

Hall Ticket Number :

R-15

Code: 5GC31

II B.Tech. I Semester Supplementary Examinations February 2022

Engineering Mathematics-III

(Common to CE & ME)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit (5 x 14 = 70 Marks)

UNIT-I

1. a) Test for consistency and solve $5x+3y+7z=4$; $3x+26y+2z=9$; $7x+2y+10z=5$ 8M
- b) Show that the Eigen values of diagonal matrix are just the diagonal elements of the matrix 6M

OR

2. a) Determine the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$ 6M
- b) Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 1 & 2 \\ 3 & 1 & 1 \\ 3 & 3 & 1 \end{bmatrix}$ and hence find A^4 . 8M

UNIT-II

3. a) Find the Cubic polynomial which takes the values. $y(0)=1$, $y(1)=0$, $y(2)=1$ and $y(3)=10$ 7M
- b) Using Newton-Raphson Method, compute $\sqrt{41}$ correct to four decimal places 7M

OR

4. Estimate the value of $f(22)$ and $f(42)$ from the following table by Newton's forward and backward interpolation formula.

x	20	25	30	35	40	45
y	354	332	291	260	231	204

14M

UNIT-III

5. Use Runge-Kutta method to evaluate $y(0.1)$ and $y(0.2)$ given that $y' = x + y$, $y(0)=1$ 14M

OR

6. Using Picard's process of successive approximation, obtain a solution up to fifth approximation of the equation $\frac{dy}{dx} = x + y$ such that $y = 1$ when $x = 0$. Check your answer by finding the exact solution. 14M

UNIT-IV

7. a) Find the Fourier series expansion for $f(x) = e^x$ in $0 < x < 2\pi$ 10M
 b) Form the partial differential equations (by eliminating the arbitrary constants and arbitrary functions) from $z = ax + by + a^2 + b^2$ 4M

OR

8. Form the partial differential equation by eliminating arbitrary function from $F(x + y + z, x^2 + y^2 + z^2) = 0$ 14M

UNIT-V

9. a) Show that the polar form of Cauchy's Riemann equations are $\frac{\partial u}{\partial r} = \frac{1}{r} \frac{\partial v}{\partial \theta}, \frac{\partial v}{\partial r} = -\frac{1}{r} \frac{\partial u}{\partial \theta}$ 7M
 b) Evaluate $\int_c \frac{e^z}{(z-1)^3} dz$ with $C: |z-1| = \frac{1}{2}$ using Cauchy's Integral Formula 7M

OR

10. a) Apply C-R conditions to $f(z) = z^2$ and show that the function is analytic everywhere. 7M
 b) Evaluate $\int_c \frac{1}{(z-1)(z-3)} dz$ with $C: |z| = 2$ using Cauchy's Integral Formula 7M

Code: 5G633

II B.Tech. I Semester Supplementary Examinations February 2022

Fluid Mechanics

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

Marks

UNIT-I

1. State Pascal's law. Derive the equation for the same. 14M

OR

2. A hot plate of area 0.125m^2 is pulled at 0.25m/s with respect to another stationary parallel plate 1mm distant from it the space between the plates containing water of viscosity 0.001 N-s/m^2 , find the force necessary to maintain this velocity and also calculate power required. 14M

UNIT-II

3. Define and distinguish between stream line, path line and streak line. 14M

OR

4. a) State the Bernoulli's theorem write its assumptions. 6M
b) The diameters of a pipe at the sections 1 and 2 are 12cm and 17cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 6m/s . Determine also the velocity at section 2. 8M

UNIT-III

5. Derive an expression for coefficient of discharge by using venture meter with neat sketch. 14M

OR

6. a) Derive an expression for the discharge over a triangular notch. 7M
b) During an experiment 95litres of water is flowing over a right angled notch was collected in two minutes. If the head of the still is 4cm , determine the coefficient of discharge of the notch. 7M

UNIT-IV

7. a) Explain about Reynolds Experiment with the help of a neat sketch. 8M
b) Write the characteristics of the laminar and turbulent flows. 6M

OR

8. The two reservoirs with surface level difference of 20m are to be connected by 1m dia pipe 6km long. Calculate the discharge when a cast iron pipe of roughness $k=0.3\text{mm}$ is used. What will be the percentage increase in discharge if cast iron pipe were to be replaced by steel pipe of roughness $k=0.1\text{ mm}$. neglect local losses 14M

UNIT-V

9. Explain the geometric, kinematic and dynamic similarities. 14M

OR

10. a) Define the terms: model, prototype, model analysis, hydraulic similitude 6M
b) A $1/50$ model of spillway was made and test was conducted with a water flow rate of $3\text{m}^3/\text{s}$. The water velocity was found to be 2m/s . Estimate the water flow rate and velocity of the prototype. 8M

Code: 5G631

II B.Tech. I Semester Supplementary Examinations February 2022

Strength of Materials-I

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

UNIT-I

1. Formulate the relationship between shear modulus, bulk modulus and elastic modulus & Also Explain the stress strain relation for mild steel

Marks CO Blooms Level

14M CO1 B2

OR

2. A bar of 30mm in diameter was subjected to a tensile load of 55kN and the measured extension on 350mm gauge length was 0.15mm and change in diameter was 0.0036mm. Calculate Poisson's ratio and values of three elastic moduli.

