V.S.B ENGINEERING COLLEGE, KARUR – 639 111
DEPARTMENT OF CIVIL ENGINEERING
CE 8501/ DESIGN OF REINFORCED CEMENT CONCRETE ELEMENTS

Name of the Faculty Member: R.Kartheeswaran

UNIT I INTRODUCTION.

PART-A (2 marks)

1. What are the advantages of elastic method? (Nov/Dec 2014)
2. Write any two assumptions of limit state method. (Nov/Dec 2011) (Nov/Dec 2014)
3. State the important factors to be considered while designing structural elements.
4. What are the different types of loads that have to be considered in the design of a building?
5. What are the different methods of design used in the design of RC structures?
6. What is meant by Working Stress Method?
7. What are the assumptions in Working Stress Method?
8. What is modular ratio?
9. What is equal area section?
10. State the advantages of Limit State Method over other methods.
11. State the different limit states.
12. List out the disadvantages of working stress method?
13. Define factor of safety.
14. Define Ultimate Load design method. (Nov/Dec 2013)
15. Differentiate between WSD and LSD.
16. What are the expression recommended by the IS 456-2000 for Modulus of Elasticity and flexural strength? (May/June 2009)
17. What are the classifications available in serviceability limit state? (Nov/Dec 2011)
18. Working stress method is unrealistic in many ways. Justify with any two points. (Nov/Dec 2013)
19. Write down the value of partial safety factor for a) concrete b) steel. (Nov/Dec 2007)
20. Define Partial safety factor. (May/June 2007)
21. What are the imposed loads on buildings?
22. Write the formula for the neutral axis depth factor ‘k’ in working stress design.
23. Write the formula for the lever arm depth factor ‘j’ in working stress design.
24. What are the factors considered limit state of serviceability?
25. What is SP-34, SP-24 and SP16?
26. What are the factors considered in limit state of collapse?
27. Define design load.
28. Objectives of Structural Design.
29. Steps in RCC structural Design.
30. List the basic types of load combination.
31. Write down the basic values of span to effective depth ratios for different types of beam.
32. Enumerate doubly reinforced section. (Nov/Dec 2014)
33. Give the codal specification for the limiting neutral axis depth in limit state method.
34. Give the important assumptions made in the design of doubly reinforced beam as per Limit State Design.
35. What is steel beam theory?
36. Why high strength deformed bars are preferred when compared to mild steel bars?

37. Calculate the limiting value of tensile stress in an uncracked section of a flexural member made with M20 grade concrete. (May/June 2012)

38. What is the minimum and maximum area of tension reinforcement for beams?

PART B and C

1. A singly reinforced concrete beam is of width 450mm and effective depth 715mm. It is reinforced with 8Nos.20mm mild steel bars. Assuming M20 concrete, determine its moment of resistance according to the working stress method. Determine also the stress in steel when the beam is subjected to the above moment.
2. A rectangular beam has b=200mm, d=400mm if steel used is Fe 415 and grade of concrete is M25. Find the steel required to carry a factored moment of 12kNm.
3. A singly reinforced concrete beam is of width 400mm and effective depth 615mm. It is reinforced with 8Nos.20mm mild steel bars. Assuming M25 concrete, determine its moment of resistance according to the working stress method. Determine also the stress in steel when the beam is subjected to the above moment.
4. Design a rectangular beam section subjected to an ultimate moment of 120kNm. Use concrete M20 and steel Fe415. Adopt limit state method.
5. A rectangular beam of width 300mm and effective depth 500mm reinforced with 4 bars of 12mm diameter. Find the moment of resistance and stresses in the top compression fiber of concrete and tension steel. Use concrete M20 and steel Fe415. Adopt Limit State method.
6. Derive an expression for the depth of neutral axis and moment of resistance of a rectangular singly reinforced balanced beam section under flexure. Use M15 concrete and mild steel Fe250
7. A reinforced concrete rectangular beam is supported on two walls 750 mm thick, spaced at a clear distance of 6 m. The beam carries a super imposed load of 30 kN/m. Design the beam in working stress method. M20 grade concrete Fe250 bars. Draw reinforcement details
8. Design a rectangular section for a simply supported reinforced concrete beam of effective span of 4 m carrying a concentrated load of 35 kN at its mid span. The concrete to be used is of grade M20 and the reinforcement consists of Fe415 steel bars.
   (a). Self Weight if beam is ignored.
   (b). Self Weight if beam is considered. Use LSM
9. A beam, simply supported over an effective span of 8 m carries a live load of 15kN/m. Design the beam, using M20 concrete and Fe415 grade steel. Keep the width equal to half the effective depth. Use Limit State method of design

10. Design a rectangular RC beam in flexure and shear when it is simply supported on masonry walls 300 mm thick and 5 m apart (center to center) to support a distributed live load of 8 kN/m and a dead load of 6 kN/m in addition to its own weight. Materials used are M20 grade of concrete and Fe415 steel bars. Adopt Limit State method of design

UNIT II DESIGN OF BEAMS

Analysis and design of Flanged beams for – Use of design aids for Flexure - Behaviour of RC members in Shear, Bond and Anchorage - Design requirements as per current code - Behaviour of rectangular RC beams in shear and torsion - Design of RC members for combined Bending, Shear and Torsion

1. When the flexural members are designed as T or L beams?
2. Under what circumstances doubly reinforced beams resorted to. (May / June 2008)
3. Explain the purpose of lintel beams in buildings. (May / June 2007)
4. Differentiate shear failure and bending failure. (Nov/Dec 2013)
5. What are the types of reinforcements used to resist shear in beams? (Nov/Dec 2007)
6. Why minimum shear reinforcement is provided in beams?
7. Define bond. (April/May 2011)
8. Distinguish between flexural bond and development bond. (April/May 2008, Nov/Dec 2011, Nov/Dec 2014)
9. What do you understand by the term Anchorage? (Nov/Dec 2013)
10. Define: Development length (April/May 2011)
11. Why is bond stress more in compression bars than that in tension bars? (Nov/Dec 2012)
12. Write down the effects of torsion on R.C. beams. (May/June 2013, May/June 2014)
13. Write about local bond and anchorage length. (May/June 2013, May/June 2014)
14. Define flexural bond.
15. How to overcome torsion on beams?
16. When will you provide side reinforcement in a beam? Why?
17. List the types of beams based on structural applications.
18. Distinguish between L-beam and T-beam?
19. What do you understand by flanged beams?
20. Define shear strength.
21. Name the different modes of shear failure and sketch it.
22. What are the important factors affecting the shear resistance of a Reinforced concrete member without shear reinforcement?
23. Define Torsion
24. What is compatibility torsion? Give an example

25. Explain Equilibrium Torsion

26. How can torsional resistance of R.C. members be enhanced?

PART B and C

1. Determine the reinforcement for a T beam with flange width = 1500mm, web width = 300mm, thickness of slab = 100mm, effective depth 735mm, to carry a moment of 380kNm due to characteristic loads. Use M25 concrete and Fe 415 steel. Using Limit State Design.
2. A rectangular beam width b=350mm and d=550mm has a factored shear of 400kN at the critical section near the support. The steel at the tension side of the section consists of four 32mm bars which are continued to support. Assuming f_{ck}=25 and f_y=415(N/mm^2) design vertical stirrups for the section.
3. A reinforced concrete rectangular beam has a breadth of 350mm and effective depth of 800mm. It has a factored shear of 105kN at section XX. Assuming that f_{ck}=25, f_y=415(N/mm^2) and percentage of tensile steel at that section is 0.5percent, determine the torsional moment the section can resist if no additional reinforcement for torsion is provided. Workout the problem according to IS456 principles of design for torsion.
4. A simply supported beam is 5m in span and carries a characteristic load at 75kN/m. If 6 Nos. of 20mm bars are continued into the supports. Check the development length at the supports assuming grade M20 concrete and Fe415steel.
5. A rectangular RCC beam is 400x900mm in size. Assuming the use of grade M25 concrete and Fe415 steel, determine the maximum ultimate torsional moment at the section can take it. No torsion reinforcement is provided and Maximum torsion reinforcement is provided.
6. A rectangular beam width b = 250mm and effective depth 500mm reinforced with 4 bars of 20mm diameter. Determine the shear reinforcement required to resist a shear force of 150kN. Use concrete M20 and steel Fe415.
7. Design a rectangular beam section of width 250mm and effective depth 500mm, subjected to an ultimate moment of 160kNm, ultimate shear force of 30kN and ultimate torsional moment of 10kNm. Use concrete M20 and steel 415.
8. A RC beam 300x450mm in cross section in reinforced with 3 Nos. 20mm diameter of grade Fe250, with an effective cover of 50mm. The ultimate shear at the section of 138kN. Design the shear reinforcement (i) Using only vertical strips without bending any bar for resisting. (ii) Bending 1 bar dia. 20mm at 45 degree to resist shear at the section. Assume concrete of grade M20
9. A T beam continuous over several supports has to carry a factored negative support moment of 1000kNm. Determine the area of steel at supports if b_W = 400mm, b_{fy} =1600mm, D_f = 100mm, D=610mm, d' = 60mm, f_{ck} = 30N/mm^2, f = 415 N/mm^2.

10. A doubly reinforced concrete beam is 250mm wide and 510mm depth the center of tensile steel reinforcement. The compression reinforcement consists of 4 Nos. of 18mm dia bars placed at an effective cover of 40mm from the compression edge of the beam. The tensile reinforcement consists of 4Nos. of 20mm diameter bar. If the beam section is subjected to a BM of 85kNm, calculate the stresses in concrete and tension steel.
11. Design a smallest concrete section of a RC beam to resist an ultimate moment of 62kNm, assuming width 230mm, concrete grade M20 and HYSD bars of grade Fe415.
12. A reinforced concrete beam 500mm deep and 230mm wide is reinforced with 8Nos.20mm diameter bars at mid span to carry a UDL of 22.5kN/m (inclusive of its own weight) over simple span of 8m. Assuming concrete grade M20, steel grade Fe415, load factor 1.5 and width of support 230mm (i) determine the minimum development length required for 20mm diameter bar to develop full strength (ii) apply check for flexural development length at support assuming all bar to continue at support (iii) determine the minimum number of bars required at support for development length of flexure.
13. A T-beam slab floor of an office comprises of a slab 150 mm thick spanning between ribs spaced at 3 m centers. The effective span of the beam is 8 m. Live load on floor is 4 kN/m^2. Using M20 grade and Fe415 HYSD bars. Design one of the intermediate tee beams. Use limit state method.

UNIT III DESIGN OF SLABS AND STAIR CASE

Analysis and design of cantilever, one way simply supported and continuous slabs and supporting beams- Two way slab- Desingn of simply supported and continuous slabs using IS code coefficients- Types of Staircases – Design of dog-legged Staircase.

