H.T No: | | | | | | | | | | | **R18** **Course Code: A30115**

# CMR COLLEGE OF ENGINEERING & TECHNOLOGY

**(UGC AUTONOMOUS)**

**B.Tech V Semester Supplementary Examinations June/July-2025**

**Course Name: Design and Drawing of RCC Structures**

**(Civil Engineering)**

**Date: 30.06.2025 FN** **Time: 3 hours** **Max.Marks: 70**

**(Note: Assume suitable data if necessary)**

**PART-A**

**Answer all TEN questions**

**Each question carries TWO marks.** **10x2=20M**

| | | |
|---|---|---|
| 1. | What is limit state of serviceability? | 2 M |
| 2. | What is an over-reinforced section? | 2 M |
| 3. | Define Anchorage length. | 2 M |
| 4. | What is limit state of serviceability for cracking? | 2 M |
| 5. | Distinguish between one-way and two-way slabs. | 2 M |
| 6. | Sketch the reinforcement details in a typical two-way simply supported slab. | 2 M |
| 7. | What are the functions of transverse reinforcement in columns? | 2 M |
| 8. | Distinguish between short and long columns. | 2 M |
| 9. | How do you compute the effective span when the stair slab is spanning longitudinally? | 2 M |
| 10. | When do you plan for a combined trapezoidal footing? | 2 M |

**PART-B**

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

11.A). Design a singly reinforced R.C. beam which is supported on two walls 300 mm thick, spaced at a clear distance of 6 m. The beam carries a super imposed load of 20 kN/m. Use Limit State Method. Use M 30 concrete mix and Fe 415 steel. 10M

**OR**

11. B). A T – beam consists of a flange 1000 mm wide and 120 mm deep. The depth of the beam is 600 mm upto the centre of steel and the width of the web is 300 mm. Find the area of steel required for an ultimate moment of 400 kN.m. Use M 20 grade concrete and Fe 415 grade steel. 10M

12. A). A R.C. beam 300 mm x 450 mm is reinforced with 3 Nos – 20 mm bars with an effective cover of 50 mm. The ultimate shear at the section is 140 kN. Design the shear reinforcement using vertical stirrups only. Use M 25 grade concrete and Fe 500 grade steel. 10M

**OR**

12. B). A doubly reinforced beam of rectangular section 300 mm wide x 500 mm overall depth is reinforced with 4 bars of 25 mm diameter on the tension face and 2 bars of 20 mm diameter on the compression face. The effective cover is 50 mm. The beam spans over 5 m. Check the deflection control if M 30 grade concrete and Fe 415 steel is used. 10M

13. A). Design a R.C. slab for a room of size 4 m x 6 m. It carries a live load of 3 kN/m$^2$ and is finished with 20 mm thick granolithic finishing, whose unit weight is 24 kN/m$^3$. The slab is simply supported on all the four edges with corners free to lift. The width of the supporting walls is 300 mm. Use M 20 concrete and Fe 415 steel. 10M

***(P.T.O..)***

**OR**

13. B). Design a simply supported one-way slab provided over a room of size 2.5 m x 6 m. It carries a live load of 3.5 kN/$m^2$ and lime concrete finishing of 75 mm thick, whose unit weight is 20 kN/$m^3$. The width of the supporting walls is 230 mm. Use M 25 concrete and Fe 415 steel. Assume mild environment. 10M

14. A). Design an axially loaded short rectangular column with an unsupported length of 3 m. The column has to carry a factored load of 600 kN. The column is fixed at one end and pinned at the other end. Use M 30 grade concrete and Fe 415 grade steel. Sketch the reinforcement details. 10M

**OR**

14. B). Design an axially loaded short helically reinforced circular column with an unsupported length of 3.5 m. The column is fixed at both the ends. The column has to carry a factored load of 800 kN. Use M 20 grade concrete and Fe 415 grade steel. 10M

