GPLUS EDUCATION

Date :
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DIFFERENTIAL EQUATIONS

Single Correct Answer Type

1. The slope of a curve at any point is the reciprocal of twice the ordinate at the point and it passes through the point (4, 3). The equation of the curve is
   a) $x^2 = y + 5$ b) $y^2 = x - 5$ c) $y^2 = x + 5$ d) $x^2 = y - 5$
2. The equation of the curve for which the square of the ordinate is twice the rectangle contained by the abscissa and the intercept of the normal on x-axis and passing through (2, 1) is
   a) $x^2 + y^2 - x = 0$ b) $4x^2 + 2y^2 - 9y = 0$ c) $2x^2 + 4y^2 - 9x = 0$ d) $4x^2 + 2y^2 - 9x = 0$
3. The differential equation obtained on eliminating A and B from the equation $y = A\cos\omega t + B\sin\omega t$ is
   a) $y_2 = -\omega^2 y$ b) $y_1 + y = 0$ c) $y_2 + y_1 = 0$ d) $y_1 - \omega^2 y = 0$
4. The differential equation $y\frac{dy}{dx} + x = a$ (a is any constant) represents
   a) A set of circles having centre on the y –axis
   b) A set of circles on the x –axis
   c) A set of ellipses
   d) None of these
5. The solution of $\frac{dy}{dx} + 1 = \text{cosec}\,(x + y)$ is
   a) $\cos(x + y) + x = c$ b) $\cos(x + y = c$
   c) $\sin(x + y) + x = c$ d) $\sin(x + y) + \sin(x + y) = c$
6. If $x^2 + y^2 = 1$, then
   a) $yy'' - (2y')^2 + 1 = 0$ b) $yy'' + (y')^2 + 1 = 0$
   c) $yy'' - (y')^2 - 1 = 0$ d) $yy'' + 2(y')^2 + 1 = 0$
7. The differential equation of all straight lines passing through origin is
   a) $y = \sqrt{x}\,\frac{dy}{dx}$ b) $\frac{dy}{dx} = y + x$ c) $\frac{dy}{dx} = y - x$ d) None of these
8. The solution of the differential equation $\frac{dy}{dx} = x\log x$ is
   a) $y = x^2\log x - \frac{x^2}{2} + c$ b) $y = \frac{x^2}{2}\log x - \frac{x^2}{4} + c$
   c) $y = \frac{x^2}{2} + \frac{x^2}{2}\log x + c$ d) None of these
9. The solution of the differential equation $y\,\frac{dy}{dx} = x - 1$ satisfying $y(1) = 1$ is
   a) $y^2 = x^2 - 2x + 2$ b) $y^2 = 2x^2 - x - 1$ c) $y = x^2 - 2x + 2$ d) None of these
10. The integral factor of equation $(x^2 + 1)\frac{dy}{dx} + 2xy = x^2 - 1$ is
    a) $x^2 + 1$ b) $\frac{2x}{x^2 + 1}$ c) $\frac{x^2 - 1}{x^2 + 1}$ d) None of these
11. If the integrating factor of the differential equation $\frac{dy}{dx} + P(x)y = Q(x)$ is x, then $P(x)$ is
    a) x b) $x^2/2$ c) $1/x$ d) $1/x^2$
12. The differential equation of all circles which passes through the origin and whose centre lies on y-axis, is
    a) $(x^2 - y^2)\frac{dy}{dx} - 2xy = 0$ b) $(x^2 - y^2)\frac{dy}{dx} + 2xy = 0$
    c) $(x^2 - y^2)\frac{dy}{dx} - xy = 0$ d) $(x^2 - y^2)\frac{dy}{dx} + xy = 0$

13. The differential equation obtained by eliminating arbitrary constants from $y = ae^{bx}$ is

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

14. A continuously differential function $\phi(x)$ in $(0, \pi)$ satisfying $y' = 1 + y^2, y(0) = 0 = y(\pi)$, is

a) $\tan x$ b) $x(x - \pi)$ c) $(x - \pi)(1 - e^x)$ d) Not possible

15. Solution of the differential equation $x\,dy - y\,dx = 0$ represents

a) A parabola whose vertex is at the origin

b) A circle whose centre is at the origin

c) A rectangular hyperbola

d) Straight lines passing through the origin

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) $\frac{1}{2^x} + \frac{1}{2^y} = c$

