

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC SEMESTER-VI • EXAMINATION – WINTER - 2016

Subject Code: X60604**Date: 26/10/2016****Subject Name: Structural Design-I****Time: 10.30 am to 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of IS 800:2007, IS 875 Part I, II, III, SP-6 and Steel Table is permitted.
5. Consider $f_y = 250 \text{ N/mm}^2$ and $f_u = 410 \text{ N/mm}^2$ for steel if not given in data.

- Q.1** Design a simply supported gantry girder to carry one electric overhead travelling crane with following details. **14**
 Span of gantry girder = 6.5 m
 Span of crane girder = 16 m
 Crane capacity = 200 kN
 Self weight of crane girder excluding trolley = 200 kN
 Self weight of trolley = 40 kN
 Minimum hook approach = 1.2 m
 Distance between wheels = 3.0 m
- Q.2(a)** Calculate nodal loads due to dead load, live load and wind load for an industrial building of size 16 m x 60 m situated in Pune. Spacing between two trusses = 5 m c/c. Assume suitable configuration for the truss. Consider medium permeability and use A.C. Sheets. Height of eaves level is 15 m. Assume suitable data if necessary. **07**
- Q.2(b)** For the calculated nodal forces in Q-2(a) design any one member of Main Tie. **07**
- OR**
- Q.2(b)** For the calculated nodal forces in Q-2(a) design suitable purlin. **07**
- Q.3** Design a simply supported welded plate girder of span 16 m to carry u.d.l. of 60 kN/m over entire span. Provide end bearing stiffeners only. Assume suitable data if necessary. (Connection design is not required). **14**
- OR**
- Q.3(a)** Explain various methods to design plate girder. **07**
- Q.3(b)** A beam ISLB 450 transfers a factored load of 800 kN to a column ISHB 450. Using Fe 410 grade steel, design the stiffened seat connection. **07**
- Q.4** Design Cross Girders and any one member of Top Chord for a foot bridge with the following details: **14**
 Type of supporting system: N- Type lattice girder
 Span: 24 m
 Width of walk way: 4.0 m,
 Flooring: RCC slab 150 mm with floor finish 1.0 kN/m^2

Pedestrian Load: 5 kN/m^2

Design Cross Girders and any one member of the truss.

Assume Suitable data if required.

OR

Q.4(a) Explain concept of Plastic design method. Give advantages and disadvantages of plastic design method. **07**

Q.4(b) Enlist advantages and disadvantages of welded, bolted and riveted connection. **07**

Q.5 Design column of 4.0 m height and subjected to the factored axial load of 500 kN with Moment at the top = 40 kNm and Moment at bottom = 20 kN m . The column is fixed at bottom and hinged at top. Assume suitable data if required. **14**

OR

Q.5 A portal frame consists of two hinge supported column of 4 m height separated by a beam of span 6 m and loaded up to collapse with downward uniformly distributed load of 15 kN/m and lateral point load of 50 kN at beam column junction . Find the plastic moment of resistance if it is of uniform strength. **14**
