Reg. No										

AY 24

GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

M.Tech. (First Semester) Regular Examinations, February – 2025

24MMDPC11001 – Advanced Stress Analysis

(Machine Design)

Time: 3 hrs | Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. State Hooke's Law for isotropic materials.	CO1	K1
b. Define shear strain.	CO2	K1
c. Classify the mechanical extensometers depending upon the manner of obtaining the magnification.	CO3	K1
d. Define Stress optic law.	CO4	K1
e. Give the disadvantages of a simple mechanical lever magnification	CO6	K1

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions		Marks	CO #	Blooms Level
2. a.	Derive the stress-strain relations for a linearly elastic, isotropic material.	5	CO1	K3
b.	Explain the test procedures for Brittle-coating analysis.	5	CO1	K2
	(OR)			
c.	Explain the concept of strain energy density and its significance.	5	CO1	K3
d.	Discuss the Tresca and on Mises yield criteria used in failure analysis.	5	CO1	K3
3.a.	Derive the differential equations of equilibrium for a three-dimensional stress state.	5	CO2	K3
b.	Explain the prismatic bar under torsion and derive the expression for shear stress distribution.	5	CO2	K2
	(OR)			
c.	Derive the stress optic law,as applied to 2D photoelasticity?	5	CO2	K3
d.	Derive the equation for light passing through a stressed model in a circular polariscope.	5	CO3	K3
4.a.	Explain the crack detection techniques in brittle coating method.	5	CO4	K3
b.	Explain the principle of Geometrical approach to moiré fringe analysis?	5	CO3	K3
	(OR)			
c.	Difference between isoclinic fringe patterns and iso chromatic fringe patterns also write their any two practical examples?	5	CO3	K3
d.	Define plane stress and plane strain conditions with examples	5	CO4	K2
5.a.	Explain the principle stresses and pricipal planes in a two-dimensional stress system.	5	CO4	K3
b.	Derive the equilibrium equations for a two-dimensional stress state.	5	CO4	K3
	(OR)			
c.	Define Mohr's Circle. Explain its sigmificance in stress analysis.	5	CO5	K2
d.	Explain Saint-Venant's Principle and its applications.	5	CO6	K1

6.a.	Discuss the Clapeyron's theorem of three moments and its application in beam analysis.	7	CO5	K2
b.	Explain stress concentration. Mention its causes and effects with examples.	3	CO5	K3
	(OR)			
c.	Derive the strain-displacement relations for a two-dimensional deformation state.	5	CO6	K2
d.	Explain the concept of stress invariants and their significance.	5	CO6	K3

--- End of Paper ---