No. of Printed Pages : 5

BCE-032

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

Term-End Examination

00790

June, 2014

BCE-032 : THEORY OF STRUCTURES-I

Time : 2 hours *Maximum Marks : 70*

Note : *Question no. 1 is **compulsory**. Attempt any **four** questions from the remaining ones. Total number of questions to be attempted are five. Assume suitable data wherever necessary and mention it clearly. Use of calculator and steel tables is permitted.*

1. Choose the most appropriate answer from the following alternatives in each case. *7×2=14*

(a) For the prismatic fixed beam subjected to a point load at the centre as shown in Fig. 1, the bending moment at support and at centre respectively are :

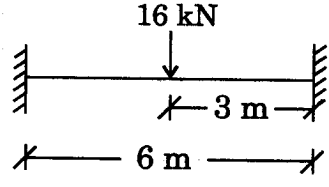

Figure 1

(i) 12 kN-m and 12 kN-m

(ii) 12 kN-m and 6 kN-m

(iii) 8 kN-m and 8 kN-m

(iv) 16 kN-m and 8 kN-m

(b) The maximum bending moment in a beam is caused by a train of moving load under a wheel which is

(i) closest to CG of loads

(ii) always at the mid span

(iii) between mid span and CG of loads

(iv) undefined

(c) The nominal diameter of a rivet is 16 mm. Its gross diameter will be

(i) 17·5 mm

(ii) 16 mm

(iii) 18 mm

(iv) None of these

(d) The sectional area of a compression member is given by its

(i) net area

(ii) gross area

(iii) net effective area

(iv) None of these

(e) Net cross-sectional area of a rivet jointed tension member is

(i) area of the member divided by the area of the rivet holes

(ii) area at the mid section of the member

(iii) area of the member minus the area of the rivet holes

(iv) area of the member minus twice the area of the rivet holes

(f) The effective length of a column having unsupported length L, and one end fixed and other end hinged is given by

(i) 0·65 L

(ii) 1·2 L

(iii) 0·80 L

(iv) 1·5 L

(g) The ratio of depth of purlin to its span should be more than

(i) $\frac{1}{50}$

(ii) $\frac{1}{60}$

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

(iv) None of these

2. Analyse the beam as shown in Fig. 2. Calculate the support moments and reactions. Flexural rigidity is given as in circles. Draw the B.M. and S.F. diagrams *14*

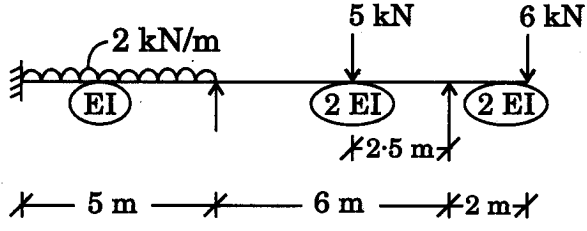

Figure 2

3. Design a simply supported I-section beam carrying a U.D.L. of 40 kN/m. The effective span of the beam is 7·0 m. The compression flange may be assumed to be laterally supported throughout its length. Assume $f_y = 250$ N/mm^2. *14*

4. A single rivetted double cover butt joint is used to connect two – 12 mm thick plates (Fig. 3). The power driven field rivets of 20 mm are used with cover plates of 12 mm. Calculate the necessary pitch and efficiency of the joint. Assume bearing stress of rivets = 270 N/mm^2, shearing stress of rivets = 90 N/mm^2, and f_y for plate = 150 N/mm^2. *14*

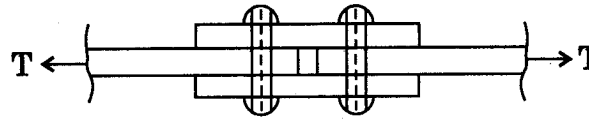

Figure 3

5. Calculate the fixed end moment and vertical support reactions for the beam shown in Fig. 4. Draw B.M. and S.F. diagrams. *14*

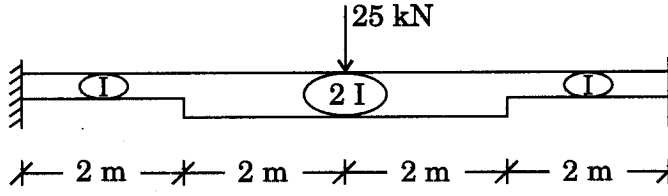

Figure 4

6. Draw the influence line diagrams for B.M. and S.F. at a point X in the simply supported beam AB of span 8 m, shown in Fig. 5.

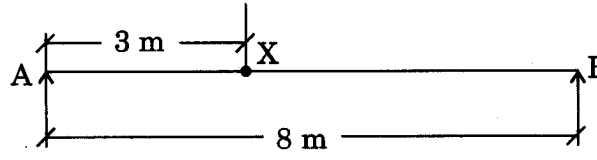

Figure 5

(a) Calculate the maximum negative and positive S.F. at X when two connected wheel loads 6 kN and 14 kN, 2 m apart cross the beam from A to B.

(b) Calculate maximum B.M. at X when UDL of 6 kN/m of length 3 m crosses the beam from A to B. *14*

7. (a) Discuss steps to design a built-up column briefly. *7*

(b) Define a Log Angle. Discuss its importance. *7*

8. A masonry retaining wall 7 m high, is 1·5 m wide at top and 4·5 m wide at base. The water face of the wall is vertical. Calculate the maximum and minimum stresses at the base. Assume the weight of masonry as 22 kN/m^3 and free board of 500 mm. *14*