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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech I Year II Semester Supplementary Examinations July-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 by using Echelon form $\begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$. **6M**

b Find the rank of the matrix by reducing the given matrix in to normal form $\begin{bmatrix} 2 & 3 & 1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & 7 \end{bmatrix}$. **6M**

OR

2 Find the characteristic equation of the matrix $\begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$ and the hence find the matrix represented by A^8 -5$A^7 + 7A^6$-3 $A^5 + A^4 - 5A^3$+ $8A^2 - 2A + I$. **12M**

UNIT-II

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

b Find div F where F = grad $(x^3 + y^3 + z^3 - 3xyz)$. **6M**

OR

4 a If $\bar{F} = 4xz\,\bar{i} - y^2\,\bar{j} + y^z\,\bar{k}$ evaluate $\iint \bar{F}.\bar{n}$ ds. Where s is the surface of the cube bounded by x=0, x=a, y=0, y=a, z=0, z=a. **7M**

b Find the work done where $\bar{F}$ =(x-3y) $\bar{i} + (y - 2x)\,\bar{j}$ and C is the curve in the xy-plane, x =$2\cos t$, $y = 3\sin t$ *from* $t = 0$ *to* $t = 2\pi$. **5M**

UNIT-III

5 a Expand the function f (x) = x sin x as Fourier series in the interval - $\pi \le$ x$\le$. Hence deduce that $\frac{1}{1-3}$ - $\frac{1}{3.5}$ + $\frac{1}{5.7}$ -------- =$\frac{\pi-2}{4}$ **8M**

b Write Dirichlet conditions and Euler's coefficients in Fourier series. **4M**

OR

6 a Expand f(x) = e^{-x} as a Fourier series in (-1,1). **6M**

b Find half-range cosine series for f (x) = $(x - 1)^2$ in o <x<1. Hence show that $\frac{1}{1^2} + \frac{1}{2^2}$ + -------+ = $\frac{\pi^2}{6}$. **6M**

UNIT-IV

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

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OR

8	**a**	Find the inverse finite Fourier sine transform of f(x), if $F_s(n) = \frac{16(-1)^{n-1}}{n^3}$, where n is a positive integer and o<x<8.	**6M**
	b	Using Parreval's identity, show that $\int_0^\infty \frac{dx}{(x^2+a^2)(x^2+b^2)} = \frac{\pi}{2ab(a+b)}$.	**6M**

UNIT-V

9	**a**	Form the P. D. E by eliminating arbitrary constants $2z = (ax+y)^2 + b$.	**6M**
	b	Using the method of separation of variables solve $\frac{\partial\mu}{\partial x} = 2\frac{\partial\mu}{\partial t} + u$. where u (x,0)= $6e^{-3x}$.	**6M**

OR

10 A homogeneous rod of conducting material of length 100 cm has its ends kept at zero temperature and the temperature initially is u (x,0) = $\begin{cases} x & : 0 \le x \le 50 \\ 100 - x & : 50 \le x \le 100 \end{cases}$ **12M**

*** END ***