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CODE: 13BS1003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech II Semester Supplementary Examinations, June-2017

ENGINEERING MATHEMATICS -III
(Common to CE, ME, CSE, IT, ECE & EEE)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1.
a) Reduce the matrix $\begin{bmatrix} 1 & -1 & 1 \\ -1 & 2 & 1 \\ 1 & -1 & 2 \end{bmatrix}$ to echelon form

b) Define the rank of matrix

c) Determine the eigen values of $\begin{bmatrix} -2 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

d) Write the nature of the Quadratic form $x_1^2 + x_2^2 + 0.1x_3^2$

e) Define Fourier transform

f) State Euler's coefficients in Fourier series of a function f(x) for [0, 2π]

g) Determine the Z-transform of $Sin\ (nt)$.

h) State Damping rule of Z- transform

i) Determine the value of $\Gamma(\frac{5}{2})$

j) Define Beta function

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. Determine the rank of a matrix A by reducing it to echelon form. **12M**

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

(OR)

3. a) Apply Gauss elimination method to solve the system of equations **6M**
$2x + 4y + z = 3,\ 3x + 2y - 2z = -2,\ x - y + z = 6$

b) Find the value of $'b'$ such that the system **6M**
$2x + y + 2z = 0,\ x + y + 3z = 0,\ 4x + 3y + bz = 0$ has non trivial solutions

UNIT-II

4. If $A=\begin{bmatrix}2 & -1 & 0\\ 3 & 1 & -1\\ 2 & 0 & 3\end{bmatrix}$, find A^{-1} using Cayley-Hamilton theorem and A^4 **12 M**

(OR)

5. Reduce the quadratic form $3x^2+3y^2+3z^2+2xy+2xz-2yz$ to canonical form by an orthogonal transformation **12M**

UNIT-III

6. a) Find the Fourier series for $f(x)=e^x,\ 0<x<2\pi$. **6M**

b) Find Fourier sine transform of $e^{-|x|}$. **6M**

(OR)

7. a) Find the half range cosine series for f(x) = x for $[0, \pi]$. **6M**

b) Find the Fourier series to represent the function $f(x)=\sin x, -\pi<x<\pi$. **6M**

UNIT-IV

8. a) Find Z- transform of $2^n \sin n\theta$ **4M**

b) Find $Z^{-1}\left[\frac{z}{z^2+11z+24}\right]$. **8M**

(OR)

9. a) Determine the inverse Z-transform of $\frac{z^2}{z^2-4z+3}$ by convolution theorem **6M**

b) Using Z – transform, solve $u_{n+2}+4u_{n+1}+3u_n=3^n$ with $u_0=0, u_1=1$ **6M**

UNIT-V

10. a) Show that $\beta(p,q)=\int_0^1 \frac{x^{p-1}+x^{q-1}}{(1+x)^{p+q}}dx$ **6M**

b) Prove that $\Gamma\left(\frac{1}{2}\right)=\sqrt{\pi}$ **6M**

(OR)

11. a) Show that $\int_0^1 y^{q-1}\left(\log\frac{1}{y}\right)^{p-1}dy=\frac{\Gamma(p)}{q^p}$, where p>0, q>0. **4M**

b) State and prove the relation between beta and gamma functions. **8M**

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