Seat No.: _____   *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER–VI • EXAMINATION – WINTER • 2014

Subject Code: X 60604   **Date: 06-12-2014**

Subject Name: Structural Design-I

Time: 02:30 pm - 05:00 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 and STEEL TABLE is allowed.**

Q.1	A simply supported welded plate girder of span 27 m is subjected to service load of 50 kN/m UDL and two fixed point loads of 200 kN each spaced at 9m from each supports. Design the plate girder cross section using the fy = 250 steel plates. Perform all required checks for cross section as per IS code provisions. Apply curtailment of flanges.	**14**

Q.2 **(a)** Design stiffener under concentrated loads for plate girder designed in Q.1.   **07**

(b) Design bearing stiffener at support for plate girder designed in Q.1   **07**

OR

(b) Design web slice for plate girder design in Q.1 at 10 m from the support using fillet weld.   **07**

Q.3 **(a)** Explain limit state of serviceability as per IS code.   **07**

(b) Design the seat angle connection between the beam ISMB 250 and column ISHB 250 @ 51 kg/m. The beam reaction is 80 kN factored load. Use M 16 bolts of 4.6 grade and steel Fe 410.   **07**

OR

Q.3 Design a suitable beam-column with flexible joints of 3.0 m high and subjected to the factored axial load = 400 kN and factored moment = 20 kNm at top of column and 30 kNm at bottom of column. Assume fy = 250 N/mm^2. Take the effective length of the column as 0.80 L along both the axes.   **14**

Q.4 Determine the design loads on the purlins of an industrial building near Gandhidham, Gujarat. Considered general type of building with life of 50 years in terrain category 3 with maximum dimension of 30 m and width having 22 m. The height of eave level is 6 m with 12 m truss span. Consider, Topography Θ < 2°, Spacing of trusses is 3.3 m, Permeability near to medium, Sheeting used as A.C. sheets, Spacing of purlins is 1.35 m and Pitch: 1/3.5.   **14**

OR

Q.4 Design a simply supported gantry girder to carry one electric overhead travelling crane. Considering following data: **14**
Span of gantry girder = 6.0 m
Span of crane girder = 11 m
Crane capacity = 15 kN
Self-weight of crane girder excluding trolley = 140 kN
Self-weight of trolley = 40 kN
Minimum hook approach = 1.0 m

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Distance between wheels = 3.4 m
Self-weight of rails = 0.25 kN/m
Only do the check for buckling resistance.

Q.5 **(a)** A continuous steel beam consists of three equal spans 10 m each carrying an UDL of 50 kN/m under working conditions. Determine fully plastic moment required for the beam. Take load factor = 1.7. (Assume uniform section)   **07**

(b) Design a suitable web cleat connection between main beam ISWB 500 @ 95.2 kg/m and secondary beam ISWB 400 @ 66.7 kg/m connected on one side of the web of the main beam. Secondary beam has to transmit an end reaction of 200 kN, due to factored loads. Use grade 8.8 bolts of 20 mm diameter, steel grade 410 MPa.   **07**

OR

Q.5 Design the foot bridge for N- Type lattice girder considering 10 no. of panels and laterally supported by Rakers. Consider bridge span of 20 m and width of walk way is 3.0 m. Flooring made up with RCC slab of 110 mm depth considering floor finish and live load is 1.2 kN/m^2 and 3.5 kN/m^2 respectively.   **14**

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