patents and Intellectual Property, Concept Generation Methodologies, Concept Selection, Concept Testing, Opportunity identification Prototyping: Principles of prototyping, Prototyping technologies, Prototype using simple things, Wooden model, Clay model, 3D printing; Experimenting/testing.

Sustainable product design, Ergonomics, Semantics, Entrepreneurship/business ideas, Product Data Specification, Establishing target specifications, Setting the final specifications. Design projects for teams.

**List of Lab Activities and Experiments**

1. Schematic and PCB layout design of a suitable circuit, fabrication and testing of the circuit.
2. Machining of 3D geometry on soft material such as softwood or modelling wax.
3. 3D scanning of computer mouse geometry surface. 3D printing of scanned geometry using FDM or SLA printer.
4. 2D profile cutting of press fit box/casing in acrylic (3 or 6 mm thickness)/cardboard, MDF (2 mm) board using laser cutter & engraver.
5. 2D profile cutting on plywood /MDF (6-12 mm) for press fit designs.
6. Familiarity and use of welding equipment.
7. Familiarity and use of normal and wood lathe.
8. Embedded programming using Arduino and/or Raspberry Pi.
9. Design and implementation of a capstone project involving embedded hardware, software and machined or 3D printed enclosure.
10. Discussion and implementation of a mini project.
11. Documentation of the mini project (Report and video).

| Lecture Periods: - | Tutorial Periods: - | Practical Periods: 30 | Total Periods: 30 |
|---|---|---|---|

**Text Books**

1. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins Publishers Ltd
2. Workshop / Manufacturing Practices (with Lab Manual), Khanna Book Publishing.

**Reference Books**

1. Ulrich and Eppinger, Product Design and Development, 3rd Edition, McGraw Hill, 2004
2. The Big Book of Maker Skills: Tools & Techniques for Building Great Tech Projects. Chris Hackett. Weldon Owen; 2018.
3. The Total Inventors Manual (Popular Science): Transform Your Idea into a Top-Selling Product. Sean Michael Ragan, Weldon Owen; 2017.
4. The Art of Electronics. 3rd edition. Paul Horowitz and Winfield Hill. Cambridge University Press.
5. Practical Electronics for Inventors. 4th edition. Paul Sherz and Simon Monk. McGraw Hill.
6. Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards. Simon Monk and Duncan Amos. McGraw Hill Education.
7. Programming Arduino: Getting Started with Sketches. 2nd edition. Simon Monk. McGraw Hill.
8. Venuvinod, PK., MA. W., Rapid Prototyping – Laser Based and Other Technologies, Kluwer
9. Chapman W.A.J, "Workshop Technology", Volume I, II, III, CBS Publishers and Distributors, 5th Edition,2002.

**Web References**

1. https://onlinecourses.nptel.ac.in/noc23_mg72

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 2 | 2 | 2 | 2 | 2 | - | - | 2 | - | 3 | 2 | - | - | - |
| 2 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | 2 | - | 3 | 2 | - | - | - |
| 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | 2 | - | 3 | 2 | - | - | - |
| 4 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | 2 | - | 3 | 2 | - | - | - |
| 5 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | 2 | - | 3 | 2 | - | - | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | Performance in Practical classes | | | Model Practical Examination | Attendance | | |
| | Conduction of Practical | Record work | viva | | | | |
| Marks | 15 | 5 | 5 | 15 | 10 | 50 | 100 |

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Madagadipet, Puducherry-605 107.

| Department | Mechatronics | | | | Programme: B.Tech. | | | |
|---|---|---|---|---|---|---|---|---|
| Semester | I | | | | Course Category: MC | | End Semester Exam Type: - | |
| Course Code | U23MEMC01 | Periods / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | INDUCTION PROGRAMME | - | - | - | Non-Credit | - | - | - |
| Prerequisite | - | | | | | | | |

| Course Outcome | The course will enable the student to | BT Mapping (Highest Level) |
|---|---|---|
| CO1 | Develop holistic attitude and harmony in the individual, family, and Society | K2 |
| CO2 | Acquire grammar skills and capable to write and speak English confidently | K2 |
| CO3 | Understand the basic concepts in Mathematics and Programming | K2 |
| CO4 | Know about the art and culture, language and literature of this vast secular nation | K2 |
| CO5 | Identify the inherent talent and develop it professionally | K3 |

| UNIT- I | Universal Human Values | Periods: 12 |
|---|---|---|

Welcome and Introductions - Getting to know each other, Aspirations and Concerns - Individual Academic and Career, Expectations of Family, Peers, Society, Nation, Fixing one's Goals, Self-Management - Self-confidence, Peer Pressure, Time Management, Anger, Stress Personality Development, Self-improvement, Health - Health issues, Healthy diet, Healthy lifestyle, Hostel life, Relationships - Home sickness, Gratitude towards Parents, Teachers and others Ragging and interaction, Competition and Cooperation, Peer Pressure, Society - Participation in Society, Natural Environment - Participation in Nature, Sum Up - Role of Education, Need for a Holistic Perspective, Self-evaluation and Closure - Sharing and feedback. **CO1**

| UNIT- II | Proficiency in English | Periods: 12 |
|---|---|---|

Communication skills - Prognostic test on Grammar - Synonyms, Antonyms, Tenses, Sentence Completion, Idioms and Phrases, One- word Substitution, Homophones, Homonyms, Use of Prepositions, Subject-verb Agreement - Writing - Paragraph writing, Letter writing, Essay writing, Story Development. **CO2**

| UNIT- III | Bridge Course in Mathematics and C Programming | Periods: 12 |
|---|---|---|

**Mathematics:**

Fundamentals of differential and integral calculus: Theory and Practice, Limit of function - Fundamental results on limits - Continuity of a function - Concept of differentiation - Concept of derivative - Slope of a curve -Differentiation Techniques - Derivatives of elementary functions from first principle - Derivatives of inverse functions - Logarithmic differentiation - Method of substitution - Differentiation of parametric functions -Differentiation of implicit functions - Higher order derivatives. Integrals of functions containing linear functions -Method of integration (Decomposition method, method of substitution, integration by parts) - Definite integrals. Simple definite integrals - Properties of Definite integrals - Reduction formulae - Area and volume - Length of curve - surface area of a solid.