PART-A (2 marks)

1. What are the rules to be followed in the design of slabs as per IS 456-2000? (Nov/Dec 2011)

2. Enumerate corner reinforcements for two-way slabs. (Nov/Dec 2011)

3. Design parameters of torsional reinforcement in two way slab:

4. Draw a yield line pattern for a one way slab with simply supported edge conditions. (Nov/Dec 2013)

5. What is the advantage of two way slab over one way slab? (Nov/Dec 2014)

6. What are the codal provisions for minimum reinforcement to be provided as main and secondary reinforcement in slab and their maximum spacing? (Nov/Dec 2007)

7. What is the difference between one way slab and two way slab? (Nov/Dec 2008)

8. Why is secondary reinforcement provided in one way RC slab? (May / June 2008)

9. What are the basic assumptions in limit state of flexure?

10. How will you provide reinforcement to resist torsion in slabs?

11. State the minimum reinforcement required in one way RC slab.

12. What are the functions of distribution bars in slabs?

13. Why is the Span/effective depth ratio of slab greater than for beams?

14. Reinforced concrete slabs are generally safe in shears and they do not require shear reinforcement why?

15. What are the factors that influence moments in two-way slabs?

16. What is the importance of two-way slab over one way slabs?

17. What is a stair case?

18. Define tread:

19. Define Riser

20. Define Going:

21. What are the types of staircases?

22. What is a flight?

23. What is the minimum rise and tread in residential buildings?

24. What is the minimum rise and tread in public buildings?

25. Mention the places where the following staircase can be used.

PART B and C

1. Design of roof slab for an interior panel of size 5mx6m. Live load is 5.0kN/m^2. Use M30 Concrete and Fe 415 Steel.
2. Design a simply supported R.C.C.SLAB for a roof of a hall 4mx10m (inside dimensions) with 230mm walls all around. Assume a live load of 4kN/m^2 and finish 1kN/m^2.Use grade 25 concrete and Fe 415 steel.
3. Design a rectangular slab supported on its all four edges (600mm thick) over a classroom of size 4.8m x6.2m. Two adjacent edges of the slab are discontinuous and the remaining two edges are continuous. A finishing surface of cement concrete of 20mm shall be provided over the slab. The slab shall be used as classroom. M20 grade of concrete and HYSD bars shall be used. The unit weight of finishing surface concrete is 24kN/m3.
4. Design the interior span of a continuous one way slab for an office floor continuous over tee beams spaced at 3 meters. Live load = 4kN/m, Floor finish = 1kN/m^2.Use concrete M20 and steel Fe415. Adopt limit state method. Sketch the steel reinforcement.
5. Design a two way slab for an office floor size 3.5 m x 4.5 m with discontinuous and simply supported edges on all the sides with the corners prevented from lifting and supporting a service live load of 4.4 kN/m^2. Adopt M20 grade and Fe415 HYSD bars.
6. Design a simply supported rectangular slab for a hall of size 4 m x 5 m to carry a UDL of 5 kN/m^2

7. Design a slab over a room 5 m x 7 m as per I.S. code. The slab is supported on masonry walls all round with adequate restraint and the corners are held down. The live load on the slab is 330 N/m^2. The slab has a bearing of 150 mm on the supporting walls
8. Design the roof slab for a Hall size 4 m x 10 m by working stress method using M20 concrete and Fe415 steel. The slab simply resting on 230 mm thick brick walls all around. Take the live load on the slab as 1.5 kN/m^2 and finish load as 2.25 kN/m^2.
9. A simply supported RC slab having an overall thickness of 150 mm is reinforced with 12 mm diameter bars at an effective depth of 130 mm. The spacing of the bars is 100 mm. The effective span of the slab is 4 m. If the self weight of slab and finishes is 4.2kN/m^2. Estimate the maximum permissible live load on the slab. Adopt M-15 grade concrete and MS grade I steel.
10. Design a RC slab for an office floor to carry a load of 8 kN/m^2 inclusive of its own weight over an effective span of 3.5 m simply supported at its ends. Materials used are M20 concrete and Fe 415 steel bars. Use working stress method of design. Adopt Limit State Method.
11. Design a dog legged staircase for an office building to suit the following data: Height between the floors is 3.2 m. rise is 160 mm and tread is 270 mm. Room size of stair hall is 2.4 m x 5 m. Assume stair is to be supported on 230mm thick masonry walls. Adopt M20 and Fe 415HYSD bars. Assume live load of 5 kN/m^2.
12. Design a dog legged stair case (waist slab type) for an office building to suit the following data using limit state method.

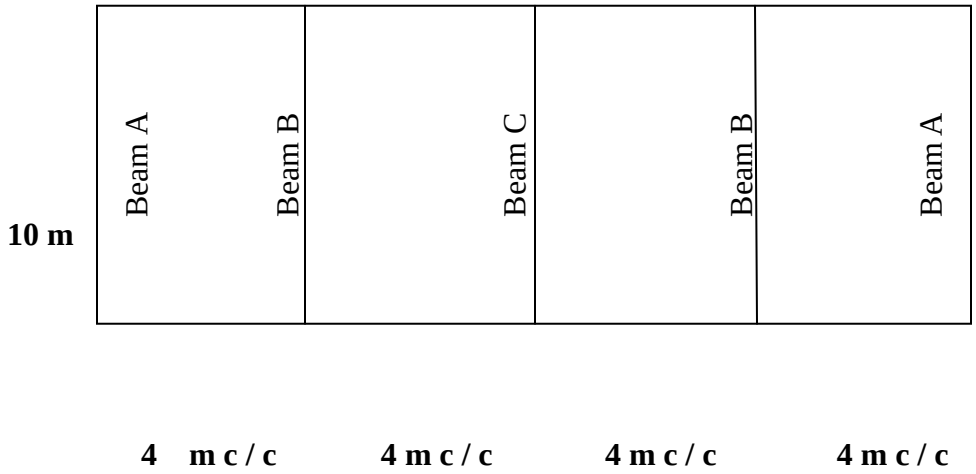
    Height between floor = 3.2 m

    Risers = 160 mm, Tread = 270 mm

    Length of landing = 1.25 m

    Width of flight = Landing width = 1.25 m

    Assume stair to be supported on 230 mm thick masonry walls at the outer edges of the landing parallel to the risers. Adopt M20 grade of concrete and Fe415 HYSD bars. Assume a Live load of 5 kN/m^2.
13. Design a continuous one way slab as shown in fig. It is subjected to live load of 5 kN/m^2 and floor finish of 0.75 kN/m^2. Consider M20 concrete grade and Fe415 HYSD bars. Assume Width of beam = 300 mm.



14. Design the interior span of a continuous one way slab for an office floor continuous over tee beams spaced at 3 meters. Live load = 4kN/m, Floor finish = 1kN/m^2.Use concrete M20 and steel Fe415. Adopt limit state method. Sketch the steel reinforcement.

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Name of the Faculty Member: K.Rajkumar

PART A QUESTIONS

UNIT I - SITE INVESTIGATION AND SELECTION OF FOUNDATION

1. What is soil exploration?
2. Define Area ratio.
3. How will you reduce the area ratio of a sampler?
4. When thin walled sampler is used for sampling?
5. Define Chunk samples.
6. Explain Representative and Non-Representative Samples.
7. What is significant depth?
8. What is detailed Exploration? (Nov/Dec 2009), (Nov/Dec 2012)
9. What are the factors affecting quality of a sample?
10. How is the depth of exploration decided?
11. What are the various methods of site investigation?
12. What are the tests used to determine the bearing capacity of soil?
13. List the field tests used in subsurface investigations. (Nov/Dec 2013)
14. Write the uses of bore log report. (Nov/Dec 2012)
15. What is meant by inside and outside clearance? What is its use? (Nov/Dec 2013)
16. What are the limitations of hand augers in soil exploration? (May/June 2012)
17. What are the guidelines in terms of inside and outside clearance for obtaining undisturbed sample? (May/June 2012)
18. What is site reconnaissance? (May/June 2013)
19. What is the objective of site investigation? (May/June 2013)
20. The internal diameter of a sampler is40mm and the external diameter is 42mm. Will you consider the sample obtained from the sampler as disturbed or undisturbed?
21. A standard Penetration test was conducted on saturated fine sand below the ground water table. The SPT value was found to be 32. Does the value represent true SPT value? Explain.
22. What is Standard Penetration Number (N)?
23. What is sub surface profile?
24. Define Sub soil investigation Report or Boring Log.

UNIT II

SHALLOW FOUNDATIONS

1. What is ultimate bearing capacity? (May/June 2013)
2. What is consolidation settlement?
3. List the various components of settlement.
4. Give the Terzaghi‟s bearing capacity equation of strip footing for local shear failure.
5. Compare general and local shear failure.
6. What is meant by allowable settlement?
7. List the factors affecting bearing capacity of soil.
8. What is spread footing?
9. Sketch the pressure distribution beneath a rigid footing on cohesive and cohesionless soil. (Nov/Dec 2009), (May/June 2012)
10. Define safe bearing capacity.
11. What is the equation used to determine the immediate settlement?
12. What are the criteria used for the determination of bearing capacity?
13. A footing was designed based on ultimate bearing capacity arrived for the condition of water table at the ground surface. If there is a chance for raise in water level much above the ground level do you expect any change in the bearing capacity, why?
14. Discuss the methods for determining immediate settlement of foundation on clay.
15. A footing 2m square is laid at a depth of 1.3 m below the ground surface. Determine the net ultimate bearing capacity using BIS formula. Take γ =20 kN/m^3, ϕ =30˚ and c= 0. For ϕ =30˚, take N_c =30.1, N_q =18.4 and N_γ = 22.4.
16. Define punching shear failure. (Nov/Dec 2012)
17. What is mean by swelling potential? (Nov/Dec 2012)
18. What is net pressure intensity? (May/June 2013)
19. What is safe bearing pressure? (May/June 2013)
20. What is the total settlement of a footing? (May/June 2013)
21. What are the major criteria to be satisfied in the design of a foundation? (Nov/Dec 2013)
22. What is the effect of rise of water table on the bearing capacity and the settlement of a footing on sand? (Nov/Dec 2013)
23. Define allowable bearing pressure.
24. Define settlement and its types.

UNIT III

FOOTINGS AND RAFT

1. When trapezoidal combined footings are provided?
2. Give the advantages of floating foundation.
3. Under what circumstances, a strap footing is adopted?
4. What is a mat foundation?
5. Where mat foundation is used?
6. Define spread footing?
7. What are types of foundation?
8. What are the footings comes under shallow foundation?
9. What are the footings comes under deep foundation?
10. Define floating foundation?
11. What is mean by proportioning of footing?
12. What are the assumptions made in combined footing?
13. List the different types of raft foundation.
14. Under what circumstances, a raft footing is adopted? (Apr/May 2017)
15. What is the function of strap beam in a strap footing?
16. Differentiate shallow and deep foundation.
17. What are the methods of design for raft foundation?
18. Define Contact pressure. (Nov/Dec 2017)
19. What is buoyant raft?
20. Write the components of total settlement.

UNIT IV

PILE FOUNDATION

1. Define end bearing pile.
2. Define group efficiency of pile.
3. List out the type of pile based on material used?
4. How is the selection of pile carried out?
5. What is mean by group settlement ratio?
6. What are the factors consider while selecting the type of pile?
7. What are the types of hammer used for pile driving?
8. What is pile driver?
9. What are methods to determine the load carrying capacity of a pile?
10. What are the two types of dynamic formulae?
11. What is meant by single-under reamed pile?
12. Write down the static formulae?
13. Define modulus of subgrade reaction?
14. What are the limitations of dynamic pile load test?
15. List the piles based on materials of installation.
16. What are anchor piles?
17. What are fender piles?
18. What are the factors governing selection of pile?
19. Define negative skin pressure
20. What are the conditions where a pile foundation is more suitable than a shallow foundation?
21. What is meant by friction pile?
22. What is floating raft foundation?

23. For identical soil conditions, the load permitted on bored pile is lesser than driven pile of identical shape and dimensions, why?
24. Define negative skin friction.
25. What is the use of batter pile?

UNIT 5

RETAINING WALL

1. Define conjugate stresses?
2. How do you check the stability of retaining walls?
3. Define angle of repose?
4. Define theory of plasticity?
5. What are the assumptions in coulomb wedge theory?
6. How to prevent land sliding?
7. Write down any two assumptions of Rankine‟s theory?
8. Distinguish Coloumb‟s wedge theory from Rankine‟s theory?
9. What is meant by critical depth of vertical cut for a clay soil?
10. Why retaining walls are usually designed for active earth pressure?
11. What do you understand by plastic equilibrium in soil?
12. What is critical failure plane?
13. What is surcharge angle?
14. What is earth pressure at rest?
15. Write the types of retaining wall.
16. Write any three assumptions of Rankine‟s theory.
17. List the assumptions common to Rankine and coulomb theory of earth pressures.
18. Draw the lateral earth pressure diagram of clay depends for active and passive condition.
19. Draw the lateral earth pressure diagram of sand depends for active and passive condition.
20. What are the assumptions in coulomb‟s theory?
21. Compare Rankine‟s and Coulomb‟s theory.
22. Define plastic equilibrium
23. Give the design criteria of gravity retaining wall

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PART B & C QUESTIONS

UNIT I
SITE INVESTIGATION AND SELECTION OF FOUNDATION

1. What are the objectives of soil exploration? (April/May 2004)
2. Briefly explain with neat sketch Standard Penetration Test and the correction to be applied to find „N‟ value. (April/May 2004), (May/June 2009) , (Nov/Dec 2011), (April/May 2004), (May /June 2012), (Nov/Dec 2013)
3. What are the steps involved in soil exploration?
4. Explain the (i) Seismic refraction method and (ii) Electrical resistivity method of soil exploration. (May/June 2009), (Nov/Dec 2005), (or)
   Explain in detail the geophysical methods of soil explorations with neat sketch. (Nov/Dec 2012), (Nov/Dec 2013), (May /June 2013)
5. Describe the various methods of drilling bore holes for sub surface investigations.(April/May 2011)
6. Discuss the features of bore log report in detail. (Nov/Dec 2010), (May/June 2012)
7. Explain in detail the cone penetration test with sketches.
8. Explain in detail the various types of samplers with sketches.
9. Describe in detail the scope of site investigation and stages of site investigation.

