Construction Management (CED452)

Unit I

1. Define project and project management.
2. Explain project monitoring and control.
3. Enlist the various qualities of a successful project manager.
4. Enlist the different phases in construction management and also write a short note on project implementation.
5. Describe in brief project initiation and project implementation.
6. Explain the function of project management.
7. Explain the term Project Goal.

Unit II

1. Describe the various parts, working of tunnel boring machine
2. Explain in detail with neat sketch backhoe.
3. Write a short note on
    a) Clamshell
    b) Dragline
    c) Scraper
    d) Shovel
4. Enlist various types of concreting equipment used in construction along with their use
5. Explain the criteria for selection of construction equipment for projects.
6. Describe in brief the various parts of dragline with sketch
7. What is milestone chart? Explain its merits and demerits.
8. What are the shortcomings of bar chart? How are these removed?
9. What is Gantt bar chart? Explain with the help of a suitable example, the method of preparing a bar chart.
10. Write a short note on Work break down structure.

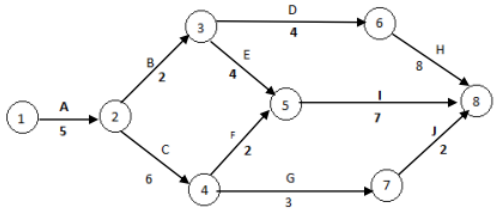
Unit III

1. Define the term
    a) Activity
    b) Event
    c) Dummy activity
    d) Successor event
    e) Predecessor event
2. Explain the network rules.
3. Differentiate between CPM and PERT.

4. Draw the following network and compute early start time, Early finish time, Latest start time, Latest finish time and Total float

Activity	1-2	1-3	2-4	2-5	3-5	3-6	4-7	5-7	6-7
Duration	7	3	10	5	3	5	5	10	5

5. Discuss cost slope and crashing of network
6. A building project consists of 10 activities represented by network as shown in fig. normal duration required to perform the various activities are given below:



Calculate: I) EST, EFT, LST, and LFT

II) Total float.

Also determine the critical path

7. Write a short note on
   a) Cost optimization construction management
   b) Networking updating
   c) Direct cost and indirect cost
8. Consider the following table summarizing the details of a project

Activity	Predecessors	Duration (weeks)		
		Optimistic time (t_o)	Most likely time (t_m)	Pessimistic time (t_p)
A	-	5	6	7
B	-	1	3	5
C	-	1	4	7
D	A	1	2	3
E	B	1	2	9
F	C	1	5	9
G	C	2	2	8
H	E,F	4	4	10
I	D	2	5	8
J	H,G	2	2	8

   a) Draw the project network
   b) Find the expected duration and variance of each activity
   c) Find the critical path and expected project completion time
   d) What s the probability of completing of project on or before 22 weeks?

Unit IV

1. Write a short note on phases of capital budgeting
2. Explain the term cost of project.
3. Enlist the different investment criteria method? Explain any one in detail.
4. Explain the term Net present value.
5. Explain the term means of finance.
6. Write a short note on
   a) Benefit cost ratio
   b) Net present value
   c) Internal rate of return
   d) Cost project
7. Describe the terms fixed capital and working capital.

Unit V

1. Describe in detail tools used for safety in construction project
2. Explain the terms upward and downward communication.
3. Explain the importance of manpower in construction organization.
4. Explain the terms internal and external communication.
5. Write a note on effective organizational communication.
6. What do you mean by job-evaluation? Explain its methods.
7. Explain the terms Oral and Grapevine communication.
8. What is effective communication? How will you overcome from the barriers in effective communication?

Unit VI

1. What are the different functions of material management?
2. Explain in detail ABC analysis for inventory control.
3. Write a note on material management with its objectives.
4. Discuss EOQ model n detail.
5. A construction company purchases 10,000 bags of cement annually. Each bag of cement cost Rs 200 and the cost incurred in procuring each lot is Rs.100. The cost of carrying is 25%. What is the most economic order quantity? What is the average inventory level?
6. Write a short note on Software use in project planning.

