No. of Printed Pages : **4**

BET-022

00522

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

Term-End Examination

June, 2019

BET-022 : STRENGTH OF MATERIALS

Time : 2 hours *Maximum Marks : 70*

Note : *(i) Question number 1 is **compulsory**.*

*(ii) Attempt **any four** more questions from the remaining questions.*

*(iii) **All** questions carry **equal** marks.*

(iv) Use of scientific calculator is permitted.

1. Choose the correct alternative : **7x2=14**

(a) Modulus of elasticity is defined as the ratio of

(i) Longitudinal stress to Longitudinal strain

(ii) Shear stress to Shear strain

(iii) Stress to strain

(iv) Stress to volumetric strain

(b) Volumetric strain in a bar subjected to an axial tensile load (P) is equal to :

(i) $e\ (1+2\ \mu)$ (ii) $e\ (1-2\ \mu)$

(iii) $e\ (2-\mu)$ (iv) $e\ (1-3\ \mu)$

(c) The point of contraflexure for a beam is a point where :

(i) BM is constant

(ii) SF is constant

(iii) BM changes sign

(iv) SF changes sign

(d) The maximum deflection of a simply supported beam of span l carrying a concentrated load W at the centre is :

(i) $Wl^3/8\ EI$

(ii) $Wl^3/16\ EI$

(iii) $Wl^2/24\ EI$

(iv) $Wl^3/48\ EI$

(e) Which one is the correct torsion formula for circular shaft ?

(i) $\frac{T}{J}=\frac{fs}{R}=\frac{C\theta}{l}$

(ii) $\frac{T}{R}=\frac{fs}{J}=\frac{C\theta}{l}$

(iii) $\frac{T}{l}=\frac{fs}{J}=\frac{C\theta}{R}$

(iv) $\frac{T}{\theta}=\frac{fs}{R}=\frac{CJ}{l}$

(f) A column has maximum crippling load when its :

(i) both ends are hinged

(ii) both ends are fixed

(iii) one end is fixed and other end is free

(iv) one end is fixed and other end is hinged

(g) Shear stress on principal planes is :

(i) Maximum

(ii) Minimum

(iii) Zero

(iv) None of the above

2. A steel rod circular in cross-section tapers from 30 mm diameter to 150 mm diameter in a length of 1 metere. **14**

Find how much of this length will increase under a pull of 4.20 kN if modulus of elasticity,

$E = 2.10 \times 10^5 \ N/mm^2$

3. Figure - 1 shows the state of stress at a point. Determine the maximum and minimum principal stresses and the plane on which they act. Determine also the magnitude of maximum shearing stress. **14**

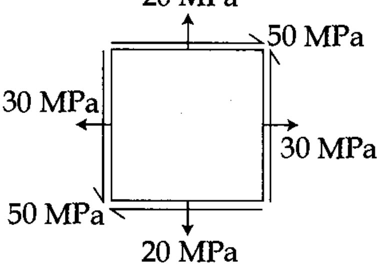

Fig. 1

4. Draw the shear force and bending moment diagram for a simply supported beam of span l carrying a uniformly distributed load of W per unit length over the entire span as shown in fig. 2. Also determine the value of maximum bending moment. **14**

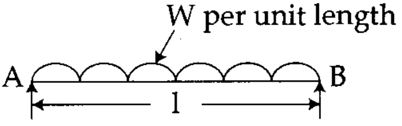

Fig. 2

5. Determine the slope and deflection at the free end of a cantilever beam of span l carrying a point load W at the free end as shown in fig. 3 **14**

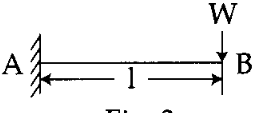

Fig. 3

6. A timber beam 150 mm wide and 350 mm deep is simply supported over a span of 5 m. Find the maximum uniformly distributed load that the beam can carry, if the stress is not to exceed 10 N/mm^2. **14**

7. The ratio of torque of hollow shaft to that of solid shaft is 1.94 for the same weight, material and maximum shear stress. Show that internal diameter of hollow shaft is two third of its external diameter. **14**

8. A solid circular strut 2 m long having 50 mm diameter loaded through pin joints at both ends. Calculate the crippling load by Euler's formula. **14**

   Assume $E = 2 \times 10^5\ N/mm^2$.