UNIT II

SHALLOW FOUNDATIONS

1. Explain in detail the various types of shear failure.
2. List the various factors that affect the depth of foundation.
3. Explain Terzaghi‟s bearing capacity theory.
4. Explain plate load test with sketch.
5. A footing 2m square rests on a soft cay soil with its base at depth of 1.5m from ground surface. The clay stratum is 3.5m thick and is underlain by a firm sand stratum. The void ratio of clay is 1.08 and compression index is 0.18, cohesion is 50 kN/m2 . Compute the settlement that would result if the load intensity equal to the safe bearing pressure of soil were allowed to act on the footing . Natural water table is quite close to the ground surface. For given conditions, bearing capacity factor(Nc) is obtained as 6.9. Take factor of safety as 3. Assume load spread of 2(vertical) to (horizontal).
6. A square foundation of size 1.8m × 1.8m is to be built at a depth of 1.6m on a uniform clay strata having the following properties : Ø = °, = / 3 and = /3. Find the safe load that the foundation can carry with a factor of safety of 3. Use Terzaghi's bearing capacity theory. If the ground water table subsequently rises from depth of 6m to the ground surface, find the load carrying capacity of the foundation. The submerged density of the soil is 10.5 KN/m3.

7. The result of two pate load tests for a settlement of 25.4 mm are given

Plate diameter	load
0.3m	31 KN
0.6m	65KN

A square column foundation is to be designed to carry a load of 800KN with an allowable settlement of 25.4mm. Determine the size of the foundation using housel's method

8. A square footing for a column is 2.5m x 2.5m and carries a load of 2000kN. Find the factor of safety against bearing capacity failure, if the soil has the following properties.

   C=50Kn/m

   2

   Ø = 15°

   r=17.6kN/m^3

   N_c''=12.5,

   N_q''=4.5 and

   N_y''=2.5. the foundation is taken to a depth of 1.5m.
9. Compute the ultimate load that an eccentrically loaded square footing of width 2m width, an eccentricity of 0.315m can take at a depth of 0.45m in soil with = . / 3, C=9kN/m2 and Ø = ° ,Nc=52, Nq=35 and Ny=42.
10. The following data was obtained from a plate load test carried out on a 60cm square test plate at a depth of 2m below ground surface on a sandy soil which extends up to a large depth. Determine the settlement of a foundation 3.0m x 3.0m carrying a load of 1100KN and located at a depth of 3m below ground surface.

Load intensity, KN/m2:	50	100	150	200	250	300	350	400
Settlement, mm :	2.0	4.0	7.5	11.0	16.3	23.5	34.0	45.0

11. A foundation, 2.0m square is installed 1.2 Above the water table and a submerged density of 10kN/m3. The strength parameters with respect to effective stress c'=0 and φ =300. Find the gross ultimate bearing capacity for the following conditions**.**

   1. Water table is well below the base of the foundation.
   2. Water table raise to the level of the base of the foundation and
   3. The water table rise to ground level. (For $\upsilon = 30^0$, Assume N_q = 22 and N_r = 20).
12. A footing 2.m square carries a gross pressure of 350 kN/m2 at a depth of 1.2m in sand. A saturated unit weight of sand is 20 kN/m2 and the unit weight of sand above water table is 16 kN/m3. The shear strength parameters are C' =0 , Ø = ° (for Ø = °, Nq=22, Nr=20). Determine the factor of safety with respect to shear failure for the following cases

    i) W.T is 5m below the ground level

    ii) W.T is 1.2m below the ground level
13. A circular footing is resting on a stiff saturated clay with unconfined compression strength of 250 kN/m2. The depth of foundation is 2m. Determine the diameter of the footing if the column load is 700 KN

UNIT III
FOOTINGS AND RAFT

1. What are various functions of foundation?

2. What is raft foundation? Under what circumstances raft foundation is adopted?

3. Design a reinforced concrete rectangular combined footing for two columns A and B located 3.6 meters apart. The sizes of the columns are 400mm × 400mm and 600mm ×600mm and the loads on them are 1000kN and 1500kN respectively. The projections of footing beyond the axis of the columns A are limited to 590mm. The limiting bearing capacity of the soil is 420 kN/m2. Use M 15 concrete and Fe 415 steel.
4.
4. Compute the safe bearing capacity of square footing 1.5m x 1.5m located at a depth of 1m below the ground level in a soil of average density 20kN/m3. Ø = 20° , Nc = 17.7, Nq = 7.4 and Nr =5. Assume a suitable factor of safety and that the water table is very deep. Also compute the reduction in safe bearing capacity of the footing if the water table rises to the ground level.
5. What are the different types of mat foundation? When are they preferred? Explain.
6. State the design requirement of a foundation.
7. Explain the conventional method of design of raft foundation
8. An R.C.C. column has a square footing founded at a depth of 2.4m below ground level on a clayey stratum of average density 18 kN/m3 and shearing strength 40 kN/m2. The total load applied to the soil is 850kN. Calculate the dimensions of the footing assuming a factor of safety 2.5.
9. Explain the design steps of a footing.
10. Explain the effect of water-table on bearing capacity.
11. What is combined Footing? Elaborate the proportioning of rectangular combined footing.
12. Elaborate the proportioning of Trapezoidal Combined Footing.
13. Explain in detail the contact pressure distribution below the footings and rafts.
14. Define mat foundation. What are the various types of raft foundations?
15. Explain floating foundation in detail.
16. Explain various types of foundation with neat sketches.

UNIT IV
PILE FOUNDATION

1. Briefly explain static and dynamic formulae of load carrying capacity of piles. Static analysis.
2. A group of 9 piles with 3 piles in a row was driven into soft clay extending from ground level to a great depth. The diameter and length of piles were 30 cm and 10 cm respectively. The unconfined compression strength of clay is 70 kN/m2. If the piles were spaced at 90cm centre to centre, compute the allowable load on the pile group on the basis of shear failure criteria for a factor of safety of 2.5, neglect bearing at the tip of piles, take m = 0.6 for shear mobilization around each pile.
3. In a load test conducted at a depth of 1 meter below ground with a square plate of 30cm side on a granular soil, load required to cause 25mm settlement was 72 kN Find out the size of a square column footing which will be having its base at a depth of 2.5 m below ground level and is required to take a load of 1750kN. The settlement of the footing is restricted to be 10mm only and factor is to be 3 only. Unit weight of soil 19kN/m2. Nc =12 and Nr = 6.
4. Describe precast concrete piles with their merits and de merits? Precast concrete piles.
5. What do you understand by under-reamed piles and what situations dictate their use?
6. A group of 16 friction piles is to support a column load of 4000kN. The piles will be driven in four rows with four numbers in each column. The piles are 35 cm diameter. And the c/c spacing is 1m both ways. What set value must be attained by the piles when driven by a single acting 22.5kN steam hammer with 90cm stroke so that the pile group can carry the column load?

7. A reinforced concrete pie weighing 30 kN is driven by a drop hammer weighing 40 kN and having an effective fall of 0.80m. The average set per bow is 1.40 cm. The total temporary elastic compression is 1.80 cm, assuming the coefficient of restitution as 0.25 and factor of safety of 2. Determine the ultimate bearing capacity and the allowable load for the pile.
8. Design a friction pile group to carry a load of 3000 KN including the weight of the pile cap at a site where the soil is uniform clay to a depth of 20 m underlain by rock. Average unconfined compressive strength of the clay is 70kN/m2. The clay may be assumed to be of normal sensitivity and normally loaded, with liquid limit of 60%. A factor safety of 3 is required against shear failure.

9. Explain with neat sketch about pile load test method of determination of load carrying capacity of piles.
10. Enumerate the various types of pile in detail.
11. List the necessities of pile foundation.
12. Explain the under reamed pile foundation with neat sketch.
13. Explain negative skin friction

UNIT V
RETAINING WALL

1. A gravity retaining wall retains 10 m of a backfill, unit weight of soil =18 kN/m3, angle of shearing resistance =30° with a horizontal surface. Assume the wall interface to be vertical, determine (i) the magnitude and point of application of the total active pressure (ii) if the water table is at a height of 5m, and how far do the magnitude and the point of the application of active pressure changed. Take submerged unit weight = 10kN/m3.
2. A retaining wall is 4 m high. Its back is vertical and it has got sandy backfill up to its top. The top of the fill is horizontal and carries a uniform surcharge of 85 kN/m2. Determine the active pressure on the wall per metre length of wall. Water table is 1m below the top of the fill. Dry density of soil = 18.5 kN/m3. Moisture content of soil above water table =12%. Angle of internal friction of soil = 30°, specific gravity of soil particles = 2.65. Porosity of backfill = 30°. The wall friction may be neglected.
3. What are the different methods of soil stabilization? Explain with neat sketches?
4. Explain Rankine‟s theory for the cases of cohesion less backfill.
5. Explain with neat sketch the culmann‟s method of calculating active earth pressure.
6. Explain the coulomb‟s Wedge theory of earth pressure with a neat sketch.
7. What is meant by tension cracks? Explain
8. What are the different types of earth pressure? Give examples. Derive an equation for determining the magnitude of earth pressure at rest.
9. What are different modes of failure of retaining wall?

VSB ENGINEERING COLLEGE, KARUR
DEPARTMENT OF CIVIL ENGINEERING

REMOTE SENSING AND GIS

Name of the Faculty Member: P.Muralikrishna

PART - A

UNIT I - FUNDAMENTALS OF GIS

1. What is GIS?
2. What is Spatial data?
3. What are the types of Spatial Data?
4. What is a Vector Data? Give Example.
5. What is Aspatial data ?
6. What is a Raster Data?
7. Explain briefly about the geographic coordinate system?
8. What is a projection?
9. What is a Datum?
10. Give the Spatial data formats.
11. Give the components of GIS.
12. Give the various softwares used in GIS environment.
13. What is a data? Give the types of data?
14. What are the Software Components ?
15. What is free ware?
16. What is Open Source Software?
17. Proprietary Software?
18. What is Public domain Software?
19. What is Shareware?
20. What is Trial ware?
21. What is Attribute Data?
22. Give the types of Attribute Data.

UNIT II – SPATIAL DATA MODELS

1. What is Management of GIS data?
2. What is an Entity?
3. What are the functions of DBNS ?
4. What are the components of DBMS ?
5. What are the data modeling approaches?
6. Write about the network system ?
7. Write about the advantage of Ring pointer structure ?
8. Write about SQI?
9. What are the different storage of GIS data models ?
10. What is temporal topology ?
11. What is DTM ?
12. Write about TIN?
13. Write about the steps involved in the DTM manipulation ?
14. Write few DTM Applications.
15. What are the advantages of Vector methods ?
16. What are the disadvantages of Vector methods ?
17. What are the advantages of Raster methods ?
18. What are the Disadvantages of Raster Data ?
19. Give the suggestions for the use of Raster and Vector data methods.

20. What is Hierarchical Data Base Structure?
21. What is a Primary Key ?
22. What is a Foreign Key ?

UNIT III – DATA INPUT AND TOPOLOGY

1. What are the data input methods ?
2. Write about the Scanning Process.
3. What is the Keyboard entry?
4. What is Coordinate Geometry (COGO):
5. What is Manual Digitizing?
6. What are the Raster data formats ?
7. What is Georeferencing ?
8. What are the Vector data input methods ?
9. What is a digitizer ?
10. What is a Projection ?
11. Write about Data transformation.
12. What is topology ?
13. What are the advantages of topology ?
14. What are the components of Topology ?
15. What are the different formats of topology ?
16. What is adjacency ?
17. What is Connectivity in ARCGIS ?
18. 17.What is meant by a containment in GIS ?
19. What are the non topological file formats ?
20. Write about the GPS data integration.
21. Write about the Attribute data models ?

VSB ENGINEERING COLLEGE, KARUR
DEPARTMENT OF CIVIL ENGINEERING
PART - B & C
13 MARK QUESTIONS
UNIT I - FUNDAMENTALS OF GIS

1. Write about the basic Spatial Concepts in GIS.
2. Write about the Coordinate system used in GIS.
3. What are the components of GIS? Explain them.
4. Write about the Proprietary and Open Source Software in detail.
5. Write a notes about Attributes in GIS.

UNIT II – SPATIAL DATA MODELS

1. Write a short note about data structures.
2. Explain about the ER diagram with one example.
3. What are the spatial data models available for GIS ? Explain them in brief.
4. Write about the methods available for the Raster data Compression.
5. Give the Advantages and Disadvantages of Raster data models over Vector data models.
6. Write a short note about a TIN.

