A-8 1176

Total no. of pages :2

2nd SEMESTER

END SEMESTER EXAMINATION

*Roll No.*____________

B.Tech (All groups)

MAY 2015

AM – 111 Mathematics-II

Time : 3 hrs

Max. Marks: 70

Note: Attempt all questions selecting ***two parts*** from each question. All questions carry equal mark. Assume missing data , if any.

1 (a) Find the inverse of the following matrix using row operation

$$A = \begin{pmatrix} 8 & 4 & -3 \\ 2 & 1 & 1 \\ 1 & 2 & 1 \end{pmatrix}$$

(b) Test for the consistency, and if consistent then solve the system of equation

$x + y + z = 0,\quad 2x - y + z = 3,\quad 4x + 2y - 2z = 2$

(c) Find the eigen values and eigen vectors of the matrix

-3 -3+5 (111)

$$A = \begin{pmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{pmatrix}$$

Solve the differential equation

2 (a) $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x sinx$

(b) Solve the differential equation

$\frac{d^2y}{dx^2} + 4y = secx$ using variation of parameter method.

$y = \frac{W_1 x}{W x}$

(c) Solve the simultaneous differential equation

$\frac{dy}{dt} + 2x + y = 0\,, \frac{dx}{dt} + 5x - 2y = t$, given that x=y=0 at t=0

3 (a) State and prove Rodrigue's Formula for Legendre's Polynomial.

1/21	10/21	-1/3
1/21	-11/21	2/3
-1/7	4/7	0

(b) Solve using Frobenious method $x^2y'' - (x^2 + x)y' + y = 0$

(c) State and prove the orthogonality of Bessel's Function.

4. (a) Find the Laplace transform of the function

$$\frac{\cos(at) - \cos(bt)}{t}.$$

(b) Solve the differential equation $\frac{d^2y}{dt^2} + 9y = cos2t$ using Laplace transform , given that $y(0) = 1$ and $y\left(\frac{\pi}{2}\right) = -1$

(c) If $f(t)$ is a periodic function of period 'a', then show that

$$L\{f(t)\} = \frac{1}{1 - e^{-as}} \int_0^a e^{-st} f(t) dt$$

5. (a) Obtain the Fourier series for $f(x) = x^2 + x \, , for - \pi < x < \pi$ and prove that $\frac{\pi^2}{6} = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots$.

(b) Obtain the Fourier series for $f(x) = x^2 - 2 \, , for - 2 < x < 2$.

(c) Find Fourier sine transform of $f(x) = e^{-|x|}$. Hence show that

$$\int_0^\infty \frac{x \sin mx}{1 + x^2} dx = \frac{\pi e^{-m}}{2} , \qquad m > 0 .$$