RAVI TEST PAPERS & NOTES, WHATSAPP 8056206308

Differential Equations previously asked

12th Standard

Maths

Multiple Choice Question 13 x 1 = 13

1) The general 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) $e^{-x} + e^{-y} = C$

2) The order of the differential equation $\frac{d^4y}{dx^4} - \sin\left(\frac{d^2y}{dx^2}\right) = 5$ is

(a) 4 (b) 3 (c) 2 (d) not defined

3) The number of solutions of $\frac{dy}{dx} = \frac{y+1}{x-1}$, when y(1) = 2 is

(a) none (b) one (c) two (d) infinite

4) The order of the following, differential equation $\frac{d^3y}{dx^3} + x\left(\frac{dy}{dx}\right)^5 = 4\log\left(\frac{d^4y}{dx^4}\right)$ is

(a) not defined (b) 3 (c) 4 (d) 5

5) The order and degree (if defined) of the differential equation, $\left(\frac{d^2y}{dx^2}\right)^2 + \left(\frac{dy}{dx}\right)^3 = x\sin\left(\frac{dy}{dx}\right)$ respectively are

(a) 2, 2 (b) 1, 3 (c) 2, 3 (d) 2, degree not defined

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

(a) 1, $\frac{2}{3}$ (b) 3, 1 (c) 3, 3 (d) 1, 2

7) What is the product of the order and degree of the differential equation $\frac{d^2y}{dx^2}\sin y + \left(\frac{dy}{dx}\right)^3 \cos y = \sqrt{y}$?

(a) 3 (b) 2 (c) 6 (d) not defined

8) Degree of the differential equation $\sin x + \cos\left(\frac{dy}{dx}\right) = y^2$ is

(a) 2 (b) 1 (c) not defined (d) 0

9) If m and n respectively, are the order and the degree of the differential equation $\frac{d}{dx}\left[\left(\frac{dy}{dx}\right)\right]^4 = 0$, then m + n is equal to

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

10) The degree of the differential equation $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{2}} = \frac{d^2y}{dx^2}$ is

(a) 4 (b) $\frac{3}{2}$ (c) 2 (d) Not defined

11) The integrating factor of the differential equation. $\left(1 - y^2\right)\frac{dx}{dy} + yx = ay$

(a) $\frac{1}{y^2-1}$ (b) $\frac{1}{\sqrt{y^2-1}}$ (c) $\frac{1}{1-y^2}$ (d) $\frac{1}{\sqrt{1-y^2}}$

12) The solution of the differential equation $\frac{dx}{x} + \frac{dy}{y} = 0$ is

(a) $\frac{1}{x} + \frac{1}{y} = C$ (b) log x - log y = C (c) xy = C (d) x + y = C

13) The general solution of the differential equation ydx - xdy = 0 is

(a) xy = C (b) $x = Cy^2$ (c) y = Cx (d) $y = Cx^2$

2 Marks 29 x 2 = 58

14) What is the degree of the following differential equation?
$5x\left(\frac{dy}{dx}\right)^2-\frac{d^2y}{dx^2}-6y=logx$

15) Write the degree of the differential equation: $5x\left(\frac{dy}{dx}\right)^2-\frac{d^2y}{dx^2}=0.$

16) Write the degree of the differential equation $\left(\frac{d^2s}{dt^2}\right)^2+\left(\frac{ds}{dt}\right)^3+4=0$

17) Write the degree of the differential equation $x^3\left(\frac{d^2y}{dx^2}\right)^2+x\left(\frac{dy}{dx}\right)^4=0$

18) Write the degree of the differential equation : $x\left(\frac{d^2y}{dx^2}\right)^3+y\left(\frac{dy}{dx}\right)^4+x^3=0$

19) Write the differential equation obtained by eliminating the arbitrary constant C in the equation representing the family of curves xy = C cos x.

20) If m and n are the order and degree, respectively of the differential equation
$y\left(\frac{dy}{dx}\right)^3+x^3\left(\frac{d^2y}{dx^2}\right)^2-xy=\sin x$, then write value of m + n.

21) Obtain the differential equation of the family of circles passing through the points (a,0) and (- a, 0).

