Chettinad College of Engineering & Technology
Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai.

MA8151-ENGINEERING MATHEMATICS-I

Unit-2 Functions of Several Variables

Objective Question Bank

1. If $u = x^2 + y^2 + z^2$ and $x = e^t, y = e^t \sin t, z = e^t \cos t$, then $\frac{du}{dt}$ is

a) $2e^{2t}$ b) $3e^{2t}$ c) $4e^{2t}$ d) $5e^{2t}$

Answer: c

2. If $x^3 + y^3 = 3axy$, then $\frac{dy}{dx}$ is

a) $\frac{x^2 - ay}{y^2 - ax}$ b) $-\frac{y^2 - ax}{x^2 - ay}$ c) $\frac{y^2 - ax}{x^2 - ay}$ d) $-\frac{x^2 - ay}{y^2 - ax}$

Answer: d

3. If $y\sin x = x\cos y$, then $\frac{dy}{dx}$ is

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

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

Answer: a

4. If $u = e^x \sin y$, where $x = st^2, y = s^2t$ then $\frac{\partial u}{\partial s}$ is

a) $t^2e^x \cos y + 2ste^x \sin y$ b) $t^2e^x \sin y + s^2te^x \cos y$

c) $t\ e^x \sin y + ste^x \cos y$ d) $t^2e^x \sin y + 2ste^x \cos y$

Answer: d

5. If $u = e^x \sin y$, where $x = st^2, y = s^2t$ then $\frac{\partial u}{\partial t}$ is

a) $t^2s^2e^x \cos y + 2ste^x \sin y$ b) $ste^x \sin y + s^2e^x \cos y$

c) $2st\ e^x \sin y + s^2e^x \cos y$ d) $t^2e^x \sin y + 2ste^x \cos y$

Answer: c

6. If $Z = f(y - z, z - x, x - y)$, then $\frac{\partial Z}{\partial x} + \frac{\partial Z}{\partial y} + \frac{\partial Z}{\partial z}$ is

a) 1 b) -1 c) 2 d) 0

Answer: d

7. If $(\cos x)^y = (\sin y)^x$, then $\frac{dy}{dx}$ is

a) $\frac{y\cot x + \log\cos y}{\log\sin x - x\tan y}$ b) $\frac{y\tan x + \log\sin y}{\log\cos x - x\cot y}$

c) $\frac{y\tan x - \log\sin y}{\log\cos x + x\cot y}$ d) $\frac{x\tan y + \log\sin y}{\log\cos x - y\cot x}$

Answer: b

8.If u = 2xy , v = $x^2 - y^2$ and x = rcos θ and y r sinθ , then $\frac{\partial(u,v)}{\partial(r,\theta)}$ =

(a) -4r (b) 4r (c) $-4r^3$ (d) $4r^3$

Answer: c

9.If $\frac{\partial(x,y)}{\partial(r,\theta)} = r$ then $\frac{\partial(r,\theta)}{\partial(x,y)}$ =

(a) –r (b) 1/r (c) 1 (d) 0

Answer: b

10.u = x + y + z , v = xy + yz + zx , w = $x^2 + y^2 + z^2$ are functionally dependent.

(a) True (b) False

Answer: a

11.If x = u(1 + v) , y = v(1 + u) , then $\frac{\partial(x,y)}{\partial(u,v)}$ =

(a) u+v (b) 1+v + uv (c) 1 – uv (d) 1 + u + v

Answer: d

12. If $f(x,y,z) = x^2 + xyz + z$, Find f_x at (1,1,1)

(a)0 (b)1 (c)3 (d)-1

Answer: c

13. If $f(x,y) = \sin(xy) + x^2 \log(y)$, Find f_{yx} at $(0,\frac{\pi}{2})$

(a)33 (b)0 (c)3 (d)1

Answer: d

14. If $f(x,y,z,t) = xy + zt + x^2yzt; x = k^3, y = k^2, z = k, t = \sqrt{k}$ Find $\frac{df}{dt}$ at $k =$ 1

(a)34 (b)16 (c)32 (d)61

Answer: b

15. If $f(x,y) = \sin\left(\frac{y}{x}\right)x^3 + x^2y$ find the value of $f_x + f_y$ at (4,4)

(a)0 (b)78 (c)$48(sin(1)+1)$ (d)61

Answer: c

16. If $f(x,y) = \frac{x^3+y^3}{x^{99}+y^{98}x+y^{99}}$ find the value of f_y at (0,1)

(a)101 (b)-96 (c)210 (d)0

Answer: b

17. Stationary point is a point where, function f(x,y) have?

a) $^{\partial f}/_{\partial x} = 0$ b) $^{\partial f}/_{\partial y} = 0$ c) $^{\partial f}/_{\partial x} = 0$ & $^{\partial f}/_{\partial y} = 0$ d) $^{\partial f}/_{\partial x} < 0$ and $^{\partial f}/_{\partial y} > 0$

Answer: c

18. For function f(x,y) to have minimum value at (a,b) value is?

a) $rt - s^2 > 0$ and $r < 0$ b) $rt - s^2 > 0$ and $r > 0$ c) $rt - s^2 < 0$ and $r < 0$ d) $rt - s^2 > 0$ and $r > 0$

Answer: b

19. For function f(x,y) to have maximum value at (a,b) is?

a) $rt - s^2 > 0$ and $r < 0$ b) $rt - s^2 > 0$ and $r > 0$ c) $rt - s^2 < 0$ and $r < 0$ d) $rt - s^2 > 0$ and $r > 0$

Answer: a

20.For function f(x,y) to have no extremum value at (a,b) is?

a) $rt - s^2 > 0$ b) $rt - s^2 < 0$ c) $rt - s^2 = 0$ d) $rt - s^2 \neq 0$

Answer: b

21. Discuss minimum value of $f(x,y)=x^2 + y^2 + 6x + 12$.

a) 3 b) 3 c) -9 d) 9

Answer: b

22. Discuss maximum or minimum value of $f(x,y) = y^2 + 4xy + 3x^2 + x^3$.

a) minimum at (0,0) b) maximum at (0,0)

c) minimum at (2/3, -4/3) d) maximum at (2/3, -4/3)

Answer: c

23. Find the minimum value of $xy+a^3 (1/x + 1/y)$.

a) $3a^2$ b) a^2 c) a d) 1

Answer: a

24. What is the saddle point?

a) Point where function has maximum value

b) Point where function has minimum value

c) Point where function has zero value

d) Point where function neither have maximum value nor minimum value

Answer: d

25. Divide 120 into three parts so that the sum of their products taken two at a time is maximum. If x, y, z are two parts, find value of x, y and z.

a) x=40, y=40, z=40 b) x=38, y=50, z=32 c) x=50, y=40, z=30 d) x=80, y=30, z=50

Answer: b