15. A). Design a dog-legged stair for a building in which the vertical distance between floors is 3.5 m. The stair hall measures 2.5 m x 4.5 m. The live load may be taken as 2 kN/$m^2$. Use M 25 concrete and Fe 415 steel. 10M

**OR**

15. B). Design an isolated square footing for a R.C. column of size 500 mm x 500 mm carrying an axial load of 600 kN. The S.B.C. of the soil is 180 kN / $m^2$. Use M 30 grade concrete and Fe 415 grade steel. Sketch the reinforcement details. 10M

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30116**

# CMR COLLEGE OF ENGINEERING & TECHNOLOGY

**(UGC AUTONOMOUS)**

**B.Tech V Semester Supplementary Examinations June/July-2025**

**Course Name: Geotechnical Engineering**

**(Civil Engineering)**

**Date: 04.07.2025 FN** **Time: 3 hours** **Max.Marks: 70**

**(Note: Assume suitable data if necessary)**

**PART-A**

**Answer all TEN questions**

**Each question carries TWO marks.** **10x2=20M**

| | | |
|---|---|---|
| 1. | Define Liquid limit and Plastic limit. | 2 M |
| 2. | Differentiate between void-ratio and porosity. | 2 M |
| 3. | List the factors affecting permeability | 2 M |
| 4. | Outline in what situations the falling head permeability test and constant head permeability tests are recommended? | 2 M |
| 5. | Explain the method of compaction quality control in the field using Proctor needle | 2 M |
| 6. | A rectangular area 3m X 6m carries a uniform pressure of 100 kN/m$^2$ at the ground surface. What will be the vertical pressure at 5m below the center of the loaded area? Use equivalent point load method. | 2 M |
| 7. | Explain Mass Spring analogy for consolidation of soil. | 2 M |
| 8. | List any four assumptions made in Terzaghi's theory of one- dimensional consolidation. | 2 M |
| 9. | List the advantages of Direct shear test. | 2 M |
| 10. | Explain vane shear test. | 2 M |

**PART-B**

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

| | | |
|---|---|---|
| 11.A). | A compacted, cylindrical specimen of 60mm diameter and 120mm length is to be prepared from dry soil. If the specimen is required to have a water content of 13%and the percentage of air voids is 18, calculate the weight of soil and water required in the preparation of soil sample whose specific gravity is 2.65. | 10M |

**OR**

| | | |
|---|---|---|
| 11. B). | Explain with neat sketch i) Single grained soil structure ii) Flocculated soil structure iii) Honeycombed structure iv) dispersed structure. | 10M |
| 12. A). | Explain "quick sand condition" with its significance. When the flow of water is parallel to the bedding plane and perpendicular to the bedding plane, which case will give higher Permeability Coefficient? Why? | 10M |

**OR**

| | | |
|---|---|---|
| 12. B). | A falling head permeameter contains a soil sample 8 cm high and 60 cm$^2$ in cross sectional area. The permeability of the sample is expected to be 1X10$^{-4}$ cm/sec. if it is desired that the head in the standpipe should fall from 30 to 10 cm in 40 minutes, determine the size of the standpipe which should be used. | 10M |

***(P.T.O..)***

13. A). Draw a typical graph of compaction curve. As the water content increased, the dry density increases initially and then decreases. Explain what causes this change in the dry density. Support your statements. 10M

**OR**

13. B). Calculate the stress in a soil mass below the center of a uniformly loaded circular area of radius 1.5 m with a pressure of 60 $kN/m^2$ and thus obtain the exact depth at which the stress reduces to 10% of applied stress. 10M

14. A). A soil layer having thickness 6 m (saturated clay) has following properties: 10M
Permeability = 1X10-6 cm/sec; Initial Pressure = 100 kPa; Initial void ratio 1.1; Final Pressure = 250 kPa; Final void ratio= 0.98.
Determine
i. Coefficient of compressibility
ii. Coefficient of volume change
iii. Compression Index
iv. Primary consolidation
v. Time required for 90% consolidation.

