17. Find the forces in all the members of the frame shown in Fig. VII by flexibility method. Area of cross-section of the respective members are shown in Figure. E- constant.

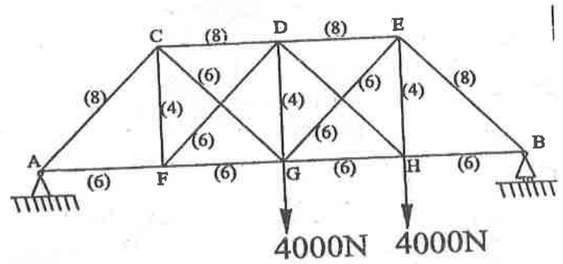


fig. (VII)

Or

18. Find the fixed end moments of the beam shown in Fig. VIII by flexibility method.

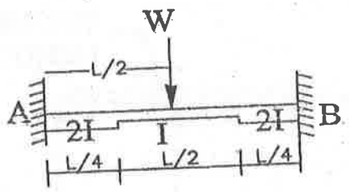


fig. (VIII)

19. Define shape function and derive shape function for first order rectangular element.

Or

20. Briefly explain the steps involved in Finite Element analysis and explain it.

(5 × 12 = 60 marks)

F 7073 (Pages : 4) Reg. No. 12019316

Name. Rahul Unnikrishnan

B.TECH. DEGREE EXAMINATION, NOVEMBER 2017

Fifth Semester

Branch : Civil Engineering

CE 010 506—STRUCTURAL ANALYSIS—I [CE]

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Define static indeterminate structure.
2. State the assumptions in moment distribution method of analysis.
3. Define stiffness and flexibility.
4. Define flexibility influence coefficient.
5. Discuss the applications of Finite Element Analysis.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Distinguish the principle between force method and displacement method of analysis of indeterminate structures.
7. Discuss the structural behavior of portal frame with out sway.
8. Discuss the relation between slope deflection method of analysis and stiffness method.
9. A fixed beam AB carrying a concentrated load W at one-third distance from support A. Flexural rigidity of the is equal to EI. Analyse the beam by flexibility method.
10. Explain idealization of actual structures.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. Draw the bending moment and shear force diagram for a beam shown in Fig. I.

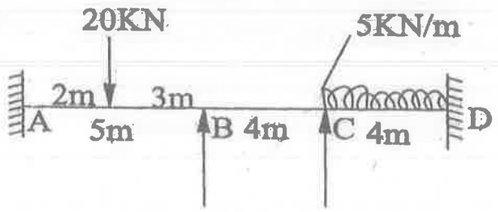


fig. (I)

Or

12. Draw the bending moment and shear force diagram for a beam shown in Fig. II.

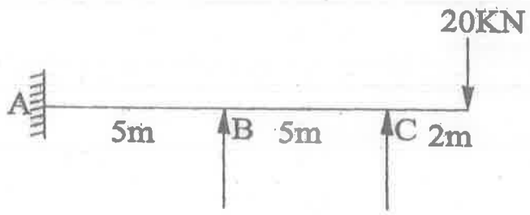


fig. (II)

13. Calculate the fixing moment and draw the bending moment diagram for the frame Shown in Fig. III.

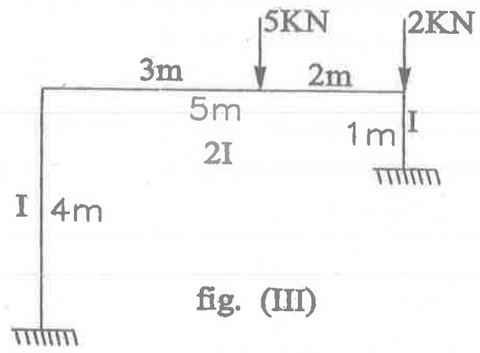


fig. (III)

Or

14. Calculate the fixed end moments and draw the bending moment diagram for the frame shown in Fig. IV :

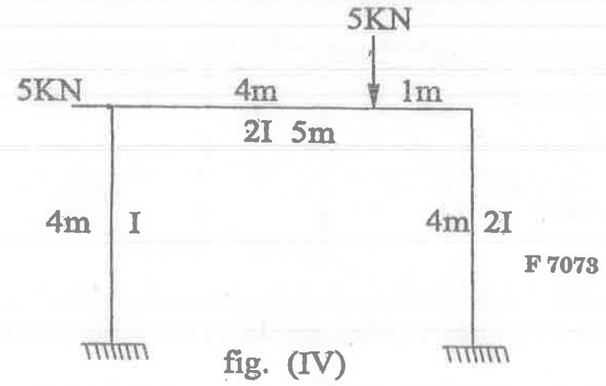


fig. (IV)

