Total no. of pages :D 2nd SEMESTER END SEMESTER EXAMINATION Roll No. 244

B.Tech (All groups) MAY 2014

AM-111

Mathematics-II

Time: 3hr

Max. Marks: 70

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

1 (a) Find the inverse of the matrix using Cayley Hamilton theorem

$$A = \begin{pmatrix} 2 & 5 & 3 \\ 3 & 1 & 2 \\ 1 & 2 & 1 \end{pmatrix}$$

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

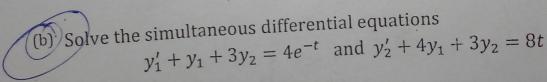
$$2x - 3y + 7z = 5$$
$$3x + y - 3z = 13$$
$$2x + 19y - 47z = 32$$

(c) Find the eigen values and eigen vectors of the matrix and if possible construct diagonalising matrix.

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

2 (a) Solve the differential equation $\frac{d^4y}{dx^4} + n^4y = 0.$

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- (c) Solve the differential equation $\frac{d^2y}{dx^2} + 4y = \sin^2 x + x^2 e^{2x}$
- 3 (a) Obtain the series solution of the differential equation x(1-x)y'' + (1-x)y' + y = 0



- (b) State and prove the orthogonality of Bessel's function of first kind
- (c) State and prove the Rodrigue's formula for $P_n(x)$. Express x^3 in ferms of Legendre's Polynomial.
- 4 (a) Find Laplace transform of the function

f(t) =
$$\sin(at) - (at)\cos(at)$$

- (b) If f(t) is a periodic function of period 'a', then find it's Laplace transform.
 - (c) Solve the differential equation using Laplace transform

ifferential equation using Edge
$$y'' + 9y = \cos 2t$$
, $y(0) = 1$, $y(\frac{\pi}{2}) = -1$

5 (a) Find the Fourier series for the function

Find the Fourier series for the function
$$f(x) = x + x^2, -\pi < x < \pi$$
 and deduce that
$$\frac{\pi^2}{6} = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots$$

- (b) Find a series of cosine of multiples of x which will represent xsinx in the interval $(0,\pi)$.
- Find Fourier transform of $f(x) = \begin{cases} 1 x^2, & -1 < x < 1 \\ 0, & elsewhere \end{cases}$ and hence evaluate the integral