Professional Practice (CED 453)

Unit I: Introduction and approximate estimate

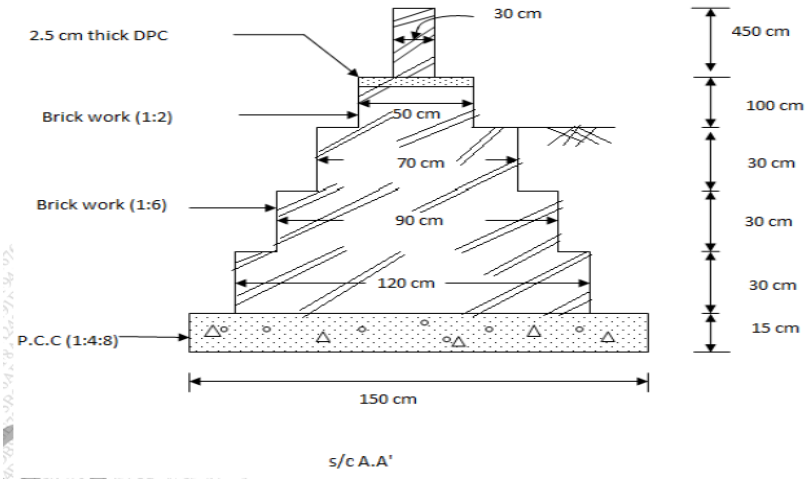
1. Define Estimate and enlist item work for estimation.
2. Explain approximate estimate.
3. What are the good qualities of good estimator?
4. What is the need to study estimate?
5. Write a short note on Professional Practice as a career.
6. Explain method of preparing approximate estimate for buildings.
7. Explain general principal of approximate estimate.
8. Describe modes and measurement of civil engineering works.
9. Explain different type of estimate procedure.

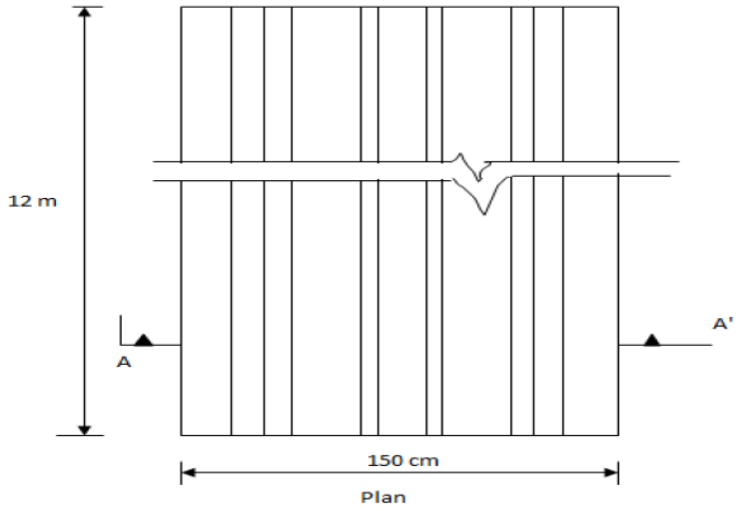
Unit II: Detailed Estimate

1. Define detailed estimate and general principal of detailedestimate.
2. Enlist type of detailedestimate.
3. Give short note on: a) Long wall and Short wall method, b) Center line method
4. Differentiate between Revised estimate and Supplementary estimate.
5. Calculate the earthwork with following data. The GLs taken for a 7.0 m wide road are as under:

Ch. in m	0	30	60	90	120	150	180
G.L. in m	266.5	267.2	268.1	268.5	269.7	269.5	269.0

6. Workout the quantities of various items of wall shown in fig.
   a) Earthwork in excavation in foundation
   b) P.C.C. work in foundation with (1:4:8) proportion
   c) Brickwork in (1:6) foundation & plinth
   d) Damp proof course 2.5 cm thick.





