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**R22**



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

Examination : B.Tech III Semester Regular & Supplementary Examinations Nov/Dec-2025  
Course Name : Strength of Materials-I  
Course Code : A401302  
Branch : Civil Engineering  
Date & Session : 24-11-2025 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. Define ductility and malleability. 1 M
2. What is the relationship between Bulk modulus, Young's modulus and Poisson's ratio? 1 M
3. What is the maximum bending moment in a cantilever beam of span 'L' subjected to a uniformly distributed load throughout the span. 1 M
4. What is point of contraflexure? 1 M
5. Determine the sectional modulus of a 300 mm side of a square section. 1 M
6. Sketch shear stress distribution across the T section. 1 M
7. What is the maximum deflection developed in a cantilever beam of 3m length subjected to a point load of 20 kN at free end. Take  $EI=3 \times 10^{12}$  N-mm<sup>2</sup>. 1 M
8. What are the limitations of double integration method? 1 M
9. The major and minor principal stresses on an inclined section of a bar are 50 MPa and 20 MPa respectively. What is the maximum shear stress at that section. 1 M
10. Define maximum principal strain theorem. 1 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). A compound tube consists of a steel tube 140 mm internal diameter and 160 mm external diameter and an outer brass tube 160 mm internal diameter and 180 mm external diameter. The two tubes are of the same length. The compound tube carries an axial load of 800 kN. Find the stresses and the load carrying capacity of each tube and the amount it shortens. Length of each tube is 140 mm. Take E for steel as  $2 \times 10^5$  N/mm<sup>2</sup> and for brass as  $1 \times 10^5$  N/mm<sup>2</sup>. 10M

**OR**

11. B). Derive the relationship between the three elastic constants (E, G and K). 10M
12. A). i) Draw the stress-strain diagram for mild steel with neat diagram and explain silent points. 5M  
ii) Find the maximum bending moment in a simply supported beam subjected a uniformly distributed load (w/m) throughout the beam and draw shear force and bending moment diagrams. 5M

(P.T.O.)

**OR**

12. B). A beam of span 8 m rests on supports 6m apart, the right hand end is overhanging by 2 m. The beam carries a uniformly distributed load of 10 kN/m over the entire length and a point load 3kN at the free end. Calculate maximum bending moment and shear force and draw Shear force and Bending moment diagrams and find the point of contra-flexure, if any. 10M
13. A). A simply supported steel beam of span 5 m has an unsymmetrical I-section, top flange 150 mm × 10 mm, bottom flange 100 mm × 12 mm, web 8 mm thick and the overall depth of the beam is 300 mm. Determine the maximum uniformly distributed load the beam can support, if the permissible stresses are 120 N/mm<sup>2</sup> in compression and 170 N/mm<sup>2</sup> in tension. 10M

**OR**

13. B). A simply supported beam of span 5 m carries a uniformly distributed load of 60 kN/m over its entire span. The cross-section of the beam has a T-section with flange width 150 mm, flange thickness 12 mm, web thickness 10 mm and overall depth 250 mm. Draw the distribution of shear stress across the depth of the section, subjected to maximum shear force. Also find the ratio of maximum shear stress to the average shear stress. 10M
14. A). A simply supported beam of span 6m, subjected to a point load 30 kN and 40 kN at 2m and 4m respectively from left support. Determine the deflections under the point loads and find maximum deflection. 10M

**OR**

14. B). A simply supported beam of length 4m carries two point loads of 3kN each acting at a distance of 1m from each end and 4 kN/m udl is acting between the point loads. Take  $E=2 \times 10^5 \text{ N/mm}^2$  and  $I=10^8 \text{ mm}^4$  for the beam. Determine (a) Slope at each end and under each load. (b) Deflection under each load and at the center. 10M
15. A). Explain the construction of Mohr's circle of stresses for a two-dimensional stress system accompanied by shear stress. 10M

**OR**

15. B). Two planes AB and AC which are right angles carry shear stress of intensity 17.5 N/mm<sup>2</sup> while these planes also carry a tensile stress of 70 N/mm<sup>2</sup> and a compressive stress of 35 N/mm<sup>2</sup> respectively. Determine the principal planes and the principal stresses. 10M

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**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
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**Examination** : B.Tech III Semester Regular & Supplementary Examinations Nov/Dec-2025  
**Course Name** : Engineering Geology  
**Course Code** : A401303  
**Branch** : Civil Engineering  
**Date & Session** : 26-11-2025 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 is the indication of rock being weathered? 1 M
2. How do you measure the hardness of minerals? 1 M
3. Write the physical properties of Feldspar. 1 M
4. Define rock and name any two examples to sedimentary rocks. 1 M
5. How do you determine the rock as igneous, sedimentary or metamorphic? 1 M
6. What is the use of knowing structures and textures of rocks? 1 M
7. What is an out crop? 1 M
8. What is the scale used to measure the magnitude of Earthquake? 1 M
9. Briefly explain the causes and effects of earthquakes. 1 M
10. Write a short note on grouting. 1 M

