

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2134

Roll No.

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**B.Tech.**

**(SEM. V) ODD SEMESTER THEORY  
EXAMINATION 2013-14**

**DESIGN OF CONCRETE STRUCTURES – I**

*Time : 3 Hours*

*Total Marks : 100*

**Note :-** (i) Attempt all questions. All questions carry equal marks. Any data if missing may be assumed suitably.

(ii) Use of IS code 456 is allowed.

1. Attempt any two parts of the following : **(10×2=20)**

- (a) Do the design mix for M-20 concrete for moderate exposure for which standard deviation is 4.6 and water cement ratio is 0.52. The coarse aggregate is 20 mm graded and sand is of grading zone II. SP. gravity of cement is 3.15, SP. gravity of coarse aggregate and sand is 2.6.
- (b) Design a rectangular beam section to carry 160 kNm moment with M-20 concrete and Fe-415 steel. The overall depth of the beam is restricted to 270 mm.
- (c) A beam section 230 mm × 300 mm effective depth is reinforced with 2 bars of 12 mm diameter. Determine its moment capacity and stresses developed in concrete and steel. Used concrete is M-20 and steel Fe-415.

2. Attempt any two parts of the following : (10×2=20)

- (a) Determine reinforcement of a rectangular beam 300 mm wide and 400 mm effective depth. The beam is subjected to a factored bending moment of 150 kNm. Use M-20 concrete and Fe-250 steel.
- (b) A rectangular beam 200 mm wide and 400 mm effective depth is reinforced with 3 bars of 16 mm diameter. If grade of concrete is M-20 and grade of steel Fe-415, determine bending moment capacity of the beam.
- (c) A T-beam, casted with M-20 concrete and Fe-415 steel, has following dimensions.

width of flange = 2400 mm

depth of flange = 100 mm

width of web = 250 mm

overall depth of beam = 450 mm

effective cover to reinforcement = 50 mm

tension reinforcement = 2 bars of 16 mm dia.

Determine moment of resistance of the beam.

3. Attempt any two parts of the following : (10×2=20)

- (a) What is bond strength of concrete ? Derive expression for bond stress in reinforced concrete.

- (b) A concrete beam is 300 mm wide and 600 mm effective depth and is reinforced with 4 bars of 25 mm diameter bars in tension zone. Design shear reinforcement at a section experiencing shear force of 100 kN. Use M-20 concrete and Fe-415 steel.
- (c) A cantilever beam is 230 mm wide and 400 mm deep at fixed end. Its span is 3 m and it carries a u.d.l. 18 kN/m inclusive of self weight. Two bars of 20 mm diameter have been provided in tension zone. Design required shear reinforcement if concrete is of grade M-20.
4. Attempt any two parts of the following : (10×2=20)
- (a) Internal dimensions of a room are 3 m × 4 m; it is resting over beams 300 mm wide. The live load on slab is 4 kN/m<sup>2</sup>. Design the slab with M-20 concrete and Fe-415 steel. Show reinforcement by neat sketches.
- (b) A 3 m wide gallery is connecting two blocks. The slab of gallery is resting over two longitudinal beams. The slab is supporting a live load of 3 kN/m<sup>2</sup>. Design gallery slab and show the details with neat sketches. Use M-20 concrete.
- (c) Design slab for a room which is 3.5 m × 5 m. The two adjacent edges are continuous. The slab is supporting live load of 4 kN/m<sup>2</sup> and floor finish of 1 kN/m<sup>2</sup>. Use M-25 concrete and Fe-415 steel; design the slab.
5. Attempt any two parts of the following : (10×2=20)
- (a) What are interactive curves used in the design of columns ? How these curves are used in design of columns subjected to axial load and moments ?

- (b) An R.C.C. circular column of effective length 2.40 m carrying an axial service load 900 kN. Design column with M-20 concrete and Fe-415 steel.
- (c) Design a reinforced concrete column which is 4.5 m long and fixed at both ends. It is carrying an axial load of 2000 kN (service). Use M-25 concrete and Fe-415 steel.