H.T No: | | | | | | | | | | | **R18** **Course Code: A30108**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations January-2025

Course Name: Strength of Materials-II

(Civil Engineering)

Date: 09.01.2025 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 torsional rigidity of the solid circular shaft. 2 M
2. The shearing stress in a solid shaft is not to exceed 40 N/mm^2 when the torque transmitted is 20000 N-m. Determine the minimum diameter of the shaft. 2 M
3. Illustrate the assumptions made in the Euler's column theory. 2 M
4. Distinguish between the column and struts. 2 M
5. What is the effect of lateral load on the buckling of columns. 2 M
6. Identify the expression for maximum deflection, maximum bending moment and maximum stress of a beam column simply supported and carrying a UDL of intensity w per unit length. 2 M
7. Define Shear centre. 2 M
8. Construct the conditions of principal plane. 2 M
9. Outline the concept of thick compound cylinder. How will you determine the hoop stresses in a thick compound cylinder. 2 M
10. List out the modes of failure in thin cylindrical shell due to an internal pressure. 2 M

PART-B

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

11.A). A solid shaft has to transmit the power 105 KW at 2000 rpm. The maximum torque transmitted in each revolution exceeds the mean by 36%. Estimate the suitable diameter of the shaft if the shear stress is not to exceed 75 N/mm^2 and maximum angle of twist is 1.5° in a length of 3.3 m and G=0.8 X 10^5 N/mm^2. 10M

OR

11. B). A Closed coil helical spring made up of 10 mm diameter steel wire has 15 coils of 100mm mean diameter. The spring is subjected to an axial load of 100 N. Examine 10M

i. The maximum shear stress induced
ii. The deflection
iii. Stiffness of the spring

Take Modulus of rigidity of the material of the spring as 8.16 x10^4 N/mm^2.

12. A). A 1.5 m long cast iron has a circular cross section of 50 mm diameter. Use end of the column is fixed in direction and position and the other end is free. Taking the factor of safety as 3. Determine the load using Rankine Gordon formula. Take yield stress as 560 MPa and a=1/1600. 10M

(P.T.O..)

OR

12. B). A bar of length 6 m when used as a simply supported beam and subjected to a UDL of 30 KN/m over the whole span deflects 15 mm at the centre. Develop the crippling loads when it is used as a column with the following end condition
i.Both ends fixed
ii.Both ends pin-jointed
iii.one end fixed and the other end hinged. 10M

13. A). Identify the concept circular beams loaded uniformly and supported on symmetrically placed columns. 10M

OR

13. B). Formulate the equation for maximum bending moment of a strut subjected to compressive axial load and a transverse point load at centre whose both the ends are pinned. 10M

14. A). Explain the stresses developed during unsymmetrical bending. Asses an expression for shear centre of a channel section. 10M

OR

14. B). Two planes AB and AC which are rigid angles carry shear stress of intensity 17.5 N/mm^2 while these planes also carry a tensile stress of 70 N/mm^2 and compressive stress of 35 N/mm^2 respectively. Identify the principal planes and principal stresses. 10M

15. A). Determine the maximum and minimum hoop stress across the section of a pipe of 400 mm internal diameter and 100 mm thick, when the pipe contains a fluid at a pressure of 8 N/mm^2.Also summarize sketch the radial pressure and hoop stress distribution across the section. 10M

OR

15. B). A cylindrical vessel whose ends are closed by means of rigid flange plates, is made of steel plate 3 mm thick.The length and the internal diameter of the vessel are 50 cm and 25 cm respectively. Determine the longitudinal and hoop stress in the cylindrical shell due to an internal fluid pressure of 3 N/mm^2. 10M

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30111**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations January-2025

Course Name: Concrete Technology

(Civil Engineering)