17. The differential equation whose solution is $Ax^2 + By^2 = 1$, where A and B are arbitrary constants, is of

a) First order and second degree b) First order and first degree

c) Second order and first degree d) Second order and second degree

18. The degree of the differential equation of all curves having normal of constant length c, is

a) 1 b) 3 c) 4 d) None of these

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

20. The solution of the differential equation $\frac{dy}{dx} = \sin\,(x + y)\tan(x + y) - 1$ is

a) $\text{cosec}\,(x + y) + \tan(x + y) = x + c$ b) $x + \text{cosec}\,(x + y) = c$

c) $x + \tan(x + y) = c$ d) $x + \sec(x + y) = c$

21. The general solution of differential equation $\frac{dy}{dx} = \frac{x^2}{y^2}$, is

a) $x^3 - y^3 = C$ b) $x^3 + y^3 = C$ c) $x^2 + y^2 = C$ d) $x^2 - y^2 = C$

22. The solution of the differential equation $\frac{dy}{dx}\tan y = \sin(x + y) + \sin(x - y)$ is

a) $\sec y + 2\cos x = c$ b) $\sec y - 2\cos x = c$ c) $\cos y - 2\sin x = c$ d) $\tan y - 2\sec y = c$

23. The differential equation representing the family of curves $y = xe^{cx}$ (c is a constant) is

a) $\frac{dy}{dx} = \frac{y}{x}\left(1 - \log\frac{y}{x}\right)$ b) $\frac{dy}{dx} = \frac{y}{x}\log\left(\frac{y}{x}\right) + 1$ c) $\frac{dy}{dx} = \frac{y}{x}\left(1 + \log\frac{y}{x}\right)$ d) $\frac{dy}{dx} + 1 = \frac{y}{x}\log\left(\frac{y}{x}\right)$

24. The solution of $\frac{dy}{dx} = \frac{x\log x^2 + x}{\sin y + y\cos y}$ is

a) $y\sin y = x^2\log x + c$ b) $y\sin y = x^2 + c$

c) $y\sin y = x^2 + \log x + c$ d) $y\sin y = x\log x + c$

25. 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) $e^x - e^{-y} = c$

26. The solution of $y' - y = 1, y(0) = -1$ is given by $y(x)$, which is equal to

a) $-\exp(x)$ b) $-\exp(-x)$ c) -1 d) $\exp(x) - 2$

27. The solution of the differential equation $(2y - 1)dx - (2x + 3)dy = 0$, is

a) $\frac{2x - 1}{2y + 3} = C$ b) $\frac{2x + 3}{2y - 1} = C$ c) $\frac{2x - 1}{2y - 1} = C$ d) $\frac{2y + 1}{2x - 3} = C$

28. The solution of $\cos y\,\frac{dy}{dx} = e^{x+\sin y} + x^2e^{\sin y}$ is

a) $e^x - e^{\sin y} + \frac{x^3}{3} = c$
b) $e^{-x} - e^{-\sin y} + \frac{x^3}{3} = c$
c) $e^x + e^{-\sin y} + \frac{x^3}{3} = c$
d) $e^x - e^{\sin y} - \frac{x^3}{3} = c$

29. The solution of the differential equation $\frac{x}{x^2+y^2}dy = \left(\frac{y}{x^2+y^2} - 1\right)dx$, is

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

30. If $y'' - 3y' + 2y = 0$ where $y(0) = 1, y'(0) = 0$, then the value of y at $x = \log 2$ is

a) 1
b) -1
c) 2
d) 0

31. The solution of the differential equation $(x + 2y^3)\frac{dy}{dx} = y$, is

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

32. The degree and order of the differential equation whose solution is a parabola whose axis is x-axis, are

a) 1,1
b) 1,2
c) 1,0
d) 2,1

33. If $\frac{dy}{dx} + y = 2e^{2x}$, then y is equal to

a) $ce^x + \frac{2}{3}e^{2x}$
b) $(1 - x)e^{-x} + \frac{2}{3}e^{2x} + c$
c) $ce^{-x} + \frac{2}{3}e^{2x}$
d) $e^{-x} + \frac{2}{3}e^{2x} + c$

34. The solution of the differential equation $\frac{d^2y}{dx^2} = e^{-2x}$ is $y = c_1e^{-2x} + c_2x + x_3$, where c_1 is

a) 1
b) $\frac{1}{4}$
c) $\frac{1}{2}$
d) 2

35. The general solution of the differential equation $(1 + y^2)dx + (1 + x^2)dy = 0$ is

a) $x - y = c(1 - xy)$
b) $x - y = c(1 + xy)$
c) $x + y = c(1 - xy)$
d) $x + y = c(1 + xy)$

