

H.T No:

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R18

Course Code: A30531



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech IV Semester Regular/Supplementary Examinations August-2023

Course Name: PYTHON PROGRAMMING

(Common for EEE, ME, ECE, CSE, IT, CSC & CSM)

Date: 07.08.2023 AN

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. Identify the difference between the if, if-else, if-elif-else statements. | 2 M |
| 2. Outline the Characteristics of functions and modules. | 2 M |
| 3. What are local variable and how they are used? | 2 M |
| 4. Show the need of Void function. | 2 M |
| 5. Summarize about two dimensional Lists. | 2 M |
| 6. Discuss the need of Recursion. | 2 M |
| 7. Determine the Benefits of Instances. | 2 M |
| 8. Distinguish between Classes and Objects. | 2 M |
| 9. Classify the need of Turtle graphics. | 2 M |
| 10. How to use Widgets in python? | 2 M |

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- | | |
|---|-----|
| 11.A. i) Identify the most Commonly used Repetition structures in Python | 5M |
| ii) Write a Python program to convert height in feet and inches to cm. [1 feet = 12 inch and 1 inch= 2.54 cm] (Sample input: 2 feet 7 inch Sample output: 78.74 cm) | 5M |
| OR | |
| 11. B). Summarize various operators, built-in functions and standard library modules that deals with python numeric type. | 10M |
| 12. A). i) Outline the declaration and calling of functions in Python? Illustrate with an example. | 5M |
| ii) Demonstrate the process of storing functions in Modules. | 5M |
| OR | |
| 12. B). i) Write a Python program to print all prime numbers less than 256 using Functions | 5M |
| ii) What type of parameter passing is used in Python? Justify your answer with sample programs. | 5M |
| 13. A). i) Demonstrate the process finding items in Lists with the in Operator. | 5M |
| ii) Illustrate a Python program that counts the number of occurrences of a letter in a string, using dictionaries. | 5M |
| OR | |
| 13. B). i) What is a list in Python? How to create nested lists? Demonstrate how to create and print a 3-dimensional matrix with lists. | 5M |
| ii) Write a python program to convert 'a, e, i, o, u' letters in a string with 'w, x, y, z, p' using string translate method. | 5M |

(P.T.O.)

14. A). i) Classify the Techniques for Designing Classes. 5M
ii) Elaborate the implementation of hierarchical inheritance in Python, with a program. 5M

OR

14. B). i) Construct a python program to show the polymorphism in Python. 5M
ii) How does Instances are created in python show with an example? 5M

15. A). i) Can you categorize the different widgets in GUI designing. 5M
ii) Show the implementation of two dimensional shapes. 5M

OR

15. B). i) Elaborate the implementation of Radio Buttons, labels and Check Buttons in Python. 5M
ii) How to Develop a python program to show Button widgets and Info Dialog boxes? 5M

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R18

Course Code: A30007



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech IV Semester Regular/Supplementary Examinations August-2023

Course Name: NUMERICAL TECHNIQUES & PROBABILITY DISTRIBUTIONS

(Common for CE, ME, CSE, IT, CSC & CSD)

Date: 09.08.2023 AN

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. Find an iterative formula for $\frac{1}{N}$, $N > 0$ using Newton-Raphson method. 2 M
2. What is Lagrange's interpolation formula? 2 M
3. What is the order and error of Trapezoidal rule? 2 M
4. Find $y(0.4)$ if $\frac{dy}{dx} = x^2 - 2xy$, $y(0) = 2$ with the assumption $h = 0.25$ using Euler's method. 2 M
5. Find the Laplace transform of $t \cosh at$. 2 M
6. Find the inverse Laplace transform of $\frac{1}{s(s^2+a^2)}$. 2 M
7. If X is a discrete RV having the following probability distribution 2 M

x	1	2	3
$p(x)$	k	k	k^2

Find the value of k .
8. Find $P(X = 2)$ if X is binomially distributed with mean 5 and standard deviation 2 2 M
9. What is meant by contingency table? 2 M
10. List any two uses of chi-square test. 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Determine the positive root of $x^3 - 4x - 9 = 0$ by bisection method. 10M
- OR**
11. B). Use Newton's formula to estimate the polynomial $f(x)$ satisfying the following data, and hence find the value of $f(4)$ 10M

