SRM Institute of Science and Technology

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Question Bank- PDE(Unit-1)

1. A partial differential equation has

   (A) one independent variable

   (B) two or more independent variables

   (C) more than one dependent variable

   (D) equal number of dependent and independent variable

   ANSWER: B

2. The partial differential equation formed by eliminating arbitrary constant $z = (x + a)(y + b)$ is

   (A) $z = p + q$

   (B) $z = p - q$

   (C) $z = \dfrac{p}{q}$

   (D) $z = pq$

   ANSWER: D

3. The partial differential equation formed by eliminating arbitrary constant in $z = ax + by$

   (A) $z = px + qy$

   (B) $z = qx + py$

   (C) $z = px - qy$

   (D) $z = qx - py$

   ANSWER: A

4. The partial differential equation formed by eliminating arbitrary constant in $z = ax + by + ab$

   (A) $z = px + qy + ab$

   (B) $z = ax + by + pq$

   (C) $z = px + qy + pq$

   (D) $c = px + qy + pq$

   ANSWER: C

5. Form the PDE by eliminating the arbitrary constants a and b from $z = ax^n + by^n$

   (A) $z = px + qy$

   (B) $5z = px + \sqrt{(p)}y$

   (C) $nz = px + qy$

   (D) $z = rx + ty$

   ANSWER: C

6. The partial differential equation formed by eliminating arbitrary function in $z = f(xy)$

   (A) $xp - yq = 1$

   (B) $xp = yq$

   (C) $p + q = 1$

   (D) $p - q = 0$

   ANSWER: B

7. The partial differential equation formed by eliminating arbitrary function in $z = f(x + ay)$ is

   (A) $ap + q = 1$

   (B) $ap + q = 0$

   (C) $ap - q = 1$

   (D) $ap - q = 0$

   ANSWER: D

8. The partial differential equation formed by eliminating arbitrary function in $z = f(x^2 + y^2)$ is

   (A) $xp = yq$

   (B) $xy = pq$

   (C) $xq = yp$

   (D) $x + p = y + q$

   ANSWER: C

9. The partial differential equation formed by eliminating arbitrary function in $z = f(y/x)$ is

(A) $xp + yq = 0$

(B) $xy - pq = 0$

(C) $xq + yp = 0$

(D) $x + p = y + q$

ANSWER: A

10. The solution which has number of arbitrary constants equal to number of independent variables is

(A) general integral

(B) complete integral

(C) particular integral

(D) singular integral

ANSWER: B

11. The complete integral of $p = q$ is

(A) $z = ax + by$

(B) $z = a(x + y) + c$

(C) $z = ax + by + c$

(D) $z = ax - by + a$

ANSWER: B

12. The complete integral of $pq = 1$ is

(A) $az = a^x + y + ac$

(B) $z = ax + ay + c$

(C) $az = x + y + c$

(D) $z = x + y + c$

ANSWER: A

13. The complete integral of $p^2 - q^2 = 6$ is

(A) $z = ax + (\sqrt{6 - a^2})y + c$

(B) $z = ax + (\sqrt{a^2 - 6})y + c$

(C) $z = (\sqrt{b^2 - 6})x + by + c$

(D) $z = (\sqrt{6 - b^2})x + by + c$

ANSWER: B

14. The complete integral of $p^2 + q^2 = npq$ is

(A) $z = ax + \left(\frac{n \pm \sqrt{n^2 - 4}}{2}\right) ay + c$

