BCE-032

DIPLOMA IN CIVIL ENGINEERING [DCLE(G)]/ADVANCED LEVEL CERTIFICATE COURSE IN CIVIL ENGINEERING (DCLEVI/ACCLEVI)

Term-End Examination

December, 2019

BCE-032 : THEORY OF STRUCTURE-I

Time : 2 Hours *Maximum Marks : 70*

Note : *Attempt any* ***five*** *questions including Question No. 1 which is* ***compulsory.*** *Assume suitable data, if missing and mention it clearly. Use of calculator is permitted.*

1. Choose the correct answer from the given options : 7×2=14

   (a) If 'no torsion' is allowed at the base of masonry wall with base width 'B',

maximum permissible eccentricity of load should be :

(i) $\dfrac{B}{3}$

(ii) $\dfrac{B}{2}$

(iii) $\dfrac{B}{6}$

(iv) $\dfrac{B}{4}$

(b) Number of possible reactions of a fixed support in a space structure can be :

   (i)   1

   (ii) 3

   (iii) 5

   (iv) 6

(c) In a steel beam the calculation of tensile and compressive stresses respectively in bending arc on the basis of :

   (i)   net area and gross area

   (ii) net area in both cases

   (iii) gross area and net area

   (iv) gross area in both cases

(d) The effective length of a column with unsupported length 'L' having one end free and other end fixed will be :

(i)   0.50 L

(ii) 1.2 L

(iii) 0.65 L

(iv) 1.5 L

(e) If a butt weld is with incomplete penetration, the effective throat thickness can be taken as :

(i) $\left(\dfrac{5}{8}\right)$ of thickness of the thinner part connected.

(ii) Half the thickness of the thinner part connected.

(iii) Half the thickness of the thicker part connected.

(iv) None of the above

(f) If nominal diameter of a rivet is 25 mm, the gross diameter of a rivet will be :

(i)   23 mm

(ii) 27 mm

(iii) 25 mm

(iv) 26.5 mm

(g) The ratio of depth of purlin to its span for a design of purlin should be more than :
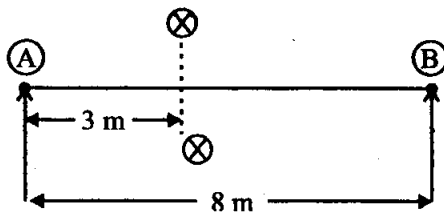
(i) $\dfrac{1}{60}$

(ii) $\dfrac{1}{50}$

(iii) $\dfrac{1}{45}$

(iv) None of the above

2. Draw the influence line for shear force and bending moment at section 'X' (Fig.) for beam with simple supported span 8 m.   14

3. Design a simply supported I section beam of effective span 7 m. This beam is carrying a UDL of 30 kN/m and the compression flange may be assumed to be laterally supported throughout its length. Assume $F_y = 250\,\text{N/mm}^2$.   14

4. (a) Compare features of a fixed support and a hinged support.   7

    (b) What is a gusset plate provided in a steel truss ? Discuss its utility.   7

5. A masonry retaining wall of 7m height is 2 m wide at the top and 5.0 m wide at base. The water face of the wall is vertical. Calculate the maximum and minimum stresses at the base if weight of masonry is 22 kN/m^3 and free board is 500 mm.   14

6. Discuss steps to design a built up column of given load carrying capacity and effective length.   14

7. Write short notes on any *four* of the following :

$$4 \times 3\tfrac{1}{2} = 14$$

    (a) Laterally supported beams

    (b) Assumptions for the design of rivetted joints

    (c) Lug angles

    (d) Euler's formula for critical load

    (e) Advantages of steel construction

    (f) Advantages of welded joints

8. Design an angle purlin for the steel truss of the
    following data :   14

    (a) Span of truss = 12 m

    (b) Slope = 28°

    (c) Number of purlins = 7

    (d) Spacing of truss = 4 m c/c

    (e) Wind load for roof truss = 1.20 kN/m²

    (f) Dead load from roof covering = 0.70 kN/m²