H.T No: | | | | | | | | | | | R22

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : **B.Tech V Semester Supplementary Examinations June/July-2025**
Course Name : **Structural Analysis-II**
Course Code : **A401314**
Branch : **Civil Engineering**
Date & Session : **30-06-2025 FN** **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark. **10x1=10M**

1. State Eddy's theorem for an arch. 1 M
2. What is carry over factor? 1 M
3. For which structures the Kani's method of analysis is useful? Why? 1 M
4. State the characteristics of cable 1 M
5. What are the reasons for support settlements? 1 M
6. What are the advantageous of continues beams? 1 M
7. Explain the equilibrium condition used in the stiffness method 1 M
8. Is it possible to develop the stiffness matrix for an unstable structure 1 M
9. What are influence lines? 1 M
10. What do you understand by an influence line for bending moment? 1 M

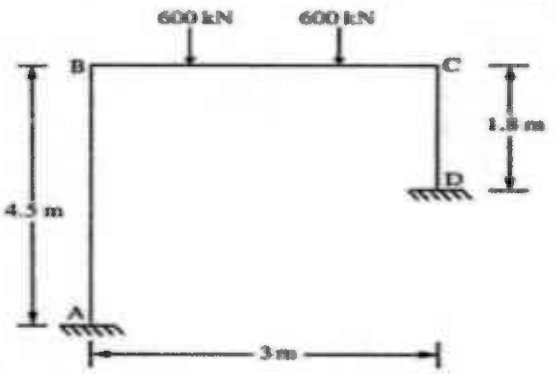
PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). A steel two-hinged circular arch rib has a span of 30 m and a rise of 3 m. The rib section is uniform throughout with an overall depth of 0.7 m. Neglecting all effect except those due to bending. Find from first principles, the bending stress at the crown due to a temperature change of 30^0 K. Take E= 2×10^5 N/mm^2 and $\alpha = 11\times10^{-6}$ per 1K. 10M

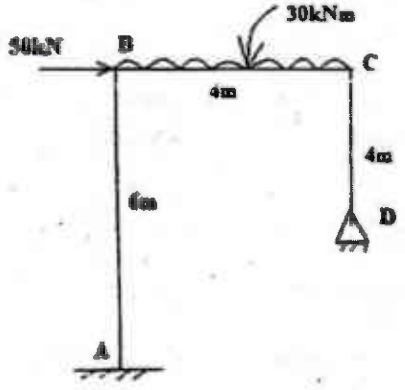
OR

11. B). Analyze the frame by moment distribution method and draw bending moment diagram 10M



(P.T.O.)

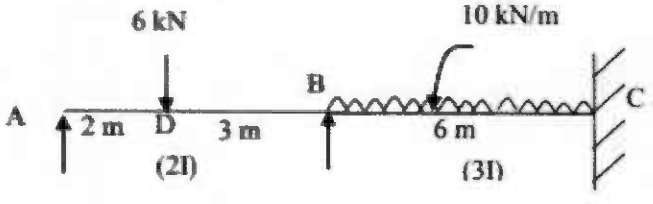
12. A). Analyze the following frame using Kani's method? Draw B.M.D 10M



OR

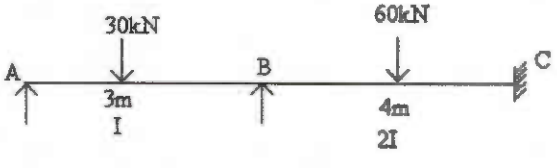
12. B). The cable carries a uniformly distributed load of 16 N/m and has its lowest point 10 m below the lower support. The ends of the cable are attached to saddles on rollers at top of piers. The backstays which may be assumed straight are inclined at 60° to the vertical. Determine :i)The maximum tension of the cable, ii)The thrust on each pier. 10M

13. A). Analyze the continuous beam shown in figure by flexibility matrix method and also sketch the bending moment diagram. 10M

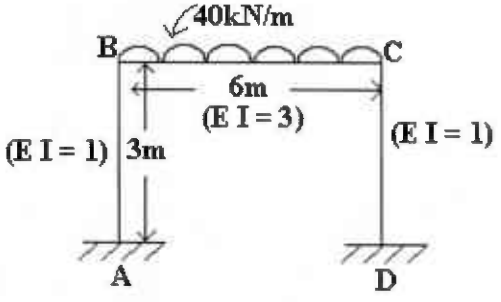


OR

13. B). Analyze the beam shown in fig. by flexibility method. Also draw BMD. 10M



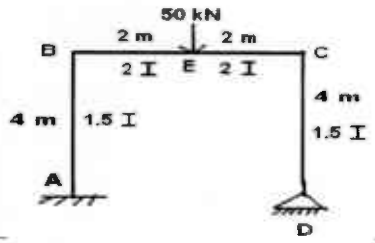
14. A). Analyse the fixed base portal loaded as shown in Fig using stiffness method and sketch the BMD. 10M



(P.T.O..)