(B) $z = ax - \left(\frac{n \pm \sqrt{n^2 - 4}}{2}\right) ay + c$

(C) $z = ax + \left(\frac{\sqrt{n^2 - 4}}{2}\right) ay + c$

(D) $z = ax - \left(\frac{\sqrt{n^2 - 4}}{2}\right) ay + c$

ANSWER: A

15. The complete integral of $q = 2py$ is

(A) $z = ax + ay^2 + b$

(B) $z = ax^2 - ay^2 + b$

(C) $z = ax + by$

(D) $z = 2xy$

ANSWER: A

16. The complete integral of $z = px + qy + p^2 + q^2$ is

(A) $z = ax + by + a^2 + b^2$

(B) $z = ax + by + a^2 - b^2$

(C) $z = ax + by + c^2 + d^2$

(D) $z = ax - by + c^2 - d^2$

ANSWER: A

17. The complete integral of $z = px + qy + \sqrt{p^2 + q^2 + 1}$ is

(A) $z = ax + by + \sqrt{a^2 + b^2 + 1}$

(B) $z = ax + by + \sqrt{a^2 + c^2 + 1}$

(C) $z = ax + by + \sqrt{b^2 + c^2 + 1}$

(D) $z = ax + by + a^2 + b^2 + 1$

ANSWER: A

18. The solution to $pq = x$ is

(A) $z = \frac{y^2}{2a} + ax + c$

(B) $z = \frac{ax^2}{2} + ay + c$

(C) $z = x + y + 1$

(D) $z = x - ay$

ANSWER: B

19. The complete integral of $9(p^2z + q^2) = 4$ is

(A) $(z + a^2)^3 = (x + ay + b)^2$

(B) $(z - a^2)^3 = (x - ay + b)^2$

(C) $(z + a^3)^2 = (x + ay + b)^2$

(D) $(z + a^2)^3 = (x + ay + b)^3$

ANSWER: A

20. The complete integral of $p(1 + q) = qz$ is

(A) $log(1 - az) = x + ay + c$

(B) $z = ax^2 - ay^2 + b$

(C) $z = ax + by$

(D) $z = 2xy$

ANSWER: A

21. The solution to $p + q = x + y$ is

(A) $z = kx - \frac{x^2}{2} + ky - \frac{y^2}{2} + c$

(B) $z = kx + \frac{x^2}{2} - ky + \frac{y^2}{2} + c$

(C) $z = kx + \frac{x^2}{2} + ky + \frac{y^2}{2} + c$

(D) $z = kx + \frac{x^2}{2} + ky - \frac{y^2}{2} + c$

ANSWER: B

22. The solution to $p + x = qy$ is

(A) $z = kx - \frac{x^2}{2} + k \log y + c$

(B) $z = kx + \frac{x^2}{2} + k \log y + c$

(C) $z = kx - \frac{x^2}{2} - k \log y + c$

(D) $z = -kx - \frac{x^2}{2} + k \log y + c$

ANSWER: A

23. The solution to $xp + yq = 0$ is

(A) $\Phi\left(\frac{x}{y}, z\right) = 0$

(B) $\Phi(xy, z) = 0$

(C) $\Phi(x - y, z) = 0$

(D) $\Phi(x + y, z) = 0$

ANSWER: A

24. The general integral of $x = zp + yq$ is

(A) $\phi\left(\frac{x + y + z}{y}, x^2 - z^2\right) = 0$

(B) $\phi(x + y, y + z) = 0$

(C) $\phi\left(x - y, \frac{x}{z}\right) = 0$

(D) $\phi\left(\frac{x}{y}, y + z\right) = 0$

ANSWER: A

25. The solution to $4p - 2q = 1$ is

(A) $\Phi(2x - 4y, y + z) = 0$

(B) $\Phi(2x + 4y, y + 2z) = 0$

(C) $\Phi(2x + 4y, y + 2z) = 0$

(D) $\Phi(2x - 4y, y - 2z) = 0$

ANSWER: B

26. The complete integral of $p^2 + q^2 = x + y$ is

(A) $z = \frac{2}{3}(x - a)^{\frac{3}{2}} + \frac{2}{3}(y - a)^{\frac{3}{2}} + b$

(B) $z = \frac{2}{3}(x + a)^{\frac{3}{2}} + \frac{2}{3}(y + a)^{\frac{3}{2}} + b$

(C) $z = \frac{2}{3}(x + a)^{\frac{3}{2}} + \frac{2}{3}(y - a)^{\frac{3}{2}} + b$

(D) $z = \frac{2}{3}(x + a)^{\frac{3}{2}} + \frac{2}{3}(a - y)^{\frac{3}{2}} + b$

