

R07**SET-4**

Code No:43063

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**II.B.TECH - I SEMESTER REGULAR EXAMINATIONS NOVEMBER, 2009****MATHEMATICS-II****(Common to CE, CHEM, MMT, AE, BT)****Time: 3hours****Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

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1. a) Find the rank of the matrix $A = \begin{pmatrix} 1 & 4 & 9 & 6 \\ 1 & 2 & 3 & 4 \\ 1 & 1 & 1 & 3 \end{pmatrix}$ by reducing it to normal form.

- b) Test for the consistency of
$$\begin{aligned} 3x + 3y + 2z &= 1 \\ x + 2y &= 4 \\ 10y + 3z &= -2 \\ 2x - 3y - z &= 5 \end{aligned}$$
 and hence solve them. [8+8]

2. Find the Eigen value and Eigen vectors for the matrix $A = \begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}$. Also Verify Cayley –Hamilton theorem for the matrix A. [16]

3. a) Prove that the inverse of an orthogonal matrix is orthogonal and its transpose is also orthogonal .
 b) Reduce the quadratic form $2x_1x_2 + 2x_2x_3 + 2x_3x_1$ into canonical form. Classify the quadratic form. [8+8]

4. a) Find the Fourier series to represent $f(x) = e^{ax}$ in $-\pi < x < \pi$

- b) Develop $\sin\left(\frac{\pi x}{k}\right)$ in half range cosine series in $0 < x < k$. [8+8]

5. a) Form the partial differential equation by eliminating the arbitrary constants a and b from $z = ax + by + ab$

- b) Solve the partial differential equation $p\sqrt{x} + q\sqrt{y} = \sqrt{z}$

- c) Solve the P.D.E. for $z = px + qy - 2\sqrt{pq}$. [5+5+6]

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6. Solve $\frac{\partial t}{\partial u} = c^2 \frac{\partial^2 \mu}{\partial x^2}$ given that

a) $\mu = 0$ when $x = 0$ and $x = l$ for all t .

b) $\mu = 3 \sin \frac{\pi x}{l}$ when $t = 0$ for all x in $0 < x < l$

[8+8]

7. a) prove that the Fourier transform is linear

b) Find the Fourier cosine transform of $2e^{-3x} + 3e^{-2x}$.

[8+8]

8. a) Find i) $z \{a^n \cos \theta\}$ ii) $z \{a^n \sin \theta\}$

b) Using the z – transform solve

$$\mu_{n+2} + 4(\mu_{n+1}) + 3\mu_n = 3^n \quad \text{given,}$$

That $\mu_0 = 0$ and $\mu_1 = 1$.

[8+8]