15. Analyse the continuous beam show in Fig. V by stiffness method.

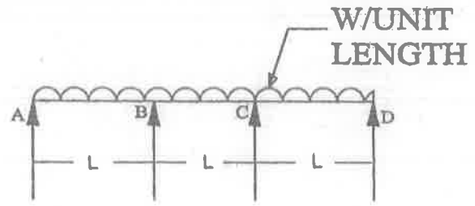


fig. (V)

Or

16. Analyse the pin jointed frame shown in Fig. VI by stiffness method.

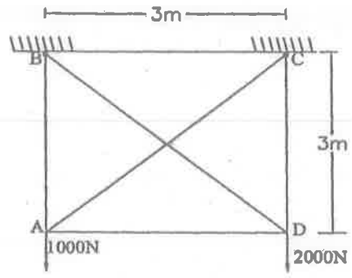


fig. (VI)

F 7060 (Pages : 6) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2017

Fifth Semester

Branch : Civil Engineering

CE 010 505—QUANTITY SURVEYING AND VALUATION (CE)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Assume any missing data suitably.

1. (a) (i) What are the purposes of estimates ?

Explain the preparation of detailed estimates.

(5 marks)

(ii) Prepare a detailed estimate of the following items and based on that abstract of estimated cost of a two roomed building given in drawing (Fig. 1 on Page 4)

- First class brickwork in foundation and plinth. (15 marks)
- 2.5 cm. cement concrete floor. (10 marks)
- Earthwork in excavation for foundation and filling for plinth. (10 marks)

Or

(b) (i) Prepare a detailed estimate of the following items and based on that prepare the abstract of estimated cost for the given residential building (Fig. 2 on Page 5)

- RCC work. (10 marks)
- Wood work for doors. (10 marks)

(ii) Prepare a detailed estimate of a R.C.C. Root slab of 3 m. clear span and 6 m. long from the given drawing (Fig. 3) on Page 6). R.C.C. work including centering and shuttering and Steel reinforcement shall be taken separately.

Also prepare schedule of bars.

(20 marks)

Turn over

2. (a) (i) Find the cost of carrying 20,000 bricks to a distance of 8 km. in a cart of at Rs. 50.00 a day, when a cart can carry 200 bricks in a trip, the speed of the cart being 30 m. in a minute. Assume a working day of 9 hours. and time taken in loading and unloading 200 bricks.

(5 marks)

(ii) Prepare a detailed specifications for the following items of work :

- Brick work in CM 1 : 6. (5 marks)
- Earth work excavation in ordinary soil. (5 marks)
- Cement concrete 1 : 2 : 4. (5 marks)

Or

(b) (i) Calculate the cost per trip for carriage of materials by bullock cart for a lead of 7 m. Take the speed of bullock cart as 4 km./hr.

(5 marks)

(ii) Prepare detailed specifications for the following of works :

- Terrazo flooring. (5 marks)
- Doors and windows. (5 marks)
- Plastering in CM 1 : 3. (5 marks)

3. (a) Work out the labour requirements, material ingredients and rate analysis for the following items of work :

- R.C.C. work in column 1 : 1½ : 3 (10 cum). (10 marks)
- Cement concrete 1 : 2 : 4. (10 cum). (10 marks)

Or

(b) (i) First class brickwork in foundation and plinth with modular bricks with cement sand mortar 1 : 6. (10 cum).

(10 marks)

(ii) Random rubble stone masonry in superstructure in 1 : 6 cement sand mortar (10 cum).

(10 marks)

4. (a) (i) What are the various types of outgoings or expenses which are required to be incurred to maintain the revenue of the building.