14M CO1 B3

UNIT-II

3. A beam of span 6m which is simply supported at its edges subjected to concentrated loads of 10kN and 20kN at a distance of 2m and 5m respectively from left support, with an overhanging span of 2m from its right support subjected to UDL of 2kN/m at its overhanging span. Determine the maximum bending moment and shear force.

14M CO2 B1

OR

4. A Cantilever 2 m long carries a uniformly varying load of zero at its free end to maximum of 20kN/m at fixed end. Draw shear force and bending moment diagrams for the cantilever.

14M CO2 B4

UNIT-III

5. Write down the assumptions of simple bending theory derive the Equation of simple bending Theory

14M CO3 B1

OR

6. Define section modulus. What is its value for a hollow pipe with external and internal diameters as 'D' and 'd'

14M CO3 B1

UNIT-IV

7. Derive the expression for the maximum deflection of a simply supported beam loaded with a central point load using Mohr's theorem.

14M CO4 B1

OR

8. A cylindrical shaft of diameter made of steel of yield strength 250MPa is subjected to static load consisting of bending moment of 10kN.m and a torsional moment of 25kN.m. Determine the diameter of the shaft using (i) maximum principal stress theory, (ii) maximum shear stress theory and (iii) maximum distortion energy theory. Take $E=200\text{GPa}$. Poisson's ratio=0.25 and factor of safety =2.

14M CO4 B4

UNIT-V

9. State the significance and application of theories of failure. Derive an expression for distortion energy theory of failure.

14M CO5 B3

OR

10. Draw & Explain Mohr's circle when a body is subjected to two mutually perpendicular principal stresses which are unequal & Unlike.

14M CO5 B1

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II B.Tech. I Semester Supplementary Examinations February 2022

Surveying
(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

Marks	CO	Blooms Level
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UNIT-I

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| 1. Describe the different types of chains used in survey indicate the relative advantages of each. | 14M |
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OR

- | | |
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| 2. a) What is closing error' in a traverse? | 7M |
| b) Describe, with a sketch, how such an error is adjusted. | 7M |

UNIT-II

- | | |
|--|-----|
| 3. The following perpendicular offsets were taken from a chain line to an irregular boundary line:
Chainage (m) - 0.00 – 6.50 – 16.20 – 27.20 – 39.60
Offset (m) –3.50 – 4.75 – 5.20 – 6.30 – 7.36.
Calculate the area between the chain line and the boundary. | 14M |
|--|-----|

OR

- | | |
|--|-----|
| 4. What does the term sensitiveness mean in the context of a bubble? How the sensitiveness of a bubble is is determined? | 14M |
|--|-----|

UNIT-III

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|---|----|
| 5. a) Describe the process of measuring the horizontal angle. | 7M |
| b) Describe how you would measure vertical angles. | 7M |

OR

- | | |
|---|----|
| 6. a) Describe the process of permanent adjustment of a transit theodolite. | 7M |
| b) How can the height of a tower be determined when it is inaccessible? | 7M |

UNIT-IV

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|--|----|
| 7. a) Discuss the methods of tacheometry. | 7M |
| b) Explain the theory of stadia tacheometry. | 7M |

OR

- | | |
|--|----|
| 8. a) Describe the procedure of setting up the plane table over a station. | 7M |
| b) What is orientation? What are the methods of orientation? Describe the methods with a sketch. | 7M |

UNIT-V

- | | |
|--|-----|
| 9. What are the different types of curves? Draw neat sketches of each. | 14M |
|--|-----|

OR

- | | |
|--|-----|
| 10. a. Explain why superelevation is required in roads and railways. | |
| b. What is a transition curve? | |
| c. Why and where are transition curves provided? | 14M |

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Code: 5G634

II B.Tech. I Semester Supplementary Examinations February 2022

Building Materials and Construction

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

Marks

UNIT-I

1. a) Explain about the properties of a good building stone? 7M
- b) List out the precautions to be taken in blasting? 7M

OR

2. a) Explain in details about the classification of stones with examples. 7M
- b) List the properties to be considered before selecting a stone for building? 7M

UNIT-II

3. a) Explain in detail about the different types of tiles and its purpose. 7M
- b) Describe about Glass, bitumen, alumina and its uses? 7M

OR

4. a) Briefly explain the constituents of lime stones. 7M
- b) Classify lime and explain its uses in different Civil Engineering Projects. 7M

UNIT-III

5. a) Briefly explain the structure and parts of timber? 7M
- b) Describe the properties of good timber? 7M

OR

6. a) Classify and describe knots found in timber based on size and quality? 8M
- b) Write a short note on methods for determination of moisture content in timber. 6M

UNIT-IV

7. a) Differentiate between English bond and Flemish bond? 7M
- b) Explain the essentials of a good foundation? 7M

OR

8. a) Distinguish between Stretcher and Header bonds? 7M
- b) Explain mat foundation and the situations where mat foundation is essential. 7M

UNIT-V

9. a) Discuss different types of floors and roofs with uses 7M
- b) Explain about different water proofing materials used? 7M

OR

10. a) Explain the following items in case of staircases 8M
(i) soffit (ii) Handrail (iii) pitch (iv) Rise and Tread
- b) With the help of a neat diagram explain the components of stair case 6M