Date: 20.01.2025 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.	Summarize about accelerators and retarders.	2 M
2.	List all properties of aggregates.	2 M
3.	What is workability of concrete?	2 M
4.	What is self-consolidating concrete?	2 M
5.	What is importance of NDT test?	2 M
6.	What is Gel-Space ratio?	2 M
7.	Write about no fines concrete.	2 M
8.	Write the different methods of concrete mix design.	2 M
9.	Explain light weight concrete.	2 M
10.	List the benefits of high performance concrete.	2 M

PART-B

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

11.A).	i) What is gap graded and well graded aggregate as per IS CODE?	6M
	ii) Outline chemical composition of cement.	4M
	OR	
11. B).	i) What are the mineral and chemical admixtures? Explain any two admixtures with example.	7M
	ii) List classification of aggregate.	3M
12. A).	Define workability and explain the factors affecting workability of concrete.	10M
	OR	
12. B).	i) Explain in detail segregation and bleeding.	7M
	ii) What is durability of concrete?	3M
13. A).	i) What are the different tests of hardened concrete? Explain any one test.	7M
	ii) What is Gel-Space ratio?	3M
	OR	
13. B).	Write about water cement ratio and Abram's law with neat sketches.	10M
14. A).	Design a concrete mix for characteristic strength of 30MPa at 28 days with a standard deviation of 5MPa.The specific gravity of FA and CA are 2.60 and 2.70 respectively. A slump of 60mm is necessary. The specific gravity of cement is 3.15. Assuming the necessary data design the mix as per IS code method.	10M

(P.T.O..)

OR

14. B). Explain formwork, different types of formworks and its selection. 10M

15. A). Explain the following: 10M
i) Cellular concrete ii) Polymer concrete iii) High performance concrete.

OR

15. B). i) Write about high density concrete. 5M
ii) Explain about self-compacting concrete. 5M

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H.T No: | | | | | | | | | | | **R18** | **Course Code: A30112**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations January-2025

Course Name: Structural Analysis-I

(Civil Engineering)

Date: 22.01.2025 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

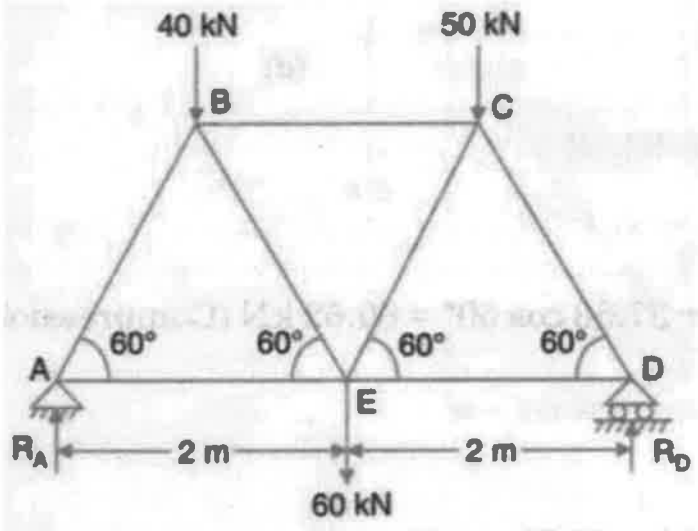
Each question carries TWO marks. **10x2=20M**

1. What is meant by perfect frame? Also write the expression with an example. 2 M
2. Differentiate between perfect frame and imperfect frame with examples. 2 M
3. What is strain energy? Write the expression for strain energy due to axial load 2 M
4. Write the types of arches based on the number of hinges 2 M
5. What are the steps involved in the analysis of propped cantilever? 2 M
6. State the degree of indeterminacy in a fixed beam 2 M
7. What are the assumptions made in slope-deflection method? 2 M
8. Differentiate between distribution factors and carry over factor. 2 M
9. What is the use of influence line diagram 2 M
10. Name the type of rolling loads for which the absolute maximum bending moment occurs at the mid span of a beam? 2 M

