

18MAB101T CT2 Answer Key

1. If $Z = x^2 + y^2 + 3xy$, then what is $\frac{\partial Z}{\partial x}$?

- (i) $2y+3x$ (ii) $3y$ (iii) $2x+3y$ (iv) $2x$

Answer C) $2x+3y$

2. If $f(x, y)$ is an implicit function then $\frac{dy}{dx} = ?$

- (i) $-\frac{\frac{\partial f}{\partial x}}{\frac{\partial f}{\partial y}}$ (ii) $\frac{\frac{\partial f}{\partial x}}{\frac{\partial f}{\partial y}}$ (iii) $\frac{\frac{\partial f}{\partial y}}{\frac{\partial f}{\partial x}}$ (iv) $\frac{\frac{\partial f}{\partial y}}{\frac{\partial f}{\partial x}}$

Answer A) $-\frac{\frac{\partial f}{\partial x}}{\frac{\partial f}{\partial y}}$

3. If $f(x, y) = x^2 + y^2$, $x = r\cos\theta$ and $y = r\sin\theta$ then $\frac{\partial f}{\partial \theta} = ?$

- (i) r^2 (ii) r (iii) $2r$ (iv) 0

Answer D) 0

4. If $\log(x^2 + xy + y^2)$, then what is $x\frac{\partial Z}{\partial x} + y\frac{\partial Z}{\partial y}$?

- A) 1 B) $\frac{2x+y}{x^2+xy+y^2}$ C) 2 D) $\frac{x+2y}{x^2+xy+y^2}$

Answer C) 2

5. If $u = \frac{y}{z} + \frac{z}{x}$ then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}$ is

- A) $2\frac{y}{z}$ B) 0 C) $2\frac{z}{x}$ D) $2\left(\frac{y}{z} + \frac{z}{x}\right)$

Answer B) 0

6. If $rt - s^2 < 0$ at (a, b) then

- A) Maximum point B) Minimum point C) Saddle point
D) None of these

Answer C) Saddle point

7. If $u = x^y$ then $\frac{\partial u}{\partial y}$ is

- A) yx^{y-1} B) $x^y \log x$ C) $x^y \log y$ D) $\frac{x}{y}$

Answer B) $x^y \log x$

8. If $rt - s^2 < 0$ and $r > 0$ at (a, b) then

- A) Maximum point B) Minimum point C) Saddle point
D) None of these

Answer C) Saddle point

9. If $f(x, y) = e^{xy}$, then what is $f_{yyy}(0, 1)$?

- A) $-e$ B) $\frac{1}{e}$ C) 0 D) $-\frac{1}{e}$

Answer C) 0

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

- A) 0 B) 1 C) 3 D) 2

Answer A) 0

11. If $v = \tan^{-1}x + \tan^{-1}y$, then $\frac{\partial v}{\partial x}$ is

- A) $1 + y^2$ B) $\frac{1}{1+y^2}$ C) $\frac{1}{1+x^2}$ D) $1 + x^2$

Answer C) $\frac{1}{1+x^2}$

12. If $f(x, y) = \cos x \sin y$, then $f_{yy}(0, 0) = ?$

- A) 1 B) 0 C) -1 D) $\frac{1}{2}$

Answer B) 0

13. If $f(x, y) = \tan^{-1}\left(\frac{y}{x}\right)$, then $f_x(1, 1)$ is
A) $\frac{\pi}{4}$ B) $\frac{1}{2}$ C) $-\frac{1}{2}$ D) 0

