

Gautam Buddha University, Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech. in Design Engg.	Advanced Mechanical Design	MED 501	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
I	3	3-0-0	3 Hours

Unit – I

Design Philosophy: Design process; Problem formation; Introduction to product design; Various design models-Shigley model; Asimov model and Norton model; Need analysis; Strength considerations -standardization. Creativity; Creative techniques; Material selections; Notches and stress concentration; design for safety and Reliability. **(06 Hours)**

Unit – II

Economic Factors Influencing Design: Economic analysis; Break-even analysis; Human engineering considerations; Ergonomics; Design of controls; Design of displays; Value engineering; Material and process selection in value engineering; Modern approaches in design. **(06 Hours)**

Unit – III

Product Design: Product strategies; value; planning and specification; concept generation; concept selection; concept testing. **(05 Hours)**

Unit – IV

Design for Manufacturing: Forging design; Casting design; Design process for non metallic parts; Plastics; Rubber; Ceramic; Wood and Glass parts like. Material selection in machine design. **(07 Hours)**

Unit – V

Failure Theories: Static failure theories; Distortion energy theory; Maximum shear stress theory; Coulomb-Mohr's theory; Modified Mohr's theory. Fatigue failure theory: Fracture; Fatigue mechanisms; Fatigue failure models; Design for fatigue strength and life. Creep: Types of stress variation; design for fluctuating stresses; design for limited cycles; multiple stress cycles; Fatigue failure theories ;cumulative fatigue damage; thermal fatigue and shock; harmful and beneficial residual stresses; Yielding and transformation

Surface Failures: Surface geometry; mating surfaces; oil film and their effects; design values and procedures; adhesive wear; abrasive wear; corrosion wear; surface fatigue; different contacts; dynamic contact stresses; surface fatigue failures; surface fatigue strength. **(15 Hours)**

Unit – VI

Design of Machine Elements: Advanced concepts for design of spur; Bevel; Worm and other types of gear drives; Bearings; Rotating discs.

(06 Hours)

Recommended Books:

1. Machine Design: An Integrated Approach; Robert L. Norton; Prentice-Hall New Jersey; USA.
2. Engineering Design; George E Dieter; McGraw Hill; 2008
3. Mechanical Engineering Design; J. E. Shigley and L.D. Mitchell; McGraw Hill International Book Company; New Delhi.
4. Fundamentals of Machine Elements; Hamrock; Schmid and Jacobian; 2nd edition; McGraw Hill International Edition.
5. Product Design and Development; Karl T. Ulrich and Steven D. Eppinger; 3rd edition; Tata McGraw Hill.
6. Product Design and Manufacturing; A. K. Chitale and R. C. Gupta; Prentice Hall.