

Code: CE2T2, CS2T1, EC2T1, EM2T2, EE2T1, IT2T3, ME2T1, AE2T1

I B.Tech-II Semester-Regular Examinations - July 2013

ENGINEERING MATHEMATICS - II
(Common for All Branches)

Duration: 3 hours

Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

- 1 a) For the matrix $A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & -1 \end{bmatrix}$ find non singular matrices P and Q such that PAQ is in the normal form.

7 M

- b) Solve the following equations by Gauss-Seidel method

$$5x + 2y + z = 12, x + 4y + 2z = 15, x + 2y + 5z = 20$$

7 M

- 2 a) Find the characteristic equation of the matrix

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix} \text{ and hence compute } A^{-1}.$$

Also find the matrix represented by

$$A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$$

7 M

b) Prove that the product of Eigen values of Matrix is equal to its determinant.

7 M

3 a) Obtain the Fourier series for $f(x) = \pi x$ in $0 \leq x \leq 2$

7 M

b) Find the Half range cosine and sine series for the function $f(x) = x^2$ in the range $0 \leq x \leq \pi$.

7 M

4 a) Find the Fourier cosine Transform of e^{-x^2} .

7 M

b) State and prove Convolution Theorem for Fourier Transforms.

7 M

5 a) Show that $z(\cos n\theta) = \frac{z(z - \cos\theta)}{z^2 - 2z\cos\theta + 1}$

4 M

b) If $U(z) = \frac{2z^2 + 5z + 14}{(z-1)^4}$ evaluate u_2 and u_3

4 M

c) Using Z-transform solve $u_{n+2} + 4u_{n+1} + 3u_n = 3^n$, with $u_0 = 0, u_1 = 1$.

6 M

6 a) Show that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$

4 M

b) Prove that $\int_0^1 \frac{x^2}{\sqrt{1-x^4}} dx \cdot \int_0^1 \frac{1}{\sqrt{1+x^4}} dx = \frac{\pi}{4\sqrt{2}}$

4 M

c) Prove that $\iint_D x^{l-1} y^{m-1} dx dy = \frac{\Gamma(l)\Gamma(m)}{\Gamma(l+m+1)} h^{l+m}$

where D is the domain $x \geq 0, y \geq 0$ & $x + y \leq h$.

6 M

7 a) Predict y at $x = 3.75$ by fitting a power curve to the data

x	1	2	3	4	5	6
y	2.98	4.26	5.21	6.10	6.80	7.50

7 M

b) The results of measurement of electric resistance R of a copper bar at various temperatures $t^\circ \text{C}$ are listed below

t	19	25	35	36	40	45	50
R	76	77	79	80	82	83	85

Find a relation $R = a + bt$ where a and b are constants to be determined.

7 M

8 a) Solve $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$, for which $\frac{\partial z}{\partial y} = -2 \sin y$ where $x = 0$ & $z = 0$ when y is odd multiple of $\frac{\pi}{2}$.

7 M

b) Solve $(mz - ny) \frac{\partial z}{\partial x} + (nx - lz) \frac{\partial z}{\partial y} = (ly - mx)$

7 M