Total No. of Questions : 8]

SEAT No. :

P1362

[Total No. of Pages : 4

[4858] - 103

T.E. (Civil) (Semester - I)

STRUCTURAL DESIGN - I

(2008 Pattern)

Time : 4 Hour] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, from Section - I and Q.5 or Q.6, Q.7 or Q.8 from Section - II.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicates full marks.***
5) ***Assume suitable data, if necessary.***
6) ***Use of cell phone is prohibited in the examination hall.***
7) ***Use of electronic pocket calculator IS : 800 and steel table is allowed.***

Section - I

Q1) a) What are the advantage and disadvantage of construction in structural steel? **[5]**

b) An I-section use as a bracket connected to flange of column as shown in fig. 1 b. Column is carrying a load of 120 kN at free end at a distance of 250 mm from the column flange. Design the welded connection. **[12]**

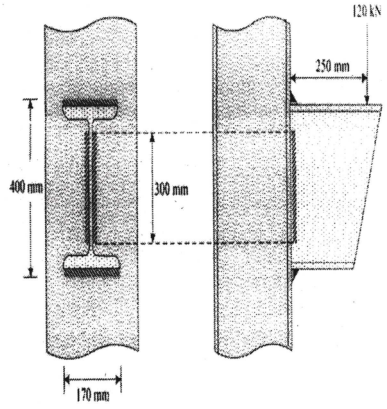

Fig. 1 b

P.T.O.

c) A tie member of a roof truss carries a load of 200 kN. Design a section using unequal angle with longer leg connected to gusset plate. Also design the bolted connection. **[8]**

OR

Q2) a) Differentiate between black bolt and HSFG bolts. Explain in details with Sketches. **[7]**

b) An ISLB 300 @ 37.7 kg/m secondary beam transmits an end reaction of 125 kN to the web of ISHB 400 @ 77.4 kg/m main beam. Design bolted framed connection. Top flange of both the beams are at same level. Draw the neat sketch showing design details. **[10]**

c) A strut of a tower carries an axial load of 200 kN resulting due to wind load. The unsupported length of member is 3 m. Design a single angle section with welded connection and draw the sketch with design details. **[8]**

Q3) a) State and explain the design steps for the design of gantry girder. **[9]**

b) A simply supported beam of 5 m effective span carries uniformly distributed load of 30 kN/m on entire span along with a central point load of 50 kN. Compression flange of beam is laterally supported only at ends and centre of beam. The ends are restrained against torsion. Design a cross section of beam and apply usual checks. **[16]**

OR

Q4) a) Calculate the moment resisting capacity of a built up beam comprising of ISMB 450 @ 72.4 kg/m with a flange plate of 250 mm × 12 mm one each on both flange. Also calculate maximum superimposed uniformly distributed load the beam can carry on simply supported span of 6 m. The compression flange is laterally restrained throughout the length. **[12]**

b) Design cross section of a welded plate girder carrying uniformly distributed load of 120 kN/m on entire span of 18 m. The compression flange is laterally restrained throughout the length. Also design the end bearing stiffener. **[13]**

Section - II

Q5) a) A truss as shown in Fig. 5 a is used for an industrial building situated at Nashik. The truss is covered with A C sheet. Calculate Panel point dead load, live load and wind load for the truss. Assume k1 = 1, k2 = 0.9, k3 = 1, cpe = –0.7 cpi = + 0.5 and spacing of truss = 3 m. **[15]**

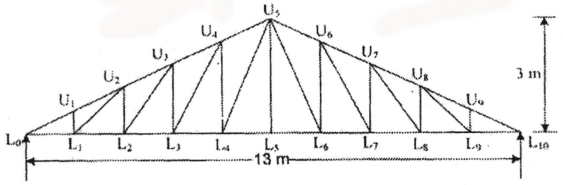

Fig. 5 a

b) A foot over bridge as shown in Fig. 5 b is subjected to live load of 5kN/m^2 and dead load of 1.2 kN/m^2. The clear available width is 2.8m and height of truss is 2m. Design the cross beam for the bridge. **[10]**

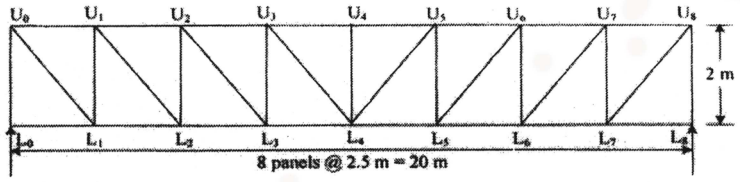

Fig. 5 b

OR

Q6) a) For the truss shown in Fig. 5 a, panel point dead load, live load and wind load are as follows. Design members U4U5, L4L5 and U5L4. **[13]**

S. N.	Type of load	Intermediate panel point load in (kN)
01	Dead load	03
02	Live load	02
03	Wind load	05 (suction)

b) For the foot over bridge shown in Fig. 5 b, design the members U4U5, L4L5 and U5L4. RCC slab of 120 mm thick is provided as flooring. Clear width is 2.8 m and live load is 4 kN/m^2. **[12]**

Q7) a) A column consists of two channel sections placed face to face subjected to an axial force of 800 kN. The unsupported length is 10 m. Assuming column to fixed at both ends, design the section. Also design suitable lacing system and draw the design sketches. **[20]**

b) Explain merits and demerits of cold formed light gauge section. **[5]**

OR

Q8) a) Design a column base for an axial load of 400 kN and bending moment of 75 kNm. A section ISHB 400 @ 77.4 kg/m is used as a column. The bearing stress in concrete is 4 N/mm^2. **[15]**

b) Explain following term with respect to light gauge section. **[10]**

i) stiffened element

ii) unstiffened element

iii) multiple stiffened element

iv) flat width ratio

v) effective design width.

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