

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-IV Examination June- 2010

Subject code: 141301**Subject Name: Design of Environmental Structure****Date: 17 / 06 / 2010****Time: 10.30 am – 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-456, IS-800, IS-875: Part-I, II, III, SP-6, steel Table is permitted.**
5. **Assume suitable data, if necessary and mention the assumed data clearly in your answers.**

- Q.1** (a) Write down the basic assumptions made in limit state method for flexure design and calculate the value of P_{tlim} for M20 & Fe415 Grade. **07**
- (b) Find out the capacity of a RCC beam reinforced with 4-20 \emptyset bars at bottom. Use M20, Fe415. Width of the beam is 230mm and total depth is 500mm. **07**
- Q.2** (a) Design a simply supported beam of span 6m carrying UDL of 40 kN/m over entire span. Use M20 and Fe415. **07**
- (b) Find out the capacity of a RCC beam reinforced with 4-20 \emptyset bars at bottom and 3-16 \emptyset bar at top. Use M20, Fe415, b=300mm and total depth is 400mm. **07**
- OR**
- (b) Design a simply supported beam of span 5m carrying UDL of 50 kN/m over entire span. Use M 20 and Fe415. Depth is restricted to 400mm. **07**
- Q.3** (a) Design a slab panel of span 3m x 7.5m simply supported on longer direction. Use M20 and Fe415. **07**
- (b) Design a short column for axial load of 1500 kN. **07**
- OR**
- Q.3** (a) Design a slab panel of span 3m x 5m simply supported on longer direction. Use M20 and Fe415. **07**
- (b) Design a pad footing for a column of size 300x450 carrying 1000 kN. S.B.C. of soil is 180 kN/m². **07**
- Q.4** (a) Find out load carrying capacity of a tie member made up from 2ISA 90x90x6 mm connected on same side of gusset plate by 20 mm \emptyset pds rivet with tacking rivet. **07**
- (b) Design single unequal angle discontinuous strut to resist axial load of 140 kN. Length of member is 1.4 m and connected by more than two rivets at each end. **07**
- OR**
- Q.4** (a) Design double equal angle tie member to resist axial load of 300 kN. The member is connected on both side of 10 mm thick gusset plate with tacking rivet. Diameter of design rivet is 16 mm. **07**
- (b) Analyse a compression member made up from 2ISA 125x75x8 mm connected on same side of 8 mm thick gusset plate and having length of 1.6 m connected by two rivet at each end. **07**

- Q.5 (a)** Design I section for the column section subjected by axial load of 800 kN. **07**
The length of the member is 5.5 m with one end fixed and other hinged.
- (b)** Design an I-section for the beam having simply supported span of 5 m **07**
subjected by UDL of 40 kN/m on entire length and 120 kN point load at mid span.

OR

- Q.5 (a)** Design riveted connection for the 2ISA 130x130x10 mm connected on same **07**
side of gusset plate subjected by axial load 350 kN. Use 20 mm diameter
PDS rivet.
- (b)** Design a slab base foundation for the column made up from ISHB 300 @ 63 **07**
kg/m subjected by a compressive force of 750 kN. Permissible bearing
pressure is 4 N/mm² and SBC of soil is 180 kN/m².