x	0	1	2	3
$f(x)$	1	2	1	10
12. A). Divide the range in to 6 equal parts, to find $\int_0^6 \frac{dx}{1+x^2}$ using Trapezoidal and Simpson's rule. Compare with the actual integration. 10M
- OR**
12. B). Examine the value of $y(0.1)$, $y(0.2)$ if $\frac{dy}{dx} = x - y^2$, $y(0) = 1$ using Fourth order Runge-Kutta method (assume $h = 0.1$). 10M

(P.T.O..)

13. A). Identify the Laplace transform of the "square wave" function $f(t)$ is defined by 10M

$$f(t) = \begin{cases} k & \text{if } 0 \leq t \leq a \\ -k & \text{if } a < t \leq 2a \end{cases} \text{ and } f(t + 2a) = f(t) \text{ for all } t.$$

OR

13. B). Solve $y'' + 4y' + 3y = e^{-t}$ given $y(0) = 1 = y'(0)$, using Laplace transform. 10M

14. A). A random variable gives measurements X between 0 and 1 with probability density function $f(x) = 12x^3 - 21x^2 + 10x, 0 \leq x \leq 1$. Find the following: 10M

(i) $P\left[X \leq \frac{1}{2}\right]$ and $P\left[X > \frac{1}{2}\right]$

(ii) the value of k such that $P[X \leq k] = \frac{1}{2}$.

OR

14. B). Messages arrive at a switchboard in a Poisson manner at an average rate of six per hour. Find the probability for each of the following events: 10M

- i). Exactly two messages arrive within one hour
- ii). No message arrives within one hour
- iii). At least three messages arrive within one hour.

15. A). Test the significance of the difference between the means of the samples, drawn from two normal populations with same S.D. from the following data. 10M

	Size	Mean	S.D.
Sample-1	100	61	4
Sample-2	200	63	6

OR

15. B). The theory predicts that the proportion of beans in the four groups A, B, C and D should be $9 : 3 : 3 : 1$. In an experiment among 1600 beans, the numbers in the four groups were 882, 313, 287 and 118. Do the experimental results support the theory? 10M

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Course Code: A30108



CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Regular & Supplementary Examinations August-2023

Course Name: **STRENGTH OF MATERIALS-II**

(Civil Engineering)

Date: 11.08.2023 AN

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 is the equation to calculate power transmitted by a shaft. 2 M
2. Write about types of springs. 2 M
3. Define short column and long column. 2 M
4. What are the limitations of Euler's Formula. 2 M
5. Distinguish clearly between direct stress and bending stress. 2 M
6. Name the various types of dams commonly used these days. 2 M
7. Differentiate between symmetrical and unsymmetrical bending 2 M
8. State the assumptions made in analyzing a beam for unsymmetrical bending. 2 M
9. What is the formula for circumferential stress and longitudinal stress in a cylindrical shell, when subjected to an internal pressure. 2 M
10. What do you understand by the term 'Lame's Theory' ? 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Calculate the maximum stress in a propeller shaft with a 400mm external and 200mm internal diameter, when subjected to a twisting moment of 4650Nm. If the modulus of rigidity, $C=82\text{GN/m}^2$, how much is the twist in a length 20 times the diameter? 10M

OR

11. B). The stiffness of a closely coiled helical spring is 1.5 N/mm of compression under a maximum load of 100N. The maximum shearing stress produced in the wire of the spring is 130 N/mm². The solid length of the spring (when the coils are touching) is given as 5cm. Find (i) Diameter of the wire (ii) Mean diameter of the coils and (iii) No. of coils required. Take $C=4.5 \times 10^4 \text{ N/mm}^2$. 10M

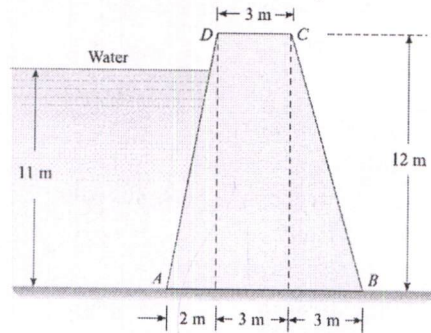
12. A). Derive an equation for Euler's critical load to the column if one end is fixed and the other is hinged. 10M