**C Programming:**

Features of C and its basic Structure - Keywords - constants - variables - operators - Data types - Formatted input and output statements - Control and Looping statement - Arrays - Functions - Strings - writing simple C programs. **CO3**

| UNIT- IV | Literary activities | Periods: 12 |
|---|---|---|

Team building activities - Quiz - Oral Exercises - Group discussion, Debate, Extempore, Role play, சிறப்பு சொற்பொழிவு - தமிழர் மரபு மற்றும் தமிழர் தொழில்நுட்பம். **CO4**

| UNIT- V | Creative arts | Periods: 12 |
|---|---|---|

Introduction to painting and renowned artworks - Documentary and Short films - Music - Vocal, Instrumental - Dance - Classical, Cinematic - Mimicry - Mime. **CO5**

| Lecture Periods: 60 | Tutorial Periods: - | Practical Periods: - | Total Periods: 60 |
|---|---|---|---|

**Reference Books**

1. R.R Gaur, R. Asthana, G.P. Bagaria," A Foundation Course in Human Values and Professional Ethics", Excel Books, New Delhi, 2nd Revised Edition, 2019.
2. Kumar Mohan R, "English Grammar for all (Functional and Applied Grammar)", Unicare Academy, 2022.
3. Seely, John," Oxford A-Z of Grammar and Punctuation, Oxford Publication, 2013.
4. B.V. Ramana," Higher Engineering Mathematics", Tata McGraw – Hill, New Delhi, 6th Edition, 2018.
5. Dr. A. Singaravelu, "Engineering Mathematics - I", Meenakshi publications, Tamil Nadu, 2019.
6. E. Balagurusamy, "PROGRAMMING IN ANSI C", Mc Graw Hill, 8th Edition, 2019.
7. Dr.K.K.Pillay,"Social Life of Tamils", A joint publication of TNTB & ESC and RMRL
8. R.Balakrishnan, "Journey of Civilization",Roja muthiah research publishers, 1st Edition 2019
9. தமிழக வரலாறு - மக்களும் பண்பாடும், பிள்ளை, கே. கே. , சென்னை : உலகத் தமிழாராய்ச்சி நிறுவனம் , 2002.
10. கணினித்தமிழ் - முனைவர் இல.சுந்தரம், விகடன் பிரசுரம்.
11. கீழடி - வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம், தமிழக தொல்லியல் துறை

**Web References**

1. http://www.newsociety.com/Books/S/Slow-isBeautiful
2. https://www.aplustopper.com/formal-letter/
3. https://www.javatpoint.com/c-programming-language-tutorial
4. http://www.math.cum.edu/~wn0g/2ch6a.pdf
5. https://education.nsw.gov.au/teaching-and-learning/curriculum/creative-arts

# SEMESTER II

| Department | Mathematics | | | Programme : B.Tech. | | | |
|---|---|---|---|---|---|---|---|
| Semester | II | | | Course Category: BS | | End Semester Exam Type: TE | |
| Course Code | U23MATC02 | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | ENGINEERING MATHEMATICS – II | 3 | 1 | - | 4 | 25 | 75 | 100 |

(Common to **ALL** Branches Except CSBS, FT)

Prerequisite: Basic Mathematics

| Course Outcome | On completion of the course, the students will be able to | BT Mapping (Highest Level) |
|---|---|---|
| CO1 | Convert a periodic function into series form. | K2 |
| CO2 | Compute Fourier transforms of various functions. | K3 |
| CO3 | Solve Differential Equations using Laplace transforms. | K3 |
| CO4 | Apply inverse Laplace transform of simple functions. | K3 |
| CO5 | Solve difference equations using Z - transforms. | K3 |

| UNIT - I | Fourier Series | Periods:12 |
|---|---|---|
| Dirichlet's conditions – General Fourier series – Odd and Even functions – Half-Range sine series and cosine series – Change of intervals – Parseval's Identity. | | CO1 |

| UNIT - II | Fourier Transforms | Periods:12 |
|---|---|---|
| Fourier Transforms and its inverse – Properties of Fourier Transform (without proof) – Fourier sine and cosine Transforms and their properties (excluding proof). | | CO2 |

| UNIT - III | Laplace Transforms | Periods:12 |
|---|---|---|
| Laplace transforms of elementary functions and Periodic functions – Basic properties (excluding proof) – Laplace transforms of derivatives and integrals – Initial and final value theorems. | | CO3 |

| UNIT - IV | Inverse Laplace Transforms | Periods:12 |
|---|---|---|
| Definition of inverse Laplace Transforms – Convolution theorem (excluding proof) – Solutions of Linear Ordinary Differential Equations of second order with constant coefficients. | | CO4 |

| UNIT - V | Z - Transforms | Periods:12 |
|---|---|---|
| Z-transforms – Elementary Properties – Inverse Z-transforms (using partial fraction and Residues) – Solution of difference equations using Z - transform. | | CO5 |

| Lecture Periods:45 | Tutorial Periods: 15 | Practical Periods: - | Total Periods: 60 |
|---|---|---|---|

**Text Books**

1. T. Veerarajan, "Engineering Mathematics", Tata McGraw Hill, New Delhi, 3rd Edition, 2011.
2. C. P. Gupta, Shree Ram Singh. M. Kumar, "Engineering Mathematics for semester I & II", Tata McGraw Hill, New Delhi, 2nd Edition, 2016.
3. H.K. Dass, "Advanced Engineering Mathematics", S. Chand, New Delhi, 22nd Edition 2019.

**Reference Books**

1. N.P. Bali and Dr. Manish Goyal, "A Textbook of Engineering Mathematics", University Science Press, India, 8th Edition, 2016.
2. P. Sivaramakrishna Das and C. Vijayakumari, "Engineering Mathematics", Pearson India Education services Pvt. Ltd, India 1st 2017.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, New Delhi, 10th Edition, 2019.
4. G. Balaji, "Engineering Mathematics - Transforms and Partial Differential Equations", G. Balaji Publishers, 18th Edition, 2022.
5. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill, New Delhi, 2017.

**Web References**

1. https://nptel.ac.in/courses/111105121/
2. https://nptel.ac.in/courses/111105035/
3. https://nptel.ac.in/courses/11110711
4. https://swayam.gov.in/nd1_noc20_ma17/preview
5. https://nptel.ac.in/courses/111/103/111103021/

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 2 | 2 | - | - | 1 | - | - | - | - | - | 1 | 1 | - | - |
| 2 | 3 | 2 | 1 | 1 | - | 1 | - | - | - | - | - | 1 | 3 | - | - |
| 3 | 3 | 2 | 1 | 1 | - | 1 | - | - | - | - | - | 1 | 3 | - | - |
| 4 | 3 | 2 | 1 | 1 | - | 1 | - | - | - | - | - | 1 | 3 | - | - |
| 5 | 3 | 2 | 1 | 1 | - | 1 | - | - | - | - | - | 1 | 3 | - | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 5 | 75 | 100 |

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.

| Department | **EEE and ECE** | | | Programme : **B.Tech.** | | | |
|---|---|---|---|---|---|---|---|
| Semester | **II** | | | Course Category: **ES** | | End Semester Exam Type: **TE** | |
| Course Code | **U23ESTC03** | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING** | **3** | **-** | **-** | **3** | **25** | **75** | **100** |

**(Common to CSE, IT, MECH, CIVIL, MCTR, CCE, AI&DS, FT and CSBS Branches)**

| Prerequisite | Mathematics and Physics | |
|---|---|---|
| Course Outcome | **On completion of the course, the students will be able to** | BT Mapping (Highest Level) |
| | **CO1** Apply the basic concepts and various laws in DC circuits. | **K3** |
| | **CO2** Analyze the AC circuits and develop resonance conditions for transmitter and receiver circuits. | **K3** |
| | **CO3** Gain the knowledge of power system components, importance of electrical safety measures and real time applications of transformer and motor. | **K2** |
| | **CO4** Understand the operator of semiconductor diode and its applications. | **K2** |
| | **CO5** Explain the characteristics and operation of BJT and FET. | **K2** |
| | **CO6** Relate and Explain Different Communication Systems. | **K2** |

