Q.P. Code: 19HS0831 **R19**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech I Year II Semester Supplementary Examinations July-2021
DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to CE, EEE, ME, ECE & AGE)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1 a Solve $(x+1)\frac{dy}{dx} - y = e^{3x}(x+1)^2$. **6M**

b Solve $(D^2 - 3D + 2)y = xe^{3x} + \sin 2x$. **6M**

OR

2 a Solve $(D^2 + 4D + 3)y = e^{-x}\sin x + x$. **6M**

b Solve $\frac{dy}{dx} + y\tan x = y^2 \sec x$. **6M**

UNIT-II

3 a Solve $(D^2 - 2D)y = e^x \sin x$ by the method of variation of parameters. **5M**

b Find the current $'i'$ in the LCR circuit assuming zero initial current and charge $'i'$, if $R = 80\ Ohms, L = 20\ Henrys,\ C = 0.01\ Farads$ and $E = 100\ V$. **7M**

OR

4 a Solve $(1+x)^2 \frac{d^2y}{dx^2} - 3(1+x)\frac{dy}{dx} + 4y = x^2 + x + 1$. **7M**

b Solve $\frac{dy}{dx} + y = z + e^x;\ \frac{dz}{dx} + z = y + e^x$. **5M**

UNIT-III

5 a Solve $\frac{\partial^3 z}{\partial x^2 \partial y} + 18xy^2 + \sin(2x - y) = 0$. **6M**

b Solve by the method of separation of variables $u_x = 2u_y + u$ where $u(x,0) = 6e^{-3x}$. **6M**

OR

6 a Form the partial differential equation by eliminating the arbitrary functions from $xyz = f(x^2 + y^2 + z^2)$. **6M**

b Solve $(z - y)p + (x - z)q = y - x$ **6M**

UNIT-IV

7 a Find the directional derivative of $2xy+z^2$ at $(1,-1,3)$ in the direction of $\vec{i}+2\vec{j}+3\vec{k}$. 6M

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

OR

8 a For what values of a, b, and c the vector point function $\bar{f}=(x+2y+az)\vec{i}+(bx-3y-z)\vec{j}+(4x+cy+2z)\vec{k}$ is irrotational. 6M

b Prove that $\nabla\times(\bar{f}\times\bar{g})=\bar{f}(\nabla\cdot\bar{g})-\bar{g}(\nabla\cdot\bar{f})+(\bar{g}\cdot\nabla)\bar{f}-(\bar{f}\cdot\nabla)\bar{g}$. 6M

UNIT-V

9 a If $\bar{F}=(2xz)\vec{i}-(x)\vec{j}+y^2\vec{k}$, evaluate $\int_v \nabla\cdot\bar{F}dv$ where v is the region bounded by the surfaces $x=0, x=2, y=0, y=6, z=x^2, z=4$. 5M

b Verify Stoke's theorem for $\bar{F}=(x^2+y^2)\vec{i}-(2xy)\vec{j}$ taken around the rectangle bounded by the lines $x=\pm a,\ y=\pm b$. 7M

OR

10 a Evaluate $\int_s \bar{F}\cdot\bar{n}\,ds$ where $\bar{F}=(18z)\vec{i}-(12x)\vec{j}+(3y)\vec{k}$ and s is the part of the surface of the plane $2x+3y+6z=12$ located in the first octant. 6M

b Using Green's theorem evaluate $\oint_c[(x^2-xy^3)dx+(y^2-2xy)\,dy]$ where c is a square with vertices (0, 0), (2, 0), (2, 2) and (0, 2). 6M

*** END ***