OR

12. B). Derive the equation for maximum deflection and stresses for a uniformly loaded lateral strut. 10M

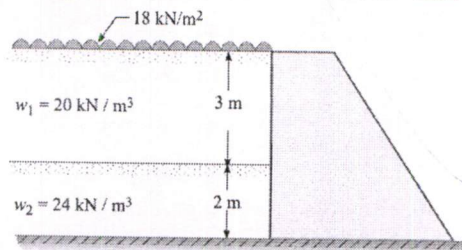
(P.T.O..)

13. A). A trapezoidal masonry dam having 3 m top width, 8 m bottom width and 12m high is retaining water as shown in Fig. Check the stability of the dam, when it is retaining water to a height of 11 m. The masonry weighs 20 kN/m^3 and coefficient of friction between the dam masonry and soil is 0.6. Take the allowable compressive stress as 400 kN/m^2 . 10M



OR

13. B). Find the resultant lateral pressure and the distance of the point of application from the bottom in the case of retaining wall as shown in Fig. Take weight of upper soil as 20 kN/m^3 and $\phi = 30^\circ$ and weight of lower soil as 24 kN/m^3 and $\phi = 30^\circ$. 10M



14. A). A beam of rectangular section 100mm wide and 180mm deep is subjected to a bending moment of 12 kN.m . The trace of the plane of loading is inclined at 45° to the y-y axis of the section. Locate the neutral axis of the section and calculate the maximum bending stress induced in the section. 10M

OR

14. B). A channel has a flanges $12 \text{ cm} \times 2 \text{ cm}$ and web $16 \text{ cm} \times 1 \text{ cm}$. Determine the shear centre of the channel. 10M

15. A). A cylindrical thin drum 800 mm in diameter and 4 m long is made of 10 mm thick plates. If the drum is subjected to an internal pressure of 2.5 MPa, determine its changes in diameter and length. Take E as 200 GPa and Poisson's ratio as 0.25. 10M

OR

15. B). A cast iron pipe of 400 mm internal diameter and 100 mm thickness carries water under a pressure of 8 N/mm^2 . Determine the maximum and minimum intensities of hoop stress across the section. Also sketch the radial pressure distribution and hoop stress distribution across the section. 10M

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Course Code: A30109



CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Regular & Supplementary Examinations August-2023

Course Name: **HYDRAULICS & HYDRAULICS MACHINERY**

(Civil Engineering)

Date: 14.08.2023 AN

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. Distinguish between gradually varied and rapid varied flows. 2 M
2. Define the terms critical velocity and critical depth. 2 M
3. Illustrate geometric similarity. 2 M
4. Recall the term model and prototype. 2 M
5. Differentiate between work done and efficiency of jet of water. 2 M
6. Write the types of efficiencies. 2 M
7. Differentiate between Pelton turbine and Francis turbine. 2 M
8. What are hydro power stations? 2 M
9. Define cavitation in pumps. 2 M
10. Define the term NPSH and its significance. 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). A 8m wide channel conveys 15 cumecs of water at a depth of 1.2m. Determine specific energy, critical depth, critical velocity, minimum specific energy, and Froude's number. 10M
- OR**
11. B). At the bottom of a spillway the velocity and depth of flow are 12 m and 1.5 m resp. If the tail water depth is 5.5m, find the location of the jump with respect to the toe of the spillway. What should be the length of the apron to contain this jump. Assume the apron to be horizontal and Manning's $n = 0.015$ 10M
12. A). State Buckingham Pi theorem method and explain its procedure. 10M
- OR**
12. B). An oil of specific gravity 0.92 and viscosity 0.03 poise is to be transported at the rate of 2.5m³/s through a 1.20 m diameter pipe. Tests were conducted on a 12cm diameter pipe using water. If the viscosity of water is 0.01 poise, find the velocity of flow in the model and the rate of flow in the model. 10M

(P.T.O.)