**SECTION A - Electrical Engineering**

| **UNIT- I** | **DC Circuits** | **Periods: 08** |
|---|---|---|
| Concept of Potential Difference, Current, Resistance, Inductance and Capacitance, Work, Power, Energy, Current and Voltage sources - ideal and practical sources - concept of dependent and independent sources, Ohm's law, Kirchhoff's law, Series parallel combination of R, L, C components, Voltage Divider and Current Divider Rules, Mesh and Nodal analysis, Star/Delta transformation, Network Theorems - Superposition, Thevenin, Norton and Maximum Power Transfer. | | **CO1** |

| **UNIT- II** | **AC Circuits** | **Periods: 08** |
|---|---|---|
| AC waveform definitions - form factor, peak factor, R-L, R-C, RLC series circuit, R-L-C parallel circuit, phasor representation in polar and rectangular form, concept of impedance, admittance, active, reactive, apparent and complex power, power factor, Resonance in series and parallel circuits, band-width and quality factor, Three Phase balanced AC Circuits (Y-Δ and Y-Y) - Power Measurement – Two Wattmeter method. | | **CO2** |

| **UNIT- III** | **Electrical Safety and Electrical Machines** | **Periods: 07** |
|---|---|---|
| Layout of electrical power system and its functions, Wiring Accessories, Types of domestic wiring, Necessity of earthing, insulators and cables, Safety devices - fuse, relay and circuit breaker - Sensors and its types.<br>Faraday's Law of electromagnetic induction, Fleming's Right and Left hand rule - DC Generator and DC Motor - construction, principle, load test and performance characteristics - Auto transformer, Single phase transformer- construction, principle, load test - Single phase capacitor start and run induction motor – Load test. | | **CO3** |

**SECTION B – Electronics Engineering**

| **UNIT- IV** | **Semiconductor Diodes and Applications** | **Periods: 07** |
|---|---|---|
| Introduction semiconductor materials – Doping - Intrinsic and Extrinsic Semiconductor – PN junction diode, structure, characteristics - diffusion and depletion capacitance - Rectifier, Half wave and Full wave rectifier - zener diode characteristics - zener diode as regulator – Light Emitting Diode (LED) - Solar Cell. | | **CO4** |

| **UNIT- V** | **Transistors** | **Periods: 07** |
|---|---|---|
| Bipolar Junction Transistor - construction - operation - Common Base, Common Emitter, Common collector Configuration - characteristics – Biasing - numerical application. Junction Field Effect Transistor (JFET), Metal oxide semiconductor Field Effect Transistor, EMOSFET-DMOSFET operation characteristics - Numerical application. | | **CO5** |

| **UNIT- VI** | **Communication systems** | **Periods: 08** |
|---|---|---|
| Need for Modulation – Block diagram of analog communication System - AM, FM, PM Definitions and Waveforms – Comparison of digital and analog communication system- Block diagram of digital communication system – Electromagnetic Spectrum. Wired and wireless Channel – Block diagram of communication systems – satellite communication - Cellular Mobile Communication - Fibre Optical Communication System. | | **CO6** |

| **Lecture Periods: 45** | **Tutorial Periods: -** | **Practical Periods: -** | **Total Periods: 46** |
|---|---|---|---|

**Text Books**

1. R. K. Rajput, ―Basic Electrical and Electronics Engineering‖, University Science Press, 2nd Edition, 2017.
2. Dr. R. Saravanakumar, Dr.V. Jegathesan, Dr. K. Vinoth Kumar, Dr. K. Kowsalya, ―Basic Electrical and Electronics Engineering‖, Wiley Publisher, 2nd Edition, 2022.
3. R. Muthusubramaniam, S. Salivahanan and K. A. Mureleedharan, ―Basic Electrical Electronics and Computer Engineering‖, Tata McGraw Hill, 2018

**Reference Books**

1. A. Sudhakar and S. P. Shyam Mohan, ―Circuits and Networks: Analysis and Synthesis‖, Tata McGraw Hill Publishing Company Ltd., New Delhi, 4th Edition, 2017.
2. D.P.Kothari and I.J. Nagrath, ―Electric Machines‖, Tata McGraw Hill, New Delhi, 5th Edition, 2017.
3. B. L. Theraja, A. K. Theraja, ―A Textbook of Electrical Technology – Volume - II‖, S Chand & Co. Ltd., New Delhi, 23rd Edition, 2009.
4. David. A. Bell, ―Electronic Devices and Circuits‖, PHI Learning Private Ltd, India, Fourth Edition, 2020
5. Wayne Tomasi, ―Electronic Communication Systems- Fundamentals Theory Advanced‖, Sixth Edition, Pearson Education, 2018.

**Web References**

1. https://nptel.ac.in/courses/108/108/108108076/
2. https://www.electrical4u.com/
3. https://nptel.ac.in/courses/108/102/108102146/
4. https://onlinecourses.nptel.ac.in/noc21_ee55/
5. https://nptel.ac.in/courses/117/102/117102059

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 3 | 3 | - | 2 | - | - | - | - | - | - | 1 | 3 | 2 | - |
| 2 | 3 | 3 | 3 | - | 2 | - | - | - | - | - | - | 1 | 3 | 2 | - |
| 3 | 3 | 3 | 3 | - | 2 | - | - | - | - | - | - | 1 | 3 | 2 | - |
| 4 | 3 | 3 | 3 | - | 2 | - | - | - | - | - | - | 1 | 3 | 2 | - |
| 5 | 3 | 3 | 3 | - | 2 | - | - | - | - | - | - | 1 | 3 | 2 | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 5 | 75 | 100 |

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Dr.G.Balamuruga Mohan Kaj,M.Tech.,Ph.D.,
Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.

| Department | Mechatronics | Programme : B.Tech. | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Semester | II | Course Category: ES | | | End Semester Exam Type: TE | | | |
| Course Code | U23MCT201 | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | MANUFACTURING TECHNOLOGY | 3 | - | - | 3 | 25 | 75 | 100 |

| Prerequisite | Nil | |
|---|---|---|
| Course Outcome | On completion of the course, the students will be able to | BT Mapping (Highest Level) |
| | CO1 Identify the suitable casting process as required. | K3 |
| | CO2 Select the required metal joining process. | K3 |
| | CO3 Understand the differences among various metal deformation processes. | K3 |
| | CO4 Choose the suitable metal removal process as per the requirement. | K3 |
| | CO5 Identify the best method for processing plastics. | K3 |

| UNIT - I | Casting Processes | Periods: 09 |
|---|---|---|
| Introduction to Moulding and Moulding sand: Types, properties, preparation of dry and green sand molding. Pattern making: Pattern materials, types and allowances. Core making: Types of core, core materials, making of cores. Casting methods: Die casting, Centrifugal Castings, Investment Casting and Shell mold Casting | | CO1 |
| **UNIT - II** | **Joining Processes** | **Periods: 09** |
| Fusion welding processes - Types of Welding, Oxy-Acetylene Welding Equipment - Flame characteristics - Electric-Arc Welding, Electrodes, manual metal arc welding, Carbon Arc Welding, Inert-Gas Shielded Arc Welding, Tungsten Inert-Gas Welding (TIG), Gas Metal-Arc Welding (GMAW), Submerged Arc-Welding (SAW), Resistance Welding and its types - welding of dissimilar metals and applications-Welding Defects. | | CO2 |
| **UNIT - III** | **Metal Forming Processes** | **Periods: 09** |
| Cold and Hot working: Rolling – Forging – Extrusion – Drawing – Sheet metal forming processes – High Energy Rate Forming Processes: Explosive Forming – Electro Hydraulic Forming – Electro Magnetic Forming | | CO3 |
| **UNIT - IV** | **Metal Mechining Processes** | **Periods: 09** |
| Mechanics of machinery–Chip formation-types of chips, orthogonal & oblique cutting–Tool wear–Tool life – Nomenclature of single point cutting tool & Twist drill bit – Effect of cutting fluids. | | CO4 |
| **UNIT - V** | **Processing Of Plastics** | **Periods: 09** |
| Types of Plastics – Types of Molding: Injection molding – Blow molding – Compression molding – Transfer molding – Thermoforming – Reinforced plastics. | | CO5 |

| Lecture Periods: 45 | Tutorial Periods: | Practical Periods: - | Total Periods: 45 |
|---|---|---|---|