Unit III: Specification and Rate analysis

1. What is Specification and Rate analysis?
2. Give objective of Specification and its uses.
3. Write principle in writing specification.
4. Give motor mix reduction theory and concrete mix reduction theory.
5. Write down general specification of first class building
6. Write specification: a) cement concrete 1:2:4
   b) Reinforced cement concrete
   c) Coarse rubble masonry in CM 1:6
7. Rate analysis: a) R.C.C slab 10cm thick (1:2:4)

b) Two coat plastering in CM (1:3)

c) PCC (1: 4:8) for foundation work pad work

d) Class II brick work in CM (1:6)

Unit IV: Contracts

1. What is contract? What are object of contract?
2. What are the different condition for the contract?
3. What is contract document?
4. Explain the termination of contract.
5. Explain different type of contract.
6. Describe essential of a valid contract.
7. Write short note on: a) Liquidated damage, b) Arbitration
8. Give clauses of the condition of contract.

Unit V: Tenders and Valuation

1. What is a tender and categories of tender?
2. What are the different modes of acceptance of tender?
3. What are the different classification of tender?
4. Write the objective of valuation?
5. Define different type of values.
6. Write down different modes of submission of tender.
7. Explain any four method of depreciation.
8. Give short note: a) Opening tender, b) Scrutiny of tender.

Unit VI: Govt. Procedure for work execution, Properties and Estates

1. Explain procedure of approval.
2. What is standard measurement book?
3. Write short note: a) Day's work, b) NMR, c)Bills and payment.
4. What is mortgages?
5. Explain banking finance terms.
6. What is building bay laws? Explain any 10 bay laws.
7. Give different municipal norms for construction works.
8. What is formation of cooperative housing society?

Structural Mechanics (CED451)
Class: B.E. Civil

1. derive governing differential equation of equilibrium for a three dimensional state of stress
2. explain plane strain and plane stress condition and derive stress strain relationship for the same
3. for following three dimensional state of stress find the body force distribution required for equilibrium at a point
4. for following state of three dimensional stress find magnitude of principal stresses and direction cosine of Minor plane

$$\begin{bmatrix} 60 & 30 & 10 \\ 30 & 50 & 20 \\ 10 & 20 & -10 \end{bmatrix}$$

5. derive governing differential equation of equilibrium for a three dimensional state of stress static condition is derived equilibrium equation for dynamic condition
6. what do you understand by invariants of stress tensor explain in details
7. state assumption made in analysis of thin plate with usual notation starting from slope curvature relation to derive governing differential equation of thin rectangular plate subjected to transfers load Q per unit area
8. derive with usual notation governing differential equation of bending of circular plates and write the solution for circular plate subjected to point load at centre with simply supported edge over Periphery
9. write in details Navier's solution for governing differential equation of rectangular plate subjected to udl simply supported over all for edges
10. What do you understand by thin plates and thick plates? Explain
11. analyse the continuous beam as shown in figure number one using stiffness Matrix method and draw BMD and SFD
12. Analyse rigid joint plane frame as shown in figure using stiffness Matrix method and draw BMD for the same

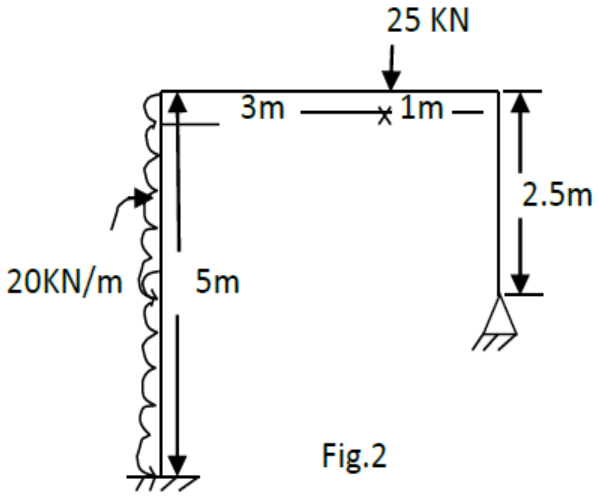


Fig.2

13. differentiate between static and kinetic indeterminacy of structure with example of a beam and frame each

