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**R18**

Course Code: A30007

**CMR COLLEGE OF ENGINEERING & TECHNOLOGY  
(UGC AUTONOMOUS)****B.Tech IV Semester Supplementary Examinations Feb/March-2023****Course Name: NUMERICAL TECHNIQUES & PROBABILITY DISTRIBUTIONS  
(Common for CE, ME, CSE, IT & CSC)****Date: 21.02.2023 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. Write down the condition for convergence of Newton Raphson Method for  $f(x) = 0$ . 2 M
2. Find the second degree polynomial through the points (0,2),(2,1),(1,0) using Lagrange's formula. 2 M
3. Evaluate  $\int_0^1 \frac{dx}{1+x^2}$  using Trapezoidal's rule. 2 M
4. What is the major drawback of Taylor's series method? 2 M
5. Find  $L^{-1} \left[ \frac{1}{(s+2)^2} \right]$ . 2 M
6. State the first shifting theorem on Laplace transforms. 2 M
7. Test whether  $f(x) = \begin{cases} |x|; & -1 \leq x \leq 1 \\ 0; & \text{otherwise} \end{cases}$  can be the probability density function of a continuous random variable. 2 M
8. If X and Y are two independent random variables with variances 2 and 3 find the variance of  $3X+4Y$ . 2 M
9. Define null hypothesis and alternative hypothesis. 2 M
10. What are the uses of 'F' - test? 2 M

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

- 11.A). Find the real root of the equation  $\cos x = 3x - 1$  correct to four places of decimal using fixed point iteration method. 10M

**OR**

11. B). From the following table, of half-yearly premium for policies maturing at different ages, estimates the premium for policies maturing at age 46 and 63. 10M

|         |    |        |       |       |       |       |
|---------|----|--------|-------|-------|-------|-------|
| Age     | x: | 45     | 50    | 55    | 60    | 65    |
| Premium | y: | 114.84 | 96.16 | 83.32 | 74.48 | 68.48 |

12. A). The velocities of a car running on a straight road at intervals of 2 minutes are given by 10M

|                 |   |    |    |    |    |    |    |
|-----------------|---|----|----|----|----|----|----|
| Time(min)       | 0 | 2  | 4  | 6  | 8  | 10 | 12 |
| Velocity(km/hr) | 0 | 22 | 30 | 27 | 18 | 7  | 0  |

Using Simpson's  $\frac{1}{3}$  rule find the distance covered by the car.

**(P.T.O..)**

**OR**

12. B). Using fourth order R-K method, Solve  $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$  with  $y(0) = 1$  at  $x = 0.2$  10M

13. A). Apply the convolution theorem to find the inverse Laplace transform of the function  $\frac{s^2}{(s^2 + a^2)(s^2 + b^2)}$ . 10M

**OR**

13. B). Solve  $(D^2 + 3D + 2)y = e^{-t}$ , given that  $y' = y = 0$ , when  $t = 0$ . 10M

14. A). If the density function of continuous random variables X is given by 10M

$$f(x) = \begin{cases} ax, & 0 \leq x \leq 1 \\ a, & 1 \leq x \leq 2 \\ 3a - ax, & 2 \leq x \leq 3 \\ 0, & \text{elsewhere} \end{cases}$$

(i) Find the value of 'a'

(ii) Find the Cumulative Distribution Function of X

(iii) Compute  $P[X \leq 1.5]$

**OR**

14. B). Six dice are thrown 729 times. How many times do you expect at least three dice to show a five or six? 10M

15. A). In a large city A, 20% of a random sample of 900 school boys had a slight physical defect. In another large city B, 18.5% of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant? (To calculate at 5% level of significance). 10M

**OR**

15. B). The theory predicts the proportion of beans in the 4 groups A, B, C and D should be 9:3:3:1. In an experiment among 1600 beans, the numbers in the 4 groups were 882, 313, 287 and 118. Does the experimental result support the theory? (To calculate at 5% level of significance). 10M