**PART-B**

**Answer the following. Each question carries TEN Marks.**

**5x10=50M**

- 11.A). Summarize any two case histories of failure of structures due to Geological draw backs. 10M
- OR**
11. B). Examine the role of physical properties for the identification of minerals. 10M
12. A). Outline the Geological classification of rocks. 10M
- OR**
12. B). Write a note on the classification of Faults. 10M
13. A). Explain the importance of shield areas and seismic belts? Write a short note on precaution to be taken for buildings construction in seismic areas? 10M
- OR**
13. B). Write a note on causes and mitigation measures to be taken in Landslide prone areas. 10M
14. A). Describe the classification of geophysical methods of gravity, magnetic methods with their Importance. 10M
- OR**
14. B). Discuss the seismic refraction principle, method and applications. 10M
15. A). Explain the role of geological considerations in Tunneling. 10M
- OR**
15. B). What are the different types of Dams? Explain how do you select a site to construct a Dam. 10M

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**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
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**Examination** : B.Tech III Semester Regular & Supplementary Examinations Nov/Dec-2025  
**Course Name** : Surveying  
**Course Code** : A401304  
**Branch** : Civil Engineering  
**Date & Session** : 28-11-2025 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 one difference between a chain and a tape. 1 M
2. Find out the representative fraction (R.F.) for a scale where 1 cm on map represents 40 m on the ground. 1 M
3. Define Contour. 1 M
4. Apply the HI method to compute RL when HI=150.000 and FS=2.340. 1 M
5. State one limitation of planimeter measurement. 1 M
6. What are the temporary adjustments of theodolite? 1 M
7. Write one advantage of using Gale's traverse table in the field. 1 M
8. What is a stadia interval? 1 M
9. Write one advantage of GPS over conventional surveying for long baselines. 1 M
10. What does EDM stand for? In modern survey methods. 1 M

**PART-B**

**Answer the following. Each question carries TEN Marks.**

**5x10=50M**

- 11.A). Explain the difference between accuracy and precision in distance measurement; illustrate with examples from chain and EDM. 10M

**OR**

11. B). A line measured with a 20 m tape shows 7 full lengths and 3.75 m remainder. Calculate the measured distance. Apply corrections if tape is 4 cm too short. 10M

12. A). Following consecutive readings were taken with a level and 4m staff on a continuously sloping ground at a common interval of 30m. Reduce level of the first point A was 180.750m. Rule out a page of a level field book and enter the above readings. Calculate reduce levels of the points by HI method. Apply Arithmetic check. Also find the difference in RL from first point to last point. 10M

0.780	1.535	1.955	2.430	2.985	3.480	1.155	1.960	2.365
3.640	0.935	1.045	1.630	2.545				

**OR**

12. B). Describe characteristics and applications of contours. Draw neat sketches. 10M

13. A). Describe methods to compute volume between two level sections (prismoidal & trapezoidal) and give formulae. 10M

**OR**

13. B). With neat diagram, Explain the fundamental lines of a theodolite and temporary adjustments. 10M

(P.T.O.)

14. A). Two straights AB and BC meet at a chainage of 3450 m. Calculate all the necessary data for setting out a simple circular curve of 250m radius joints them the deflection angle  $50^{\circ}$  by the method of offsets from the long chord. 10M

**OR**

14. B). The staff intercept on a vertical staff is 2.20 m. The vertical angle is  $+6^{\circ}$ , and the constants are  $k=100$ ,  $c=0$ . Compute horizontal and vertical distances. 10M

15. A). Describe GPS segments (space, control, user) and their functions. 10M

**OR**

15. B). Critically evaluate the choice between total station and GPS for a multi-km topographic survey in hilly terrain — include accuracy, logistics and cost. 10M

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14. A). Explain in detail Darcy-wiesbach equation with derivation. 10M

**OR**

14. B). A pipe of diameter 500 mm and 5000 m connects two reservoirs A and B. The difference of the water levels of these reservoirs is 20 m. Half way along the pipe there is a branch through which water can be discharged to a third reservoir C. Find the rate of flow to the reservoir B when i) No water is discharged to the reservoir C and ii) The discharge to the reservoir C is  $0.05 \text{ m}^3/\text{sec}$ . Take  $f= 0.0006$  for all pipes. 10M

15. A). Define the terms: drag and lift. Derive the expression for drag and lift. 10M

**OR**

15. B). Explain in detail about displacement thickness, momentum thickness and energy thickness. 10M

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