R07 **SET-2**

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 A = $\begin{bmatrix} 3 & 2 & -1 \\ 5 & 1 & 0 \\ 1 & 3 & 2 \\ 4 & -2 & 1 \end{bmatrix}$ by reducing it to normal form.

   b) Test for consistency of the equation
   $x+2y=3$, $y-z=2$, $x+y+z=1$ and hence solve them if possible. [8+8]

2. Verify Cayley Hamilton theorem for A = $\begin{pmatrix} 1 & 2 & -2 \\ 2 & 5 & -4 \\ 3 & 7 & -5 \end{pmatrix}$ and hence find A^{-1}. [16]

3. a) Prove that the Eigen values of a Hermitian matrix are all real .

   b) Reduce the quadratic form $2x^2+2y^2+3z^2+2xy-4yz-4zx$ to canonical form. Find the rank index and signature. [8+8]

4. a) Obtain the Fourier series to represent
   $$f(x)=\frac{1}{4}(\pi-x)^2 \ in \ 0<x<2\pi$$

   b) Develop a Fourier series for the function
   $$f(x)=x \ \ in \ \ 0<x<\frac{\pi}{2}$$
   $$=\pi-x \ \ in \ \ \frac{\pi}{2}<x<\pi$$ [8+8]

5. a) Obtain the partial differential equation form z = $f(\sin x+\cos y)$

   b) Solve the PDE for $xp-yq=y^2-x^2$

   c) Solve the PDE for $p(1+q)=qz$ [6+5+5]

6. a) Solve $\mu_{xx}-\mu_y=0$ by separation of variables

   b) Solve $2xz_x-3yz_y=0$ by separation of variables [8+8]

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7. a) Find the Fourier cosine and sin transform of

$$f(x) = \begin{cases} = \cos x & if \ \ 0 < x < a \\ 0 & if \quad x \geq a \end{cases}$$

b) Prove that $e^{-x^2/2}$ is self reciprocal with respect to Fourier transform. [8+8]

8. a) Find i) $z\{a^n\}$ ii) $Z\left\{\frac{1}{n!}\right\}$

b) If $Z(\mu_n) = \overline{\mu}(z)$ prove that $z\left(a^n \mu_n\right) = \overline{\mu}\left(\frac{z}{a}\right)$. [8+8]

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