Q.P. Code: 20HS0830 **R20**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech I Year I Semester Supplementary Examinations November-2022

ALGEBRA AND CALCULUS

(Common To All)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	a	Reduce the matrix $A=\begin{bmatrix} 1 & 2 & 1 \\ -1 & 0 & 2 \\ 2 & 1 & -3 \end{bmatrix}$ into Echelon form and find its rank.	L1	6M
	b	Show that the equations $x+y+z=4$; $2x+5y-2z=3$; $x+7y-7z=5$ are not consistent.	L1	6M

OR

2		Verify Cayley Hamilton theorem for $\mathbf{A}=\begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ and find A^{-1} *and* A^{4} using Cayley-Hamilton theorem.	L3	12M

UNIT-II

3	a	Verify Rolle's theorem for the function $f(x)=\frac{\sin x}{e^{x}}$ in $[0,\pi]$	L2	6M
	b	If $u=\frac{x+y}{1-xy}$ *and* $v=\tan^{-1}x+\tan^{-1}y$, find $\frac{\partial(u,v)}{\partial(x,y)}$	L1	6M

OR

4	a	Find the shortest distance from origin to the surface $xyz^{2}=2$.	L1	6M
	b	Find the minimum value of $x^{2}+y^{2}+z^{2}$ *given* $x+y+z=3a$.	L1	6M

UNIT-III

5	a	Evaluate $\int_{0}^{\pi}\frac{x\sin x}{1+\cos^{2}x}dx$	L5	6M
	b	Evaluate $\int_{0}^{a}\int_{0}^{\sqrt{a^{2}-y^{2}}}(x^{2}+y^{2})dydx$	L5	6M

OR

6	a	Evaluate $\int_{-1}^{1}\int_{0}^{z}\int_{x-z}^{x+z}(x+y+z)dxdydz$	L5	6M
	b	Evaluate $\int_{0}^{\infty}\int_{0}^{\infty}e^{-(x^{2}+y^{2})}dxdy$ by converting into polar coordinates.	L3	6M

UNIT-IV

7	a	Find $grad\ f$ if $f = xz^4 - x^2y$ at a point $(1,-2,1)$ .Also find $\|\nabla f\|$	L1	6M
	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.	L6	6M

OR

8	a	Prove that $div(curl\bar{f}) = 0$ where $\bar{f}$ is vector point function.	L6	6M
	b	Find $curl\ \bar{f}$ if $\bar{f} = grad(x^3 + y^3 + z^3 - 3xyz)$	L1	6M

UNIT-V

9	a	If $\bar{F} = (5xy - 6x^2)\bar{i} + (2y - 4x)\bar{j}$ then evaluate $\int_c \bar{F}.d\bar{r}$ along the curve $y = x^3$ in xy-plane from $(1,1) to (2,8)$.	L5	6M
	b	Evaluate by Green's theorem $\oint_c (y - sinx)dx + cosxdy$ where 'c' is the triangle enclosed by the lines $y = 0, x = \frac{\pi}{2}$ and $\pi y = 2x$.	L5	6M

OR

10	Verify Stoke's theorem for $\bar{F} = (x^2 + y^2)\vec{i} - 2xy\vec{j}$ taken around the rectangle bounded by the lines $x = \pm a$, $y = \pm b$.	L2	12M

*** END ***