PART-B

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

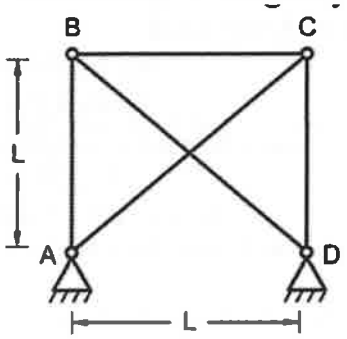
11.A). Determine the forces in all the members by joint method for the truss shown in figure and indicate the magnitude and nature of the forces on the diagram of the truss. All inclined members are at 60° to horizontal and length of each member is 2m. 10M



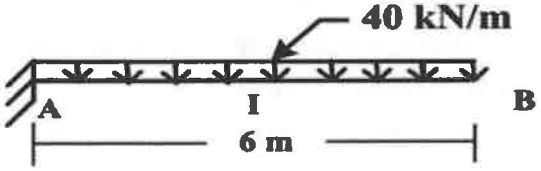
(P.T.O.)

OR

11. B). Determine the force in various members of the pin-jointed frame as shown in Fig. If the member BC is short by an amount of δ. All members of the frame have same axial rigidity as AE. 10M

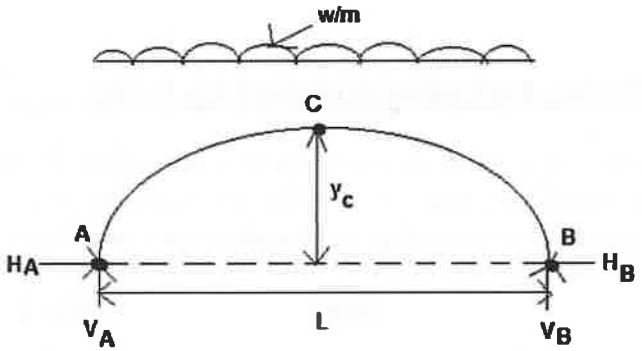


12. A). Determine the slope and deflection at free end of a cantilever beam subjected uniformly distributed load of w/m length as shown in figure by unit load method. 10M



OR

12. B). Derive the expression for the horizontal thrust in a three hinged parabolic arch carrying UDL over entire span. 10M

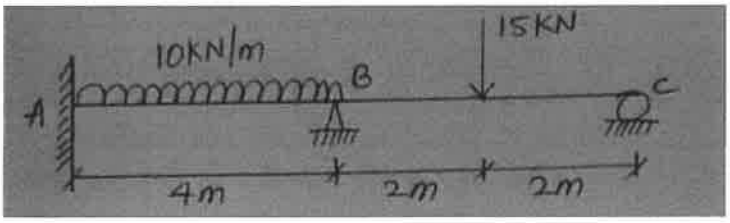


13. A). Analyze the propped cantilever beam of the length 10m is subjected to point load of 10kN acting at a 6m from fixed and draw SFD and BMD. 10M

OR

13. B). Find the fixing moments and support reactions of a fixed beam AB of length 6m, carrying a uniformly distributed load of 4kN/m over the left half of the span. Also draw the SFD and BMD. 10M

14. A). Analyze the continuous beam by slope-deflection method and also draw SFD and BMD if support B sinks by 3 mm, E= 200kN/m^2 and I= 4 x 10^7 mm^4. 10M



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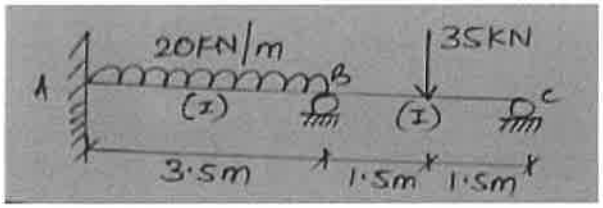
OR

14. B). Analyze the continuous beam by moment distribution method and also draw SFD and BMD. If support B sinks 1cm. Take EI=500 kNm^2. 10M



15. A). Draw ILD for Shear Force and Bending moment at a distance '2m' from left support for double overhanging beam carrying a unit load concentrated load. The span between supports is 8m and the overhang on either side is 2.5m. 10M

