# Department of Civil Engineering


# Question bank

**(For All Subjects)**

# Subject: Professional Practise

Q1. (Short Questions)

a) What are steel stanchions?

b) What do you understand by analysis of rates?

c) List various factors upon which rates of particular item of work depends upon.

d) What do you mean by out turn work?

e) Give Classification of Timber.

f) Define dismantling?

g) What is tender and tender document?

h) What do you mean by piecework agreement?

i) What are Liquidated damages?

j) Define permanent imprest?

k) Explain the term Schedule of rates.

l) Classify the contracts.

m) List the different methods for calculating the earthwork in Road construction.

n) What is Index Plan?

o) Explain the term Temporary imprest.

p) Write the detailed specifications of first-class Brickwork.

q) Why measurement books are considered very important account records?

r) What is a Temporary advance?

s) What do you understand by analysis of rates?

t) Explain the term Arbitration.

u) What is meant by ‘Lay out plan’?

v) What is meant by item rate contract?

w) What is a ‘petty work’? How does it differ from minor work?

x) List any two approximate methods of building estimation.

y) What is meant by schedule of rates?

z) What are ‘transfer entries’?

aa) How is material at site account differ from stock account?

bb) Differentiate between ‘lead and lift’.

cc) What is a ‘cash book’?

dd) What is meant by physical verification of stores?

(Long Questions)

**1.** What is a muster Roll? What are the various parts of Muster Roll? What are the rules for preparation of Muster Roll?

**2.** Prepare a detailed estimate of the Madras Terrace Roof of a room of 3x4.5m in size. The beams are of sal wood 8x16cm size spaced 45cm centre to centre. The ceiling shall be finished with two coats of coal tar and the exposed faces shall be painted with two coats of painting over one coat of priming?

**3.** Give detailed specification for use of Lime concrete in Foundation?

**4.** Enumerate general conditions for contract?

**5.** Estimate the material and cost of 12mm plaster to be provided in the ratio of 1:6 for an area of 50 sqm

**6.** Enumerate general specifications for various classes of buildings?

**7.** What are the various rules and methods of measurement followed for preparation of the estimates and bills of quantities for earthwork?

**8.** Write the detailed specifications for Earthwork in excavation in foundation.

**9.** Explain the difference between Main Cash book and Subsidiary Cashbook.

**10.** Discuss the Main features of PWD systems of Accounts. Explain different types of estimates; Write a short note on detailed estimate.

**11.** How present-day cost of a building can be worked out?

**12.** Give differences between the followings:

a) road metal account and material at site
b) technical sanction and administrative approval
c) major work and minor work
d) security deposit and earnest money

**13.** What is purpose, importance and factors on which analysis of rates of items depend? Discuss in detail.

**14.** Discuss different kinds of arbitration according to Arbitration Act. What are the advantages of arbitrations over a court decision?

**15.** Write the detailed specifications for Earthwork in excavation in foundation.

**16.** Explain the difference between Main Cash book and Subsidiary Cashbook.

**17.** Discuss the Main features of PWD systems of Accounts.

**18.** Explain different types of estimates, Write a short note on detailed estimate.

**19.** How present-day cost of a building can be worked out?

**20.** Estimate the quantity of earthwork in a tabular form for the portion of a road from the following data:

**21.** Formation width of Road 8.0m, Side Slope 1.5:1 in banking, l: l in cutting. Distance between stations = 50.0m, Assume Ground as Level.

| **Station** | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **PL of Ground** | 102.0 | 101.5 | 102.5 | 102.5 | 102.5 | 102.75 |
| **RL of formation** | 102.0 >>>>> upward 1:200 | | | | | |

**22.** Draw a page of a cashbook. Explain with examples how receipt and payment sides are filled

**23.** Explain the following:

- Indent Form and its use.
- Regular Establishment.
- Work Order.
- Muster Roll.

24 What is a lump sum contract? What are its essential characteristics? How are the payments under such contracts adjusted?

25 Calculate the quantity of earth work for 500 m length of a road in a uniform ground the heights of banks at the two ends being 1.00 m and 1.50 m. The formation width is 10 m and side slopes 2 : 1 (H : V). Assume there is no transverse slope.

26 List any five checks applied to muster rolls.

27 What documents are submitted by the SDE to divisional office every month? What action is taken on these in the divisional office?

28 Explain the major items of construction work which require quality control.

29 From the plan and part cross section of the hexagonal compound wall given in the figure below, estimate the quantities of :

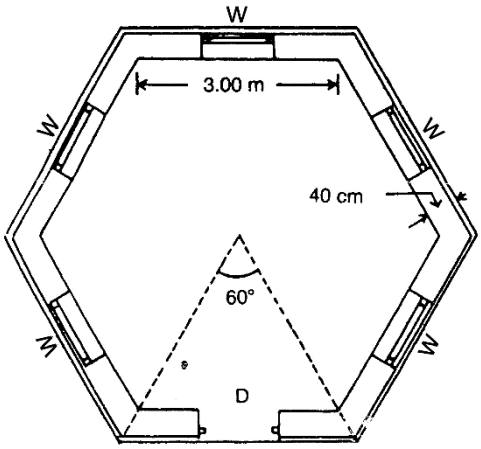
a) Earth work in foundation

b) Lime concrete foundation

c) I Class brick work in foundation and plinth in lime mortar

d) I class brick work in superstructure in lime mortar

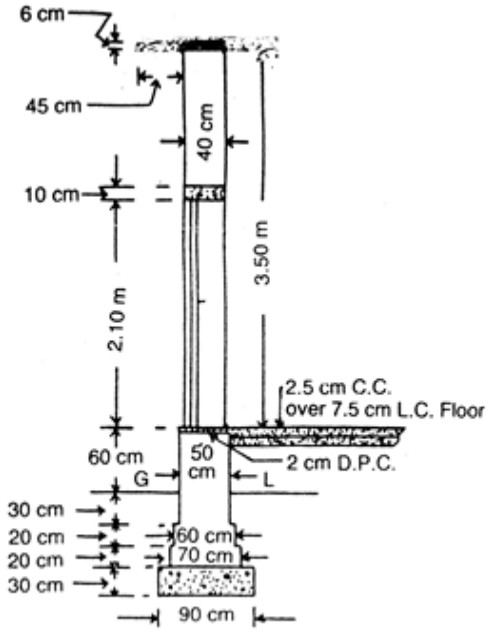
e) 12 mm cement plastering 1 : 6 inside and outside walls. Also, prepare an Abstract of the quantities.




Plan

SCHEDULES :-

D-120 cm × 210 cm(1.20 m × 2.10 m)
W-110 cm × 150 cm(1.10 m × 1.50 m)




CROSS SECTION OF WALL THROUGH DOOR

CO1.

30. Prepare an analysis of rates for an RCC Column work excluding cost of steel including centring, shuttering, bending and binding. Use Concrete mix 1:3:6. Use any rate (CPWD/PPWD) as applicable. Calculate the rate per m3. Give the specifications.

31. Differentiate clearly between the following:

i) Piece work agreement and work order

ii) General and retailed specification

iii) Road metal account and material at site

iv) Technical sanction and administrative approval

## Subject: Survey and Geomatics

1. What are the two basic principles of surveying?
2. What are the factors on which precision of survey-depends?
3. Give the conventional signs used to represent the following surface features on a survey map
4. Canal (ii) Unmetalled road
5. What is a well-conditioned triangle?
6. What is the importance of parallax measurement?
7. What is meant by 'Tie line'?
8. Differentiate between open and closed traverse.
9. What is meant by true bearing of a line?
10. What is meant by orientation of the table in plane table surveying?
11. Define Bench mark. How is it established?
12. What do you understand by horizontal equivalent in contouring?
13. Differentiate between Claw screw and Tangent screw.
14. What is Traverse? List various types of traverse.
15. What is meant by 5° curve? What will be the corresponding radius of the curve?
16. Define the terms 'Point of curve' and 'Point of tangency'.
17. What is Tachometry? Describe its uses.
18. What is Baseline? List the methods for baseline measurements.
19. An offset is measured with an accuracy of 1 in 40. If the scale of plotting is 1 cm = 20m, find the limiting length of the offset so that the displacement of the point on the paper from both sources of error may not exceed 0.25 mm.
20. Define local attraction and how to detect it. Why is it important to 'work from the whole to part and never from part to whole' in surveying.

21. What is Bowditch rule?
22. What is the minimum number of ranging rods required for ranging?
23. What are the principles of surveying?
24. Differentiate between FB and BB.
25. What is meant by well-conditioned triangle? Why is it necessary to use it?
26. Name the various plane table accessories.
27. Distinguish between line of collimation and line of sight.
28. What are face left and face right observations?
29. Deduce the relationship between degree and radius of curve.
30. A chain line AB crosses a river, C and D being on the near and distant banks, respectively. A point O at right angle to AB from C is fixed at 50 m and at O the bearings of D and A are taken so that the included angle DOA is 90°. AC is then measured as 30 m. find the width of the river.
31. Explain the Bowditch and transit rule for adjustment of closing error in theodolite surveying.
32. From the following data calculate the height of the chhajja from the floor level: RL of the floor –100.000, staff reading on the floor - 3.125. staff reading at the bottom of the chhajja with the staff held inverted is 1.875.
33. What is tangential tachometry? Explain its general theory? What are the different methods of locating contours? Describe merits and demerits of each.
34. What are the characteristics of contours? Explain clearly with diagrams.
35. Explain the Three Point Problem giving details of different types of solutions to the problem. When does the theory to solve the problem fail?
36. How are curves classified? Explain the following terms in connection with curves
    (a) Vertex
    (b) Arc length
    (c) Long chord of the curve
    (d) Summit
37. The chainage of the intersection of two straights having the deflection angle of 50° is 1680.5 m. If the radius of the curve is 450 m, calculate the following
    a) Tangent distance. b) Length of curve. c) Length of long chord. d) Degree of curve.
38. What is Baseline? Explain the different methods of baseline measurements.
39. What are the possible sources of error while using a theodolite? How can they be eliminated?
40. Differentiate between surveyors' compass and prismatic compass. What types of adjustments are made in these compasses?
41. What do you mean by two-point problem in plane table surveying?
42. Write any two characteristics of Earth Resources Satellite.
43. Differentiate between Crab and Drift.
44. Explain the objective and the basic principle of triangulation. Also, explain the different triangulation systems.
45. Define photogrammetry.

46. What is the effect of curvature of earth on surveys? How can they be removed? Explain.
47. What is an Angle of Parallax?
48. Define radiometric resolution.
49. How is vertical angle measurement made with the help of Total Station?
50. Explain the objective and the basic principle of triangulation.
51. Explain various types of EDM instruments in detail.
52. Why atomic clocks are used in GPS survey? Name and explain **any two** segments of GPS system
53. The following bearings taken on a closed compass traverse:

| Line | F.B. | B.B. |
|---|---|---|
| AB | 80° 10' | 260°00' |
| BC | 120° 20' | 301° 50' |
| CD | 170° 50' | 350° 50' |
| DE | 230° 10' | 49° 30' |
| EA | 310° 20' | 130° 15' |

Compute the interior angles and correct them for observational errors. Assuming the

Observed bearing of the line CD to be correct adjust the bearing of the remaining sides.

54. Give the primary classification of 'Survey' and distinguish between them.
55. Explain the chaining operation. Who is the actual surveyor- leader or the follower? Why? A road 1557m long was found, when measured by a defective 30m chain, to be 1550m. How much correction does the chain need?
56. Explain atmospheric windows.
57. Draw schematic diagram of geodimeter.
58. What is WGS-84?
59. Discuss in brief salient features of Meteorological satellites.
60. Define remote sensing.
61. What is a two-point problem? Explain with a neat sketch the procedure of solving a two-point problem in plane table surveying.
62. What are the characteristics of contour lines?
63. What is a satellite station and phase of a signal?
64. Discuss crop health monitoring from remotely sensed imageries.
65. Explain applications of remote sensing in hydrological science.
66. What is Geodimeter used for?
67. Define GIS
68. Why atomic clocks are used in GPS survey? Name and explain **any two** segments of GPS system.

