H.T No: | | | | | | | | | | | R22

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : **B.Tech IV Sem Supplementary Examinations January-2025**
Course Name : **Hydraulics and Hydraulics Machinery**
Course Code : **A401308**
Branch : **Civil Engineering**
Date & Session : **07-01-2025 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. Write the expression for chezy's formula for open channel flow. 1 M
2. Explain the terms Critical depth of a flowing liquid. 1 M
3. Explain positive surge. 1 M
4. List any two bottom slopes of non-uniform flow. 1 M
5. Write the expression for force exerted by jet on stationary vane placed normal to the jet. 1 M
6. Write any two methods of dimensional analysis. . 1 M
7. Expression for Unit Speed of a turbine. 1 M
8. Write any two types of turbines. 1 M
9. Define Cavitation in Pumps. 1 M
10. Write any two types of Centrifugal pump. 1 M

PART-B

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

11.A). i) Define the term most economical section of a channel. What are the conditions for the rectangular channel of the best section. 5M

ii) Find the velocity of flow and rate of flow of water through a rectangular channel of 6m wide and 3m deep, when it is running full. The channel is having bed slope as 1 in 2000. Take Chezy's constant C=55. 5M

OR

11. B). i) Explain briefly about specific energy curves. 4M

ii) Derive an expression for critical depth of rectangular channel. 6M

12. A). i) Define hydraulic jump. And write its characteristics 4M

ii) A sluice gate discharges water into a horizontal rectangular channel with a velocity of 10m/s and depth of flow of 1m. Determine the depth of flow after the jump and consequent loss in total head. 6M

OR

12. B). i) Explain classification of surface profiles which occur in mild sloped channels. 5M

ii) Explain the terms: Specific energy of a flowing liquid, minimum specific energy and critical depth 5M

(P.T.O..)

13. A). i) What do you mean by dimensional numbers? Name any four-dimensional numbers 4M
ii) Write the step by step procedure for dimensional analysis by using buckingham's π method 6M

OR

13. B). i) Derive an expression for force exerted by a jet on moving symmetric curved plate when jet is striking at the Centre 5M

ii) A jet of water of diameter 50mm moving with a velocity of 40m/s, strikes a curved fixed plate at the Centre. Find the force exerted by the jet of water in the direction of the jet, if jet is deflected through an angle of 120^0 at the outlet of the curved plate. 5M

14. A). What do you understand by the characteristics curves of turbine? Explain the main characteristic curves of a Francis turbine. 10M

OR

14. B). A pelton wheel has a mean bucket speed of 15 m/s with a jet of water flowing at the rate of 700 litres/sec under a head of 50 meters. The buckets deflect the jet through an angle of 160^0. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume co-efficient of velocity as 0.98 10M

15. A). i) Derive an expression for the specific speed of a centrifugal pump. 4M

ii) A centrifugal pump has an impeller diameter 30 cm whose width at exit is 6cm. The velocity of flow through the impeller is constant at 3m/sec. The impeller vanes are radial at the outer periphery. If the speed is 1000 r.p.m. and the manometric efficiency is 80%. Calculate the head developed and the discharge. 6M

OR

15. B). i) Explain briefly manometric efficiency, mechanical efficiency and overall efficiency of centrifugal pump. 5M

ii) Draw the indicator diagram for slip of single acting reciprocating pump. 5M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : **B.Tech IV Sem Supplementary Examinations January-2025**
Course Name : **Concrete Technology**
Course Code : **A401306**
Branch : **Civil Engineering**
Date & Session : **09-01-2025 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 Flakiness index?	1 M
2.	Explain the phenomenon of bulking of sand.	1 M
3.	Classify the methods are adopted for compacting the Concrete.	1 M
4.	What is the effect of time on workability?	1 M
5.	Why the split tensile strength test is an indirect method?	1 M
6.	How is the secant modulus determined from stress strain curve?	1 M
7.	What is the difference between creep and shrinkage?	1 M
8.	What is the shrinkage strain value considered for concrete as per Indian Standards	1 M
9.	What is 'no fines concrete'?	1 M
10.	What is statistical quality control of concrete?	1 M

PART-B

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

11.A).	Describe the types of aggregate and explain the effects of aggregate on properties of concrete.	10M
	OR	
11. B).	Explain any four important tests used to assess the quality of aggregate for the use in concrete construction.	10M
12. A).	Elaborate comprehensively on the various factors influencing the workability of concrete.	10M
	OR	
12. B).	Explain the process of manufacture of concrete in detail, also Discuss in detail about segregation and bleeding.	10M
13. A).	Explain different types of curing of concrete. Discuss the potential short term and long term consequences of inadequate curing and discuss what measures can be taken to mitigate these effects?	10M
	OR	
13. B).	What is Non destructive testing? Explain any two NDT tests on concrete.	10M
14. A).	Discuss the relationship between creep and time and explain different factors affecting creep of concrete.	10M

(P.T.O..)