OR

14. B). Analyze the portal frame ABCD shown in Fig below by stiffness method and also estimate the bending moment. 10M



15. A). A system of four loads 80, 160, 160 and 120 kN crosses a simply supported beam of span 25m with the 120 KN load leading. The loads are equally spaced at 1m. Determine the values of the following using influence lines. 10M

i.Maximum bending moment at a section 10m from left support and

ii. Absolute maximum shear force and bending moment in the beam.

OR

15. B). A beam has a span of 24m, draw the influence line diagram for the bending moment and shear force at a section 8m from the left and also determine maximum bending moment and shear force at this section due to two point loads of 10kN and 6kN at a fixed distance of 2m apart rolling from left to right with 6kN load leading. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : **B.Tech V Semester Supplementary Examinations June/July-2025**
Course Name : **Geotechnical Engineering**
Course Code : **A401311**
Branch : **Civil Engineering**
Date & Session : **02-07-2025 FN** **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark. **10x1=10M**

1. Reproduce the relation between voids ratio, degree of saturation, watercontent and specific gravity — 1 M
2. State the number of groups the soil is identified as per IS classification system — 1 M
3. Recall DARCY's law — 1 M
4. Define "Flownet" — 1 M
5. Outline: Isobar. — 1 M
6. Reproduce through a phased diagram: Fully compacted Soil — 1 M
7. Recall whether immediate settlement occurs in cohesive soils — 1 M
8. Reproduce the most important assumption underlying the consolidation theory — 1 M
9. Reproduce Mohr Coulombs equation — 1 M
10. Reproduce Strength envelops for cohesive and cohesion less soils — 1 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Review various soil structures. — 10M

OR

11. B). A soil in the borrow pit is at a dry density of 14.56 kN/m^3 with a moisture content of 12%. The soil is excavated from this pit and compacted in a embankment to a dry density of 16.28 kN/m^3 with a moisture content of 14%. Estimate the quantity of soil to be excavated from the borrow pit and the amount of water to be added for 120 m^3 of compacted soil in the embankment. — 10M

12. A). Explain various factors affecting permeability. — 10M

OR

12. B). In a container filled with each of the following materials, at a porosity of 40%, compute upward gradient required to cause quick condition:
(a) lead shot with a specific gravity of 12.53;
(b) fibre beads with a specific gravity of 1.65;
(c) sand with a specific gravity 2.45. — 10M

13. A). Produce the concept of Newmarks influence chart for calculating the stress below irregular areas. — 10M

OR

13. B). Explain the various factors affecting compaction. — 10M

(P.T.O..)

14. A). Discuss: Normally consolidated soil, over consolidated soil, under consolidated soil and show the same in a e-log(p) curve. 10M

OR

14. B). Review: Assumptions underlying Terzaghi's 1-D consolidation theory, produce the fundamental equation governing the same and mention the units of the parameters used therein. 10M

15. A). List types of laboratory test to assess the shear strength parameters and discuss any two of them mentioning salient points and sketches. 10M

OR

15. B). Describe stress path method. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : **B.Tech V Semester Supplementary Examinations June/July-2025**
Course Name : **Hydrology and Water Resources Engineering**
Course Code : **A401313**
Branch : **Civil Engineering**
Date & Session : **04-07-2025 FN** **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark. **10x1=10M**

1. What are the different types of precipitations? 1 M
2. Name the types of rain-gauges. 1 M
3. What is the mean by surface run-off? 1 M
4. What are the components of run off? 1 M
5. Who introduced unit hydrograph theory? 1 M
6. List the limitations of hydrograph. 1 M
7. Define Specific yield. 1 M
8. What is meant by crop rotation? 1 M
9. Name the methods used for design of irrigation canals. 1 M
10. Where are canal falls typically located in a canal system? 1 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Explain various methods of determining average Rainfall over a basin and also discuss the suitability of each method. 10M

OR

11. B). Describe the procedure involved in the analysis for developing intensity duration-frequency relationships. 10M

12. A). Explain in brief the evaporation process. What are the factors that influence the process of evaporation. 10M

OR

12. B). What is infiltration? Explain the different methods of measuring infiltration. How would you use infiltration capacity curve to calculate runoff from a small catchment? 10M

13. A). Determine the unit hydrograph of an effective duration of 3 hours. The flood hydrograph due to an isolate storm of 3 hours duration has 6 hours ordinates as under in cumecs: 2; 4; 33; 116; 86; 64; 46; 32; 18; 15; 9; 7; 5; and 3. Assume a base flow of 2 cumecs. The catchment area of the basin is 200 km^2 10M

OR

13. B). Define an 'S-curve hydrograph' giving a neat sketch and state its use. 10M

(P.T.O..)

