# FACULTY OF ENGINEERING & TECHNOLOGY

## Effective from Academic Batch: 2025-26

**Programme:** **Bachelor of Technology**

**Semester:** **I/II**

**Course Code:** **102001225**

**Course Title:** **Basics of Mechanical and Civil Engineering**

**Course Group:** **Engineering Science Course**

**Course Objectives: The course is designed to acquaint the students with the fundamental principles of Mechanical Systems and Engineering. A thorough exposure to these systems lays the groundwork for comprehending advanced domains such as robotics, IoT devices, applying AI and embedded systems, thereby establishing a vital bridge between traditional engineering disciplines and contemporary computing applications. The course introduces basics of Civil Engineering like branches of civil engineering, building construction, estimation and construction materials. The course helps the students to understand the conventional and modern surveying instruments.**

**Teaching & Examination Scheme:**

| Contact hours per week | | | Course Credits | Examination Marks (Maximum / Passing) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory | | J/V/P* | | Total |
| Lecture | Tutorial | Practical | | Internal | External | Internal | External | |
| 2 | 0 | 4 | 4 | 50 / 18 | 50 / 18 | 25 / 9 | 25 / 9 | 150/54 |

* **J**: Jury; **V**: Viva; **P**: Practical

**Detailed Syllabus:**

| Sr. | Contents | Hours |
|---|---|---|
| 1 | **Introduction of Mechanical Engineering**:<br>Prime movers and its types, Heat, Temperature, Specific heat, Change of state, Path, Process, Cycle, Internal energy, Enthalpy, Statements of Zeroth law and First law, Boyle's law, Charles's law, Combined gas law, Relation between Cp and Cv, Constant volume process, constant pressure process, Isothermal process, Adiabatic process. | 5 |
| 2 | **Internal Combustion Engines**:<br>Introduction, Classification, Basic terminologies of I.C. engine, four-stroke/ two-stroke cycle Petrol/Diesel engines, Indicated power, Brake Power, Efficiencies.<br>**Refrigeration & Air Conditioning**:<br>Refrigerant, Vapor compression refrigeration system, Domestic Refrigerator, Split air conditioners. | 5 |



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| | | |
|---|---|---|
| **3** | **Transmission of Motion and Power**:<br>Concept of Force, Pressure, Energy, Work, Power, System, Shaft and axle, Different arrangement and applications of Belt drive; Chain drive; Friction drive and Gear drive. | **3** |
| **4** | **Introduction to Civil Engineering and Building Construction:**<br>Introduction of Civil Engineering, Various branches, Scope, Understanding Building Components, Various loads acting on a building, Types of structures (load bearing structure, framed structure and composite structure), Introduction of Civil Engineering Materials, Sustainable Infrastructure. | **5** |
| **5** | **Introduction to Building Planning and estimation:**<br>Principles of planning and basic requirements, Plan elevation and section of a single room residential building, Typical building layout (residential and industrial), Building bye-laws, Estimation of one room building | **5** |
| **6** | **Introduction to Surveying Instruments:**<br>Surveying and Levelling instruments – use, Introduction to modern instruments and tools in surveying – Theodolite, Total Station, RS, GIS & GPS. | **3** |

**List of Practicals / Tutorials:**

| | |
|---|---|
| **1** | Understand various mechanical engineering terminologies. |
| **2** | Study basic thermodynamic laws -Boyle's Law, Charles's Law and the Ideal Gas Law |
| **3** | Analysis of Thermodynamic Properties in Non-Flow Processes |
| **4** | Study of thermodynamic cycles involved in IC Engines |
| **5** | Demonstrate and differentiate working of SI and CI Engine. |
| **6** | Hands on practice on refrigeration and AC system tools |
| **7** | Demonstration of VCR system |
| **8** | Operate and understand the function of a domestic refrigerator and split AC systems |
| **9** | Compare different types of motion transmission devices, evaluating their suitability for different mechanical applications |
| **10** | Describe the function and importance of power transmission devices in mechanical systems. |
| **11** | Study of different building components (site visit) |
| **12** | Typical section of a load bearing wall (drawing) |
| **13** | Prepare a plan, section and elevation of a single room building |
| **14** | Prepare a plan, section and elevation of a single room building ( c o n t i n u e ) |
| **15** | Study of symbols used in building services |
| **16** | Estimation of a one room building |
| **17** | Computation of area by planimeter |
| **18** | Horizontal angle measurement using compass |
| **19** | Determination of RLs by Dumpy level |
| **20** | Demonstration of Total Station, GPS etc. |

**Reference Books:**



| | |
|---|---|
| **1** | Basic Mechanical Engineering by Pravin Kumar, Pearson Publications |
| **2** | Elements of Mechanical Engineering by Sadhu Singh, S. Chand Publication |
| **3** | Elements of Mechanical Engineering by P.S.Desai and S.B.Soni, Atul Prakashan |
| **4** | Fundamental of Mechanical Engineering by G.S. Sawhney, PHI Publications |





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| | |
|---|---|
| **5** | Dr. B.C. Punmia, Ashok kumar Jain, Arunkumar Jain, "Surveying Vol. I", Laxmi Publication New Delhi. |
| **6** | Duggal S.K. "Surveying Vol. I" Tata McGraw Hill Publication, New Delhi. |
| **7** | S.C. Rangwala, "Civil Engineering Drawing" Charotar Publication. |
| **8** | Gurucharan Singh / Jagdish Singh, "Building planning, designing and scheduling" Standard Publisher. |
| **9** | S.C. Rangwala, "Estimating and Costing", Charotar Publishing house. |
| **10** | S. Ramamrutham "Basic Civil Engineering" Dhanpatrai Publication. |
| **11** | Dr R B Khasiya, "Elements of Civil Engineering", Mahajan Publishing House. |


**Pedagogy:**

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Industrial/ Field visits
- Course Projects

**Internal Evaluation:**

The internal evaluation is comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

**Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):**

| Distribution of Theory Marks in % | | | | | | **R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating |
|---|---|---|---|---|---|---|
| **R** | **U** | **A** | **N** | **E** | **C** | |
| 10% | 30% | 20% | 15% | 15% | 10 % | |

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Course Outcomes (CO):**

| Sr. No. | Course Outcome Statements | %weightage |
|---|---|---|
| **CO-1** | Learn fundamental concepts and terms concerning mechanical engineering and I C engine applications. | **25** |
| **CO-2** | Learn applications and fundamentals of refrigeration & AC system, and various motion and power transmission devices. | **25** |
| **CO-3** | Understand basics of civil engineering, building planning, estimation and materials. | **40** |
| **CO-4** | Get the knowledge of basic and modern surveying instrument. | **10** |

| **Curriculum Revision:** | |
|---|---|
| Version: | 1 |
| Drafted on (Month-Year): | April -2025 |
| Last Reviewed on (Month-Year): | -- |
| Next Review on (Month-Year): | April - 2028 |



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