(5 marks)

(ii) Explain the following terms in detail :—

- Free hold purchase. (2 marks)
- Capitalised value and book value. (3 marks)

Or

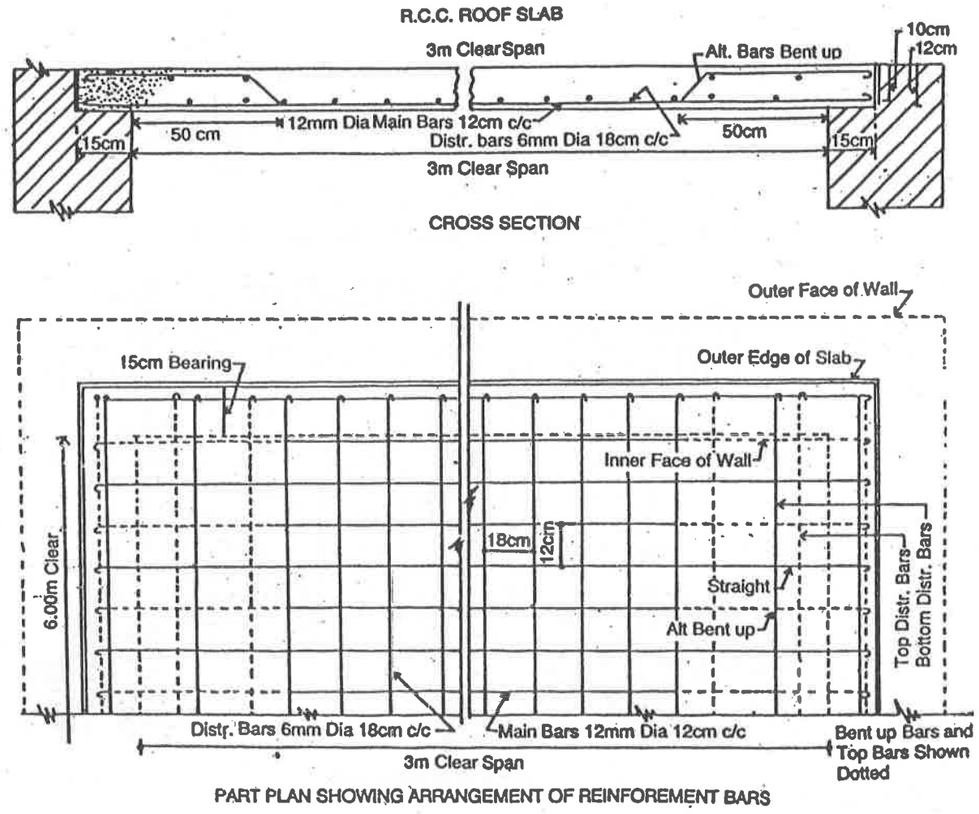


Fig. 3

Note—In plan bent up and top bars have been shown in dotted lines.

(b) Find the plinth area required and suggest the monthly rent payable for the residential accommodation for an assistant engineer drawing a salary of 30,000 per month. Consider cost of construction as 20,000 per sq. m. (10 marks)

5. (a) (i) Explain in detail the different methods of valuation of property. (5 marks)

(ii) Explain the following terms in detail :—

- Years purchase. (2 marks)
- Market value and scrap value. (3 marks)

Or

(b) Calculate the standard rent of a government residential building newly constructed from the following data :

- Cost of land Rs. 10,00,000.
- Cost of construction of the building Rs. 40,00,000.
- Cost of roads within the compound fencing Rs. 20,000
- Cost of electric 'installations including fans 8 % of the cost of building.
- Municipal house tax Rs. 400/annum.

Water tax Rs. 50/annum.

Property tax Rs. 140/annum.

(10 marks)

