CLASS XII – MATHEMATICS – CHAPTER 09

DIFFERENTIAL EQUATIONS

Name: Date:

Q01. Find the order and degree $y''' + y^2 + e^{y^c} = 0$

Q02. Verify that the functions is a sol of the corresponding differential required y = x sin x ;

$xy' = y + x\sqrt{x^2 - y^2}$

Q03. Form the differential equation of the family of hyperbola having foci on x-axis and centre at origin.

Q04. Find the order and degree $\left(\frac{ds}{dt}\right)^4 + 3s\frac{d^2s}{dt^2} = 0$.

Q05. Verity that the function is a solution of the corresponding differential equation

$x + y = \tan^{-1}y$; $y^2 y^1 + y^2 + 1 = 0$.

Q06. Find order and degree $\left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right)^2 + \sin\left(\frac{dy}{dx}\right) + 1 = 0$.

Q07. Verify that the function is a solution of the corresponding differential equation

$y + x\sqrt{1 + x^2}$; $y^1 = \frac{xy}{1+x^2}$

Q08. Find order and degree. $\frac{d^4y}{dx^4} + \sin(y''') = 0$

Q09. Verify that the function is a solution of the corresponding differential equation

$y = x^2 + 2x + c$; $y' - 2x - 2 = 0$

Q10. Write the order and degree of the diff equation $y = x\frac{dy}{dx} + a\sqrt{1 + \left(\frac{dy}{dx}\right)^2}$

Q11. Verify that the given functions is a solution of the corresponding differential equation

$y = \cos x + c$; $y' + \sin x = 0$

Q12. Form the differential equation of the family of circles having centre on y-axis and radius 3 units.

Q13. Solve the differential equation $\sec^2 x.\tan y\, dx + \sec^2 y \tan x\, dy = 0$.

Q14. Solve the differential equation $y \log y\, dx - x\, dy = 0$.

Q15. Solve $x\cos\left(\frac{y}{x}\right)\frac{dy}{dx} = \cos\left(\frac{y}{x}\right) + x$.

Q16. Solve $2ye^{\frac{x}{y}}dx + (y - 2xe^{\frac{x}{y}})dy = 0$ and x = 0 when y = 1.

Q17. Form the differential equation representing the family of ellipses having foci on x – axis and centre at the origin.

Q18. Form the differential equation of the family of circles touching the x – axis at origin.

Q19. Solve the diff eq. $e^x \tan y\, dx + (1 - e^x) \sec^2 y\, dy = 0$

Q20. Solve $\cos\left(\frac{dy}{dx}\right) = a$; y = 1 when x = 0.

Q21. Solve. $(x^2 - y^2)dx + 2xy\, dy = 0$.

Q22. Solve $\left\{x \cos\left(\frac{y}{x}\right) + y \sin\left(\frac{y}{x}\right)\right\} y\, dx = \left\{y \sin\left(\frac{y}{x}\right) - x \cos\left(\frac{y}{x}\right)\right\} x\, dy$

Q23. Form the differential equation representing the family of curves given by $(x - a)^2 + 2y^2 = a^2$, where a is an arbitrary constant.

Q24. Form the differential equation of the family of circles in the second quadrant and touching the coordinate axes.

Q25. Solve the diff eq. $(x^3 + x^2 + x + x)\frac{dy}{dx} = 2x^2 + x$; y = 1 when x = 0.

Q26. Solve $x(x^2 - 1)\frac{dy}{dx} = 1$; y = 0 when x = 2.

Q27. Solve $\left(1 + e^{\frac{x}{y}}\right)dx + e^{\frac{x}{y}}\left(1 - \frac{x}{y}\right) dy = 0$

Q28. $\left[x \sin^2\left(\frac{y}{x}\right) - y\right]dx + x\, dy = 0$; $y = \frac{\pi}{4}$, when $x = 1$.

Q29. Form a differential equation representing the given family of curve by eliminating arbitrary constants a and b, $y = e^{2x}(a + bx)$

Q30. Form a differential equation representing the given family of curve by eliminating arbitrary constants a and b, $y = e^x(a \cos x + b \sin x)$.

Q31. Solve the diff eq. $\frac{dy}{dx} + \sqrt{\frac{1-y^2}{1-x^2}} = 0$.

Q32. Find the equation of the curve passing through the point $\left(0, \frac{\pi}{4}\right)$ whose diff eq. is

$\sin x \cos y\, dx + \cos x \cdot \sin y\, dy = 0$

Q33. Solve $(x\, dy - y\, dx)\, y \sin\left(\frac{y}{x}\right) = (y\, dx + x\, dy) \cos\frac{y}{x}$

Q34. Solve the diff eq. $y\, e^{\frac{x}{y}}\, dx = (x\, e^{\frac{x}{y}} + y^2)dy = 0$

Q35. Form a differential equation representing the given family of curve by elimination arbitrary Constants a and b, $y = a\, e^{3x} + b\, e^{-2x}$

Q36. Form a differential equation representing the given family of curve by elimination arbitrary Constants a and b, $y^2 = a(b^2 - x^2)$

Q37. Find the particular Solution of the diff. equation $(1+ e^{2x})dy + (1+ y^2)e^x dx = 0$ given that y = 1, when x = 0

Q38. Solve the diff. equation $\frac{dy}{dx} + \frac{y^2+y\,1}{x^2+x\,1} = 0$.

Q39. Solve the diff. equation $\frac{dy}{dx} = \frac{x(2y-x)}{x(2y+x)}$, if $y = 1$ when $x = 1$

Q40. Solve the following diff equation $(3xy + y^2)\,dx + (x^2 + xy)\,dy = 0$

Q41. Find the general sol. of the diff equation $\frac{dy}{dx} - y = \cos x$.

Q42. Find the particular sol of the diff. eq. $\frac{dy}{dx} + y\cot x = 2x + x^2\cot x$. Given that y = 0 when $x = \frac{\pi}{2}$.

Q43. Find the particulars solution of diff . equation. $(1+x^2)dy + 2xy\,dx = \cot x\,dx$

Q44. Find the particular solution of diff. equation $x\frac{dy}{dx} + y - x + xy\cot x = 0$

Q45. Solve the eq. $(1 + y^2)dx = (tan^{-1} - x)dy$

Q46. Solve the diff eq. $\left(\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}}\right)\frac{dx}{dy} = 1$.

Q47. Find a particular solution of the diff eq. $\frac{dx}{dy} + y\cot x = 4x.\ \mathrm{cosec}\ x$. Given that y = 0 when $x = \frac{\pi}{2}$.

Q48. Solve the diff eq. $\cos^2 x\frac{dx}{dy} + y = \tan x$.

Q49. Solve the following diff. equation $(x^2 + 1)\frac{dy}{dx} + 2xy = \sqrt{x^2+4}$.

Q50. Solve the diff. equation $\frac{dy}{dx} + 2y\tan x = \sin x$.