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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : **B.Tech VI Semester Supplementary Examinations Nov/Dec-2025**
Course Name : **Structural Engineering-II**
Course Code : **A401315**
Branch : **Civil Engineering**
Date & Session : **09-12-2025 AN** **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 types of failures occur in riveted joint? 1 M
2. List out the types of welded joints 1 M
3. Mention the factors affecting the strength of the tension members 1 M
4. What is meant by effective length? 1 M
5. State Lower bound theorem 1 M
6. State the factors affecting Plastic moment capacity 1 M
7. Mention the various components of the plate girder 1 M
8. What is meant by Transverse Stiffeners? 1 M
9. Classify the type of truss based on span. 1 M
10. What is the purpose of the purlin in a roof truss? 1 M

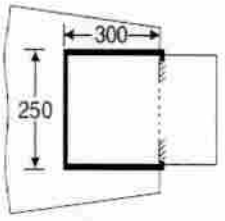
PART-B

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

11.A). Calculate the strength of a 20mm diameter bolt of grade 4.6 for the following cases. The main plates to be jointed are 12mm thick. a) Lap joint b) Single cover butt joint: the cover plate being 10mm thick 10M

OR

11. B). A tie member in a truss girder is 250 x 14mm in size. It is welded to a 10mm thick gusset plate by a fillet weld. The overlap of the member is 300mm and the weld size is 6mm. Determine the design strength of the joint, if the welding is done as shown in fig. What is the increase in strength of the joint, if welding is done all around. Assume shop welding 10M



12. A). Design a suitable angle section as a tie member in a truss to carry factored load of 215kN. Use double angle section connected back to back on either side of 12mm thick gusset plate by means of 4 nos 20mm dia bolts in one line. Assume design strength of 20mm dia bolt is 45.3kN 10M

OR

12. B). Calculate the design compressive strength about strong and weak axis for a stanchion of ISHB 350@72.41N/m, 3.5m high. The column is restrained in direction and position at both the ends. Use steel of Fe410 grade. 10M

(P.T.O..)

13. A). Determine the collapse load of propped cantilever beam of length "L" subjected to uniformly distributed load "w" throughout length. 10M

OR

13. B). Write design procedure of Laterally supported beam. 10M

14. A). Explain in detail about various steps involved in the design of welded plate girders. 10M

OR

14. B). Design a welded plate girder using Fe415 steel for a span of 25m to carry a load of 30kN/m. 10M

15. A). An industrial roof shed of size 20 mx30 m is proposed to be constructed at Mangalore near a hillock of 160 m and slope is 1 in 2.8. The roof shed is to be built at a height of 120 m from the base of the hill. Determine the design wind pressure on the slope. The height of roof shed shall be 12m 10M

OR

15. B). Write down the step by step procedure of design of Purlins. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : **B.Tech VI Semester Supplementary Examinations Nov/Dec-2025**
Course Name : **Environmental Engineering**
Course Code : **A401316**
Branch : **Civil Engineering**
Date & Session : **10-12-2025 AN** **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 is fire demand? How is it estimated? 1 M
2. What are permissible drinking water standards for Nitrates? Give its effects. 1 M
3. What are coagulant aids? Give 2 examples. 1 M
4. Sketch break point chlorination curve. Give its importance 1 M
5. Differentiate between BOD and COD. 1 M
6. Sketch a trap. List its functions. 1 M
7. Differentiate between aerobic and anaerobic decomposition. Give end products in each. 1 M
8. What is sludge bulking? List the causes. 1 M
9. What is photochemical smog? Give its effects 1 M
10. What are emission standards for automobile emissions? Give their values. 1 M

PART-B

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

11.A). i) Using the data given below estimate the population for 2021. Use any two methods and comment on their suitability. 6M

1961	1971	1981	1991	2001	2011
1,26,000	1,41,500	2,02,000	2,91,000	3,25,500	3,80,000

ii) Discuss various aspects considered while selecting a source for a water supply scheme. 4M

OR

11. B). i) Discuss the role of environmental engineer in controlling water –borne diseases 6M
ii) What is an indicator organism? What is the criteria for selection of indicator organism. 4M

12. A). i) With help of a schematic diagram, indicate the sequence of various units in a treatment plant to treat River water. State the objective of each unit 6M
ii) Design a plain sedimentation tank for Warangal town assuming per capita demand as 120 lpcd and population as 600,000. 4M

OR

12. B). i) Explain the working of rapid sand filter and back wash system with help of a sketch. 6M
ii) Discuss various kinds of distribution systems and comment on the criteria for selection. 4M

13. A). i) Determine the velocity, discharge and gradient required for a 350 mm dia sewer flowing at 0.35 depth. The self-cleansing velocity when running full is 0.8 m/s. Take N as 0.012; a/A as 0.315and r/R as 0.77. 6M
ii) Bring out a detailed comparison between separate system and combined system. 4M

(P.T.O.)

