PVP 14

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

I B.Tech - II Semester – Regular Examinations – JULY 2015

ENGINEERING MATHEMATICS - II
(Common for all Branches)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks
11x 2 = 22 M

1. a) Define Echelon form of a Matrix.
   b) Explain Normal form of a Matrix.
   c) Prove that If λ is an Eigen value of an orthogonal matrix then $\frac{1}{\lambda}$ is also its Eigen value.
   d) Find the Sum and product of the Eigen values of
   $$A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}.$$
   e) Find $L(\cos^2 2t)$
   f) Define Dirac's delta function.
   g) Find $L^{-1}\left(\cot^{-1}\left(\frac{s}{2}\right)\right)$.
   h) Write the existence conditions of Fourier series expansion.
   i) Define change of scale property of Fourier transform.
   j) State Damping rule of Z- transform.
   k) State Initial value theorem of Z-transform.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks. 16 x 3 = 48 M

2. a) Are the following vectors linearly dependent? If so find the relation between them, where X=(1,3,4,2), Y=(3,-5,2,2), and Z=(2,-1,3,2). 8 M

   b) Investigate the values of λ and μ so that the equations x+y+z=6, x+2y+3z=10, x+2y+ λ z= μ have 8 M

   i) No solution ii) A unique solution

   iii) An infinite number of solutions.

3. a) State the Cayley-Hamilton theorem for a matrix and find verify the Cayley-Hamilton for the given matrix also find A^{-1} where $A=\begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{bmatrix}$ 8 M

   b) If $A=\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ then obtain the matrix P such that $P^{-1}AP$ is a diagonal matrix. 8 M

4. a) Evaluate $L\left[\int_0^t \frac{\cos at - \cos bt}{t} dt\right]$ 8 M

b) Solve the differential equation $y^{11} - 3y^{1} + 2y = e^{3t}$ where $y(0) = 1, y^{1}(0) = 0$ using transform method.

8 M

5. a) Obtain Fourier series for the function f(x) given by

$$f(x) = 1 + \frac{2x}{\pi}; \qquad -\pi \le x \le 0$$

$$1 - \frac{2x}{\pi} \qquad 0 \le x \le \pi$$

Hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots\ldots = \frac{\pi^2}{8}$. 8 M

b) Find the Fourier Cosine transform of e^{-x^2}. 8 M

6. a) Find the Z-transform of

i) $3n - 4\sin\frac{n\pi}{4} + 5a$ ii) $\sin(3n + 5)$. 8 M

b) Using Z - transforms

solve $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ with

$y_0 = y_1 = 0$. 8 M