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**R18**

Course Code: A30109



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

**B.Tech IV Semester Supplementary Examinations Feb/March-2023**

**Course Name: HYDRAULICS & HYDRAULICS MACHINERY**  
(Civil Engineering)

**Date: 25.02.2023 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. Explain the terms: i) rapidly varying flow ii) gradually varying flow. 2 M
2. What is meant by economical section of a channel? 2 M
3. Define the terms: i) model ii) proto type iii) model analysis iv) hydraulic similitude. 2 M
4. What are the methods of dimensional analysis? 2 M
5. What is a radial vane? 2 M
6. What is work done and efficiency? 2 M
7. Discuss about classification of hydraulic turbines. 2 M
8. What is governing of turbines? 2 M
9. What is meant by multi stage centrifugal pump? 2 M
10. What is manometric head? 2 M

**PART-B**

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

**5x10=50M**

- 11.A). Derive the conditions for the best side slope of the most economical trapezoidal section. 10M
- OR**
11. B). Find the critical depth and critical velocity of water flowing through a rectangular channel of width 5 m, when discharge is 15 m<sup>3</sup>/s. 10M
12. A). What do you mean by repeating variables? How are repeating variables selected for dimensional analysis? 10M
- OR**
12. B). What are the different laws on which models are designed for dynamic similarity? where are they used? 10M
13. A). i) Obtain an expression for the force exerted by a jet of water on fixed vertical plate in the direction of the jet. 5M  
ii) Show that the efficiency of a free jet striking normally as series of flat plates mounted on the periphery of a wheel never exceed 50%. 5M
- OR**
13. B). Using the impulse-momentum principle, derive an expression for the force exerted by a moving jet of fluid on a stationary curved vane. 10M

*(P.T.O.)*

14. A). i) What is cavitation? How can it be avoided in reaction turbine? 5M  
ii) A turbine develops 9000 kW power when running at 10 r.p.m. The head on the turbine is 30 m. If the head of the turbine is reduced to 10m, determine the speed and the power developed by the turbine. 5M

OR

14. B). Define the term governing of turbines? describe with a neat sketch the working of an oil pressure governor. 10M

15. A). Explain the various performance characteristics of a pump for the following: 10M  
i) Main Characteristics  
ii) Operating Characteristics  
iii) Universal Characteristics.

OR

15. B). A three-stage centrifugal pump has impeller 40 cm in diameter and 2.5 cm wide at outlet. The vanes are set back at the outlet at  $30^\circ$  and reduce the circumferential area by 15%. The manometric efficiency is 85% and overall efficiency is 75%. determine the head generated by the pump when running at 12000 r.p.m and discharge is  $0.06 \text{ m}^3/\text{s}$ . Also find the shaft power? 10M

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**R18**

Course Code: A30110



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

B.Tech IV Semester Supplementary Examinations Feb/March-2023

**Course Name: ENVIRONMENTAL ENGINEERING**

**(Civil Engineering)**

Date: 28.02.2023 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 fire demand? 2 M
2. What are infiltration wells? 2 M
3. What is detention period? 2 M
4. Distinguish between disinfection and sterilization. 2 M
5. What is a joint? List the different joints used in water distribution system. 2 M
6. What is the most commonly used water meter? 2 M
7. What is the purpose of a grit chamber? 2 M
8. Name the various biological treatment units. 2 M
9. What is sludge digestion? Why is it necessary? 2 M
10. What is the use of soak pit? 2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). The census records of a town are given below. Estimate the population of the town in the year 2041 using arithmetic and incremental increase methods. 10M

|            |        |        |          |          |
|------------|--------|--------|----------|----------|
| Year       | 1971   | 1981   | 1991     | 2001     |
| Population | 72,000 | 85,000 | 1,00,000 | 1,21,000 |

**OR**

- 11.B). i) Give the permissible limits for the following in drinking water: a) Turbidity, 5M  
b) Chlorides, c) Nitrates, d) Hardness and e) MPN.  
ii) What are the factors that govern the water demand of a city? 5M

- 12.A). Design a plain sedimentation tank to treat a flow of 2 MLD. Assume suitable design criteria. 10M

**OR**

- 12.B). Mention different types of layouts of water distribution? Describe them in detail with their merits and demerits. 10M

- 13.A). i) Calculate the velocity of flow and discharge in a sewer of circular section having diameter of 0.7 m laid at a gradient of 1 in 500. Take Manning's N as 0.012. Assume that the sewer is running half full. 5M

- ii) Discuss the various factors that affect the hydraulics of sewers. 5M

**OR**

- 13.B). Write short notes on the following: 10M  
i) Spigot and Socket Joint, ii) Water meter, iii) Fire-Hydrant and iv) Air valve.

