ODEVC (UNIT3,4,5)

UNIT III

1) Using Convolution theorem, evaluate $L^{-1}\{\frac{1}{s(s^2+2s+2)}\}$

2)Find $L^{-1}\{\frac{1}{s(s^2+a^2)}\}$

3) Find the Laplace Transform of $\{e^{-4t}\int_0^t \frac{\sin 3t}{t}\,dt\}$

4) Solve the differential equation $(D^2+4D+4)= e^t$ given that y(0) = 0 and $y^{1}(0)=0$ by using Laplace Transformation.

5) Find $L^{-1}\{\frac{s-2}{(s^2+5s+6)}\}$

6) Solve the following differential equation using the Laplace transform,

$$\frac{d^2y}{dt^2}+2\frac{dy}{dt}+2y=5\sin t, y(0)=y^1(0)=0$$

7) Using the Convolution theorem, find $L^{-1}\{\frac{s^2}{(s^2+4)\,(s^2+9)}\}$

8) Using laplace transform solve $(D^2+4D+5)y = 5, given\ \ that\ y(0)=0, y^1(0)=0.$

UNIT IV

1) Find div $(r^n\bar{r})$. Find n if it is solenoidal?

2) Prove that div($\bar{a}$ x $\bar{b}$) = $\bar{b}$. curl$\bar{a}$ - $\bar{a}.curl\bar{b}$

3) If $\vec{F}=2xyz^2\vec{\imath}+(x^2z^2+z\cos yz)\vec{\jmath}+(2x^2yz+y\cos yz)\vec{k}$ is conservative (Irrotational), then find its scalar potential function.

4) If $\bar{f}=y(ax^2+z)\boldsymbol{i}+x(y^2-\boldsymbol{z^2})\boldsymbol{j}+\boldsymbol{2xy}(z-xy)\boldsymbol{k}$ **is** solenoidal then find a.

5)Find the directional derivative of the $\varphi=4xy^2+2x^2yz$ at $A(1{,}2{,}3)$ in the direction of AB, $B(5{,}0{,}4)$.

5) Find the unit normal vector to the given surface $x^2y+2xz=4$ at the point (2,-2,3) .

7) Prove that $div(grad\ r^n)=n(n+1)r^{n-2}$.

8) Prove that if $\bar{r}\ is\ the$ position vector of any point in space, then $r^n\bar{r}$ is irrotational.

9) Evaluate the angle between the normals to the surface xy = z^2 at the points (4, 1, 2) and (3, 3, -3)

10) If Ø$(2xz^4-x^2y)$ find ∇Ø at the point(2, -2, -1)

11) Show that the vector $(x^2$-yz)$\bar{\imath}$+$(y^2-zx)\bar{\jmath}+(z^2-xy)\bar{k}$ is irrotational and find its scalar potential.

12) Find the directional derivative of xy + yz + zx in the direction of vector $\bar{\imath}+2\bar{\jmath}+2\bar{k}$ at the point (1,2,0).

13) Find div$\bar{f}$ Where $\bar{f}=grad(x^3+y^3+z^3-3xyz)$.

UNIT V

1) Verify Green's theorem in plane for $\oint(3x^2 - 8y^2)dx + (4y - 6xy)dy$ where C is the region bounded by $y = \sqrt{x}$ and $y = x^2$.
2) Verify Gauss divergence theorem for $\vec{F} = (x^3)\vec{\imath} + (y^3)\vec{\jmath} + (z^3)\vec{k}$ over the cube bounded by $x = 0, x = a, y = 0, y = a, z = 0, z = a.$
3) Verify Gauss divergence theorem for $\bar{F} = (x^3 - yz)\bar{\imath} - 2x^2y\bar{\jmath}+z\bar{k}$ taken over the surface of the cube bounded by the planes x = y = z = a and coordinate planes.
4) Verify stoke's theorem for $\bar{F} = (y - z + 2)\bar{\imath} + (yz + 4)\bar{\jmath} - xz\bar{k}$ where S is the surface of the cube x =0, y=0, z=0, x=2, y=2, z=2 above xy-plane .
5) Verify greens theorem in the palne for $\oint(x^2 - xy^3)dx + (y^2 - 2xy)dy$,where C is the square with vertices (0,0) (2,0) (2,2)(0,2) .
6)Verify Stokes theorem for $\vec{F} = (2x - y)\vec{\imath} - yz^2\vec{\jmath} - y^2z\vec{k}$ over the upper half surface of the sphere $x^2 + y^2 + z^2 = 1$ bounded by the projection of the xy-plane.
7) Verify stoke's theorem for $\bar{F} = -y^3\bar{\imath} + x^3\bar{\jmath}$, where S is the circular disc $x^2 + y^2 \leq 1,\ z = 0.$