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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech I Year I Semester Supplementary Examinations November-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		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.	L2	12M
		OR		
2	a	State Cayley-Hamilton theorem.	L1	2M
	b	Show that the matrix $A=\begin{bmatrix}1 & -2 & 2\\ 1 & 2 & 3\\ 0 & -1 & 2\end{bmatrix}$ satisfies its characteristic equation and find A^{-1} ?	L2	10M

UNIT-II

3	a	Express the polynomial $2x^3+7x^2+x$-6 in power of $(x-2)$ assigning Taylor's series.	L3	6M
	b	Using Maclaurin's series expand $\tan x$ up to the fifth power of x and hence find the series for log (sec x).	L3	6M
		OR		
4	a	Find the stationary points of $u(x,y)=sinx.siny.sin(x+y)\ where\ 0<x<\pi, 0<y<\pi$ and find the maximum of u.	L1	6M
	b	Find the shortest distance from origin to the surface $xyz^2=2$.	L1	6M

UNIT-III

5	a	Evaluate $\int_0^{\pi}\frac{x\sin x}{1+\cos^2 x}dx$.	L5	6M
	b	Evaluate $\int_0^{\pi}\theta\sin^8\theta\cos^4\theta d\theta$.	L5	6M
		OR		
6	a	Evaluate $\int_0^{\infty}\int_0^{\infty}e^{-(x^2+y^2)}dxdy$ by converting to polar coordinates.	L3	6M
	b	Evaluate $\int_0^{2}\int_0^{\sqrt{2x-x^2}}(x^2+y^2)dxdy$ by changing into polar coordinates.	L3	6M

UNIT-IV

7	**a**	Evaluate the angle between the normal to the surface $xy = z^2$ at the points $(4,1,2)$ and $(3,3,-3)$.	**L1**	**6M**
	b	Find the maximum or greatest value of the directional derivative of $f = x^2yz^3$ at the point $(2,1,-1)$.	**L1**	**6M**
		OR		
8	**a**	Find 'a' if $\bar{f} = y(ax^2 + z)\vec{i} + x(y^2 - z^2)\vec{j} + 2xy(z - xy)\vec{k}$ is solenoidal.	**L1**	**6M**
	b	If $\bar{f} = (x + 2y + az)\vec{i} + (bx - 3y - z)\vec{j} + (4x + cy + 2z)\vec{k}$ is irrotational then find the constants *a, b and c.*	**L1**	**6M**

UNIT-V

9	**a**	If $\bar{F} = (5xy - 6x^2)\vec{i} + (2y - 4x)\vec{j}$ .Evaluate $\int_c \bar{F}.d\bar{r}$ along the curve 'c' in *xy*-plane $y = x^3$ from $(1,1)$ to $(2,8)$.	**L5**	**6M**
	b	Find the work done by a force $\bar{F} = (2y + 3)\vec{i} + (xz)\vec{j} + (yz - x)\vec{k}$ when it moves a particle from $(0,0,0)$ to $(2,1,1)$ along the curve $x = 2t^2; y = t; z = t^3$.	**L1**	**6M**
		OR		
10		Verify Stoke's theorem for $\bar{F} = (x^2 + y^2)\vec{i} - 2xy\vec{j}$ taken round the rectangle bounded by the lines $x = \pm a$, $y = \pm b$.	**L2**	**12M**

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