(P.T.O..)

14. A). What is a trickling filter? Describe its construction features. Explain its biological process. What are its advantages and disadvantages? 10M

**OR**

14. B). What is activated sludge process? Describe its working principle with the help of a line diagram. What are its advantages compared to other biological treatment units. 10M

15. A). What is the purpose of sludge digestion tanks? Explain with a neat sketch. What are the factors affecting digestion. 10M

**OR**

15. B). Design a septic tank to serve 25 persons. 10M

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R18

Course Code: A30112



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

B.Tech IV Semester Supplementary Examinations Feb/March-2023

Course Name: STRUCTURAL ANALYSIS-I

(Civil Engineering)

Date: 02.03.2023 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

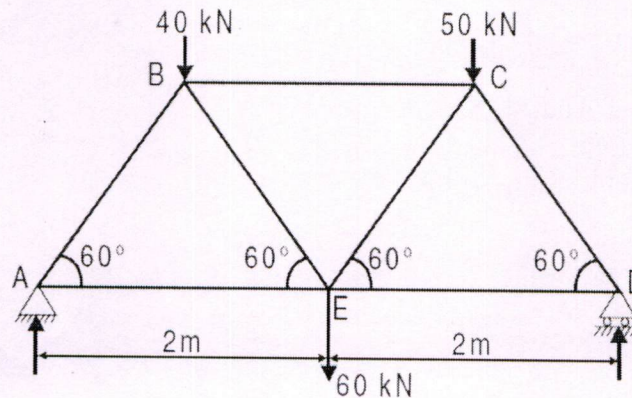
1. Define Tension Coefficient. 2 M
2. What are the limitations of method of joints? 2 M
3. Define Castigliano's theorem-I. 2 M
4. Compare two hinged and three hinged arches. 2 M
5. Explain the method of consistent deformation for analyzing propped beams. 2 M
6. What are the advantages of fixed beam? 2 M
7. List out the assumptions required in Slope-Deflection method of Structural Analysis. 2 M
8. What do you mean by Balancing of Moment? 2 M
9. List out the uses of Influence line diagrams. 2 M
10. Demonstrate the influence diagram for bending moment at a section less than half span from one support in simply supported beam. 2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Determine the forces in all the members, all inclined members are at  $60^\circ$  to the horizontal and length of each member is 2m. 10M

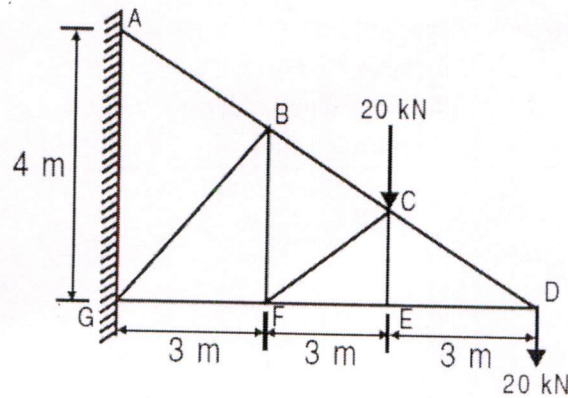


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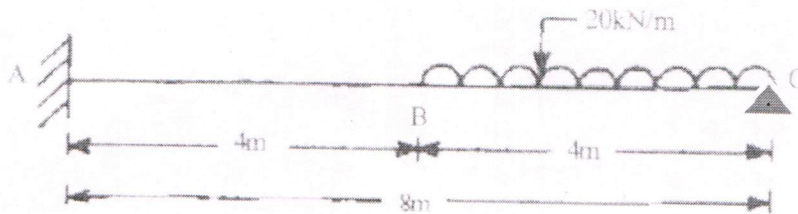
OR

11. B). Evaluate the forces in all the members

10M



12. A). Determine the vertical deflection at free end C of the beam ABC shown in figure. 10M  
Consider  $E=2 \times 10^5 \text{ N/mm}^2$  and  $I=8 \times 10^8 \text{ mm}^4$  use Castigliano's first theorem