**Text Books**

1. Rao P N, 'Manufacturing Technology', Volume I & II, Tata McGraw Hill Publishing Company, New Delhi, Fifth Edition, 2018.
2. Sharma P C, 'A Text Book of Manufacturing – I', S Chand & Company Pvt Ltd, 2008.
3. Rajput R K, 'A Text Book of Manufacturing Technology', Laxmi Publications, New Delhi, 2nd edition, 2017.

**Reference Books**

1. Kaushish J P, 'Manufacturing Processes', Second Edition, PHI Learning Pvt. Ltd, 2013.
2. Kalpakjian S, Schmid R, 'Manufacturing Engineering and Technology', Seventh Edition, Pearson Education India Edition, 2013.
3. Adithan M, Gupta A B, 'Manufacturing Technology', New Age, Fifth Edition, 2012.
4. B S Nagendra Parashar, R K Mittal, 'Elements of Manufacturing Processes', Prentice Hall India Pvt. Ltd, 2003.
5. S K Hajra Choudry, 'Workshop Technology', Vol – I & II, Media Promoters and Publishers Pvt. Ltd, 2009.

**Web References**

1. https://nptel.ac.in/courses/112/107/112107219
2. https://nptel.ac.in/courses/112/105/112105127/
3. https://www.coursera.org/courses?query=manufacturing
4. https://www.udemy.com/topic/manufacturing/
5. https://www.linkedin.com/company/manufacturing-technology-inc

**Cos Mapping with POs and PSOs**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| **1** | 3 | 3 | 3 | 2 | 3 | - | 1 | - | - | - | - | 3 | 3 | 3 | 3 |
| **2** | 3 | 3 | 3 | 2 | 3 | - | 1 | - | - | - | - | 3 | 3 | 3 | 3 |
| **3** | 3 | 3 | 3 | 2 | 3 | - | 1 | - | - | - | - | 3 | 3 | 3 | 3 |
| **4** | 3 | 3 | 3 | 2 | 3 | - | 1 | - | - | - | - | 3 | 3 | 3 | 3 |
| **5** | 3 | 3 | 3 | 2 | 3 | - | 1 | - | - | - | - | 3 | 3 | 3 | 3 |

**Correlation Level: 1-Low, 2-Medium, 3- High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 5 | 75 | 100 |

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Dr.G.Balamuruga Mohan Raj, M.Tech.,Ph.D.,
Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.

| Department | Mechatronics | Programme : B.Tech. | | | | | |
|---|---|---|---|---|---|---|---|
| Semester | II | Course Category: ES | | | End Semester Exam Type: TE | | |
| Course Code | U23MCT202 | Periods/Week | | | Credit | Maximum Marks | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | THERMODYNAMICS AND HEAT TRANSFER | 3 | - | - | 3 | 25 | 75 | 100 |

| Prerequisite | Nil | |
|---|---|---|
| Course Outcome | On completion of the course, the students will be able to | BT Mapping (Highest Level) |
| CO1 | Understand the basic concepts associated with the first law of thermodynamics. | K2 |
| CO2 | Understand the basic concepts associated with the second law of thermodynamics. | K2 |
| CO3 | Analyze steady state and transient heat conduction problems of real life Thermal systems. | K4 |
| CO4 | Understand the convective heat transfer problems in various thermal systems. | K2 |
| CO5 | Analyze radiation heat transfer problems in various thermal systems. | K4 |

| UNIT - I | Basic Concepts And First Law Of Thermodynamics | Periods: 12 |
|---|---|---|
| Thermodynamic systems, concepts of continuum, basic definitions, heat and work, zeroth law, First law, SFEE, First Law for closed and open systems. | | |
| **UNIT - II** | **Second Law Of Thermodynamics** | **Periods: 12** |
| Second law of thermodynamics Statements, reversibility, causes of irreversibility, Carnot cycle, reversed Carnot cycles. Thermodynamic Temperature Scale, entropy, Clausius inequality | | CO2 |
| **UNIT - III** | **Conduction** | **Periods: 12** |
| Introduction of heat transfer – conduction - convection and radiation – Laws – General equation of heat conduction – Derivation in Cartesian - cylindrical and spherical coordinates – One dimensional steady state heat conduction in simple geometries – plane wall - cylinder and sphere – Heat transfer composite walls - composite cylinders and composite spheres –Conduction with Internal Heat Generation – Extended Surfaces(Description only). | | CO3 |
| **UNIT - IV** | **Convection** | **Periods: 12** |
| Boundary layer theory – Hydrodynamic and Thermal Boundary Layer- Dimensional Analysis-Flow over a flat– Flow over cylinders -spheres - tube bank – Internal flow through pipes in forced heat transfer – Natural convection in vertical - inclined and horizontal surfaces. | | CO4 |
| **UNIT - V** | **Radiation** | **Periods: 12** |
| Radiation heat transfer –Thermal radiation – Laws of radiation – Black body concept – Gray body radiation - Emissive power – Radiation shape factor-radiation heat exchange between surfaces –Radiation Shields. | | CO5 |

| Lecture Periods: 60 | Tutorial Periods: | Practical Periods: - | Total Periods: 60 |
|---|---|---|---|

**Text Books**


1. Nag P. K., Engineering Thermodynamics, McGraw Hill Education India Pvt. Ltd, 2017.
2. Sachdeva R. C., Fundamentals of Heat and Mass Transfer, New Age International Publishers, 2017.
3. Rajput R K “A text book of Engineering Thermodynamics”, S. Chand publishers, 2016


**Reference Books**


1. Moran and Shapairo, Principles of Engineering Thermodynamics, 8th Edition, Wiley, 2015
2. Yunus A. Cengel, Heat and Mass Transfer: Fundamentals and Applications, McGraw Hill Education, 2016.
3. Frank P. Incropera and David P. Dewitt, Incropera’s principles of Heat and MassTransfer, Wiley India Edition, 2018.
4. C. P. Kothandaraman and S. Subramanyan, Heat and Mass Transfer Data Book,Fifth Edition, New Age International Publishers, 2018.
5. Arora C.P, "Thermodynamics", 25th Reprint, McGraw-Hill, New Delhi, 2013


**Web References**

1. https://nptel.ac.in/courses/112105266/
2. https://nptel.ac.in/courses/112108148/
3. https://nptel.ac.in/courses/112/103/112103275/
4. https://www.linkedin.com/company/heat-transfer-and-process-design-htpd
5. https://www.udemy.com/course/an-introduction-to-heat-transfer/

