5E3153

B. Tech. V Semester (Back) Examination, Dec., 2014

CIVIL ENGINEERING # 5CE3

STEEL STRUCTURES-I

Time : 3 Hours | Min. Passing Marks : 24 | Maximum Marks : 80

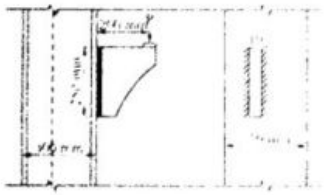
Instruction to Candidates :

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit-'I'

1. **(a)** In a steel roof truss a tie member consists of an angle section 80 × 80 × 8 mm. Design its welded connection to a gusset plate 10 mm thick using side welds only. Assume Fe-410 grade of steel and shop welding. the force in the member being 100 kN. [6]

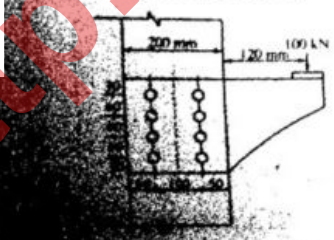
(b) A plate bracket 10 mm thick is attached to the flange of a column ISHB 300 @ 63 kg/m by 6 mm fillet welds as shown in figure. Calculate the maximum factored value of load P safety carried by the bracket. [10]



OR

2. **(a)** A single bolted butt joint with double cover plates has main plates 8 mm thick and cover plates of 5 mm thickness, using 16 mm bolts of grade 4.6 and Fe-410. Provided at 50 mm pitch find the efficiency of the joint. [6]

(b) A plate bracket connected to the column carries a factored load of 100 kN applied as shown in fig. There are 8 bolts of 16 mm dia of grade 4.6. Find out whether the design is safe or not. [10]



Unit-'II'

3. (a) A discontinuous strut in a truss carries an axial load of 150 kN (factored). The length between centres of connections is 1.8 m. Design an equal angle section for this. Do not design the connection. [6]

(b) A column in a steel building is 3.5 m long with its one end fixed and other hinged. Its section consists of an ISHB 200 @ 37.32 kg/m with one cover plate of size 280 mm × 16 mm on each flange. What maximum factored axial load the column can carry safely. [10]

4. A steel column in an industrial building is subjected to an axial factored load of 1600kN. Taking two I sections, placed side by side, design its section. The column is 6.0m in height with top and bottom both oplanned. Also design a system of batten plates for the column. [16]

Unit-'III'

5. A beam of effective span 4.0 m is simply supported at its ends. The compression flange of the beam is fully restrained. Design a suitable I-section, if it carries a uniformly distributed load of 24 kN/m (factored). [16]

OR

6. A column carries an axial load of 2000kN. It rests centrally on a steel base plate of size 800mm × 800mm. Design a two tier gritlage foundation for it, if bearing pressure on soil is limited to 200kN/m^2. [16]

Unit-'IV'

7. (a) Draw a neat diagram of a slab base for a column and label the components. [6]

(b) A column has section ISHB 250@54.72 kg/m and is subjected to an axial factored load of 1200 kN. Design the gusseted base for the column. [10]

OR

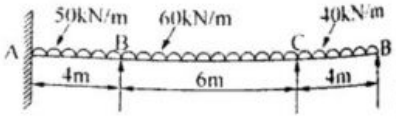
8. (a) Briefly explain the terms shear lag and block shear associated with design of a tension member. [6]

(b) A tension member used in a bracing system has to transmit a factored axial load of 150kN. Design a suitable equal angle section for this. Assume grade of steel as Fe410 and of bolts as M20 of grade 4.6. [10]

Unit-'V'

9. (a) Find shape factor for a T section ISNT 100@14.92 kg/m. [6]

(b) A three span continuous beam is subjected to working loads as shown in Fig.3. Calculate the uniform value of Mp with which the beam would be safe. Take load factor as 1.8. [10]



OR

10. For a fixed beam of varying section shown in Fig. 4. determine the time value of collapse load. [16]