69. Why is balancing of back sight and foresight necessary? Explain with a neat sketch. To find the RL of station B, two observations are taken by a theodolite from station A one to a BM and the other to the station B. The record are as follows:

| Inst. St. | Staff St. | Target | Vertical angle | Staff reading | Remarks |
|---|---|---|---|---|---|
| A | BM | Lower | –10°0' | 0.655 | RL of BM = 510.500m |
| | | upper | –7°0' | 2.655 | |
| A | B | Lower | –5°0' | 1.250 | |
| | | upper | +4°0' | 3.200 | |

Find the RL of B and the distance between the BM and station

101. Find the missing figures and complete the level page book. Apply usual arithmetic checks.

| Station | BS | IS | FS | HI | RL | Remarks |
|---|---|---|---|---|---|---|
| 1 | 1.175 | | | X | 100 | BM |
| 2 | | X | | | 98.975 | |
| 3 | | 1.470 | | | X | |
| 4 | 2.00 | | X | X | 98.100 | CP |
| 5 | | 1.900 | | | X | |
| 6 | | X | | | 97.200 | |
| 7 | 3.5 | | 2.5 | 101.10 | 97.600 | CP |
| 8 | | | 2.65 | | X | |

b) What are constants of a tachometer and how they are determined?

102 The following data is available for a closed traverse ABCDEA:

| Line | Length | Bearing |
|---|---|---|
| AB | 130 | 92° |
| BC | 158 | 174° |
| CD | 145 | 220° |
| DE | 308 | 279° |
| EA | 337 | 48° |

Check for angular error and correct it, if necessary.

b) The elevations of two proposed triangulation stations A and B, are 140m and 416m above MSL, resp. The elevation of an intervening peak at C, 60km from A, which is likely to obstruct the line of sight, is 150m: Ascertain if A and B are intervisible, and if not, find the height required, for the scaffold at B so that the line of sight clears C by 3 m.

103. Write short notes on:

a) Rise and fall method

b) Temporary adjustments of theodolite

c) Elements of simple circular curve

104. Name various sensors on board of Indian Remote sensing satellites (IRS).

105. What do you understand by spatial data and attribute data? How are they integrated to make a GIS?

## Subject: Civil Engineering - Introduction, Societal & Global Impact

1) Enlist any five ancient marvels in the field of civil engineering.
2) Write down the importance of Civil Engineering in shaping the World.
3) What are the methods to control flood?
4) What is the difference between tunnel and bridge?
5) What are the effect of infrastructure development and growth of the nation on GDP?
6) Discuss in detail about the scope of work involved in various branches of civil engineering.
7) What is Global Warming? What are its causes and impact?
8) Discuss any five Engineering wonders of modern world.
9) What you meant by Environment Impact assessment?
10) What are the benefits of EIA? Explain key element of EIA?
11) What is hyper loop?
12) List out the advantages of river interlinking.
13) What is LEED rating system?

14) What are the advantages of Tidal energy?

15) What are the indicators of sustainability?

16) What are the most common air Pollutants? Explain any three.

17) How can the building be more energy efficient?

18) Differentiate between the renewable and non renewable resources.

19) What are renewable energy resources? Explain any four renewable energy resources.

20) Write a short note on

(i) Megacities

(ii) Smart city

(iii) Metros

## Subject: Environment Engineering-II

**1)** What is design period?
**2)** How do you express the strength of sewage?
**3)** Draw oxygen sag curve?
**4)** Difference between combined & separate system of sewage?
**5)** What is meant by relative stability?
**6)** Why ventilation of sewer is is important?
**7)** What is meant by water seal in sanitary fixture?
**8)** Enlist the name of joints used in pipeline.
**9)** Difference between main sewer & trunk sewer?
**10)** Derive the Stokes's equation for setting velocity.
**11)** What do you understand by self cleansing velocity in sewers?
**12)** What do mean by variations in sewage? Explain average flow, dry weather flow and maximum flow?
**13)** What is meant by ventilation of house sewer and how is it achieved? Discuss the use of anti-siphonage pipe in multi-storeyed building?
**14)** What do you understand by inverted siphon? Why do you construct it? What are the purposes served by an inverted siphon?
**15)** What are physical, chemical & biological characteristics of sewage?
**16)** What are different sewer appurtenances? Explain with diagrams.
**17)** Explain the different stages of construction of sewers? Describe the methods of testing the straightness of sewers?

**18)** Discuss the various types of manholes with neat sketches and point out their respective advantages?

**19)** Explain the different systems of plumbing with neat sketches?

**20)** Give a brief account of general composition of sewage. What is the purpose and principles involves in its treatment and disposal?

**21)** Discuss the function of grit chamber?

**22)** Discuss the function of soakage pit?

**23)** Why it is necessary to remove nitrogen from the effluents from treatment plants?

**24)** What is principle of clarification process?

**25)** List any four objectives of sludge digestion.

**26)** Give the composition of biogas fuel.

**27)** What is meant by sewage sickness?

**28)** What is meant by activated sludge process?

**29)** Explain the use of Macrophyte ponds?

**30)** What do you understand by advance wastewater treatment? How it is different from the conventional treatment?

**31)** Differentiate between septic and Imhoff tank?

**32)** What is purpose of aeration process? Discuss the various types of aerators with sketches?

**33)** What is the function of grit chamber? What are the major design criteria governing the design of grit chamber?

**34)** Explain clearly how do you determine the area of secondary settling tank in activated sludge process? How do you decide the solids loading rate for such tank?

**35)** Write short note on: *a)* Disinfection *b)* Polishing *c)* Stabilization pond *d)* Trickling filters *e)* Sludge disposal.

**36)** Explain sludge handling & sludge disposal.

**37)** Explain the working and design of sedimentation tank.

**38)** Discuss different type of methods of treatment of wastewater.

**39)** What are the common problems that occur during the designing of a wastewater treatment plant?

**40)** Discuss chlorination and its various types.

**41)** For a small town, having projected population of 30,000 residing over an area of 20 hectors, find the design discharge for the combined sewer for the following data:

1. Rate of water supply = 150litres per capital per day.
2. Runoff coefficient = 0.4
3. Time of concentration = 30 minutes

**42)** Design an unlined trapezoidal section for the outfall reach of a storm water drain collecting storm water from a catchment of 50 hectares. The following information is available:

I. Inlet time: 12 minutes
II. Time of flow in the upper reaches of drain: 18 minutes
III. Rainfall during time of concentration: 40 mm

IV. Imperviousness factor: 0.55
V. Design water surface slope: 1 in 2000
VI. Maximum permissible velocity: 0.85 m/sec.
VII. Manning's coefficient N: 0.025

**43)** Determine ultimate BOD for a sewage having 5-day BOD at 20° C as 160 ppm. Assume deoxygenating constant as 0.2 per day.

**44)** The BOD of a sewage incubated for one day at 30° C has been found to be 100 mg/l. What will be the 5-day 20° C BOD? Assume K = 0.12 (base 10) at 20° C.

**45)** Design a grit chamber having rectangular cross-section and a proportional flow weir as the velocity control device, for the following data.
Maximum flow: 20mLd
Dia. Of the smallest grit particles to be removed: 0.2 mm
Average temperature: 20° C
Specific gravity of grit particles: 2.65

**46)** Design a primary settling tank of rectangular shape for a town having a population of 50,000, with a water supply of 180 litres per capita per day.

**47)** Design a secondary settling tank of an activated sludge treatment plant for 45 mLd peak flows operating with an MLSS of 3000 mg/l.

## Subject: Environment Engineering-I

**1)** What is importance of fire fighting water demand and how is it measured.

**2)** Explain the different methods of population forecasting of a city for which a water scheme is to be planned.

**3)** Write a short note on infiltration galleries.

**4)** What do you mean by ground water potential? Explain the water potential of water resources in India.

**5)** How will you determine loss of head in a pipe?

**6)** What is an intake structure? What points should be considered while designing an intake?

**7)** What is meant by pumping? Why it is so important now days?

**8)** Write the principle& working of centrifugal pump.

**9)** What are pump operating curves?

**10)** How do you evaluate head, power and efficiency of a pump?

**11)** Define design period. How is it decided in a water supply scheme planning?

**12)** What is meant by fluctuations in demand? How is this information used for balancing tank design?

**13)** What is meant by economical diameter of a rising main?

**14)** List the different types of pumps used in water supply. Give the suitability and criteria for choosing the pumps

**15)** Distinguish clearly between water quality criteria and standards. Critically examine the use of MPN as bacteriological water quality standard.

**16)** What are the sources of water used in water supply scheme? Compare their suitability with respect to quality and quantity.
**17)** Although conductivity does not have a water quality standard, it is considered as a parameter to assess water quality. Why?
**18)** What are common impurities found in natural water and explain its effect on the quality?
**19)** Discuss in detail about population forecasting methods. What is logistic curve method?
**20)** Discuss in detail physical & chemical water quality parameters?
**21)** Give any four factors on which the coagulant dose depends
**22)** What is the biological purification mechanism involved in a slow sand filter?
**23)** What is meant by rain water harvesting?
**24)** What are the factors which induce corrosion of water supply pipes? Discuss the various corrective treatments to prevent it.
**25)** Differentiate between desalination and demineralization.
**26)** Discuss about: i) Slow & Rapid sand filtration ii) Base-ion process.
**27)** Fluoridation & de-fluoridation.
**28)** Double filtration & In-depth filtration.
**29)** Water softening & Stabilisation.
**30)** What is disinfection? What are good qualities of a good disinfectant? What are different factors affecting disinfection? Explain different methods of disinfection?
**31)** Pre-chlorination & Aeration.
**32)** What are different types of joints in pipes? Explain with neat & clean sketches.
**33)** What are different types of water distribution system?
**34)** Distinguish between continuous and intermittent water supply system.
**35)** Explain mass-curve & area-elevation method.
**36)** What are different types of Reservoirs?
**37)** Explain Hardy-cross method.
**38)** What are objectives of water supply system? Give the design criteria of a rural water supply system.
**39)** Explain briefly about pressure and gravity distribution system.
**40)** Difference between permanent & temporary hardness.

## Subject: Irrigation Engineering-II

**Two marks Questions**

Q-1) Write down the formulae used for the design of the following:

(a) Correction for Mutual interference.

(b) For creep length as stated by Bligh's & Lanes.

(c) Lacey's scour depth.

(d) Thickness of impervious floor.

Q-2) Define the following:

(e) Exit Gradient

(f) Critical exit gradient

(g) Piping

(h) Hydraulic Jump

Q-3) Write down the formulae used for the design of the following:

(i) For a standard form consisting of a floor length 'b' with a vertical cutoff of depth 'd' the Exit Gradient at downstream end is given by ……?

(j) For calculation of total creep length as stated by Bligh's & Lanes.

(k) For calculations of top width of weir wall based upon No tension Criteria.

Q-4) Write down the formulae used for the design of the following:

(l) Correction for Mutual interference.

(m) For creep length as stated by Lanes.

(n) Thickness of downstream impervious floor.

5. Define canal regulation works?
6. Differentiate between metered and Non metered fall by giving one example of each.
7. Define canal escapes
8. Give discharge formula & shape for a crest of a fall if discharge is less than 14 cumecs.
9. What do you mean by canal regulation?
10. Define canal fall?
11. Differentiate between canal head regulator & canal cross regulator.
12. Give discharge formula & shape for a crest of a fall if discharge is less than 14 cumecs.
13. Differentiate between Metered and Non Metered fall by giving one example of each.
14. Explain in brief about canal fall.
15. What do you mean by canal regulation works?
16. Differentiate between Weir & Barrage.
17. Give various functions of a cross regulator?

18. What are the different types of weir? Explain with neat sketches.
19. Define 'Super Passage' and 'Aqueduct'.
20. Define Cross drainage works.
21. Differentiate between 'Non Modular Outlets' & 'Flexible Modules'.
22. Inlets & Outlets are provided when drainage discharge is …… (more or less).
23. Define 'Level Crossing' and 'Syphon-Aqueduct'.
24. State any two essential requirements of good Modules.
25. Give the formula for calculating discharge in a submerged pipe outlet.
26. Level crossing is provided when drainage discharge is ……?