13. A). A jet of water having a velocity of 40m/s impinges without shock on a series of vanes moving at 12 m/s, the jet is making an angle of 20° with the direction of the motion of the vane. Relative velocity at exit is 0.9 times the relative velocity at entrance and the absolute velocity of water at exit is normal to the direction of the motion of vanes. Find the vane angles at entrance and exit, work done on the vanes per unit weight of water and hydraulic efficiency. 10M

OR

13. B). Discuss in detail on velocity of triangles and derive the expression for work done. 10M

14. A). A Pelton wheel is required to develop 8825KW, when working under the head of 300m. The speed of the Pelton wheel is 540rpm, coefficient of velocity is 0.98 and speed ratio is 0.46. Assuming a jet ratio of 10 and overall efficiency 84%. Determine i) the number of jets ii) The diameter of the wheel and iii) The discharge. 10M

OR

14. B). Explain the construction and working process of Pelton wheel turbine with a neat sketch. 10M

15. A). A centrifugal pump having an outer diameter equal to two times the inner diameter running at 1000 rpm, works against a head of 40m. The velocity of flow through the runner is constant and equal to 2.5 m/s. The vanes are set back at an angle of 40° at outlet. If the outer diameter of the impeller is 500 mm and the width at outlet is 50 mm, determine the i) vane angle at outlet ii) Work done by the impeller on water per second and iii) Manometric efficiency. 10M

OR

15. B). Discuss the various classification of hydro power plants and explain with neat sketch a simple hydro power plant. 10M

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Course Code: A30110



CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Regular/Supplementary Examinations August-2023

Course Name: ENVIRONMENTAL ENGINEERING

(Civil Engineering)

Date: 16.08.2023 AN

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. List out the objectives of protective water supply scheme. 2 M
2. What is unconfined aquifer? 2 M
3. Outline the principle of sedimentation. 2 M
4. List out the common coagulants used in water treatment. 2 M
5. Illustrate any two methods of storm water quantity estimation. 2 M
6. Define BOD and state its importance. 2 M
7. Illustrate the need of screens in wastewater treatment. 2 M
8. What are the operational problems of trickling filters? 2 M
9. Outline the advantages of septic tanks. 2 M
10. What is meant by sewage farming? 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Categorize the various types of water demands in detail. 10M

OR

11. B). The following is the population data of a city, available from past census records. Determine the population of the city in the year 2051 by:
- i). Arithmetic increase method
 - ii). Geometrical increase method

Year	1951	1961	1971	1981	1991	2001	2011
Population	12000	16500	26800	41500	52500	68000	74100

12. A). Discuss the layout and general outline of water treatment units. 10M

OR

12. B). Make use of a neat sketch explain the construction and working of slow sand filter. 10M

13. A). Explain conservancy and water carriage system of sanitation along with merits and demerits. 10M

OR

13. B). Make use of a neat sketch discuss the working of following:
- i) Manholes
 - ii) Automatic Flushing Tank
- 10M

(P.T.O..)

14. A). Discuss the following with a neat sketch: 10M
i). Grit Chamber
ii). Skimming tank

OR

14. B). Make use of a neat sketch explain the working of trickling filter and discuss its advantages and disadvantages. 10M

15. A). Examine construction and working process of a septic tank. 10M

OR

15. B). Distinguish different methods of ultimate disposal of wastewater. 10M

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Course Code: A30111



CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Regular & Supplementary Examinations August-2023

Course Name: **CONCRETE TECHNOLOGY**

(Civil Engineering)

