

I/IV B.Tech. DEGREE EXAMINATIONS, NOV/DEC-2017**First Semester****CSE/ECE/EEE****MATHEMATICS-I****Time: Three Hours****Maximum marks:60****Answer Question No.1 Compulsory****12X1=12 M****Answer ONE Question from each Unit****4X12=48 M**

1. a) Find the rank of $A = \begin{bmatrix} 1 & 2 & 1 & 0 \\ -2 & 4 & 3 & 0 \\ 1 & 0 & 2 & -8 \end{bmatrix}$
- b) P.T the eigen values of A^{-1} are the reciprocals of the eigen values of A.
- c) If 'A' is Skew-Hermitian matrix, prove that 1A is a Hermitian Matrix.
- d) State Taylors Mean value theorem
- e) Write down all the normal equations to the second degree polynomial by the sum of least squares Method.
- f) Define Gamma function and write down its properties.
- g) Define error function.
- h) Define normalised Model Matrix.
- i) Write down fourier series for even function.
- j) Define odd function.
- k) Write Maclaurins theorem.
- l) Write down the complex form of fourier series.

UNIT-I

2. a) Find for what values of 'λ' the equations $x+y+z=1$, $x+2y+4z=\lambda$, $x+4y+10z=\lambda^2$ have a solution and solve them completely in each case.

- b) Find the eigen values and corresponding eigen vectors of $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$

(OR)

3. Reduce the Quadratic form $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$ to the canonical form.

UNIT-II

4. a) Expand $e^{\sin x}$ by Maclaurin's series upto the term containing x^4 .

b) Examine the function $x^3 + y^3 - 3axy$ for Maxima and Minima.

(OR)

5. a) Find the Maximum and Minimum values of $x+y+z$ subject to $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 1$ using

Lagrange's undetermined Multiplier.

b) By the method of least squares, find the straight line that best fits the following data:

x	1	2	3	4	5
y	14	27	40	55	68

UNIT-III

6. a) Change the order of Integration $\int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} dy dx$ and hence evaluate.

b) S.T $B(m,n) = a^m b^n \int_0^{\infty} \frac{x^{m-1}}{(ax+b)^{m+n}} dx$

(OR)

7. a) Evaluate $\int_0^1 \int_0^x \int_0^{x+y} dx dy dz$

b) P.T $B(m,n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$

UNIT-IV

8. a) Find the fourier series of $f(x) = e^x \forall x \in (-\pi, \pi)$

b) Find the fourier series of $f(x) = x^2 \forall x \in (-\pi, \pi)$

(OR)

9. a) Find the complex form of fourier series of $f(x) = \cos ax, x \in (-\pi, \pi)$

b) Expand $f(x) = \frac{(\pi-x)^2}{4}$ as a half range fourier sine series in $(0, \pi)$



I/IV B. Tech. DEGREE EXAMINATIONS, JUNE / JULY 2017**FIRST SEMESTER****BT / CSE / ECE / EEE****MATHEMATICS - I**Time : **Three Hours**Maximum Marks : **60****Answer Question No. 1 Compulsory.****12x1=12 M****Answer ONE question from each Unit.****4x12=48 M**

1. a) Define characteristic equation of a matrix.
- b) Write the condition for consistency of $AX = B$.
- c) Write any two applications of Cayley-Hamilton theorem.
- d) What do you mean by Model matrix.
- e) Define Unitary matrix.
- f) Write Taylor's theorem.
- g) Write Maclaurin's series for $f(x) = e^x$.
- h) Define Beta function.
- i) Write the relation between beta and gamma functions.
- j) Define Even function.
- k) Write the Parseval's formulae for Fourier series.
- l) Write Dirichlet's conditions for Fourier series.

UNIT - I

2. a) Investigate for consistency of the equations :
 $4x - 2y + 6z = 8$, $x+y-3z = -1$, $15x - 3y + 9z = 21$, and if possible find the solutions.

- b) 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 .

(OR)

3. Find a matrix P which transforms the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ to the diagonal form. Hence

find A^4 .**P.T.O.**

UNIT - II

4. a) Verify Maclaurin's theorem for $f(x) = (1-x)^{\frac{5}{2}}$ with Lagrange's form of remainder upto 3 terms where $x = 1$.
- b) Given that $x+y+z = a$, find the maximum value of $x^m y^n z^p$.

(OR)

5. a) Expand $e^x \log(1+y)$ in powers of x and y upto terms of third degree.
- b) Fit a second degree parabola to the following data :

x	:	0	1	2	3	4
y	:	1	1.8	1.3	2.5	6.3

UNIT - III

6. a) Change the order of integration and hence evaluate $I = \int_0^a \int_{\sqrt{ax}}^a \frac{y^2}{\sqrt{y^4 - a^2 x^2}} dx dy$.
- b) Evaluate $\int \int r^3 dr d_n$ over the area included between the circles $r=2 \sin\theta$ and $r=4 \sin\theta$.

(OR)

7. a) Prove that $\left(m, \frac{1}{2}\right) = 2^{2m-1} (m, n)$.
- b) Evaluate $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} dx dy$ by changing to polar coordinates.

UNIT - IV

8. a) Find the Fourier series to represent the function $f(x)$ given by $f(x) = \begin{cases} x, & 0 \leq x \leq f \\ 2f - x, & f \leq x \leq 2f \end{cases}$.
- b) Find the complex form of the Fourier series of $f(x) = e^{ax}, -l < x < l$.

(OR)

9. a) Find the Fourier to represent x^2 in the interval $(-l, l)$.
- b) Find the half range cosine series for the function $f(x) = (x-1)^2$ in the interval $0 < x < 1$.