**OR**

14. B). Explain 10M
1. Over consolidated soil (Pre consolidated soil)
2. Normally consolidated soil
3. Under consolidated soil

List out the limitations of the Terzaghi's one dimensional consolidation theory.

15. A). The shear strength parameter of the given soil sample are $c=0.6kg/cm^2$ and $\Phi=21°$. Undrained triaxial test are to be carried out on specimens of the soil. Determine 10M
i. Deviator stress at which failure will occur if the cell pressure is to be 2.5 kg/cm2.
ii. The cell pressure during the test if the sample fails when the deviator stress reaches 1.68 kg/cm2

**OR**

15. B). A direct shear test conducted on identical soil specimens gave the following results 10M

| Specimen | Normal Stress ($kN/m^2$) | Shear Stress ($kN/m^2$) |
|---|---|---|
| 1 | 50 | 40 |
| 2 | 100 | 70 |

Determine the shear strength parameters. If an undrained triaxial test was conducted on the same soil and at the same density and water content with a cell pressure of 75 $kN/m^2$, estimate the deviator stress at failure.

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H.T No: | | | | | | | | | | | R18 | Course Code: A30142

# CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech V Semester Supplementary Examinations June/July-2025

**Course Name: Environmental Impact Assessment**

(Civil Engineering)

**Date: 07.07.2025 FN** **Time: 3 hours** **Max.Marks: 70**

**(Note: Assume suitable data if necessary)**

**PART-A**

**Answer all TEN questions**

**Each question carries TWO marks.** **10x2=20M**

| | | |
|---|---|---|
| 1. | What is the purpose of an Initial Environmental Examination (IEE) in EIA? | 2 M |
| 2. | Illustrate Environmental Base Map. | 2 M |
| 3. | What are development activities, and how can they impact vegetation? | 2 M |
| 4. | Illustrate how do development activities affect wildlife habitats. | 2 M |
| 5. | Outline common methods used for predicting the impact on soil quality. | 2 M |
| 6. | List out mitigation measures for preventing soil degradation. | 2 M |
| 7. | What is meant by environmental audit and outline its importance? | 2 M |
| 8. | Define an audit protocol in the context of Environmental Auditing | 2 M |
| 9. | Outline the primary purpose of the Environmental Protection Act. | 2 M |
| 10. | What role does the Central Pollution Control Board (CPCB) play under the Air Act? | 2 M |

**PART-B**

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

| | | |
|---|---|---|
| 11.A). | Identify the factors affecting Environmental Impact Assessment (EIA) and explain how they influence the effectiveness of the assessment process. | 10M |
| | **OR** | |
| 11. B). | Make use of a sketch explain the Network and Overlay methods with their advantages | 10M |
| 12. A). | Identify the methodology for assessment of impacts of developmental activities on Wildlife. | 10M |
| | **OR** | |
| 12. B). | Explain the causes of deforestation and their connection to human activities. How do these causes impact the environment? | 10M |
| 13. A). | Discuss the importance of procuring relevant soil quality data in environmental assessments. | 10M |
| | **OR** | |
| 13. B). | Identify the methods used to assess the significance of soil quality impacts. | 10M |
| 14. A). | Discuss the onsite activities and explain the steps involved in the evaluation of audit data and preparation of an audit report. | 10M |
| | **OR** | |
| 14. B). | Identify post-audit activities and explain How can post-audit activities contribute to continuous environmental improvement? | 10M |
| 15. A). | Explain the salient features of the Water Act and how does the Water Act contribute to water pollution control? | 10M |
| | **OR** | |
| 15. B). | Discuss the salient features of Motor Act and Wildlife Act. | 10M |

