II B.Tech. I Semester Supplementary Examinations June 2024
Strength of Materials
(Civil Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
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		Marks	CO	BL

UNIT–I

1. A steel rod of 30mm diameter is enclosed by a copper tube of 50mm external diameter and 35mm internal diameter. The ends are closed by rigid metal plates. If the temperature of the assembly is raised by 60^0C, find the stresses in the steel and copper rods and the combined expansion of the assembly. Take $E_S = 2 \times 10^5 N/mm^2$ and $E_C = 1 \times 10^5 N/mm^2$; S = 1.2×10^{-5} per ^0C and C = 1.6×10^{-5} per ^0C 14M CO1 B3

OR

2. Formulate the relationship between shear modulus, bulk modulus and elastic modulus & Also Explain the stress strain relation for mild steel   14M CO1 B2

UNIT–II

3. Draw the shear force & bending moment diagram for the simply supported beam carrying a central point load.   14M CO2 B4

OR

4. A simply supported beam AB of span 8 m is subjected to a uniformly distributed load of 30 KN/m over the left half of span and a concentrated moment of 48 KN-m acting at a distance of 6 m from left support A. Draw the shear force and bending moment diagrams. Also find the position and magnitude of maximum bending moment.   14M CO2 B4

UNIT–III

5. A beam of rectangular cross section having width of 100 mm and height of 200 mm is subjected to a shear force of 25 KN. Find the value of maximum shear stress, and sketch the shear stress distribution along the depth of beam   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. Obtain an expression for normal and tangential stresses on an inclined plane when an element subjected to bi-axial direct stresses. Also obtain the expressions for resultant stress and their direction   14M CO4 B4

OR

8. 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

UNIT–V

9. According to the theory of maximum shear stress , determine the diameter of a bolt which is subjected to an axial pull of 9 kN together with a transverse shear force of 4.5 KN. Elastic limit in tension is 225 N/mm^2 ,FOS =3 and poission's ratio =0.3   14M CO5 B1

OR

10. State the significance and application of theories of failure. Derive an expression for distortion energy theory of failure.   14M CO5 B3

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R-17

Code: 7G634

II B.Tech. I Semester Supplementary Examinations June 2024

Surveying

(Civil Engineering)

Max. Marks: 70   Time: 3 Hours

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

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Marks

| **UNIT–I** |

1. a) Distinguish between closed and open traverse.   7M

   b) What is closing error' in a traverse?   7M

OR

2. A line was shown to a magnetic bearing of $38^0 15'$ in an old map, when the declination was $15^0 45'$ E. to what bearing should it be set now if the present magnetic declination is $6^0 15'$W.   14M

| **UNIT–II** |

3. The following consecutive readings were taken with a level and 4m leveling staff on a continuously sloping ground at common intervals of 30m.

   0.905(on A), 1.745, 2.345, 3.125, 3.725, 0.545, 1.390, 2.055, 2.955, 3.455, 0.595, 1.015, 1.850, 2.655, and 2.945 9(on B).

   The RL of A was 395.500. calculate the RLs of difference points and find the gradient of the line AB.   14M

OR

4. Define the following: datum surface, line of collimation, reduced level, bench mark, change point, and parallax.   14M

| **UNIT–III** |

5. a) How can the height of a tower be determined when it is inaccessible?   7M

   b) What are the methods of locating interior details in theodolite traversing? Describe the methods of checking the accuracy of close and open traverse.   7M

OR

6. a) How is the closing error in a traverse balanced?   7M

   b) Describe the process of measuring the horizontal angle.   7M

| **UNIT–IV** |

7. a) What is orientation? What are the methods of orientation? Describe the methods with a sketch.   7M

   b) Discuss the methods of tacheometry.   7M

OR

8. a) Explain the theory of stadia tacheometry.   7M

   b) Describe the procedure of setting up the plane table over a station.   7M

| **UNIT–V** |

9. Show with neat sketches, the different types of vertical curves possible.   14M

OR

10. a) Explain why super elevation is required in roads and railways.   7M

    b) Why and where transition curves are provided?   7M

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II B.Tech. I Semester Supplementary Examinations June 2024
Engineering Mathematics-III
(Common to All Branches)

Max. Marks: 70   Time: 3 Hours

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

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UNIT–I

1. a) Apply fourth order Runge-Kutta method to $\frac{dy}{dx} = 3x + \frac{1}{2}y$, $y(0) = 1$ determine $y(0.1)$ correct to four decimal places.   7M

 b) Find a real root of the equation $3x = \cos x + 1$ by Newton-Raphson's method correct to four decimal places.   7M

OR

2. Use Milne's method to find $y(0.3)$ from $y' = x^2 + y^2$ $y(0) = 1$. Find the intial values $y(-0.1)$, $y(0.1)$, $y(0.2)$ from the Taylors series method.   14M

UNIT–II

3. a) Evaluate $\int_0^1 \frac{1}{1+x} dx$ by Simpson's 1/3 rule.   7M

 b) Using Lagrange formula find $f(4)$. Given

x	0	2	3	6
y	-4	2	14	158

   7M

OR

4. Using Lagrange is interpolation formula find the value of $f(10)$ from the following table

x	5	6	9	11
y	12	13	14	16

   14M

UNIT–III

5. Form the partial differential equation by eliminating the arbitrary constants $x^2 + y^2 + (z-c)^2 = a^2$ 14M

OR

6. Form a partial differential equation by eliminating the arbitrary functions $f(x)$ and $g(y)$ from $z = y f(x) + x g(y)$.   14M

UNIT–IV

7. Find the fourier series expansion of $f(x) = 2x - x^2$ in $(0,3)$ and hence deduce that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \frac{1}{5^2} - \frac{1}{6^2} + ... = \frac{f^2}{12}$ 14M

OR

8. a) Find the Fourier series expansion for $f(x) = f - x$ in $0 < x < f$ 7M

 b) Expand $f(x) = \cos x, 0 < x < f$ in half range sine series.   7M

UNIT–V

9. a) Find the Fourier sin and cosine transform of $f(x) = \frac{e^{-ax}}{x}, a > 0$ 7M

 b) Find the Fourier sin and cosine transform of $f(x) = 2e^{-5x} + 5e^{-2x}$ 7M

OR

10. Find the Fourier cosine transform of $f(x) = \frac{1}{1+x^2}$, hence, derive the Fourier sine transform of $w(x) = \frac{x}{1+x^2}$ 14M

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