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Total Number of Pages: 2

B.Tech
PECI5301

6th Semester Regular / Back Examination 2016-17

DESIGN OF STEEL STRUCTURE

BRANCH: CIVIL

Time: 3 Hours

Max Marks: 70

Q.CODE: Z241

**Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks. Use of IS 800-2007
and STEEL TABLE is allowed**

Q1 Answer the following questions: (2 x 10)

- a) Draw the c/s of ISWB 600 and ISLC 400 showing different dimensions.
- b) What do you mean by a *spandrel beam*?
- c) State four advantages of steel materials compared to RCC material.
- d) Write two assumptions of welded connection .
- e) Out of permissible compressive strength and permissible tensile strength of a steel member, which is constant and which is variable. For variable strength, what are governing parameters?
- f) Find the minimum length of an angle section required to accommodate 4 bolts in a single row, if 20 mm dia bolts of property class 4.6 are used.
- g) What are the various types of stiffeners provided in a plate girder?
- h) Distinguish between *laterally restrained beam* and *laterally unrestrained beam*.
- i) What are the advantages of a plate girder compared to a built up beam?
- j) Draw separate figures to show *major axis buckling* and *minor axis buckling* of a I beam.

Q2 Determine the tension capacity of a 125 x 75 x 6 angle of Fe410 steel assuming the connection is through the longer leg with 3 numbers M20 bolt. Will there be any difference if the shorter leg is connected? Explain. (10)

Q3 Design a lap joint between the two plates each of width 150 mm and of thickness, 12 mm using bearing type bolts. The joint has to carry a design load of 150 kN. Use Fe 410 grade of steel and M16 bolts of grade 4.6. Draw the c/s and the top view. (10)

- Q4** A beam is to carry a uniformly distributed dead load of 300 kN (total) and superimposed load of 40 kN/m. The beam is simply supported over a clear span of 8.0 m and rests over stiff bearings of 215 mm at the ends. Design the beam assuming full lateral support for the compression flange. Assume any other data, if required. **(10)**
- Q5** Design a single angle strut carrying a factored compressive load of 100 kN with length between centre to centre of intersection as 3.0 m. Also design the bolted end connection. Show the end connection by drawing a figure. **(10)**
- Q6** Design a slab base for a column of size ISHB 350 to support a factored axial load of 800 kN. Assume Fe 410 grade of steel and concrete of M25. Sketch the plan and elevation showing the details of connection. **(10)**
- Q7** Calculate the moment capacity of a welded plate girder of 18 m span carrying a udl of 60 kN/m. The top flange is restrained laterally. Overall depth of c/s = 1400 mm, thickness of flange plate = 50 mm, thickness of web plate = 25 mm, width of flange = 300 mm. Use $f_y = 250$ N/sq mm. **(10)**
- Q8** **Write short answer on any TWO:** **(5 x 2)**
- Block shear
 - Compact Section
 - Moment resisting frame
 - Tensile strength capacity of a bolt