CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech VI Semester Supplementary Examinations June-2025
Course Name: Design and Drawing of Steel Structures
(Civil Engineering)

Date: 19.06.2025 AN   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 are the advantages of bolted connections over riveted connections?	2 M
2.	State the Mechanical Properties that are to be considered in the design of steel structures.	2 M
3.	Sketch the different forms of compression members.	2 M
4.	Write short notes on column splice.	2 M
5.	Explain about web buckling.	2 M
6.	Explain the design of framed connections using bolts.	2 M
7.	Write the expression for economical depth of the plate girder. Assume moments are resisted by flanges only.	2 M
8.	What is the economical depth of welded plate girder?	2 M
9.	What are the different types of methods used for analyzing the trusses?	2 M
10.	What is purling's? Explain with a neat sketch.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	i) Explain failure of bolted joints with neat sketch.	5M
	ii) Discuss in detail the limits states design of steel structures.	5M

OR

11. B). An angle tie ISA 150mm x 115mm x 10 mm, carrying an axial tension of 500KN is to be connected to a 12mm thick gusset plate through its longer leg by side fillet welds only, at site. Design the joint if the ultimate shear strength in the weld is 410Mpa.   10M

12. A). A column section ISHB 300@0.630KN/m with one cover plate 400mm X 20mm on either side is carrying an axial load of 2800KN, inclusive of self-weight of bar and column. Design a guested base. The allowable bending pressure in concrete is $4N/mm^2$ and the allowable bending stress in base plate is $185N/mm^2$.   10M

OR

12. B). Determine the design axial load on the column section ISMB350, given that the height of the column is 3m & that it is pin ended. Also assume the following, $f_Y=250 \ N/mm^2$, $f_U=410 \ N/mm^2$ & $E=2X 10^5 \ N/mm^2$.   10M

13. A). A simply supported beam is to support UDL 70KN/m excluding weight of the beam, over a clear span of 8m. Design a plated rolled steel beam if ISMB500@0.086 KN/m &10mm thick plates are only available. The compression flange of the beam is laterally restrained.   10M

OR

13. B). Write a design procedure of bending strength for laterally supported beams.   10M

(P.T.O..)

14. A). What is truss? What are different types of trusses, explain with neat sketch.   10M

OR

14. B). Determine the wind pressure to be considered on sloping roof from the following data: 10M
     i. The building is located in Pondicherry.
     ii. Span of the roof 12m.
     iii. Pitch of the roof 1/4.
     iv. Height of the eaves above the ground is 6m.
     v. Risk coefficient, $k_1=1$, terrain factor $K2=0.82$ & topographic factor $k_3=1$.
     vi. Assume normal permeability.

15. A). Design a welded plate girder 24m in span and laterally restrained thoughout.it has to support a UDL of 100KN/m throughout the span exclusive of self-weight. Design the girder without intermediate transverse stiffeners, grade of steel Fe 410.   10M

OR

15. B). Write the design procedure of plate girder with stiffness.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech VI Semester Supplementary Examinations June-2025
Course Name: Foundation Engineering
(Civil Engineering)

Date: 21.06.2025 AN   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 significant depth?   2 M

2. The internal diameter of a sampler is 40mm and the external diameter is 42mm. Justify whether the sample obtained from the sampler is disturbed or undisturbed?   2 M

3. Find the factor of safety of a slope of infinite extent having a slope angle = 25°. The slope is made of cohesionless soil with $0' = 30°$.   2 M

4. What is the significance of pore water pressure in slope stability analysis?   2 M

5. Provide a justification for the preference of either cohesionless or cohesive soils as backfill material.   2 M

6. How tension cracks influence the distribution of active earth pressure in pure cohesion.   2 M

7. List the factors affecting bearing capacity of soil.   2 M

8. Compare general and local shear failure.   2 M

9. Explain the concept of negative skin friction.   2 M

10. List the forces acting on well foundation.   2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Briefly explain with neat sketch Standard Penetration Test and the correction to be applied to find "N" value.   10M

OR

11. B). (i) Briefly outline the salient features of bore log report.   5M
(ii) Explain wash boring method of advancing bore hole.   5M