22) Find the solution of the differential equation $\frac{dy}{dx}=x^3e^{-2y}$

23) Solve the differential equation $\frac{dy}{dx}=e^{x-y}+xe^{-y}.$

24) Find the integrating factor of the differential equation $\left(\frac{e^{-2\sqrt{x}}}{\sqrt{x}}-\frac{y}{\sqrt{x}}\right)\frac{dx}{dy}=1\,.$

25) Find the general solution of differential equation
$\frac{dy}{dx}+y=e^{-x}$

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

27) Find the particular solution of the differential equation
$e^x\tan ydx+(2-e^x)\sec^2ydy=0$ given that $y=\frac{\pi}{4}$ when $x=0$

28) Write the integrating factor of the following differential equation.$\left(1+y^2\right)+(2xy-\cot y)\frac{dy}{dx}=0.$

29) Find the value of m and n, where m and n are order and degree of differential equation:
$\frac{4\left(\frac{d^2y}{dx^2}\right)^3}{\frac{d^3y}{dx^3}}+\frac{d^3y}{dx^3}=x^2-1$

30) Find the degree of the differential equation $1+\left(\frac{dy}{dx}\right)^2=x$

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

32) Find the order and degree (if defined) of the differential equation $\frac{d^2y}{dx^2}+x\left(\frac{dy}{dx}\right)^2=2x^2\log\left(\frac{d^2y}{dx^2}\right)$

33) Write the sum of the order and the degree of the following differential equation $\frac{d}{dx}\left(\frac{dy}{dx}\right)=5$

34) How many arbitrary constants are there in the particular solution of the differential equation $\frac{dy}{dx}=-4xy^2$; y(0) = 1?

35) For what value of n is the following a homogeneous differential equation $\frac{dy}{dx}=\frac{x^3-y^n}{x^2y+xy^2}$?

36) Find the integrating factor of the differential equation $x\frac{dy}{dx}+2y=x^2$

37) Write the general solution of differential equation $\frac{dy}{dx}=e^{x+y}$

38) Write the solution of the differential equation $\frac{dy}{dx}=2^{-y}$

39) Solve the following differential equation $\frac{dy}{dx} = x^3$ cosec y, given that y(0) = 0

40) Find the general solution of the differential equation $\frac{dy}{dx} = e^{x+y}$.

41) Solve the differential equation $\cos\left(\frac{dy}{dx}\right) = a, (a \in R).$

42) Verify that $ax^2 + by^2 = 1$ is a solution of the differential equation $x\left(yy_2 + y_1^2\right) = yy_1$

3 Marks 73 x 3 = 219

43) Solve the differential equation : $(x^3 + x^2 + x + 1)\frac{dy}{dx} = 2x^2 + x$: y = 1 when x = 0

44) Solve the differential equation : $\frac{dy}{dx}$ + 2y tan x = sin x , given that y =0, when x = $\frac{\pi}{3}$

45) Find the particular solution of the differential equation: $\left\{xsin^2\left(\frac{y}{x}\right) - y\right\}dx + xdy = 0$given that $y = \frac{\pi}{4}$, when x = 1

46) Show that the differential equation $\left(x^2 - y^2\right)dx + 2xydy = 0$ is homogeneous and solve it.

47) verify that the given functions (explicit or implicit) is a solution of the corresponding differential equation :
y – cos y = x : $(y\sin y + \cos y + x)y' = y$

48) Show that the given differential equation is homogeneous and solve it.
$x\frac{dy}{dx} - y + x\sin\left(\frac{y}{x}\right) = 0$

49) Find the general solution of the differential equation $\frac{dy}{dx} = \frac{x+1}{2-y}, (y \neq 2)$

50) Solve: $\cos x\frac{dy}{dx} + y = \sin x$, given that y = 2 when x = 0.

51) Solve the differential equation : $\left(x^2 - 1\right)\frac{dy}{dx} + 2xy = \frac{2}{x_2 - 1}$

52) $xy\frac{dy}{dx} + y\cot x = 4x\,\mathrm{cosec}\,x, (x+2)(y+2)$, find the solution curve passing through the point (1,-1).

53) Solve the differential equation : $(1 + e^{2x})$ dy + $(1+y^2)$ e^x sx = 0, given that when x = 0, y = 1.

54) Solve the differential equation : e^x tan y dx + (1 - e^x) $\sec^2$ y dy = 0.

55) Solve the differential equation : x dy - y dx = $\sqrt{x^2 + y^2}$ dx

56) Solve the differential equation : (x + 1) $\frac{dy}{dx}$ = $2e^{-y}$-1; y = 0 when x = 0.

57) Solve the differential equation : $(1 + x^2)$dy + 2xy dx = cot x dx; $\neq$ 0.

58) Solve the differential equation : $e^x\sqrt{1-y^2}dx + \frac{y}{x}dy = 0, x = 0, y = 1.$

59) From the differential equation represending the family of parabolas having vertes at orgin and axis along positive direction of the x-axis.

