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CE 131603 BINA CHOWDHURY CENTRAL LIBRARY
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Azara, Hatkhowapara,

Roll No. of candidate

Guwahati	781017								
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2019

B.Tech. 6th Semester End-Term Examination

DESIGN OF STRUCTURES – II

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Use of ISL: 800–2007; IS:875 (Part III) and steel tables
are permitted

Answer Question No. 1 and any *Six* from the rest.

1. Fill in the blanks : (10 × 1 = 10)
- (a) As per IS 800, the proof stress of bolts can be taken as _____ the ultimate tensile stress of bolt.
- (b) Maximum center-to-center distance between the fasteners in a line when in tension is _____
_____ whichever is less.
- (c) Buff weld connects two plates 200 mm x 20 mm each. If bending moment acting on the plate is 25kNm. stress developed in the weld is _____.

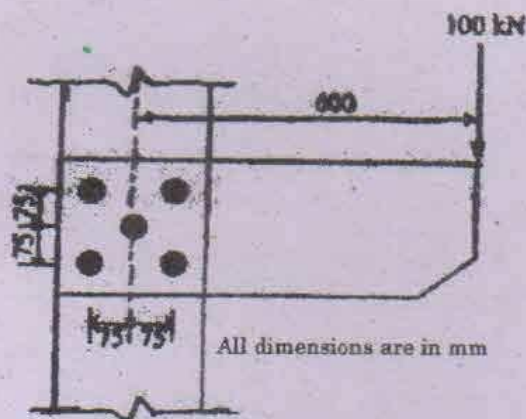
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- (d) Two steel columns A (length L , yield strength = 250MPa) and B (length = $3L$, yield strength = 500MPa) have the same cross section and end condition. The ratio of buckling load of column A that of column B is _____
- (e) The ratio of shear carrying capacity of a rivet in double cover buff joint to that of a rivet in lap joint is _____
- (f) The stress diminution (longitudinal tensile stress or compressive bending stress) in wide beam flanges with the distance from web is _____
- (g) The maximum slenderness ratio for lacing bars in column is _____
- (h) Distance between centre of two consecutive rivets measured along row of rivets is defined as _____
- (i) Nominal diameter of rivet for connecting structural element of thickness 't' is _____
- (j) Lateral buckling of web is prevented by _____

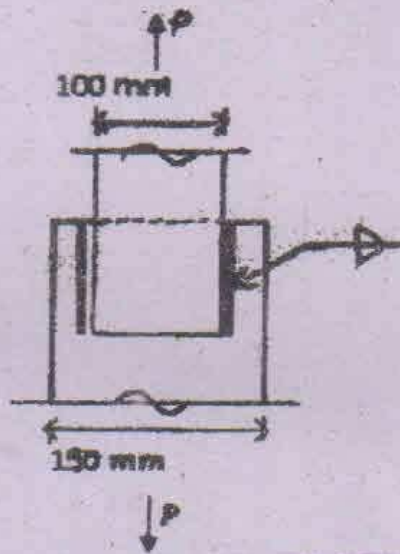
2. (a) Design a butt weld to connect a 12 mm thick bracket to the flange of a column. The bracket is to transmit a load of 100 kN at an eccentricity of 15cm.
- (b) Design a seat angle connection between a beam MB 300 and column SC 200 for a reaction beam 100 kN, using M20 bolts of property class 4.6. Take Fe 410 grade steel. (5 + 10 = 15)
3. (a) Calculate the strength of ISA 40 x 25, 6mm thick when used as a tension member with its longer leg connected by:
- (i) 14mm diameter rivets, and
- (ii) fillet weld
- (b) A tie member in a bracing system consist of two angles 75x75x6 bolted to a 10mm gusset, one on each side using a single row of bolts and tack bolted. Determine the tensile capacity of the member and the number of bolts required to develop full capacity of the member. (6 + 9 = 15)
4. (a) What are the basic assumptions made while deriving the Euler's Formula? Write the equation for Euler's critical load for a column for different boundary conditions.
- (b) Design a single angle discontinuous strut to carry a factored load of 65 kN. Assume that the distance between its joints is 2.5 m. Use $f_y = 250$ MPa. (7 + 8 = 15)

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5. (a) What is the difference between a beam and a plate girder.
- (b) A welded plate girder has a simply supported span of 20 m. It carries a uniformly distributed load of 100 kN/m inclusive of its weight and two concentrated loads of 100 kN each at 4m from either end. The depth of the plate girder is restricted to 1500 mm due to head room requirement. Design a suitable section. (3 + 12 = 15)
6. (a) What do you mean by base plate. Write different types of base plate and explain their functions.
- (b) An ISHB 400 x 82.2 Kg/m column supports a load of 250 kN at an eccentricity of 400mm from the center line of the column, the load lying on the y-y axis. Design the base plate. (5 + 10 = 15)
7. (a) A bracket plate connected to a column flange transmits a load of 100 kN as shown in the following figure. Calculate the maximum force for which the bolts should be designed.



- (b) Two plates are connected by fillet welds of size 10 mm and subjected to tension, as shown in the figure. The thickness of each plate is 12 mm. The yield stress and the ultimate tensile stress of steel are 250 MPa and 410 MPa, respectively. The welding is done in the workshop ($\gamma_{mw} = 1.25$). As per the Limit State Method of IS 800: 2007. Determine the minimum length of each weld to transmit a force P equal to 270 kN (factored).



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(7 + 8 = 15)

8. (a) Draw and explain the stress-strain curve for mild steel.
- (b) Design a built-up column for a length of 3.5 m to support a working load of 3500 kN. The column is effectively held at both ends and restrained in direction at one of the ends.
- (5 + 10 = 15)

9. A proposed cantilever beam is built into a concrete wall and free at its end. It supports dead load of 20 kN/m and a live load of 10 kN/m. The length of the beam is 5m. Select an available section with necessary checks, Assume bearing length of 100 mm.
(9 + 6 = 15)
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