

Proposed syllabus

NIRMA UNIVERSITY
INSTITUTE OF TECHNOLOGY, SCHOOL OF ENGINEERING
B Tech in Mechanical Engineering
Semester V

L	T	P	C
3	0	2	4

Course Code	2ME501
Course Title	Machine Design – I

Course Outcomes(CO):

After successful completion of the course, student will be able to-

1. explain the concepts of design philosophy,
2. design welded joints, riveted joints, pressure vessels and components subjected to buckling,
3. evaluate the fatigue life of mechanical components,
4. design mechanical systems like hydraulic press, clutch and brakes.

Syllabus

Teaching Hours: 45

UNIT - I	Design philosophy	09 hours
	Fail safe and safe life design concepts, Damage tolerant design, Design for Assembly (DFA), Design for Manufacturability (DFM), ergonomics, thermal stress, creep, concurrent engineering. Standardization – Limit, fit, tolerance, preferred numbers, process capability.	
UNIT - II	Designs of welded and riveted joints	05 hours
	Design of butt weld joints, Design of parallel and transverse fillet joint, Design of welded joints subjected to eccentric loading, Design of riveted joint for various configurations.	
UNIT - III	Design of machine components under fatigue loading	14 hours
	Design for finite and infinite life for completely reversed load, Design based on Gerber, Goodman and Soderberg criteria, Application of fatigue loading for design of shafts, axles, various mechanical components etc.	

- UNIT - IV Design of clutches and brakes** **07 hours**
Types of clutches-mechanical, hydraulic and electro-magnetic. Design of various mechanical clutches like single plate, multiple plate, centrifugal clutch etc., Design of various mechanical brakes like block brake, band brake, internal expanding shoe brake etc.
- UNIT - V Design of parts subjected to Buckling** **03 hours**
Design of components subjected to buckling such as connecting rod push rod and piston rods
- UNIT - VI Design of Pressure Vessels** **07 hours**
Thin and thick pressure vessels, compound cylinder with internal and external pressures. ASME Codes for design of pressure vessels.
- Self - Study** The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 07 experiments/exercise to be incorporated.

Suggested Readings:

1. Bhandari V. B., Design of Machine Element, Tata McGraw Hill
2. Shigley, Budynas, Nisbett, Mechanical Engineering Design, Tata McGraw Hill
3. Norton R. L., Machine Design, Pearson Education
4. Juvinall R. C., Marshek K.M., Fundamentals of Machine Component Design, John Wiley & Sons

L=Lecture T= Tutorial P=Practical, C=Credit

w.e.f. academic year 2020-21 and onwards