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C14–C—501

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BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2016

DCE—FIFTH SEMESTER EXAMINATION

DESIGN AND DETAILING OF R.C.ELEMENTS

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

PART—A 3×10=30

Instructions : (1) Answer **all** questions.

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

(3) All dimensions are in mm.

(4) Use of IS 456–2000 and SP–16 is permitted.

1. State the types of steel used in RC members. Why is steel used as reinforcement?

2. State various limit states to be considered in limit state design.

3. A singly reinforced rectangular member 250 mm 400 mm effective depth, is subjected to a shear force of 40 kN under working loads. Calculate nominal shear stress in concrete.

4. What are the types of bond? Write the anchorage value for a standard U-type hook.

5. Classify the slabs based on spanning directions and support conditions.

6. How and where do you provide reinforcement in a cantilever slab? Draw a neat sketch.

7. Write any three advantages of T-beams.

8. Calculate the maximum factored moment at the middle of interior span of a 3-span continuous floor slab with the following data :

Factored deal load = 8·4 kN/m

Factored live load = 3·75 kN/m

Effective span = 3·39 m

9. Write any three advantages of continuous beams.

10. Write any four design specifications of columns.

PART—B 10×5=50

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

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

(3) Answer each question by using limit state method unless specified.

11. *(a)* Explain the three different types of singly reinforced RC section as per working stress method. 7

(b) Write the relevant formulae for moment of resistance for the sections. 3

12. A doubly reinforced beam 230 mm 500 mm total depth is reinforced with 4 bars of 16 mm diameter as compression reinforcement and 6 bars of 20 mm diameter as tension reinforcement at an effective cover of 40 mm on both sides. Find the safe uniformly distributed load, the beam can carry if it is simply supported over an effective span of 5 m. Use M 20 grade concrete and Fe 415 steel.

f_{sc} values (Table F in SP 16)

Grade of steel	*d /d*	
Fe 415	0·05	0·10
	355	353

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

14. Design a reinforced concrete one-way slab to carry a live load of 3 kN/m^2 and finishes of 1 kN/m^2 on an effective span of 3·5 m. Use M 20 grade concrete and Fe 415 steel reinforcement. Sketch the reinforcement details.

15. Calculate the moment of resistance of the T-beam with the following data :

Width of the flange = 750 mm

Thickness of the slab = 110 mm

Width of the rib = 250 mm

Effective depth = 600 mm

Area of tension steel = 2400 mm^2

Grade of steel is Fe 415 and grade of concrete is M 20.

16. A continuous RCC rectangular beam of size 250 mm 500 mm overall depth, is supported by 300 mm 300 mm size masonry pillars at clear intervals of 4 m. The beam carries a deadload of 20 kN/m including its self-weight and an imposed load of 12 kN/m. Design the reinforcement at support next to the end support and interior support section. Use M 20 grade concrete and Fe 415 steel.

17. Design a square column 400 mm 400 mm, 3·3 m long subjected to a working load of 1000 kN. Use M 20 and Fe 415. The column is effectively held in position and direction at both the ends.

18. A reinforced concrete column of size 300 mm 300 mm carries a load of 750 kN. The safe bearing capacity of soil is 200 kN/m^2. Design an isolated column footing with uniform thickness. Use M 20 grade concrete and Fe 415 steel. Check for development length and check for bearing pressure is not required.

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