**Cos Mapping with POs and PSOs**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| **1** | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 2 | 1 |
| **2** | 3 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 2 | 1 |
| **3** | 3 | 2 | 3 | 3 | 2 | - | - | - | - | - | - | 3 | 2 | 2 | 1 |
| **4** | 3 | 2 | 3 | 3 | - | - | - | - | - | - | - | 3 | 2 | 2 | 1 |
| **5** | 3 | 2 | 3 | 3 | - | - | - | - | - | - | - | 3 | 2 | 2 | 1 |

**Correlation Level: 1-Low, 2-Medium, 3- High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 5 | 75 | 100 |

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Dr.G.Balamuruga Mohan Raj, M.Tech., Ph.D.,
Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.

| Department | Mechanical | | | Programme : B.Tech. | | | |
|---|---|---|---|---|---|---|---|
| Semester | II | Course Category: HS | | | End Semester Exam Type: TE | | |
| Course Code | U23HSTC01 | Periods/Week | | | Credit | Maximum Marks | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | UNIVERSAL HUMAN VALUES - II | 2 | - | - | 2 | 25 | 75 | 100 |

**(Common to all Branch)**

Prerequisite: UHV – I

| Course Outcome | On completion of the course, the students will be able to | BT Mapping (Highest Level) |
|---|---|---|
| CO1 | Evaluate the significance of value inputs in formal education and start applying them in their life and profession | K2 |
| CO2 | Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc. | K2 |
| CO3 | Analyze the value of harmonious relationship based on trust and respect in their life and profession | K32 |
| CO4 | Examine the role of a human being in ensuring harmony in society and nature. | K2 |
| CO5 | Apply the understanding of ethical conduct to formulate the strategy for ethical life and profession. | K2 |

| UNIT - I | Introduction to Value Education | Periods: 06 |
|---|---|---|
| Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) - Understanding Value Education - Self-exploration as the Process for Value Education - Basic Human Aspirations - Happiness and Prosperity - Current Scenario- Method to Fulfil the Basic Human Aspirations | | CO1 |

| UNIT - II | Harmony in the Human Being | Periods: 06 |
|---|---|---|
| Understanding Human being as the Co-existence of the Self and the Body-Distinguishing between the Needs of the Self and the Body-The Body as an Instrument of the Self-Understanding Harmony in the Self-Harmony of the Self with the Body-Programme to ensure self-regulation and Health | | CO2 |

| UNIT - III | Harmony in the Family and Society | Periods: 06 |
|---|---|---|
| Harmony in the Family - Basic Unit of Human Interaction- 'trust' - Foundational Value in Relationship - 'Respect' - as the Right Evaluation - Other Feelings, Justice in Human-to-Human Relationship - Understanding Harmony in the Society-Vision for the Universal Human Order. | | CO3 |

| UNIT - IV | Harmony in the Nature / Existence | Periods: 06 |
|---|---|---|
| Understanding Harmony in the Nature-Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature - Realizing Existence as Co-existence at All Levels - Holistic Perception of Harmony in Existence | | CO4 |

| UNIT - V | Implications of the Holistic Understanding - A Look at Professional Ethics | Periods: 06 |
|---|---|---|
| Natural Acceptance of Human Values - Definitiveness of (Ethical) Human Conduct - Basis for Humanistic Education, Humanistic Constitution and Universal Human Order-Competence in Professional Ethics-Holistic Technologies, Production Systems and Management Models-Typical Case Studies-Strategies for Transition towards Value - based Life and Profession | | CO5 |

| Lecture Periods: 30 | Tutorial Periods: | Practical Periods: - | Total Periods: 30 |
|---|---|---|---|

**Text Books**

1. R. R. Gaur, R. Asthana, G. P. Bagaria, "A Foundation Course in Human Values and Professional Ethics", Excel Books, 2nd Revised Edition, New Delhi, 2019.

**Reference Books**

1. A Nagraj, Jeevan Vidya Prakashan, Amarkantak, "Jeevan Vidya: EkParichaya", 2013.
2. A.N. Tripathi, "Human Values", New Age International Publishers, New Delhi, 3rd Edition, 2019.
3. Annie Leonard, "The Story of Stuff", Free Press, Reprint Edition, 2011.
4. Mohandas Karam chand Gandhi, "The Story of My Experiments with Truth – Mahatma Gandhi Autobiography", Finger print Publisher, 2009.
5. E. F Schumacher, "Small is Beautiful", Vintage Publisher, 1993.
6. Cecile Andrews, "Slow is Beautiful", New Society Publishers, 2006.
7. J C Kumarappa, "Economy of Permanence", Sarva Seva Sangh Prakashan, 2017.
8. Pandit Sunderlal, "Bharat Mein Angreji Raj", Prabhat Prakashan Publisher, 2021.
9. Dharampal, "Rediscovering India", Stosius Inc/Advent Books Division Publisher, 1983.
10. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule", Gyan Publishing House, 2023.
11. Maulana Abdul Kalam Azad, "India Wins Freedom", Orient BlackSwan Publisher, 1st Edition, 1988.

12. Life of Vivekananda, "Romain Rolland (English)", Advaita Ashrama Publisher, India, 4th Edition, 2010.
13. Mahatma Gandhi, "Romain Rolland (English)", Srishti Publishers & Distributors, 2020.

**Web References**

1. https://www.uhv.org.in/uhv-ii
2. http://www.storyofstuff.com
3. https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw
4. https://fdp-si.aicte-india.org/8dayUHV_download.php
5. https://www.youtube.com/watch?v=8ovkLRYXIjE

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | - | - | - | - | - | 2 | 3 | 2 | 2 | - | - | 3 | - | - | - |
| 2 | - | - | - | - | - | 2 | 3 | 2 | 2 | - | - | 3 | - | - | - |
| 3 | - | - | - | - | - | 3 | 3 | 2 | 2 | - | - | 3 | - | - | - |
| 4 | - | - | - | - | - | 2 | 3 | 2 | 2 | - | - | 3 | - | - | - |
| 5 | - | - | - | - | - | 2 | 3 | 2 | 2 | - | - | 3 | - | - | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 5 | 75 | 100 |

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Dr.G.Balamuruga Mohan Kay,M.Tech.,Ph.D.,
Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.

| Department | English | | | Programme : B.Tech. | | | |
|---|---|---|---|---|---|---|---|
| Semester | II | | | Course Category: HS | | End Semester Exam Type: TE | |
| Course Code | U23ENBC02 | Periods/Week | | | Credit | Maximum Marks | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | COMMUNICATIVE ENGLISH - II | 2 | - | 2 | 3 | 50 | 50 | 100 |