**Five mark Questions**

1. Explain in brief various functions of divide wall?
2. Differentiate between Bligh's theory and Lane Weighted creep theory?
3. Explain in brief about canal Head Regulator & also its functions?
4. Define the following Terms:

   Stream Lines (ii) Equipontential Lines
5. What are the different types of weir? Explain with neat sketches.
6. Write short notes on any two of the following:
   - Slotted Roller bucket & Solid Roller bucket
   - Stream lines & Equipotentials lines
   - Weir & Barrage
7. What are the various functions of diversion head works?
8. Give at least two points each for the various functions of under sluice & divide wall?
9. What are the various causes of failure of weirs?
10. Explain in detail with neat sketch silt excluder & silt extractor.
11. What are the different types of weir? Explain with neat sketches.
12. Explain in detail with neat sketch silt excluder & silt extractor.

13. Write short notes on any two of the following:

    Piping & Critical exit gradient.

14. Explain in detail with neat sketch Silt Ejectors.

15. List the various elements of diversion head works.

16. Explain in detail with neat sketch Silt Excluders.

17. Explain with neat sketches various types of weirs.

18. Give various functions of a cross regulator?

19. Explain the following types of fall with neat sketches:

    (a) Rapid fall (b) Well type fall

20. Explain the various alignment of the off taking channel along with neat sketches?

21. Give various functions of a head regulator?

22. Explain the following types of fall with neat sketches:

    (a) Ogee fall (b) Trapezoidal Notch fall

23. Give various functions of a cross regulator?

24. Explain the following types of fall with neat sketches:

    (a) Vertical drop fall (b) Well type fall

25. Differentiate between Slotted Roller bucket & Solid Roller bucket along with neat sketches.

26. Differentiate between Metered and Non Metered fall by giving one example of each.

27. If Froude number is between 2.5 to 4.5 than the jump is known as ……..?

28. Give discharge formula & shape for a crest of a fall if discharge is less than 14 cumecs

29. Explain in detail with neat sketches the various types of aqueducts?

30. Give basic requirements of good canal outlet?

31. Define the following terms:

    (i) Minimum Modular Head (iii) Drowning Ratio

    (ii) Efficiency of an outlet (iv) Modular Range

32. Explain in detail with neat sketches the various types of aqueducts?

33. Write a short note on the following:

(i) Non Modular , (iii) Semi Modules

(ii) Rigid Modules (iv) Submerged pipe outlet.

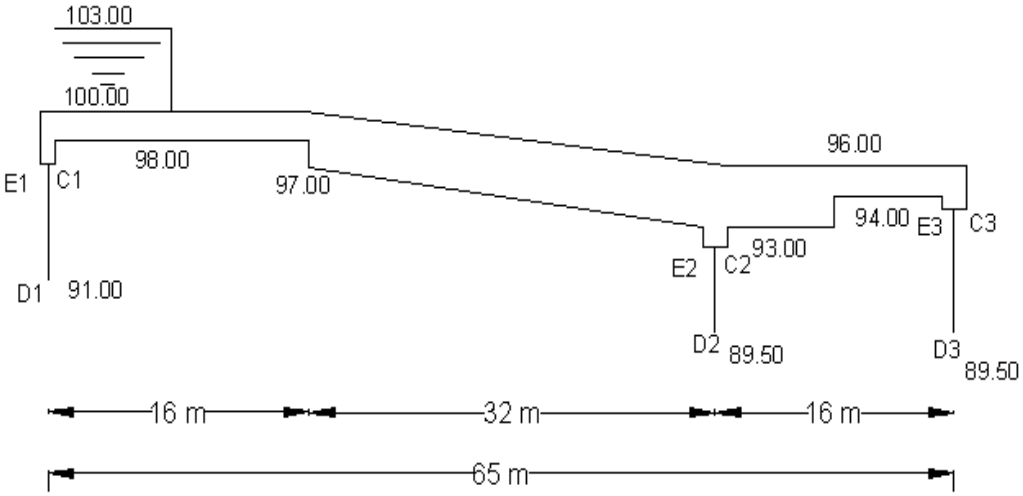
34. Define the following terms:

(i) Flexibility (iii) Proportionality

(ii) Sensitivity (iv) Setting

**Ten mark Questions**

1. The various levels shown in the figure are in meters. Determine the uplift pressures at the key points E1,C1,D1 & E2,D2,C2.




2. Explain in detail with proper diagram various component parts of a diversion head works?

3. What are the five possibilities on which location of jump depends & give energy dissipation arrangements?

4. Design a vertical drop weir on the basis of Bligh's theory (only hydraulic calculations along with top & bottom width of weir) for the following data:

Maximum flood discharge = 2585 cumec

H.F.L. before construction = 255.0 m

Minimum water level = 248.0 m

F.S.L. of canal = 254.0 m

Allowable afflux = 1 m

Coefficient of creep 'C' = 12

Silt factor = 1

Head loss through regulator = 0.5 m

5. What are the five possibilities on which location of jump depends & give energy dissipation arrangements for all five possibilities.

6. Design a cross regulator for a channel which takes off from the parent channel with the following data:

Discharge of parent channel = 140 cumecs ; Discharge of distributary = 140 cumecs ; F.S.L of parent channel, u/s = 210 m ; F.S.L of parent channel, d/s = 210 m ; Bed width of parent channel, u/s = 52 m ; Bed width of parent channel, d/s = 46 m ; Depth of water in the parent channel u/s & d/s =2.5 m ; F.S.L of distributary = 209.10 m ; Silt factor = 0.8 ; Assume safe exit gradient = 1/5 ; Assume Y1 & Y2 = 0.8 & 1.8m.

7. Design a 1.5 metres sarda type fall for a canal having a discharge of 40 cumecs with the following data:

Bed level u/s = 105 m ; Side slope of channel = 1:1 ; Bed level d/s = 103.5 m ; F.S.L u/s = 106.8 m; F.S.L d/s = 105.3 m ; Berm level u/s = 107.4 m ; Bed width u/s & d/s = 30 m ; Safe exit gradient for Khosla's Theory = 1/5.

8. Design an unflumed non meter baffle fall for the canal having the following data:

Full supply discharge = 30 cumecs ; Bed level u/s = 203 m ; Bed level d/s = 201.2 m

FSL u/s = 204.3 m ; FSL d/s = 202.5 m ; Bed width =28 m ; Drop (HL) = 1.8 m ; Side slopes of channel = 1:1

9. Design a cross regulator for a channel which takes off from the parent channel with the following data:

Discharge of parent channel = 140 cumecs ; Discharge of distributary = 140 cumecs ; F.S.L of parent channel, u/s = 210 m ; F.S.L of parent channel, d/s = 210 m ; Bed width of parent channel, u/s = 52 m ; Bed width of parent channel, d/s = 46 m ; Depth of water in the parent channel u/s & d/s =2.5 m ; F.S.L of distributary = 209.10 m ; Silt factor = 0.8 ; Assume safe exit gradient = 1/5 ; Assume Y1 & Y2 = 0.8 & 1.8m.

10. Design a suitable cross drainage work at the crossing of a canal & a drainage for the following data:

    CANAL

    Full Supply Discharge = 32 Cumecs

Full Supply Level = 213.5 m

Canal Bed Level = 212 m

Canal water depth = 1.5 m

Bed width = 20 m

Trapezodial canal section with 1.5H : 1V Slopes

DRAINAGE

High Flood Discharge = 300 Cumecs

High Flood Level = 210 m

High Flood Depth = 2.5 m

General Ground level = 212.5 m

11. Explain in detail the various types of canals outlets?
12. Design a pipe outlet for the following data:

Full Supply discharge at the head of water course= 90 lit/sec

Full Supply level in distributaries= 205 m

Full Supply level in canal= 204 m

13. Explain in detail with neat sketches various types of cross drainage works?
14. Explain in detail with neat sketches various types of cross drainage works?

**Subject: STRUCTURAL ANALYSIS – II**

**Two marks Questions**

1. Define Lack of fit.
2. What are statically indeterminate structures.
3. Differentiate between Pin-jointed & Rigid-jointed structures?
4. Briefly explain degree of freedom of a structure.
5. Differentiate between statically determinate structures & statically indeterminate structures.

6. Briefly explain degree of freedom of a structure.
7. What do you mean by Pure Sway & General Sway?
8. Give the slope deflection equations to calculate final end moments for both the ends, If both the ends of the beam are fixed.
9. Give the formula to calculate fixed end moments, if a fixed beam is applied by a moment at the centre.
10. If one end of a member is hinged or pinned and other end is fixed, than relative stiffness is taken as……..?
11. Give the slope deflection equations to calculate final end moments for both the ends, If both the ends of the beam are fixed.
12. Give the formula to calculate fixed end moments, if a fixed beam is applied by a moment at the centre.
13. Give the formula to calculate Rotation factor & Distribution factor.
14. Define

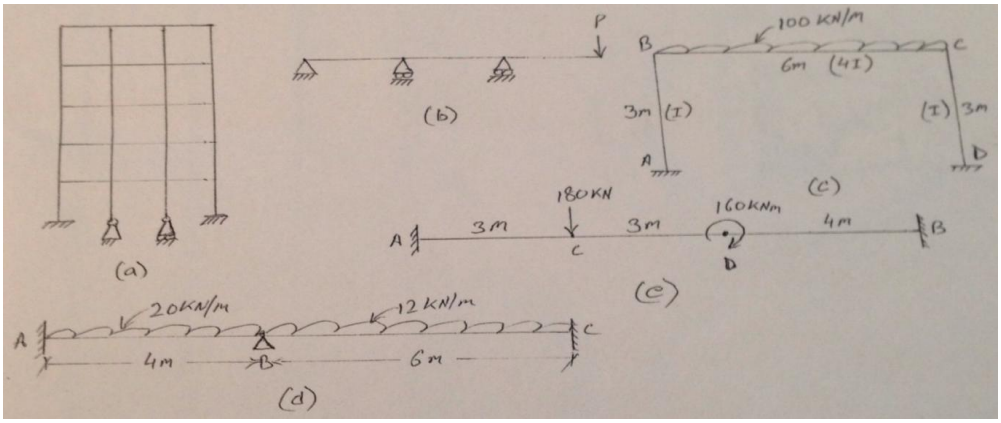
    (i) Distribution Theorem (ii) Carry over Theorem.
15. Name the approximate methods used in practice for the analysis of frames?
16. State the various assumptions of Cantilever method.
17. If an end of a member is hinged or pinned, relative stiffness is taken as……..?
18. Define Influence Line Diagram. Give any two uses of Influence Line Diagram?
19. Write clapeyron's theorem of three moments for point load & for uniformly distributed load.
20. Give the formula to calculate fixed end moments, if a fixed beam is applied by a moment at the centre.
21. The Relative stiffness of a member at a joint, whose farther end is hinged or simply supported is ……?
22. The Slope defection method is used to determine …… (Statically Determinate structures / Statically Indeterminate structures).
23. Consider a simply supported beam of span 10 m carrying a point load of 5 KN at the center. Calculate reactions at supports and bending moment at centre.
24. Differentiate between static indeterminacy and kinematic indeterminacy .Explain in detail.
25. Draw Stress –Strain curve for Ductile, Brittle, Rigid material.

26. Explain in details with proper diagrams sway and non-sway types of frames.

27. Define Lack of Fit

**Three marks Questions**

1. Determine the degree of static indeterminacy of the rigid jointed plane fame as shown in fig (a).
2. Determine the degree of freedom of the continuous beam as shown in figure (b).
3. State the following:
   (a) Carry over Theorem
   (b) Distribution Theorem
   (c) Distribution Factor
   (d) Relative Stiffness.
4. For the given beam find the moments and the reactions at the supports. Also draw bending moment & shear force diagrams for the beam using Moment Distribution method refer figure (c).
5. Using Moment Distribution method determine the support Moments at A,B,C & D for the continuous girder shown in figure (d).