12. A). (i) Explain the concept of infinite and finite earth slopes. Discuss the types of failures associated with earth slopes and their causes.   5M

(ii) An excavation is to be made in a soil deposit with a slope of 25° to the horizontal and to a depth of 25 meters. The soil has the following properties: $c'= 35kN/m^2$, $\varphi' = 15°$ and bulk unit weight = 20 kN/m^3, Taylor's stability number is 0.03. Determine the factor of safety of the slope assuming full friction is mobilized.   5M

OR

12. B). Describe the Swedish arc method for slope stability analysis. Provide a step-by-step procedure for applying this method, highlighting its advantages and limitations.   10M

13. A). A retaining wall 6 m high retains a clay backfill with c = 20 kN/m^2, $\varphi = 15^0$ and $\gamma =18$ kN/m^3 . Assume that the wall is smooth and the back vertical. It is expected that tension cracks may develop to the full theoretical depth. Calculate the total active earth force acting on the wall.   10M

(P.T.O..)

OR

13. B). Explain the Rankine's theory for conditions of cohesive and cohesionless.   10M

      (i)   Submerged backfill

      (ii)   Sloping backfill

14. A). A rectangular footing of dimensions 2.5 m X 3 m in plan is founded at a depth of 1.5 m   10M
below the ground level. The load on the footing acts at an angle of 15° to the vertical and
is eccentric in the direction of the width by 10 cm. The saturated unit weight of soil is
18 kN/m^3 . C'=15 kN/m^2, Φ'=30°. Water table is at a depth of 2m below the ground
surface. Use IS 6403-1981 recommendations to calculate the net ultimate bearing
capacity. For Φ'=30° , Nc=30.14, Nq= 18.4, Nγ=22.4.

OR

14. B). A strip footing 2m wide carries a load intensity of 400 kN/m^2 at a depth of 1.2m in sand.   10M
The saturated unit weight of the sand is 19.5 kN/m^3 and unit weight above the water table
is 16.8 kN/m^3. the shear strength parameters are c = 0 and ø = 35°. Determine the factor of
safety with respect to shear failure for the water table 4m below G.L.

15. A). Explain the components of well foundations and its functions with a neat sketch. What are   10M
the different shapes of well foundations?

OR

15. B). A group of 16 piles of 10 m length and 0.5 m diameter is installed in a 10 m thick stiff   10M
clay layer underlain by rock. The pile-soil adhesion factor is 0.4. Average shear strength
of soil on the sides is 100kPa. Undrained shear strength of soil at the base is also 100 kPa.
Calculate the base resistance of a single pile and the group side resistance assuming 100%
efficiency of group.

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech VI Semester Supplementary Examinations June-2025
Course Name: Estimation and Costing
(Civil Engineering)

Date: 24.06.2025 AN   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. The plinth area and plinth area rate of a residential building are 100 sqm and Rs. 5000/- respectively. Determine the total cost of building assuming suitable provisions. 2 M

2. List the difference between centre line method and long wall-short wall method of taking out measurements 2 M

3. Illustrate the methods to determine the area of excavation in roads. 2 M

4. During the construction of a road, a fill is required over a 200-meter section. The average depth of fill is 0.8 meters, and the width of the fill area is 12 meters. Calculate the total volume of fill required 2 M

5. Calculate the materials required for brick tile flooring in 1:6 cement mortar and 1:2 cement mortar for pointing. 2 M

6. Define lead and lift. 2 M

7. What information is typically included in a bar bending schedule? 2 M

8. Examine the qualification of contractor. 2 M

9. A property fetches a net income of Rs.1100.00 deducting all outgoings. Workout the capitalized value of the property if the rate of interest is 6.2% per annum. 2 M

