

SEMESTER S1
**INTRODUCTION TO MECHANICAL ENGINEERING & CIVIL
ENGINEERING**

Course Code	A102EST04	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	4-0-0-0	ESE Marks	60
Credits	4	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. Understand thermodynamic cycles and working of IC engines.
2. Understand the refrigeration cycles and psychrometric concepts.
3. Understand the relevance of civil engineering and its various disciplines.
4. Describe the relevance of various building codes and types of buildings as per NBC.
5. Understand different building components and building materials.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	General introduction to Mechanical Engineering: Thermodynamic cycles -Carnot Cycle -Derivation of efficiency (problems on efficiency) Otto, Diesel cycles (no derivation of efficiency and problems). IC Engines: CI & SI Engines, working of 2-Stroke & 4-Stroke engines. Listing the parts of IC Engines. Concept of CRDI, MPFI and hybrid engines. Refrigeration: Unit of refrigeration, reversed Carnot cycle, COP, vapour compression cycle (only description and no problems); Definitions of dry, wet & dew point temperatures, specific humidity and relative humidity, Psychrometric chart, Cooling and dehumidification, Layout of central air conditioning systems	9

2	Classification of pumps, Description about working with sketches of: Reciprocating pump, Centrifugal pump, Classification of Hydraulic Turbines. Different type of gears and its applications (spur, helical, bevel, worm and worm wheel), List types of clutches and their use, Bearings and their classification (Journal bearing and ball bearing) Manufacturing Process: Sand Casting, Forging, Rolling, Extrusion, Metal Joining Processes: List types of welding, Description with sketches of Arc Welding, SMAW, Soldering and Brazing and their applications. Machining processes: Description and operations performed on Lathe, Drilling machine, Milling machine, CNC machine, 3D printing.	9
3	General Introduction to Civil Engineering: Relevance of Civil Engineering in the overall infrastructural development of the country. Brief introduction to major disciplines of Civil Engineering like Structural Engineering, Geo-technical Engineering, Transportation Engineering, Water Resources Engineering and Environmental Engineering. Introduction to buildings: Types of buildings according to character of occupancy as per NBC, Load bearing and non-load bearing building structures, components of a residential building and their functions (conceptonly). Selection of site for a residential building Building Area Definitions: Built up area, Plinth area, Floor area, Carpet area and Floor area ratio of a building as per KBR Building rules and regulations: Relevance of NBC, KBR & CRZ norms (brief discussion of relevance only).	9
4	Conventional construction materials: Brick, stone, sand, cement and timber- Classifications, Qualities, Tests and Uses of construction materials. Cement concrete: Constituent materials, properties and types.	9

	Tests on fresh and hardened concrete - slump test, cube compressivestrength as per IS Codes Steel: Structural steel sections and steel reinforcements – types and uses. Soil- Origin of soil-weathering of rocks, types of weathering	
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Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
2 Questions from each module. - Total of 8 Questions, each carrying 3 marks (8x3 =24marks)	- Each question carries 9 marks - Two questions will be given from each module, out of which 1 question should be answered - Each question can have a maximum of 3 sub divisions (4x9 = 36 marks)	60

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Understand the relevance of mechanical engineering and its various disciplines.	K2
CO2	Learn the applications of thermodynamics through IC engines and refrigeration systems.	K2
CO3	Understand the various manufacturing processes adapted by mechanical engineers.	K2
CO4	Understand the relevance of civil engineering and its various disciplines.	K2
CO5	Describe the relevance of various building codes and types of buildings as per NBC	K2
CO6	Understand different building components and building materials	K2

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping Table:

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Text Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Basic Mechanical Engineering	Pravin Kumar	Pearson Education	1 st Edition,2013
2	A Textbook of Basic Mechanical Engineering	R.K. Rajput	Laxmi Publications	3 rd Edition,2017
3	Elements of Mechanical Engineering	K.P. Roy, S.K. Hajra Choudhury, A.K Hajra Choudhury	Media Promoters & Publishers Pvt Ltd.	Revised Edition, 2012
4	Fundamentals of Mechanical Engineering	G S. Sawhney	PHI Learning Pvt Ltd.	1 st Edition,2013
5	Essentials of Civil Engineering	Dalal K R	Charotar Publishing house	1 st Edition 2012
6	Engineering Materials(Material Science)	Rangwala S C	Charotar PublishingHouse Pvt Limited	43 rd Edition2019
7	Building Materials	Duggal S K	New Age International	5 th Edition2019

Reference Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives	Chris Mi and M. Abul Masrur	John Wiley & Sons	2nd Edition, 2017
2	Automotive Engineering Fundamentals	Richard Stone and Jeffrey K. Ball	SAE International	1 st Edition, 2004
3	Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing	Ian Gibson, David W. Rosen, and Brent Stucker	Springer	2 nd Edition, 2015
4	Heating, Ventilating, and Air Conditioning Analysis and Design	Faye C. McQuiston, Jerald D. Parker, and Jeffrey D. Spiller	John Wiley & Sons	6 th Edition, 2005
5	Materials for Civil and Construction Engineering	Mamlouk, M.S., and Zaniewski, J.P.	Pearson Publishers	4 th Edition, 2017
6	Building Construction	Rangwala, S.C and Dalal, KB	Charotar Publishing house	34 th Edition, 2022
7	Construction Technology Vol.I to IV	Chudley, R	Longman group, England Course Plan	2 nd Edition, 2014
8	Building Construction Volumes 1 to 4	Mckay, W.B. and Mckay, J.K	Pearson India Education Services	5 th Edition
9	Engineering Geology	Duggal S. K., Pandey H. K. and Rawat N,	Mcgraw Hill Education, New Delhi	1 st Edition, 2017
10	Latest Building codes and related rules and regulations.			

Video Links (NPTEL, SWAYAM...)	
Module No.	Link ID
1	https://nptel.ac.in/courses/112/105/112105123/ https://nptel.ac.in/courses/112/106/112106133/ https://nptel.ac.in/courses/112/105/112105129/
2	https://nptel.ac.in/courses/112/105/112105171/ https://nptel.ac.in/courses/112/105/112105268/ https://archive.nptel.ac.in/courses/112/107/112107145
3	https://archive.nptel.ac.in/courses/105/106/105106201/
4	https://archive.nptel.ac.in/courses/105/106/105106206/