36. The degree and order of the differential equation $y = px + \sqrt[3]{a^2p^2 + b^2}$, where $p = \frac{dy}{dx}$, are respectively

a) 3,1
b) 1,3
c) 1,1
d) 3,3

37. The solution of $\frac{dy}{dx} + y = e^x$ is

a) $2y = e^{2x} + c$
b) $2ye^x = e^2 + c$
c) $2ye^x = e^{2x} + c$
d) $2ye^{2x} = 2e^x + c$

38. The solution of the differential equation $\frac{dy}{dx} = e^{3x-2y} + x^2e^{-2y}$, is

a) $e^{2y} = e^{3x} + x^3 + c$
b) $\frac{1}{2}e^{2y} = \frac{1}{3}(e^{3x} + x^3) + c$
c) $\frac{1}{2}e^{2y} = \frac{1}{3}(e^{3x} + x^3) + c$
d) $e^{2y} = e^{3x} + x^3 + c$

39. The equation of the curve through the point (1,0) and whose slope is $\frac{y-1}{x^2+x}$, is

a) $2x + (y - 1)(x + 1) = 0$
b) $2x - (y - 1)(x + 1) = 0$
c) $2x + (y - 1)(x - 1) = 0$
d) None of these

40. The solution of the equation $\frac{dy}{dx} = \frac{x+y}{x-y}$ is

a) $c(x^2 + y^2)^{1/2} + e^{\tan^{-1}(y/x)} = 0$
b) $c(x^2 + y^2)^{1/2} = e^{\tan^{-1}(y/x)}$
c) $c(x^2 - y^2) = e^{\tan^{-1}(y/x)}$
d) None of the above

41. Integrating factor of $(x + 2y^3)\frac{dy}{dx} = y^2$ is

a) $e^{\left(\frac{1}{y}\right)}$
b) $e^{-\left(\frac{1}{y}\right)}$
c) y
d) $\frac{-1}{y}$

42. The slope of the tangent at (x, y) to a curve passing through a point (2, 1) is $\frac{x^2+y^2}{2xy}$, then the equation of the curve is

a) $2(x^2-y^2)=3x$ b) $2(x^2-y^2)=6y$ c) $x(x^2-y^2)=6$ d) $x(x^2+y^2)=10$

43. Solution of the differential equation $\frac{dy}{x}+\frac{dy}{y}=0$, is

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

44. If $y(t)$ is a solution of $(1+t)\frac{dy}{dt}-ty=1$ and $y(0)=-1$, then $y(1)$ is equal to

a) $-\frac{1}{2}$ b) $e+\left(\frac{1}{2}\right)$ c) $e-\frac{1}{2}$ d) $\frac{1}{2}$

45. Solution of $\frac{dy}{dx}=\frac{x\log x^2+x}{\sin y+y\cos y}$ is

a) $y\sin y=x^2\log x+c$
b) $y\sin y=x^2+c$
c) $y\sin y=x^2+\log x$
d) $y\sin y=x\log x+c$

46. The differential equation of system of concentric circles with centre (1,2) is

a) $(x-2)+(y-1)\frac{dy}{dx}=0$
b) $(x-1)+(y-2)\frac{dy}{dx}=0$
c) $(x+1)\frac{dy}{dx}+(y-2)=0$
d) $(x+2)\frac{dy}{dx}+(y-1)=0$

47. The solution of $y'=1+x+y^2+xy^2, y(0)=0$ is

a) $y^2=\exp\left(x+\frac{x^2}{2}\right)-1$
b) $y^2=1+c\exp\left(x+\frac{x^2}{2}\right)$
c) $y=\tan(c+x+x^2)$
d) $y=\tan\left(x+\frac{x^2}{2}\right)$

48. $y=cx-c^2$, is the general solution of the differential equation

a) $(y')^2-xy'+y=0$
b) $y''=0$
c) $y'=c$
d) $(y')^2+xy'+y=0$

49. The solution of $\frac{dy}{dx}=\frac{y^2}{xy-x^2}$ is

a) $e^{y/x}=kx$ b) $e^{y/x}=ky$ c) $e^{x/y}=kx$ d) $e^{-y/x}=ky$

50. The general solution of the differential equation $100\frac{d^2y}{dx^2}-20\frac{dy}{dx}+y=0$ is

a) $y=(c_1+c_2x)e^x$ b) $y=(c_1+c_2x)e^{-x}$ c) $y=(c_1+c_2x)e^{\frac{x}{10}}$ d) $y=c_1e^x+c_2e^{-x}$

