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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech I Year I Semester Regular Examinations July-2021

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	Define the rank of the Matrix.	L1	2M
	b	Find whether the following equations are consistent if so solve them $x+y+2z=4\,;2x-y+3z=9\,;3x-y-z=2.$	L3	10M

OR

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

UNIT-II

3	a	State and verify Rolle's Theorem for the function f(x) =$\log\left[\frac{x^2+ab}{x(a+b)}\right]$ in $[a,b]$ (x$\neq$ 0).	L2	6M
	b	Verify Lagrange's mean value theorem for f(x) =x^3-x^2-5x+3 in $[0,4]$.	L2	6M

OR

4	a	Examine the function for extreme values $f(x,y)=x^4+y^4-2x^2+4xy-2y^2$;(x>0,y>0).	L4	6M
	b	Find the minimum value of $x^2+y^2+z^2$ *given* $x+y+z=3a$.	L1	6M

UNIT-III

5	a	Prove that $\int_{-\infty}^{\infty}\frac{1}{1+x^2}dx=\pi$.	L1	6M
	b	Evaluate $\int_0^5\int_0^{x^2}x(x^2+y^2)dxdy$.	L5	6M

OR

6		Change the order of integration in $I=\int_0^1\int_{x^2}^{2-x}(xy)dydx$ and hence evaluate the same.	L3	12M

UNIT-IV

7	a	Find $div\,\bar{f}$ *if* $\bar{f}=grad(x^3+y^3+z^3-3xyz)$.	L1	6M
	b	Find *curl* of the vector $\bar{f}=(x+y+1)\bar{i}+\bar{j}-(x+y)\bar{k}$.	L1	6M

OR

8	a	Prove that $\nabla(r^n) = n.r^{n-2}\bar{r}$.	L2	6M
	b	Prove that $curl(\emptyset \bar{f}) = (grad\emptyset) \times \bar{f} + \emptyset(curl\bar{f})$.	L6	6M

UNIT-V

9	a	Evaluate $\int_s \bar{F}.\bar{n}ds.$ where $\bar{F} = 18z\vec{i} - 12\vec{j} + 3y\vec{k}$ and's' is the part of the surface of the plane $2x + 3y + 6z = 12$ located in the first octant.	L5	6M
	b	Evaluate $\int_s \bar{F}.\bar{n}ds.$ where $\bar{F} = 12x^2y\vec{i} - 3yz\vec{j} + 2z\vec{k}$ and's' is the portion of the plane $x + y + z = 1$ located in the first octant.	L5	6M

OR

10	Verify Gauss's divergence theorem for $\bar{F} = (x^3 - yz)\vec{i} - 2x^2y\vec{j} + z\vec{k}$ taken over the surface of the cube bounded by the planes $x = y = z = a$ and coordinate planes.	L2	12M

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