Answer C) $-\frac{1}{2}$

14. If $f(x, y) = e^x \cos y$, the value of $f_{xy}\left(0, \frac{\pi}{2}\right)$ is
A) 0 B) 1 C) -1 D) 2

Answer: C) -1

15. If $f(x, y) = e^x \sin y$, the value of $f_{xy}\left(1, \frac{\pi}{2}\right)$ is
A) e B) $\frac{1}{e}$ C) 0 D) 2e

Answer: C) 0

16. If $f(x, y) = \sin xy$, the value of $f_{yy}\left(1, \frac{\pi}{2}\right)$
A) 1 B) -1 C) 0 D) $\frac{\pi}{2}$

Answer B) -1

17. If $f(x, y) = e^{xy}$, the value of $f_{xxx}(0, 0)$

A) e B) 2e C) 2+e D) 2-e

Answer 0

18. If $f = e^x \log(1+y)$ then $f_{xxx}(0, 0)$

A) 0 B) 1 C) -1 D) ∞

Answer A) 0

19. If $f(x, y) = x^2y + 3y - 2$, the value of $f_{xy}(1, -2)$
A) 2 B) 4 C) -4 D) 0

Answer A) 2

20. If $f(x, y) = x^3 + y^3 - 3x - 12y + 20$ then the function is _____ at (1,2)

A) Maximum point B) Minimum point C) Saddle point D) Nothing can be said

Answer B) Minimum point

21. All the stationary points of the function

$f(x, y) = x^3 + y^3 - 12x - 3y + 20$ is

A) (2,1) B) (-2,-1) C) $(\pm 2, \pm 1)$ D) $(\pm 1, \pm 2)$

Answer C) $(\pm 2, \pm 1)$

22. All the stationary points of the function $f(x, y) = x^3 y^2 (1 - x - y)$ is

A) $(0,0), \left(\frac{1}{2}, 0\right)$ B) $(0,0), \left(\frac{1}{2}, \frac{1}{3}\right)$ C) $\left(\frac{1}{2}, \frac{1}{3}\right)$ D) $(0,0), \left(\frac{1}{3}, \frac{1}{2}\right)$

Answer B) $(0,0), \left(\frac{1}{2}, \frac{1}{3}\right)$

23. If $f(x, y) = x^2 y + \sin y + e^x$, then $f_x(1, \pi)$ is

A) $2\pi - e$ B) 2π C) $2\pi + e$ D) 0

Answer C) $2\pi + e$

24. If $u = \frac{y^2}{x}, v = \frac{x^2}{y}$ then $\frac{\partial(u, v)}{\partial(x, y)}$

A) 3 B) -3 C) 5 D) -2

Answer B) -3

25. If $x = r \cos \theta, y = r \sin \theta$ then $J\left(\frac{r, \theta}{x, y}\right)$ is

A) $\frac{1}{r}$ B) r C) r^2 D) $r \cos 2\theta$

Answer A) $\frac{1}{r}$

26. u and v are functionally dependent if their Jacobian value is

- A) zero B) one C) nonzero D) greater than zero

Answer A) zero

27. If $u = x^2y$ and $v = xy^2$, then $\frac{\partial(u,v)}{\partial(x,y)} = ?$

- A) 0 B) $3xy$ C) $3x^2y^2$ D) $5x^2y^2$

Answer C) $3x^2y^2$

28. If $u = \frac{y^2}{x}$ and $v = \frac{x^2}{y}$, then $\frac{\partial(x,y)}{\partial(u,v)} = ?$

- A) -3 B) 3 C) $-\frac{1}{3}$ D) $\frac{1}{3}$

Answer C) $-\frac{1}{3}$

29. If $x = r \cos \theta$, $y = r \sin \theta$ then $J\left(\frac{r,\theta}{x,y}\right)$ is

- A) $\frac{1}{r}$ B) r C) r^2 D) $r \cos 2\theta$

Answer A) $1/r$

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

- A) $1+u+v$ B) uv C) $u+v$ D) 1

Answer A) $1+u+v$

31. Which of the following is the general solution to

$$\frac{d^2y}{dx^2} + 3\frac{dy}{dx} - 10y = 0$$

- A) $y = Ae^{2x} + Be^{-5x}$ B) $y = Ae^{-2x} + Be^{5x}$
C) $y = Ae^{-2x} + Be^{-5x}$ D) $y = Ae^{2x} + Be^{5x}$

Answer A) $y = Ae^{2x} + Be^{-5x}$

32. The solution of the differential equation $(D^2 + 2D + 1)y = 0$ is

- A) $e^{-x}(Ax+B)$ B) $Ae^{-x} + Be^{-2x}$ C) $Ae^x + Be^{2x}$ D) $e^x(Ax+B)$

Answer A) $e^{-x}(Ax+B)$

33. The solution of $(D^2 - 2D + 2)y = 0$ is

- A) $e^{-x}(A \cos x + B \sin x)$ B) $e^x(A \cos x + B \sin x)$ C) $Ae^{-x} + Be^x$ D) $e^x(Ax + B)$

Answer B) $e^x(A \cos x + B \sin x)$

34. The solution of $(D^2 + 6D + 9)y = 0$ is

- A) $e^{-3x}(Ax + B)$ B) $e^{3x}(Ax + B)$ C) $Ae^{3x} + Be^{-3x}$ D) $e^{3x}(A \cos 3x + B \sin 3x)$

Answer A) $e^{-3x}(Ax + B)$

35. The Solution of $(D^2 - 9D - 52)y = 0$ is

- A) $Ae^{4x} + Be^{-13x}$ B) $Ae^{-4x} + Be^{-13x}$ C) $Ae^{-4x} + Be^{13x}$ D) $Ae^{4x} + Be^{13x}$