TWO-ROOM BUILDING WITH FRONT VERANDAH

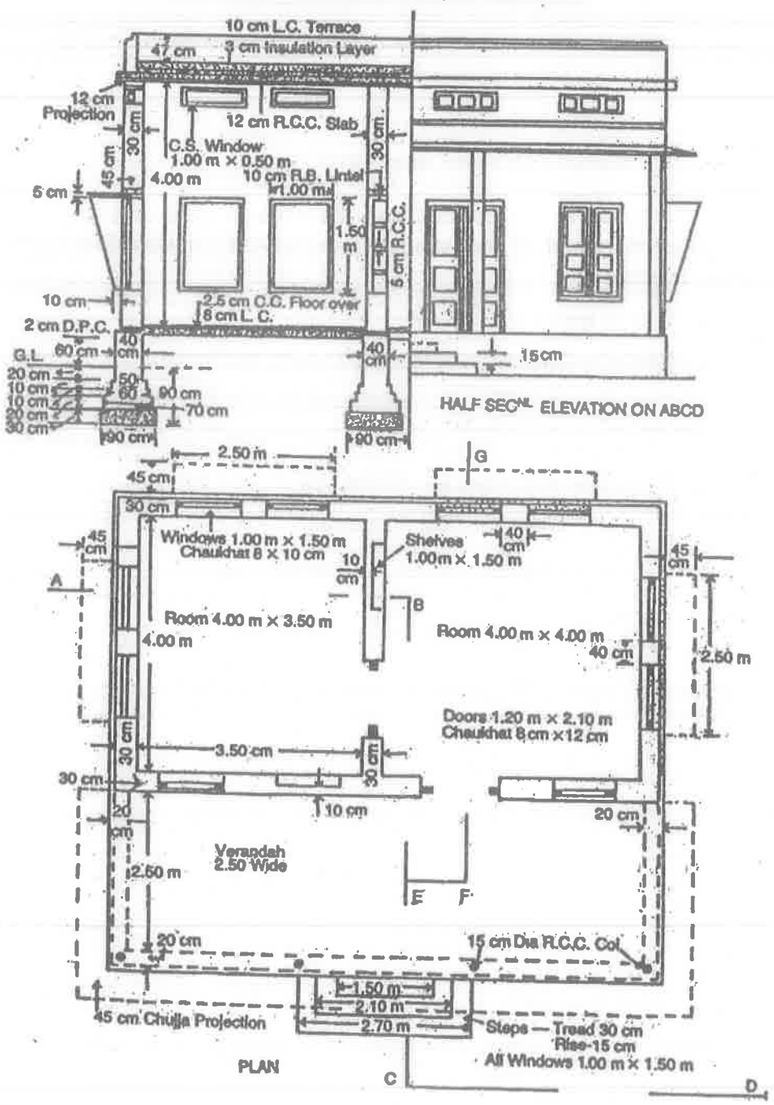
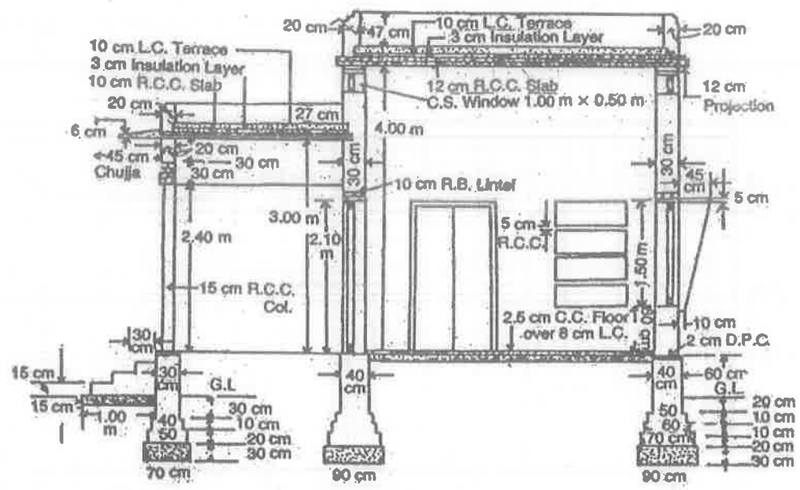


Fig. 1

TWO-ROOM BUILDING WITH FRONT VERANDAH

CROSS-SECTION OF TWO-ROOMED BUILDING



Note — *Foundation of verandah is continuous of same section.*

Fig. 2

Turn over

20. (a) Differentiate between :

(i) Normally consolidated and over consolidated clays.

(ii) Primary and secondary consolidated.

(5 marks)

(b) The time required for 50% consolidation of a 25 mm thick clay layer drained at top and bottom in the lab of 140 seconds. How long will it take for a 3 m thick clay layer of the same clay in the field under the same pressure increment to reach 50% consolidation. In the field there is a rack layer at the bottom of the clay. Also determine the time taken in the field, for 30% primary consolidation to occur.

