QB365 Question Bank Software Study Materials

Ordinary Differential Equations 50 Important 1Marks Questions With Answers (Book Back and Creative)

12th Standard

Maths

Total Marks : 50

50 x 1 = 50

1) The order and degree of the differential equation $\frac{d^2y}{dx^2}+\left(\frac{dy}{dx}\right)^{1/3}+x^{1/4}=0$ are respectively

(a) 2, 3 (b) 3, 3 (c) 2, 6 (d) 2, 4

2) The differential equation representing the family of curves y = Acos(x + B), where A and B are parameters,is

(a) $\frac{d^2y}{dx^2}-y=0$ **(b) $\frac{d^2y}{dx^2}+y=0$** (c) $\frac{d^2y}{dx^2}=0$ (d) $\frac{d^2x}{dy^2}=0$

3) The order and degree of the differential equation $\sqrt{sinx}(dx+dy)=\sqrt{cosx}(dx-dy)$ is

(a) 1, 2 (b) 2, 2 **(c) 1, 1** (d) 2, 1

4) The order of the differential equation of all circles with centre at (h, k) and radius ‘a’ is

(a) 2 **(b) 3** (c) 4 (d) 1

5) The differential equation of the family of curves y = Ae^x + Be^{-x}, where A and B are arbitrary constants is

(a) $\frac{d^2y}{dx^2}+y=0$ **(b) $\frac{d^2y}{dx^2}-y=0$** (c) $\frac{dy}{dx}+y=0$ (d) $\frac{dy}{dx}-y=0$

6) The general solution of the differential equation $\frac{dy}{dx}=\frac{y}{x}$ is

(a) xy = k (b) y = k log x **(c) y = kx** (d) log y = kx

7) The solution of the differential equation $2x\frac{dy}{dx}-y=3$ represents

(a) straight lines (b) circles **(c) parabola** (d) ellipse

8) The solution of $\frac{dy}{dx}+p(x)y=0$ is

(a) $y=ce^{\int pdx}$ **(b) $y=ce^{-\int pdx}$** (c) $x=ce^{-\int pdy}$ (d) $x=ce^{\int pdy}$

9) The integrating factor of the differential equation $\frac{dy}{dx}+y=\frac{1+y}{\lambda}$ is

(a) $\frac{x}{e^{\lambda}}$ **(b) $\frac{e^{\lambda}}{x}$** (c) λe^x (d) e^x

10) The integrating factor of the differential equation $\frac{dy}{dx}+P(x)y=Q(x)$ is x, then P(x)

(a) x (b) $\frac{x^2}{2}$ **(c) $\frac{1}{x}$** (d) $\frac{1}{x^2}$

11) The degree of the differential equation $y(x)=1+\frac{dy}{dx}+\frac{1}{1.2}\left(\frac{dy}{dx}\right)^2+\frac{1}{1.2.3}\left(\frac{dy}{dx}\right)^3+\ldots$ is

(a) 2 (b) 3 **(c) 1** (d) 4

12) If p and q are the order and degree of the differential equation $y=\frac{dy}{dx}+x^3\left(\frac{d^2y}{dx^2}\right)+xy=cosx$, When

(a) p < q (b) p = q **(c) p > q** (d) p exists and q does not exist

13) The solution of the differential equation $\frac{dy}{dx}+\frac{1}{\sqrt{1-x^2}}=0$ is

(a) y + $\sin^{-1}$ x = c (b) x + $\sin^{-1}$ y = 0 (c) y^2+ 2 $\sin^{-1}$ x = c (d) x^2+ 2 $\sin^{-1}$y= c

14) The solution of the differential equation $\frac{dy}{dx}=2xy$ is

(a) $y = Ce^{x^2}$ (b) $y = 2x^2 + C$ (c) $y = Ce^{-x^2} + C$ (d) $y = x^2 + C$

15) The general solution of the differential equation $\log\left(\frac{dy}{dx}\right) = x + y$ is

(a) $e^x + e^y = C$ **(b) $e^x + e^{-y} = C$** (c) $e^{-x} + e^y = C$ (d) $e^{-x} + e^{-y} = C$

16) The solution of $\frac{dy}{dx} = 2^{y-x}$ is

(a) $2^x + 2^y = C$ (b) $2^x - 2^y = C$ **(c) $\frac{1}{2^x} - \frac{1}{2^y} = C$** (d) $x + y = C$