6. Find the support moments at A,B,C,D for the continuous beam as shown in figure using rotation contribution method. Fig. (a)

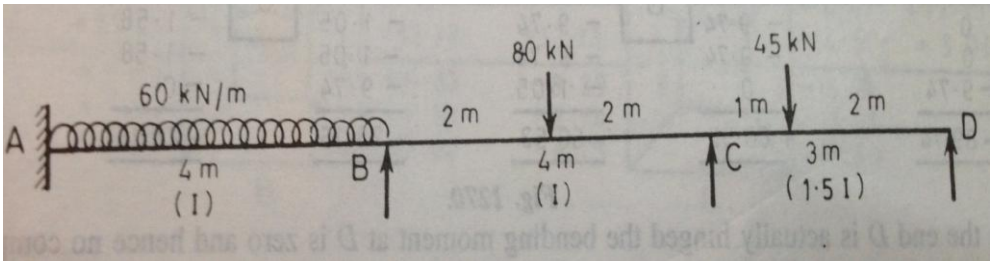
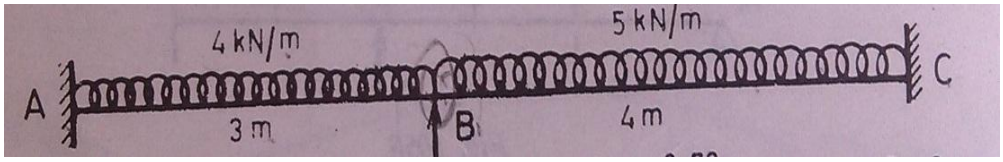



Fig. (a)

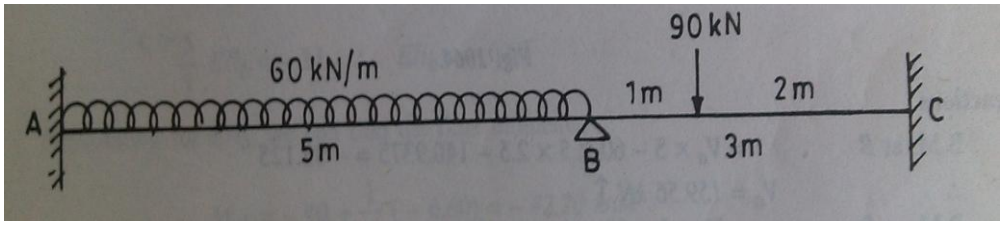
7. A live load of 80 KN per metre moves on a simply Supported girder of span 12 metres. Find the maximum bending moment which can occur at a section 4 metres from the left end. Using Influence line diagram.

8. A continuous beam ABC covers two consecutive spans AB and BC of lengths 4 m and 6 m carrying uniformly distributed loads of 60 KN/m and 100 KN/m respectively. If the ends A and C are Simply Supported find the support moments at A, B and C. Draw also B.M. and S.F. diagrams. Using method of three moments.

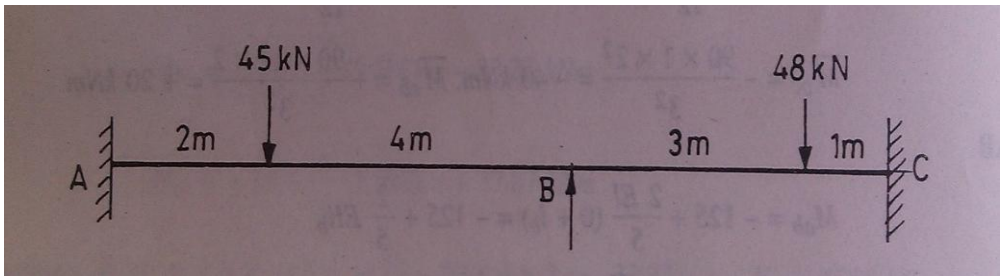
9. A continuous beam ABC consists of span AB=3m and BC = 4m , the ends A and C being fixed . AB and BC carry uniformly distributed loads of intensity 4kN/m and 5kN/m respectively. Find the support moments and draw the bending moment diagram for beam. The beam is of uniform section throughout.



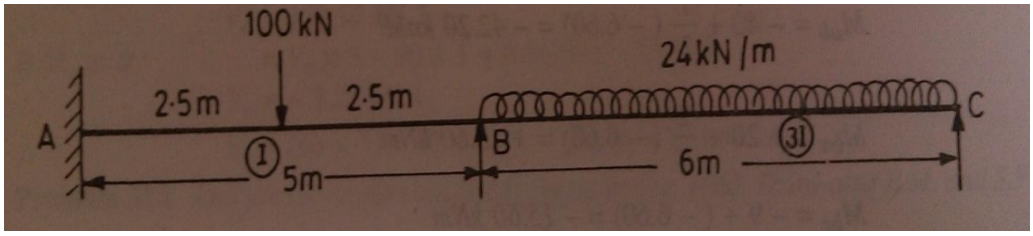

10. Determine the support moments and reactions for the continuous beam as shown in fig. Draw also B.M.diagram.



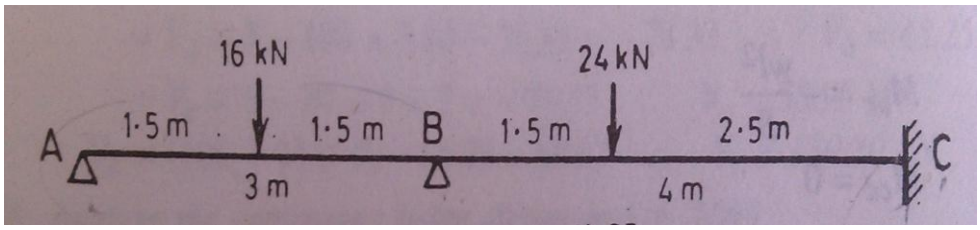

11. Analyse the continuous beam as shown in fig. Draw also B.M. & S.F diagram.



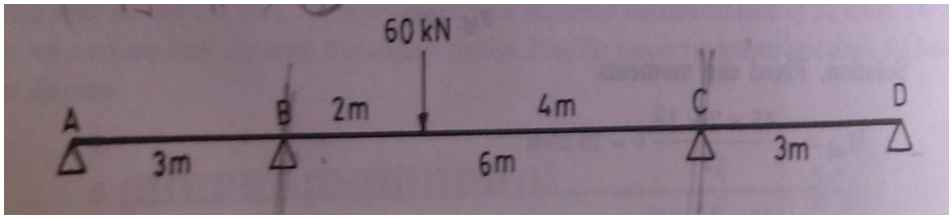

12. Analyse the continuous beam as shown in fig.



13. A continuous beam ABC consists of spans AB= 3m and BC= 4m.The end A is simply supported, while end C is fixed. The span AB carries a concentrated of 16 kN at the centre of span and the span BC carries a concentrated load of 24 kN at the distance of 1.5m from B. Find the support moments and draw the bending moment diagram for the beam.




14. Find the support moments and draw B.M. diagram for the continuous beam as shown in fig.




15. A beam AB of uniform section of span 9m and flexural rigidity EI= 36 kNm² is partially fixed at the ends. When the beam carries a point of 90kN at a distance of 3m from the left end A., the following displacements were observed:-

Rotation at A = 0.01 radians (clockwise)

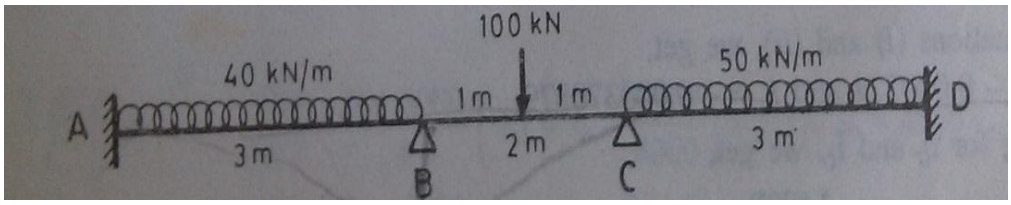
Settlement at A = 20mm

Rotation at B = 0.0075 radians (anticlockwise)

Settlement at B = 15mm

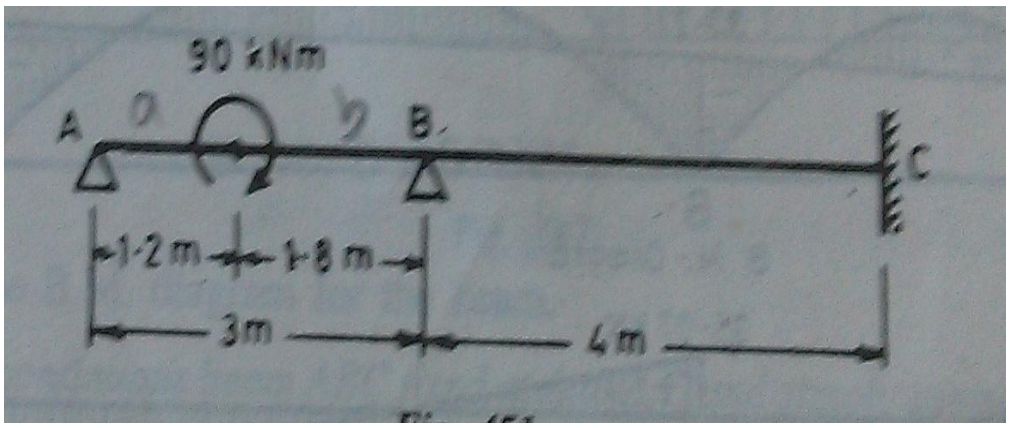
Find the support moments and the reactions at the supports and draw B.M. diagram.

16. Determine the support moments for the continuous girder shown in fig. if the support B sinks by 2.50mm. For all members, I = $3.50 \times 10^7 mm^4$; E=200kN/$mm^2$

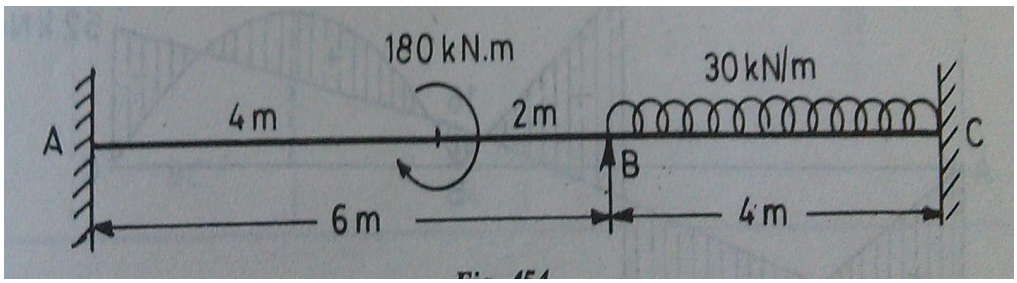



**Solve the following questions by MOMENT DISTRIBUTION METHOD.**

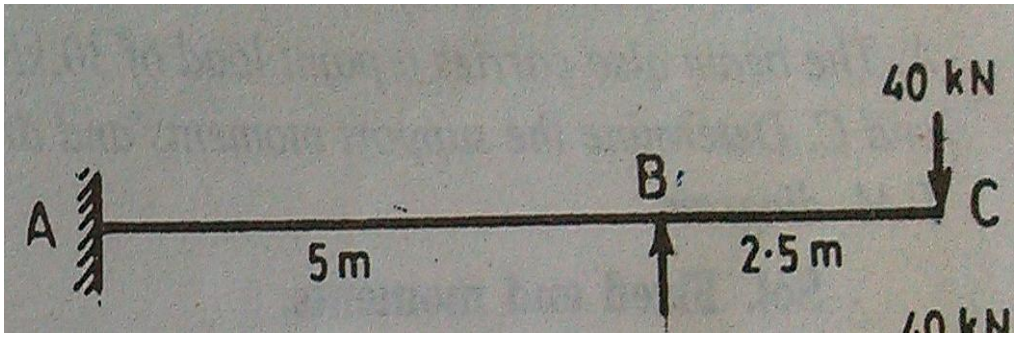
17. Find the support moments and draw the B.M. diagram for the beam shown in fig. Assume the section to be uniform.



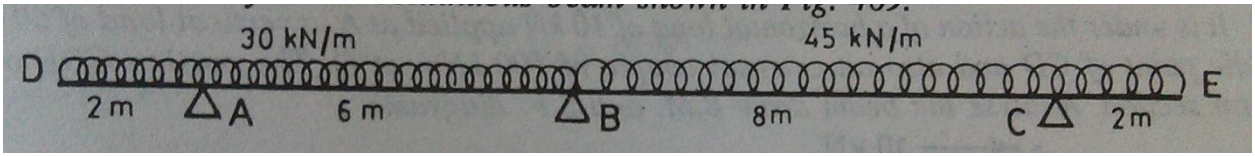

18. A continuous beam ABC is loaded as shown in fig. Find the support reactions and moments. Also draw the S.F. and B.M. diagrams.