UNIT III – DATA INPUT AND TOPOLOGY

1. Write about the Raster data inputs available now a days.
2. Explain about the Georeferencing of Imageries in brief.
3. What is Coordinate transformation ? Explain it.
4. What is topology ? Explain about the basic components of topology.
5. How can we integrate the GPS data in GIS to Spatial and Aspatial data? Explain it.

V.S.B.ENGINEERING COLLEGE, KARUR

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

OA 1551 ENVIRONMENT AND AGRICULTURE

Name of the Faculty Member:V.T.S.Vignesh

UNIT-I
PART - A

1. What are all the environmental basis for agriculture and food?
2. Define agricultural bio diversity?
3. Write the key roles of Agricultural bio diversity.
4. Define land use.
5. How does land use varies from area to area. Explain
6. What are the effects of land use change?
7. Write the zones of land use.
8. Differentiate between Rural urban fringe and suburbs.
9. Explain the term land cover change.
10. Give an outline of climatic impact of land use change.
11. Show the types of land use.
12. What do you infer from the landscape change?
13. List four major stages of landscape change.
14. Categorize the water quality issues.
15. What are the adverse impacts on natural resources?
16. Explain about CAP (Common Agricultural Policy).
17. What are the major causes of pollution?
18. Define Globalization. Also give its importance.
19. Explain the term agro ecosystem.
20. Why AESA is needed?

PART – B & PART-C

1. Explain about land use zones.
2. Describe briefly types of land use in India.
3. Write notes on four major stages of landscape change and effects of Landscape change on species and populations.
4. Give notes on categories of water pollution.
5. Write a detailed study about major water pollution in India.
6. Enumerate and explain the causes, effects and solution for water pollution.
7. How is social change explained by Comte, Spencer and Marx?
8. Explain the functionalist perspective of social change.
9. How does conflict theory contribute to our understanding of social change?
10. What are the impacts, benefits and disadvantages of globalization in India ?
11. List the types of globalization and explain in detail.
12. Define agro ecosystem and explains its methodology.

UNIT – II

PART - A

1. Define watershed.
2. Define Monoculture.
3. What is meant by Mechanised agriculture?
4. List out soil cover impacts.
5. What is the role of irrigation in agricultural development?
6. Explain agricultural drainage.
7. What are the advantages of mechanized agriculture?
8. What is the role of mechanization of sustainability?
9. List the environmental impacts of different aspects of intensification.
10. How mechanization improved agricultural production?
11. What are the limitation of farm mechanization?
12. How can irrigation affect erosion?
13. What is the importance of erosion control?
14. Analyze the ill effects of over irrigation.
15. Explain the possible result of increased irrigation of agricultural fields
16. How can you limit the impact of irrigation?
17. Why urban agriculture is important?
18. Generalize about the agricultural pollution.
19. Distinguish between the Organic culture and monoculture.
20. Summarize about watershed management in India.

PART – B & PART-C

1. What is meant by watershed? Explain any two watershed scheme.
2. Briefly explain watershed management in India.
3. Write notes on a) watershed management b) watershed development
4. Define mechanised agriculture. What are the systems available?
5. Explain mechanized agriculture with their technologies
6. Explain mechanized agriculture with their advantages and disadvantages.
7. What is meant by soilcover and its impacts? Explain it.
8. Explain soil erosion problems in irrigation systems.
9. How does irrigation prevent soil erosion? Explain with neat sketches
10. Write short notes on mechanised agriculture, problems in irrigation systems and urban impacts
11. Explain Agricultural drainage and downstream impacts with detail..
12. Compare mechanized agriculture and drainage agriculture.
13. Write notes on watershed programmes in India.
14. Define erosion. What are the approaches to controlling erosion in rural areas?

UNIT – III

PART-A

1. How does climate change affects us?
2. What are the causes of global warming?
3. How does global warming affect the ocean?
4. What is meant by global warming?
5. What is meant by ecosystem changes?
6. What are the three things that can cause an ecosystem to change?

7 What ecosystems are affected by climate change?
8 What factors are affecting ecosystems all over the world?
9 What is the difference between green water and blue water
10 What is green water?
11 How is grey water footprint determined
12 What is included in the calculation of virtual water usage?
13 How does water scarcity affect india?
14 What are the problems shortage affect the environment
15 Which countries suffer from water scarcity?
16 What is meant by Desertification?
17 What are the main causes of Desertification?
18 What is process of Desertification?
19 How does global warming affect human health? With example
20 What is climate changing issue?

PART-B & PART-C

1 What is global warming with non-human activities? What are the changes in our climate and ecosystem?
2 Define global warming. What are the causes to form global warming?
3 List out the climate change due to global warming. Example any two natural scenarios
4 What are the resources to change the climate? What kind of effects develops the climate change
5 How global warming and climate change does affects the ecosystems?
6 List out the changes in ecosystems due climate change and global warming.
7 Explain blue, green and grey water with water cycles.
8 How does water changes its characteristics due to Climate change.
9 Define desertification. List out the process and explain any two of them.
10 Explain desertification. where is desertification happening in the world?
11 Differentiate natural and anthropogenic climate change scenarios.
12 Explain drought and characterization of water shortage
13 Explain about changing Blue, green, grey water cycles.

UNIT-IV

PART-A

1 What is diversity in agriculture?
2 How is biodiversity important to agriculture?
3 Why is diversity important for ecosystems?
4 What is agrobiodiversity PDF?
5 How does GM crops affect the environment?
6 What are the environment benefits of GM crops?
7 What are transgenic plants explain?
8 What are the impacts of GM crops?
9 What are the pests in agriculture?
10 How are insects beneficial to agriculture?
11 Why are insects important to agriculture?
12 What insects destroy crops? Example
13 What is the pollinator crisis?

14 Why are pollinators disappearing?
15 Why are pollinators decreasing
16 Which bee is the best pollinator? why?
17 What is ecological farming?
18 What are principles of ecological agriculture?
19 What are the effects of habitat fragmentation
20 How does agricultural biotechnology work?

PART-B & PART-C

1 Explain about biodiversity, population and ecological principles
2 What kind of relation appears in wildlife with ecosystems and biodiversity?
3 What is meant by GM? Explain with few examples
4 Write an overview of GM. What are the merits and demerits of GM
5 Explain GM foods with their safety, risksand public concerns
6 Explain role of insects in agriculture with suitable example
7 What are uses in insects? Explain with use in medicine and agriculture
8 Explain Pollination crisis. What kind of activities happening in India
9 Define ecological farming . write their principles with suitable examples
10 Explain about ecological agriculture with their principles, practices and constraints.
11 Explain ecological impacts of tropical forest fragmentation
12 Explain the effects of habitat fragmentation by forestry and agriculture
13 What is meant by Agricultural Biotechnology, explain about their techniques, advantages and concerns.
14 What are the biotechnology issues in agriculture. Explain use of biotechnology in agriculture and its benefits and risks.

UNIT-V

PART-A

1 Give notes on different types of goals in GEG?
2 Define alternate culture system.
3 What are the three main goals of sustainable agriculture?
4 Define sustainable agriculture.
5 Differentiate between vertical and mega farming.
6 State hydroponics.
7 What do you understand by aeroponics?
8 Compare and contrast the terms Aquaponics and Aeroponics.
9 What is virtual trade water?
10 Why virtual trade water is important?
11 What are all the objectives of agricultural policy?
12 Compare vertical farming with mega farming.
13 List the types of environmental impacts on agriculture.
14 Mention the advantages and Disadvantages of vertical farming.
15 Define Biosphere.
16 What about lighting costs in vertical farming?
17 How does vertical farming work?
18 How does vertical farming save water?
19 What are all the global environmental issues?
20 What is meant by Global environmental governance?

PART-B & PART-C

1 Describe in detail about types of environmental governanace issues.
2 Explain about challenges, models and goals in Environmental governance issue
3 Discuss Environmental governance in India.
4 Explain in detail about vertical farming and types of vertical farms.
5 Write notes on Advantages and disadvantages of vertical farming.
6 What Are the Pros and Cons of Vertical Farms?
7 Define virtual trade water and explain its impacts on local environment.
8 Discuss briefly about environmental impacts of agriculture.
9 Explain about agricultural environmental policies.
10 Write notes on sustainable agriculture.
11 Write in detail about the techniques adopted for sustainable farming.
12 How land degradation takes place?

DEPARTMENT OF CIVIL ENGINEERING

CE8502 STRUCTURAL ANALYSIS I

Name of the Faculty Member: C.Mohanaselvan

Class/ Semester: III/V Semester B.E., Civil Engineering

PART -A (Two marks)

UNIT-I

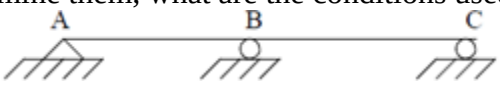
STRAIN ENERGY METHOD

1. Why is it necessary to compute deflections in structures?
2. Define "Structure".
3. Name any four methods used for computation of deflections in structures.
4. State the difference between strain energy method and unit load method in the determination of deflection of structures.
5. What are the assumptions made in the unit load method?
6. Give the equation that is used for the determination of deflection at a given point in beams and frames.
7. Distinguish between pin jointed and rigidly jointed structure.
8. What is meant by thermal stresses?
9. What is meant by lack of fit in a truss?
10. Write down the two methods of determining displacements in pin jointed plane frames by the unit load concept.
11. What is the effect of temperature on the members of a statically determinate plane truss?
12. Distinguish between 'deck type' and 'through type' trusses.
13. Define static indeterminacy of a structure.
14. Differentiate the statically determinate structures and statically indeterminate structures.
15. Define: Trussed Beam.
16. Define: Unit load method.
17. Give the procedure for unit load method.
18. Define degree of indeterminacy.
19. Explain strain energy.
20. Explain principle of conservation of energy.
21. Define pin-jointed frame.
22. Define rigid jointed frame.
23. What are the various methods of computing the joint deflection of a perfect frame?

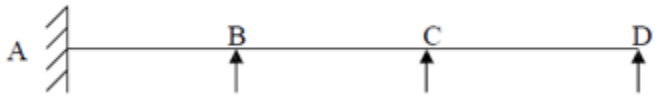
UNIT-II

SLOPE DEFLECTION METHOD

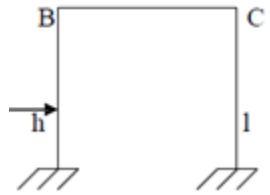
1. What are the assumptions made in slope deflection method?
2. How many slope deflection equations are available for a two span continuous beam?
3. What is the moment at a hinged end of a simple beam?
4. What are the quantities in terms of which the unknown moments are expressed in slope deflection method?
5. The beam shown in figure is to be analyzed by slope deflection method. What are the unknowns and to determine them, what are the conditions used?



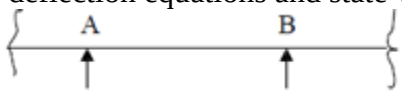
6. How do you account for sway in slope deflection method for portal frames?
7. Write down the equation for sway correction for the portal frame.
8. Write down the slope deflection equation for a fixed end support.



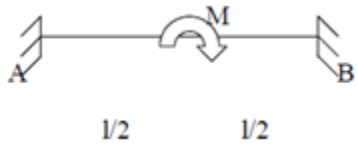
9. Write down the equilibrium equation for the frame shown in figure.



10. Who introduced slope deflection method of analysis?
11. Write down the general slope deflection equations and state what each term represents?



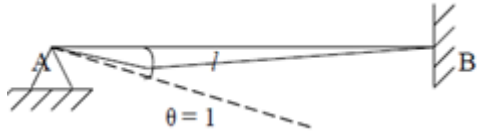
12. Mention any three reasons due to which sway may occur in portal frames.
13. How many slope deflection equations are available for each span?
14. Write the fixed end moment for a beam carrying a central clockwise moment.



15. State the limitations of slope deflection method.
16. Why slope deflection method is called a ‘displacement method’?
17. Define degree of freedom.
18. In a continuous beam, one of the support sinks, what will happen to the span and support moments associated with the sinking of support.
19. A rigid frame is having totally 10 joints including support joints. Out of slope deflection and moment distribution methods, which method would you prefer for analysis? Why?
20. What is the basis on which the sway equation is formed for a structure?