OR

14. B). Explain procedure for determining poisons ratio from dynamic modulus of elasticity using Ultrasonic pulse velocity equipment. 10M

15. A). Write the procedure of Mix Design with reference to the provisions as per BIS method. 10M

OR

15. B). Explain in detail about different types of fibers used in concrete. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination	:	**B.Tech IV Sem Supplementary Examinations January-2025**
Course Name	:	**Probability & Statistics**
Course Code	:	**A400005**
Branch	:	**Civil Engineering**
Date & Session	:	**10-01-2025 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. One card is selected at random from 25 cards numbered 1 to 25. Find the probability that the number on card is divisible by 5 ? 1 M
2. State Probability with an example. 1 M
3. When the binomial distribution tends to Poisson distribution? 1 M
4. Define mean and variance of discrete random variable. 1 M
5. Define normal distribution. 1 M
6. If a random variable has a probability distribution such that p(1)=p(2) then find mean of Poisson of distribution. 1 M
7. When is the t-test used? 1 M
8. Define estimation. 1 M
9. Define rank correlation. 1 M
10. Write different types of regression lines. 1 M

PART-B

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

11.A). Probability density function of random variable X is given by 10M

$$f(x) = \begin{cases} \frac{1}{2}sinx, & 0 \le x \le \pi \\ 0, & elsewhere \end{cases}$$

Find (i) median (ii) find the probability between 0 and $\pi/2$

OR

11. B). State and prove Baye's theorem. 10M

12. A). If a random variable has a Poisson distribution such that P(1)=P(2), Find i) Mean of the distribution ii) P(4) iii) P(X≥1) iv) P(1<X<4) 10M

OR

12. B). Out of 500 families with 5 children each, how many would you expect to have (a) 3 boys (b) 5 girls (c) Either 2 or 3 boys (d) At least 1 boy. Assume equal probabilities for boys and girls. 10M

(P.T.O..)

13. A). A population consists of five numbers 2,3,6,8, and 11. Consider all possible samples of size two which can be drawn with replacement from the population. Find 10M

i. The mean of the population.
ii. The standard deviation of the population.
iii. The mean of the sampling distribution of means and the standard deviation of the sampling distribution of means.

OR

13. B). The uniform distribution is given by $f(x) = \begin{cases} k, & a \le x \le b \\ 0, & elsewhere \end{cases}$ 10M

14. A). A manufacturer claims that only 4% of his products are defective. A random sample of 500 were taken among which 100 were defective. Test the hypothesis at 0.05 level of significance? 10M

OR

14. B). Two independent samples of 8 and 7 items respectively had the following values 10M

Sample-I	11	11	13	11	15	9	12	14
Sample-II	9	11	10	13	9	8	10	-

Is the difference between the means of samples significant?

15. A). Determine the least square regression line of (i) Y on X (ii) X on Y(iii) find Y when X=8 10M

X	12	10	14	11	12	9
Y	18	17	23	19	20	15

OR

15. B). Fit a curve of the form $y=a+bx+cx^2$ for the following data and hence find the value of y when x = 23. 10M

x	10	15	20	25	30	35
y	35.3	32.4	29.2	26.1	23.2	20.5

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	**B.Tech IV Sem Supplementary Examinations Jan-2025**
Course Name	:	**Strength of Materials-II**
Course Code	:	**A401307**
Branch	:	**CIVIL**
Date & Session	:	**25-01-2025 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. Torque is _____ moment. 1 M
a) Twisting b) shear c) Bending d) Couple

2. In shafts with keyways the allowable stresses are usually....of the value given. 1 M
(a) 25 percent (b) 50 percent (c) 75 percent (d) 95 percent

3. If a slenderness ratio of a column is more than 120 it is termed as 1 M
(a) short column (b) medium column (c) long column (d) none of the above.

4. Euler's buckling formula is applicable for columns
(a) subjected to eccentric loads (b) having initial curvature 1 M
(c) initially straight and subjected to only axial loads (d) none of the above

5. An eccentric load W, with eccentricity e, is equivalent to -----
(a) an axial load W (b) a moment equal to W × e 1 M
(c) both (a) and (b) (d) none of the above

6. The brick chimney is stable if the resultant thrust lies within the middle___ 1 M
(a) third (b) half (c) either of the above (d) none of the above.

