Q.P. Code: 16HS611 **R16**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech I Year II Semester Supplementary Examinations March-2021

ENGINEERING MATHEMATICS-II

(Common to all)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1 **a** Find the rank of the matrix $\begin{bmatrix} 2 & 1 & 3 & 5 \\ 4 & 2 & 1 & 3 \\ 8 & 4 & 7 & 13 \\ 8 & 4 & -3 & -1 \end{bmatrix}$ by using echelon form. **6M**

b Reduce the matrix $\begin{bmatrix} 1 & 0 & -3 & 2 \\ 0 & 1 & 4 & 5 \\ 1 & 3 & 2 & 0 \\ 1 & 1 & -2 & 0 \end{bmatrix}$ to normal form and hence find the rank. **6M**

OR

2 Verify Cayley – Hamilton theorem and hence find the A^{-1} and A^4 where $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$ **12M**

UNIT-II

3 **a** Find a unit normal vector to the surface $x^2y + 2xz = 4$ at $(2,-2,3)$. **6M**

b Find div $\bar{f}$ where $\bar{f} = grad\,(x^3 + y^3 + z^3 - 3xyz)$. **6M**

OR

4 **a** Verify Green's theorem for $\int_C \left[\left(3x^2 - 8y^2\right)dx + \left(4y - 6xy\right)dy \right]$ where C is the region bounded by $x = 0,\ y = 0$ and $x + y = 1$. **10M**

b Define the statement of Gauss Divergence theorem. **2M**

UNIT-III

5 **a** Write Dirichlet conditions and Eulers coefficients of Fourier Series. **4M**

b Find the Fourier series of $f(x) = x^2 over\left[-\pi, \pi\right]$ and hence deduce that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \ldots\ldots = \pi^2/12$. **8M**

OR

6 a Find the half range cosine series for the function $f(x) = x$ in the range $0 < x < \pi$ and hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + ... = \frac{\pi^2}{8}$. **6M**

b Find the half range sine series for $f(x) = x(\pi - x)$ in $0 < x < \pi$ and deduce that $\frac{1}{1^3} - \frac{1}{3^3} + \frac{1}{5^3} - \frac{1}{7^3} + ... = \frac{\pi^3}{32}$. **6M**

UNIT-IV

7 a Find Fourier Cosine transform of $f(x) = e^{-ax} \cos ax$, a>0 **6M**

b Prove that i) $F_s\{af(x) + bg(x)\} = aF_s(p) + bG_s(p)$ **6M**

ii) $F_c\{af(x) + bg(x)\} = aF_c(p) + bG_c(p)$

OR

8 Find the Fourier transform of $f(x) = \begin{cases} a^2 - x^2, & |x| < a \\ 0, & |x| > a \end{cases}$ and hence show that $\int_0^\infty \frac{x\cos x - \sin x}{x^3} dx = \frac{\pi}{4}$ **12M**

UNIT-V

9 a Form the partial differential equation by eliminating the arbitrary constants a, b from $\log(az - 1) = x + ay + b$. **6M**

b Form the partial differential equation by eliminating the arbitrary function $z = xy + f(x^2+y^2)$. **6M**

OR

10 Solve $4u_x + u_y = 3u$ and $u(0, y) = e^{-5y}$, by the method of separation of variables. **12M**

*** END ***