Date: 18.08.2023 AN

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 constituents harmful to cement? 2 M
2. Classify the mechanism of deflocculating of cement by super plasticizer. 2 M
3. What are the factors affecting workability? 2 M
4. Identify the causes of bleeding and segregation of concrete. 2 M
5. What is Gel-space ratio? How is it related to strength of concrete? 2 M
6. How is Elastic Moduli important for Concrete? 2 M
7. Outline the Acceptance criteria used in concrete testing. 2 M
8. List out the factors in the choice of mix proportions of concrete. 2 M
9. List the various applications of light weight concrete. 2 M
10. What are the factors that affect the properties of fiber reinforced concrete? 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Explain how the Bogue's compounds participate in the development of strength of cement. 5M
ii) Explain the wet process of manufacturing of cement with a flow chart. 5M
- OR**
11. B). i) Briefly describe the factors promoting alkali aggregate reaction. 5M
ii) List out different types of chemical admixtures; Explain any five types of with suitable examples. 5M
12. A). Define workability and how measurement of workability can be done by various tests. 10M
- OR**
12. B). i) Explain briefly the manufacturing process of concrete. 5M
ii) Write short notes on quality of mixing water in the manufacturing of concrete. 5M
13. A). List out the Non-destructive tests and explain any two non-destructive testing methods on hardened concrete. 10M
- OR**
13. B). i) Explain the various factors affecting the strength of hardened concrete. 5M
ii) Discuss the static and dynamic moduli of elasticity of concrete along with their relation. 5M

(P.T.O.)

14. A). Design a concrete mix for an airfield pavement using BIS method. The pavement is to be designed for a M25 concrete. The laboratory tests on the controlling mix show a standard deviation of 4 N/mm². The specific gravity of C.A is 2.68 and its maximum size of aggregate is 20 mm. The specific gravity of F.A is 2.64. A slump of 25 mm is specified and exposure condition is severe (RCC). OPC will be used. Assume any other data suitably. 10M

OR

14. B). i) Explain how quality control of concrete is achieved. 5M
ii) Describe briefly about durability of concrete. 5M

15. A). i) Illustrate with examples the applications of light weight concrete. 5M
ii) Write short notes on no- fines concrete. 5M

OR

15. B). i) What are the basic properties of fibre – reinforced concrete which can be advantageously made use of in the design of structural elements? 5M
ii) Write a brief note on polymer concrete. 5M

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Course Code: A30112



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech IV Semester Regular & Supplementary Examinations August-2023

Course Name: STRUCTURAL ANALYSIS-I

(Civil Engineering)

Date: 21.08.2023 AN

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

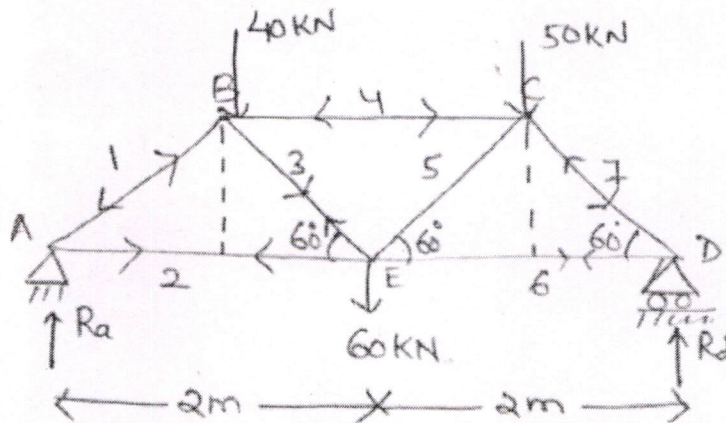
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|--|-----|
| 1. Define determinate and Indeterminate Structures. | 2 M |
| 2. What is static indeterminacy and how it is determined in plane trusses? | 2 M |
| 3. State Castigliano's first theorem. | 2 M |
| 4. Differentiate between three hinged arch and two hinged arches. | 2 M |
| 5. State the degree of indeterminacy in propped cantilever for general loading. | 2 M |
| 6. What is a fixed beam? What are the advantages of fixed beams over simply supported beams. | 2 M |
| 7. Write down the fundamental equation of slope deflection method. | 2 M |
| 8. What is the distribution factor? | 2 M |
| 9. What are influence lines? | 2 M |
| 10. What is meant by absolute maximum bending moment in 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 section method for the truss shown in figure 10M 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.