(Common to ALL Branches except CSBS)

| Prerequisite | Basics of English Language | |
|---|---|---|
| Course Outcome | On completion of the course, the students will be able to | BT Mapping (Highest Level) |
| | CO1 Draft effective written communication in professional environment | K2 |
| | CO2 Apply the mechanics of creative writing with precision and clarity | K3 |
| | CO3 Acquire language skills professionally to groom the overall personality through sensitizing various etiquettes in real time situation | K2 |
| | CO4 Develop language fluency and gain self-confidence | K3 |
| | CO5 Express thoughts and ideas with clarity and focus | K2 |

| UNIT- I | Business Correspondence | Periods: 10 |
|---|---|---|
| Business Writing: Circular, Agenda, Memoranda, Notice, Instruction, Minutes, Email Writing ,Report Writing- Official and Demi Official Letters : Applying for Educational / Car / Home Loans / Joining Report, Leave Letter, Industrial Visit, In plant Training, Letter to the Editor, Calling for a quotation, Placing Order, Letter of Complaints, Letter seeking Clarification, Resume', Job Application Letter, Bio-data, CV | | CO1 |

| UNIT- II | Functional Writing Skills | Periods: 10 |
|---|---|---|
| Four Modes of Writing, Sentence Structure, Art of condensation: Summary Writing and Note Making, Use of phrase and clause in sentence, Principles of paragraph writing, Techniques of Essay Writing, Jumbled Sentence, Paraphrasing | | CO2 |

| UNIT- III | Etiquettes | Periods: 10 |
|---|---|---|
| Etiquette: Meaning, Kinds: Corporate Etiquette, Meeting Etiquette, Telephone Etiquette, Email Etiquette, Social Media Etiquette, Dining Etiquette, Communication Etiquette | | CO3 |

| UNIT- IV | Communication Practice – II | Periods: 15 |
|---|---|---|
| **List of Exercises**<br>**Listening**: Letter writing tips<br>**Speaking**: Just a Minute, Impromptu Speech, Contemporary Issues<br>**Reading**: Variety of examples for Modes of Writing<br>**Writing:** Different types of letters | | CO4 |

| UNIT- V | Interpersonal Communication – II | Periods: 15 |
|---|---|---|
| **List of Exercises**<br>**Listening:** Videos on different types of Etiquettes<br>**Speaking**: Team Presentation, Negotiation Skills<br>**Reading**: Phrase and Clause<br>**Writing:** Free writing on any given topic, Paraphrasing Practice | | CO5 |

| Lecture Periods: 30 | Tutorial Periods: - | Practical Periods: 30 | Total Periods: 60 |
|---|---|---|---|

**Text Books**

1. PC Das, "Letter Writing including Official and Business Letters", New Central Book Agency, 2020.
2. Kumar, Sanjay, Pushpalatha," Communication Skills". Oxford University Press, 2018.
3. Raman, Meenakshi&Sangeetha Sharma," Communication Skills", New Delhi: OUP, 2018.

**Reference Books**

1. Sahukar, Nimeran, Bhalla, Prem,, "The book of Etiquettes and Manners".PustakMahal Publisher, New Delhi; 1st Edition 2009.
2. Gerson Sharon J, Steven M. Gerson, "Technical Writing Process and Product", Pearson Education Pvt. Ltd. 3rd Edition, 2009.
3. Grussendorf, Marion, "English for Presentations". Oxford University Press, Oxford, 2007.
4. Seely John, "The Oxford Guide to Writing and Speaking", Oxford University Press, 2006.
5. R.C. Sharma, Krishna Mohan, "Business Correspondence and Report Writing", Tata McGraw Hill &Co.Ltd., New Delhi, 2001

**Web References**

1. https://www.indeed.com/career-advice/finding-a-job/how-to-write-an-application-letter
2. https://owlcation.com/humanities/Four-Types-of-Writing

| | |
|---|---|
| 3. | https://targetstudy.com/languages/english/paragraph-writing.html |
| 4. | https://www.businessnewsdaily.com/8262-email-etiquette-tips.html |
| 5. | https://www.youtube.com/watch?v=UOceysteIjo |

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |
| 2 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |
| 3 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |
| 4 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |
| 5 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Theory | | | | | | |
|---|---|---|---|---|---|---|
| Assessment | Continuous Assessment Marks (CAM) | | | | End Semester Examination (ESE) Marks | Total Marks |
| | CAT 1 | CAT 2 | Model Exam | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 75 | 60 |
| | 20 ( to be weighted for 10 marks) | | | | ( to be weighted for 50 marks) | |

| Practical | | | | |
|---|---|---|---|---|
| Continuous Assessment Internal Evaluation | | End Semester Internal Evaluation | | Total Marks |
| 30 (to be weighted for 10 marks) | | 30 marks | | 40 |
| Listening (L)* | 10 | Listening (L)* | 10 | |
| Speaking(S) | 5 | Speaking(S) | 5 | |
| Reading(R)* | 10 | Reading(R)* | 10 | |
| Writing(W)* | 5 | Writing(W)* | 5 | |

- **LRW components of Practical can be evaluated through Language Lab Software**

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Professor & Head,
Dept. of Mechatronics Engineering
Sri Manakula Vinayagar Engineering College,
Madagadipet, Puducherry-605 107.

| Department | EEE/ ECE | Programme : B.Tech. | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Semester | II | Course Category: ES | | | End Semester Exam Type: LE | | | |
| Course Code | U23EEPC01 | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY | - | - | 2 | 1 | 50 | 50 | 100 |

(Common to CSE, IT, MECH, CIVIL, CCE, AI&DS, FT, MCTR, CSBS Branches)

| Prerequisite | Basic Knowledge of Science | |
|---|---|---|
| Course Outcome | **On completion of the course, the students will be able to** | BT Mapping (Highest Level) |
| | **CO1** Build the different wiring for domestic and commercial applications. | **K3** |
| | **CO2** Design and analyze the domestic power distribution. | **K3** |
| | **CO3** Estimate the performance of transformer and motors by conducting load test. | **K3** |
| | **CO4** Describe characteristics of semiconductor diode and utilize it for different applications | **K5** |
| | **CO5** Relate the characteristics of various transistor | **K2** |
| | **CO6** Understand Rectifiers and Regulators | **K2** |

**List of Experiments**

**Section – A Electrical Experiments**

Demonstration on Power Sources, Ammeter, Voltmeter, Wattmeter and Energy meter are Pre-requisite for conducting this Electrical Engineering Lab.

1. Electrical safety precautions and study of tools, accessories, electrical joints and electrical symbols.
2. Domestic Wiring Practice
   - Staircase wiring
   - Doctor's room wiring
   - Godown wiring
   - Wiring of Ceiling fan, LED lamps and Iron Box.
3. Design of Domestic power distribution.
4. Measurement of 3-phase power using two wattmeter method
5. Load test on DC shunt motor.
6. Load test on single phase transformer.
7. Load test on single phase Induction Motor.

**Section – B Electronics Experiments**

1. Study of Electronic components and equipment: Resistor, Capacitor
2. Measurement of AC signal parameter (Peak-Peak, rms period, frequency) using CRO.
3. VI Characteristics of PN junction diode, Zener diode
4. Input and output characteristics of Common Emitter configuration of BJT
5. Characteristics of JFET
6. Measurement of Ripple factor of HWR, FWR
7. Voltage Regulator using Zener Diode

| Lecture Periods: - | Tutorial Periods: - | Practical Periods: 30 | Total Periods: 30 |
|---|---|---|---|

**Reference Books**

1. S. Gowri, T. Jeyapoovan Nadar, ¯Engineering Practices Lab Manual‖, Vikas Publishing House Private Limited, New Delhi, 5th Edition, 2014.
2. A.Sudhakar and Shyam Mohan.S.P, ¯Circuits and Networks Analysis and Synthesis‖, Tata McGraw Hill Publishing Company Ltd., New Delhi, 4th edition, 2017.
3. D.P.Kothari and I.J. Nagrath, ¯Electric Machines‖, Tata McGraw Hill, New Delhi, 5th Edition, 2017.
4. Edward Hughes, John Hiley, Keith Brown, Ian McKenzie Smith, Electrical and Electronics Technology, Pearson Education Limited, New Delhi, 12th edition 2016.
5. S.K. Sahdev, ¯Fundamentals of Electrical Engineering and Electronics‖, DhanpatRai and Co, 2017.

