PVP 14

Code: CE2T1, ME2T1, CS2T1, IT2T1, EE2T1, EC2T1, AE2T1

I B.Tech - II Semester – Regular/Supplementary Examinations
April - 2019

ENGINEERING MATHEMATICS - II

(Common for all Branches)

Duration: 3 hours | Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11 x 2 = 22 M

1.

a) Define the following terms: i) Consistency ii) Trivial Solution for Homogeneous System of Equations.

b) For a non-homogeneous system, when we say the system is consistent and in what case we get infinite number of solutions?

c) Find the eigen values of $A^2 - 2A + I$,where

$$A = \begin{bmatrix} 2 & 3 & 4 \\ 0 & 4 & 2 \\ 0 & 0 & 3 \end{bmatrix}$$

d) Two eigen values of the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ are equal to 1 each. Find the eigen values of A^{-1}.

e) Write the statement of Cayley-Hamilton theorem.

f) Find the Laplace transform of sin2tcos3t.

g) Find the inverse Laplace transform of $\frac{1}{s^2-5s+6}$.

h) Write the Fourier series for the function f(x) in the interval $-c < x < c$.

i) Define the Fourier transform and inverse Fourier transform of a function.

j) Write the convolution theorem in Z-transforms.

k) Show that $z\left(\frac{1}{n+1}\right) = z \log\left(\frac{z}{z-1}\right)$.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) For what values of μ, λ the simultaneous equations

$x+y+z=6$

$x+2y+3z=10$

$x+2y+\lambda z=\mu$ have

i) No solution

ii) Unique solution

iii) Infinite number of solutions 8 M

b) Apply Gauss elimination method to solve the following system of equations

$x+4y-z=-5$, $x+y-6z=-12$, $3x-y-z=4$ 8 M

3. a) Verify Cayley-Hamilton theorem for the matrix

$A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ and find its inverse. Also express

$A^5 - 4A^4 - 7A^3 + 11A^2 - A - 10I$ as a linear polynomial in A. 8 M

b) Find the eigen values and eigen vectors of the following matrix $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$ 8 M

4. a) Find the Laplace transform of the following functions

i) $\frac{(e^{-at} - e^{-bt})}{t}$ ii) $f(t) = \begin{cases} 4, when\ 0 \le t \le 1 \\ 3, \quad when\ t > 1 \end{cases}$

8 M

b) Use Laplace transform to solve 8 M

$$\frac{d^2x}{dt^2} - 2\frac{dx}{dt} + x = e^t\ with\ x = 2, \frac{dx}{dt} = -1\ at\ t = 0$$

5. a) Find the Fourier series to represent $f(x)=e^x$, $-\pi<x<\pi$ and hence derive a series for $\frac{\pi}{\sin h\pi}$ 8 M

b) Find the Fourier sine and cosine transform of

$f(x) = \begin{Bmatrix} sinx, if\ 0 < x < a \\ 0, if\ x \ge a \end{Bmatrix}$ 8 M

6. a) If $z[f(n)] = \frac{5z^2+3z+12}{(z-1)^4}$, find f(2) and f(3) 8 M

b) Solve 8 M

$$u_{n+2} + 4u_{n+1} + 3u_n = 3^n\ given\ that\ u_0 = 0, u_1 = 1$$