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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech I Year II Semester (R16) Supplementary Examinations Dec 2017
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. 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) a unique solution and (iii) an infinite number of solutions. 6M

b. Reduce the matrix $A=\begin{bmatrix}2 & 3 & -1 & -1\\ 1 & -1 & -2 & -3\\ 3 & 1 & 3 & -2\\ 6 & 3 & 0 & -7\end{bmatrix}$ to normal form and hence find rank 6M

OR

2 Reduce the matrix $A=\begin{bmatrix}1 & 1 & 3\\ 1 & 5 & 1\\ 3 & 1 & 1\end{bmatrix}$ to the diagonal form 12 M

UNIT-II

3 a Find the angle between the surfaces $x^2+y^2+z^2=9$ and $z=x^2+y^2-3$ at the point $(2,-1,2)$ 6M

b Compute the line integral $\int_C y^2dx-x^2dy$ about the triangle whose vertices are $(1,0)$, $(0,1)$ and $(-1,0)$ 6M

OR

4 State the Stoke's theorem and verify the Stoke's theorem for $F=(x^2+y^2)i-2xy\,j$ taken around the rectangle bounded by the lines $x=\pm a,\ y=0,\ y=b$ 12M

UNIT-III

5 a. If $f(x)=|\cos x|$, expand $f(x)$ as a Fourier series in $(-\pi,\pi)$. 6M

b. Prove that $x^2=\frac{\pi^2}{3}+4\sum_{n=1}^{\infty}(-1)^n\frac{\cos nx}{n^2}, \quad -\pi<x<\pi$ using Fourier series. 6M

OR

6 a. Obtain Fourier series for the function $f(x)=\begin{cases}\pi x, & 0\le x\le 1\\ \pi(2-x), & 1\le x\le 2\end{cases}$

Deduce that $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\ldots\ldots\ldots\ldots\ldots\ldots=\frac{\pi^2}{8}$. 8M

b. Express $f(x)=x$ as a half-range sine series in $0<x<2$. 4M

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 $\int_0^{\infty}\frac{\sin x-x\cos x}{x^3}dx=\frac{\pi}{4}$. 12M

OR

8 Find the cosine transform of (i) $e^{-ax}\cos ax$ and (ii) $e^{-ax}\sin ax$ 12M

UNIT-V

9 a. Solve by Method of separation of variables $\frac{\partial^2 u}{\partial x^2}-2\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}=0$ 6M

b. Form the P.D.E by eliminating arbitrary function $z=f(x+at)+g(x-at)$ 6M

OR

10 Solve the Laplace equation $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0$ subject to the conditions

$u(0,y)=u(l,y)=u(x,0)=0$ and $u(x,a)=\sin\left(\frac{n\pi x}{l}\right)$ 12M

***** END *****