**Web References**

1. http://eie.sliet.ac.in/laboratories/basic-electrical-engineering-lab/
2. https://www.electronics-tutorials.ws/accircuits/series-circuit.html
3. https://www.allaboutcircuits.com/textbook/experiments/
4. https://www.electronicshub.org/measurements-of-ac-current/
5. http://www.electronics-tutorials.ws

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 2 | 3 | - | - | 1 | - | - | 3 | - | - | 1 | 3 | 2 | - |
| 2 | 3 | 2 | 3 | - | - | 1 | - | - | 3 | - | - | 1 | 3 | 2 | - |
| 3 | 3 | 2 | 3 | - | - | 1 | - | - | 3 | - | - | 1 | 3 | 2 | - |
| 4 | 3 | 2 | 3 | - | - | 1 | - | - | 3 | - | - | 1 | 3 | 2 | - |
| 5 | 3 | 2 | 3 | - | - | 1 | - | - | 3 | - | - | 1 | 3 | 2 | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | Performance in Practical classes | | | Model Practical Examination | Attendance | | |
| | Conduction of Practical | Record work | viva | | | | |
| Marks | 15 | 5 | 5 | 15 | 10 | 50 | 100 |

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| Department | Mechatronics | Programme : B.Tech. | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Semester | II | Course Category: ES | | | End Semester Exam Type: LE | | | |
| Course Code | U23MCP201 | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | THERMAL ENGINEERING LABORATORY | - | - | 2 | 1 | 50 | 50 | 100 |

| Prerequisite | Basic Knowledge of Science | |
|---|---|---|
| Course Outcome | On completion of the course, the students will be able to | BT Mapping (Highest Level) |
| CO1 | Understand about various fuels and their properties. | K2 |
| CO2 | Demonstrate the fundamental principles of convective heat transfer in practice | K3 |
| CO3 | Demonstrate the fundamental principles of conductive heat transfer in real life systems practice. | K3 |
| CO4 | Analyse and assess the performance of Air compressor and Blower. | K4 |
| CO5 | Model and test heat exchanging system | K5 |

**List of Experiments**

1. Determination of Kinematic Viscosity using Redwood viscometer
2. Determination of Flash and fire point using Cleveland apparatus
3. Determination of Heat transfer coefficient for heat transfer from cylindrical surface by natural convection
4. Determination of Heat transfer coefficient for heat transfer from cylindrical surface by forced convection
5. Determination of Heat transfer coefficient for heat transfer from Pin fin by natural convection
6. Determination of Heat transfer coefficient for heat transfer from Pin fin by forced convection
7. Determination of thermal resistance and conductivity of a composite wall
8. Determination of emissivity of a specimen
9. Performance test on reciprocating air compressor
10. Performance test on air blower
11. Performance analysis of Parallel and Counter flow heat exchanger
12. Heat transfer studies using a plate type heat exchanger

| Lecture Periods: - | Tutorial Periods: - | Practical Periods: 30 | Total Periods: 30 |
|---|---|---|---|

**Reference Books**

1. Sachdeva R. C. Fundamentals of Heat and Mass Transfer, New Age International (P) Ltd, (2017),
2. Holman J. P.Heat Transfer, 9th Edition, McGraw-Hill Publishing Company Limited, 2011),
3. Kothandaraman C. P. and Subramanyan.S, Heat and Mass Transfer Data Book, Fifth Edition, New AgeInternational Publishers (2018),
4. R.K.Rajput, Thermal Engineering, 10th edition, Lakshmi Publications, 2018.
5. Yunus A. Cengel, Robert H. Turner, John M. Cimbala, Fundamentals of Thermal-Fluid Sciences, Indianedition, 2016

**Web References**

1 http: https://archive.nptel.ac.in/courses/112/103/112103316/
2 https://onlinecourses.nptel.ac.in/noc22_me110/preview
3. https://www.classcentral.com/course/swayam-fundamentals-of-convective-heat-transfer-19876
4 https://archive.nptel.ac.in/content/storage2/courses/112104117/ui/Course_home-lec6.htm
5. https://archive.nptel.ac.in/content/storage2/courses/112104117/ui/Course_home-lec39.htm

**Cos Mapping with POs and PSOs**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 3 | 3 | 3 | 3 | - | - | - | 3 | - | - | 3 | 1 | 2 | 2 |
| 2 | 3 | 3 | 3 | 3 | 3 | - | - | - | 3 | - | - | 3 | 1 | 2 | 2 |
| 3 | 3 | 3 | 3 | 3 | 3 | - | - | - | 3 | - | - | 3 | 1 | 2 | 2 |
| 4 | 3 | 2 | 2 | 3 | 3 | - | - | - | 3 | - | - | 3 | 1 | 2 | 2 |
| 5 | 3 | 2 | 2 | 3 | 3 | - | - | - | 3 | - | - | 3 | 1 | 2 | 2 |

**Correlation Level: 1-Low, 2-Medium, 3- High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | Performance in Practical classes | | | Model Practical Examination | Attendance | | |
| | Conduction of Practical | Record work | viva | | | | |
| Marks | 15 | 5 | 5 | 15 | 10 | 50 | 100 |

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| Department | Mechatronics | Programme : B.Tech. | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Semester | II | Course Category: ES | | | End Semester Exam Type: LE | | | |
| Course Code | U23MCP202 | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | MANUFACTURING TECHNOLOGY LABORATORY | - | - | 2 | 1 | 50 | 50 | 100 |

| Prerequisite | Basic Knowledge of Science | |
|---|---|---|
| Course Outcome | On completion of the course, the students will be able to | BT Mapping (Highest Level) |
| | CO1 Machine parts by performing various types of operations using a lathe. | K2 |
| | CO2 Perform grinding operations using various types of grinding machines. | K3 |
| | CO3 Design and prepare moulding with different types of patterns. | K3 |
| | CO4 Make proper welded joints as per the design requirements. | K3 |
| | CO5 Perform sheet metal operations as per the shape and size of the components. | K3 |

**st of Experiments**

**MACHINES**

1. Plain Turning and Facing
2. Taper Turning
3. Drilling and Boring
4. Square Head Shaping
5. Hexagonal Head Shaping
6. Plain Surface grinding
7. Cylindrical grinding

**FOUNDRY**

8. Preparation of a sand mold using split pattern
9. Preparation of a sand mold using solid pattern

**WELDING AND SHEET METAL**

10. Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding
11. Gas welding practice - Demonstration
12. Forming& Bending by sheet metal
13. Model making – Trays and funnels and different type of joints in sheet metal

| Lecture Periods: - | Tutorial Periods: - | Practical Periods: 30 | Total Periods: 30 |
|---|---|---|---|

