

SECTION-B

2. Investigate for what values of λ and μ the simultaneous equations

$$x + y + z = 6$$

$$x + 2y + 3z = 10 \text{ Have (i) no solution (ii) a unique solution (iii) infinitely many solutions.}$$

$$x + 2y + \lambda z = \mu$$

3. Solve the differential equation $\left(1 + e^{x/y}\right) dx + e^{x/y} \left(1 - \frac{x}{y}\right) dy = 0$.

4. Solve $x^2 \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} - 12y = x^3 \log x$.

5. In case of stretched elastic horizontal string which has one end fixed and a particle of mass m attached to the other. Find the equation of motion of the particle given that l is the natural length of the string and e is its elongation due to the weight mg . Also find the displacement s of the particle when initially $s = 0, v = 0$.

SECTION-C

6. Calculate the angle between the normals to the surface $xy = z^2$ at the points $(4, 1, 2)$ and $(3, 3, -3)$.
7. Verify Stokes' theorem for the vector field defined by $F = -y^3 \hat{i} + x^3 \hat{j}$ in the region $x^2 + y^2 \leq 1, z = 0$.
8. In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and the standard deviation of the distribution.
9. Eleven school boys were given a test in drawing. They were given a month's further tuition and a second test of equal difficulty was held. Do the marks give evidence that the students have benefitted by extra coaching?

Boy	1	2	3	4	5	6	7	8	9	10	11
Ist test	23	20	19	21	18	20	18	17	23	16	19
IIInd test	24	19	22	18	20	22	20	20	23	20	17

Given t at 5% level of significance for 10 d.f = 2.228.