51. Solution of differential equation $\sec x\ dy-\operatorname{cosec} y\ dx=0$ is

a) $\cos x+\sin y=c$ b) $\sin x+\cos y=c$ c) $\sin y-\cos x=c$ d) $\cos y-\sin x=c$

52. The solution of the differential equation $9y\frac{dy}{dx}+4x=0$ is

a) $\frac{y^2}{9}+\frac{x^2}{4}=c$ b) $\frac{y^2}{4}+\frac{x^2}{9}=c$ c) $\frac{y^2}{9}-\frac{x^2}{4}=c$ d) $y^2-\frac{x^2}{9}=c$

53. The differential equation which represents the family of plane curves $y=\exp(cx)$ is

a) $y'=cy$ b) $xy'-\log y=0$ c) $x\log y=yy'$ d) $y\log y=xy'$

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

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

55. The solution of $\frac{dy}{dx}+1=e^{x+y}$ is

a) $e^{-(x+y)}+x+c=0$ b) $e^{-(x+y)}-x+c=0$ c) $e^{x+y}+x+c=0$ d) $e^{x+y}-x+c=0$

56. The solution of $\frac{dy}{dx}=\left(\frac{y}{x}\right)^{1/3}$ is

a) $x^{2/3}+y^{2/3}=c$ b) $x^{1/3}+y^{1/3}=c$ c) $y^{2/3}-x^{2/3}=c$ d) $y^{1/3}-x^{1/3}=c$

57. The differential equation satisfied by the family of curves $y=ax\cos\left(\frac{1}{x}+b\right)$ where a,b are parameters is

a) $x^2y_2+y=0$ b) $x^4y_2+y=0$ c) $xy_2-y=0$ d) $x^4y_2-y=0$

58. The family of curves $y = e^{a \sin x}$, where a is an arbitrary constant, is represented by the differential equation

a) $\log y = \tan x \frac{dy}{dx}$ b) $y \log y = \tan x \frac{dy}{dx}$ c) $y \log y = \sin x \frac{dy}{dx}$ d) $\log y = \cos x \frac{dy}{dx}$

59. An integrating factor of the differential equation $(1 + y + x^2 y)dx + (x + x^3)dy = 0$ is

a) $\log x$ b) x c) e^x d) $\frac{1}{x}$

60. The equation of the curve satisfying the differential equation $y_2(x^2 + 1) = 2xy_1$ passing through the point (0,1) and having slope of tangent at $x = 0$ as 3 is

a) $y = x^3 + 3x + 1$ b) $y = x^3 - 3x + 1$ c) $y = x^2 + 3x + 1$ d) $y = x^2 - 3x + 1$

61. Solution of the differential equation $\frac{dy}{dx} + \frac{y}{x} = x^2$ is

a) $y = \frac{x^2}{4} + cx^{-2}$ b) $y = x^{-1} + cx^{-3}$ c) $y = \frac{x^3}{4} + cx^{-1}$ d) $xy = x^2 + c$

62. The solution of differential equation $(x + y)(dx - dy) = dx + dy$ is

a) $x - y = ke^{x-y}$ b) $x + y = ke^{x+y}$ c) $x + y = ke^{x-y}$ d) $(x - y) = ke^{x+y}$

63. The solution of the differential equation $\frac{dy}{dx} = (4x + y + 1)^2$, is

a) $(4x + y + 1) = \tan(2x + c)$ b) $(4x + y + 1)^2 = 2\tan(2x + c)$

c) $(4x + y + 1)^3 = 3\tan(2x + c)$ d) $(4x + y + 1) = 2\tan(2x + c)$

64. If $y = \left(x + \sqrt{1 + x}\right)^n$, then $(1 + x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx}$ is

a) $n^2 y$ b) $-n^2 y$ c) $-y$ d) $2x^2 y$

65. The solution of the differential equation $\frac{dy}{dx} = \frac{x-2y+1}{2x-4y}$ is

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

66. The integrating factor of the differential equation $\frac{dy}{dx} + y = \frac{1+y}{x}$, is

a) $\frac{x}{e^x}$ b) $\frac{e^x}{x}$ c) $x e^x$ d) e^x

67. The differential equation of all non-vertical lines in a plane is

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

68. Solution of the equation $x^2 y - x^3 \frac{dy}{dx} = y^4 \cos x$, when $y(0) = 1$ is

a) $y^3 = 3x^3 \sin x$ b) $x^3 = 3y^3 \sin x$ c) $x^3 = y^3 \sin x$ d) $x^3 = y^3 \cos x$

