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BET-022

DIPLOMA IN CIVIL ENGINEERING (DCLE(G)) / DIPLOMA IN MECHANICAL ENGINEERING (DME) / DCLEVI / DMEVI / DELVI / DECVI / DCSVI / ACCLEVI / ACMEVI / ACELVI / ACECVI / ACCSVI

00157

Term-End Examination

December, 2017

BET-022 : STRENGTH OF MATERIALS

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt **five** questions in all. Question no. **1** is **compulsory**. Assume any missing data suitably. Use of scientific calculator is permitted.*

1. Answer ***all*** the questions : *7×2=14*

   (a) Define Normal and Shear stress.

   (b) Show that $E = \frac{9\,KG}{3\,K + G}$; where E, G and K are Young's modulus of elasticity, modulus of rigidity and bulk modulus.

   (c) Define Point of Contraflexure in a beam.

   (d) Explain neutral axis with diagram.

   (e) Define Equivalent Length of a column.

   (f) What is Torsional stress ?

   (g) Draw the stress – strain diagram for cast iron.

2. In a tensile test on a certain specimen 20 mm diameter, 200 mm long, an axial pull of 100 kN is applied. It produces an elongation of 0·32 mm and reduction in diameter of 0·0085 mm. Find the value of Poisson ratio and the three modulii. *14*

3. At a certain point in a strained material the normal stresses on two planes at right angles to each other are 20 N/mm^2 and 10 N/mm^2, both being tensile. They are accompanied by a shear stress of 10 N/mm^2. Find principal planes, principal stresses and maximum shear stress. *14*

4. A steel beam of hollow square section of 60 mm outer side and 50 mm inner side is simply supported on a span of 4 m. Find the maximum concentrated load the beam can carry at the middle of the span, if the bending stress is not to exceed 120 N/mm^2. *14*

5. Draw the Shear Force Diagram (SFD) and Bending Moment Diagram (BMD). Also draw the SFD and BMD of the beam loaded as shown in figure 1. *14*

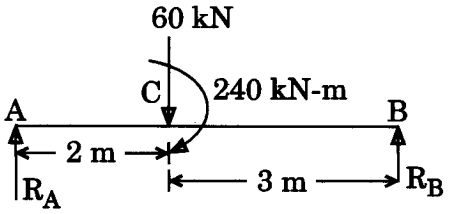

Figure 1

6. A hollow shaft of external diameter 120 mm transmits 30 kW at 200 rpm. Determine the maximum internal diameter, if the maximum shear stress in the shaft is not to exceed 60 N/mm^2. *14*

7. Write short notes on the following : *2×7=14*

   (a) Middle Third Rule for Rectangular Cross-Section

   (b) Euler's Formula for Column