Km Mayawati Govt.Girls Polytechnic

Assignment (Unit-2)

Applied Mathematics-III

1-Identify the curve given by $2x^2$ + 2 y^2 -6x + 5 = 0.

2-If u = e^{xyz} , then show $\frac{\partial^3 u}{\partial x \partial y \partial z}$ = (1 + 3xyz + $x^2y^2z^2$) e^{xyz}

3-If u = log $(x^3 + y^3 + z^3 - 3xyz)$

show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = -\frac{9}{(x+y+z+)^2}$

4-If u= $\sin^{-1} \frac{\sqrt{x}-\sqrt{y}}{\sqrt{x}+\sqrt{y}}$, then show $\frac{\partial u}{\partial x}$ = - $\frac{y}{x}\frac{\partial u}{\partial y}$

5-If z = f (x,y) , x = $e^{u} + e^{-v}$, y = $e^{-u} - e^{v}$, y = e^{-u} -e^{v} , then prove

$\frac{\partial z}{\partial u}$ - $\frac{\partial z}{\partial v}$ = x $\frac{\partial z}{\partial x}$ − y $\frac{\partial z}{\partial y}$

6-If u_1 = $\frac{x_2x_3}{x_1}$, u_2 = $\frac{x_3x_1}{x_2}$, u_3 = $\frac{x_1x_2}{x_3}$, then prove J (u_1, u_2, u_3) = 4

7-If x = r sin θ cos $\emptyset$, y = r sin θ sin $\emptyset$, z = r cos θ , then show $\frac{\partial(x,y,z)}{\partial(r,\theta,\emptyset)}$ = r^2 sin θ

And evaluate $\frac{\partial(r,\theta,\emptyset)}{\partial(x,y,z)}$

8-If x = r cosθ , y = r sin θ , then find $\frac{\partial(x,y)}{\partial(r,\theta)}$ and $\frac{\partial(r,\theta)}{\partial(x,y)}$.

9- If $\vec{r}$ = t^2 $\hat{\imath}$ - t $\hat{\jmath}$+ (2t + 1)$\hat{k}$, find (i) $\frac{d\vec{r}}{dt}$ (ii) $\frac{d^2\vec{r}}{dt^2}$ (iii) $\left|\frac{d\vec{r}}{dt}\right|$ (ii) $\left|\frac{d^2\vec{r}}{dt^2}\right|$

10-If $\vec{f}$ = grad $(x^3 + y^3 + z^3 - 3xyz)$, then find div $\vec{f}$, curl $\vec{f}$.

11- Prove (i) curl grad $\emptyset$ = 0 (ii) div $\vec{r}$ = 3

12- (i) $\int_1^2 \int_0^{y/2} y\, dy\, dx$ (ii) $\int_0^1 \int_0^1 \int_0^1 e^{x+y+z}$ dx dy dz

13- If $\overrightarrow{r(t)}$ = 5 t^2 $\hat{\imath}$ + t $\hat{\jmath}$ - $t^3\hat{k}$ then find $\int_1^2 \overrightarrow{r} \times \frac{d^2\vec{r}}{dt^2}$ dt

14- If F = xy^3 - x^3y then find $\Delta^2 F$

15-Prove $\frac{\partial(u,v)}{\partial(x,y)} \times \frac{\partial(x,y)}{\partial(u,v)}$ = 1