69. If $y(t)$ is a solution of $(1 + t)\frac{dy}{dt} - ty = 1$ and $y(0) = -1$, then $y(1)$ is equal to

a) $-\frac{1}{2}$ b) $e + \frac{1}{2}$ c) $e - \frac{1}{2}$ d) $\frac{1}{2}$

70. The solution of $(1 + x^2)\frac{dy}{dx} + 2xy - 4x^2 = 0$ is

a) $3x(1 + y^2) = 4y^3 + c$ b) $3y(1 + x^2) = 4x^3 + c$

c) $3x(1 - y^2) = 4y^3 + c$ d) $3y(1 + y^2) = 4x^3 + c$

71. The solution of the differential equation $y\,dx + (x + x^2 y)dy = 0$ is

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

72. The solution of $y\,dx - x\,dy + 3x^2 y^2 e^{x^3} dx = 0$ is

a) $\frac{x}{y} + e^{x^3} = C$ b) $\frac{x}{y} - e^{x^3} = 0$ c) $-\frac{x}{y} + e^{x^3} = C$ d) None of these

73. The differential equation of the family of curves $y = e^{2x}(a \cos x + b \sin x)$, where a and b are arbitrary constants, is given by

a) $y_2 - 4y_1 + 5y = 0$ b) $2y_2 - y_1 + 5y = 0$ c) $y_2 + 4y_1 - 5y = 0$ d) $y_2 - 2y_1 + 5y = 0$

74. $y = ae^{mx} + be^{-mx}$ satisfies which of the following differential equations

a) $\frac{dy}{dx}-my=0$ b) $\frac{dy}{dx}+my=0$ c) $\frac{d^2y}{dx^2}-m^2y=0$ d) None of these

75. The differential equation $\frac{d^2y}{dx^2}=2$ represents

a) A parabola whose axis is parallel to x-axis
b) A parabola whose axis is parallel to y-axis
c) A circle
d) None of the above

76. The general solution of the differential equation $\frac{dy}{dx}+\frac{1+\cos 2y}{1-\cos 2x}=0$ is given by

a) $\tan y+\cot x=c$ b) $\tan y-\cot x=c$ c) $\tan x-\cot y=c$ d) $\tan x+\cot y=c$

77. A particles moves in a straight line with a velocity given by $\frac{dx}{dt}=x+1$ (x is the distance described). The time taken by a particle to traverse a distance of 99 metres is

a) $\log_{10} e$ b) $2\log_e 10$ c) $2\log_{10} e$ d) $\frac{1}{2}\log_{10} e$

78. Integral curve satisfying $y'=\frac{x^2+y^2}{x^2-y^2}, y(1)=2$ has the slope at the point $(1, 0)$ of the curve is equal to

a) $-5/3$ b) -1 c) 1 d) $5/3$

79. The solution of the differential equation $(1+y^2)\tan^{-1}x\ dx+y(1+x^2)dy=0$ is

a) $\log\left(\frac{\tan^{-1}x}{x}\right)+y(1+x^2)=c$
b) $\log(1+y^2)+(\tan^{-1}x)^2=c$
c) $\log(1+x^2)+\log(\tan^{-1}y)+c$
d) $(\tan^{-1}x)(1+y^2)+c=0$

80. The differential equation of all non-horizontal lines in a plane is

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

81. The differential equation of the curve for which the initial ordinate of any tangent is equal to the corresponding subnormal, is

a) Non-linear
b) Homogeneous
c) In variable separable form
d) None of the above

82. The order and degree of the differential equation $\sqrt{\frac{dy}{dx}}-4\frac{dy}{dx}-7x=0$ are

a) 1 and 1/2 b) 2 and 1 c) 1 and 1 d) 1 and 2

83. The differential equation of the rectangular hyperbola whose axes are the asymptotes of the hyperbola, is

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

84. The differential equation of family of curves $x^2+y^2-2ax=0$, is

a) $x^2-y^2-2xy\,y'=0$ b) $y^2-x^2=2xy\,y'$ c) $x^2+y^2+2y''=0$ d) None of these

85. The general solution of the differential equation $\frac{dy}{dx}=\frac{(1+y^2)}{xy(1+x^2)}$ is

a) $(1+x^2)(1+y^2)=c$
b) $(1+x^2)(1+y^2)=cx^2$
c) $(1-x^2)(1-y^2)=c$
d) $(1+x^2)(1+y^2)=cy^2$

