Q.P. Code: 19HS0830 **R19**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech I Year I Semester Supplementary Examinations August-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** Reduce the matrix A= $\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$ into Echelon form and find its rank? **6M**

b Solve the system of equations x+2y+3z=0 ,3x+4y+4z=0,7x+10y+12z=0 **6M**

OR

2 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} ? **12M**

UNIT-II

3 **a** Verify Rolle's Theorem for the function f(x) = $\frac{\sin x}{e^x}$ in $(0, \pi)$. **6M**

b Verify Cauchy's mean value theorem for the function $sinx$ and $cosx$ in $[0, \frac{\pi}{2}]$. **6M**

OR

4 Obtain the Maclaurin's series expression of the following functions: **12M**

i) e^x ii) $\cos x$ iii) $\sin x$

UNIT-III

5 **a** If $u = tan^{-1}\left[\frac{2xy}{x^2-y^2}\right]$, prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ **6M**

b If $u = \frac{x+y}{1-xy}$ and $v = tan^{-1}x + tan^{-1}y$,$find$ $\frac{\partial(u,v)}{\partial(x,y)}$? **6M**

OR

6 Examine the function for extreme values $f(x,y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$; (x>0,y>0). **12M**

UNIT-IV

7 **a** Evaluate the following improper integrals i) $\int_1^\infty \frac{1}{x^4} dx$ ii) $\int_0^1 \frac{1}{\sqrt{x}} dx$. **6M**

b Evaluate $\int_{-1}^{1}\int_{0}^{z}\int_{x-z}^{x+z}(x+y+z)dxdydz$ **6M**

OR

8		Evaluate $\int_0^a \int_{\frac{x}{a}}^{\sqrt{\frac{x}{a}}} (x^2+y^2)dydx$, by changing the order of integration	12M

UNIT-V

9	a	Define Beta and Gamma functions and Prove that $\Gamma(1) = 1$	6M
	b	Evaluate $\int_0^1 x^4 \left(log\frac{1}{x}\right)^3 dx$.	6M

OR

10	a	Prove that $\int_0^{\frac{\pi}{2}} sin^2\theta cos^4\theta d\theta = \frac{\pi}{32}$	6M
	b	Prove that $\int_0^1 \frac{x}{\sqrt{1-x^5}} dx = \frac{1}{5} B\left(\frac{2}{5},\frac{1}{2}\right)$.	6M

*** END ***