

**4618****BOARD DIPLOMA EXAMINATION, (C-14)****MARCH /APRIL-2019****DCE - FIFTH SEMESTER EXAMINATION**

DESIGN &amp; DETAILING OF R.C ELEMENTS

Time:3 hours

Max.Marks: 80

**PART-A****10x3=30M**

**Instructions:** 1) Answer all questions. Each question carries three marks.  
2) Answers should be brief and straight to the point and shall not exceed five simple Sentences.

1. State any three uses of I.S. 456-2000 & SP-16 is permitted.
2. Define 'Design Strength' of a material? Write the partial safety factor values for steel & concrete in limit state of collapse?
3. If the ultimate load moment is 80KN-m, what is the effective depth of a singly reinforced concrete section, if the width of beam is 230 mm. Use M-20 grade concrete and Fe415 grade steel.
4. Define development length and write the formula?
5. Explain load distribution in two way slabs?
6. How do you check for shear in design of one way slab?
7. State the formula for finding effective width of flange for T- beam and explain terms along with diagram.
8. Draw the line diagram of a continuous beam and indicate the deflection profile and the Bending Moment variations at salient points. Also mention Bending moment equations at those points.

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9. Calculate the maximum Bending moment at the support for a continuous beam as per IS-456:2000.

Clear distance between supports	=	3.5m
Dead load	=	2.5KN/m
Imposed load (not fixed)	=	10 KN/m
Number of spans	=	4
Effective Depth	=	450mm
Effective Cover	=	50mm

10. What is meant by slenderness ratio of a column? State the conditions to consider a column as long or short column.

### PART-B

**5x10=50M**

**Instructions:** 1) Answer any **five** questions. Each question carries **ten** marks.

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

11. A reinforced concrete beam 300mm x600mm overall depth is reinforced with 4 bars of 20mm diameter at an effective cover of 50mm. What uniformly distributed load this beam can carry excluding its self weight over a simply supported span of 5m. Assume M25 grade of concrete and Fe 415 Steel. Use Working stress Method.

12. Design a singly reinforced beam for flexure of width 300mm, having an effective span 5.3m, carries a LL of 20 KN/m (including self weight). Use M20 grade concrete & Fe415 steel. Also check the design for deflection.

13. An RC Beam 300mx500mm is provided with an effective cover of 50mm and is reinforced with 4 numbers of 25mm diameter bars as main reinforcement. Design Shear is 150 kN. Use M20 grade concrete and Fe 415 steel.

- Calculate :
- i) Value of nominal shear stress
  - ii) Shear resistance of beam
  - iii) Spacing of 2 legged 8 mm diameter vertical stirrups
  - iv) Check for maximum spacing.
14. Design a two-way slab for a room 4000mmx3500mm clear in size, if the super imposed load is 3 kN/m<sup>2</sup> and floor finish of 1kN/m<sup>2</sup>. The edges of the slab are simply supported and corners are not held down. Use M20 grade concrete and Fe 415 steel. It is supported on 300mm thick wall.
15. Calculate the maximum uniformly distributed load at limit state, the T beam can carry including its own weight on a simply supported span of 5m, width of the flange 1500mm, thickness of flange is 100mm. Effective depth of the tensile steel from top of flange is 500mm, width of the web is 250mm, effective cover =40mm. Area of the reinforcement is 804mm<sup>2</sup>. Materials used are Fe415 grade steel and M20 grade concrete.
16. Design a singly reinforced continuous RC rectangular beam for flexure at the middle of interior span with the following details.:
- No. of spans :3
- Clear distance between supports :3600mm
- Width of support:300mm
- imposed load (not fixed):5kN/m<sup>2</sup>
- imposed load (fixed):7.5kN/m<sup>2</sup>(excluding self weight)
- use M20 grade concrete &Fe 415 grade steel.
17. Design a circular column to carry an axial load of 1000kN using lateral ties. Use M20 grade concrete & Fe 415 steel.
18. Design a square footing of uniform thickness for a concrete column 500x500mm carrying an axial load of 500kN. The safe bearing capacity of soil is 150kN/m<sup>2</sup>. Use M20 grade concrete and Fe415 steel. Check: for one way and two way shear.