FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: **Bachelor of Technology (Mechanical Engineering)**

Semester: **VIII**

Course Code: **202090803**

Course Title: **Machine Design**

Course Group: **Professional Elective Course - V**

Course Objectives: The course is to provide fundamental knowledge for analysis and design of Internal Combustion engine components, Speed Gear Box, cranes, welded joints and riveted Joints.

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	
3	0	2	4	50 / 18	50 / 17	25 / 9	25 / 9	150/53

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

Detailed Syllabus:

Sr. No.	Contents	Hours
1	**IC Engine Components:** Design of cylinder and Cylinder head, Design of piston, Design of connecting rod, Design of crankshaft and Design of valve-gear mechanism.	17
2	**Design of Cranes:** Basic objectives of material handling system, Types of load, Classification and application of various Material handling equipment, Basic principles in selection of material handling system, Classification of cranes, Stress analysis and Design of Hooke, Pulley System (hoisting tackle analysis), Steel Wire ropes: Classification and coding, stress analysis and selection, Design of Sheave and drums.	14
3	**Design of Gear Box for Machine Tools:** Comparison and Choice of progression (Arithmetic, Geometric, Harmonic and Logarithmic), general design procedure, determination and fixation of spindle speeds, selection of the best structure diagram, selection of gear layout and ray diagram, determination of number of teeth on gears.	06

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4	**Welded and Riveted Joints:** Welded joints: stress relieving of welded joints, Strength of butt and fillet joint, Eccentric load in the plane of weld, Welded joint subjected to bending and torsion. Riveted joints: rivet materials, types of failure, strength and efficiency of joint, Caulking and Fullering, Longitudinal and Circumferential lap joint, Eccentrically loaded riveted joint.	**08**
	Total	**45**

List of Practicals / Tutorials:

1	To understand basic functions and requirement of different permanent joining methods.
2	Design of riveted joint.
3	Design of welded joint.
4	Design of IC engine cylinder and piston.
5	Design of connecting rod, crank shaft and valve gear mechanism.
6	To understand the requirement of speed gear box in different machines.
7	Design of speed gear box
8	To understand the requirement and basic concept of material handling equipment.
9	Design of lifting equipment (Crane hook).
10	Design of lifting equipment (Rope Drum).

Reference Books:

1	Design of Machine Elements, V B Bhandari, 3/e, McGraw Hill.
2	Machine Design, P C Sharma and D K Aggarwal
3	Fundamentals of Machine Component Design, R C Juvinall, 4/e, Wiley.
4	Shigley's Mechanical Engineering Design, R G Budynas, and K J Nisbett, McGraw-Hill
5	Machine Design An Introduction, R L Norton, Pearson.
6	Machine tool Design and Numerical Control, N K Mehta Tata McGraw Hill
7	Design Data Book, Bhandari, V.B., Tata McGraw-Hill Publishing Company Ltd.

Supplementary learning Material:	
1	NPTEL resources

Pedagogy:

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

Internal Evaluation:

The internal evaluation 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%.

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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%	20%	50%	10%	5%	5 %	

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.	Course Outcome Statements	%weightage
CO-1	Design IC engine components	**35**
CO-2	Students will be able to select Material handling equipment and design crane assembly	**30**
CO-3	Design gearboxes for machine tools.	**15**
CO-4	Students will be able to design welded / riveted joints.	**20**

Curriculum Revision:	
Version:	2
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	--
Next Review on (Month-Year):	June-2025

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