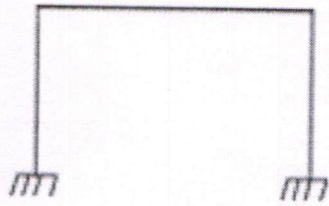
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OR

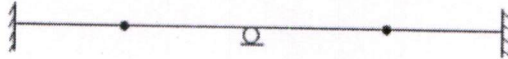
11. B). Calculate the static indeterminacy for the following pin jointed frame:

10M

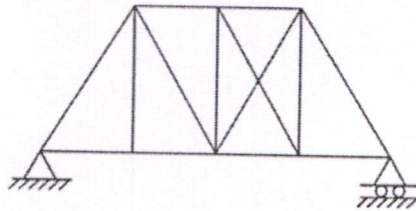
(i)



(ii)



(iii)



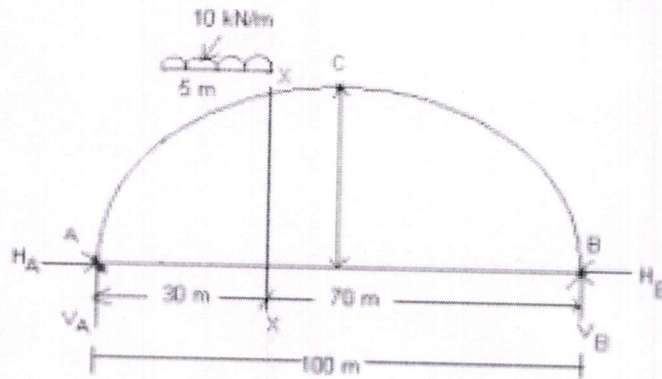
12. A). Derive an expression for strain energy to the member subjected to pure bending.

10M

OR

12. B). Find the maximum bending moment at a section 30 m from the left end of the three hinged stiffening girder of span 100 m when a UDL of 10 kN/m, 5 m length crosses the girder.

10M



13. A). Analyze the propped cantilever beam of the length 10m is subjected to uniformly distributed load of 5 kN/m and draw SFD and BMD.

10M

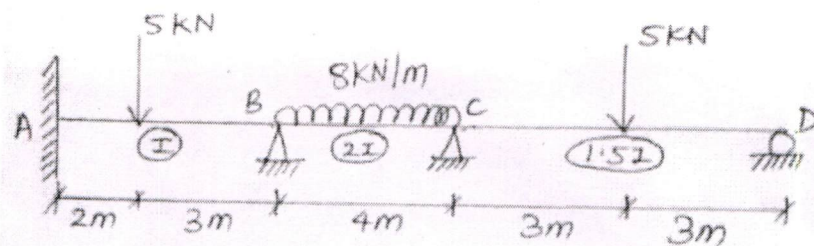
OR

13. B). Analyze fixed beam AB of length 6m, carrying a uniformly distributed load of 5kN/m over the entire span. Also draw the SFD and BMD.

10M

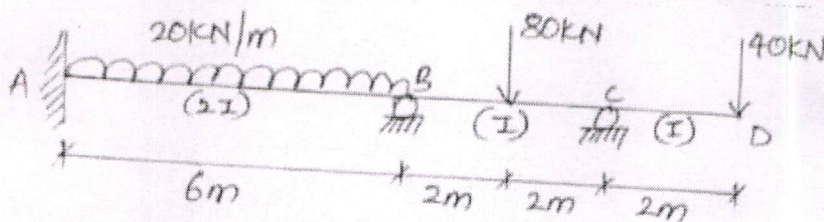
(P.T.O..)

14. A). Analyze the continuous beam by slope-deflection method and draw BMD and Elastic curve. 10M



OR

14. B). Analyze the continuous beam by moment distribution method and draw SFD and BMD. 10M



15. A). Two wheel loads of 50kN and 30kN spaced 4m apart across a girder of 15m span. With 30kN load leading from left to right. Draw influence lines for shear force and bending moment, and also find maximum +ve, -ve shear force and bending moment at 7m from the left support. 10M

OR

15. B). A simply supported beam has a span of 16 m is subjected to a UDL (dead load) of 5 kN/m and a UDL (live load) of 8 kN/m (longer than the span) traveling from left to right. Draw the ILD for shear force and bending moment at a section 4 m from the left end. Use these diagrams to determine the maximum shear force and bending moment at this section. 10M