14. differentiate between stiffness Matrix method and flexibility Matrix method in detail starting procedure of both state advantages of stiffness Matrix method over flexibility Matrix method

15. explain membrane theory of thin spherical shell and hence derive expression for the membrane forces in the spherical shells

16. state and explain stepwise procedure adopted in finite element method of structural analysis

17. explain what do you understand by one dimensional and two dimensional elements stating that in analysis of which type of structures these element can be used

18. Write strain displacement relations for a three dimensional state of strain gauge derive compatibility conditions for three dimensional state of strain

19. state and explain assumptions made in theory of plates

20. state and explain properties of stiffness Matrix

21. explain various boundary conditions and its effect on analysis of plates

22. differentiate between flexibility Matrix method and stiffness Matrix method of structural analysis

23. explain in detail stepwise procedure of finite element method used for analysis of structure

24. explain membrane theory of thin cylinder shells in a details and hence derive equation for membrane force in cylindrical shells

25. derive governing differential equation for deflected shape of circular plate subjected to uniform distributed load of per unit area

26. find the transfers deflection w for simply supported circular plate with hole of radius is subjected to shear force along the individual is find expression for

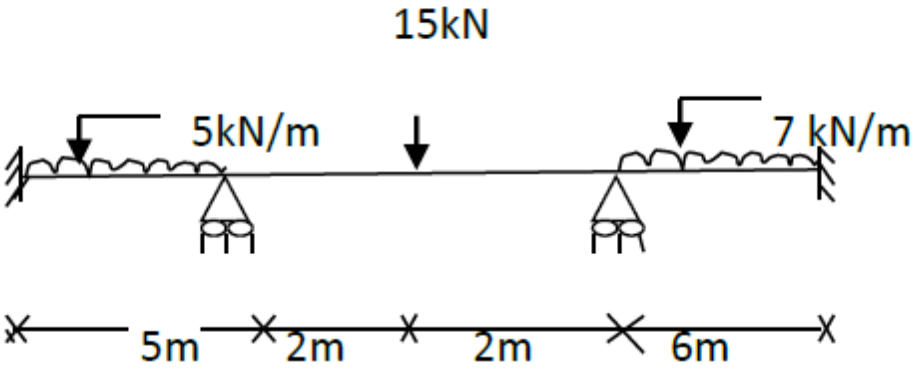
27. using membrane theory derive the equation of equilibrium for shell of revolution

28. which method of following is advantages and how

1) Flexibility method 2) stiffness method

29. explain stepwise procedure of finite element analysis

30. Analyze the continuous beam shown in fig.by stiffness matrix method. Draw BMD



31. Given the following system of strains

Determine if this system of strain is possible. If yes, then find the displacement components in terms of x and y, assuming that the displacement and rotation at the origin is zero. Boundary condition at (x,y)=0, displacement (4,4)=0

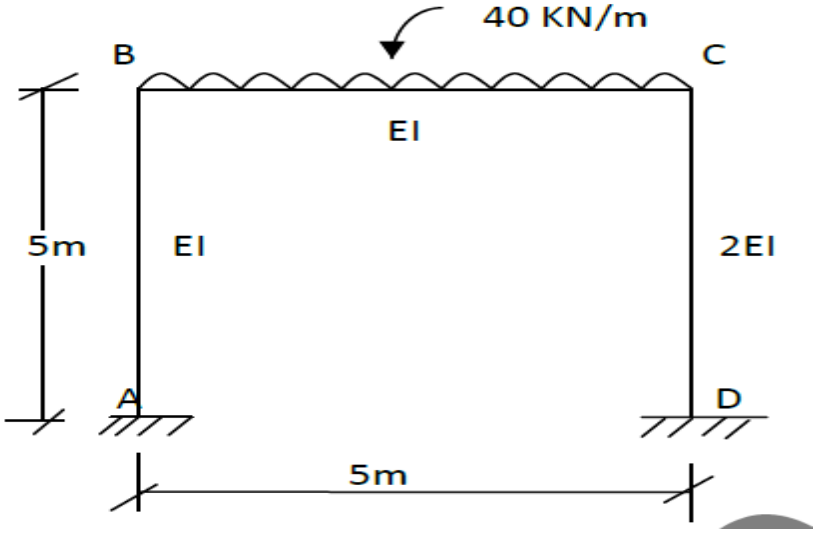
$$\epsilon_x = x^2 + y^2 + x^4 + y^4 + 5$$

