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C09–C–402

# 3423

## BOARD DIPLOMA EXAMINATION, (C–09)

## OCT/NOV—2017

## DCE—FOURTH SEMESTER EXAMINATION

RC STRUCTURES

*Time* : 3 hours ] [ *Total Marks* : 80

**PART—A** 3×10=30

***Instructions*** : (1) Answer **all** questions.
(2) Each question carries **three** marks.
(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.
(4) Assume suitable data if necessary.
(5) IS 456:2000 code and SP-16 is allowed with candidates

**1.** Define *(a)* characteristic strength of materials and *(b)* partial safety factor.

**2.** Describe briefly the various design methods of RCC members.

**3.** State any three assumptions made in the design of RC members for the limit state of collapse in flexure, as per IS 456:2000.

**4.** Define *(a)* development length and *(b)* anchorage.

**5.** Write three functions of distribution bars in slabs.

**6.** Write the design requirements for slabs as per IS 456:2000, for the following :

*(a)* Minimum reinforcement

*(b)* Maximum diameter of bars

**7.** Find the effective flange width of simply supported Tee-beam with the following data :

Effective span = 5 m
Breadth of web = 300 mm
C/c distance of adjacent panels = 3 m
Thickness of slab = 100 mm

**8.** Write the three advantages of continuous beams/slabs over simply supported beams/slabs.

**9.** Calculate the shear force at inner side of support next to the end support for a continuous beam as per IS 456:2000. Size of beam is 300 mm×450 mm overall, effective span = 3·5 m, imposed load (not fixed) = 10 kN/m, imposed load (fixed) = 12 kN/m including self weight, effective cover = 40 mm.

**10.** Write any three codal provisions for transverse reinforcement (lateral ties) in the design of RCC rectangular columns.

## PART—B

10×5=50

***Instructions*** : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

(4) Assume suitable data if necessary.

(5) Answer all questions in limit state method unless mentioned as working stress method

**11.** An RCC beam 250 mm wide and 600 mm deep has 4 bars of 20 mm diameter as tension reinforcement, the centre of bars being 50 mm above from the bottom of the beam. Determine the uniformly distributed load the beam can carry over a simply supported effective span of 6·1 m. Use M-20 grade concrete and Fe-415 steel. Use working stress method.

**12.** Design a rectangular simply supported RC beam over a clear span of 6 m. If the superimposed load is 12 kN/m and the support width is 230 mm. Use M-20 grade concrete and Fe-415 steel .The beam is to have width of 300 mm. Check for deflection and development length.

**13.** Design an RC lintel for an opening of 1·2 m width on a masonry wall of 230 mm width using M-20 grade concrete and Fe-250 steel. The height of masonry wall above the opening is 1·5 m. The lintel has a bearing of 150 mm on the walls. The unit weight of masonry may be taken as 19 $kN/m^3$. No shear reinforcement design is required. Check for deflection (stiffness) may be done.

**14.** The floor slab of a classroom of 3 m×5 m is discontinuous over all four sides and the corners of the slab are prevented from lifting. Live load on the slab is 3 $kN/m^2$ and floor finish is of 1·0 $kN/m^2$ width of the support is 250 mm. Design the slab using M-20 grade concrete and Fe-415 steel.

**15.** Calculate the maximum uniformly distributed load at limit state, the Tee-beam can carry including its own weight on a simply supported span of 5 m, width of flange = 1500 mm, thickness of flange = 100 mm, depth of tensile steel from the top of flange is 500 mm, width of web = 250 mm, effective cover = 40 mm, area of reinforcement = 804 $mm^2$. Use M-20 grade concrete and Fe-415 steel.

**16.** Calculate the maximum BM at the support for a continuous beam using IS 456:2000, effective depth = 350 mm, gross depth = 400 mm, clear distance between supports = 4 m, width of beam = 230 mm, width of support = 230 mm, imposed load (not fixed) = 8 kN/m, imposed load (fixed) = 12 kN/m excluding self weight. No. of spans = 4. Also calculate the maximum shear force at the support.

**17.** Design a shot reinforced concrete circular column with lateral ties to carry an axial load of 1500 kN. Use M-20 grade concrete and Fe-415 steel.

**18.** Design a RCC footing of uniform thickness to carry an axial load of 1000 kN from a square RCC column of size 350 mm×350 mm. The safe bearing capacity of soil is 180 kN/$m^2$. Use M-20 grade concrete and Fe-415 steel.

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