7. When a thin cylindrical shell is subjected to internal fluid pressure, which of the following stress is developed in its wall? 1 M
(a) Circumferential stress (b) Longitudinal stress (c) both (a) and (b) (d) none of the above

8. In a thick cylinder the radial stress at the outer surface is 1 M
(a) always more than zero (b) always less than zero (c) usually equal to zero (d) none of the above.

9. In the case of unsymmetrical bending, the direction of neutral axis is 1 M
(a) perpendicular to the plane of bending (b) not perpendicular to the plane of bending (c) either (a) or (b) (d) none of the above.

10. . In an I-section, symmetrical about XX and YY axes, shear centre lies at 1 M
(a) centroid of the top flange (b) centroid of the web
(c) at the centroid of the bottom flange (d) none of the above.

(P.T.O.)

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. A copper bar inscribed in a hollow circular shaft of steel having internal diameter 50mm. if the composite shaft is Subjected to torsion of 1000 N-m. Find the external diameter of the steel shaft. If torsion resisted by steel & copper is Equal. Length of the shaft is 2.5m and Gs =80Gpa, Gc= 60 Gpa. 10M

OR

11. B. Derive torsion equation T/J = q/r = Gθ/L with neat sketch 10M

12. A. A solid round bar 3m long and 5cm in diameter is used as a strut with following end conditions, E= $2X10^5 N/mm^2$ Determine Crippling or collapsing load. i) Both ends hinged ii) One end is fixed and other is free iii) Both the ends are fixed iv) One end is fixed and other is hinged. 10M

OR

12. B. Determine the expression for crippling load when both the ends of the column is fixed. 10M

13. A. A short column of 20 cm external diameter and 15 cm internal diameter, when subjected to a load the stress measurements indicate that the stress varies from 150 MN/m2 compressive at one end to 25 MN/m2 tensile on the other end. Estimate the load and distance of the line of action from the axis of the column 10M

OR

13. B. A masonry chimney 24 metres high, of uniform circular section, 3.5 metres external diameter and 2 metres internal diameter is subjected to a horizontal wind pressure of 1 kN/m2 of projected area. Find the maximum and minimum stress intensities at the base, if the specific weight of masonry is 22 kN/m3. 10M

14. A. A cylindrical vessel whose ends are closed by means of rigid flange plates is made of steel plate 3 mm thick. The internal length and diameter of vessel are 50 cm and 25 cm respectively. Determine the longitudinal and circumferential stresses in the cylindrical shell due to an internal fluid pressure of 3 MN/m2 . Also calculate increase in length, diameter and volume of the vessel. Take E = 200GN/m2, Poisson's ratio =0.23 10M

OR

14. B. A steel cylinder of 1000 mm inside diameter is to be designed for an internal pressure of 4·8 MN/m2. Calculate: (i) The thickness if the maximum shearing stress is not to exceed 21 MN/m2. (ii) The increase in volume, due to working pressure, if the cylinder is 7 m long with closed ends. Neglect any constraints due to ends. Take: E = 200 GN/m2; Poisson's ratio = 1/3. 10M

15. A. Determine the position of the shear centre for a channel section of 120mm*120mm outside and 10mm thick. 10M

OR

15. B. Derive the equation of Shear center for unequal I-section 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	**B.Tech IV Sem Supplementary Examinations January-2025**
Course Name	:	**Structural Analysis-I**
Course Code	:	**A401309**
Branch	:	**Civil Engineering**
Date & Session	:	**27-01-2025 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 the redundant. 1 M
2. State the difference between a perfect frame and an imperfect frame. 1 M
3. Define the radial shear force as applied in three-hinged arches. 1 M
4. Enunciate Eddy's theorem. 1 M
5. What do you understand by the term 'prop'? 1 M
6. List out the advantages of a fixed beam. 1 M
7. Define the continuous beam. 1 M
8. List out the assumptions made in the slope deflection method. 1 M
9. Define the focal length. 1 M
10. Draw the influence lines for the bending moment, when one concentrated load cross over a beam. 1 M

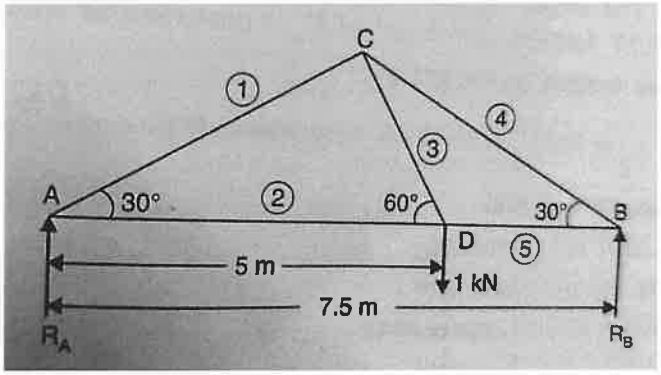
PART-B

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

11.A). List out the advantages of method of section over method of joints. Explain the method of section in finding forces in the members of a truss. 10M