OR

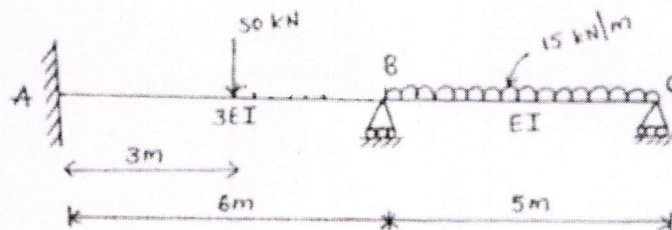
12. B). Evaluate the reactions at the supports, bending moment, radial shear and normal thrust at a distance of 10m from the left support in a symmetrical three hinged parabolic arch of span 40m and rise 8m carries an uniformly distributed load of 30kN/m over the left half of the span. The hinges are provided at the supports and at the centre of the arch. 10M

13. A). Develop the prop reaction and sketch the Bending Moment Diagram in a Propped cantilever beam of length  $l$  is subjected to uniformly distributed load of  $w/m$  length over three fourth of its span from the fixed support. 10M

OR

13. B). Analyze the beam and draw SFD & BMD in a fixed beam AB of span 8m is carrying a uniformly distributed load of 20kN/m over the entire span. The support 'B' sinks by 1cm. Determine the fixing moments at A and B. Draw shear force and Bending moment diagrams. Take  $E=200 \text{ kN/mm}^2$  and  $I=7.5 \times 10^7 \text{ mm}^4$  10M

14. A). Analyze the continuous beam shown in figure by slope-Deflection method and draw SFD and BMD. 10M

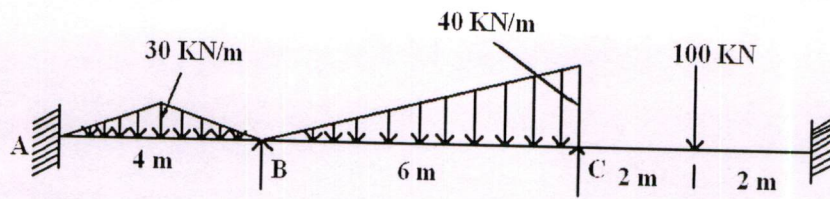


(P.T.O..)



OR

14. B). Analyze the beam by moment distribution method and draw SFD & BMD. Sinking of support at B=2 mm, Sinking of support at C=3 mm 10M



15. A). Estimate shear force and bending moment at a section 6m from left support, Four wheel loads 6kN, 4kN, 8kN and 5kN cross a girder of 16m span from left to right with the 5kN load leading. The spacing between the loads is 2m each. 10M

OR

15. B). Construct the maximum shear force diagram and find the maximum shear force values at sections 3m and 6m from one end in a uniformly distributed load of 2kN/m and 4m long crosses a girder of 12m span. 10M

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H.T No:

**R18**

Course Code: A30531



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

B.Tech IV Semester Supplementary Examinations Feb/March-2023

Course Name: PYTHON PROGRAMMING

(Common for CE, ME, ECE, CSE & IT)

Date: 04.03.2023 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. How to read input and print output in python? 2 M
2. How Type conversion is done in python? 2 M
3. Define File. 2 M
4. Differentiate between local and global variables. 2 M
5. What is the purpose of string slicing? 2 M
6. Why recursion is used give example? 2 M
7. Define polymorphism. 2 M
8. What is object? 2 M
9. Give the syntax for button and dialog box. 2 M
10. What is image processing? 2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Explain various control structures supported in Python each with respective example program. 10M

**OR**

11. B). List and explain operators supported by Python. Demonstrate python code to print all prime numbers less than 256. 10M

12. A). Define a Function and explain default, keyword and variable length arguments in functions. 10M

**OR**

12. B). Explain the class design techniques with example. And write a python program to print the area of circle. 10M

13. A). What is a string and explain different string manipulations techniques? 10M

**OR**

13. B). Discuss about Lists, Dictionaries, sets and Tuple each with and executable code. 10M

14. A). List and explain the features of object-oriented programming. 10M

**OR**

14. B). What is inheritance list different types of inheritance with code snippets? 10M

15. A). Why GUI is powerful explain using tkinter module? 10M

**OR**

15. B). Discuss about turtle Graphics with an example. 10M

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**R18**

Course Code: A30111



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

B.Tech IV Semester Supplementary Examinations Feb/March-2023

Course Name: **CONCRETE TECHNOLOGY**

(Civil Engineering)