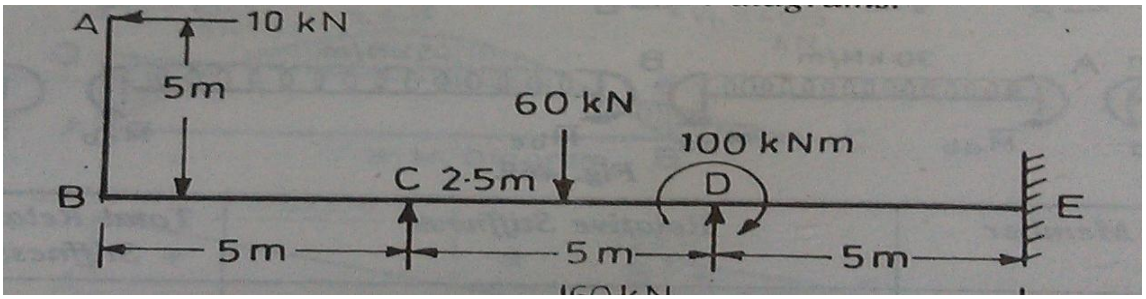
19. Draw the B.M. diagram for the beam shown in fig.



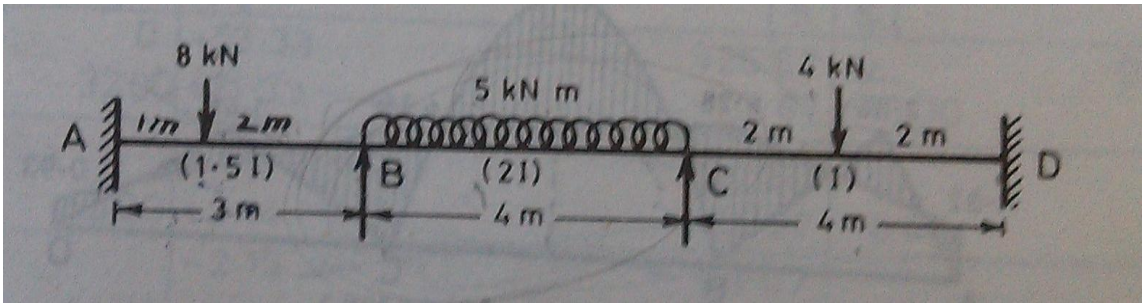

20. Analyse the continuous beam shown in fig.



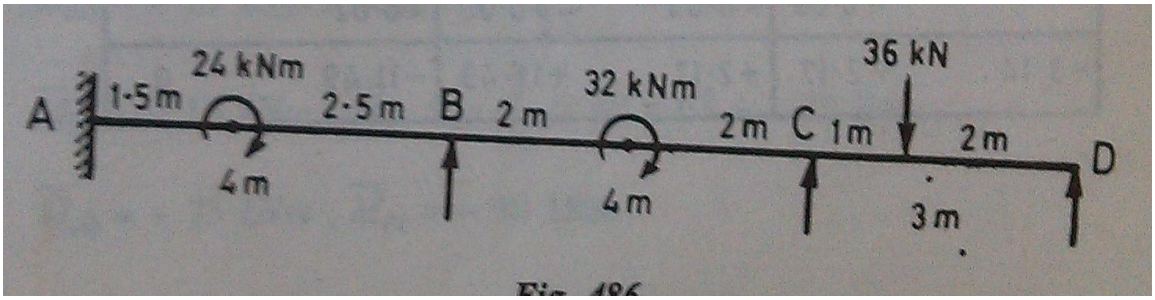

21. A continuous beam ABCDE is encastred at E and freely supported at C and D as shown in fig. It is under the action of horizontal load 10kN at A , a vertical load of 60kN at the mid point of CD and also an external couple of 100kNm at D. The portion CDE is of uniform section. Analyse the beam and draw S.F. and B.M. diagram.



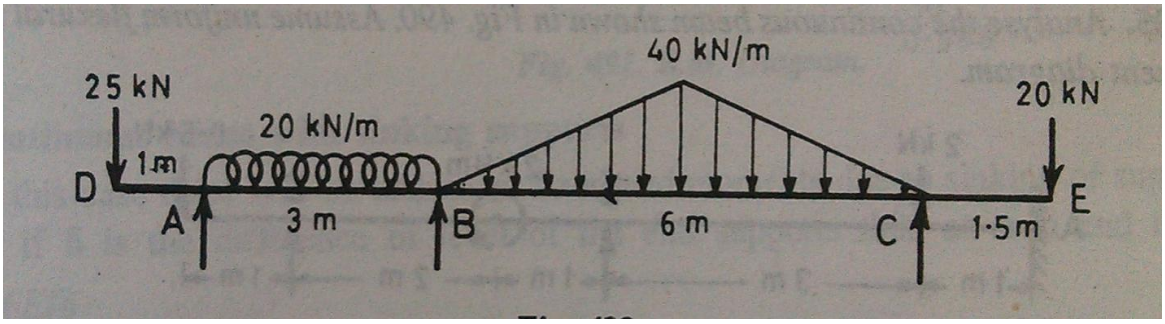

22. Determine the support moments A, B,C and D for the continuous beam shown in fig.



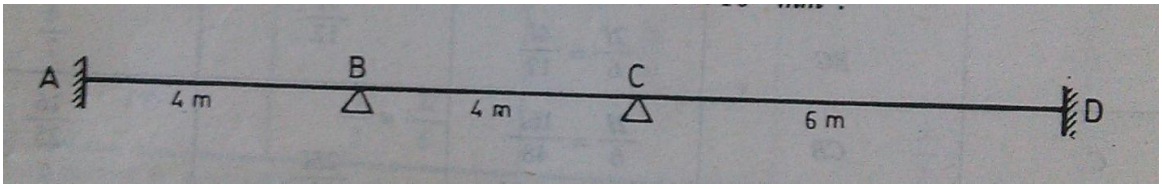

23. Determine the support moments for the beam shown in fig.



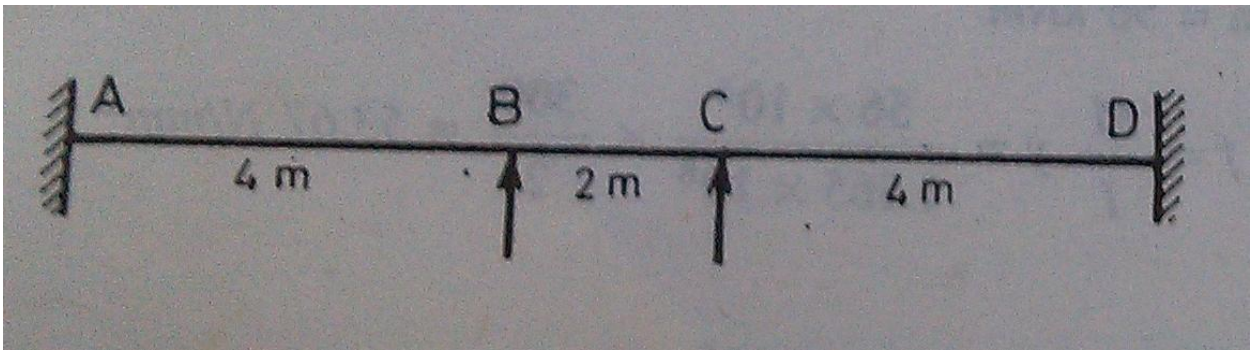
24. Analyse the continuous beam shown in fig.




25. Analyse the continuous beam shown in fig. Take I= $4x10^7$ $mm^4$ ; E = 200 $kN/mm^2$

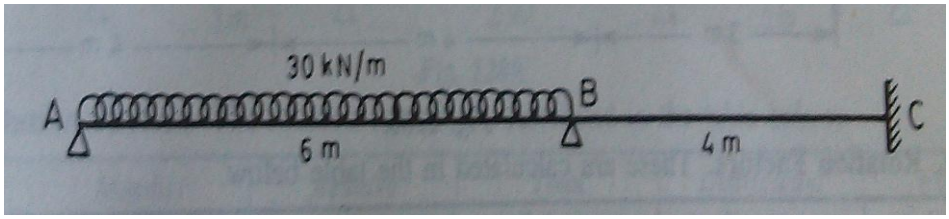



26. The following continuous beam has flexural rigidity EI = $2000x10^7$ $kNmm^2$ . If end A rotates by 0.001 radians in the anticlockwise order, calculate the moments at A, B, C , D.

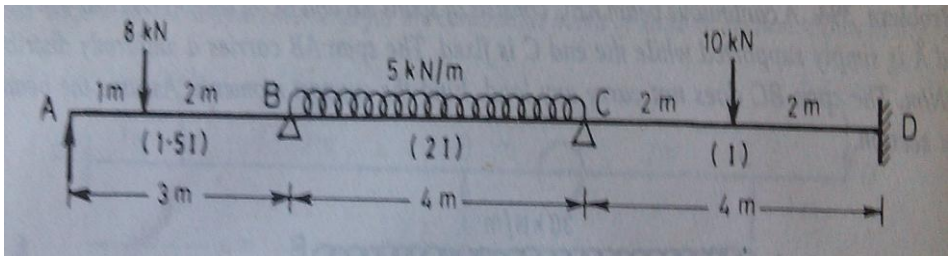



27 A continuous beam ABC consists of span AB and BC of lengths 3m and 4m, resp. End A is simply supported and C is fixed. The beam carries a point load of 16kN at the centre of span AB and a point load of 24 kN on span BC at a distance of 2.5m from end C. find the support moments. Assume uniform section of the beam.

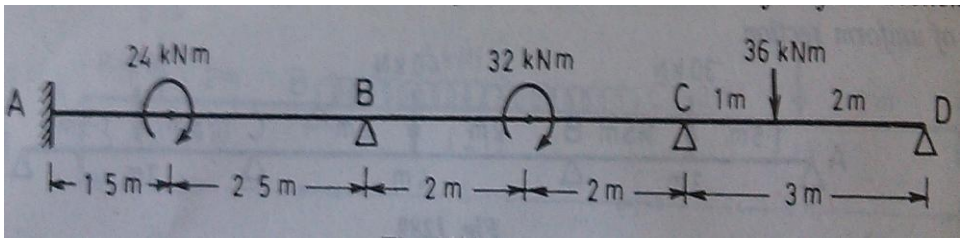
28. Find the support moments assuming the section to be uniform.



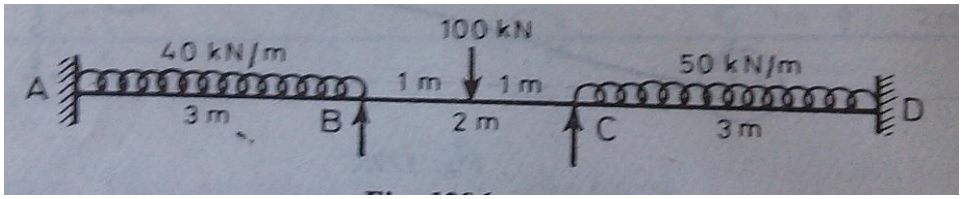

29. Find the moments at A, B, C and D in following fig.




30. Find the support moments in the following continuous beam.




31. Determine the support moment for the continuous girder as shown in fig. ; if the support B sinks by 2.5mm. Given I = 3.5x10 $mm^4$ ; E = 200 $kN/mm^2$ .