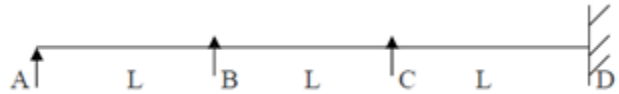
UNIT-III
MOMENT DISTRIBUTION METHOD

1. What is the difference between absolute and relative stiffness?
2. Define continuous beam.
3. What are the advantages of continuous beam over simply supported beam?
4. In a member AB, if a moment of -10 kNm is applied at A, what is the moment carried over to B?
5. What are the moments induced in a beam member, when one end is given a unit rotation, the other end being fixed. What is the moment at the near end called?

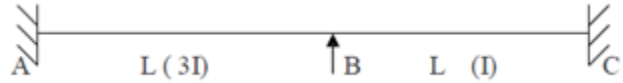


6. A beam is fixed at A and simply supported at B and C. AB=BC=l. Flexural rigidities of AB and BC are 2EI and EI respectively. Find the distribution factor at joint B if no moment is to be transferred to support C.
7. Define moment distribution method.
8. Define stiffness factor.
9. Define distribution factor.
10. Define carry over moment and carry over factor.
11. Define flexural rigidity of beams.
12. Define constant strength beam.
13. What is the sum of distribution factors at a joint?

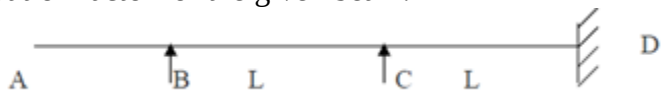
14. Define the term ‘sway’.
15. Find the distribution factor for the given beam.



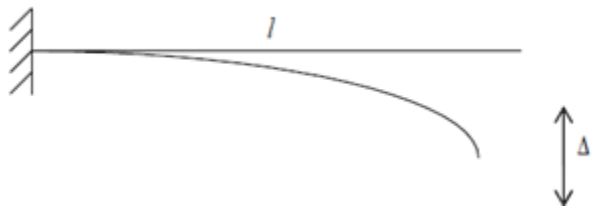
16. Find the distribution factor for the given beam.



17. Find the distribution factor for the given beam.

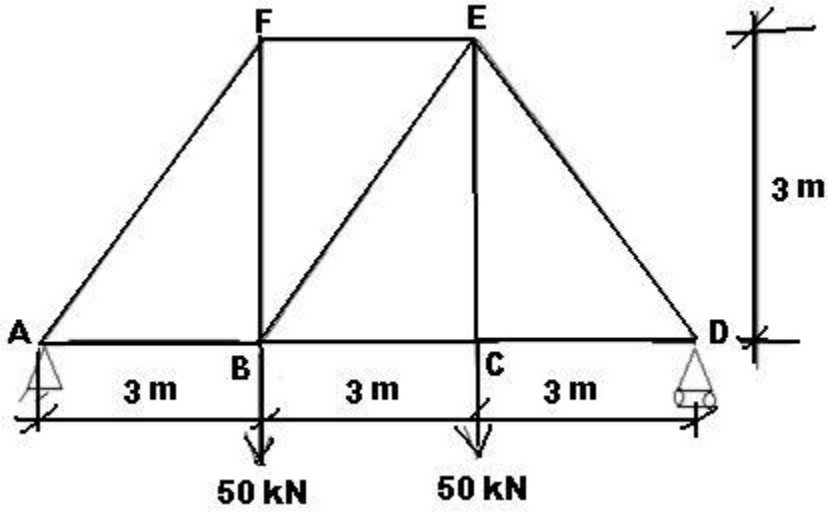


18. What are the situations where in sway will occur in portal frames?
19. What is the ratio of sway moments at column heads when one end is fixed and the other end hinges? Assume that the length and M.I of both legs are equal.
20. A beam is fixed at its left end and simply supported at right. The right end sinks to a lower level by a distance ‘Δ’ with respect to the left end. Find the magnitude and direction of the reaction at the right end if l is the beam length and EI, the flexural rigidity.

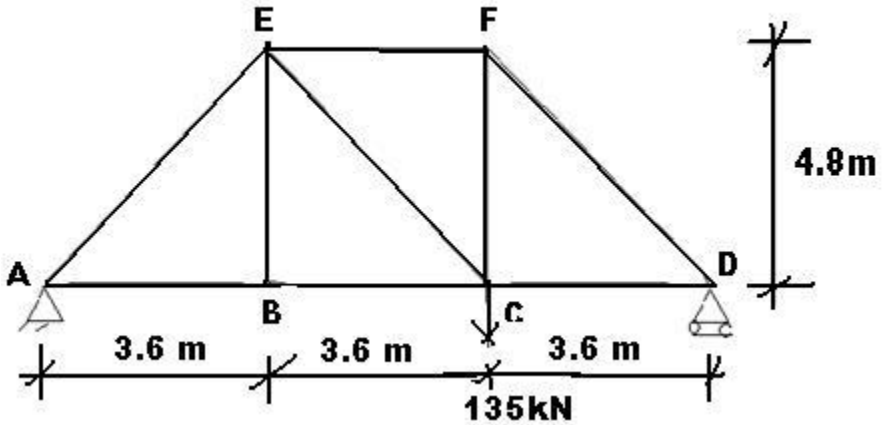


CE8502 STRUCTURAL ANALYSIS – I
QUESTION BANK
PART – B
UNIT – I STRAIN ENERGY METHOD

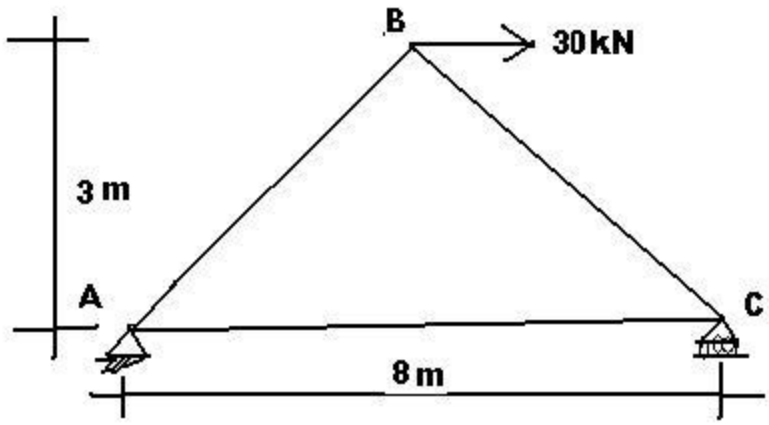
1. Determine the vertical displacement of joint „C" of the steel truss shown in fig. The cross sectional area of each member is A = 400mm^2 and E = 200 GPa.



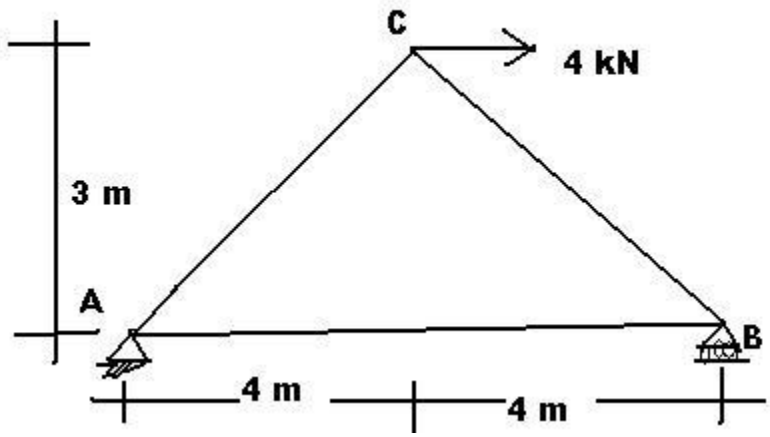
2. Determine the vertical displacement of joint „C" of the steel truss shown in fig. The cross sectional area of each member is A = 400mm^2 and E = 2x10^5 mm^2.



3. Determine the vertical and horizontal displacement of the joint „B" in a pin jointed frame shown in fig.



4. The cross sectional area of each member of the truss shown in figure is A = 400 mm^2 and E = 200 GPa.

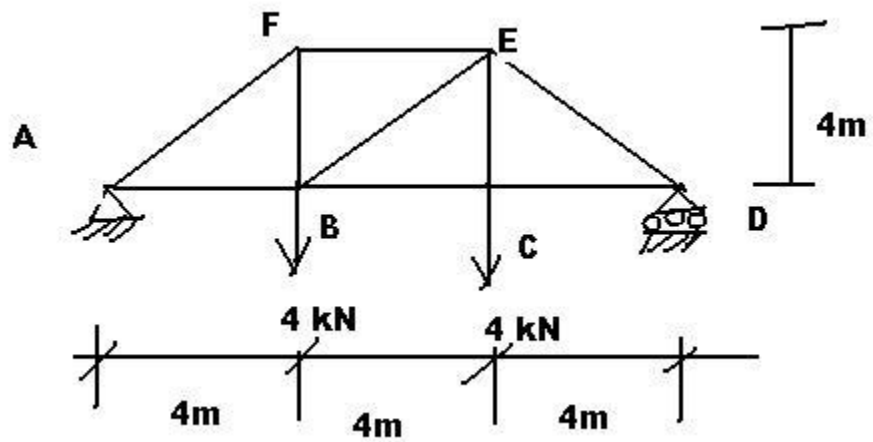


(a) Determine the vertical displacement of joint C if a 4 kN force is applied to the truss at C?

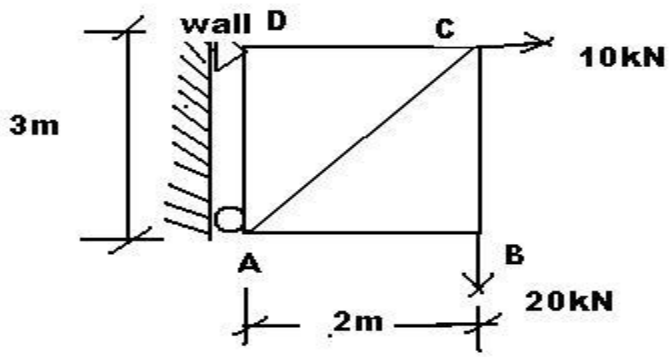
(b) If no loads act on the truss, what would be the vertical displacement of joint C if member AB were 5 mm too short?

(c) If 4 kN force and fabrication error are both accounted, what would be the vertical displacement of joint C?

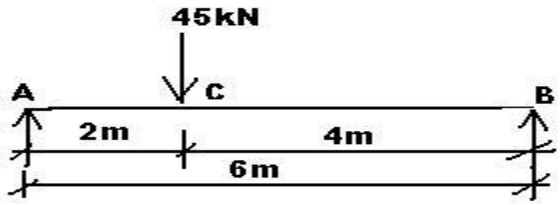
5. Determine the vertical and horizontal displacement of the joint „B" in a pin jointed frame shown in fig.



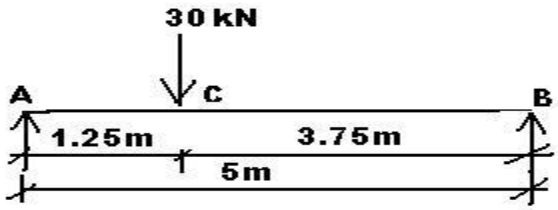
6. Determine the vertical displacement of joint C of the steel truss as shown in fig. Due to radiant heating from the wall, members are subjected to a temperature change; member AD is increase +60°C, members DC is increases +40°C and member AC is decrease - 20°C. Also member DC is fabricated 2mm too short and member AC 3mm too long. Take $\alpha = 12(10^{-6})$, the cross sectional area of each member is A = 400 mm^2 and E = 200 GPa?



