Gautam Buddha University; Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech. Design	Advanced Mechanics of Solids	MED 503	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
I	3	3-0-0	3 Hours

Unit – I

Flat Plates: Introduction to plates as structure; Types of plates-isotropic and anisotropic; Displacement theory for plates; Stress-strain-temperature relationship for isotropic elastic plates; Strain energy of a plate; Boundary conditions for plates; Determination of field variable in rectangular and circular plates.   **(07 Hours)**

Unit – II

Beams on Elastic Foundation: General theory; Infinite beam subjected to concentrated load; Boundary conditions; Infinite beam subjected to a distributed load segment; Semi-infinite beam subjected to loads of its end; Semi-infinite beam with concentrated load near its end; Short beams; Thin-wall circular cylinders.   **(06 Hours)**

Unit – III

Torsion: Torsion of bars having different cross-section: Circular; rectangular; Elliptical etc. Torsion of cylindrical bar of circular cross-section Saint-Venant's semi-inverse method; Linear elastic solution; The Prandtl elastic; Membrane (soap-film) analogy; Narrow rectangular cross-section; Hollow thin-wall torsion members: Multiply connected cross-section; Thin-wall torsion members with restrained ends; Fully plastic torsion.

(08 Hours)

Unit – IV

Crack in Structure: Develop basic fundamental understanding of the effects of crack-like defects on the performance of mechanical engineering structures; Selection of appropriate materials for engineering structures to insure damage tolerance; Numerical methods to determine

critical crack sizes and fatigue crack propagation rates in engineering structures. **(07 Hours)**

Unit – V

Contact Stresses: Type of contact; Line and point; Contact stresses; Development of governing equation for computation of contact stresses; Determination of elastic deformation at line; Point and rectangular area contacts. **(09 Hours)**

Unit – VI

Stress Concentration: Introduction to stress concentration; Static stress concentration; Dynamic stress concentration; Determination of stress concentration factors; Measurement of stress concentration. **(08 Hours)**

Recommended Books:

1. Advanced Mechanics of Materials; A. P. Boresi; and O. M. Sidebottm.
2. Advanced Mechanics of Materials; Seely and Smith.
3. Advanced Strength of Materials; Den Hartog.
4. Advanced Strength of Materials; S. P. Timoshenko.