

M. C. E. EXAMINATION, 2025
1st semester
THEORY OF ELASTICITY AND ELASTIC STABILITY
Time 3 hours Full marks 100

Answer each part in separate answer scripts

Part- I (Full marks 60)

Answer all questions

1. Form the tensorial transformation law for vectors. Hence, show how to transform the strain tensor? Show for an admissible displacement the Jacobian between deformed and initial coordinates should be positive definite. $6+6+6 = 18$
2. Find the expressions to evaluate (a) traction $T_i^{(n)}$ and (b) normal stresses σ_n with respect to stress components, σ_{ij} . $9+8 = 17$
3. From the gradient of displacement vector, derive strain, rotation and interpret rotation graphically. Derive the stress-strain law of an orthotropic material from that of an anisotropic material. $6+6+6+9 = 25$

[Turn over

M.E. CIVIL ENGINEERING FIRST YEAR FIRST SEM. EXAM. -2025**Subject: THEORY OF ELASTICITY AND ELASTIC STABILITY****Time: 3 Hrs****Full Marks 100****PART-II (MARKS-40)**

Use a separate Answer-Script for each part

No. of questions	<u>Answer all questions</u>	Marks 6+18+16=40
1.	What do you mean by stable, unstable and neutral equilibrium. Discuss with neat sketch.	6
2.	Determine the elastic buckling load of a column having one fixed support and other end free. Also determine the buckling load of a column having both end fixed support.	18
3.	Deduce the fourth order equation of plate bending with neat sketch.	16