Seat No: _____ **Enrollment No: _____**

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech., Summer 2018-19 Examination

Semester: 6 **Date:02/05/2019**
Subject Code: 03104353 **Time: 10:30 am to 1:00 pm**
Subject Name: Structural Design - II **Total Marks: 60**

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.
5. IS 800, IS 875 and Steel Table are allowed.

Q.1 Objective Type Questions: **(15)**

(A) Answer the most appropriate option from the multiple choices.

1. Which one of the following is the mode of failure in a fillet weld material?
   (a) Tension (b) Shear (c) Bearing (d) Crushing
2. The value of imperfection factor (α) is ____ for buckling class 'c'.
   (a) 0.21 (b) 0.34 (c) 0.49 (d) 0.76
3. For a column of length L having both end hinged, the effective length is _____.
   (a) 0.65L (b) 0.8 L (c) 1 L (d) 1.2 L
4. Beams should be designed and checked for
   (a) flexural strength (b) stiffness (c) local buckling (d) all of the above
5. Maximum value of effective slenderness ratio for Members always under tension (other than pre-tensioned members) is _____.
   (a) 180 (b) 250 (c) 300 (d) 400

(B) Fill in the blanks.

6. Modulus of elasticity (E) for steel is generally _____ N/mm^2.
7. In slab base, bearing strength of concrete is_____.
8. For 5.8 grade HSFG bolts, the yield strength (f_{yb}) of bolt is _____ N/mm^2.
9. The distance between centers of bolts (Pitch) shall not be less than _____ times the nominal diameter of the bolt.
10. Self weight of plate girder is _____ KN/m .
11. Yield strength of bolt of class 4.6 is_____.
12. Pitch of truss is defined as_____.
13. Slenderness ratio of a compression member_____.
14. To calculate design bending strength (M_d), the value of β_b for plastic section is _____.
15. Commonly used sheetings are_____.

Q.2 Answer the following questions. (Attempt any three) **(15)**

A) What are the properties of steel required for engineering design?

B) Write the short notes on (i) Limit state of collapse/strength & (ii) Limit state of serviceability

C) Design a lap joint between two plates each of width 120 mm, if the thickness of one plate is 16 mm and theother is 12 mm. The joint has to transfer a design load of 160 KN. The plates are of Fe410 grade. Use bearing type bolts.

D) Design a double angle tension member connected on each side ofa 10 mm thick gusset plate to carry an axial factored load of 375 KN. Use 20 mm black bolts. Assume shop connection.

Q.3 A) Design a laced column with two channels back to back of length 10 m to carry an axial factored Load of 1400 KN. The column may be assumed to have restrained in position but not in direction at both ends(hinged). **(07)**

B) Design a welded plate girder of span 24 m to carry superimposed load of 35 KN/m. Avoid use of bearing and intermediate stiffeners.Use Fe415 (E250) steel. **(08)**

OR

B) Design a gantry girder for following data : **(08)**

a) Crane capacity = 200 kN
b) Span of gantry girder = 7.5 m
c) Span of crane girder = 15 m
d) Self-weight of crane girder excluding trolley = 200 kN
e) Self-weight of trolley (crab) = 40 kN
f) Minimum hook approach = 1.2 m
g) Wheel base of crane = 3.5 m
h) Self-weight of rail section = 300 N/m
i) Yield stress of steel = 250 MPa
j) Self-weight of gantry girder = 1.6 kN/m^2

Find the following :

i) Maximum wheel load
ii) Maximum Shear Force
iii) Maximum Bending Moment
iv) Fix the dimensions of gantry girder

Checks are not required.

Q.4 **A) Design a steel roof truss for the following data :** **(07)**

a) Location - Ahmedabad
b) Span of roof truss = 14 m
c) Spacing of roof truss = 5 m
d) Pitch = 1/4

Find the following :

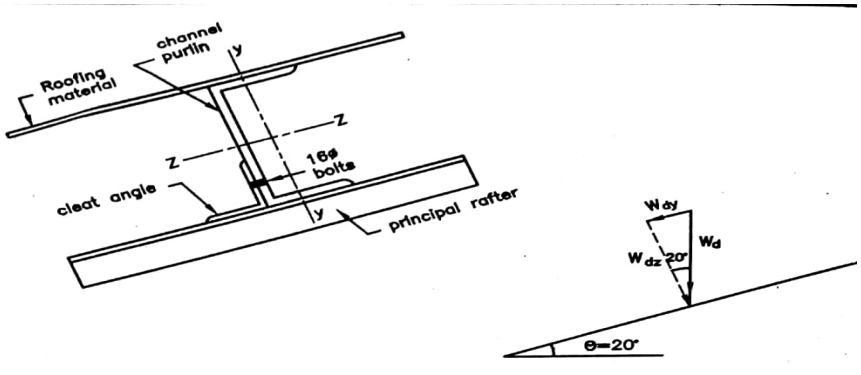
i) Fix the configuration of truss.
ii) Compute Dead Load & Live Load.

OR

A) Design a purlin on a sloping roof truss with the following data : **(07)**

a) Dead load = 0.15 KN/m^2
b) Live load = 2 KN/m^2
c) Wind Load = 0.5KN/m^2 (Suction)

The span of purlin is 4 m and spacing of purlins is 2 m c/c. Purlin is continuous over the supports. Angle of roof truss = 20°.
Use channel section as a purlin.



B) Design a slab base for a column ISHB 300 @ 577 N/m carrying an axial factoredload of 1000 KN. M20 concrete is used for the foundation. Provide welded connection between column and base plate. **(8)**