OR

13. B). i) The BOD of a wastewater sample incubated for 3 days at 27^0C is 270 mg/l. Find the 5 day BOD of the sample at 30^0C. 6M

ii) With help of a sketch explain the significance of DO depletion, reaeration and DO sag in rivers. 4M

14. A). Bring out a detailed comparison between Grit chambers and trickling filters in terms of working principles. 10M

OR

14. B). i) Design a septic tank for a township with 100 houses. Assume 4 inhabitants in each house and per capita water supply as 150 lpcd. 6M

ii) With help of flow chart, explain various sludge treatment options and indicate their objectives. 4M

15. A). i) Explain the phenomena of greenhouse effect and their possible consequences. 6M

ii) Discuss the effects of carbon monoxide and suspended particulates on human beings. 4M

OR

15. B). i) With help of sketches, explain different types of plume for different atmospheric lapse rates. 6M

ii) Explain the working principles of wet scrubbers and fabric filters. 4M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : **B.Tech VI Semester Supplementary Examinations Nov/Dec-2025**
Course Name : **Pavement Analysis and Design**
Course Code : **A401318**
Branch : **Civil Engineering**
Date & Session : **12-12-2025 AN** **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.	Tell about Gross Weight and Legal Axle Load.	1 M
2.	What do you understand by AADT in traffic analysis?	1 M
3.	State the assumptions of Westergaard's theory.	1 M
4.	Differentiate between damping and random vibration.	1 M
5.	What is PCA in rigid pavement design?	1 M
6.	Mention one difference between AASHTO and IRC methods.	1 M
7.	List any two properties of mineral aggregates used in pavements.	1 M
8.	What is the role of rubber modified bitumen in pavements?	1 M
9.	What are low volume roads?	1 M
10.	What is an overlay?	1 M

PART-B

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

11.A).	Describe the directional distribution and vehicle damage factors.	10M
	OR	
11. B).	Explain the effects of transient and moving loads on pavements.	10M
12. A).	Write detailed notes on stress solutions for one-, two-, and three-layered systems.	10M
	OR	
12. B).	Explain Westergaard's theory with assumptions and equations.	10M
13. A).	Illustrate the calibrated mechanistic design process for rigid pavements.	10M
	OR	
13. B).	Compare and contrast flexible and rigid pavement design methods.	10M
14. A).	Write detailed notes on stabilization methods for pavement design.	10M
	OR	
14. B).	Explain the use and benefits of geo-synthetics in pavement construction.	10M
15. A).	Discuss the design methodology for low volume roads as per IRC codes.	10M
	OR	
15. B).	Outline and compare the various types of overlays used in pavement rehabilitation.	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : **B.Tech VI Semester Supplementary Examinations Nov/Dec-2025**
Course Name : **Prestressed Concrete**
Course Code : **A401405**
Branch : **Civil Engineering**
Date & Session : **13-12-2025 AN** **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 is pretensioning and post-tensioning?	1 M
2.	List any two advantages of prestressed concrete.	1 M
3.	What is loss of prestress due to relaxation?	1 M
4.	How do you estimate the loss due to elastic shortening in PSC beams?	1 M
5.	List any one modes of failure due to shear.	1 M
6.	What is the impact of flexure in PSC?	1 M
7.	How do you calculate Transmission length	1 M
8.	Define anchorage stress.	1 M
9.	Define composite beam.	1 M
10.	Draw a typical load deflection behavior of a PSC beam up to failure	1 M

PART-B

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

11.A). Explain the need of the high strength of concrete and high grade of steel required for prestressed concrete. 10M

OR

11. B). Explain in detail about the differences between RCC and PSC. 10M

12. A). Explain any two methods of prestressing system. 10M

OR

12. B). A rectangular concrete beam 100 × 300 mm is prestressed by means of eight 5 mm wires located 65 mm from the bottom and two 5 mm wires located 35 mm from the top of the beam. If the wires are tensioned to a strong of 900 N/mm^2, calculate the percentage loss of stress in steel immediately after transfer allowing for the loss of stress due to elastic deformation of concrete only. Given, Es = 210 kN/mm^2 and Ec= 31.5 kN/mm^2. 10M

13. A). Explain with sketches the method of estimating the ultimate flexural strength of flanged prestressed sections according to IS 343 code specifications. 10M

OR

13. B). A prestressed uncracked rectangular girder of 200 mm X 350 mm with square hallow portion of 150 mm X 150 mm is to be designed to support dead load of 25kN/m, live load of 30 kN/m, wind load of 15 kN/m and seismic load of 20 kN/m. Length of the beam can be taken as 3m. The uniform prestress across the section is 5 MPa. Take M40 and Fe415 bars of 10 mm diameter, use effective cover as 40mm. Design this beam for shear per IS 1343.Modulus of elasticity of steel and concrete are 210GPa and 35 GPa. 10M

(P.T.O..)