60) Show that the diffrential equation $(xe^{x/y} + y)dx = xdy$ is homogeneous. Find the particular solution of this differential equation, given that x = 1 when y = 1.

61) Form the differential equation of the family of hyperbolas having foci on the x-axis and centre at orgin.

62) Find the particular solution of the differential equation: $log\left(\frac{dy}{dx}\right) = 3x + 4y$, given that $y = 0$ when $x = 0.$

63) Find the general solution of the differential equations: $ydx - \left(x + 2y^2\right)dy = 0.$

64) Find the differential equation of the family of circles $(x-a)^2 + (y-b)^2 = r^2$, where $'a'$ and $'b'$ are arbitrary constants.

65) Form the differential equation of the family of curves: $v = \frac{A}{r} + B$ where A and B are arbitrary constants.

66) Solve the differential equation:$\left(1 + y^2\right)(1 + log \quad x)\,dx + x \quad dy = 0$, given that when $x = 1, y = 1.$

67) Solve $e^x\sqrt{1-y^2}dx + \frac{y}{x} = 0$, given that $x = 0$ when $y = 1$

68) Solve the differential equation: $x \quad dy + \left(y - x^3\right)dx = 0.$

69) Find the particular solution of the following equation: $\frac{dy}{dx} = 1 + x^2 + y^2 + x^2y^2$, given that $y = 1$ when $x = 0$

70) Find the particular solution of the differential equation: $\frac{dy}{dx} = \frac{xy}{x^2+y^2}$, given that $y = 1$, and $x = 0$

71) Solve $\left(y + 3x^2\right) \frac{dx}{dy} = x.$

72) Find the particular solution of the differential equation:
$\frac{dy}{dx} + x \quad cot \quad y = 2y + y^2 cot \quad y\,(y \neq 0)$, given that $x = 0$when $y = \frac{\pi}{2}.$

73) Solve the following differential equation: $xy \quad log\left(\frac{y}{x}\right) dx + \left(y^2 - x^2 log\left(\frac{y}{x}\right)\right) dy = 0$

74) Find the particular solution of the following differential equation:$x\frac{dy}{dx} - y + x \quad sin\left(\frac{y}{x}\right) = 0$, given that when $x = 2, y = \pi.$

75) Suppose the growth of a population is proportional to the number present. If the population of a colony doubles in 50 months, in how many months will the population becomes triple?

76) Find the general solution of the following differential equation :
$y - x\frac{dy}{dx} = a\left(y^2 + \frac{dy}{dx}\right)$

77) If y(x) is a solution of the differential equation $\left(\frac{2+\sin x}{1+y}\right) \frac{dy}{dx} = -\cos x$ and y(0) = 1, then find the value of $y\left(\frac{\pi}{2}\right).$

78) Find the particular solution of the differential equation $\sqrt[e^x]{1 - y^2} dx + \left(\frac{y}{x}\right) dx = 0$ given that y = 1 when x = 0.

79) Solve the following differential equation :
$cosecx \log y \frac{dy}{dx} + x^2 y^2 = 0$

80) Find the particular solution of the differential equation x (1 + y^2) dx - y (1 + x^2)dy = 0, given that y = 1, when x = 0.

81) Find the particular solution of the differential equation $\frac{dy}{dx}$ = 1 + x + y + xy given that y = 0 when x = 1.

82) Find the particular solution of the following differential equation : $\frac{dy}{dx} = 1 + x^2 + y^2 + x^2 y^2$, given that y = 1 when x = 0.

83) Find the particular solution of the following differential equation :
$(x + 1) \frac{dy}{dx} = 2e^{-y} - 1$; y = 0 when x = 0.

84) Find the particular solution of the following differential equation :
$xy\frac{dy}{dx} = (x + 2)(y + 2)$; y = -1, when x = 1.

85) Find the particular solution of the following differential equation :
$x\left(x^2 - 1\right) \frac{dy}{dx} = 1$; y = 0 and x = 2.

86) Solve the differential equation :$3e^x$ tan y dx + (2 - e^x)sec^2 y dy = 0, given that when x = 0, $y = \frac{\pi}{4}.$

87) Solve the following differential equation :
(1 + y^2)(1 + log x) dx + x dy = 0.

88) Solve the differential equation
$x\frac{dy}{dx} + y = x\cos x + \sin x$, given $y\left(\frac{\pi}{2}\right) = 1$

89) Solve the following differential equation :
$\left(x^2 - 1\right) \frac{dy}{dx} + 2xy = \frac{2}{x^2-1}, x \neq 1$

90) Solve the differential equation : $\left(1 + y^2\right) \frac{dy}{dx} + y = e^{\tan^{-1} x}$

91) Find the particular solution of the following differential equation :
$\frac{dy}{dx} - y = \cos x$ for x = 0, y = 1

92) Find the particular solution of the following differential equation given that at x = 2, y = 1 $x\frac{dy}{dx} + 2y = x^2, (x \neq 0)$

93) Solve $\left(1 + x^2\right) \frac{dy}{dx} + 2xy - 4x^2 = 0$ subject to the initial condition y(0) = 0.