ANSWER: C

27. If complete integral is $z = ax + by - 3ab$, the singular integral is

(A) $z = x + y$

(B) $z = \frac{x}{y}$

(C) $z = xy$

(D) $xy = 3z$

ANSWER: D

28. The equation $Pp + Qq = R$ is called as

(A) Charpit's equation

(B) Lagrange's equation

(C) Bernoulli's equation

(D) Clairut's equation

ANSWER: B

29. The general integral of $z = xp + yq$ is

(A) $\phi\left(\frac{x}{y}, \frac{y}{z}\right) = 0$

(B) $\phi(x + y, y + z) = 0$

(C) $\phi\left(x - y, \frac{x}{z}\right) = 0$

(D) $\phi\left(\frac{x}{y}, y + z\right) = 0$

ANSWER: A

30. The general integral of $1 = 2p + 3q$ is

(A) $\Phi(2x - 3y, y - 3z)$

(B) $\Phi(3x - 2y, y - 3z)$

(C) $\Phi(3x - 2y, y - z)$

(D) $\Phi(2x - 3y, 3y - z)$

ANSWER: B

31. The general integral of $p + q = 1$ is

(A) $x - y = f(y - z)$

(B) $\Phi(x + y, y - z) = 0$

(C) $f(x - y, y - z) = 0$

(D) $x = y + f(y + z)$

ANSWER: C

32. The solution to $z^2 = pq$ is

(A) $x + ay + c = \sqrt{a}\log z$

(B) $x - ay + c = \log z$

(C) $ax + y = \log az$

(D) $ax + y = a\log z$

ANSWER: A

33. The complete integral of $\sqrt{p} + \sqrt{q} = 1$

(A) $z = ax + (1 - \sqrt{a})^2 y + c$

(B) $z = ax + \sqrt{(a)}y + c$

(C) $z = ax + 2y + c$

(D) $z = ax + ay + c$

ANSWER: A

34. The general integral of $p\tan x + q\tan y = \tan z$ is

(A) $f(\frac{sinx}{siny}, \frac{siny}{sinz}) = 0$

(B) $f(\sin(\frac{x}{y}), \sin(\frac{y}{z})) = 0$

(C) $f(\sin x, \sin y) = 0$

(D) $f(\sin y, \sin z) = 0$

ANSWER: A

35. Characteristics for the equation $(y^2 z)p + (zx)q = y^2$ are

(A) $\frac{dx}{y^2 z} = \frac{dy}{zx} = \frac{dz}{y^2}$

(B) $\frac{dx}{x^2} = \frac{dy}{y^2} = \frac{dz}{zx}$

(C) $\frac{dx}{y^2} = \frac{dy}{x^2} = \frac{dz}{zx}$

(D) $\frac{dx}{zx} = \frac{dy}{y^2 z} = \frac{dz}{y^2}$

ANSWER: A

36. The partial differential equation $u_{xx} = u_{yy}$ is of the form

(A) parabolic

(B) elliptic

(C) hyperbolic

(D) elliptic and parabolic

ANSWER: C

37. The particular integral of $(D^2)z = x^3y$ is

(A) $\frac{x^5y}{20}$

(B) x^3y

(C) x^4y^2

(D) x^2y^2

ANSWER: A

38. The particular integral of $(D^3 - 2D^2D')z = e^{x+2y}$ is

(A) $\frac{e^{x+2y}}{3}$

(B) $\frac{e^x}{3}$

(C) e^{x+2y}

(D) $\frac{-e^{x+2y}}{3}$

ANSWER: D

39. The Complementary function of $(D^2 + 2DD' + D'^2)z = e^{2x+3y}$ is

