AR20

CODE: **20BST101** **SET2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech I Semester Supplementary Examinations, November-2021

LINEAR ALGEBRA AND CALCULUS

(Common to All Branches)

Time: 3 Hours **Max Marks: 6x10 = 60**

Answer ONE Question from each Unit

Each Question Carry **10** Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Determine the values of a for which the system has **exactly one Solution (Unique solution)** .

$x+2y-3z=4$

$3x-y+5z=2$

$4x+y+(a^2-14)z=a+2$ **5M**

b) Find the number of free variables and solve the system of equation by Gauss Elimination method:

$Z_3+Z_4+Z_5=0, -Z_1-Z_2+2Z_3-3Z_4+Z_5=0, Z_1+Z_2-2Z_3-Z_5=0,$

$2Z_1+2Z_2-Z_3+Z_5=0$ **5M**

(OR)

2 a) Find the relations among p, q and r for which the rank of $A=\begin{bmatrix}1&1&1\\p&q&r\\p^2&q^2&r^2\end{bmatrix}$ is 2. **5M**

b) Investigate for what values of λ, μ the simultaneous equations

$x+y+z=6,$

$x+2y+3z=10,$

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

have **an infinite number of solutions**. **5M**

UNIT-II

3. Find a matrix P that diagonalizes $A=\begin{bmatrix}-1&7&-1\\0&0&0\\0&15&-2\end{bmatrix}$, and then compute A^{11}. **10M**

(OR)

4. Find all values of k for which the quadratic form of $5x_1^2+x_2^2+kx_3^2+4x_1x_2-2x_1x_3-2x_2x_3$ is positive definite. **10M**

UNIT-III

5. Evaluate $\iint_E \frac{xy(x+y)^2}{(x^2+y^2)}dxdy$, Where E is bounded by $y=0,\ y=x,\ x^2+y^2=a^2$ the first quadrant. **10M**

(OR)

6. Evaluate $\iiint_E 6z^2dV$ where E is the region below $4x+y+2z=10$ in the first octa **10M**

CODE: 20BST101 **SET2**

UNIT-IV

7. Evaluate $\int_0^{\frac{\pi}{2}} (\sin x)^{2n-1} (\cos x)^{2m-1}\, dx$, using β and γ functions. **10M**

(OR)

8. Evaluate $\int_0^1 x^n (\ln x)^m \; dx$ using β and γ functions **10M**

UNIT-V

9. Find the values of a, b so that the surfaces $ax^2 - byz = (a+2)x$ and $4x^2y + z^3 = 4$ may intersect at orthogonally at the point (1,-1,2). **10M**

(OR)

10. Find $div(\nabla\emptyset)$ where $\phi = x^2 yz + 4xz^2$ at (1, -2, -1). **10M**

UNIT-VI

11. Evaluate $\int_S \; F.N\; ds$ where $F = 18zi - 12j + 3yk$ and S is the part of the plane $2x + 3y + 6z = 12$located in the first octant. **10M**

(OR)

12. Verify Gauss's divergence theorem to evaluate $F = (x^3 - yz)i - 2x^2 yj + zk$ over the Surface of the cube bounded by the coordinate planes $x = y = z = a$. **10M**