No, of Printed Pages : 5

BCE-032

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

00075

Term-End Examination

June, 2015

BCE-032 : THEORY OF STRUCTURES – I

Time : 2 hours *Maximum Marks : 70*

Note : *Question number 1 is* ***compulsory****. Attempt any* ***four*** *questions from the remaining. 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) The maximum permissible longitudinal pitch in a riveted joint in tension is

(i) 16 t or 200 mm whichever is less

(ii) 4 t + 100 mm

(iii) 12 t or 200 m whichever is less

(iv) 2·5 d

(b) The efficiency of a riveted joint is the ratio of

(i) Least strength of a riveted joint to the strength of the solid plate.

(ii) Least strength of a riveted joint to the greatest strength of the joint.

(iii) Greatest strength of the joint to the strength of the solid plate.

(iv) None of the above

(c) The cross-section of a standard fillet weld is a triangle with base angles of

(i) 30° and 60°

(ii) 40° and 50°

(iii) 45° and 45°

(iv) 35° and 45°

(d) The weakest section in the computation of strength of a fillet weld is

(i) Side perpendicular to the load axis

(ii) Side parallel to the load axis

(iii) Throat of the fillet weld

(iv) None of the above

(e) The minimum thickness of steel members exposed to weather and accessible for painting shall not be less than

(i) 3 mm

(ii) 5 mm

(iii) 6 mm

(iv) 8 mm

(f) The maximum permissible slenderness ratio of steel tension members is

(i) 180

(ii) 250

(iii) 350

(iv) 400

(g) The effective length of a compression member of length L, effectively held in position at both ends and restrained against rotation at one end is

(i) 0·65 L

(ii) 0·80 L

(iii) 1·2 L

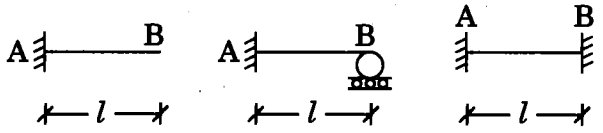
(iv) 2·0 L

2. (a) A beam AB of span L is simply supported. Draw the influence line diagrams for the reactions R_A, R_B, maximum positive and negative shear force and bending moment for a section X which is at a distance of Z from the left hand support A. *7*

(b) Calculate the maximum positive and negative shear force at X of the beam mentioned above in question 2(a) when a udl of 4 kN/m and of length 3 m crosses the beam from left to right. Consider L as 12 m and Z as 4 m. *7*

3. (a) Define a statically determinate and statically indeterminate structure. *4*

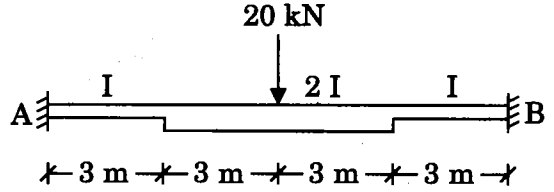
(b) Mention which of the structures shown below is statically determinate and which one is statically indeterminate and calculate the degree of redundancy in each case. *3×2=6*



(i) (ii) (iii)

(c) State the moment area theorems. *4*

4. Find the fixed end moments and the vertical support reaction for the beam shown below. Draw the B.M. and S.F. diagrams. *14*



5. (a) Determine the strength of a single riveted joint of 6 mm thick plates having 20 mm nominal dia. rivets at a pitch of 6 cm. Hand driven shop rivets are used and the yield stress of plates is 250 MPa. Permissible stresses in shearing and bearing for rivets are 80 MPa and 250 MPa respectively. Sketch the joint. *7*

(b) A single U-butt weld joins two plates of size 150 × 20 thick and 150 × 16 thick. Find the strength of the joint in tension assuming permissible stress in the weld as 142 N/mm^2. Size of the plates is in mm. 7

6. Find the net effective area of an ISA 150 × 75 × 10 connected by its longer leg to a 12 mm gusset plate

(a) by means of 5 mm fillet weld,

(b) by means of 20 mm dia rivets (single hole)

2×7=14

7. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Types of riveted joint

(b) Degree of redundancy

(c) Distribution factors

(d) Slenderness ratio of compression members

(e) Loads on roof trusses

(f) Stability of masonry dams