(A) $f_1(y - x) + xf_2(y - x)$

(B) $f_1(y + x) + xf_2(y + x)$

(C) $f_1(y - x) + f_2(y - x)$

(D) $f_1(y + x) + f_2(y + x)$

ANSWER: A

40. The Complementary function of $(D^2 - 3DD' + 2D'^2)z = e^{3x+4y}$ is

(A) $f_1(y + 2x) + f_2(y + x)$

(B) $f_1(y - 2x) + f_2(y - x)$

(C) $f_1(y + 2x) + f_2(y - x)$

(D) $f_1(y - 2x) + f_2(y + x)$

ANSWER: A

41. The Complementary function of $(D^2 + 3DD' - 4D'^2)z = \sin(x + 5y)$ is

(A) $f_1(y + 4x) + f_2(y - x)$

(B) $f_1(y + 4x) + f_2(y + x)$

(C) $f_1(y - 4x) + f_2(y - x)$

(D) $f_1(y-4x)+f_2(y+x)$

ANSWER: D

42. The Complementary function of $r+s-6t=e^{5x+y}$ is

(A) $f_1(y-3x)+f_2(y-2x)$

(B) $f_1(y-3x)-xf_2(y-3x)$

(C) $f_1(y-4x)+f_2(y-x)$

(D) $f_1(y-3x)+f_2(y+2x)$

ANSWER: D

43. The Particular integral of $(D^2+2DD'+D'^2)z=e^{2x+3y}$ is

(A) $\frac{e^{2x+3y}}{25}$

(B) $\frac{e^{2x+3y}}{30}$

(C) $\frac{e^{3x+2y}}{25}$

(D) $\frac{e^{3x+2y}}{30}$

ANSWER: A

44. The Particular integral of $(D^2-3DD'+2D'^2)z=e^{3x+4y}$ is

(A) $-\frac{e^{3x+4y}}{5}$

(B) $\frac{e^{3x+4y}}{5}$

(C) $\frac{e^{3x+4y}}{77}$

(D) $\frac{e^{3x+4y}}{59}$

ANSWER: B

45. The Particular integral of $(D^2+3DD'-4D'^2)z=\sin(x+5y)$ is

(A) $\frac{1}{116}\sin(x+5y)$

(B) $\frac{1}{86}\sin(x+5y)$

(C) $\frac{1}{84}\sin(x+5y)$

(D) $-\frac{1}{84}\sin(x+5y)$

ANSWER: C

46. The Particular integral of $(D^2+5DD'+6D'^2)z=\cos 3x$ is

(A) $\frac{1}{9}\cos 3x$

(B) $-\frac{1}{9}\cos 3x$

(C) $\frac{1}{20}\cos 3x$

(D) $-\frac{1}{14}\cos 3x$

ANSWER: B

47. The solution of $(D^3+2D^2D'-DD'^2-2D'^3)z=0$ is

(A) $f_1(y+x)+f_2(y-x)+f_3(y+2x)$

(B) $f_1(y+x)+xf_2(y+x)+f_3(y+2x)$

(C) $f_1(y+x)+f_2(y-x)+f_3(y-2x)$

(D) $f_1(y-x)+xf_2(y-x)+f_3(y+2x)$

ANSWER: C

48. The solution of $(D^3-D^2D'-8DD'^2+12D'^3)z=0$ is

(A) $f_1(y+2x)+f_2(y+2x)+f_3(y-3x)$

(B) $f_1(y+2x)+xf_2(y+2x)+f_3(y-3x)$

(C) $f_1(y+2x)+f_2(y-2x)+f_3(y-3x)$

(D) $f_1(y-2x)+xf_2(y-2x)+f_3(y-3x)$

ANSWER: B

49. The solution of $(D^2-D'^2)z=0$ is

(A) $f_1(y+x)-f_2(y-x)$

(B) $f_1(y+x)+f_2(y-x)$

(C) $f_1(y+x)+xf_2(y+x)$

(D) $f_1(y+x)-xf_2(y-x)$

ANSWER: B

50. The Particular Integral of $(D^2 - DD' - 20D'^2)z = e^{5x+y}$ is

(A) $\frac{x}{9}e^{5x+y}$

(B) $-\frac{x}{9}e^{5x+y}$

(C) $\frac{x}{3}e^{5x+y}$

(D) $\frac{x}{9}e^{5x-y}$

ANSWER: A