86. The equation of one of the curves whose slope at any point is equal to $y+2x$ is

a) $y=2(e^x+x-1)$ b) $y=2(e^x-x-1)$ c) $y=2(e^x-x+1)$ d) $y=2(e^x+x+1)$

87. The equation of the curve in which subnormal varies as the square of the ordinate is (λ is constant of proportionality)

a) $y=C\,e^{2\lambda x}$ b) $y=C\,e^{\lambda x}$ c) $\frac{y^2}{2}+\lambda x=C$ d) $y^2+\lambda x^2=C$

88. The general solution of $y^2dx+(x^2-xy+y^2)dy=0$ is

a) $\tan^{-1}\left(\frac{x}{y}\right)+\log y+c=0$
b) $2\tan^{-1}\left(\frac{x}{y}\right)+\log x+c=0$
c) $\log\left(y+\sqrt{x^2+y^2}\right)+\log y+c=0$
d) $\sin h^{-1}\left(\frac{x}{y}\right)+\log y+c=0$

89. The differential equation of all coaxial parabola $y^2 = 4a(x - b)$, where a and b are arbitrary constants, is

a) $y\frac{d^2y}{dx^2} + \frac{dy}{dx} = 1$ b) $y\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 = 1$ c) $y\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 = 0$ d) $y\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$

90. The order and degree of the differential equation

$5\left(\frac{d^2y}{dx^2}\right)^5 + 4\left(\frac{d^3y}{dx^3}\right)^2 + \left(\frac{dy}{dx}\right)^3 + 2y + x^3 = 0$ are respectively

a) (2,5)   b) (3,2)   c) (1,3)   d) (2,3)

91. The equation of the curve whose tangent at any point (x, y) makes an angle $\tan^{-1}(2x + 3y)$ with x-axis and which passes through (1,2) is

a) $6x + 9y + 2 = 26e^{3(x-1)}$ b) $6x - 9y + 2 = 26e^{3(x-1)}$

c) $6x + 9y - 2 = 26e^{3(x-1)}$ d) $6x - 9y - 2 = 26e^{3(x-1)}$

92. The solution of the equation $y - x\frac{dy}{dx} = a\left(y^2 + \frac{dy}{dx}\right)$ is

a) $y = c(x + a)(1 - ay)$ b) $y = c(x + a)(1 + ay)$

c) $y = c(x - a)(1 + ay)$ d) None of these

93. The solution of the differential equation $(1 + y^2) + \left(x - e^{\tan^{-1}y}\right)\frac{dy}{dx} = 0$ is

a) $2xe^{\tan^{-1}y} = e^{2\tan^{-1}y} + c$ b) $xe^{\tan^{-1}y} = {}^{\tan^{-1}y} + c$

c) $xe^{2\tan^{-1}y} = e^{\tan^{-1}y} + c$ d) $(x - 2) = ce^{-\tan^{-1}y}$

94. A function $y = f(x)$ has a second order derivative $f'' = 6(x - 1)$. If its graph passes through the point (2,1) and at point the tangent to the graph is $y = 3x - 5$ then the function is

a) $(x - 1)^2$ b) $(x - 1)^3$ c) $(x + 1)^3$ d) $(x + 1)^2$

95. The solution of $dy = \cos x\,(2 - y\,\mathrm{cosec}\,x)dx$, where $y = \sqrt{2}$, when $x = \pi/4$ is

a) $y = \sin x + \frac{1}{2}\mathrm{cosec}\,x$ b) $y = \tan(x/2) + \cot(x/2)$

c) $y = (1/\sqrt{2})\sec(x/2) + \sqrt{2}\cos(x/2)$ d) None of the above

96. The differential equation of the family of ellipse having major and minor axes respectively along the x and y-axes and the minor axis is equal to half of the major axis, is

a) $xy' - 4y = 0$ b) $4xy' + y = 0$ c) $4yy' + x = 0$ d) $yy' + 4x = 0$

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

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

98. The order of the differential equation $\frac{d^2y}{dx^2} = \sqrt{1 + \left(\frac{dy}{dx}\right)^3}$, is

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

99. The solution of $\frac{dy}{dx} + y\tan x = \sec x$ is

a) $y\sec x = \tan x + c$ b) $y\tan x = \sec x + c$ c) $\tan x = y\tan x + c$ d) $x\sec x = \tan y + c$