Answer C) $Ae^{-4x} + Be^{13x}$

36. The complementary function of $(D^2 + 6D + 8)y = e^{-x}$

- A) $Ae^{4x} + Be^{2x}$ B) $Ae^{4x} + Be^{-2x}$ C) $Ae^{-4x} + Be^{-2x}$ D) $Ae^{-4x} + Be^{2x}$

Answer C) $Ae^{-4x} + Be^{-2x}$

37. The complementary function of $(D^2 - 10D + 21)y = \sin 2x$

- A) $Ae^{-7x} + Be^{-3x}$ B) $Ae^{-3x} + Be^{7x}$ C) $Ae^{-7x} + Be^{3x}$ D) $Ae^{7x} + Be^{3x}$

Answer D) $Ae^{7x} + Be^{3x}$

38. The Complementary function of $(D^2 - 4D + 5)y = 2x$ is

- A) $Ae^{-5x} + Be^x$ B) $Ae^{5x} + Be^{-x}$ C) $e^{-2x}(A \cos x + B \sin x)$ D) $e^{2x}(A \cos x + B \sin x)$

Answer B)

39. The Particular integral of $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 2y = e^{-3x}$ is

- A) $\frac{e^{-3x}}{23}$ B) $-e^{-3x}$ C) e^{-3x} D) $-e^{3x}$

Answer B) $-e^{-3x}$

40. The particular integral of $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = e^{-2x}$ is

- A) $\frac{xe^{-2x}}{4}$ B) $\frac{x^2e^{-2x}}{2}$ C) $\frac{e^{-2x}}{16}$ D) $\frac{xe^{-2x}}{8}$

Answer B)

41. The Particular integral of $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 4y = e^{-x}$ is

- A) $\frac{e^{-x}}{10}$ B) $\frac{x^2e^{-x}}{2}$ C) $\frac{xe^{-x}}{3}$ D) $\frac{xe^{-x}}{7}$

Answer C) $\frac{xe^{-x}}{3}$

42. The particular integral of $(D^2 + 1)y = \cos x$ is

- A) $\frac{x \sin x}{2}$ B) $-\frac{x \sin x}{2}$ C) $x \cos x$ D) $-x \sin x$

Answer A) $\frac{x \sin x}{2}$

43. The Particular integral of $(D^2 + 4)y = \cos 3x$ is

- A) $\frac{\cos 3x}{5}$ B) $\frac{\cos 3x}{-5}$ C) $\frac{\sin 3x}{5}$ D) $-\frac{\sin 3x}{5}$

Answer B) $\frac{\cos 3x}{-5}$

44. The particular integral of $\frac{d^2y}{dx^2} + 6\frac{dy}{dx} + 2y = e^{2x}$ is

- A) $\frac{e^{2x}}{9}$ B) $\frac{e^{2x}}{6}$ C) $\frac{e^{2x}}{18}$ D) $\frac{xe^{2x}}{10}$

Answer C) $\frac{e^{2x}}{18}$

45. The particular integral of $\frac{d^2y}{dx^2} + y = x$ is

- A) $x+1$ B) $x-1$ C) x D) 1

Answer C) x

46. The Particular integral of $\frac{d^2y}{dx^2} + 2y = e^{2x}$

- A) $\frac{e^{2x}}{6}$ B) $\frac{e^{2x}}{4}$ C) $\frac{e^{2x}}{2}$ D) e^{2x}

Answer A) $\frac{e^{2x}}{6}$

47. The particular integral of $\frac{d^2y}{dx^2} + 2y = x^2$ is

- A) $\frac{x^2}{2}$ B) $\frac{1}{2}(x^2 - 1)$ C) $\frac{1}{2}(x^2 + 1)$ D) $x^2 - 1$

Answer B) $\frac{1}{2}(x^2 - 1)$

48. The particular integral of $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = e^x \cos x$
- A) $e^x \cos x$ B) $-e^x \cos x$ C) $e^x \sin x$ D) $-e^x \sin x$

Answer B) $-e^x \cos x$

49. The complementary function of $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} - 4y = e^x \cos x$

- A) $Ae^x + Be^{4x}$ B) $Ae^{-x} + Be^{4x}$ C) $Ae^{-x} + Be^{-4x}$ D) $Ae^x + Be^{-4x}$

Answer B) $Ae^{-x} + Be^{4x}$

50. The complementary function of $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} - 14y = xe^x$

- A) $Ae^{2x} + Be^{7x}$ B) $Ae^{-2x} + Be^{-7x}$ C) $Ae^{2x} + Be^{-7x}$ D) $Ae^{2x} + Be^{-7x}$

Answer C) $Ae^{2x} + Be^{-7x}$ D) $Ae^{2x} + Be^{-7x}$
