

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2125)

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B. Tech 4th Semester Examination
Design of Steel Structures-I (OS)
CE-4002

Time : 3 Hours

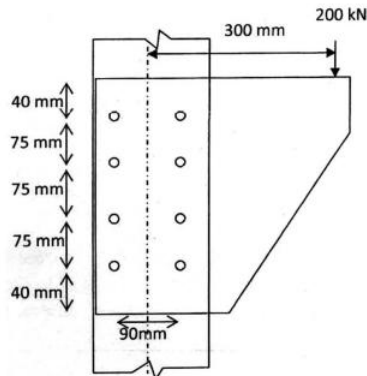
Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt one question each from Sections A, B, C and D. Section E is compulsory. All questions carry equal marks. Use of IS: 800 - 2007 is allowed.

SECTION - A

1. A tie member 100x8mm is to transmit a load of 115 kN. Design the fillet weld and calculate necessary overlap if (i) welding is done on three sides (ii) welding is done on four sides. (20)
2. Determine the resultant stresses in the 20 mm diameter rivet shown in following figure. The load is acting in the plane of riveting. The thickness of the flange of the I section is 9mm. The thickness of the bracket plate is 10 mm. (20)



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SECTION - B

3. Using lug angles for the channel MC250 @ 306 N/m in tension with two rows of holes in web and one row in the flanges, Design the connection to a gusset for its capacity, if 20mm diameter rivets are to be used. Assume $F_y=250\text{MPa}$. (20)
4. Design a welded/ riveted laced column of height 6m for a design load of 1000 kN. Effective length coefficient is 1.0 and $F_y=250\text{MPa}$. (20)

SECTION - C

5. Design a suitable Base for a column section ISHB 350 @ 724 N/m subjected to an axial load of 4000 kN. Base is resting on M15 concrete pedestal. Safe bearing pressure of concrete is 4000 kN/m². (20)
6. A simply supported beam of span 10m with overhangs of 3.5 m on either side is carrying a uniformly distributed load of 25 kN/m over its entire length. Design a suitable beam from ISMB series satisfying the IS-800. Assume that (i) beam is laterally supported (ii) the fillet depth is 0.1 times the depth of beam (iii) support width is 200mm (iv) Steel is conforming to IS-226. Apply checks. (20)

SECTION - D

7. Design a gantry girder to carry an overhead travelling crane, having the following data:

(i) Span of gantry girder	= 7m
(ii) Crane capacity	=300 kN
(iii) Distance between centres of gantry girder	= 16m
(iv) Weight of crane girder	=120 kN
(v) Weight of crab	= 50kN

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- (vi) Minimum approach of crane hook = 1.02m
- (vii) Distance between centres of wheel = 3.8m
- (viii) Height of rail section = 80 mm
- (ix) Mass of rail section = 30kg/m
- (x) Yield stress of steel = 250 N/mm²
(20)

8. Design a riveted plate girder of span 18 m to carry a uniformly distributed load of 80 kN/m exclusive of self weight in addition to 200 KN concentrated load at 1/3 points of span. Design a suitable section. (20)

SECTION - E

9. Attempt any Five.
- (a) Explain Buckling in Compression members.
 - (b) Why do we curtail the flanges of plate girder?
 - (c) Differentiate between butt and fillet welds.
 - (d) What are various modes of failure of a riveted joint?
 - (e) Draw a neat sketch of a gantry crane system and name the components.
 - (f) How is the Slab base designed? (5×4=20)