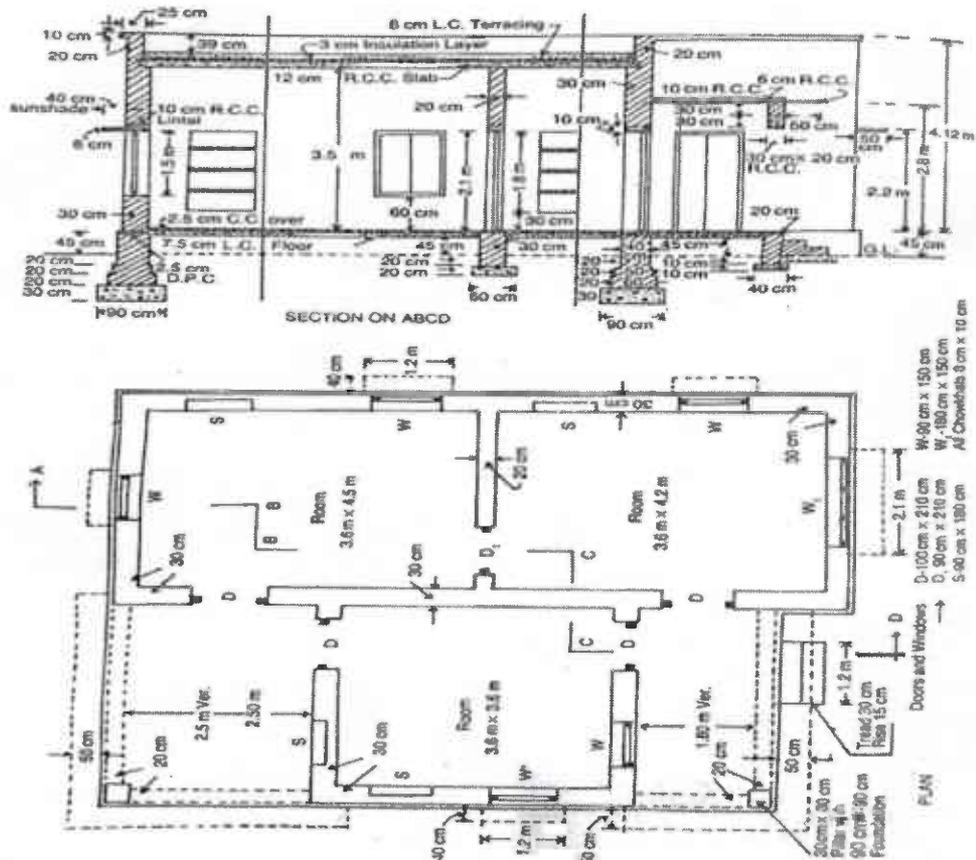10. Enumerate the factors affecting market value. 2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Explain the Detailed Estimate for the following items of works are given in the figure below.   10M
   (i) 1st Class Brick work in Foundation
   (ii) 1st Class Brick work in Super Structure

(P.T.O..)

SECTION ON ABCD

PLAN

OR

11. B). What are the methods of preparation of approximate estimates and explain briefly. 10M

12. A). Find the quantity of earthwork of a hill road from the following data. Formation width is 10 m, side slope in filling and cutting is 2:1 and 1.5:1 respectively. 10M

Chainage (m)	0	100	200	300	400	500	600
RL of Ground (m)	1115.3	1116.0	1116.75	1118.1	1118.25	1118.1	1117.7

Formation: RL at chainage 0 is 1116.5m, upward gradient 1 in 200 upto chainage 300m, downward gradient 1 in 400 from chainage 300m.

OR

12. B). A canal is proposed to be excavated between two points A and B, 120 m apart. If the bed width is 10.00 m. Side slopes 1.5:1 and depth of cutting 1.00 m and 2.00 m and 3.00 m at A, B and C. calculate the quantity of earth work excavation by 10M

A) Mid sectional area method.

B) Mean sectional area method.
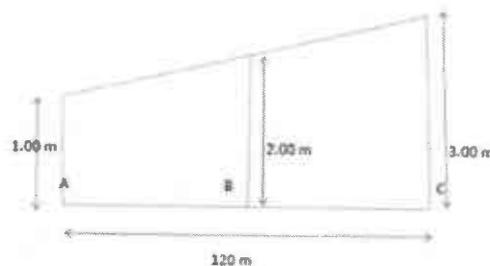
(P.T.O..)