14. A). A 30 cm well completely penetrates an unconfined aquifer of depth 40 m. After a long period of pumping at a steady state of 1580 lpm, the drawdown in two observation wells 25 m and 75 m from the pumping well were found to be 3.5 m and 2.0 m respectively. Determine the transmissibility of the aquifer. What is the drawdown at the pumping well 10M

OR

14. B). Define water logging and explain the causes of water logging. 10M

15. A). Discuss the following canal outlets 10M
i) Non-modular outlet ii) Semi-modular outlet iii) Modular outlets.

OR

15. B). Explain in detail about classification of canals. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : **B.Tech V Semester Supplementary Examinations June/July-2025**
Course Name : **Structural Engineering-I**
Course Code : **A401310**
Branch : **Civil Engineering**
Date & Session : **07-07-2025 FN** **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark. **10x1=10M**

1. Why is self weight considered as a dead load? 1 M
2. Define Shear wall. 1 M
3. What is the anchorage value of a standard hook of reinforcement bar of diameter 'D'? 1 M
4. Infer the area of 2 legged 10 mm vertical stirrups. 1 M
5. Differentiate one way and two-way slabs. 1 M
6. Define limit state method. 1 M
7. What is the failure pattern of long columns? 1 M
8. Define slenderness ratio. 1 M
9. Classify footings. 1 M
10. What should be the minimum cover for footings? 1 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Design a reinforced concrete beam supported on two walls 500 mm thick spaced at a clear distance of 6 m. The beam carries a super-imposed load of 30 kN/m. The size of the beam is restricted to 300 mm x 500 mm. Use M20 concrete and Fe415 steel. 10M

OR

11. B). Find the moment of resistance of a T-beam section having b_w = 300 mm, b_f = 1600 mm, D_f = 100 mm and d = 510 mm. The reinforcement consists of 4 bars of 25 mm dia. Use M20 concrete and Fe 415 steel. 10M

12. A). A simply supported beam 300 mm wide and 500 mm effective depth carries a uniformly distributed load of 50 kN/m including its own weight over an effective span of 6 m. Design the shear reinforcement in the form of vertical stirrups. Assume that the beam contains 0.75% reinforcement throughout the length. Assume M20 grade concrete and Fe 415 grade steel. 10M

OR

12. B). A rectangular beam 300 mm wide and 400 mm deep is reinforced with 2 numbers of 12 mm dia. bars at top and 2 numbers of 16 mm dia. bars at the bottom, each provided at an effective cover of 40 mm. Assuming M20 grade concrete and Fe415 grade steel, determine the resistance of the beam in pure torsion. 10M

(P.T.O..)

13. A). Design a R.C. slab for a hall 6.5 m wide and 13.5 long. The slab is supported on R.C.C. beams, each 240 mm wide which are monolithic. The ends of the slab are supported on walls, 300 mm wide. Design the slab for a live load of 2 kN/m^2. Assuming the weight of the roof finishing = 1.5 kN/m^2. Use M20 concrete and Fe415 steel. 10M

OR

13. B). Design a R.C.C floor slab for a room having inside dimensions 4 m x 10 m and supported on all sides by a 40 cm thick brick wall. The super-imposed load may be taken as 3 kN/m^2. Use M20 concrete and HYSD bars. 10M

14. A). Design a short axially loaded square column, 500 mm x 500 mm for a service load of 2000 kN. Use M20 concrete and Fe 415 steel. 10M

OR

14. B). A R.C rectangular column of size 240 mm x 300 mm is reinforced with 4 bars of 20 mm dia. provided one at each corner with an effective cover of 60 mm. Check the safety of the column if it is subjected to P_u = 350 kN, M_{ux} = 32 kNm, and M_{uy} = 30 kNm. Take M20 concrete and Fe 415 steel. 10M