17) The solution of the differential equation $\frac{dy}{dx} = \frac{y}{x} + \frac{\phi\left(\frac{y}{x}\right)}{\phi'\left(\frac{y}{x}\right)}$ is

(a) $x\phi\left(\frac{y}{x}\right) = k$ **(b) $\phi\left(\frac{y}{x}\right) = kx$** (c) $y\phi\left(\frac{y}{x}\right) = k$ (d) $\phi\left(\frac{y}{x}\right) = ky$

18) If sin x is the integrating factor of the linear differential equation $\frac{dy}{dx} + Py = Q$, then P is

(a) log sin x (b) cos x (c) tan x **(d) cot x**

19) The number of arbitrary constants in the general solutions of order n and n +1 are respectively

(a) n-1,n **(b) n,n+1** (c) n+1,n+2 (d) n+1,n

20) The number of arbitrary constants in the particular solution of a differential equation of third order is

(a) 3 (b) 2 (c) 1 **(d) 0**

21) Integrating factor of the differential equation $\frac{dy}{dx} = \frac{x+y+1}{x+1}$ is

(a) $\frac{1}{x+1}$ (b) x+1 (c) $\frac{1}{\sqrt{x+1}}$ (d) $\sqrt{x+1}$

22) The population P in any year t is such that the rate of increase in the population is proportional to the population. Then

(a) $P=Ce^{kt}$ (b) $P=Ce^{-kt}$ (c) P=Ckt (d) P=C

23) P is the amount of certain substance left in after time t. If the rate of evaporation of the substance is proportional to the amount remaining, then

(a) $P = Ce^{kt}$ **(b) $P = Ce^{-kt}$** (c) P = Ckt (d) Pt = C

24) If the solution of the differential equation $\frac{dy}{dx} = \frac{ax+3}{2y+f}$ represents a circle, then the value of a is

(a) 2 **(b) -2** (c) 1 (d) -1

25) The slope at any point of a curve y = f (x) is given by $\frac{dy}{dx} = 3x^2$ and it passes through (-1, 1). Then the equation of the curve is

(a) $y = x^3 + 2$ (b) $y = 3x^2 + 4$ (c) $y = 3x^4 + 4$ (d) $y = 3x^2 + 5$

26) The order and degree of the differential equation $\left[\left(\frac{d^2y}{dx^2}\right) + \left(\frac{dy}{dx}\right)\right]^{\frac{1}{2}} = \frac{d^3y}{dx^3}$ are _________

(a) 1, 2 (b) 2, 1 **(c) 3, 2** (d) 2, 3

27) If cosx is an integrating factor of the differential equation $\frac{dy}{dx} + Py = Q$, then P = __________

(a) -cot x (b) cot x (c) tan x **(d) -tan x**

28) The solution of $\sec^2 x \tan y\, dx + \sec^2 y \tan x\, dy = 0$ is ________

(a) tan x+tan y = c (b) sec x + sec y = c **(c) tan x tan y = c** (d) sec x- sec y = c

29) The transformation y = vx reduces $\frac{dy}{dx} = \frac{x+y}{3x}$ __________

(a) $\frac{3av}{4v+1} = \frac{dx}{x}$ (b) $\frac{3dv}{v+1} = \frac{dx}{x}$ (c) $2x\frac{dv}{dx} = v$ (d) $\frac{3dv}{1-2v} == \frac{dx}{x}$

30) The solution of $\frac{dy}{dx} + y$ cot x = sin 2x is __________

(a) y sin x = $\frac{2}{3}\sin^3 x + c$ (b) y sec x = $\frac{x^2}{2} + c$ (c) y sin x = c+x **(d) 2y sin x = sin x - $\frac{\sin 3x}{3} + c$**

31) The I.F of y log y $\frac{dx}{dy} + x - log\, y = 0$ is ________

(a) log(log y) **(b) log y** (c) $\frac{1}{log\, y}$ (d) $\frac{1}{log(log\, y)}$

32) The I.F of $\frac{dy}{dx} - y$ tan x = cos x is ________

(a) sec x (b) cos x **(c) $e^{\tan x}$** (d) cot x

33) The order and degree of $y'+(y'')^2 = (x + t'')^2$ are ________.

(a) 1, 1 (b) 1, 2 **(c) 2, 1** (d) 2, 2

34) On finding the differential equation corresponding to y = e^{mx} where m is the arbitrary constant, then m is ________.

