AR20

CODE: 20BST101 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech I Semester Regular Examinations, August, 2021

LINEAR ALGEBRA AND CALCULUS

(Common to All Branches)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. Show that the only real number 'λ' for which the system $x + 2y + 3z = \lambda x$, $3x + y + 2z = \lambda y$, $2x + 3y + z = \lambda z$ has non- zero solution is 6, and solve them when 'λ' = 6 . 10M

(OR)

2. Analyse for what values of a, b the equations $x + y + z = 3$, $x + 2y + 2z = 6$, $x + ay + 3z = b$ have i) no solution ii) a unique solution iii) an infinite number of solutions? 10M

UNIT-II

3. Find the Eigen values of the matrix $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ and the corresponding Eigen vectors. 10M

(OR)

4. Diagonalize the matrix $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$ 10M

UNIT-III

5. Evaluate $\iint_R y\,dx\,dy$, where R is the region bounded by the Parabolas $y^2 = 4x$ and $x^2 = 4y$ 10M

(OR)

6. Find the solution of $\iint_R xy\,dx\,dy$, where R is the region bounded by x- axis and x = 2a and the curve $x^2 = 4ay$. 10M

UNIT-IV

7. Show that $\beta(m,n)=\frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$. 10M

(OR)

8. a) Evaluate $\int_0^1 (8-x^3)^{1/3}\,dx$ using β and γ functions 5M

b) Find $\int_0^\infty x^7 e^{-x^2}\,dx$. 5M

UNIT-V

9. Find the constants a,b,c , so that the vector $\bar{A}$ = (x + 2y + az)$\bar{i}$ + (bx-3y-z) $\bar{j}$ + (4x+cy +2z)$\bar{k}$ is irrotational. Also find ϕ such that $\bar{A} = \nabla\phi$. 10M

(OR)

10. a) Find the angle between the surfaces $x^2+ y^2+ z^2 = 9$, $Z = x^2 + y^2 -3$ at the point (2,-1,2). 5M

b) Show that the vector $(x^2-yz)\bar{i}+(y^2-zx)\bar{j}+(z^2-xy)\bar{k}$ is irrotational and find its scalar potential. 5M

UNIT-VI

11. Verify Green's theorem in a plane for $\int_C (3x^2-8y^2)dx+(4y-6xy)dy$, where C is the region bounded by $y=\sqrt{x}$ and $y = x^2$ 10M

(OR)

12. Verify Gauss Divergence theorem for $\bar{F} = x^2\,\bar{i} + y^2\,\bar{j} + z^2\,\bar{k}$ over the cube formed by the planes x = 0 , x = a , y = 0 , y = b, z =0, z=c. 10M