H.T No: | | | | | | | | | | | **R18** **Course Code: A30118**

# CMR COLLEGE OF ENGINEERING & TECHNOLOGY

**(UGC AUTONOMOUS)**

**B.Tech V Semester Supplementary Examinations June/July-2025**

**Course Name: Structural Analysis-II**

**(Civil Engineering)**

**Date: 09.07.2025 FN** **Time: 3 hours** **Max.Marks: 70**

**(Note: Assume suitable data if necessary)**

**PART-A**

**Answer all TEN questions**

**Each question carries TWO marks.** **10x2=20M**

1. Mention any three reasons due to which sway may occur in portal frames. 2 M
2. In a member AB, if moment of -10 kNm is applied at A, what is the moment carried over to B? 2 M
3. Cite the limitation of slope-deflection equations applied in structural analysis. 2 M
4. Give the applications of two hinged arches 2 M
5. Recall the limitations made in Cantilever method. 2 M
6. List the assumptions made in Portal method. 2 M
7. Predict the relation between flexibility and stiffness of an element. 2 M
8. Write the element flexibility matrix for a beam member. 2 M
9. State the importance of ILD. 2 M
10. Differentiate static and kinematic indeterminacy of structure 2 M

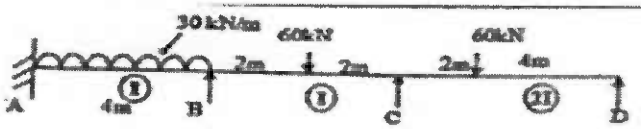
**PART-B**

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

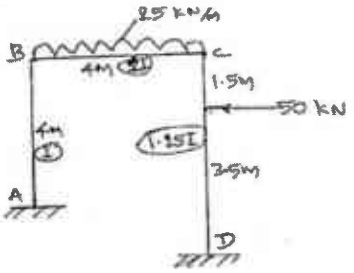
11.A). Analyze single-bay, single-story portal frame ABCD using moment distribution method. Members AB and CD are columns of height 4 m, and BC is a beam of span 6 m. All joints are rigid. The bases A and D are pinned, and a horizontal load of 20 kN is applied at joint B (top of the left column). Assume EI is constant for all members. 10M

**OR**

11. B). A continuous beam ABCD is fixed at A and hinged at D. Support A sinks by 7mm and support B sinks by 4 mm Take E=200 GPa and I= $9x10^7$ $mm^4$ Analyze the continuous beam by Kani's Method and sketch SFD and BMD (all spans are 4 m) 10M




12. A). Analyze the single bay single storey portal frame by slope deflection method and draw SFD and BMD diagrams. 10M




*(P.T.O..)*

**OR**

12. B). A two hinged parabolic arch has a span of 20 m and a rise of 5 m carries a UDL of 20 kN/m for a distance of 5 m from the left end. Determine (i) Horizontal thrust at each support (ii) BMD (iii) Normal thrust and radial shear at a section at the arch 5 m from the left end. 10M

13. A). Analyze the frame by portal method for shopping complex frame having 2 Bay 3 m width each and three storied each 3 m height is subject to 15 kN, 23 kN and 31 kN Acting from bottom, middle and top floor at frame level. size of beams are 230 mm x 300 mm, size of columns 300 mm x 300 mm. 10M

**OR**

13. B). Using the substitute frame method draw shear force and bending moment diagrams for the maximum moment in central span of a typical 3 span continuous reinforced beam isolated from a 5 story building with the storey height of 3.6 m the beams frame into 380 mm x 380 mm and columns are supported by uniformly distributed service dead load (including self weight )and live load 25 kN/m And 35 kN/m respectively the spans are 7.1 m having 600 mm deep section and with 300 mm Also estimate the bending moment for interior columns. 10M

14. A). A continuous beam ABC is fixed at A and simply supported over supports B and C AB = 6 m and BC =4 m. Moment of inertia is constant throughout the beam with a single point load of 25 kN Acts on AB at 2 m from the support A and UDL of 10 kN/m acts over the entire span BC examine the final forces by stiffness method and draw SFD and BMD diagrams. 10M