15. A). Design an rectangular isolated footing of uniform thickness of a R.C. column bearing a vertical load of 600 kN and having a base of size 400 mm x 600 mm. The safe bearing capacity of soil may be taken as 120 kN/m^2. Use M20 concrete and Fe 415 steel. 10M

OR

15. B). Design a combined rectangular footing for two columns A and B, carrying loads of 500 kN and 700 kN respectively. Column A is 300 mm x 300 mm in size and column B is 400 mm x 400 mm in size. The centre to centre spacing of columns is 3.4 m. The safe bearing capacity of soil may be taken as 150 kN/m^2. Use M20 concrete and Fe 415 steel. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : **B.Tech V Semester Supplementary Examinations June/July-2025**
Course Name : **Airports, Railways and Waterways**
Course Code : **A401401**
Branch : **Civil Engineering**
Date & Session : **09-07-2025 FN** **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark. **10x1=10M**

1. Write any two functions of ballast. 1 M
2. List the different types of rails. 1 M
3. What do mean by grade compensation? 1 M
4. Write any two requirements of transition curve. 1 M
5. What do mean by track circuiting? 1 M
6. What do mean by point and crossing? 1 M
7. List the methods of orientation of runway. 1 M
8. List any two aircraft characteristics. 1 M
9. What do mean by dry dock? 1 M
10. Define jetties. 1 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Briefly explain the role of Indian railways in national development. 10M

OR

11. B). What is creep of rail? Explain briefly the causes, effects and prevention of creep. 10M

12. A). A 5 degree curve diverges from a 3 degree main curve in reverse direction in the layout of a B.G yard. If the speed on branch line is restricted to 35 kmph, determine the restricted speed on the main line. 10M

OR

12. B). What are the objective of providing horizontal curve and vertical curves in railway track? 10M

13. A). Explain the necessity of maintaining railway track. List the various items of maintenance. 10M

OR

13. B). Explain briefly the different types of railway stations. With a neat sketch, explain the functioning of a marshalling yard. 10M

14. A). What are the components of an ideal airport layout? Sketch typical layout of an airport 10M

OR

14. B). Explain the various factors considered in selection of an airport site. 10M

15. A). Explain with a neat sketch the layout and components of an artificial harbor. 10M

OR

15. B). What is breakwater? With a neat sketch, explain wall breakwater. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : **B.Tech V Semester Supplementary Examinations June/July-2025**
Course Name : **Transportation Engineering**
Course Code : **A401312**
Branch : **Civil Engineering**
Date & Session : **11-07-2025 FN** **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark. **10x1=10M**

1. List out different road development plans in India. 1 M
2. What is highway alignment? 1 M
3. Define super elevation. 1 M
4. List out the types of gradients. 1 M
5. Differentiate between on-street and off-street parking. 1 M
6. Define at-grade intersection. 1 M
7. Differentiate between abrasion and attrition. 1 M
8. List out the tests conducted for bitumen. 1 M
9. Name the IRC code used for rigid pavement design. 1 M
10. List out critical load positions in rigid pavements. 1 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). What are the various engineering surveys required for fixing the final alignment of a highway? Explain. 10M

OR

11. B). Discuss about the types of drawings prepared for a highway project with the recommended scales and sizes of the drawings. 10M

12. A). The speeds of overtaking and overtaken vehicles are 90 and 50 kmph respectively. If the acceleration of the overtaking vehicle is 2.5 kmph/sec, calculate the safe passing sight distance for a) one-way traffic b) two-way traffic 10M

OR

12. B). A radius of 250 m has to be provided at a locality due to site restriction in a NH with design speed 100 kmph. Design the super elevation. Should there be restriction in speed? 10M

13. A). List out different methods of carrying out traffic volume studies and briefly explain any two methods. 10M

OR

13. B). Write short notes on the following: 10M
i) Level of Service (LOS) ii) Traffic signals

(P.T.O.)

14. A). Explain CBR test of soil with a neat sketch. 10M

OR

14. B). Enumerate the types of tests on stone aggregate and briefly explain about any two tests with IRC specifications. 10M

15. A). List out the types of pavements and explain any one type of pavement with functions of each layer with a neat sketch. 10M

OR

15. B). Calculate the stresses at interior, and edge of a cement concrete pavement by using Westergaard's equations 10M

Modulus of elasticity of concrete = 3 x 105 kg/cm^2

Poisson's ratio of concrete = 0.15

Thickness of concrete pavement = 18 cm

Modulus of subgrade reaction = 8.5 kg/cm^2

Wheel load = 5100 kg

Radius of loaded area = 15 cm.

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