Q1. Solve the following differential equation: **3 Marks**

$\frac{dy}{dx} - \frac{y}{x} = 2x^2$

Q2. Find the particular solution of the differential equation $x\frac{dy}{dx} + x\cos^2\left(\frac{y}{x}\right) = y$; given that when $x=1, y = \frac{\pi}{4}$. **3 Marks**

Q3. Find the particular solution of the differential equation $(y + 3x^2)\frac{dx}{dy} = x$, given that $y = 1$, when $y = 1$. **3 Marks**

Q4. Solve the following differential equation: **3 Marks**

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

Q5. Solve the following differential equation: **3 Marks**

$(\tan^{-1} y - x)dy = (1 + y^2)dx$

Q6. Solve the following differential equation: **3 Marks**

$\sin x\frac{dy}{dx} + \cos xy = \cos x \sin^2 x$

Q7. Solve the following differential equation: **3 Marks**

$y(1 - x^2)\frac{dy}{dx} = x(1 + y^2)$.

Q8. Find the particular solution of the differential equation given by $x^2\frac{dy}{dx} - xy = x^2\cos^2\left(\frac{y}{2x}\right)$, given that when $x = 1, y = \frac{\pi}{2}$. **3 Marks**

Q9. Find the general solution of the differential equation. **3 Marks**

$x\frac{dy}{dx} - y + x\sin\frac{y}{x} = 0.$

Q10. Find the general solution of the differential equation $\frac{dy}{dx} = \frac{x^2+y^2}{2xy}$. **3 Marks**

Q11. Solve the differential equation: $\frac{dy}{dx} = \frac{x^2+y^2}{xy}$. **3 Marks**

Q12. Find the general solution of the differential equation $x\frac{dy}{dx} = y(\log y - \log x + 1)$. **3 Marks**

Q13. Find the general solution of the differential equation: $\frac{dy}{dx} - \frac{2y}{x} = \sin\frac{1}{x}$. **3 Marks**

Q14. Find the particular solution of the differential equation: $\frac{dy}{dx} = \sin(x + y) + \sin(x - y)$, given that when $x = \frac{\pi}{4}, y = 0$. **3 Marks**

Q15. Find the general solution of the differential equation: **3 Marks**

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

Q16. Find the particular solution of the differential equation $\frac{dy}{dx} + \cot x \cdot y = \cos^2 x$, given that when $x = \frac{\pi}{2}, y = 0$. **3 Marks**

Q17. Find the general solution of the differential equation $ye^y dx = (y^3 + 2xe^y)dy$. **3 Marks**

Q18. Find the particular solution of the differential equation **3 Marks**

$x\frac{dy}{dx} = y - x\tan\left(\frac{y}{x}\right)$, given that $y = \frac{\pi}{4}$ at $x = 1$.

Q19. Find the particular solution of the differential equation $x\frac{dy}{dx} - y = x^2.e^x$, given $y(1) = 0$. **3 Marks**

Q20. Find the particular solution of the differential equation $\frac{dy}{dx} + \sec^2 x \times y = \tan x \times \sec^2 x$, given that y(0) = 0. **3 Marks**

Q21. Solve the differential equation given by **3 Marks**
$x\,dy - y\,dx - \sqrt{x^2 + y^2}\,dx = 0.$

Q22. Form the differential equation of the family of curves y = a cos(x + b), where a and b are arbitrary constants. **3 Marks**

Q23. Form the differential equation of the family of curves y = a sin (x + b), where a and b are arbitrary constants. **3 Marks**

Q24. Form the differential equation of the family of curves $y = A\cos 2x + B\sin 2x$,where A and B are constants. **3 Marks**

Q25. Verify that y = A cos x - b sin x is a solution of the differential equation. **3 Marks**
$\frac{d^2y}{dx^2} + y = 0.$