DESIGN AND DETAILING OF R.C. STRUCTURES

Course code	Course title	No. of period/week	Total no. of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-402	Design and Detailing of R.C. Structures	05	75	20	80

Model Paper for Unit Test-I

State Board of Technical Education and Training,

A.P.Diploma in Civil Engineering (DCE)

Fourth Semester: C-402 Design and Detailing of R.C. Structures

Time: 90 Minutes **Unit Test –I** **Maximum Marks : 40 PART- A**

16 Marks

Instructions:

(i) Answer all questions

(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a) The value of factor of safety adopted for concrete as per working stress method is_____ (CO1)

   (b) Partial safety factor adopted for material strength steel as per IS 456 is_____ (CO2)

   (c) As per IS456-200, the basic value of span to depth ratio for simply supported beams for spans upto 10m is_____ (CO2)

   (d) When the ration between longer span to shorter span is greater than 2 such slabs are to bedesigned as two-way slab (TRUE/FALSE). (CO4)

2. What is the necessity of providing the reinforcement in concrete? Why steel is used as reinforcement. (CO1)

3. State the methods of design of reinforced concrete structures. (CO2)

4. The dimensions of a singly reinforced, simply supported rectangular beam are 300x450mm deep effective, provided with Fe-415 steel and M20 grade concrete. Determine the Limiting moment of resistance of the beam. (CO2)

5. Distinguish between one way slabs and two way slabs. (CO2)

PART- B **3 x 8 = 24 Marks**

Instructions :

(i) Answer all questions

(ii) Each question carries EIGHT marks

(iii) Answer should be comprehensive and the criterion for valuation is the content but notthe length of the answer.

6. (A) Calculate the area of reinforcement required for a simply supported reinforced concrete beam 230x400mm effective depth to resist ultimate moment of 80kN-m. Assume M20 concrete Fe415 steel. (CO2)

(OR)

(B)Design a rectangular simply supported reinforced concrete beam over a clear span of 4.3m. The superimposed load is 20kN/m and support width is 230mm each, use M20 concrete Fe415steel. Check the design for deflection(CO2)

7. (A) Calculate the ultimate Moment of Resistance of an R.C. beam of rectangular section 300x400mm effective depth. Area of steel consists of 6nos 16mm dia in tension zone and 3nos 16mm dia in compression zone. Assume steel of grade Fe415 and concrete of grade M20 and effective cover to compression reinforcement is 40mm.(CO2)

(OR)

(B) Design a rectangular reinforced rectangular concrete beam for a clear span of 4.0m. The Super imposed load is 35kN/m and the size of the beam is restricted to 250x400mm overall depth. Use M20 grade concrete Fe415 grade steel. Support width is 300mm and effective cover is 40mm.(CO2)

8. (A) An R.C.C. beam 250mm wide and 450mm effective depth is reinforced with 6nos 16mm diameter bars in tension zone of which two bars are cranked up near the support. If the design shear is 120 kN, design the shear reinforcement considering bent up bars. use M20 concrete Fe415 steel.(CO2)

(OR)

(B) A simply supported R.C.C. slab has to be provided for a roof slab of a room of clear dimensions 3x8m. Width of supporting wall is 300mm. The weight of weathering course over the slab is 1 kN/sqm. Take Live load on the slab 2 kN/sqm. Design the slab using M20 grade concrete and Fe415 grade steel. Check the design for stiffness.(CO2)

State Board of Technical Education and Training,
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Time: 90 Minutes **Unit Test –II** **Maximum Marks : 40**

PART- A **16 Marks**

Instructions :

(i) Answer all questions

(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a) Maximum diameter of the bar in the slab shall not exceed_____times total thickness ofthe slab. (CO2)

   (b) Minimum %of tensile reinforcement in slabs when HYSD bars are used____ (CO2)

   (c) The effective width of flange of T-Beam is given by_____ (CO3)

(d) Minimum no. of longitudinal bars to be used in the circular R.C.C. column is _ (CO4)

2. Find the effective flange width of the following simply supported T-beam. (CO3)

   Effective span = 5.0m c/c
   distance between adjacent panels = 4m
   breadth of web = 300mm
   Thickness of slab = 110mm.

3. A continuous R.C.C. rectangular beam of size 250x500mm overall is supported on 300x300mmmasonry column at a clear interval of 4.0m. Calculate the effective spans. (CO3)

4. For a square column 450x450mm reinforced with 8bars 20mm diameter of grade Fe415 andgrade of concrete is M20. Calculate load carrying capacity as per IS code. (CO4)

5. A reinforced concrete column of size 300x300mm carries a load of 700kN. The SBC of soil is200kN/m^2. Find the size of the footing. Use M20 concrete and Fe415 grade steel. (CO4)

PART- B **3 x 8 = 24 Marks**

Instructions :

(i) Answer all questions

(ii) Each question carries EIGHT marks

(iii) Answer should be comprehensive and the criterion for valuation is the content but notthe length of the answer.