$$\epsilon_y = 3x^2 + 3y^2 + x^4 + y^4 + 6$$

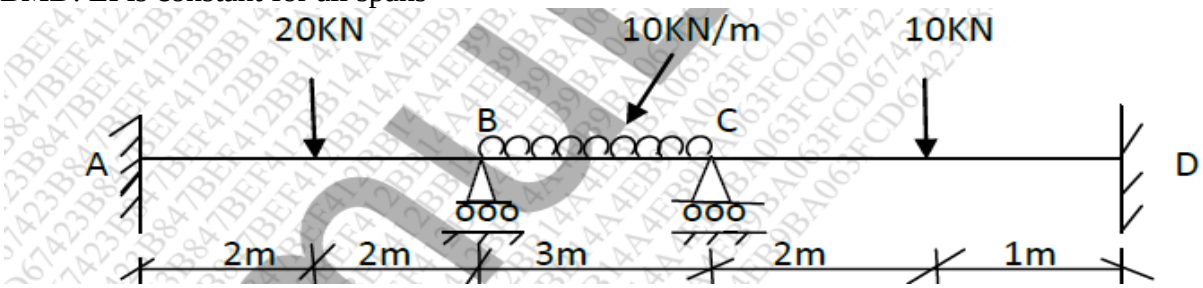
$$\gamma_{xy} = 4xy(x^2 + y^2 + z) + 10$$

$$\epsilon_x = \gamma_{yz} = \gamma_{xz} = 0$$

32. Analyze the frame as shown in figure using stiffness matrix method and draw BMD and SFD



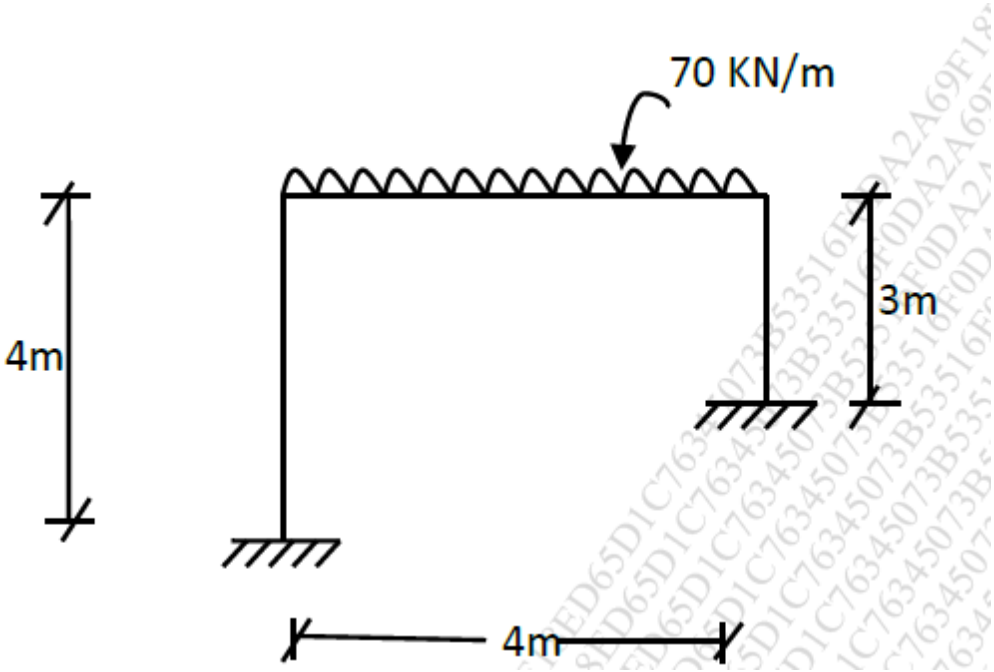
33. Analyze the continuous beam as shown in figure 1) using stiffness matrix method and draw BMD. EI is constant for all spans