7. A beam AB is simply supported over a span 6m in length. A concentrated load of 45kN is acting at a section 2m from support. Calculate the deflection under the load point. Take E = 200 x 10^6 kN/m^2. And I = 13 x 10^{-6} m^4

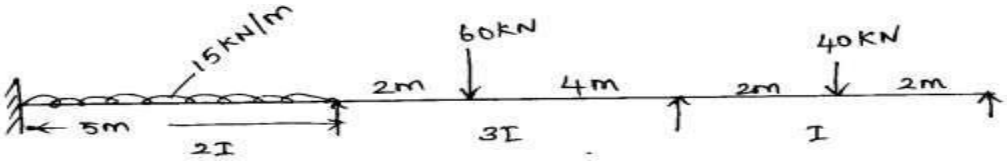


8. A beam AB is simply supported over a span 5m in length. A concentrated load of 30kN is acting at a section 1.25m from support. Calculate the deflection under the load point. Take E = 200 x 10^6 kN/m^2. And I = 13 x 10^{-6} m^4

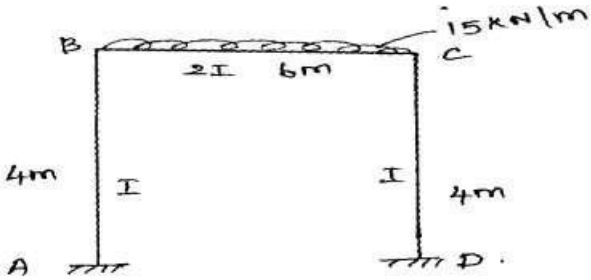


UNIT-II SLOPE DEFLECTION METHOD

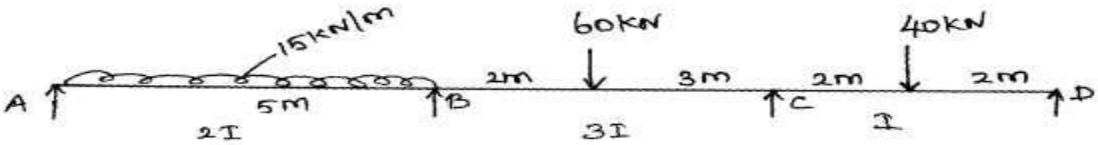
1. Analyse the continuous beam given in figure by slope deflection method and draw the B.M.D



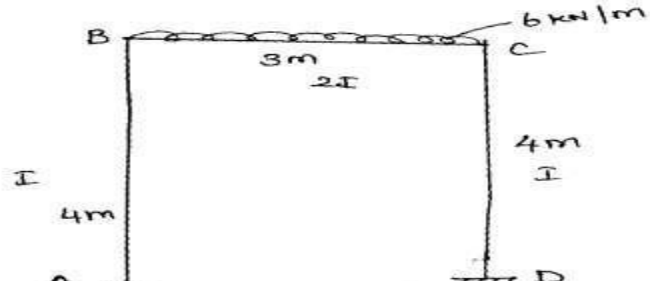
2. Analyze the frame given in figure by slope deflection method and draw the B.M.D



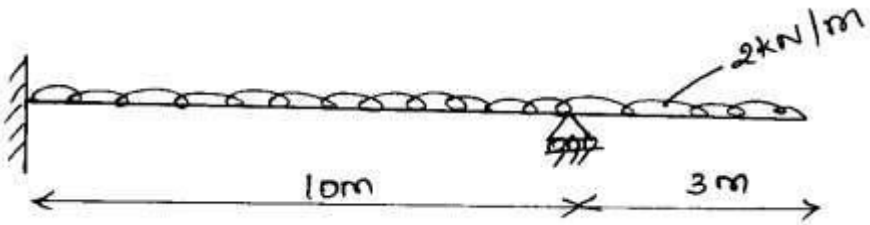
3. Analyze the continuous beam given in figure by slope deflection method and draw the B.M.D



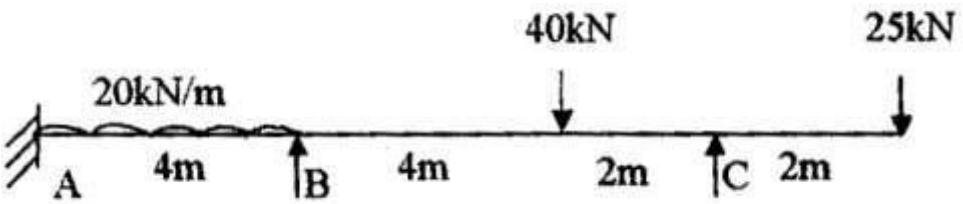
4. Analyze the frame given in figure by slope deflection method and draw the B.M.D.



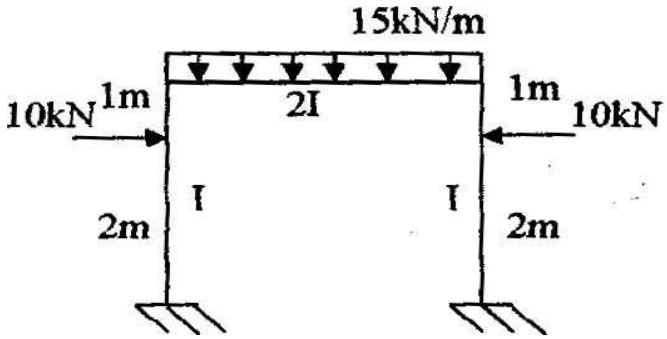
5. Analyze the continuous beam given in figure by slope deflection method and draw the B.M.D



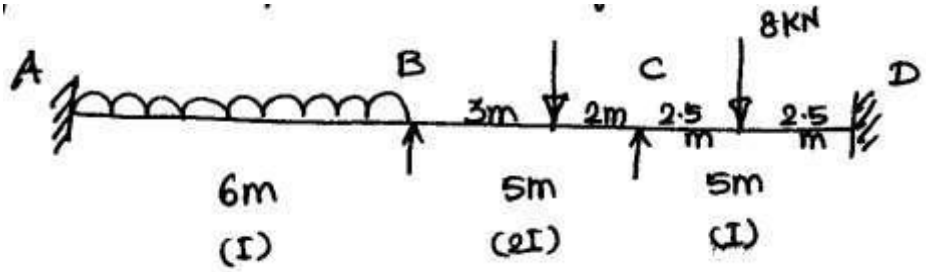
6. Using slope deflection method, determine slope at B and C for the beam shown in figure below. EI is constant. Draw free body diagram of BC.



7. Analysis the frame shown in below by the slope deflection method and draw the bending moment diagram. Use slope deflection method.

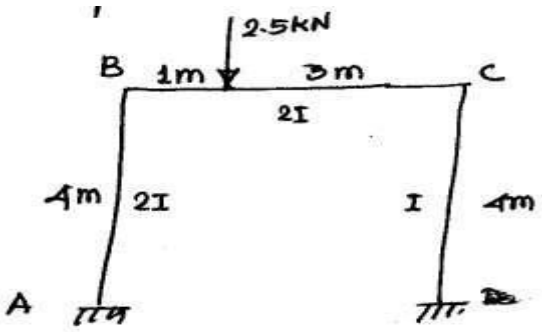


8. A continuous beam ABCD consist of three span and loaded as shown in fig.1 end A and D are fixed using slope deflection method Determine the bending moments at the supports and plot the bending moment diagram.



(or)

9. A portal frame ABCD, fixed at ends A and D carriers a point load 2.5Kn as shown in figure – 2. Analyze the portal by slope deflection method and draw the BMD.



10. Using slope deflection method analyzes the portal frame loaded as shown in Fig (1). EI is constant.

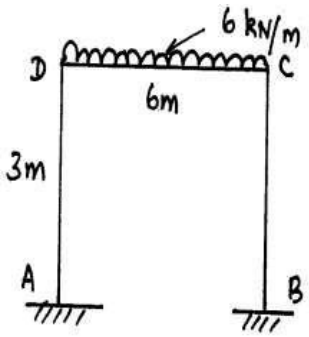
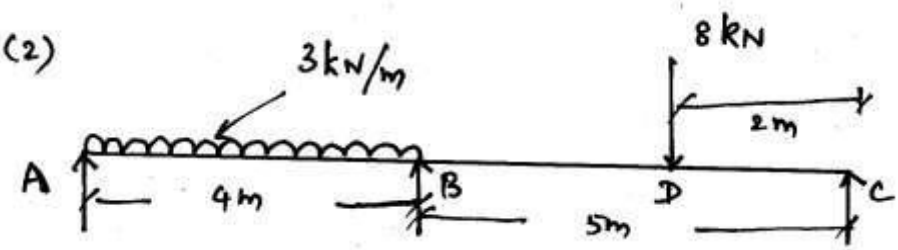


Fig (1)

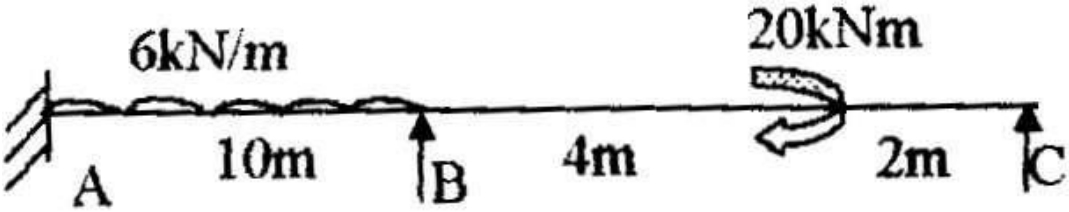
11. Using slope deflection method analyzes a continuous beam ABC loaded as shown in Fig (2). The ends A and C are hinged supports and B is a continuous support. The beam has constant flexural rigidity for both the span AB and BC.

Fig (2)

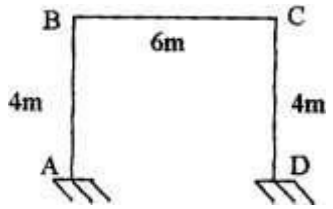


UNIT –III MOMENT DISTRIBUTION METHOD

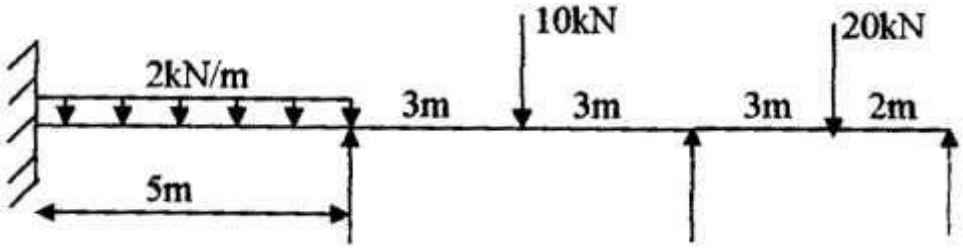
1. Draw the bending moment diagram and shear force diagram for the continuous beam shown in figure below using moment distribution method. EI is constant.



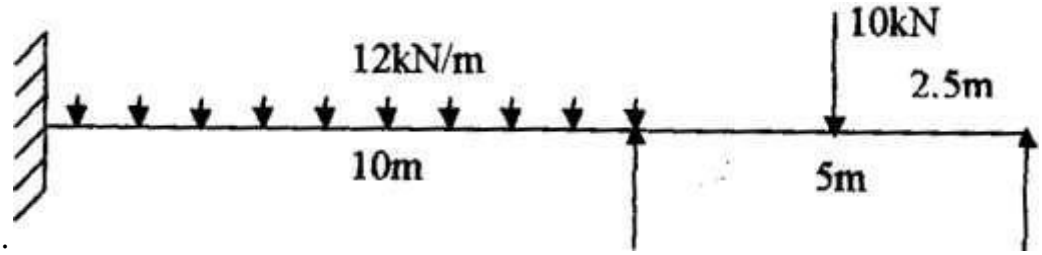
2. Analysis the frame shown in figure below for a rotational yield of 0.002 radians anticlockwise and vertical yield of 5mm downwards at A. assume EI=30000 kNm^2. I_{AB} = I_{CD} = I; I_{BC} = 1.51. Draw bending moment diagram. Use moment Distribution Method.



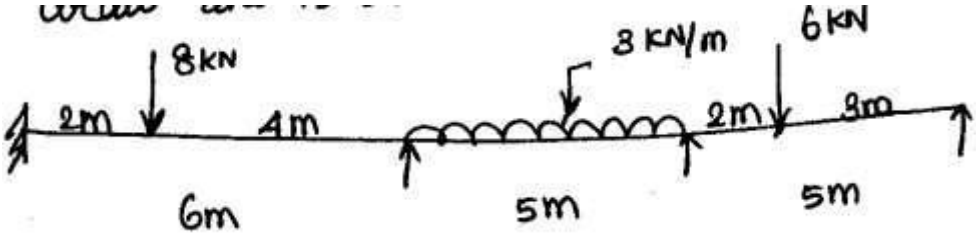
3. Draw the bending moment diagram and shear force diagram for the continuous beam shown in figure below using moment distribution method. EI is constant.



4. Draw the bending moment diagram and shear force diagram for the continuous beam shown in figure below using moment distribution method. EI is constant.



5. A continuous beam ABCD if fixed at A and simply supported at D and is loaded as shown in figure 3. spans AB, BC and CD have MI of I, I-SI, and I respectively. Using moment distribution method determine the moment at the supports and draw the BMD.



6. Analyze and draw the BMD for the frame shown in figure 4. Using moment the frame has stiff joint at B and fixed at A,C and D.