**Reference Books**

1. P N Rao, „Manufacturing Technology – Metal Cutting and Machine Tools", Tata McGraw Hill PublishingCompany Ltd, NewDelhi, 2008
2. Raghavan V, „Physical Metallurgy - Principles and Practice", Prentice Hall India Pvt. Ltd., NewDelhi,2006.
3. Kalpakjain S, Schimd S, „Manufacturing Engineering and Technology", Pearson Education,7th edition,New Delhi, 2018
4. B S Nagendra Parashar, R K Mittal, „Elements of Manufacturing Processes", Prentice Hall India Pvt.Ltd., 2003.
5. S K Hajra Choudry, „Workshop Technology", Volume – I & II, Media Promoters and Publishers Pvt. Ltd

**Web References**

1 http://gssl.iitk.ac.in/pssl/
2 https://www.coursera.org/courses?query=manufacturing
3 https://www.linkedin.com/company/laboratory-for-manufacturing-systems
4 https://www.udemy.com/course/non-traditional-manufacturing/
5 https://www.coursera.org/lecture/digital-manufacturing-design/introduction

**Cos Mapping with POs and PSOs**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 3 | 3 | - | 3 | - | - | - | 3 | - | - | 3 | 2 | 1 | 1 |
| 2 | 3 | 3 | 3 | - | 3 | - | - | - | 3 | - | - | 3 | 2 | 1 | 1 |
| 3 | 3 | 3 | 3 | - | 3 | - | - | - | 3 | - | - | 3 | 2 | 1 | 1 |
| 4 | 3 | 3 | 3 | - | 3 | - | - | - | 3 | - | - | 3 | 2 | 1 | 1 |
| 5 | 3 | 3 | 3 | - | 3 | - | - | - | 3 | - | - | 3 | 2 | 1 | 1 |

**Correlation Level: 1-Low, 2-Medium, 3- High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | Performance in Practical classes | | | Model Practical Examination | Attendance | | |
| | Conduction of Practical | Record work | viva | | | | |
| Marks | 15 | 5 | 5 | 15 | 10 | 50 | 100 |

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| Department | **Mechanical** | Programme : **B.Tech.** | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Semester | **II** | Course Category: **MC** | | | End Semester Exam Type: - | | | |
| Course Code | **U23MEM202** | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **SPORTS, YOGA AND NSS** | **-** | **-** | **2** | **Non-Credit** | **100** | **-** | **100** |

**(Common to all Branch)**

| Prerequisite | - | |
|---|---|---|
| Course Outcome | **On completion of the course, the students will be able** | BT Mapping (Highest Level) |
| | **CO1** Practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility and relaxation. | **K2** |
| | **CO2** Understand basic skills associated with yoga and physical activities including strength and flexibility, balance and coordination. | **K2** |
| | **CO3** Develop understanding of psychological problems associated with age and lifestyle. | **K2** |
| | **CO4** Recognize the importance of national service in community development. | **K2** |
| | **CO5** Convert existing skills into socially relevant life skills. | **K2** |

| **UNIT - I** | **Introduction to Physical Education** | **Periods: 06** |
|---|---|---|

Definition, Aims and Objectives of Physical Education - Changing trends in Physical Education

**Physical Fitness, Wellness and Lifestyle:** Importance of Physical Fitness and Wellness - Components of Physical fitness -Components of Health related fitness - Components of wellness - Preventing Health Threats through Lifestyle Change - Concept of Positive Lifestyle. **CO1**

| **UNIT - II** | **Yoga and Lifestyle** | **Periods: 06** |
|---|---|---|

Importance of Yoga - Elements of Yoga - Introduction - Asanas, Pranayama, Meditation and Yogic Kriyas - Yoga for concentration and related Asanas (Sukhasana, Tadasana, Padmasana and Shashankasana) - Relaxation Techniques for improving concentration - Yog-nidra. Asanas as preventive measures – Hypertension – Obesity - Back Pain-Diabetes - Asthema. **CO2**

| **UNIT - III** | **Training and Planning in Sports** | **Periods: 06** |
|---|---|---|

Training - Warming up and limbering down-Skill, Technique and Style - Objectives of Planning – Tournament - Knock-Out, League/Round Robin and Combination.

**Psychology and Sports** - Important of Psychology in Physical Education and Sports - Differentiate Between Growth and Development - Adolescent problems and their Management - Emotion: Concept, Type and Controlling of emotions - Concepts and Types of Aggressions in Sports - Psychological benefits of exercise - Anxiety and Fear and its effects on Sports Performance - Motivation, its type and techniques - Understanding Stress and Coping strategies **CO3**

| **UNIT - IV** | **Introduction To National Service Scheme** | **Periods: 06** |
|---|---|---|

Orientation of NSS volunteers: History, motto, symbol, awards, structure and activities of NSS - Days of National and International Importance - Sensitizing about the thrust areas and awareness activities - Importance of tree plantation and voluntary blood donation - The role of SHGs and NGOs in community development – CSR - Life skills and youth development-extension activities in HEIs - various clubs and schemes like RRC, ELC, YRC, UBA, SBA, etc., **CO4**

| **UNIT - V** | **Community Issues and the use of Technology** | **Periods: 06** |
|---|---|---|

Common Problems of rural India - Technology development and its suitability - Sustainability - Value addition to agricultural products - Service learning and youth volunteering – Shramdaan - Campus cleaning - Field visit to nearby communities - village survey - Initiatives to clean and green environment - preservation of water bodies in adopted villages. **CO5**

| **Lecture Periods: -** | **Tutorial Periods: -** | **Practical Periods: 30** | **Total Periods: 30** |
|---|---|---|---|

**Reference Books**

1. Brar Ajmer Singh, Gill Jagtar Singh, Bains Jagdish, ―Modern Textbook of Physical Education Health and Sports- I‖, Kalyani Publishers, 6th Edition, 2014
2. B.K.S. Iyengar, ―Light on Yoga: The Definitive Guide to Yoga Practice‖, Thorsons Publishers, Thorsons Classics edition, 2015
3. Joseph, Siby K, Mahodaya, ―Bharat Essays on Conflict Resolution‖, Institute of Gandhian Studies Publishers, 2007
4. Barman Prateeti, Goswami, ―Document on Peace Education‖, Triveni Akansha Publishing House, New Delhi, 2009
5. Prof R.B.S. Verma, ―Field Work Practicum in Social Work-Emerging Concerns‖, Rapid Publisher, Lucknow, 2020
6. Sibereisen, K, Richard M, ―Lerner Approaches to Positive Youth Development‖, Sage Publications, New Delhi, 2007
7. Hoshiar Singh, ―Administration of Rural Development in India‖, Sterling Publisher, the University of Michigan, 2009

| Web References | |
|---|---|
| 1. | http://www.thebetterindia.com/140/national-service-scheme-nss |
| 2. | http://en.wikipedia.org/wiki/national-service-scheme 19=http://nss.nic.in/adminstruct |
| 3. | http://nss.nic. in |
| 4. | http://socialworknss.org/about.html |
| 5. | Young Journal on Youth published by SAGE: http://you.sagepub.com |

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | Total Marks |
|---|---|---|---|---|
| | Attendance | MCQ Test | Presentation / Activity / Assignment | |
| Marks | 10 | 30 | 60 | 100 |