14. A). Describe Magnels method for end block design. 10M

OR

14. B). The end block of prestressed concrete is of size 120mm x 1300mm, an effective prestressing force of 300 kN is transmitted. The distribution plate is of size 150mm wide and 150mm deep concentrically loaded at the ends. Calculate the maximum tensile force and bursting tension. Use Guyon's method. 10M

15. A). Explain in detail about different types of composite beams. 10M

OR

15. B). A concrete beam having a rectangular section 100 × 300 mm is prestressed by a parabolic cable with an initial prestressing force of 240 kN. The cable has an eccentricity of 50 mm at the centre and concentric at the supports. If the span of the beam is 10 m and subjected to a live load of 2 kN/m. Calculate the shortterm deflection at midspan. Assume Ec = 38 kN/mm^2, creep coefficient = 2, loss of prestress = 20%. Estimate the long-term deflection. 10M

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Examination	:	**B.Tech VI Semester Supplementary Examinations Nov/Dec-2025**
Course Name	:	**Foundation Engineering**
Course Code	:	**A401317**
Branch	:	**Civil Engineering**
Date & Session	:	**19-12-2025 AN** **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. Differentiate between the Outside and Inside Clearance with the help of neat sketch. 1 M
2. What are the types of soil samplers? 1 M
3. A vertical cut is made in a clay deposit (c=30 kN/m^2, Ø = 0, γ = 16kN/m^3). Find the maximum height of the cut which can be temporarily supported. 1 M
4. What is stability number? 1 M
5. How is Coulomb's theory of earth pressure mainly different from Rankine's theory? 1 M
6. Define earth pressure at rest. 1 M
7. Define Allowable soil pressure. 1 M
8. What do you mean by Punching shear failure? 1 M
9. How would you estimate the load carrying capacity of a pile in cohesive and cohesionless soils? 1 M
10. List various types of pile foundations. 1 M

PART-B

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

11.A). i) Explain with neat sketch Thin-walled sampler. What are its advantages? 5M

ii) Explain the importance of the depth of exploration for different structures. 5M

OR

11. B). Explain how you would conduct a plate load test with a sketch and write its limitations. 10M

12. A). Critically discuss the assumptions made in the stability analysis of slopes in bishop's and Swedish methods. 10M

OR

12. B). i) A slope of over consolidated clay (c'=21 kN/m^2, Ø' = 19^0, γ_{sat} = 21kN/m^3) is inclined at 12^0 to the horizontal. The water table is at the surface and the seepage is parallel to the slope. If a plane slip had developed at a depth of 6m below the surface, determine the factor of safety. 5M

ii) The following particulars are given for an earth dam of height 12 m. The slope is submerged and the slope angle β = 45°, γ_b = 8.2 kN/m^3, c' = 75 kN/m^2, Ø' = 20°. Determine the factor of safety FS. 5M

(P.T.O..)

13. A). Derive an Expression for active earth Pressure in cohesionless soil by Rankine's theory (ground surface horizontal and inclined). 10M

OR

13. B). Check the stability of a cantilever concrete retaining wall having a stem thickness of 0.4m uniform throughout, 6.0 m height bed block thickness 0.8 m and a projection of 2.5m on the heel side and 1.5 m on the toe side. The unit weight of the wall material is $25kN/m^3$. The soil has a unit weight of $18kN/m^3$ and an angle of internal friction of 360. Take in to account a uniform surcharge on the ground of $50kN/m^2$. The ground level on the toe side is 1.2 m high above the base of the wall. 10M

14. A). i) What are the different types of shear failures and explain. 5M

ii) A 2.0m square footing is laid at a depth of 1.3m below the ground surface. Determine the net ultimate bearing capacity using IS code method. Take $\gamma=20$ kN/m^3, $\varphi'=30^0$ and $c'=0$. ($\varphi'=30^0$, $N_c=42.82$, $N_q=18.24$ and $N_\gamma=22.28$) 5M

OR

14. B). i) Explain the effect of water table on bearing capacity of soils with neat sketch. 5M

ii) Discuss how allowable bearing capacity is calculated from N value. 5M

15. A). i) Write a note on the pile dynamic formulae mentioning their limitations. 3M

ii) Explain pile load test with a neat sketch. 7M

OR

15. B). A pile group consisting of 9 piles is arranged in 3 rows with 3 piles in each row. Diameter of each pile is 35 cm and spacing is 1.2 m. Length of pile is 10 m. The piles are driven completely in clayey soil having unconfined compressive strength of $100kN/m^2$. Determine the capacity of pile group. Take $\alpha=0.7$. 10M

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