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Total No. of Questions: 09

B.Tech.(2010 Batch) (Sem. – 2) ENGINEERING MATHEMATICS – II M Code: 54002 Subject Code: AM-102 Paper ID: [A0119]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

- 1. 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 at least TWO questions from SECTION B & C.

SECTION A

- 1. a) Examine whether vectors (2, 2, 1), (1, -l, l), (l, 0, l) are linear independent or not.
 - b) Show that the eigen values of Hermitian matrix are real.
 - c) Obtain general solution of differential equation $y = xy' + (y')^2$
 - d) Find the solution of xy' + y = y
 - e) Find a unit normal vector to the surface $xy^2 + 2yz = 8$ at point (3, -2, 1)
 - f) State Gauss Divergence theorem. Find divergence of vector field

$$\mathbf{V} = (x^2 y^2 - z^3)\hat{l} + 2xyz\,\hat{j} + e^{xyz}\,\hat{\mathbf{k}}$$

- g) A can solve 90% of problems given in book and B can solve 75%. What is the probability that at least one of them will solve problem selected at random.
- h) Give applications of Chi-square distribution.
- i) Find homogenous linear differential equation whose particular solution is $5 + e^{x} + 2e^{3x}$
- j) A particle is executing S.H.M with amplitude 20cm and time 4 seconds. Find the time required by particle in passing between points which are at distance 15cm and 5cm from the centre of force and are on same side of it.

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SECTION B

(8 marks each)

2. Show that the matrix $A = \begin{bmatrix} 3 & 1 & -1 \\ -2 & 1 & 2 \\ 0 & 1 & 2 \end{bmatrix}$ is diagonalizable. Hence find P such that P⁻¹AP is

diagonal matrix. Then obtain the matrix $B = A^2 + 5A + 3I$

- 3. Solve the differential equation $(2xy + x^2)y' = 3y^2 + 2xy$
- 4. Solve $x^3 y''' 3x^2 y'' + 7xy' 8y = 3x^3 + 8x$
- 5. A constant electromotive force E volts is applied to circuit containing constant resistance R ohms in series and constant inductance L henries. If initial current is zero show that current builds up to half its theoretical maximum in (L log 2)/R seconds.

SECTION C

(8 marks each)

- 6. Give physical interpretation of Curl.
- 7. Evaluate $\oint 2y^3 dx + x^3 dy + z dz$ over the curve where curve is trace of cone $z = \sqrt{x^2 + y^2}$ intersected by the plane z = 4 and S is the surface of cone below z = 4.
- 8. a) The random variable X is normally distributed with mean = 9 and standard deviation = 3. Find the probabilities i) $X \ge 15$ ii) $X \le 15$ iii) $0 \le X \le 9$
 - b) Find the moment generating function of Poisson distribution.
- 9. a) Test the hypothesis that $\sigma = 20$, given that s = 30 for a random sample of size 80 from a normal population.
 - b) The number of students in a class is 100. The average marks scored by 64 boys is 66 with standard deviation of 10 while the average marks scored by 36 girls is 70 with standard deviation of 8. Test at 1% level of significance whether the girls perform better than boys.