APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S7 (S, FE) / S7 (PT) (S) Examination May 2024 (2019 Scheme)

Course Code: CET401

Course Name: DESIGN OF STEEL STRUCTURES

Max. Marks: 100   Duration: 3 Hours

Use of IS 800 -2007, SP6(1), IS 875- part1, part2, part3 permitted
Assume any missing data suitably

PART A
Answer all questions, each carries 3 marks.   Marks

1	What are the disadvantages of bolted connection?	(3)
2	With the help of sketches what are the various types of weld commonly used.	(3)
3	Enumerate the effect of shear lag in tension members.	(3)
4	Explain the various modes of failure of tension members.	(3)
5	Explain the various modes of failure of built up compression members.	(3)
6	With the help of sketches what are the various type of column bases used	(3)
7	Briefly explain the lateral stability of beams.	(3)
8	Draw and mark the various elements of plate girder in detail	(3)
9	List the classification of trusses according to span	(3)
10	Explain the concept of fire resistant design of steel framed building	(3)

PART B
Answer one full question from each module, each carries 14 marks.

Module I

11 a) A tie member of a roof truss consists of 2 ISA 100 x75x8mm. The angles are   (14)
connected to opposite side of a gusset plate of 10 mm thick and member is
subjected to working pull of 300kN. Design the welded connection. Assume
connections are made in the work shop.

OR

12 a) Design a lap joint connecting two plates 120mm wide and 16mm thick to transmit   (7)
a factored load of 150kN. Use 16mm dia bolts of grade 4.6 and steel having f_u =
410N/mm^2

b) A double cover plate butt joint is used to connect two plates 16mm and 8mm thick. Design the joint to carry a tensile load of 300kN. use 18mm dia bolts and Fe 410 grade steel (7)

Module II

13 Design a suitable angle section to carry a factored tensile load of 210kN assuming a single row of M20 bolts. Length of tie member is 3m. Use Fe 410 grade steel (14)

OR

14 Calculate the design tensile strength of a channel ISJC -175 with gusset plate connected to the web by two rows of 16mm bolts with a connection length of 140mm which is shown in the figure below. Use Fe 410 grade steel (14)
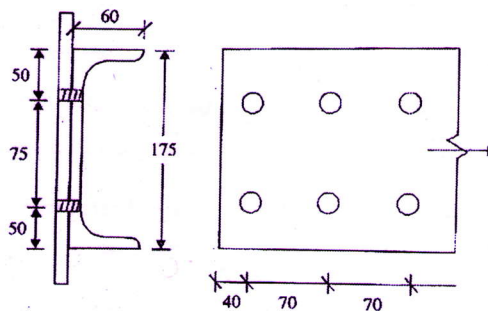
Module III

15 Design a column with battens to carry a factored load of 1200kN. The column is fixed at both ends. The columns are placed back to back. Adopt bolted connections. Use Fe 410 grade steel (14)

Try ISMC 350 . (connections not required)

OR

16 Design a gusseted base for a column ISHB350 @710N/m with two plates 450mm x 20mm carrying a factored load of 2500kN. The column is supported on concrete pedestal with M20 grade. Use Fe 410 grade steel and 20mm dia bolts of grade 4.6 for connections (14)

Module IV

17 Design as simple supported laterally unsupported beam of span 3.5m subjected to a factored bending moment of 300kNm and factored shear of 140kN. Use Fe 410 steel. (14)

OR

18   Design welded plate girder without intermediate vertical stiffeners of 20m span.   (14)
      It has to support a load of 80 kN/m exclusive of self-weight. Use Fe 410 grade
      steel

Module V

19   Estimate the dead load, live load and wind load at panel point of a fink roof   (14)
      truss show in the figure
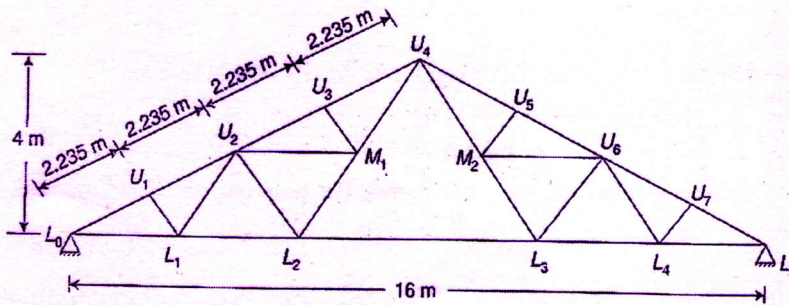
      Length of building = 48m, width of building is 16.5m, Centre to centre distance
      of columns is 16m, spacing of truss is 8m , height of column is 11m. The building
      is located in Calicut city.

OR

20   a)   Design a I section purlin for an industrial building situated in Trivandrum to   (14)
           support corrugated iron sheet roof for the following data
           Spacing of the truss is 6m, span of truss is 12m, rise 3m, Spacing of purlin is
           1.5m, intensity of wind pressure is 2kN/m². Weight of sheets is 130N/m²

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