13. A). Prepare a rate analysis for brick masonry work for the fig below. Assume I class   10M
brickwork with cement mortar 1:6.
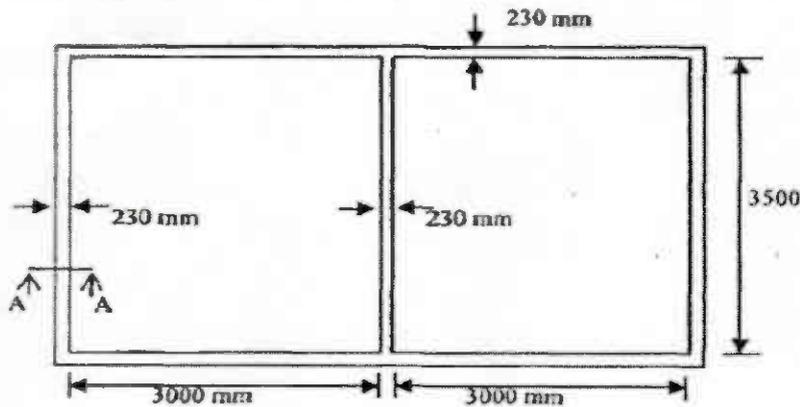
OR

13. B). Prepare analysis of rates for cement concrete 1:2:4 for 1 m³.   10M

14. A). Illustrate in detail about Lumpsum Contract and Item rate Contract.   10M

OR

14. B). Estimate the quantity of steel required for R.C.C (1:2:4) slab 125 mm thick provided for a   10M
room 3.5 m x 7.25 m, resting over a 300 mm thick walls.
Reinforcement details:
- Main reinforcement: 10 mm bars at 160 mm c/c (alternate bars are bent – up)
- Distribution reinforcement: 8 mm at 200 mm c/c.
- Also prepare bar bending schedule.

15. A). List the various methods of valuation of property and explain any two methods in detail.   10M

OR

15. B). Workout the valuation of a cold storage with the following data: 10M
   i)   Cost of land: Rs. 20,00,000,00
   ii)   Gross income per year: Rs. 95, 00, 000.00
Expenses incurred per year are as follows:
   iii) Staff salary, electricity charges at the rate of 25% of gross income.
   iv)   Repair and maintenance of machinery, plants, equipments etc at the rate of 5%
         of their capital cost, which is Rs. 15,00,000.00.
   v)   Sinking fund for machinery, plants etc with 25 yrs life at the rate of 4% after
         allowing 10% scrap value.
   vi)   Insurance premium per year is Rs. 15,000.00
Assume year's purchase for 60 yrs at the rate of 8% and redemption of capital at the rate
of 4%.

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech VI Semester Supplementary Examinations June-2025
Course Name: Water Resources Engineering
(Civil Engineering)

Date: 26.06.2025 AN   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 Hydrology.	2 M
2.	List out the factors affecting the runoff.	2 M
3.	Distinguish between direct runoff and base flow.	2 M
4.	Sketch the flood hydrograph resulting from an isolated storm.	2 M
5.	List any two advantages of ground water compared to surface water.	2 M
6.	Define specific yield.	2 M
7.	State the necessity of irrigation.	2 M
8.	Sketch the ring basin flooding.	2 M
9.	Define the balancing depth of canal.	2 M
10.	Classify the canals based on canal alignment.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).   Discuss the factors affecting evaporation.   10M

OR

11. B).   The shape of a catchment approximately resembles a square of side 8 km. With reference to an x-y coordinate frame whose origin is coinciding with one of the corners of the catchment the locations of the four corners of the catchment are (0,0), (8,0),(8,8) and (0,8). These are four raingauges A, B, C and D within this catchment whose positions with reference to the same coordinate frame are (2,2), (6,2), (6,6) and (2,6) respectively. The rainfall recorded by the raingauges A, B, C and D during a storm are 8, 6, 9 and 11 cm respectively. Determine the average depths of rainfall over the catchment by Arithmetic mean and Thiessen methods.   10M

12. A).   Explain the three methods of separating the baseflow from the total runoff.   10M

OR

12. B).   Discuss about the unit hydrograph of different duration. Summaries of the method of superposition.   10M

13. A).   Distinguish between   10M
(i) Confined aquifer and unconfined aquifer
(ii) Aquifer and Aquifuge.

OR

13. B).   Derive an expression for the steady state discharge of well fully penetrating into a confined aquifer.   10M

(P.T.O..)