100. The solution of the differential equation $(x + y)^2\frac{dy}{dx} = a^2$ is

a) $(x + y)^2 = \frac{a^2x}{2} + c$ b) $(x + y)^2 = a^2x + c$

c) $(x + y)^2 = 2a^2x + c$ d) None of these

101. The differential equation of all 'Simple Harmonic Motions' of given period $\frac{2\pi}{n}$, is

a) $\frac{d^2x}{dt^2} + nx = 0$ b) $\frac{d^2x}{dt^2} + n^2x = 0$ c) $\frac{d^2x}{dt^2} - n^2x = 0$ d) $\frac{d^2x}{dt^2} + \frac{1}{n^2}x = 0$

102. The integrating factor of the differential equation $x\log x\frac{dy}{dx} + y = 2\log x$ is given by

a) e^x b) $\log x$ c) $\log(\log x)$ d) x

103. The solution of the differential equation $(x^2+y^2)dx = 2xy\,dy$ is (here c is an arbitrary constant)
a) $x^2+y^2=cy$ b) $c(x^2-y^2)=x$ c) $x^2-y^2=cy$ d) $x^2+y^2=cx$
104. The differential equation of all circles passing through the origin and having their centres on the x-axis is
a) $x^2=y^2+xy\frac{dy}{dx}$ b) $x^2=y^2+3xy\frac{dy}{dx}$ c) $y^2=x^2+2xy\frac{dy}{dx}$ d) $y^2=x^2-2xy\frac{dy}{dx}$
105. The integrating factor of the differential equation $\cos x\left(\frac{dy}{dx}\right)+y\sin x=1$ is
a) $\sec x$ b) $\tan x$ c) $\sin x$ d) $\cot x$
106. The solution of the differential equation $(x^2-yx^2)\frac{dy}{dx}+y^2+xy^2=0$ is
a) $\log\left(\frac{x}{y}\right)=\frac{1}{x}+\frac{1}{y}+c$ b) $\log\left(\frac{y}{x}\right)=\frac{1}{x}+\frac{1}{y}+c$
c) $\log(xy)=\frac{1}{x}+\frac{1}{y}+c$ d) $\log(xy)+\frac{1}{x}+\frac{1}{y}=c$
107. The order of the differential equation of all tangent lines to the parabola $y=x^2$ is
a) 1 b) 2 c) 3 d) 4
108. The solution of $\frac{dv}{dt}+\frac{k}{m}v=-g$ is
a) $v=c\,e^{-\frac{k}{m}t}-\frac{mg}{k}$ b) $v=c-\frac{mg}{k}e^{-\frac{k}{m}t}$ c) $ve^{-\frac{k}{m}t}=c-\frac{mg}{k}$ d) $v\,e^{\frac{k}{m}t}=c-\frac{mg}{k}$
109. The differential equation of the family of parabola with focus as the origin and the axis as x-axis, is
a) $y\left(\frac{dy}{dx}\right)^2+4x\frac{dy}{dx}=4y$ b) $-y\left(\frac{dy}{dx}\right)^2=2x\frac{dy}{dx}-y$
c) $y\left(\frac{dy}{dx}\right)^2+y=2xy\frac{dy}{dx}$ d) $y\left(\frac{dy}{dx}\right)^2+2xy\frac{dy}{dx}+y=0$
110. The solution of $e^{dy/dx}=(x+1), y(0)=3$ is
a) $y=x\log x-x+2$ b) $y=(x+1)\log|x+1|-x+3$
c) $y=(x+1)\log|x+1|+x+3$ d) $y=x\log x+x+3$
111. The differential equation of all ellipses centred at the origin is
a) $y_2+x\,y_1^2-y\,y_1=0$
b) $xy\,y_2+x\,y_1^2-y\,y_1=0$
c) $y\,y_2+x\,y_1^2-x\,y_1=0$
d) None of these
112. The solution of $\frac{dy}{dx}+y=e^{-x}, y(0)=0$, is
a) $y=e^{-x}(x-1)$ b) $y=xe^{-x}$ c) $y=xe^{-x}+10$ d) $y=(x+1)e^{-x}$
113. The solution of $x\,dy-y\,dx+x^2e^x dx=0$ is
a) $\frac{y}{x}+e^x=c$ b) $\frac{x}{y}+e^x=c$ c) $x+e^y=c$ d) $y+e^x=c$
114. The solution of $\log\left(\frac{dy}{dx}\right)=ax+by$ is
a) $\frac{e^{by}}{b}=\frac{e^{ax}}{a}+c$ b) $\frac{e^{-by}}{-b}=\frac{e^{ax}}{a}+c$ c) $\frac{e^{-by}}{a}=\frac{e^{ax}}{b}+c$ d) None of these
115. The general solution of $\frac{dy}{dx}=\frac{2x-y}{x+2y}$ is
a) $x^2-xy+y^2=c$ b) $x^2-xy-y^2=c$ c) $x^2+xy-y^2=c$ d) $x^2+xy^2=c$
116. The degree of the differential equation $2\left(\frac{d^2y}{dx^2}\right)+3\left(\frac{dy}{dx}\right)^2+4y^{3.}=x$, is
a) 0 b) 1 c) 2 d) 3
117. The order and degree of the differential equation $\left(1+4\frac{dy}{dx}\right)^{2/3}=4\frac{d^2y}{dx^2}$ are respectively