Date: 08.03.2023 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 chemical composition of the OPC? 2 M
2. Classify the shape of the aggregates. 2 M
3. Name the workability tests commonly employed to fresh concrete. 2 M
4. Define segregation. 2 M
5. Write the Abrams water cement ratio. 2 M
6. What is meant by accelerated curing? 2 M
7. What is meant by Mean strength? 2 M
8. Define Target mean strength. 2 M
9. Name any four light weight aggregates. 2 M
10. What is meant by Aerated concrete? 2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Explain any three laboratory tests usually conducted on OPC. 10M
- OR**
11. B). Elaborate the testing procedure for determination of specific gravity of an aggregate. 10M
12. A). Explain the factors affecting the workability of fresh concrete. 10M
- OR**
12. B). Discuss the different methods adopted for compacting the concrete. 10M
13. A). Elaborate the compression test of concrete. 10M
- OR**
13. B). Explain any one of Non- Destructive Testing methods. 10M
14. A). Elaborate the concept of mix design of concrete. 10M
- OR**
14. B). Design a concrete mix of grade M20 according to IS recommended methods. 10M
15. A). Explain the advantages & disadvantages of Light weight concrete. 10M
- OR**
15. B). Discuss briefly about Cellular concrete and No- fines concrete. 10M

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**R18**

Course Code: A30108



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

B.Tech IV Sem Pester Supplementary Examinations Feb/March-2023

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

(Civil Engineering)

Date: 23.02.2023 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. Write the Polar Modulus (i) for a solid shaft and (ii) for a hollow shaft. 2 M
2. Define spring and mention types of springs. 2 M
3. Define column and effective length of a column. Distinguish between a column and a strut. 2 M
4. What are the assumptions made in Euler's theory to arrive at buckling load on column? 2 M
5. Name the various conditions for the stability of a dam. Describe any two of them. 2 M
6. What is a retaining wall? Discuss its uses. 2 M
7. What are the conditions that should be satisfied for a beam to bend without twisting? 2 M
8. What is principal moment of inertia? 2 M
9. Derive a formula for the hoop stress in a thin spherical shell subjected to an internal pressure. 2 M
10. Write the relations for the hoop stress in a thick spherical shell. 2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). A hollow circular shaft, of outside diameter 50 mm and inside diameter 36 mm, is made of steel, for which the permissible stress in shear is 90 MPa and  $G = 85 \text{ GPa}$ . Find the maximum torque that such a shaft can carry and the angle of twist per metre length. 10M

**OR**

11. B). In an open coil helical spring having 10 coils, the stresses due to bending and twisting are 98MPa and 105MPa respectively, and the spring is axially loaded. Assuming the mean diameter of the coils to be 8 times the diameter of wire, find the maximum permissible load and the diameter of wire for a maximum extension of 2cm.  $E=210\text{GPa}$  and  $G=82\text{GPa}$ . 10M

12. A). Compare the critical stresses using Euler's and Rankine's formulae for struts with slenderness ratios 50, 100, 150, and 200. Assume that both ends are hinged.  $E = 200 \text{ GPa}$ , Rankine's constant =  $1/7500$ , and  $\sigma_y = 300 \text{ MPa}$ . 10M

**OR**

12. B). A cast iron column with a 10cm external diameter and 8cm internal diameter is 3m long. Calculate the safe load using Rankine's formula if (i) both ends hinged (ii) both ends fixed (iii) one end free and other end fixed (iv) one end hinged and other end fixed.  $\sigma_c = 600\text{N/mm}^2$ ,  $\alpha = 1/1600$ . Adopt factor of safety of 3. 10M

(P.T.O.)

15. A). A cylindrical vessel 2 m long and 500 mm in diameter with 10 mm thick plates is subjected to an internal pressure of 3 MPa. Calculate the change in volume of the vessel. Take  $E = 200$  GPa and Poisson's ratio = 0.3 for the vessel material. 10M

**OR**

15. B). A compound cylinder is made by shrinking a tube of 160 mm internal diameter and 20 mm thick over another tube of 160 mm external diameter and 20 mm thick. The radial pressure at the common surface, after shrinking, is  $8 \text{ N/mm}^2$ . Find the final stresses set up across the section, when the compound cylinder is subjected to an internal fluid pressure of  $60 \text{ N/mm}^2$ . 10M

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