1. What is the order and degree of the following differential equation ?

$$Y = x\left(\frac{dy}{dx}\right) + a\left\{1 + \left(\frac{dy}{dx}\right)^2\right\}^{\frac{1}{2}}$$

(a) Order 2, degree 1 (b) order 1, degree 2 (c) order 2, degree 2 (d) None of thes

2. Which of the following equations are exact ?

(1) $(4x+3y+1)\,dx + (3x+2y+1)\,dy = 0$

(2) $x(x^2+3y^2)\,dx + y(y^2+3x^2)\,dy = 0$

(3) $y(2xy+e^x)\,dx = e^x\,dy$

(4) $x^2y\,dx - (x^3 - y^3)\,dy = 0$

(a) 1,2,4 (b) 1,2 (c) 2,3,4 (d) all of these

3. What is the value of the constant λ such that $(2xe^y + 3y^2)\frac{dy}{dx} + (3x^2 + \lambda e^y) = 0$ is exact?

(a) $\lambda = 2$ $(b)\ \lambda = 3$ $(c)\ \lambda = \frac{1}{2}$ $(d)\ None\ of\ these$

4. Classify the following differential equation

$X^2(y+1)\,dx + y^2(x-1)\,dy = 0$

(a) Linear but not separable (b) Separable but not linear (c) Neither separable nor linear

(d) None of these

5. What is the integrating factor of the following differential equation

$Y(x^2y^2+2)\,dx + x(2 - 2x^2y^2)\,dy = 0$

(a) $\frac{1}{x^3y^3}$ (b) $3x^2y^2$ (c) $\frac{1}{3x^3y^3}$ (d) None of these

6. Describe the type of the following differential equation

$P^3 - p(y+3) + x = 0$

(a) Solvable for p (b) solvable for x (c) solvable for y (d) None of these

7. What is the general solution of the following differential equation

$\sin px \cos y = \cos px \sin y + p$

(a) $Y = cx + \sin c$ (b) $y = cx + \sin^{-1} c$ (c) $y = cx - \sin^{-1} c$ (d) None of these

8. What is the wronskian of e^x, e^{-x}, cosh x ?

(a) e^x (b) e^{-x} (c) 0 (d) None of these

9. What is $\frac{1}{F(D)}e^{ax}$ while solving for particular integral ?

(a) $\frac{1}{F(a)}$ (b) $\frac{e^{ax}}{F(a)}$ (c) e^{ax} (d) None of these

10. What is the particular integral for the equation $\frac{d^2y}{dx^2}$ -3$\frac{dy}{dx}$ +2y = e^{2x}

(a) $\frac{e^x}{5}$ (b) $\frac{e^{2x}}{4}$ (c) $\frac{e^{2x}}{3}$ (d) None of these

11. What is the Auxiliary equation for the following equation

$\frac{d^2y}{dx^2}$ - 4 $\frac{dy}{dx}$ + y = cos 2x

(a) $D^2 - 4D + 1$ (b) $D^2 - 4D + 1 = 0$ (c) $D^2 - 4D + 1 = \cos 2x$ (d) None of these

12. What are the roots of the Auxiliary equation of the differential equation

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

(a) -1, 1,1 (b) -1,-1,1 (c) 1,1,1 (d) None of these

13. When there are two pairs of complex roots α ±iβ, α± iβ of auxiliary equation then corresponding part of C.F. is

(a) $e^{\alpha x}$ {($c_1 + c_2$) cos ß x + ($c_3 + c_4$) Sin βx} (b) $e^{\alpha x}$ {($c_1 + c_2 x$) cosβx + ($c_3 + c_4 x$) Sinβx}

© ($c_1 + c_2 x$) cosβx + ($c_3 + c_4 x$) sinβx (d) None of these

14. What is particular integral of the following differential equation

($D^2 + 9$) y = cos 4x

(a) $\frac{-1}{7}$ cos 4x (b) $\frac{1}{5}$ cos 4x (c) $\frac{1}{4}\cos 4x$ $(d)\ None\ of\ these$

15. What is the general solution of the following differential equation

P = log (y –xp)

(a) Y = cx+c (b) y = cx + p (c) $y = cx + e^p$ (d) None of these

16. What is the integrating factor of the linear differential equation of the form

$\frac{dy}{dx}$ + P y=Q where P, Q are functions of x

(a) $\int P\ dx$ (b) $e^{\int P\ dx}$ (c) $\int Q\ dx$ (d) None of these

17. Classify the following differential equation :

($x + 2y^3$) $\frac{dy}{dx}$ = y

(a) Separable but not linear (b) Not Separable but linear (c) Neither separable nor linear

(d) None of these

18. The equation M(x,y) dx + N (x,y) dy = 0 is is exact if and only if

(a) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ (b) $\int M\,dx = \int N\,dx$ (c) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$ (d) None of these

19. What is the solution of the exact differential equation M dx+ N dy = 0

(a) $\int M$ dy - $\int N$ dx (b) $\int M\,dx + \int (Terms\ of\ N\ not\ containing\ x)\,dy = c$

© $\int M\,dy + \int N\,dx = c$ (d) None of these

20. What is the symbolic form of following differential equation

$\frac{d^3y}{dx^3}$ + 6 $\frac{d^2y}{dx^2}$ + 11 $\frac{dy}{dx}$ + 6y = 2 sinx

(a) $D^3 + D^2 + D + 6 = 0$ (b) $D^3 + 6D^2 + 11D + 6 = 0$ (c) $(D^3 + 6D^2 + 11D + 6)y = 2\sin x$

(d) None of these