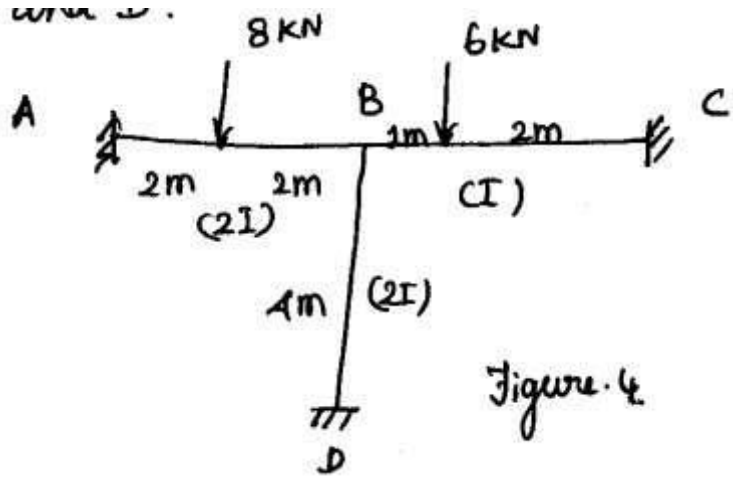
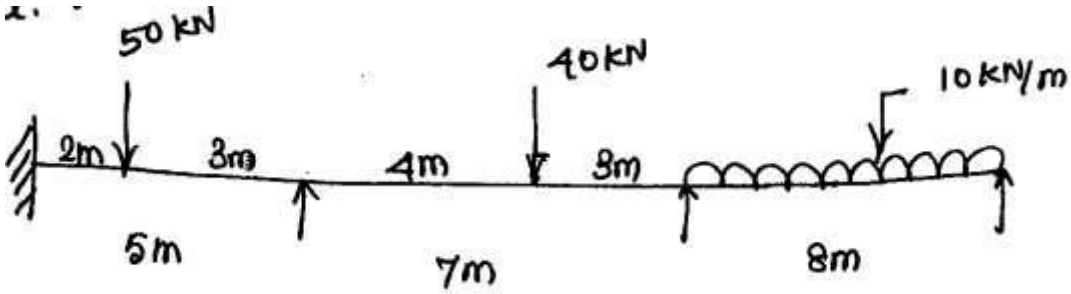


Figure. 4

7. A beam ABCD, 16m long is continuous over three spans AB=6m, BC = 5m & CD = 5m the supports being at the same level. There is a udl of 15kN/m over BC. On AB, is a point load of 80kN at 2m from A and CD there is a point load of 50 kN at 3m from D, calculate the moments by using moment distribution method. Assume EI const.
8. A continuous beam ABCD 20m long carried loads as shown in figure 5. Find the bending moment at the supports using moment distribution method. Assume EI constant.



9. Analyze a continuous beam shown in Fig (3) by Moment distribution method. Draw BMD.

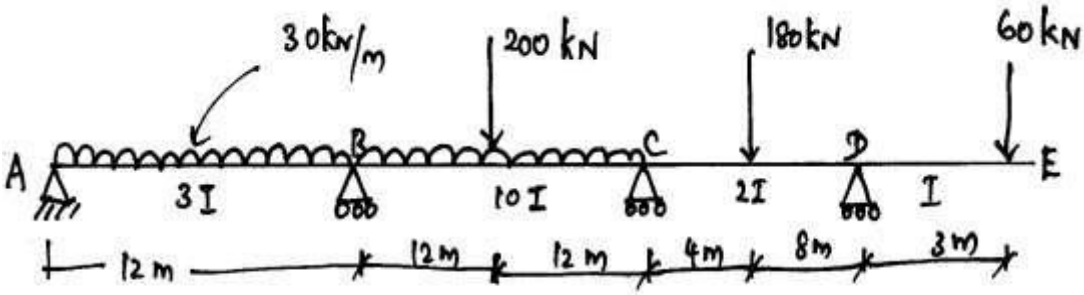


Fig (3)

10. Using Moment Distribution method, determine the end moments of the members of the frame shown in Fig (4) EI is same for all the members.

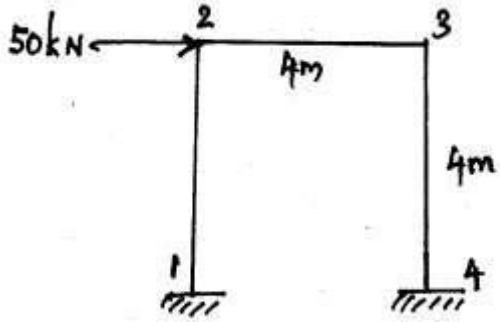
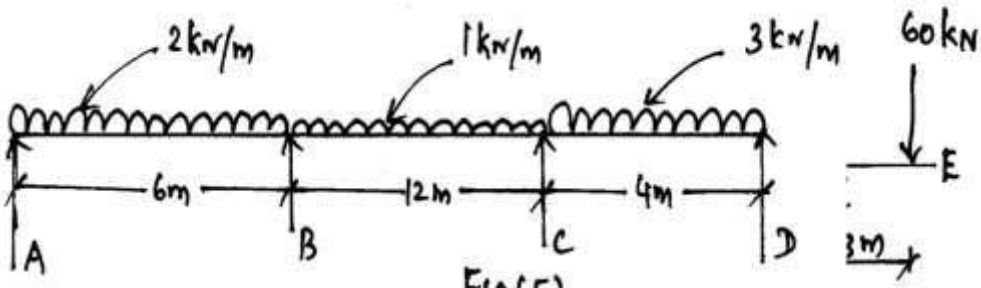


Fig (4)

11. A continuous beam ABCD of uniform cross section is loaded as shown in Fig(5) Find (a) Bending moments at the supports B and C

(b) Reactions at the supports. Draw SFD and BMD also



Fig(5)

12. A two span continuous beam fixed at the ends is loaded as shown in Fig(6). Find (a) Moments at the supports.

(b) Reactions at the supports. Draw the BMD and SFD also.

Use Moment distribution method.

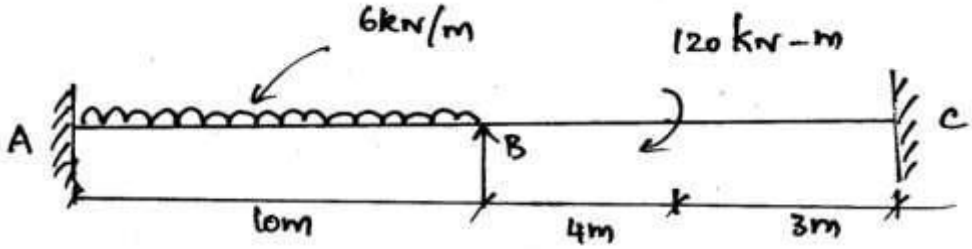
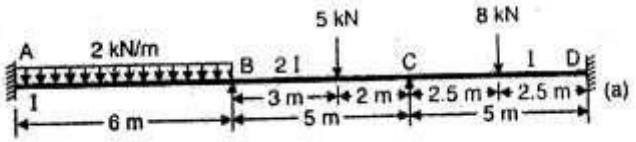
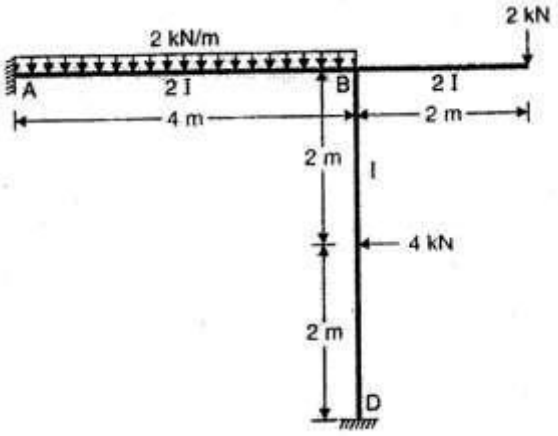


Fig (6)

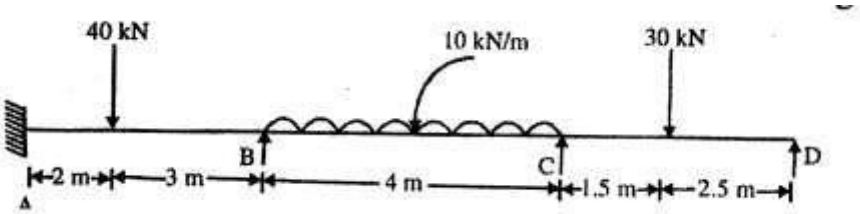
12. A continuous beam ABCD consists of three spans and is loaded as shown in figure. Ends A and D are fixed. Determine the bending moments at the supports and plot the bending moment diagram.



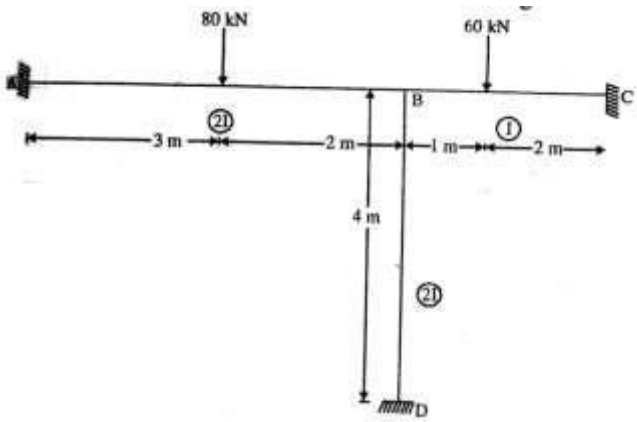
13. Analyze the rigid frame shown in figure.



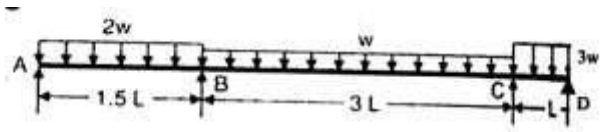
14. Analyze the continuous beam loaded as shown in figure by the method of moment distribution. Sketch the bending moment and shear force diagrams.



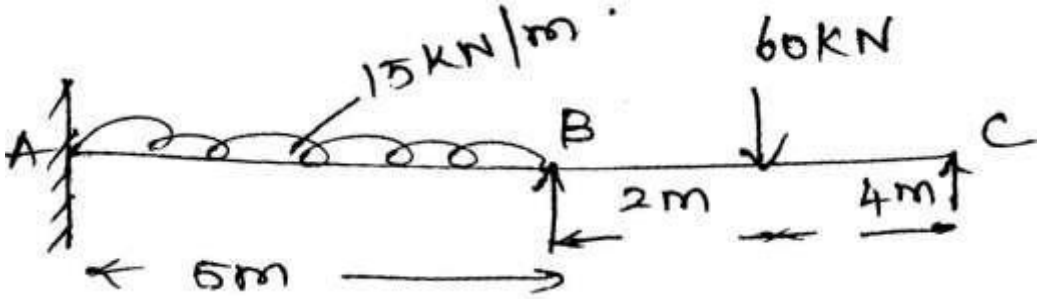
15. Analyze the structure loaded as shown in figure by moment distribution method and sketch the bending moment and shear force diagrams.



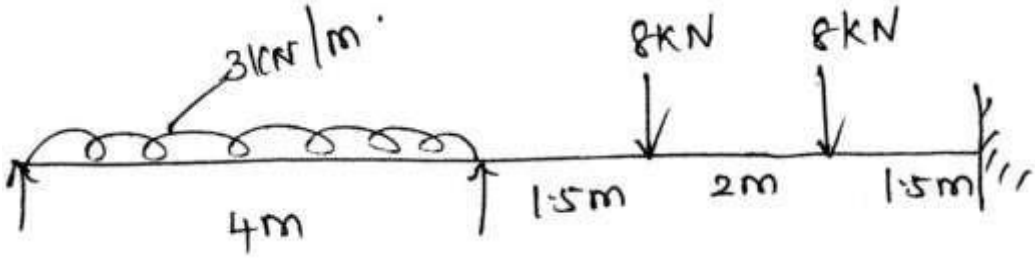
16. A continuous beam ABCD covers three spans AB = 1.5L, BC = 3L, CD=L. It carries uniformly distributed loads of 2w, w and 3w per metre run on AB, BC, CD respectively. If the girder is of the same cross section throughout, find the bending moments at supports B and C and the pressure on each support. Also plot BM and SF diagrams.



17. An en-cast beam of span L carries a uniformly distributed load w. The second moment of area of the central half of the beam is I_1 and that of the end portion is I_2. Neglecting the weight of the beam itself find the ratio of I_2 to I_1 so that the magnitude of the bending moment at the centre is one-third of that of the fixing moments at the ends.