OR

15. B). Two point loads of 100 kN and 200 kN spaced 3 m apart cross a girder of span 12 m from left to right with the 100 kN leading. Draw the ILD for shear force and bending moment and find the values of maximum shear force and bending moment at a section 4 m from the left hand support. Also evaluate the absolute maximum bending moment due to the given loading system. 10M

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H.T No: | | | | | | | | | | | R18 | Course Code: A30109

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations January-2025

Course Name: Hydraulics and Hydraulics Machinery

Branch : CIVIL

Date: 27.01.2025 FN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

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

1.	What are the conditions for the rectangular channel to be the most economical section?	2 M
2.	Differentiate subcritical and supercritical flows	2 M
3.	Define the principle of Dimensional Homogeneity	2 M
4.	What are the various similarities that should exist between the model and prototype?	2 M
5.	Differentiate Gross head and Effective head of a turbine	2 M
6.	What is meant by angular momentum principle?	2 M
7.	Differentiate Hydraulic efficiency and Mechanical efficiency	2 M
8.	What is meant by governing of turbines?	2 M
9.	Classify the Centrifugal pumps according to the type of casing provided	2 M
10.	Define load factor and capacity factor with respect to hydroelectric power station	2 M

PART-B

Answer any FIVE questions. One question from each unit either A or B (Compulsory)

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

11. A. What is specific energy curve? Draw specific energy curve, and derive expressions for critical depth and critical velocity — 10M

OR

11. B. Derive an expression for loss of energy due to hydraulic jump — 10M

12. A. i) State and explain Rayleigh method of dimensional analysis — 5M

ii) Define the terms Geometric similarity, Kinematic similarity and Dynamic similarity — 5M

OR

12. B. The resisting force F of a plane during flight can be considered as depending upon length of the aircraft L, velocity V, air viscosity μ, air density ρ and bulk modulus of air k. Derive the functional relationship between these variables using dimensional analysis — 10M

13. A. i) A jet of water of diameter 50 mm strikes a fixed plate in such a way that the angle between the plate and the jet is 30^0. The force exerted in the direction of the jet is 1471.5 N. Determine the rate of flow of water.

ii) Draw a sketch to show the layout of a typical Hydropower installation and explain it in brief. — 5M

(P.T.O)

5M

OR

13. B. A 7.5 cm diameter jet having a velocity of 30 m/s strikes a flat plate, the normal of which is inclined at 45^0 to the axis of the jet. Find the normal pressure on the plate: (i) when the plate is stationary and (ii) when the plate is moving with a velocity of 15 m/s and away from the jet. Also determines the power and the efficiency of the jet when the plate is moving. 10M

14. A. i) Define and explain hydraulic efficiency, manometric efficiency and overall efficiency of a turbine. What is the relation between them? 5M

ii) Define the term specific speed of a turbine. Derive an expression for specific speed 5M

OR

14. B. A reaction turbine works at 450 r.p.m. under a head of 120 meters. Its diameter at inlet is 120 cm and the flow area is 0.4 m2. The angles made by absolute and relative velocities at inlet are 20^0 and 60^0 respectively with the tangential velocity. Determine:

a) the volume flow rate b) the power developed

c) Hydraulic efficiency 10M

15. A. i) Define specific speed of a centrifugal pump. Derive an expression for the same. 5M

ii) What do you understand by characteristic curves of a pump? What is the significance of the characteristic curves? 5M

OR

15. B. The impeller of a centrifugal pump having external and internal diameters 500 mm and 250 mm respectively, width 50 mm at outlet and running at 1000 rpm, works against a head of 40 m. The velocity of flow through the impeller is constant and is equal to 2.5 m/sec. The vanes are set back at an angle of 40^0 at the outlet. Determine (i) the inlet vane angle (ii) work done by the impeller on water per sec (iii) manometric efficiency 10M

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