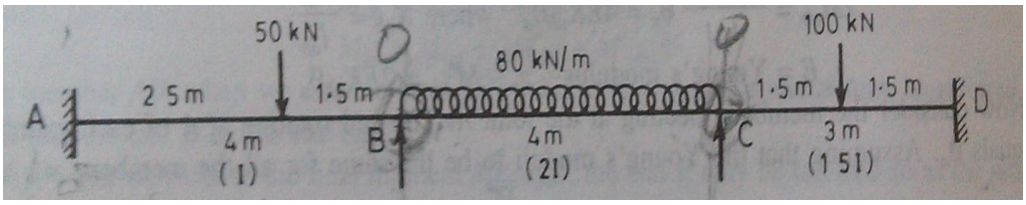



**Ten marks Questions**

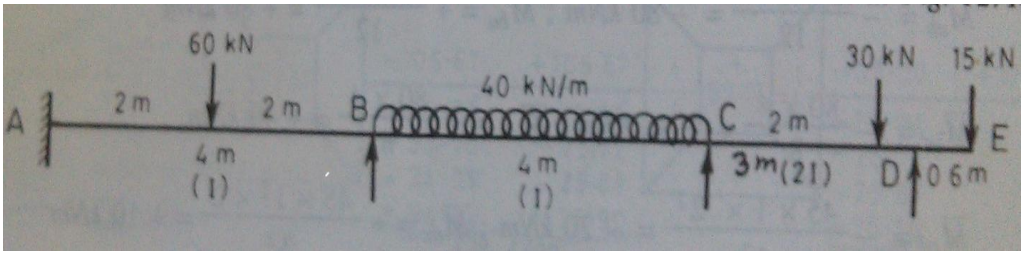
15. A continuous beam ABCD 16 m long is simply supported at A,B,C,D. the beam consists of spans AB,BC, & CD of lengths 4 m, 6m, & 6m respectively. It carries a point load of 64 KN on the span "AB" at a distance of 1m from "A", a load of 45 KN on the span "BC" at a distance of 2 m from "B" and a UDL of 12 KN/m on the span "CD". Find the support moments & reactions. Also draw "BMD" & "SFD". Use theorem of three moments. s

**Solve the following questions by ROTATION CONTRIBUTION METHOD.**

16. Determine the support moments at A, B, C D for the continuous beam shown in fig




17. Find the support moments of continuous beam shown in fig.




18.

19. Explain in detail with proper diagram various component parts of a diversion head works?

20. What are the five possibilities on which location of jump depends & give energy dissipation arrangements?

21. Design a vertical drop weir on the basis of Bligh's theory (only hydraulic calculations along with top & bottom width of weir) for the following data:

## Subject: Geomatics engineering

1) **2 marks**

a) Define photogrammetry.
b) What is the importance of parallax measurement?
c) What is Geodimeter used for?
d) Define GIS.
e) Define crab and drift.
f) How does mosaic differs from a map?
g) How is vertical angle measurement made with the help of Total Station?
h) Draw schematic diagram of geodimeter.
i) Name various sensors on board of Indian Remote sensing satellites (IRS)
.j) Draw a schematic diagram of Generic GPS receiver
a) what is an Angle of Parallax?
b) Differentiate between Crab and Drift.

c) What do you mean by Amplitude Modulation?
d) What is the guiding principle behind Infrared Instruments?
e) How do you INPUT data in GIS?
f) What is Hierarchical Database structure?
g) What are Geostationary Satellites?
h) Why do you see sky orange or red at the time of sunrise and sunset?
i) What is DGPS?
j) For accurate position on the earth surface how many satellite should be in line?
Discuss various components of GIS.
b) Enlist any two applications of Geodimeter.
c) Write any two characteristics of Earth Resources Satellite
d) Explain atmospheric windows.
e) Differentiate between a CAD Engine (Auto CAD etc.) and a GIS Software
f) Discuss importance of projections in GIS.
g) List kind of errors can occur in GIS.
h) What is WGS-84?
i) What is Ideal Remote Sensing?
j) Write full form o/DGPS and TIFF
a) If the distance between two identifiable points on the photo graph is 16 cm and on the map is 4 cm, calculate the photo scale if the map scale is 1:40,000.
b) What are the factors that can affect the velocity of light through the atmosphere?
c) Define remote sensing.
d) Write the name of four different types of sensors for remote sensing.
e) Write the purpose of using a prism in EDM.
f) Compare between true colour and false colour composition in a satellite image.
g) Define spectral resolution.
h) Define radiometric resolution.
i) Classify GPS receivers.
j) Define crab in photogrammetry

**5 Marks**

1) Derive an expression to determine the elevation of a point by photographic measurement.
2) What are the various types of EDM instruments? Explain.
3) Write a note on remote sensing observation platforms.
4) How is Raster and Vector data represented?
5) Why is the GPS signal so complicated?
6) A vertical photograph is taken with a camera of focal length 350 mm from an elevation of 2500m above the ground. The terrain is nearly flat. What is the photo scale?
7) Explain various parts and applications of the Total Station.
8) What do you understand by across track scanning? Explain with neat diagram.
9) How GIS and RS can be useful in disaster mitigation and relief measures
10) Discuss any two segments of GPS.
11) Write a short note on Aerial Camera with diagram.
12) Label various parts of a Electromagnetic Spectrum with neat diagram.
13) Write a short note on Indian Remote Sensing Satellite (IRS).
14) Discuss different components of GIS.
15) Write a short note on common ERRORS encounter during use of GPS.

16) Derive an expression to determine the elevation of a point by photographic measurement.
17) What are the various types of EDM instruments? Explain.
18) Write a note on remote sensing observation platforms.
19) How is Raster and Vector data represented?
20) Why is the GPS signal so complicated?
21) Describe the main components and the use of a photo-theodolite.
22) A photographic survey was carried out at a flying height of 4500 m. Focal length of the lens was 15 cm. The photographic plate size was 23 cm × 23 cm. The overlap along the direction of flight was 61%. Calculate the error in height measurement for an error of 0.1 mm in the parallax measurement.
23) Discuss in detail about Tellurimeter.
24) What is the physical basis of signature in the remote sensing? Discuss with the example of 4 different earth's features.
25) Write notes on the followings:
Digital elevation model; attribute information.

**8 Marks**

1.Name and explain various parts of aerial camera. Also draw the schematic diagram of aerial camera.

2. Explain various types of Raster GIS Models.

3. Explain various segments of GPS System along with neat sketches.

4. The difference in parallax between a point living at sea level and another point on a higher ground is measured and found to be 4.20mm. The flying height is 2530m above sea level, the air base is 950m and the focal length of the camera is 210 mm. Determine the elevation of the point on the higher ground.

5. Explain National Reference Systems and Worldwide Reference ellipsoid.

6. Why atomic clocks are used in GPS surveys? Name and explain any two segments a GPS what is Stereoscopic Fusion? Discuss various CLUES to Depth Perception.

7. Discuss in brief salient features of Meteorological satellites.

8. Describe in detail OVERLAY analysis of Raster data.

Name and explain various parts of aerial camera. Also draw the schematic diagram of aerial camera.

9. Explain various types of Raster GIS Models.

10. Explain various segments of GPS System along with neat sketches

# Subject: Design of concrete structures-II

1. List the different type of stairs.

2. What are functions of foundation in buildings?

3. What is difference between column and strut?

4. What do you mean by uniaxial and biaxial bending?

5. What is the reason of torsion in beam?

6. Explain about intermediate and end moments in continuous beam.

7. What do you mean by equivalent shear?

8. The maximum compressive strain in concrete in axial compressive is taken as……

9. Partial safety factor of concrete is 1.5 but why concrete stress is divided by two time of partial safety factor?

10. What do you mean by one way and two way shear?

11. What are assumptions in design of strap footing?

12. Define tread and riser.

13. Draw neat sketch of dog legged stairs.

14. List the loads acted on domes.

15. Describe functions of shear key.

16. What are Hoop Stresses and Meridional Stresses?

17.How can you reduce crack width in R.C. members subjected to tension?

18. What are compression members?

19. What is modular ratio?

20. List types and pressure acted on retaining wall.

21. Name various types of staircase according to their geometrical classification.

22. What do you mean by biaxial bending?

23. In a circular beam center of gravity does not coincide with longitudinal axis of beam.

State true or false. Also support your answer.

24. Under what circumstances combined footing is preferred?

25. What is significance of overturning moment in retaining wall?

26. What are methods of design of water tank?

27. Which type of reinforcement of provided to counter the hoop stresses in domes?

28. For what purpose a temporary open joint is provided in water tank?

29. How does slenderness ratio effects the design of column?

30. Why does the counter forts are provided in retaining wall?

31. What are various cases of failure of combined footing?

32. What is factor of safety due to sliding of retaining wall?

33. In which case 8-legged stirrups are provided in a combined footing?

34. What is shape of pressure distribution diagram beneath the footing when the footing is symmetrically loaded?

35. In which conditions strap footing is provided?

36. What is minimum cover provided in trapezoidal footing?

37. What is shape of shear stress diagram in a reinforced concrete beam?

38. What is maximum spacing of vertical stirrups in a rectangular beam?

39. When a shear key is provided in reinforced concrete retaining wall?

40. What are various forces which are considered for designing domes?

41. What is pitch of lateral ties in an axially loaded column.?

42.List different types of stairs.

43.What are functions of footings in a building?

44.What are various causes of failure of footings?

45.Under what conditions strap footing is provided?

46.What is slope of pressure distribution diagram beneath footing?

47.What is minimum cover provided in trapezoidal footing?

48.Under what circumstances combined footing is provided?

49.In which case 8-legged stirrups are provided in combined footing?

50.Design a flight of stairs supported from both sides by beams. Effective span of stairs is to be taken 1.5m. Live load to be considered is 3KN/$m^2$. Use M20 and HYSD bars.

51.Design a stair for public building being supported by wall from one side and stranger beam from another side. Width of staircase is 1.3. Assume necessary data.

**Note: Long questions**

1.Explain method of designing a shear key for a retaining wall.

2.What are various structural elements of Intz type tank and what are their design principles?

3.Explain method of designing vertical stem, toe slab and heel slab of a T-shaped cantilever retaining wall. What will be the changes in the design if counterforts are provided at regular intervals towards the side of backfill?

4.What are various thumb rules for proportioning of a staircase?

5.Differentiate between isolated footing and combined footing?

6.Derive expression for meridional thrust in circular domes.

7.Explain design principles of cantilever retaining wall.

8. A rectangular column 30cm×40cm carries an axial load of 1500KN. Design a footing for the column. Bearing capacity of soil is 15ton/$m^2$. Use M30 grade and Fe415 steel.

9. Design a footing for a rectangular column having size 30cm×45cm carrying an axial load of 1000KN. Bearing capacity of soil is 18KN/$m^2$. Use M20 grade of concrete and Fe415 of steel.

10.Design a circular water tank with flexible base resting on the ground to store 50000 liters of water. Depth of tank may be taken as 5m.Use M25 grade of concrete and Fe415 of steel.

11.Design a cantilever retaining wall to retain an earth embankment with a horizontal top 3m above ground surface. Density of earth is 18KN/$m^3$. Angle of internal friction is 30°. S.B.C. of soil is 200KN/$m^2$. Take coefficient of friction between soil and concrete is 0.7 . Use M20 grade and Fe415 steel.

**Subject: Geotechnical Engineering**

Q1) Differentiate between residual and transported soil?

Q2) Give the relationship between S,G,W,e?

Q3) A compacted sample of soil with the bulk unit wt of 19.62kn/$m^3$ as a water content of 15%. What are it's dry density , degree of saturation and air content. Assume G=2.65?

Q4) what are all the atterberg limit for soil and why it's necessary?

Q5) Define sieve analysis and sedimentation analysis end. what is the necessary of those two analysis?

Q6) what is zero air void line and draw the compaction curve and draw the zero air void line?

Q7) what is porosity of given soil sample?

Q8) Define effective size of particle in sieve analysis?

Q9) List any one expression for finding dry density of soil?

Q10) what are laboratory method for determination of water content?

Q11) Differentiate standard Procter from modified Procter test?

Q12) what is the function of a line chart in soil classification?

Q13) Define plasticity index, flow index, liquidity index , toughness index?

Q14) what is seepage velocity?

Q15) what is mix sand condition?

Q16) what is surface tension?

Q17) State and explain the Darcy law?

Q18) what is the Stokes law?

Q19) what are the factors affecting permeability?

Q20) What are the application of flow net ?

Q21) what are isobars?

Q22) Differentiate between consolidation and compaction?

Q23) Explain detailed procedure for drawing phreatic line for earthen dam?