34. For the state of stress given below; find the magnitude of principal stresses and direction cosines of major principal stress.

$$\sigma_{ij} = \begin{bmatrix} 30 & -10 & 70 \\ -10 & 20 & 40 \\ 70 & 40 & 50 \end{bmatrix} \text{MPa}$$

35. Analyse the portal frame shown in the figure2), using stiffness matrix method and hence draw BMD for the same. EI= Constant.



36. Write strain displacement relations for three dimensional state of strain. Hence, derive compatibility
Conditions for three dimensional state of strain

37. Find the transverse deflection is for the simply supported circular plate with hole of radius a subjected to moments M1 and M2 distributed uniformly along inner and outer edges.

38. Derive the equilibrium equations when a body subjected to three dimensional state of stress for static and dynamic condition.

39. Explain convergence criteria in finite element method of analysis.

40. Derive equilibrium equations for spherical shell as membrane theory. Determine the stresses in the shell under its own weight.

ELECTIVE-I

PAVEMENT DESIGN

Unit: I Basic Design Parameters (MECHANISTIC and Modified AASHTO)

1) Explain Mechanist- Empirical Design and the term "Traffic and Loading"
2) Equivalent Single Axle Load.
3) Find ESWL at depths of 5cm, 20cm and 40cm for a dual wheel carrying 2044 kg each. The centre to centre tyre spacing is 20cm and distance between the walls of the two tyres is 10cm.
4) Equivalent Single Wheel Load.
5) Advantages of Empirical Pavement Design Method.
6) Explain Mechanistic Empirical Pavement Design Method.
7) Define.
    a. Composite Pavement.
    b. Equivalent single wheel load

Unit: - II Structural Design of Rigid Pavements

1) Explain Westergaard's stress Equation. For wheel load stress.
2) Explain Expansion joint and Contraction joint.
3) Application of Mechanist Design Method.
4) Design size and spacing of dowel bars at an expansion joint of concrete pavement of thickness 25 cm. Given the radius of relative stiffness of 80 cm. design wheel load 5000 kg. Load capacity of the dowel system is 40 percent of design wheel load. Joint width is 2.0 cm and the permissible stress in shear, bending and bearing stress in dowel bars are 1000, 1400 and 100 kg/cm^2 respectively.
5) Explain Tie Bars and its equation of analysis.
6) Explain Temperature stresses.(i.e. warping stress and frictional stress)
7) A cement concrete pavement of thickness 18 cm, has two lanes of 7.2 m with a joint. Design the tie bars.
8) Application of Modified AASHTO Design Method.

Unit: - III Structural Design of Flexible Pavements

1) Define Flexible Pavement with its components.
2) Explain Typical Flexible pavement Failure cases.
3) Define the Application of Mechanist Design Method for Flexible Pavement.
4) Define load equivalency factor. Explain its significance for design of pavements.
5) Define VDF (Vehicle Damage Factor). What are the factors affecting VDF.

6) What is the standard axle load value of Single axle – single wheel, Single axle – double wheel and tandem axle- four wheel according to IRC and AASHTO Recommendation.

Unit: - IV Structural Design of Composite Pavements

1) Explain Structural Design of Composite Pavements.
2) Explain Traffic Factors Composite Pavement Structural Number.
3) Explain the thickness and design criteria for composite Pavement.
4) Write down the design procedure of composite pavement design.

Unit: - V Pavement Selection Analysis

1) Explain the term Life-Cycle Activities
2) Impotence of Cost Analysis in Pavement Design
3) Selection Process for different types of pavements

Unit: - VI Pavement Design Submittals

1) Explain Pavement Design Submittals
2) Write down Submittal Requirements of pavement.

