Registration No :

Total Number of Pages : 03

B.Tech
PCI5I102

5th Semester Regular / Back Examination 2018-19
DESIGN OF STEEL STRUCTURES
BRANCH : CIVIL
Time : 3 Hours
Max Marks : 100
Q.CODE : E485

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.
The figures in the right hand margin indicate marks.

Part- I

**Q1** **Short Answer Type Questions (Answer All-10)** (2 x 10)

a) State the two disadvantages of steel structures over R.C.C structures.

b) What are Black bots? Where are they used?

c) What is meant by throat thickness?

d) What is plug weld and slot weld?

e) Under what circumstances you would go for Built-up members?

f) What are the main objectives of the lug angles?

g) What is the thickness of a batten plate?

h) What is meant by castellated beam?

i) Why intermediate stiffeners are required for plate girders?

j) Where the steel roof trusses are used?

Part- II

Q2 **Focused-Short Answer Type Questions- (Answer Any EIGHT out of TWELVE)** (6 x 8)

a) Two flats Fe 410 Grade steel each 210mmx8mm are to be jointed using 20mm diameter 4.6 grade bolt to form a lap joint. The joint is supposed to transfer a factored load of 260kN. Determine the design strength of the bolts in joint.

b) A tie member of a roof truss consists of 2 ISA 100, 75, 8mm. The angles are connected to either side of a 10mm gusset plates and the member is subjected to a working pull of 300KN. Design the weld connection. Assume connections are made in the workshop.

c) Briefly explain the different Modes of failures in bolted connections.

d) Design a suitable longitudinal fillet welds to connect the plates as shown in fig. To transmit a pull equal to the full strength of small plate. Given: plates are 12mm thick, grade of plates Fe410 and welding to be made in workshop.

100 mm   160 mm
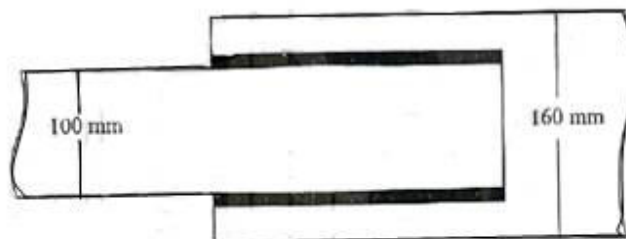
e) A Column ISHB 350@ 674N/m carries an axial load of 850KN. Design suitable slab base using M20 grade of concrete.

f) State the purpose of providing column base? Give the difference between slab base and gusseted base for steel columns. Draw the column base plate diagram.

g) Write the difference between web crippling and web buckling.

h) Determine the design tensile strength of the plate 200mmx12mm with the holes for 16mm diameter bolts as shown in fig. considering the block shear strength. Use Fe415 grade of Steel.
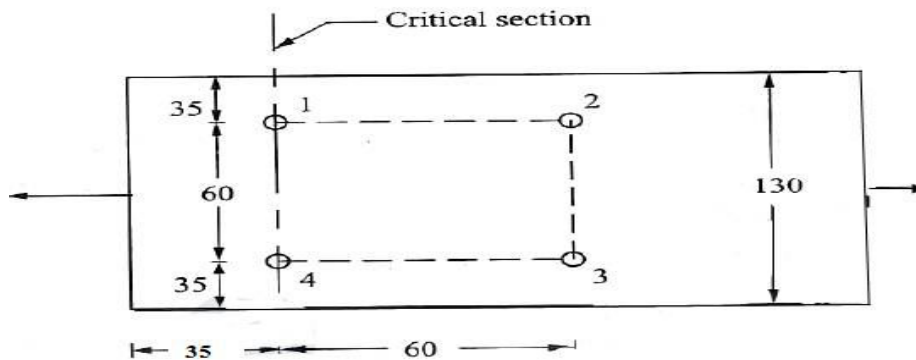

i) What are the steps involved in design of compression members?

j) In a truss, a strut 3m long consists of two angles ISA 100x100x6.Find the factored strength of the member if the angles are connected on both sides of 12mm gusset plate by one bolt.

k) Design a single angle strut connected to the gusset plate to carry 180KN factored load. The length of the strut between centre to centre intersections is 3m.

l) Briefly explain compact, semi-compact and slender section. Draw the curvature for flexural member performance.