(7 marks)

[5 × 12 = 60 marks]

F 7045 **(Pages : 4)** **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2017

Fifth Semester

Branch : Civil Engineering

CE 010 504—GEOTECHNICAL ENGINEERING—I (CE)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Graph / Semi-log sheets to be supplied.
Missing data if any may be suitably assumed.

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Explain three-phase system of soil.
2. What do you mean by quick sand condition ?
3. Define thixotropy.
4. Explain Zero air void line.
5. What is meant by coefficient of compressibility ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. The void ratio of a clay sample is 0.5 and degree of saturation is 70%. Compute the water content, dry and wet unit cut of the soil. Assume G = 2·7.
7. Explain the field methods to determine the coefficient of permeability of the soil.
8. What are the demerits of direct shear test ?
9. Explain the factors affecting compaction.
10. State the factors affecting consolidation of soils.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. A sample of wet silty clay has a mass of 126 kg. Wet density $\rho_t = 2.1 g/cm^3$, G = 2·7, water content, w = 15%. Determine (i) dry density, ρ_d ; (ii) porosity ; (iii) void ratio ; and (iv) degree of saturation.

Or

12. A mass of an oven dried soil pat is 0.78 N. When immersed in mercury, the dry soil displaces 4.75 N of mercury. If G = 2.72, what is the shrinkage limit of the soil. Assume G (mercury) = 13.6.

13. (a) A falling head permeability test was carried out on a sample of sand. The diameter and length of sample were 10 cm and 20 cm respectively. The head of the water was maintained at 35 cm. If 110 cm^3 of water is collected in $1^m\ 20^s$, compute the coefficient of permeability of sand. (7 marks)

(b) Explain Darcy's law of permeability. (5 marks)

Or

14. (a) Explain the procedure of drawing the actual flow net for flow through an anisotropic soil in which the fields are not squares. (5 marks)

(b) Explain the term quick sand condition and what will be the critical gradient at which quick sand condition will occur in a coarse grained soil having void ratio of 0.78 and of specific gravity 2.67. (7 marks)

15. A cylindrical sample of soil having a cohesion of 80 kN/m^2 and an angle of internal friction of 20° is subjected to a cell pressure of 100 kN/m^2. Determine (a) the maximum deviator stress at which the sample will fail ; (b) the angle made by the failure plane with the axis of the sample.

Or

16. A consolidated undrained triaxial test was conducted on a normally consolidated clay yielding the following data :

$\sigma_3 = 250\ kN/m^2$; $(\Delta\sigma_d)f = 275\ kN/m^2$

Determine (i) angle of friction ; (ii) angle which the failure plane makes with the major principal plane and ; (iii) normal stress and shear stress on the failure plane.

17. The following are the result of a compaction test :

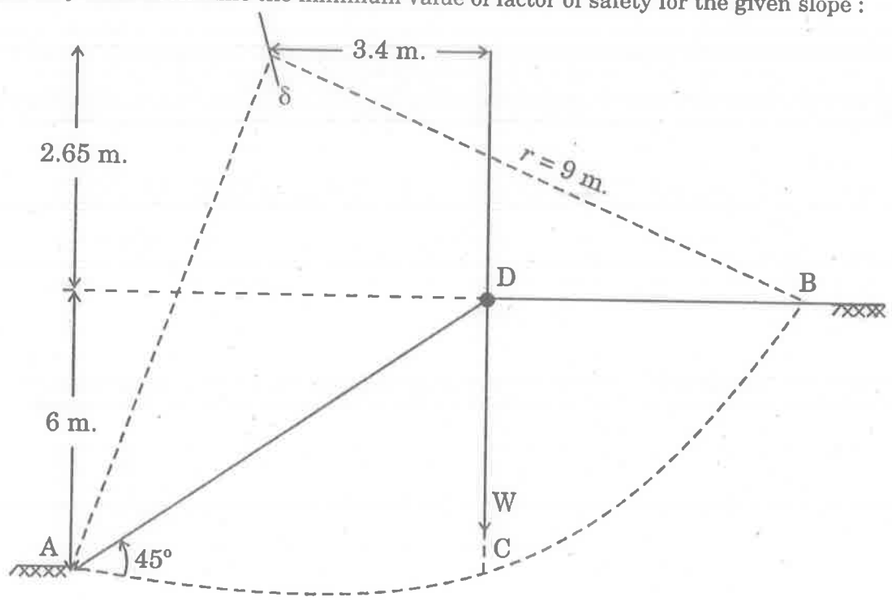
Mass of mould t wet soil (g)	2925	3095	3150	3125	3070
Water content (%)	10.0	12.0	14.3	16.1	18.2

Volume of mould = 1000 ml ; Mass of mould = 1000 g ; G = 2·7.

