MALNAD COLLEGE OF ENGINEERING, HASSAN

DEPARTEMENT OF Mechanical Engineering

Course Title	**ELEMENTS OF MECHANICAL ENGINEERING**		
Course Code		**(L-T-P) C**	(3-0-0)3
SEE duration	3 hours	**Hours / Week**	03
CIE (Theory) marks	30	**CIE (Practical's)/Activity marks**	20
SEE marks	50	**Total contact hours**	39

Course Objective:

Tointroducefreshentrantsofmechanical engineering course totheprinciplesandfundamentalsofMechanicalEngineering

Course Outcomes (COs) {with mapping shown against the **Program Outcomes (POs)**} **Uponcompletion of the course,studentsshallbeable to:**

Sl. No.	Course outcomes	Mapping to POs
1.	explain the purpose of mechanical engineering in industry and society, basics of steam, IC engines and electric vehicles	1, 2, 10
2.	Describedifferentpowertransmission systems,and concepts of engineering materials	1, 2, 10
3.	describe traditional manufacturing techniques and illustrate manufacturing components using Lathe, CNC, additive manufacturing, and joining processes	1, 10
4.	understand the basic principles of refrigeration and air-conditioning and mechatronics systems	1, 10

Course Contents:

MODULE –1 **10 Hrs.**

Introduction to Mechanical Engineering (Overview)

Role of Mechanical Engineers in Industries and Society - Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, Automation, Industry 4.0 and applications in Artificial Intelligence (AI) and Machine Learning (ML)

Steam Formation and its properties: Steam formation, Types of steam, Steam properties and applications of steam, Simple numerical problems.

IC Engines: Components and working principles, 4-stroke petrol and diesel engines, Applications of IC Engines, Performance of IC engines, Numericalproblems onIP, BP, FP, Mechanical Efficiency.

Activity:

1. Visit to any manufacturing/ aero/ auto industry or any power plant
2. Demonstration of working of IC engine
3. Various pollutants from the IC engine emission and effect on the environment

MODULE –2 **10 Hrs.**

Engineering Materials: Classification of Engineering Materials, Composite materials - classification, need, properties, advantages, limitations, and applications.

Power Transmission: Gears-spurgears, bevelgears, helicalgears, worm gear sets, and rack and pinion, simple and compound gear trains, Belt drives (Flat and V-belt drive), Slip and creep in belt drives, V-belt drive, Velocity ratio, Simple numerical problems.

Electric Vehicles: Working, Advantages and disadvantages, Components - Batteries, Chargers, Power devices, Drives and Transmission, Current status of EV vehicle technology in India.

Activity:

1. Demonstration on tensile testing using UTM
2. Demonstration of power transmission devices
3. Comparison of electric and hybrid vehicles

MODULE –3	10 Hrs.

Conventional Machining Processes: Introduction, Differences between conventional and non-conventional machining processes. **Machine Tool Operations:** Lathe: Principle of working of a center lathe, lathe operations - Turning, facing, thread cutting, taper turning by swiveling the compound rest. Drilling Machine: Working principle of simple drilling machine, drilling operations: drilling, boring, reaming, tapping. Milling machine: Working principle of simple milling machine, milling operations: up milling and down milling.
(No sketches of machine tools, sketches to be used only for explaining operations)
Joining Processes: Basic principle of welding, working principle of Electric Arc-welding and Gas welding and flames, Brazing, and soldering with applications.

Activity:

1. Demonstration of lathe/ milling/ drilling operations
2. Demonstration of welding operation

MODULE – 4	10 hrs.

RefrigerationandAirConditioning: Principle of refrigeration, Refrigerants and their desirable properties, working principle of VCR refrigeration system, Working principle of room/ window type air conditioner and Applications of air conditioners.
Introduction to Advanced Manufacturing Systems: Introduction, Components of CNC, advantages and applications of CNC, Additive Manufacturing.
Introduction to Mechatronics: Measurement system, Elements of measurement system, Open-loop and closed loop control systems, Advantages, disadvantages and applications of Mechatronics.

Activity:

1. Demonstration of working of refrigerator
2. Visit to air conditioning unit
3. Demonstration of CNC operations and 3D printing

TEXTBOOK:

1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008
2. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.

REFERENCES:

1. An Introduction to Mechanical Engineering, Jonathan Wickert, 2nd edition, Cengage Learning 2006, ISBN-10: 1-111-57682
2. Elements of Mechanical Engineering - K P Roy, S K H Choudhry, A K H Choudhry, Roy Media promoters and publishers, Mumbai, 7th edition, ISBN: 4567145216, 1234567145210.
3. Electric and Hybrid vehicles by A. K. Babu Khanna Publications
4. Introduction to Mechatronics, AppuuKuttan K K, Oxford University Press, 2007.

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COURSE ATRICULATION MATRIX

Course Out comes	Program Outcomes [POs]													
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2								2				
CO2	3	2								2				
CO3	3									2				
CO4	3									2				

Scheme of Evaluation (Theory Courses)

	Portions for CIE	Mode of Evaluation	Weightage in Marks
CIE - 1	Syllabus to be decided by the course coordinators such that all the COs shall be covered.	Descriptive Test	**10**
CIE - 2		Descriptive Test	**10**
CIE - 3		Descriptive Test	**10**
Activity	Minimum of two activities to be conducted	Assignment / Case study/Practical/ Working model /Quiz	**20**
SEE			**50**
Total			**100**