Total No. of Pages 2

Roll No. 2K10/EC/009

SECOND SEMESTER

B.Tech. (Group A&B)

END SEMESTER EXAMINATION ***MAY-2012***

AM-111 MATHEMATICS-II

Time: 3:00 Hours ***Max. Marks : 70***

Note : Answer ***ALL*** questions selecting Two parts from each question.
Each question carry equal marks.
Assume suitable missing data, if any.

1[a] Apply row transformation to find the inverse of the matrix

$$\begin{bmatrix} 2 & -1 & 3 \\ 1 & 1 & 1 \\ 1 & -1 & 1 \end{bmatrix}$$

[b] Find the eigen values and eigen vectors of the matrix

$$\begin{bmatrix} 2 & -2 & 2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$$

If possible form the diagonalizing matrix.

[c] Test for the consistency and if consistent then solve the following system of equation;

$x + 2y + z = 3$
$2x + 3y + 2z = 5$
$3x - 5y + 5z = 2$
$3x + 9y - z = 4$

2[a] Find the general solution of differential equation

$\frac{d^4y}{dx^4} + n^4y = 0$

[b] Solve the differential equation

$(D^2 + 1)(D - 2)^2y = e^{2x}sinx$

[c] Solve the simultaneous differential equation

$(3D + 1)y + 3Dx = 3t + 1$
$(D - 3)y + Dx = 2t$

3[a] Solve the differential equation in series
$9x(1-x)y''-12y'+4y=0$

[b] State and prove Rodrigues formula for Legendre's polynomial.

[c] State and prove orthogonality of Bessel's function of First kind of order 'n'.

4[a] Solve the differential equation using Laplace transform
$(D^2+1)x = tcos2t \qquad x(0)=0, \left(\frac{dx}{dt}\right)_{t=0}=0$

[b] Find the inverse Laplace transform of

(i) $\frac{s}{s^4+s^2+1}$ (ii) $\frac{e^{-\pi s}}{s^2+1}$

[c] If f(t) is a periodic function with period *'a'* then find its Laplace transform.

5[a] Find half range cosine series to represent the function *xsinx* in the internal $[0,\pi]$.

[b] Obtain the Fourier series for the function

$$f(x)=\begin{cases} x & -1\le x\le 0 \\ x+2 & 0<x\le 1 \end{cases}$$

and hence deduce that

$$\pi/4 = 1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\cdots\ldots\ldots\ldots\ldots$$

[c] Find the Fourier transform of
$f(x)=e^{-ax^2} \quad a>0$
and using this find the fourier transform of $f(x)=xe^{-ax^2}, a>0$