Q24) What is pressure bulk and new mark`s chart?

Q25) what is the use of influence chart in soil mechanics?

Q26) Define critical hydraulic gradient?

Q27) what are the factors affecting consolidation?

Q28) If at e=.4, k=.001cm/s. Then at e=.6 find the value of k?

Q29) If G=2.68,w=17% calculate theoretical maximum dry density ?

Q30) A soil sample consist gravel=30%,sand=40%,silt and clay=30%,pi=12%

Q31) Write down soil classifications?

Q32) Define density index?

Q33) what are the different soil classification method?

Q34) what is pore water pressure also write the factors affecting on it?

Q35) Explain the assumption of Rankine's theory?

Q36) what are the factors affecting permeability of soil?

Q37) Explain the concept of diffused double layer?

Q38) what is optimum moisture condition and it's importance?

Q39) why modified Procter test done in Geotechnical?

Q40) Define the significance of effective stress in soil engineering?

Q41) List the various clay minerals?

Q 42) Result of a laboratory proctor test are shown below.

| No. of test | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Wt. of soil and mould kg | 3.526 | 3.711 | 3.797 | 3.906 | 3.924 | 3.882 |
| Water content % | 8.33 | 10.40 | 12.23 | 16.20 | 17.92 | 20.39 |

Weight of empty mould is 1.89kg. The mould is 12.7cm high and has internal dia 10cm. For a given G = 2.68

a) Draw a curve between moisture content and dry density.

b) Draw a curve between optimum moisture content and max dry density.

c) Plot the zero air void curve.

Q 43) Laboratory sieve analysis was carried out on a soil sample using complete set of IS sieves. Out of 500gm of soil used in test, 200gm was retained on 600 micron sieve and 250gm was retained on 500 micron sieves. Calculate Cu (uniformity coefficient) and classify the soil.

1. The following test results at failure conditions are obtained from consolidated untrained triaxial test on sample from a saturated clay stratum. Obtain effective shear strength parameters.

| Specimen no. | Confining shear pressure ($KN/m^2$) | Deviator stress ($KN/m^2$) | Pore pressure ($KN/m^2$) |
|---|---|---|---|
| 1 | 275 | 150 | -150 |
| 2 | 425 | 220 | +70 |

2. **The** subsoil consist of fine sand layer lying in between a clay layer at top and silt layer at bottom. The coefficient of permeability of sand is 200times that of clay and 20times that of silt. While the thickness of sand layer is 1/10 of clay and 1/3 of silt. Find equation of permeability of the deposit. In direction parallel and perpendicular to bedding plane in terms of coefficient of permeability of clay layer. Prove that equivalent coefficient of permeability greater in horizontal than in vertical.

Q44) List the components of settlement of soil.

Q45) Define coefficient of compressibility and compressive index.

Q46) Define over consolidation ratio.

Q47) what are methods to determine coefficient of consolidation.

Q48) Explain with neat sketch Terzagi's one dimensional consolidation theory.

Q49) what are various components of settlement. How are they estimated?

Q50) how will you determine pre consolidation pressure?

Q51) Explain in detail the laboratory determination of coefficient of consolidation?

Q52) why triaxial shear test is considered better than direct shear test?

Q53) what is angle of internal friction?

Q54 Write the expression for coulomb's law?

Q55) Define shear strength and failure envelope?

Q 56) what are types of triaxial test based on drainage conditions?

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Q60) Explain triaxial compression test to determine shear strength of soil?

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## Subject- Transportation Engineering-II

1. Giving a typical cross section of a permanent way, indicate various components/ What is permanent way? Explain functions of various components briefly?
2. List out the various gauges prevailing in India with their gauge widths.
3. What are the factors governing the selection of suitable gauge?
4. Draw neat labelled cross section of a single line and double line broad gauge track in embankment on straight path.
5. What are the different types of rails? What are the advantages of using F.F. rails?
6. Name at least five causes of Rail failures?
7. What is meant by wear of Rails? Enumerate the various types of Rail wear and enlist the methods by which it can be measured.
8. What are Sleepers? What are the advantages and disadvantages of Concrete sleepers?

9. What is the minimum number of sleepers required for a 2km length of rail for a broad gauge?
10. Write about Adzing of sleepers and sleeper density.
11. Determine the number of sleepers required for the construction of 2000 m of BG track, with a sleeper density of N + 7.
12. Determine the number of sleepers required for the construction of 1800 m of BG track, with a sleeper density of N + 5.
13. Find the number of sleepers required for constructing a B.G. railway track 640m long, using a sleeper density of M+5, where M is the length of the rail in metres.
14. A Broad gauge track has a sleeper density of (n + 6). If the track is laid with welded rails of 26 meter length, find out the number of sleepers on rail length?
15. Explain adzing of sleepers Why it is needed?
16. What is the role of ballast in railway track? What are the requirements of ballast?
17. What is Creep? What are its causes?
18. What is conning of wheel and tilting of rails. Explain the behaviour of a conned wheel on curved track.
19. Explain various types of chairs and their uses?
20. Explain the following terms (i) Track modulus, (ii) Coning of Wheels. Draw neat sketches,
    wherever necessary.
21. List the types of rail joints.
22. What is cant deficiency? Draw a neat sketch of the same.
23. What do you understand negative super elevation?
24. What are the limitations of cant deficiency?
25. Derive an expression for cant in rail curves.
26. What is degree of curve?
27. Differentiate between-Stud switch and Split switch.
28. What is the difference between T.N.C and A.N.C?
29. What are the different gradients used in Railways? Briefly describe.
30. What are objects of signaling?
31. What is the' necessity of points and crossings on Railways?
32. What are the functions of a Railway station?
33. Gradients in station yards.
34. What is meant by a crossing? What are the essential requirements of a good crossing? Discuss various types of crossings in use on Indian Railways?
35. Draw a neat diagram of simple right-hand turnout and show its various component parts. Explain the working principle of the turnout.
36. Describe the working of" Absolute Block" system of signaling. How signals are classified? Explain with neat sketches the working of semaphore signals.
37. Draw a neat sketch of Right hand turn out, clearly showing the various elements.

**2marks**

1. What do you understand by zoning laws, approach zone, clear zone and turning zone?
2. What do you understand by airport capacity? What are factors which affect the airport capacity?
3. What do you understand by runway capacity? What are factors which affect the runway capacity?
4. List the items to be considered in the geometric design of a runway.
5. Draw sketches of runway and taxiway fillets for small airports.

6. List various factors controlling taxiway layout. / List various factors on which the location of exit taxiway depends upon.
7. What do you understand by the term basic runway length?
8. What do you understand by the term visual aid in connection with airports?
9. Draw a neat sketch of Wind direction indicator.

**5marks**

10. Name the different characteristics of aircrafts.
11. Draw a neat sketch of an aeroplane and explain its various components parts?
12. Explain how the basic runway length is determined on the basis of the performance characteristics of jet and conventional engine aircrafts.
13. What is a wind rose diagram? What is its utility? What are its types?
14. What are the design considerations for a taxiway lightning? Explain with neat sketches.
15. Design an exit taxiway joining a runway and a parallel main taxiway. The total angle of turn is 30° and the turn off speed is 80 kmph.

**10marks**

16. Enumerate the various factors which would keep in view while selecting a suitable site for an airport?
17. Draw a neat cross section 0f runway for an international. Airport having instrumental and in facilities. Show therein the various runway geometrics.
18. What are the imaginary surfaces? What is their significance? Explain with the aid of neat sketches the shape of each surface for different types of airport.

## Subject- DSS-I

1. What is ductility? Why is it important?
2. What is factor of safety and partial safety factor?
3. Write the various mechanical properties of steel?
4. What is rolled steel section? List the various rolled steel sections with sketches?
5. Define the following terms:
    a. Pitch of rivets/bolts
    b. Nominal diameter of rivet/bolt
    c. Gross diameter of rivet/bolt
    d. Gauge distance
    e. End and edge distance
    f. Staggered pitch of rivets/bolts
    g. Efficiency of joint rivet/bolt
    h. Bolt value of rivet/bolt
    i. Effective throat thickness
    j. Leg length
6. What is the difference between lap and butt joints with sketches?

7. What is the difference between groove (butt) weld and fillet weld?
8. What is the difference between black bolts and HSFG bolts?
9. What is groove welding? List its various types?
10. Write the two advantages and disadvantages of riveted connections?
11. Write the three advantages and disadvantages of bolted connections?
12. Write the four advantages and disadvantages of welded connections?
13. What does 4 and 6 imply for bolts of grade 4.6?
14. Design a lap joint between two plates 12 x 10 mm, so as to transmit factored load of 70 kN. Using M16 grade of bolt 4.6 and Fe 410 grade of steel.
15. A ISA 100 x 100 x 10 mm carries factored tensile force of 100 kN. It is jointed with 12 mm thick gusset plate. Design the HSFG bolt joint
    1. When no slip is permitted
    2. When slip is permitted

    Grade of bolt is 8.8S with 16mm diameter and grade of steel Fe410.
16. Calculate the strength of a 16mm diameter bolt of grade 4.6 for the following cases. The main plates to be jointed are 10mm thick.
    1. Lap joint
    2. Double cover butt joint; each of the cover plate being 8mm thick.
17. Two plates 10 mm and 18 mm thick are the to be jointed by double cover butt joint. Design the joint for the following data

    Factored design load = 750 kN
    Bolt diameter = 20 mm
    Grade of steel (Fe410)
    Grade of bolts (4.6)
    Cover plates 2 (one on each side) = 8mm thick.
18. A single bolted double cover butt joint is used to connect two plates which are 8 mm thick. Assuming 16 mm diameter bolts of grade 4.6 and cover plates to be 6 mm thick, calculate the strength and efficacy of the joint if 4 bolts are provided in the bolt line at a pitch of 45 mm as shown in fig.1.
19. A tie member 95 mm x 10 mm is to transmit a factored load of 170 kN. Design the fillet welds and necessary overlaps for the cases shown in fig. Grade of steel Fe410. Assume gusset plate to be 14mm thick.
20. What are the column bases? Why are they provided?
21. Difference between slab base and gusset base with sketches.
22. When do we prefer the grillage footing / Write a short note on grillage footing.
23. What is the purpose of anchor bolts in a base plate?
24. Write the formula for computing thickness of square base of a solid round steel column.
25. Draw bending stress diagram under a column base which is subjected to a point load P at an eccentricity e.
26. Design a slab base for a column section ISHB 350 @ 710.2 N/m subjected to an axial load of 1500 kN. Base is resting on M20 concrete pedestal. Use grade of steel Fe500.

27. Design a suitable bolted gusset base for a column section ISHB 350 @ 724 N/m subjected to an axial load of 4000 kN. Base is resting on M15 concrete pedestal. Safe bearing pressure of concrete is 4000 kN/m 2 .
28. Design a suitable bolted gusset base for a column section ISHB 350 @ 661.2 N/m subjected to an axial load of 1700 kN. Base is resting on M15 concrete pedestal. Use 24 mm diameter bolts of grade 4.6 for making the connections.
29. Design a base for the column section ISHB 350 subjected to an axial load of 3000 KN. The base is resting on M15 concrete pedestal. Assume bearing strength of concrete is 4MPa.

1. What is tension member?

2. List the different modes of failure of a tension member.

3. What is shear lag effect?

4. What is meant by net sectional area of a tension member? How are determined net

area for plates for chain and zig-zag (staggered) bolting?

5. Write a short note on

1. Lug angles

2. Splices

3. Gusset Plate

4. Length of end connection (L c )

6. A 250 ISF 8 mm of grade Fe 410 is used as a tension member in a lattice girder. It is

connected to a 12 mm thick gusset plate by 16 mm diameter bolts of grade 4.6.

Calculate the effective net area of the member, if

1. Chain bolting is done as shown in fig.

2. Zia-Zag bolting is done as shown in fig.

7. Determine the effective net area for the tension member as shown in fig. The angles

are connected as shown in the fig. Use grade of steel Fe410.

8. Determine the effective net area of double angle section connected to a gusset plate

12 mm in thickness as shown in the fig. Use grade of steel Fe410.