14. A). Discuss briefly the factors affecting duty.   10M

OR

14. B). Discuss briefly the different types of irrigation systems.   10M

15. A). Describe Lacey's theory for the design of irrigation channel in alluvial soil.   10M

OR

15. B). A small watershed near Nagpur is 250 ha in size and has group C soil. The land cover can be classified as 30% open forest (CN = 60) and 70% poor quality pasture (CN=86). Assuming AMC at average condition and the soil to be black soil, estimate the direct runoff volume due to a rainfall of 75 mm in one day. Use SCS-CN equation applicable to Indian Conditions.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech VI Semester Supplementary Examinations June-2025
Course Name: Prestressed Concrete
(Civil Engineering)

| Date: 28.06.2025 AN | 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.	Discuss the basic assumptions in analysis of prestress.	2 M
2.	What are the applications of prestressed concrete?	2 M
3.	List the types of losses of prestress.	2 M
4.	What are the factors influencing the loss of stress due to creep of concrete?	2 M
5.	What are the different types of flexural failure modes observed in prestressed concrete beams?	2 M
6.	Distinguish between web-shear, flexural and flexure shear cracks in concrete beams with sketches.	2 M
7.	What is transmission length?	2 M
8.	Sketch the distribution of stresses in the anchorage zone.	2 M
9.	What are the types of deflections of prestressed concrete members?	2 M
10.	List the factors influencing the short term and long term deflections of prestressed concrete members.	2 M

PART-B
Answer the following. Each question carries TEN Marks. 5x10=50M

11.A). Define Prestressed concrete and bring out the differences between RCC and PSC. 10M

OR

11. B). A beam of size 500 mm × 1000 mm is used on simply supported span of 10 m. It is 10M
provided with a bent tendon having an eccentricity of 100 mm at the centre and an
eccentricity of 50 mm upwards at the ends. The dead load of the beam is 10kN/m.
Compute the stresses at ends and at mid span.

12. A). A concrete beam is prestressed by a cable carrying an initial prestressing force of 300 kN. 10M
The cross sectional area of the wires in the cable is 300 mm^2. Calculate the % of loss of
stress in the cable only due to Shrinkage of concrete using IS:1343 recommendations
assuming the beam to be a pretensioned and posttensioned, Assume E for steel 210
kN/mm^2.

OR

12. B). A rectangular concrete beam 100 × 300 mm is prestressed by means of eight 5 mm wires 10M
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, $E_s = 210$ kN/mm^2 and $E_c = 31.5$ kN/mm^2.

(P.T.O..)

13. A). What are the codal recommendations regarding the design of reinforcements in prestressed sections subjected to moment shear and torsion? 10M

OR

13. B). A post-tensioned bridge girder with unbounded tendons is of box section of overall dimensions 1200 mm wide by 1800 mm deep with wall thickness of 150 mm. The high-tensile steel has an area of 4000 mm2 and is located at an effective depth of 1600 mm. The effective pre-stress in steel after all losses is 1000 N/mm^2 and the effective span of the girder is 24 m. If the f_{ck} = 40 N/mm^2 and f_p = 1600 N/mm^2, estimate the ultimate flexural strength of the section. 10M

14. A). A pretensioned beam of 8 m span has a symmetrical I-section. The flanges are 200 mm wide and 600 mm thick. The web thickness is 80 mm and the overall depth of girder is 400 mm. The member is prestressed by 8 wires of 5 mm diameter located on the tension side such that the effective eccentricity is 90 mm. The initial stress in the wires is 1280 N/m^2 and the cube strength of concrete at transfer is 42 N/m^2. Determine the maximum vertical tensile stress developed in the transfer zone. 10M

OR

14. B). Develop the steps involved in the design of end blocks by Guyon's method. 10M

15. A). Explain in detail the long term deflections in prestressed members. 10M

OR

15. B). Explain in detail the short term deflections in prestressed members. 10M

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