94) Find the general solution of the differential equation (1 + tan y)(dx - dy) + 2xdy = 0

95) Check whether the following differential equation is homogeneous or not :
$x^2 \frac{dx}{dy} - xy = 1 + \cos\left(\frac{y}{x}\right), x \neq 0$. Find the general solution of the differential equation using substitution y = vx.

96) Can $y = ax + \frac{b}{a}$ be a solution of the following differential equation
$y = x\frac{dy}{dx} + \frac{b}{\frac{dy}{dx}}$ If no, find the solution of the D.E.

97) Solve the following differential equation :
$\frac{dy}{dx} = \frac{y}{x} + \frac{\sqrt{x^2+y^2}}{x}, x > 0$

98) Find the order and degree if defined : $\frac{dy}{dx} - secx = 0$

99) Verify that the function $x^2 = 2y^2 \log y$ is a solution of the differential equation.
$\left(x^2 + y^2\right)\frac{dy}{dx} - xy = 0$

100) Fcrm the differential equation of the family of parabolas having vertex at origin and axis along positive Y-axis.

101) Find the particular solution of the differential equation $e^x\sqrt{1-y^2}dx + \frac{y}{x}dy = 0$.given that y = 1 when x = 0.

102) Solve the following differential equation
$xy\log\left(\frac{y}{x}\right)dx + \left[y^2 - x^2\log\left(\frac{y}{x}\right)\right]dy = 0$

103) Solve the differential equation
$x^2dy + \left(xy + y^2\right)dx = 0$ given $y = 1,$ when $x = 1$

104) Show that the differential equation $\frac{dy}{dx} = \frac{y^2}{xy-x^2}$ is homogeneous and also solve it.

105) Solve the following differential equation $x^2dy + y(x + y)dx = 0$

106) Solve the differential equation given by $xdy - ydx - \sqrt{x^2+y^2}dx = 0$

107) Find the general solution of the differential equation $(xy - x^2)dy = y^2dx$

108) Find the general solution of the differential equation $\left(x^2+1\right)\frac{dy}{dx} + 2xy = \sqrt{x^2+4}$

109) Solve the differential equation $xdy - ydx = \sqrt{x^2+y^2}dx$

110) Solve the differential equation $ydx + (x - y^2)dy = 0$

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

112) Find the general solution of the differential equation $x\frac{dy}{dx} = y(\log y - \log x + 1)$

113) Find the general solution of the following differential equation $x\frac{dy}{dx} = y - x\sin\left(\frac{y}{x}\right)$

114) Find the particular solution of the following differential equation, given that y = 0 when x = $\frac{\pi}{4}\frac{dy}{dx} + y\cot x = \frac{2}{1+\sin x}$

115) Find the general solution of the following differential equation $xdy - (y + 2x^2)dx = 0$

5 Marks 40 x 5 = 200

116) Show that the following differential equation is homogeneous and then solve it.
$ydx + x\log\left|\frac{y}{x}\right|dy - 2xdy = 0$

117) Solve the following differential equation $(1 + x^2)dy + 2xy\,dx = \cot x\,dx$, where $x \neq 0$.

118) Obtain the differential equation of all the circles of radius r.

119) Find the particular solution of the differential equation $(\tan^{-1} y - x)\,dy = (1 + y^2)\,dx$, given that when x = 0, y = 0.

120) Find the particular solution of the differential equation $\frac{dy}{dx} = \frac{xy}{x^2+y^2}$ given that y = 1, when x = 0.

121) Find the particular solution of the differential equation :
$xe^{\frac{y}{x}} - y\sin\left(\frac{y}{x}\right) + x\frac{dy}{dx}\sin\left(\frac{y}{x}\right) = 0$ for x = 1, y = 0.

122) Find the particular solution of the differential equation : $x^2dy = y(x + y)dx = 0$, when x = 1, y = 1.

123) Find the particular solution of the differential equation :
$x^2\frac{dy}{dx} - xy = 1 + \cos\left(\frac{y}{x}\right), x \neq 0$, when x = 1, $y = \frac{\pi}{2}$

124) Find the particular solution of the differential equation
$(3xy+y^2)dx+(x^2+xy)dy = 0$ for x = 1, y = 1

125) Solve the following differential equation
$x\left(x^2-1\right)\frac{dy}{dx}=1, y=0, \text{ when } x=2$

126) Find the particular solution of the differential equation $(x-y)\frac{dy}{dx}=(x+2y)$, given that when x = 1, y =0.

