

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech., Winter 2018 - 19 Examination

Semester: 1
Subject Code: 203209102
Subject Name: Advanced Solid Mechanics

Date: 11-12-2018
Time: 10:00 am to 01:00 pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

- Q.1** A) Write the application of linear elasticity (05)
 B) Write difference between linear elasticity and strength of material. (05)
 C) Write the types of stresses and strain. (05)
- Q.2** Answer the following questions. (Attempt any three) (Each five mark) (15)
 A) Write the short note on the linear elasticity
 B) Prove that stiffness matrix $D_{ij} = D_{ji}$
 C) Write the assumptions associated with the elementary approach of bar under torsion.
 D) Explain the idealised stress- strain curve for the plastic deformation.
- Q.3** A) Explain the St. Venant's principle. (07)
 B) Explain the torsion of Rectangular bar. (08)
- OR**
- B) The following are the principal stress at a point in a stressed material. Taking $E = 210 \text{ N/mm}^2$ and $n = 0.3$, calculate the volumetric strain and the Lamé's constants. (08)
 $\sigma_x = 200 \text{ N/mm}^2$, $\sigma_y = 150 \text{ N/mm}^2$, $\sigma_z = 120 \text{ N/mm}^2$.
- Q.4** A) Explain the Airy's Stress function (07)
- OR**
- A) Derive the equation between E, G, K. (07)
 B) When the stress tensor at a point with reference to axes (x, y, z) is given by the array, show that the stress invariants remain unchanged by transformation of the axes by 45° about the z-axis. (08)
- $$\begin{bmatrix} 4 & 1 & 2 \\ 1 & 6 & 0 \\ 2 & 0 & 8 \end{bmatrix} \text{ MPa}$$