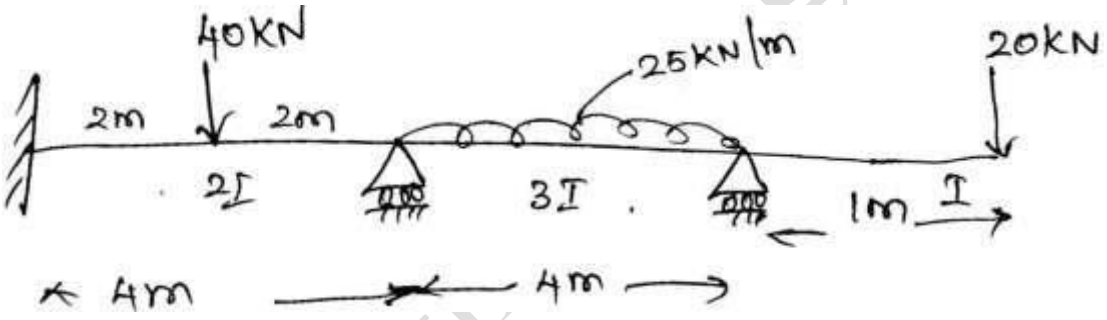


18. Analyze the continuous beam shown in figure by moment distribution method and draw the BMD.



19. Analyze the portal frame ABCD fixed at A and D and has rigid joints at B and C. the column AB is 3m long and column CD is 2m long. The Beam BC is 2 m long and is loaded with UDL of intensity 6 KN/m. The moment of inertia of AB is 2I and that of BC and CD is I. Use moment distribution method.

20. Draw the shear force and bending moment diagram for the beam loaded as shown in figure. Use moment distribution method.



V.S.B. ENGINEERING COLLEGE, KARUR

DEPARTMENT OF CIVIL ENGINEERING

Academic Year: 2019 -2020 (ODD Semester)

Year/Semester & Branch: III /V B.E Civil Engineering

EN 8491 WATER SUPPLY ENGINEERING

Name of the Faculty Member: M.Aathavan

PART A (TWO MARKS)

UNIT I

COLLECTION FROM SOURCE

1. What are the objectives of public water supply scheme? (AU April 2015, Dec 2014)
2. Distinguish between shallow well and deep well. (AU April 2015)
3. Distinguish between carbonate and non-carbonate hardness(AU Dec 2014)
4. What are the components of a water supply (scheme) system? (AU May 2013)
5. What are the acceptable quality standards as per BIS10500:1983 for Fluoride and Nitrates? (AU May 2013)
6. How do you determine the storage needed for and impounding reservoir? (AU May 2014)
7. State the drinking quality standards for any four physic-chemical parameters. (AU May 2014)
8. Define design period? (AU Dec 2012)
9. What are rivers? What are the types of river?
10. Define per capita demand?
11. What are the methods of population forecasting?
12. Define design period?
13. What are the factors governing the design period?
14. What are various type of water demand?
15. What are the various type of water available on the earth?
16. What is hydrologic cyde?
17. What are rivers? What are the types of river?
18. What is jack well?
19. What are springs?
20. What are artesian springs?
21. What are the different types of wells?
22. What is artesian spring?

UNIT II CONVEYANCE FROM THE SOURCE

1. What is the role of intake structure in water supply scheme? (AU April 2015, Dec 2014)

2. List out any two appurtenances in water conveyance system. (AU April 2015)
3. What is an intake? (AU Dec 2014)
4. What are the properties of ductile iron pipe? (AU May 2014)
5. Enlist the external forces acting on water transmission main if the pipe is laid under heavy traffic(AU May 2014)
6. What is meant by economic diameter of a pumping main? (AU Nov 2014)
7. What are the two types of "Intake' according to their position? (AU May 2013)
8. How do you select pipe material for water supply (AU Nov 2012)
9. How will you calculate the total head in the design of pumps for water supply schemes? (AU May 2013).
10. What are various type pressure pipes?
11. What are types of joint?
12. How the corrosion of metal pipes is reduced?
13. What are the factors governing location of intake?
14. What are the types of intake?
15. What are vitrified clay pipes?
16. What are the advantages and disadvantages of RCC pipes?
17. What are tube wells?
18. List the various joints in cast iron pipes
19. draw a sketch of spigot and socket joints showing the position of materials used in making it watertight.
20. what is the difference between system curve and pump curve?
21. mention the situation in which pumps will be connected ?
22. what is meant by economic diameter of pumping main?
23. what is meant by pipe appurtenance and mention their role?
24. mension the basic for the selection of types and capacity of pumps.

UNIT III WATER TREATMENT

1) Enumerate the mechanism of disinfection process? (AU April 2015)
2) What are the factors influencing settling of discrete particle? (AU April 2015)
3) What is the significance of velocity gradient in flash mixer?(AU April 2014) (AU Nov 2014).
4) What is break point chlorination?(AU April 2014)
5) Define: Detention time and surface overflow rate for a sedimentation tank? (AU May 2013)
6) What are tests to be done to find the residual chlorine in water? (AU May 2013)
7) Distinguish between BOD and COD? (AU April 2012)
8) Name any two softwares used in design of sewers.(AU April 2012)
9) What are difference between Unit Operations and Unit Process?(AU Nov 2012)
10) What are the advantages of chlorine as disinfectant?
11) State the stokes equation for finding settling velocity of particles.
12) On What factors does the dose of coagulants depend?
13) Give the design criteria for a flash mixer and state its use in water supply scheme.
14) on what factors dose of coagulant depend?
15) what is significant of velocity gradient in flash mixer?
16) give the design criteria for a flash mixer and state its use.
17) determine the size of a flash mixer for a water treatment plant of 10MLD
18) what role dose flash mixer play in water treatment plant?
19) define air binding.
20) enumerate the mechanism of disinfection process.
21) enumerate any two mechanics of disinfection process.
22) difference between sterilization and disinfection.
23) what are the advantages of chlorine as disinfectant?
24) Define breakpoint chlorination.
25) what are the residue generated from a water treatment plant?

PART-B&C QUESTIONS (16 MARKS)

UNIT I COLLECTION OF SOURCE

1. Explain the different methods used for prediction of future population of a city, with reference to the design of a water supply system. (AU April 2015)
2. Discuss the various sources of water and give brief account of the characteristics of water. (AU April 2015)
3. Enumerate and explain the characteristics of surface and ground water and state their environmental significance.(AU May 2014)
4. The population of a town as per past census records are furnished below. Forecast the population in the year 2031 and 2041 Using the following methods: (AU May 2014)
   (i) Arithmetical increase method
   (ii) Geometrical increase method

(iii) Incremental increase method

Census year	1941	1951	1961	1971	1981	1991	2001	2011
Population	44642	50487	56816	63859	71458	78543	88131	100290

5. The population of a town as per past census records are furnished below. Forecast the population in the year 2031 and 2041 Using the following methods: (AU Dec 2014)

(iv) Arithmetical increase method

(v) Geometrical increase method

(vi) Incremental increase method

Census year	1941	1951	1961	1971	1981	1991	2001	2011
Population	35642	39487	46816	57859	70458	78543	92131	116500

6. (i) Discuss the factors to be considered in fixing the design periods for water supply components?

(ii) Explain the various sources of surface and ground water? (AU Dec 2014)

7. Explain the different sources of water and their characteristics with respect to turbidity, Hardness, Chloride and microbiology. (AU May 2013)

8. (i) Write a note on water demand.

(ii) In two periods each of 20 years a city has grown from 50000 to 110000 and 160000. Find the population expected in the next 20 years and also the saturation population.

(AU May 2013)

UNIT II CONVEYANCE SYSTEM

1. Mention the points which should be taken into consideration in deciding the location of and intake for the water supply of a large town, the source being a perennial river. Draw a neat sketch of a canal intake and explain the salient features.(AU April 2015)

2. (i) What are the factors to be considered in the selection of pipe material for water transmission?

(ii) Describe the various joints used in the pipeline construction. (AU April 2015)

3. (i) What are the important considerations which govern the selection of site of an intake structure?

(ii). Explain the salient features of river intake with the aid of a neat sketch.

(AU May 2014)

4. (i) Describe the various pipe materials used in conveyance of water

(ii) What factor are required to be considered in the selection of the type of a pump?

(AU May 2014)

5. (a). In a water supply scheme to be designed for serving a population of 12 lakhs, the storage reservoir is situated at 9km away from the city and the loss of head from the source to city is 19.5m. Calculate the size of the supply main by using Darcy Weisbach formula as well as by using Hazen's formula assuming a maximum daily demand of 150 lpcd and 2/3 of the daily

supply to be pumped in 10 hours. Assume friction factor (4f) for the pipe material as 0.005 in Weishbach formula and $C_H = 110$ in Hazen's formula.
(AU Nov 2014)

6. (i) What are the important considerations, which govern the selection of site of an intake? (ii) Discuss the factors to be considered in the selection of pipe material for water transmission. (AU Nov 2014)

7. (i) What are the classification of intakes based on source also explain with a sketch any one of the intakes?
(ii)What are the different pipe materials used in the water transmission? (AU May 2013)

8. (i) List the classification of pipe joints depending their ability to movement and briefly explain the factors that influence the decision on the type of joints.
(ii). Write a note on pumps used in water supplier. (AU May 2013)

9. (i) What actions are required for sustainable development?
(ii) What are the factors to be considered in the selection of source for water supply scheme? (AU Apr 2012)

UNIT III WATER TREATMENT

1. Explain the various
(i) Design a flash mixer for a proposed water treatment plant with a capacity of 25ML/d and draw a neat sketch of the unit. (8)
(ii) Estimate the alum and quick lime requirements with reactions involved to treat 2ML/d of water with raw water alkalinity of 9mg/L as $CaCO_3$ if the alum dosage adopted was 40mg/L. (purity of quicklime – 80%).(AU April 2015) (8)

2. Briefly explain the mechanism of sand filtration. Draw a neat sketch of rapid sand filter unit and explain the working principle. (AU April 2015)

3. (i) Calculate the average chlorine required per day to treat 150ML/d of water. Also calculate the storage required for 60days. Assume an average chlorine dosage of 5mg/L. (AU April 2014) (4)
(iii) Explain the various unit operations and unit processes involved in water treatment (4)

4. A new township is to have a population of 5,00,000 and 90 Lpcd of water supply. Design a rapid sand filter unit with details of under drainage and water washing including gutter arrangement. Limit the maximum spent backwash water as 3.5% (AU April 2014) (12)

5. Design a clariflocculator for a proposed water treatment plant with a capacity of 80 Ml/d and draw a neat sketch of the unit.

6. (i) Draw the longitudinal section of a rectangular sedimentation tank indicating the various zones. (8)
(ii) The following data are corresponding to a clariflocculator find the volume of the flocculation and its diameter.
Detention: 30min, Depth: 3m, Outer diameter of the inlet shaft = 0.9m, Water to be treated: 10 ML/d (AU May 2013) (8)

7. (i) With a neat sketch (cross section) explain the working of a rapid wound filter.

(ii) Write a note on 'Break Point Chlorination' (AU May 2013) (8)

8. Design a sedimentation tank for water treatment plant to treat 8MLD of water. Assume a surface rate of $30m^3/m^2/day$. Check the adequacy of detention time. Draw the plan of the water treatment plant? (AU Nov 2012)

9. With the help of the diagram, explain the process of Rapid sand filter. (AU Nov 2012)

10. (i) Explain the sedimentation process used in water treatment plant. (8)

(ii) Sketch and explain break point chlorination (AU April 2011) (8)

11. Find the area of rapid sand filter required for a town having a population of 80,000 with an average rate of demand 180 lpcd. Assume suitable data for design. Draw the cross section of the designed filter. (AU April 2011)

12. (i) Discuss the sedimentation by coagulation process using alum and sate the merits and demerits of using alum. (8)

13. (ii) What are the methods of disinfection and state the quality requirements of a good disinfectant. (AU Nov 2011) (8)

14. Find the settling velocity of a particle of 0.06mm diameter having specific gravity of 2.65 in water at a temperature of 20^oC.Take kinematic velocity $\gamma=1.007 \times 10^{-6}\ m^2/sec$. (8)

15. Design a slow sand filter for a town of population 6,00,000 persons, provided water supply at the rate of 160 litres/head/day. Take the filtration rate as 2.5 litres/minute.m^2, L/B ratio as 2, maximum demand as 1.8 times average demand. (8)