**Programme Name & Branch: B.Tech Mechanical (Energy, Automotive, Production and Industrial Engineering)**

**Course Name & Code: MEE1032 & Mechanics of Solids and Fluids**

**Class Number: VL2019201002248**       **Slot: D1+TD1**       **Exam Duration: 90 min**

**Maximum Marks: 50**

**Faculty: Sharan Chandran M**

**General instruction:**

Missing Data may be assumed suitably

| S.No. | Section – A (2 x 10 = 20 Marks) Question | Course Outcome (CO) |
|---|---|---|
| 1. | Explain the stress-strain diagram of mild steel and Cast Iron with neat sketch. | 1,2 |
| 2. | A body with cuboid shape with dimensions 100 mm x 50 mm x 20 mm is subjected to stresses in three mutually perpendicular direction as $\sigma_x$=+16 MPa, $\sigma_y$=+6 MPa, $\sigma_z$= -5 MPa. E=200 GPa, poisson's ratio is 0.3. Determine the volume change of the body. | 1,2 |

| S.No. | Section – B (2 x 15 = 30 Marks) Question | Course Outcome (CO) |
|---|---|---|
| 3. | The principal tensile stresses at a point across two perpendicular planes are 120 MN/m² and 60 MN/m². Find using both analytical and graphical methods: <br><br> (i) The normal and tangential stress and the resultant stress and its obliquity on a plane at $20^0$ with the major principal plane. <br><br> (ii) The intensity of stress which acting alone can produce the same maximum strain. Take the value of Poisson's ratio = 0.25. | 1,2 |

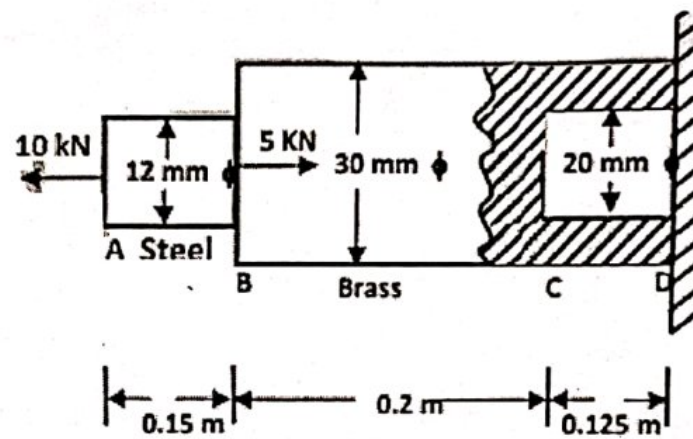| 4. | (a) Explain various static failure theories with neat sketch (5 Marks) | 1,2 |
|---|---|---|
| | (b) The diameters of the brass and steel segments of the axially loaded bar shown in Fig. 1 are 30 mm and 12 mm respectively. The diameter of the hollow section of the brass segment is 20 mm. Determine: (i) The displacement of the free end; (ii) The maximum normal stress in the steel and brass. Take E for steel= 210 GPa and E for brass = 105 GPa.                                   (10 Marks) | |



10 kN   5 KN
12 mm   30 mm   20 mm
A Steel
B   Brass   C   D
0.15 m   0.2 m   0.125 m

Figure.1