ELECTIVE-II

ADVANCED STRUCTURES

Unit I: MAT AND RAFT FOUNDATIONS

1. What is a mat foundation? Under what situations it is adopted?
2. Explain structural behavior of a mat foundation with sketches.
3. Write difference between a mat and a raft foundation.
4. Write step by step procedure for design of mat foundation with neat sketches.
5. Write step by step procedure for design of raft foundation with neat sketches.
6. Draw a neat sketch to show details of reinforcements in a mat foundation.
7. Draw a neat sketch to show details of reinforcements in a mat foundation.
8. Design a mat foundation for four columns situated in a single row. The columns are spaced 4m c/c. Load on each outer column and inner column is 600kN and 700 kN respectively. Size of each is 400 mmx400 mm .SBC of soil is equal to 100 kN/m^2.Use M-20 and Fe-415 for concrete and steel respectively. Draw neat sketches to show details of reinforcements in plans and sectional elevations.
9. Design a raft slab and raft beam to support four columns situated in a single row. The columns are spaced 4m c/c. All columns are connected by raft beams 400mm wide. Load on each outer column and inner column is 600kN and 700 kN respectively. Size of each is 400 mmx400 mm .SBC of soil is equal to 100 kN/m^2.Use M-20 and Fe-415 for concrete and steel respectively. Draw neat sketches to show details of reinforcements in plans and sectional elevations.

Unit II: PILE FOUNDATION

1. Differentiate between a shallow and deep foundation.
2. Write detailed classification of pile foundation with neat sketches.
3. Differentiate between a load bearing and friction pile.
4. Write step by step procedure for design of load bearing pile foundation.
5. Write step by step procedure for design of friction pile.
6. Draw neat sketches to show details of reinforcements in a pile foundation.
7. Write short notes on :
   i. Group action of piles with sketches

ii. Efficiency of different pile groups with sketches

8. Design a load bearing pile foundation to support a column load of 1000KN.The length of pile is 6m below the ground level. Use M-20 and Fe-415 for concrete and steel respectively. Draw neat sketches to show details of reinforcements in plan and sectional elevation

Unit III: PILE CAP

1. Explain necessity of provision of a pile cap.
2. Draw a neat sketch to show details of reinforcements in a pile cap.
3. Write step by step procedure for design of pile cap supported on four piles.
4. Write a short note on shapes of pile capes with neat sketches.
5. Design a pile cap to support a column load of 1500 kN. Four piles (300mmx300mm) are used. The c/c distance between two piles in x and y direction is 1.2m.column size is 300 mm x 300 mm. Use M-20 and Fe-415 for concrete and steel respectively. Draw neat sketches to show details of reinforcements in plan and sectional elevation.

Unit IV: DEEP BEAMS

1. Differentiate between a shallow and deep beam.

2. Under what situations a deep beam is adopted?

3. Explain various types of loadings on a deep beam.

4. Explain various cracking patterns for a deep beam under different load cases.

5. Write step by step procedure for design of a deep beam as per is method.

6. Describe various types of reinforcements provided in a deep beam. Draw neat sketches.

7. Design a deep beam to meet the following requirements:

i. Clear span=4.2m
ii. Thickness of supports=450mm
iii. Overall depth =3500mm
iv. Width =250mm

v. Supporimposed load=200kN/m

Use M-20 and Fe-415 for concrete and steel respectively. Draw neat sketches to show details of reinforcements.

Unit V: ANALYSIS OF DECK SLABS

1. Explain for bridge deck the distribution of wheel load, its dispersion along the depth ,ground contact area.

2. Write in detail the classifications of transmission towers with sketches.

3. Explain various types of forces/stresses acting on a transmission tower.

4. What are folded plates? Write detailed classification of folded plates.

Unit VI: BEAMS CURVED IN PLAN

1. What is a curved beam? Explain various forces/BM acting on it under the applied loads.

2. Derive expressions for BM, twisting moments and SF for a beam curved in plan.

3. A curved beam is in the form of a continuous circle in plan with a radius of 4 m and is supported on six columns. The beam carries a udl of 20 kN/m inclusive of its own weight. Determine the BM, twisting moments and SF at salient locations and draw BM,TM and SF diagrams.