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BCE-032

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

Term-End Examination

June, 2019

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 numbers of questions to be attempted are five. Assume suitable data wherever necessary. Use of calculator and steel table is permitted.

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

    (a) Degree of indeterminacy of a propped cantilever is :

    (i) 1

    (ii) 2

    (iii) 3

    (iv) 4

(b) Speed of construction is more in the case of :

   (i) Riveting

   (ii) Bolting

   (iii) Welding

   (iv) Riveting and bolting both

(c) Lug angles :

   (i) are used to reduce the length of connection.

   (ii) are unequal angles

   (iii) increase shear lag

   (iv) All of the above

(d) The weakest plane in a fillet weld is :

   (i) a side parallel to the force

   (ii) a side normal to the force

   (iii) the one along the throat

   (iv) the one normal to the throat

(e) Intermediate vertical stiffeners are provided in plate girder to :

   (i) eliminate web buckling

   (ii) eliminate local buckling

   (iii) transfer concentrated loads

   (iv) prevent excessive deflection

(f) Stresses and strains are proportional in structural steel upto :

   (i) field point

(ii) proportional limit

(iii) failure

(iv) end of plastic range

(g) The range of economical spacing of trusses varies from :

   (i)   L/3 to L/5

   (ii) L/4 to 2L/5.

   (iii) L/3 to L/2

   (iv) 2L/5 to 3L/5

   where L is span.

2. Two concentrated loads of 120 kN and 60 kN, placed 9 m apart, travel along a simply supported girder of 30 m span. Draw the maximum shear force diagrams indicating position of maximum value. 60 kN load leads the 120 kN load from left to right.   14

3. A 6 mm thick angle section is jointed to a 10 mm thick gusset plate. The angle is supporting a tensile load of 55 kN. Find out the number of 16 mm diameter power driven rivets from shear considerations.   14

4. An ISA 100 × 100 × 6 mm (f_y = 250 N/mm²) is used as a strut in a truss. The length of the strut between the intersections at each end is 3.0 m. Determine the strength of the strut if it is connected by two rivets at each end.   14

5. (a) What do you understand by a "column splice" ? Describe its purpose and design briefly.   7

   (b) Draw a neat sketch of stress-strain curve of mild steel.   7

6. (a) State how angle iron purlins are designed.
                                                     7

   (b) Discuss how stability of a retaining wall is checked.   7

7. (a) Describe the various loads considered in the design of roof trusses briefly.   7

   (b) Write advantages of welded joints in comparison to bolted types.   7

8. Write short notes on any *four* of following topics : $4 \times 3\frac{1}{2}$

   (a) Effective length of compression members

   (b) Biaxial bending

   (c) Assumptions in the theory of riveted joints

   (d) Distribution factor

   (e) Butt joint