

SEMESTER S₁

INTRODUCTION TO MECHANICAL ENGINEERING & CIVIL ENGINEERING

Course Code: GCEST104

Credits: 4

Exam Hours: 2 Hrs. 30 Min.

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	<p>General introduction to Mechanical Engineering: Thermodynamic cycles -Carnot Cycle -Derivation of efficiency (problems on efficiency) Otto, Diesel cycles (no derivation of efficiency and problems).</p> <p>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.</p> <p>Refrigeration: Unit of refrigeration, reversed Carnot cycle, COP, vapour compression cycle (only description and no problems);</p>	

	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	<p>Classification of pumps, Description about working with sketches of: Reciprocating pump, Centrifugal pump. Classification of Hydraulic Turbines.</p> <p>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)</p> <p>Manufacturing Process: Sand Casting, Forging, Rolling, Extrusion.</p> <p>Metal Joining Processes: List types of welding, Description with sketches of Arc Welding, SMAW, Soldering and Brazing and their applications.</p> <p>Machining processes: Description and operations performed on Lathe, Drilling machine, Milling machine, CNC machine, 3D printing.</p>	9
3	<p>General Introduction to Civil Engineering: Relevance of Civil Engineering in the overall infrastructural development of the country.</p> <p>Brief introduction to major disciplines of Civil Engineering like Structural Engineering, Geo-technical Engineering, Transportation Engineering, Water Resources Engineering and Environmental Engineering.</p> <p>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 (concept only).</p> <p>Selection of site for a residential building.</p> <p>Building Area Definitions: Built up area, Plinth area, Floor area, Carpet area and Floor area ratio of a building as per KBR.</p> <p>Building rules and regulations: Relevance of NBC, KBR & CRZ norms (brief discussion of relevance only).</p>	9
4	<p>Conventional construction materials: Brick, stone, sand, cement and timber- Classifications, Qualities, Tests and Uses of construction materials.</p> <p>Cement concrete: Constituent materials, properties and types.</p> <p>Tests on fresh and hardened concrete - slump test, cube</p>	9

	compressive strength 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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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	1st Edition, 2013
2	A Textbook of Basic Mechanical Engineering	R.K. Rajput	Laxmi Publications	3rd 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.	1st Edition, 2013
5	Essentials of Civil Engineering	Dalal K R	Charotar Publishing house	1st Edition 2012
6	Engineering Materials(Material Science)	Rangwala S C	Charotar Publishing House Pvt Limited	43rd Edition 2019
7	Building Materials	Duggal S K	New Age International	5Th Edition 2019

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	2 nd 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. Spitler	John Wiley & Sons	4th Edition, 2005
5	Materials for Civil and Construction Engineering	Mamlouk, M.S., and Zaniwski, J.P	Pearson Publishers	4th Edition, 2017
6	Building Construction	Rangwala, S.C and Dalal, KB	Charotar Publishing house	4th Edition 2022
7	Building Construction Volumes 1 to 4	Mckay, W.B. and Mckay, J.K	Pearson India Education Services	4th Edition
8	Construction Technology Vol. I to IV	Chudley, R	Longman group, England Course Plan	2 nd Edition 2014
9	Engineering Geology	Duggal S. K., Pandey H.K. and Rawat N,	Education, New Delhi	1 st Edition 2017
10	Latest Building codes and related rules and regulations.			