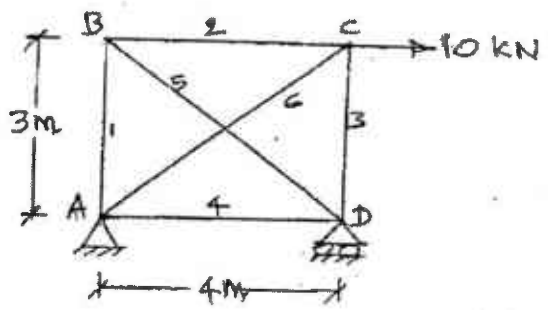
**OR**

14. B). A continuous beam ABC is fixed at A and simply supported over supports B and C AB = 7 m and BC =4 m moment of inertia is constant throughout .A single point load of 15 kN acts on span AB at 2 m from the support A and point load of 20 kN acts on span AB at 5 m away from the support A and UDL of 5 kN/m Acts over the entire span BC analyze using flexible method and draw SFD and BMD diagrams. 10M

15. A). Draw the influence line diagram for the propped reaction of a propped cantilever beam having span 6m. Take EI=constant. Compute the ordinates at 1m interval. 10M

**OR**

15. B). Analyze the given truss using castigliano's second theorem. 10M

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30117**

# CMR COLLEGE OF ENGINEERING & TECHNOLOGY

**(UGC AUTONOMOUS)**

**B.Tech V Semester Supplementary Examinations June/July-2025**

**Course Name: Transportation Engineering-I**

**(Civil Engineering)**

**Date: 14.07.2025 FN** **Time: 3 hours** **Max.Marks: 70**

**(Note: Assume suitable data if necessary)**

**PART-A**

**Answer all TEN questions**

**Each question carries TWO marks.** **10x2=20M**

| | | |
|---|---|---|
| 1. | What is a road network pattern? Give two examples. | 2 M |
| 2. | List any four road development plans adopted in India. | 2 M |
| 3. | What is extra widening on horizontal curves? | 2 M |
| 4. | What is intermediate sight distance? | 2 M |
| 5. | List the methods of traffic volume data collection. | 2 M |
| 6. | What is a condition diagram and collision diagram in accident studies? | 2 M |
| 7. | What is a channelized intersection? | 2 M |
| 8. | Name any two types of traffic islands. | 2 M |
| 9. | List any four common types of pavement failures. | 2 M |
| 10. | Define highway drainage and state its necessity. | 2 M |

**PART-B**

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

| | | |
|---|---|---|
| 11.A). | Explain the principles involved in finalizing the highway alignment with respect to drainage, geology, economy, and safety. | 10M |
| | **OR** | |
| 11. B). | Describe the steps involved in highway planning, from reconnaissance to preparation of detailed project reports (DPR). | 10M |
| 12. A). | Find the OSD for a vehicle travelling at 70 km/h on a two-lane highway. Speed of overtaken vehicle = 40 km/h, Acceleration = 1.5 m/s², Time gap between vehicles = 3 seconds, Use IRC-recommended values. | 10M |
| | **OR** | |
| 12. B). | A summit curve is formed at the junction of an ascending gradient of +3.5% and a descending gradient of -2.5%. Design the curve for a design speed of 80 km/h to provide adequate stopping sight distance (SSD). Assume: Reaction time = 2.5 sec, Coefficient of friction = 0.35, Height of driver's eye = 1.2 m, Height of object = 0.15 m. | 10M |
| 13. A). | Discuss the principles and steps involved in the design of traffic signals using Webster's Method. | 10M |
| | **OR** | |
| 13. B). | Classify traffic signs and describe their specifications with suitable examples. | 10M |

***(P.T.O.)***

14. A). Discuss the different types of conflicts that occur at intersections. How can they be minimized? 10M

**OR**

14. B). Design a rotary intersection with neat sketch. 10M

15. A). Explain the methods and importance of maintenance of highways. 10M

**OR**

15. B). Describe the construction procedure of cement concrete pavements. 10M

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