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Roll No. :

320651(20)

B. E. (Sixth Semester) Examination, April-May 2020

(New Scheme)

(Civil Engg. Branch)

STRUCTURAL ENGINEERING DESIGN-II

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) of each question is compulsory. Attempt any one part from (b) & (c) of each question. Also draw necessary diagrams. IS 800-2007 and Steel Table is permitted. Assume suitable data if required with relevance.

Unit-I

1. (a) What do you mean by serviceability limit and service criteria? 2

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- (b) Calculate the collapse load for the following cases; 14
- (i) Simply supported beam with concentrated load at centre
 - (ii) Simply supported beam with eccentric load
- (c) Find the shape factor for the following sections :
- (i) Square of side a with its diagonal parallel to the zz -axis.
 - (ii) Triangular section of base b and height h . 14

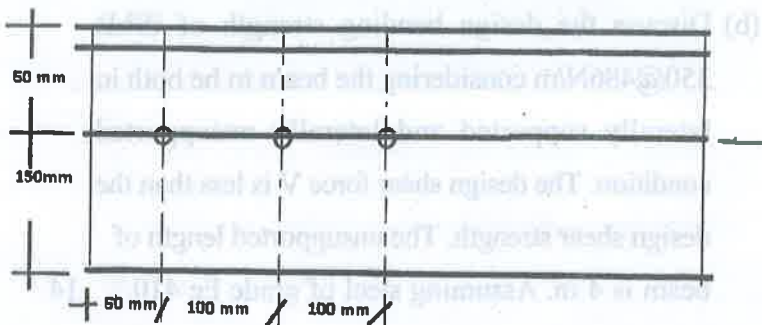
Unit-II

2. (a) What is 'Pitch' in bolt measurement? Draw the suitable diagram. 2
- (b) Two Indian standard flats 2 m long & 250 mm \times 10 mm size are jointed to make 4 m length. Design a butt joint with the bolts arranged in the diagonal pattern. The bolts are supported to carry a factored tensile force of 375 kN. Also determine the net tensile strength of main plate and cover plate. The steel and bolts are of Fe 410 and 4.6 respectively. 14

- (c) A tie member consisting of an ISA 80 mm × 50 mm × 8 mm (Fe 410 grade steel) is welded to a 12 mm thick gusset plate at site. Design welds to transmit load equal to the design strength of the member. 14

Unit-III

3. (a) What do you mean by slenderness ratio? 2
- (b) A tension member 1.2 m long is to resist a dead load of 35 kN and live load of 75 kN. Design the rectangular bar of Fe 410 grade steel. Use 4-6 grade, 20 mm diameter bolt in one line. 14
- (c) The 200 × 100 × 15 mm angle shown in the figure is connected with three 20 mm, 4-6 grade bolts. Calculate the design tensile strength and comment on the results. 14



Unit-IV

4. (a) What is the difference between lacing and battening element? 2
- (b) Write the steps for design of axially loaded compression members with suitable discussion. 14
- (c) Design a built up column consisting of two channel sections placed toe to toe with a clear spacing of 250 mm between them. The column carries an axial load of 1080 kN and is having an effective height of 10 m. Design the lacing for the column. 14

Unit-V

5. (a) What are the possible situations of web buckling of beam member? 2
- (b) Discuss the design bending strength of ISLB 350@486N/m considering the beam to be both in laterally supported and laterally unsupported condition. The design shear force V is less than the design shear strength. The unsupported length of beam is 4 m. Assuming steel of grade Fe 410. 14

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(c) Design a laterally unsupported beam for the following data : 14

- (i) effective span = 4 m
- (ii) Max BM = 450 kN-m
- (iii) Max SF = 220 kN,
- (iv) Grade of steel is Fe 410.