9. Compute the tensile strength of an angle section ISA 200x100x10mm of Fe410 grade

of steel connected with the gusset plate as shown in fig. for the following cases

1. Gross section yielding

2. Net section rupture

10. Determine the block shear strength of the welded and bolted tension member as

shown in fig. Use the grade of steel Fe410.

11. A tension member 0.95 m long to resist a service dead load of 20 kN and a service

live load of 60kN. Design a rectangular bar of standard structural steel of grade

Fe410. Assume that the member is connected by one line of 16 mm diameter bolts of

grade 4.6.

12. Design a bridge truss diagonal subjected to a tensile load of 300 kN. The length of

diagonal is 3m. The tension member is connected to a gusset plate 16 mm thick with

one line of 20 mm diameter bolts of grade 8.8.

13. Design a tension member to transmit a pull of 150kN. Effective length of member is

4.5 meters. Member should consist of a pair of angles connected to both sides of

gusset plate.

1. Difference between column and strut.

2. Difference between short column and long column.

3. What is slenderness ratio? How does it affect the load carrying capacity of a column?

4. Give maximum and minimum value of angle of inclination for laced column. / What is

the recommend value of minimum and maximum inclination of a lacing bar?

5. What is the maximum slenderness ratio recommended for a member carrying

compressive loads resulting from dead load and superimposed load?

6. What is the recommended value of effective length of a compression member if it is

effectively held in position at both ends, but not restrained against rotation. The

unsupported length is 5m.

7. Write the Euler's formula for long and short pinned ended column.

8. Compression members are more critical than tension members. Comments.

9. Give the factor by which effective length of battened column is altered.

10. Difference between lacing and batten.

11. Design a column to support a factored load of 1050 kN. The column has an effective

length of 7 m with respect to z-axis and 5 m with respect to y-axis. Use steel of grade

Fe410.

12. Design a column with effective length 7m. It is subjected to an axial load of 1500 kN.

Provide two channel sections placed back to back with lacing. Design suitable lacing

system also.

13. Design a double angle discontinuous strut to carry a factored load of 135 kN. The length

of strut is 3 m between intersections. The two angles are placed back to back (with long

legs connected). Use steel of grade Fe410.

a. Angles are placed on opposite sides of 12 mm gusset plate(ISA 70 x 70 x 6 mm)

b. Angles are placed on same sides of 12 mm gusset plate(ISA 80 x 80 x 6 mm)

14. Write short note on:

(a) Design of columns using battening system.

1. What are Purlins?

2. Difference between purlins and girt.

3. What are laterally supported and unsupported beams?

4. What is plastic section modulus and shape factor?

5. Difference between web buckling and web crippling with sketches.

6. Design a laterally unsupported beam with 6 m simply supported effective span, subjected

to UDL of 20 kN/m over entire span and a point load of 40 kN at mid span. Depth of

beam is restricted to 350 mm.

Date of Submission- 17-11-2017

1. What are the different load combinations of roof trusses?

2. Draw a ,roof truss and label following members on ,it: (i) upper chord

member (ii) lower chord member (iii) prinCipal rafter (iv) purlin.

3. Write short note on:

(a) Economical spacing of roof trusses.

## Subject: Rock Mechanics & Engineering Geology

### UNIT -I

1. (a) Discuss the relationship between the Engineering Geologists and Civil Engineers.

(b) Describe the importance of Engineering Geology in Civil Engineering.

2. Describe the various branches of Engineering Geology?

3. Describe briefly few case studies of civil engineering failures due to geological drawback.

4. Write the importance of physical geology & structural geology.

5. What is meant by weathering of rocks? Explain in detail different geological agents responsible for weathering of rocks.

6. Describe the weathering due to air & water in detail.

7. Explain physical weathering in detail.

8. Explain frost weathering.

9. Explain chemical & biological weathering.

10. (a) What is meant by “meandering of a river”?

(b) Explain the development of a meander with neat sketches.

11. “The knowledge of geology is very essential at planning stage, design stage and construction stage of any Civil Engineering project”. Justify this statement with a reference to a Dam site selection.

**Define**

1. Engineering Geology

2. Environmental Geology

3. Shortcrete

4. Rock mechanics

5. Geomechanics

6. Mining Geology and Petroleum Geology

7. Deflation

8. Abaration

9. Attrition

10. Pedestal rock

11. Vintifact

12. Hydraulic action.

13. Pot holes

**UNIT –II**

1. How can you identify a mineral by the help of their physical and chemical properties?

2. Add notes on the following physical characteristics that are useful for the identification of rocks and minerals.

( i ) Colour (ii ) Streak (iii) Hardness (iv) Form

3. (a) Define Mineral. How are the minerals classified?

(b) Explain the physical properties of the following minerals.
i. Feldspar ii. Hornblende iii. Talc iv. Biotite

4. Explain the significance of different Physical properties in mineral identification.

5. On the basis of silicate structure, classify silicate minerals into various groups. Explain the structure of each group in detail.

6. Explain the following principles of mineral identification.

a. Hardness b. Twining

**SHORT NOTES:**

1. Quartz

2. Feldspars

3. Micas

4. Calcite or Gypsum

5. Kyanite

6. Chlorite

7. Talc

8. Calcite

9. Clay Minerals

10. Bauxite.

**UNIT –III**

1. Discuss thoroughly about the structures of Igneous Rocks. (Illustrate your answer with neat diagrammatic sketches)

2. Discuss what you know the processes of Sedimentation.

3. With the help of neat diagrammatic sketches, describe briefly on Primary Sedimentary Structures.

4. Write about the various sedimentary deposition environments.

5. Briefly describe the classifications of igneous rocks based on silica percentage, silica saturation and depth of formation. Quote suitable examples.

6. Explain how the sedimentary rocks are formed. Describe the various structures present in these rocks.

7. Differentiate between

a. Sandstone and Shale

b. Shale and Limestone

c. Conglomerate and Breccia.

d. Quartzite and Marble

e. Gneiss and Schist

f. Gneiss and Slate.

**SHORT NOTES**

1. GRANITE

2. GABBRO

3. SAND STONE

4. LIME STONE

5. GENISS

6. DIORITE

7. SCHIST

8. DOLOMITE

**UNIT –IV**

1. Discuss the various geological deformities and importance.

2. Explain the attitudes of geological structures.

3. Explain briefly a. Fold b. Fault c. Joint.

4. Define fold and explain various parts of fold with neat sketches and causes of folding. Describe over turned fold drag fold, recumbent fold.

5. Classify and describe the different types of faults. Give the various minor structures found in the fault zones. Discuss the effects of faulting on various engineering projects.

6. Explain the structure of a. Fold b. Fault.

7. Explain the importance of fold in civil engineering.

8. Explain the importance of fault in civil engineering.

9. With the help of neat diagrammatic sketches, describe briefly on Faults.

10. With the help of neat diagrammatic sketches, describe briefly on Folds.

11. From an Engineering Geological point of view, define Joints.

12. Discuss thoroughly about the Rock Joint Description in relation to Engineering Geological investigation of rock materials.

**SHORT NOTES**

1. Unconformities

2. Disconformity

3. Non conformity

4. Unloading joints

5. Cooling joints

6. Fan Fold.

7. Columnar joints

8. Angular unconformity

9. Radial faults
10. Joints due to the regional deformation

**UNIT –V**

1. What is a water table and what are the types of ground water which occurs in the zone of aeration and saturation.

2. Discuss the various Groundwater movements.

3. Write about Geological controls on Groundwater Movement.

4. Explain the following investigations to be carried out in ground water exploration

(a) Geological Investigations (b) Geophysical Investigations
(c) Hydrological investigations.

5. Discuss, in brief, the causes and effects of earthquakes. In this connection enumerate some of the major Indian earthquakes and comment on the possible mode of origin.

6. Write a short account on Earthquake Belt and Seismic Zone.

7. Explain about the Earthquake prediction.

8. (a) Discuss briefly on groundwater investigation.

(b) Explain about the water in rocks.

9. Write a short account on Zonal Distribution of Groundwater.

10. Write an essay on Classification and Causes of Earthquakes? Describe the Civil Engineering Considerations in Seismic Areas with reference to building construction.

**SHORT NOTES:**

1. P-waves

2. L-waves

3. Vadose water

4. Aquifer

5. Unconfined aquifer

6. Confined aquifer

7. Artesian aquifer

8. Fresh and salt groundwater

9. Solifluction

**Subject: CMWM**

Q1. What do you understand by cost slope?
Q2. Direct and Indirect costs of a project.
Q3 Define
a) Normal Time
b) Normal Cost
c) Crash Time
d) Crash Cost.
Q4. Draw a typical cost-duration curve and show on it optimum duration and minimum project cost.
Q5. Difference between event and activity.
Q6. Slack and types
Q7. Differ between PERT and CPM
Q8. List the difference between milestone chart and bar chart
Q9. Define estimated time, backward pass and forward pass
Q10. Define Fulkerson's rule.
Q.11 Choose event and activity
a) Survey site
b) Maps prepared
c) Invitation mailed
d) Assemble parts
Q12. Define network diagram and its types.
Q13. Describe various faces of project management

## Marks-3 & 5

Q14. (a) Explain the working of hoes with neat sketches.
(b) How would you determine the economic life of equipment?
Q15. What are scrappers? Give factors affecting output of scrapers.
Q16. List various Hoisting and transporting equipments used in civil engg. projects. Explain one of them in detail with neat sketches.

Q17. A maintenance project consists of number of jobs. Their normal duration and costs along with crash costs and duration are given below. Find out the optimum project cost and time

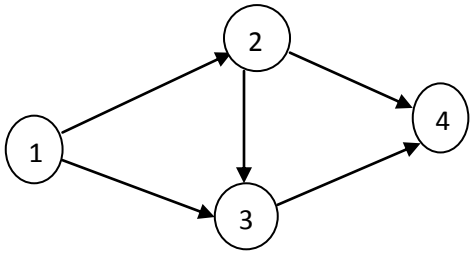
| Job | Normal duration | Normal Cost(Rs.) | Crash duration | Crash Cost(Rs.) |
|---|---|---|---|---|
| 1-2 | 9 | 9000 | 6 | 15000 |
| 1-3 | 8 | 2000 | 5 | 9500 |
| 1-4 | 15 | 5000 | 10 | 20000 |
| 2-4 | 5 | 2000 | 3 | 4000 |
| 3-4 | 10 | 7000 | 6 | 13000 |
| 4-5 | 2 | 3000 | 1 | 7000 |

Indirect costs are Rs. 6000/. per day

Q18. Updating process.
Q19. Name any 3 equipments used for excavation of work?
Q20. Explain the working of bulldozer with neat sketches.
Q21. . A maintenance project consists of number of jobs. Their normal duration and costs along with crash costs and duration are given below. Find out the optimum project cost and time

| Job | Normal duration | Normal Cost(Rs.) | Crash duration | Crash Cost(Rs.) |
|---|---|---|---|---|
| 1-2 | 6 | 7000 | 3 | 14500 |
| 1-3 | 8 | 4000 | 5 | 8500 |
| 2-3 | 4 | 6000 | 1 | 9000 |
| 2-4 | 5 | 8000 | 3 | 15000 |
| 3-4 | 5 | 5000 | 3 | 11000 |

Indirect costs are Rs. 3000/. per day. Determine the optimum duration of the project and corresponding minimum cost.




Q22. What are the different factors for selection of any construction equipment?

Q23. What do you mean by project management?

Q24. Drawbacks of bar charts.

Q25. Different types of events, activity and dummy.

Q26. Define critical path and its types.

Q27. Define probability distribution curve.

Q28. Define

a) optimistic time
b) most likely time
c) pessimistic time
d) estimated time
e) Earliest expected time
f) Latest allowable occurrence time.

Q29. Define Slack and its types

Q30. Define Float and its types.
Q31. Define EST, EFT, LST and LFT.
Q32. Define resources allocation and its types.
Q33. Define Crane and its function. Types of cranes
Q34. Explain Plants for grading, batching, mixing
Q35. Write different types of mixers
Q35. Explain concrete pumps.
Q36. Explain in detail Belt conveyors
Q37. Explain in detail Belt conveyors Ropeways
Q38. Explain power shovels in detail and draw its sketch
Q38. Explain dragline in detail and draw its sketch