6. (A) Calculate the ultimate moment resistance of a T-beam for the following data. (CO3)Width of flange = 1500mm
   Depth of flange = 150mm
   Effective depth = 600mm
   Width of rib = 300mm
   Area of steel in tension = 3nos 25mm dia.Concrete grade M20 and steel Fe415.

(OR)

(B) A T-beam floor consists of 150mm thick R.C.C. slab monolithic with 300mm wide beams. The beams are spaced at 3.5m intervals and their effective span is 6.0m. If the super imposed load on the slab is 5 kN/m^2, design the intermediate T-beam. Use M20 Concrete and Fe415 steel. (CO3)

7. (A) Design a short column square in section to carry an axial load of 2000kN using M20 Concreteand Fe415 steel. Take load factor of 1.5.(CO4)(OR)

(B) Design a short circular column to carry an axial load of 1500kN using M25 Concreteand Fe415 steel. Take load factor of 2.

8 (A) Design an R.C.C. footing of uniform thickness to carry an axial load of 1000kN from a square column of size 350x350mm. The SBC of the soil is 180 kN/m^2 use M20 Concrete and Fe415steel.(CO4)

(or)

(B) Explain the design procedure of isolated square footing of uniform depth under a square column.

Model Test Paper

State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Fourth Semester: C-402 DESIGN AND DETAILING OF R.C.STRUCTURES

Time: 180 Minutes **End Examinations** Maximum Marks: 80

PART – A 3 x 10 = 30 Marks

Instructions:

(i) Answer all questions
(ii) First question carries THREE marks.
(iii) Answer should be brief and straight to the point and shall not exceed five simple sentences.

1. State the types of steel used in R.C. members. Why is steel used as reinforcement? (C01)
2. State the loads to be considered in the design of beams as per IS: 875. (C02)
3. State various limit states to be considered in limit state design. (C02)
4. What are the types of bond? Write the anchorage value for a standard U-type hook.(C02)
5. Write any three differences between oneway slab and two way slab (C02)
6. State the functions of distribution steel in one way slabs (CO2)
7. Find the effective flange width of simply supported T-beam with the following data:
   Effective span—530 m, breadth of web—300 mm, C/C of adjacent panels—4·0 m,
   Thickness of slab—100mm. (C03)
8. State any three design specifications of column. (C04)
9. List any three design specifications of footing. (C04)
10. A reinforced concrete column of size 400x400mm carries a load of 1000kN. The SBC of soil is 250 kN/m^2. Find the size of the footing. Use M20 concrete and Fe415 grade steel. (CO4)

PART – B 5 x 10 = 50 Marks

Instructions:

(iv) Answer any FIVE questions
(v) Each question carries TEN marks.
(vi) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. Design a rectangular simply supported beam over a clear span of 6·0 m to carry a super imposed load of 30 kN/m,the support width is 230 mm. Check for deflection. (C02)
12. Design a rectangular simply supported reinforced concrete beam over a clear span of 4 m. The superimposed load is 20 kN/m and support width is 250 mm each, use M25 concrete Fe500 steel. Check the design for deflection (C02)
13. Design a simply supported R.C.C. slab over a roof of a room of clear dimensions 2·5 m x 5·5 m. The width of supporting wall is 300 mm. The slab carries a superimposed load of 2·5kN/m2 and floor

finish of 1kN/m^2.Use M20grade concrete and Fe415steel. (CO2)

14. A simply supported R.C.C. slab has to be provided for a roof slab of a room of clear dimensions 3 x 8m. Width of supporting wall is 300mm. The weight of weathering course over the slab is 1 kN/sqm. Take Live load on the slab 2 kN/sqm. Design the slab using M20 grade concrete and Fe415 grade steel. Check the design for stiffness. (C02)

15. Find the moment carrying capacity of a T-beam of effective flange width 1300 mm,thickness of slab 110 mm, rib width 300 mm and effective depth 520 mm, reinforced with 4-number of Fe 415 grade steel bars of 16 mm diameter. The concrete used is of grade M20. (C03)

16. Design the reinforcement for an axially loaded short square column to carry an axial load of 1200 kN. Use M25 grade concrete and Fe 415 steel. (C04)

17. Design a square column 400mm x 400mm, 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. (C04)

18. A reinforced concrete column of size 300mm x 300mm 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. (C04)