Part-III
Long Answer Type Questions (Answer Any TWO out of FOUR)

Q3 Two cover plates, 10mm and 18mm thick are connected by a double cover butt joint **(16)** using 6mm cover plates as shown in fig. Find the strength of the joint. Given M20 bolts of grade 4.6 and Fe410 plates are used. What is the efficiency of the joint?
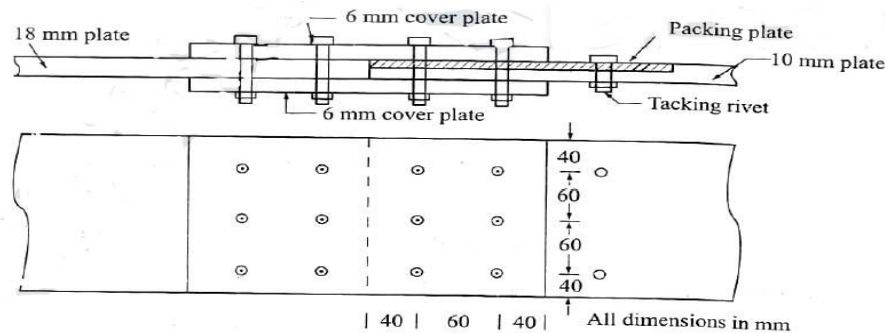
Q4 A single unequal angle ISA 9060, 6mm is connected to a 10mm gusset plates at the ends with 5 nos.of 16mm bolts to transfer tension. Determine the design tensile strength of the angle, If the gusset is connected to 90mm leg. **(16)**

g =50 mm, if 90 mm leg is connected
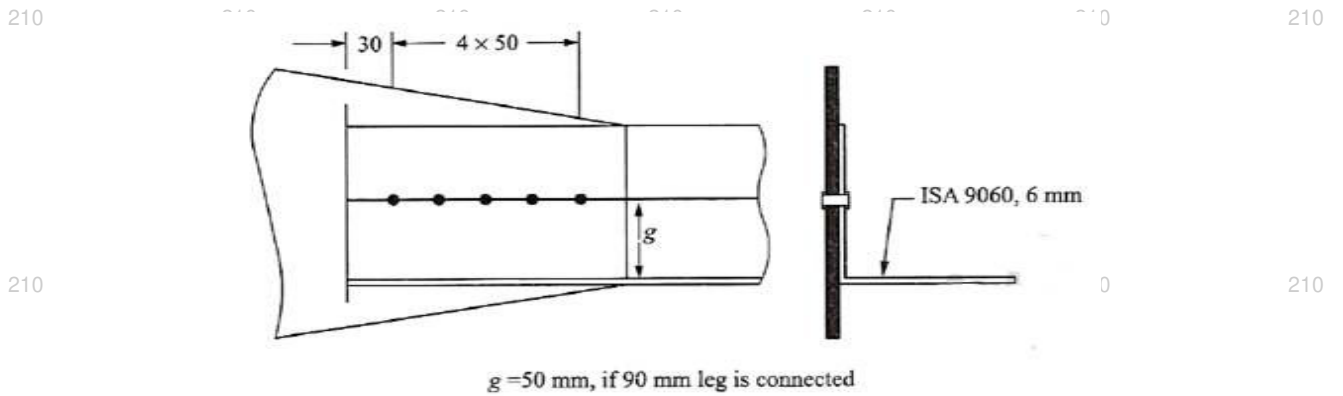
Q5 Obtain factored axial load on the column section ISHB 400. The height of the column is 3.0m and it is pin-ended. **(16)**
[f_y = 250 N/mm^2 ; E = 2 x10^5 N/mm^2 ; γ_m = 1.10]

Q6 A simply supported beam of span 3.25 m consists of a rolled steel section ISLB 325 @ 422.8 N/m. Determine the design bending strength of the beam if the beam is laterally unsupported. Assume that the factored shear force is less than the design shear strength. **(16)**