Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14CE2002** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MECHANICS OF SOLIDS** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Define:  (i) Tensile Stress (ii) Compressive Stress (iii) Shear Stress. | CO1 | 5 |
| b. | The figure below shows a bar consisting of three lengths. Find the stresses in three parts and the total extension of the bar for an axial pull of 40kN. Take E = 2 x 105N/mm2. | CO1 | 15 |
| **(OR)** | | | | |
| 2. |  | A compound tube consists of a steel tube 150 mm internal diameter and 10mm thickness and on the outer brass tube 170mm internal diameter and 10mm thickness. The two tubes are of the same length. The compound tube carries an axial load of 1,000kN. Find the stresses and the load carried by each tube and the extent it shortens. Length of each tube is 150mm. Take Es = 2 x 105N/mm2 and Eb = 1 x 105N/mm2. | CO1 | 20 |
|  |  |  |  |  |
| 3. |  | A rectangular block of material is subjected to stresses as shown in figure below. Find   1. The direction of principal planes; and 2. The magnitude of the principal stresses | CO1 | 20 |
| **(OR)** | | | | |
| 4. | a. | The tensile stresses at a point across two mutually perpendicular planes are 120N/mm2 and 60N/mm2. Determine the normal, tangential and resultant stresses on a plane inclined 30o to the axis of the minor stress. | CO2 | 15 |
| b. | Define principal planes and principal stresses and their applications. | CO2 | 5 |
|  |  |  |  |  |
| 5. |  | Draw the shear force and bending moment diagram for the beam shown in figure below. | CO2 | 20 |
| **(OR)** | | | | |
| 6. |  | Draw the shear force and bending moment diagram. | CO2 | 20 |
|  |  |  |  |  |
| 7. |  | A Tee – section as given in figure below is used as a simply supported beam of span 8m and subjected to u.d.l. of 25kN/m over its entire span. Draw the variation of shear force across the depth of the beam. | CO3 | 20 |
| **(OR)** | | | | |
| 8. |  | A solid circular shaft has to transmit 100kN at 200 rpm. Calculate the required diameter of shaft, if the twist in the shaft is not to exceed 1.2o in 2m length of shaft and the shearing stress is limited to 60N/mm2. The maximum torque exceeds mean torque by 20%. Take C = 0.8 x 105N/mm2. | CO3 | 20 |
|  | | **Compulsory**: |  |  |
| 9. |  | A cantilever of span 15m carries two points load of 5kN and 8kN at 4m and 8m from support. Determine the slope and deflection at the free end. | CO4 | 20 |