Q.P.Code: 16HS611 | R16 | H.T.No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech I Year II Semester Supplementary Examinations May/June-2024

ENGINEERING MATHEMATICS-II
(Common to all Branches)

Time: 3 Hours **Max. Marks: 60**

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

UNIT-I

1	a	Reduce the matrix $A=\begin{bmatrix}2&3&-1&-1\\1&-1&-2&-4\\3&1&3&-2\\6&3&0&-7\end{bmatrix}$ into Normal form and hence find their rank	CO1	L2	6M
	b	Investigate for what values of λ and μ the simultaneous equations $x+y+z=6;;\ x+2y+3z=10;\ x+2y+\lambda z=\mu$ have (i) no solution (ii) unique solution, (iii) an infinite number of solutions.	CO1	L3	6M
		OR			
2		Reduce the quadratic form to the sum of squares form by orthogonal reduction. Find index, Nature and Signature of the quadratic form $3x^2+5y^2+3z^2-2xy-2yz+2xz$	CO1	L3	12M

UNIT-II

3	a	Find the directional derivative of the function $\phi = xyz$ along the direction of the normal to the surface $xy^2+yz^2+zx^2=3$ at the point $(1,1,1)$	CO2	L2	6M
	b	Find a unit normal vector to the given surface $x^2y+2xz=4$ at the point $(2,-2,3)$	CO2	L2	6M
		OR			
4	a	Verify Greens theorem for $\int_C [(3x^2-8y^2)dx-(4y-6xy)dy]$ where C is the region Bounded by $x=0$, $y=0$, and $x+y=1$	CO2	L3	10M
	b	Define the statement of Gauss Divergence theorem	CO2	L1	2M

UNIT-III

5	a	Find the Fourier series of the function $f(x)=x,-\pi\le x\le\pi$	CO3	L2	6M
	b	Find the Fourier series of the function defined by $f(x)=\begin{cases}0, & -\pi\le x<0;\\ \sin x, & 0\le x\le\pi;\end{cases}$	CO3	L2	6M
		OR			
6	a	Find the Fourier series of the function defined by $f(x)=\begin{cases}1+x, & -1\le x<0;\\ 1-x & 0\le x\le 1;\end{cases}$	CO3	L3	6M
	b	Find the half range cosine series expansion of $f(x)=x;\ 0<x<2$	CO3	L2	6M

UNIT-IV

7	a	Express $f(x)=\begin{cases}1 \text{ for } 0\le x\le\pi\\ 0 \text{ for } x>\pi\end{cases}$ as a Fourier sine integral and hence evaluate $\int_0^\infty \frac{1-\cos(\pi\lambda)}{\lambda}\sin(x\lambda)\,d\lambda$	CO4	L2	6M
	b	Show that (i) $F_s[x\,f(x)] = -\frac{d}{ds}\{F_c(s)\}$; (ii) $F_c[x\,f(x)] = \frac{d}{ds}\{F_s(s)\}$.	CO4	L2	6M
		OR			

8	a	Find the Fourier cosine transform of e^{-x^2}	CO4	L3	6M
	b	Evaluate $\int_0^\infty \frac{x^2}{(a^2+x^2)^2}dx$; $(a>0)$ using Parseval's Identity	CO4	L3	6M

UNIT-V

9	a	Form the PDE by eliminating the arbitrary functions from $z = yf(x) + xg(y)$	CO5	L2	6M
	b	Using the method of separation of variable, solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$, where $u(x,0) = 6e^{-3x}$.	CO5	L2	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 $u(x,0) = \begin{cases} x & ;0 \le x \le 50 \\ 100-x & ;50 \le x \le 100 \end{cases}$ Find the temperature $u(x,t)$ at any time.	CO5	L3	12M

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