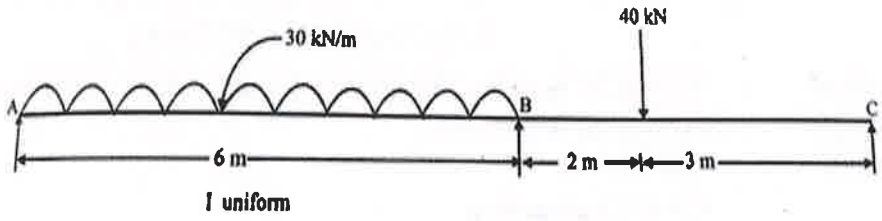
OR

11. B). A truss of span *7.5 m* carries a point load of *1 kN* at joint *D* as shown in fig. Determine the reactions and forces in the members of the truss by method of joints. 10M



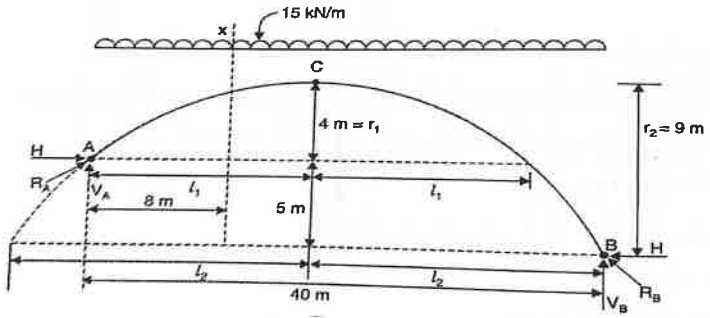
(P.T.O..)

12. A). Analysis the continuous beam shown in fig. by strain energy method. Determine the reactions. (*EI* is constant). 10M

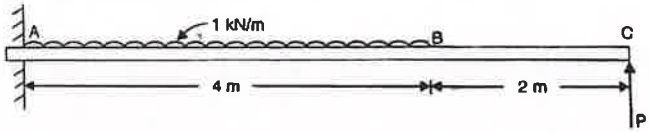


OR

12. B). A three hinged parabolic arch of *40 m* span has abutments at unequal levels. The highest point of the arch is *4 m* above left support and *9 m* above the right abutment. The arch is subjected to an *u.d.l* of *15 kN/m* over its entire horizontal span. Determine the horizontal thrust and bending moment at a point *8 m* from the left support. 10M



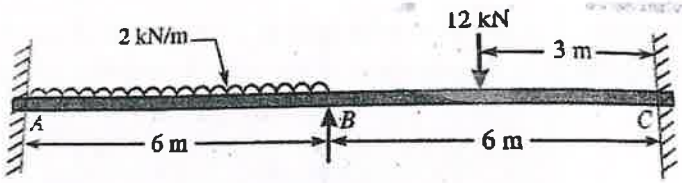
13. A). A cantilever ABC is fixed at A and rigidly propped at C and is loaded as shown in figure. Find the reaction at C. 10M



OR

13. B). A beam of span *l* is fixed at its both ends. It carries two concentrated loads of *W* each at a distance of *l/3* from both the ends. Determine the fixing moments and draw the bending moment diagram. 10M

14. A). Determine beam *ABC 12 m* long rests on three supports *A, B*, and *C* at the same level and is loaded as shown in fig 10M

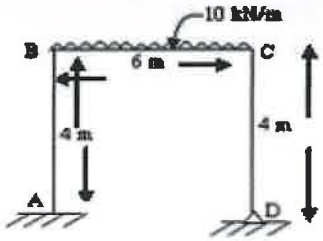


Determine the moments over the beam calculate the reactions at the supports. Draw Shear force and Bending moment diagrams.

(Apply Clapeyron's Theorem of Three Moments)

OR

14. B). Analyze the portal frame as shown in fig. by slope deflection method and draw the bending moment diagram. (Take the moment of inertia is constant) 10M



(P.T.O)

15. A). Two-point loads of *120kN* and *160kN* spaced *5m* apart, cross a girder of *25m* span from left to right with the *120kN* load loading. Construct the maximum shear force and bending moment diagrams starting the absolute maximum values. 10M

OR

15. B). A simply supported beam has a span of *20m*. A uniformly distributed load of *20kN/m*. Using influence lines determine the maximum bending moment produced at a point 8 m from the left support. 10M

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