All Branches Hinglish

Subject: Engineering Mathematics

DPP-08

Chapter: Calculus

Topic : Partial Differentiation & Euler's theorem

1. If $u = e^{xyz}$, then $\frac{\partial^3 u}{\partial x \partial y \partial z}$ is equal to

(a) $e^{xyz}\left[1 + xyz + 3x^2y^2z^2\right]$

(b) $e^{xyz}\left[1 + xyz + x^3y^3z^3\right]$

(c) $e^{xyz}\left[1 + 3xyz + x^2y^2z^2\right]$

(d) $e^{xyz}\left[1 + 3xyz + x^3y^3z^3\right]$

2. If $z = f(x + ay) + \phi(x - ay)$, then

(a) $\frac{\partial^2 z}{\partial x^2} = a^2 \frac{\partial^2 z}{\partial y^2}$ (b) $\frac{\partial^2 z}{\partial y^2} = a^2 \frac{\partial^2 z}{\partial x^2}$

(c) $\frac{\partial^2 z}{\partial y^2} = -\frac{1}{a^2} \frac{\partial^2 z}{\partial x^2}$ (d) $\frac{\partial^2 z}{\partial x^2} = -a^2 \frac{\partial^2 z}{\partial y^2}$

3. If $u = \tan^{-1}\left(\frac{x + y}{\sqrt{x} + \sqrt{y}}\right)$, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ equals

(a) 2 *cos* 2 *u* (b) $\frac{1}{4}\sin 2u$

(c) $\frac{1}{4}\tan u$ (d) 2 tan 2 *u*

4. If $u = \tan^{-1}\frac{x^3 + y^3 + x^2y - xy^2}{x^2 - xy + y^2}$, then the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is

(a) $\frac{1}{2}\sin 2u$ (b) *sin* 2 *u*

(c) sin *u* (d) 0

5. If $u = \phi\left(\frac{y}{x}\right) + x\psi\left(\frac{y}{x}\right)$, then the value of $x^2\frac{\partial^2 u}{dx^2} + 2xy\frac{\partial^2 u}{dxdy} + y^2\frac{\partial^2 u}{\partial y^2}$, is

(a) 0 (b) *u*

(c) 2*u* (d) –*u*

6. If $z = e^x \sin y$, $x = \log_e t$ and $y = t^2$, then $\frac{dz}{dt}$ is given by the expression

(a) $\frac{e^x}{t}\left(\sin y - 2t^2 \cos y\right)$ (b) $\frac{e^x}{t}\left(\sin y + 2t^2 \cos y\right)$

(c) $\frac{e^x}{t}\left(\cos y + 2t^2 \sin y\right)$ (d) $\frac{e^x}{t}\left(\cos y - 2t^2 \sin y\right)$

7. If $z = z(u, v), u = x^2 - 2xy - y^2, v = a$, then

(a) $(x + y)\frac{\partial z}{\partial x} = (x - y)\frac{\partial z}{\partial y}$

(b) $(x - y)\frac{\partial z}{\partial x} = (x + y)\frac{\partial z}{\partial y}$

(c) $(x + y)\frac{\partial z}{\partial x} = (y - x)\frac{\partial z}{\partial y}$

(d) $(y - x)\frac{\partial z}{\partial x} = (x + y)\frac{\partial z}{\partial y}$

8. If $f(x, y) = 0$, $\phi(y, z) = 0$, then

(a) $\frac{\partial f}{\partial y} \cdot \frac{\partial \phi}{\partial z} = \frac{\partial f}{\partial x} \cdot \frac{\partial \phi}{\partial y} \cdot \frac{dz}{dx}$

(b) $\frac{\partial f}{\partial y} \cdot \frac{\partial \phi}{\partial z}\frac{\partial f}{\partial x} = \frac{\partial f}{\partial x} \cdot \frac{dz}{dx}$

(c) $\frac{\partial f}{\partial y} \cdot \frac{\partial \phi}{\partial z} \cdot \frac{dz}{dx} = \frac{\partial f}{\partial x} \cdot \frac{\partial \phi}{\partial y}$

(d) None of these

9. If $z=\sqrt{x^2+y^2}$ and $x^3+y^3+3axy=5a^2$, then at $x=a, y=a, \frac{dz}{dx}$ is equal to

(a) $2a$ (b) 0

(c) $2a^2$ (d) a^3

10. If $x = r\cos\theta, y = r\sin\theta$ where r and θ are the functions of x, then $\frac{dx}{dt}$ is equal to

(a) $r\cos\theta\frac{dr}{dt}-r\sin\theta\frac{d\theta}{dt}$ (b) $\cos\theta\frac{dr}{dt}-r\sin\theta\frac{d\theta}{dt}$

(c) $r\cos\theta\frac{dr}{dt}+\sin\theta\frac{d\theta}{dt}$ (d) $r\cos\theta\frac{dr}{dt}-\sin\theta\frac{d\theta}{dt}$

Answer Key

1. **(c)**
2. **(b)**
3. **(b)**
4. **(a)**
5. **(a)**
6. **(b)**
7. **(c)**
8. **(c)**
9. **(b)**
10. **(b)**