(a) $\frac{y}{y^1}$ **(b) $\frac{y^1}{y}$** (c) y' (d) y

35) The population p of a certain bacteria decreases at a rate proportional to the population p. The differential equation corresponding to the above statement is ________.

(a) $\frac{dp}{dt} = \frac{k}{p}$ (b) $\frac{dp}{dt} = kt$ (c) $\frac{dp}{dt} = kp$ **(d) $\frac{dp}{dt} = -kp$**

36) The general solution of x $\frac{dy}{dx}$ = y is ________.

(a) y = cx (b) $x^2 + y^2 = c$ (c) $x^2 - y^2 = c$ (d) $y = c^x$

37) The differential equation of $x^2y = k$ is ________.

(a) $x^2\frac{dy}{dx} = 0$ **(b) $x^2\frac{dy}{dx} + y = 0$** (c) $x\frac{dy}{dx} + 2y = 0$ (d) $y\frac{dy}{dx} + 2x = 0$

38) Using y = vx, the differential equation $\frac{dy}{dx} = \frac{y}{x+\sqrt{xy}}$ is reduced to ________.

(a) $x(1+\sqrt{v})dv = v\sqrt{v}dx$ (b) $x(1-\sqrt{v})dv = v\sqrt{v}dx$ **(c) $x(1+\sqrt{v})dv = -v\sqrt{v}dx$** (d) $v(1+\sqrt{v})dx - v\sqrt{v}dv = 0$

39) The I.F. of $(1+y^2)\, dx = (\tan^{-1}-t-x)\, dy$ is ________.

(a) $e^{\tan^{-1} y}$ (b) $e^{\tan^{-1}} x$ (c) $\tan^{-1} y$ (d) $\tan^{-1}x$

40) The differential equation associated with the family of concentric circles having their centres at the origin is ________.

(a) $\frac{dy}{dx} = \frac{-x}{y}$ (b) $\frac{dy}{dx} = \frac{-y}{x}$ (c) $\frac{dy}{dx} = \frac{x}{y}$ (d) $\frac{dy}{dx} = \frac{y}{x}$

41) The solution of the differential equation $\frac{dy}{dx} = e^{x+y}$ is ________

(a) $e^x + e^y = c$ **(b) $e^x + e^{-y} = c$** (c) $e^x - e^{-y} = c$ (d) none of these

42) The order and degree of the differential equation $\frac{d^3y}{dx^3} + 6\frac{dy}{dx} + 3y = 0$ is ________

(a) 3, 1 (b) 1, 3 (c) 1, 1 (d) none of these

43) The order and degree of the differential equation $4\frac{d^2y}{dx^2} + 6\left(\frac{dy}{dx}\right)^2 = \log x$ is ________

(a) 1, 2 **(b) 2, 1** (c) 2, not defined (d) not defined, 2

44) The order and degree of the differential equation $\frac{dy}{dx} - \tan y = 0$ ________

(a) 1, 1 (b) 1, not defined (c) not defined, 1 (d) none of these

45) The particular solution of the DE $\frac{dy}{dx} = y$ tan x, given that y = 1 when x = 0 is ________

(a) y = cos x (b) y = sin x **(c) y = sec x** (d) y = sec-x

46) The solution of the differential equation x dy + y dx = 0 is ________

(a) x - y = c (b) x + y = c **(c) xy = c** (d) none of these

47) The solution of the differential equation $\frac{dy}{dx} = 1 - y + x - xy$ is ________

(a) $\log(1-y) = x + \frac{x^2}{2} + c$ **(b)** $\log(1+y) = x + \frac{x^2}{2} + c$ (c) $e^{(1+y)} = x + \frac{x^2}{2} + c$ (d) none of these

48) The solution of the differential equation x cos y dy - (xe^x log x 4 e^x) dx is _________

(a) sin y = e^x log x + c (b) sin y = e^x + log y + c (c) sin y = e^x + log x + c (d) none of these

49) The solution of the differential equation $\frac{dy}{dx} = e^x + 2$ is _________

(a) $y = e^x + C$ **(b)** $y = 2x + e^x + C$ (c) $y = 2xe^x + C$ (d) $y = e^x + 2Cx$

50) If $\left(\frac{dy}{dx}\right)^2$ = x + y + 5 then order and degree are ___________

(a) (1, 2) (b) (2,1) (c) (1, 1) (d) (2, 2)