Roll No. Total No. of Pages: 02

Total No. of Questions: 09

B.Tech.(2009-2010 Batches) (Sem.-2) ENGINEERING MATHEMATICS - II

Subject Code: AM-102 Paper ID: [A0119]

Time: 3 Hrs. Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION B & C have FOUR questions each.
- 3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
- 4. Select atleast TWO questions from SECTION B & C.

SECTION-A

1. Write briefly:

- a) Define Rank of a matrix.
- b) Define exact differential equation.
- c) Define Similar Matrices.
- d) What is the physical interpretation of ∇f ?
- e) Prove that $\nabla \cdot (\phi \vec{f}) = \nabla \phi \cdot \vec{f} + \phi \nabla \cdot \vec{f}$
- f) State Stoke's theorem.
- g) Define discrete density function.
- h) Define Chi-Square test.
- i) If the probability that a new born child is a male is 0.6, find the probability that in a family of 5 children there are exactly three boys.
- j) Define positive definite matrix.

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SECTION-B

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

$$x + y + z = 6$$

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

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

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

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 $x^2 + y^2 \le 1, z = 0$.
- 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
IInd 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.

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