127) Solve the differential equation $dy=\cos x(2-y\operatorname{cosec} x)dx$ given that y = 2 when $x=\pi/2$.

128) Solve the following differential equation $\frac{dy}{dx}+y\cot x=4x\operatorname{cosec} x, \text{ given that } y=0$ when $x=\pi/2$.

129) Solve the differential equation
$\left(x^2+1\right)\frac{dy}{dx}+2xy=\sqrt{x^2+4}$

130) Solve the initial value problem
$ye^y dx=\left(y^3+2xe^y\right)dy, y(0)=1$

131) Solve the differential equation $x\sin\left(\frac{y}{x}\right)\frac{dy}{dx}+x-y\sin\left(\frac{y}{x}\right)=0$. Given that x = 1, when $y=\frac{\pi}{2}$.

132) Find the general solution of the differential equation $\frac{dy}{dx}+\frac{1}{x}=\frac{e^y}{x}$.

133) Solve the differential equation $\left(1+x^2\right)\frac{dy}{dx}+2xy-4x^2=0$, subject to the initial condition y(0) =0.

134) Solve the differential equation $\frac{dy}{dx}-\frac{2x}{1+x^2}y=x^2+2$

135) Solve the differential equation $\frac{dy}{dx}=-\left[\frac{x+y\cos x}{1+\sin x}\right]$

136) Find the particular solution of the differential equation $\left(1+x^2\right)\frac{dy}{dx}+2xy=\frac{1}{1+x^2}$, given that y = 0, when x = 1.

137) Show that (x - y)dy = (x + 2y)dx is a homogeneous differential equation. Also, find the general solution of the given differential equation.

138) Show that the family of curves for which $\frac{dy}{dx}=\frac{x^2+y^2}{2xy}$, is given by $x^2 - y^2 = cx$.

139) Solve the differential equation $x\frac{dy}{dx}$ + y = x . cos x + sin x, given that y = 1 when x = $\frac{\pi}{2}$.

140) Solve the differential equation $(\tan^{-1} x - y)\, dx = (1 + x^2)\, dy$.

141) Find the general solution of the differential equation $ydx -(x +2y^2)dy=0$.

142) Can y = ax + $\frac{b}{a}$ be a solution of the following differential equation ?$y=x\frac{dy}{dx}+\frac{b}{\frac{dy}{dx}} \ldots\ldots (*)$
If no, then find the solution of the DE(*)

143) Find the particular solution of the differential equation $(1 - y^2)(1+ \log|x|)dx + 2xy\, dy = 0$ given that y = 0, when x = 1.

144) Solve the following differential equation $y^2dx + (x^2 - xy + y^2)dy = 0$

145) Solve the following differential equation $(\cot^{-1} y + x)dy = (1 + y^2)dx$

146) Find the particular solution of the differential equation satisfying the given condition. $x^2dy + (xy + y^2)\, dx = 0$, when y(1) = 1

147) Solve the differential equation $\frac{dy}{dx}+y\cot x=2\cos x$, given that y=0, when $x=\frac{\pi}{2}$.

148) Solve the differential equation $\left(1+x^2\right)\frac{dy}{dx}+y=e^{\tan^{-1}x}$

149) Solve the following differential equation. $x\cos\left(\frac{y}{x}\right)\frac{dy}{dx}=y\cos\left(\frac{y}{x}\right)+x; x\neq 0$

150) Solve the following differential equation $\frac{dy}{dx}-y$ = cos x, given that if x = 0, y = 1.

151) Find the particular solution of the following differential equation, given that x = 2, y = 1
$x\frac{dy}{dx}+2y=x^2, (x\neq 0)$

152) Solve the following differential equation $\frac{dy}{dx}=1+x^2+y^2+x^2y^2$, given that y = 1, when x = 0.

153) Solve the following differential equation. $(1 + y^2)\,(1 + \log|x|)\,dx + x\,dy = 0$.

154) Solve the following differential equation. $\left[y - x\cos\left(\frac{y}{x}\right)\right]dy + \left[y\cos\left(\frac{y}{x}\right) - 2x\sin\left(\frac{y}{x}\right)\right]dx = 0$

155) Find the particular solution of the differential equation $(\tan^{-1} y - x)\,dy = (1+y^2)\,dx$, given that $x = 0$, when $y = 0$.

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