

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

00359

**Term-End Examination**

**December, 2016**

**BET-022(S) : STRENGTH OF MATERIALS**

*Time : 2 hours*

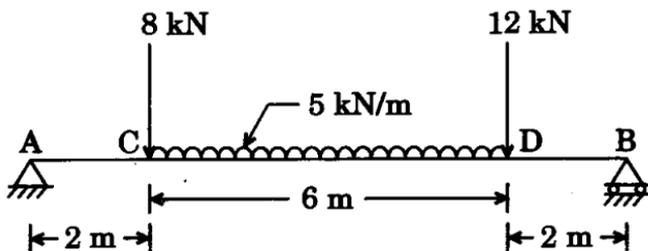
*Maximum Marks : 70*

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

1. Answer **all** the questions :  $7 \times 2 = 14$
- (a) Define stress and differentiate between stress and pressure.
  - (b) Derive the relation between E, G and  $\nu$ .
  - (c) Define section modulus.
  - (d) Explain shear force.
  - (e) Define Poisson's ratio.
  - (f) Explain polar moment of inertia.
  - (g) Differentiate between strut and column.

2. Explain the stress – strain curve for a ductile material with a neat sketch. A steel bar is subjected to a load of 80 kN. The diameter of the bar is 16 mm and its length is 320 mm. Calculate the elongation if modulus of elasticity is  $196 \text{ kN/mm}^2$ . Calculate the change in diameter if Poisson's ratio is 0.28. 14

3. Draw the shear force and bending moment diagram of the beam loaded as shown in Figure 1. 14



*Figure 1*

4. What are the assumptions made for the bending equation? Also derive the bending equation for a cantilever. 14
5. A hollow rectangular beam, 50 mm deep and 200 mm wide and wall thickness of 5 mm, is simply supported over a span of 6 m. Determine the maximum bending stress in the beam with a uniformly distributed load of 11 kN/m. 14

6. In an elastic material, at a certain point on planes at right angles to one another, direct stresses of 120 MPa (T) and 100 MPa (C) are acting. The major principal stress in the material is to be limited to 160 MPa. Find the shear stress, minimum principal stress and maximum shear stress. 14
7. Write short notes on the following : 14
- (a) Rankine-Gordon Formula
  - (b) Middle Quarter Rule
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