(i) Find the compaction curve showing the OMC and maximum dry density ; (ii) plot the zero air void line ; (iii) determine the degree of saturation at the maximum dry density.

Or

18. A 45° slope has been excavated to a depth of 6 m in a saturated clay having the following properties. Cu = 50 kN/m^2 ; $\phi_u = 0$ and r = 19 kN/m^3. For a trial slip surface shown below, determine the factor of safety. Also determine the minimum value of factor of safety for the given slope :



19. (a) Derive the expression for settlement :

$$S = \frac{C_c \cdot H}{(1+e_0)} \log \frac{\sigma_0^1 + \Delta\sigma^1}{\sigma_0^1}.$$

(7 marks)

(b) Explain the procedure for determining per consolidation pressure of soil. (5 marks)

Or

F 7031 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2017

Fifth Semester

Branch : Civil Engineering

CE 010 503—DESIGN OF CONCRETE STRUCTURES–I (CE)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Missing data if any may be suitably assumed and stated.
IS : 456 *and* SP : 16 *are allowed to be used.*

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Enumerate the assumptions in WSM of design.
2. Define 'limit state' and mention its types.
3. Differentiate *b/w* one-way slab and two-way slab.
4. Define slenderness ratio. What is its significance ?
5. What is footing ? What is its function ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. State the merits and demerits of WSM of design.
7. Explain the assumptions in LSM of design.
8. Why are stirrups generally not required in RC slabs ?
9. Draw the different types of lateralities used in Columns.
10. List the different types of support conditions of slabs.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Briefly explain the loads, types and their Combinations preferred in WSM of design as per Code recommendations.

Or

12. Determine the moment of resistance and u.d.l. (superimposed) load carried by a simply supported singly reinforced RC beam having effective span 5 m. and a cross X^n 300 × 555 ($b \times d$) reinforced with # 5 – 20ϕ. Use M 20, Fe 415.

13. Design an RC beam of 5 m. clear span supported on two walls of 300 mm. thickness and Carrying a u.d.l. of 20 kN/m. run including self cut. Use M 20 concrete, Fe 415 steel.

Or

14. Determine the moment of resistance of a doubly reinforced RC beam of $(b \times D) = (250 \times 450)$ mm. A_{st} = # 4 – 20ϕ ; A_{sc} = # 2 – 16ϕ. Use M 20 concrete, Fe 415 steel.

15. Design a two way slab for a room size 3 m. × 4 m. with discontinuous and simply supported edges on all sides with corners prevented from lifting to support a LL of 3 kN/m^2. Use M 20, Fe 415.

Or

16. Design a simply supported slab to suit the following data : clear span = 4 m. ; supported brick walls 300 mm. thick. LL = 1 kN/m^2. M 20 and Fe 415.

17. An RC column 3.3 m., effective length and 400 mm. dia is reinforced with 8 bars of 20 mm. dia Fe 250 steel. Find the safe load the column can carry if it is wound by spiral reinforcement with 8 mm. mild steel bar around the Compression reinforcement at a pitch of 50 mm. clear caves is 40 mm. Use M 20 concrete.

Or

18. Design the reinforcement in a column size 450 mm by 550 mm. subjected to an axial working load of 1500 kN. The column has an unsupported length of 3 m. and is against side sway in both directions. Use M 20 concrete and Fe 415 HYSD bars.

19. Design an isolated footing for a square column, 450 mm. × 450 mm., reinforced with # 8 – 25 ϕ bars, and carrying a service load of 2300 kN. Assume soil with a SBC of 300 kN/m.^{2} at a depth of 1.5 m. below ground. Assume M20 Concrete and Fe 415 steel for the footing.

Or

20. A straight staircase is made of structurally independent tread slabs, cantilevered from a reinforced concrete wall. Given that the rises is 150 mm., tread is 300 mm. and width of flight is 1.5 m, design a typical tread slab. Use M 20, Fe 250. Assume mild exposure conditions.

(5 × 12 = 60 marks)