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

118. The equation of curve passing through the point $\left(1, \frac{\pi}{4}\right)$ and having slope of tangent at any point (x, y) as $\frac{y}{x} - \cos^2\left(\frac{y}{x}\right)$, is

a) $x = e^{1+\tan\left(\frac{y}{x}\right)}$ b) $x = e^{1-\tan\left(\frac{y}{x}\right)}$ c) $x = e^{1+\tan\left(\frac{x}{y}\right)}$ d) $x = e^{1-\tan\left(\frac{x}{y}\right)}$

119. If $y = a\sin(5x + c)$, then

a) $\frac{dy}{dx} = 5y$ b) $\frac{dy}{dx} = -5y$ c) $\frac{d^2y}{dx^2} = -25y$ d) $\frac{d^2y}{dx^2} = 25y$

120. The degree of the differential equation satisfying the relation $\sqrt{1+x^2} + \sqrt{1+y^2} = \lambda\left(x\sqrt{1+y^2} - y\sqrt{1+x^2}\right)$, is

a) 1 b) 2 c) 3 d) None of these

121. The degree of the equation $e^x + \sin\left(\frac{dy}{dx}\right) = 3$ is

a) 2 b) 0

c) Degree is not defined d) 1

122. The solution of $\frac{dy}{dx} = \frac{ax+h}{by+k}$ represents a parabola, when

a) $a = 0, b = 0$ b) $a = 1, b = 2$ c) $a = 0, b \neq 0$ d) $a = 2, \ b = 1$

123. The solution of the differential equation $\frac{dy}{dx} = \frac{xy+y}{xy+x}$ is

a) $x + y = \log\left(\frac{cy}{x}\right)$ b) $x + y = \log(cxy)$ c) $x - y = \log\left(\frac{cx}{y}\right)$ d) $y - x = \log\left(\frac{cx}{y}\right)$

124. If $y = ax^{n+1}$, then $x^2 \ \frac{d^2y}{dx^2}$ is equal to

a) $n(n-1)$ b) $n(n+1)y$ c) ny d) n^2y

125. The general solution of the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 2e^{3x}$ is given by

a) $y = (c_1 + c_2x)\, e^x + \frac{e^{3x}}{8}$ b) $y = (c_1 + c_2x)e^{-x} + \frac{e^{-3x}}{8}$

c) $y = (c_1 + c_2x)e^{-x} + \frac{e^{3x}}{8}$ d) $y = (c_1 + c_2x)e^x + \frac{e^{-3x}}{8}$

126. Solution of the differential equation $xdy - ydx = 0$ represents a

a) Parabola b) Circle c) Hyperbola d) Straight line

127. A curve $y = f(x)$ passes through the point $P(1,1)$. The normal to the curve at point P is $a(y-1) + (x-1) = 0$. If the slope of the tangent at any point on the curve is proportional to the ordinate at that point, then the equation of the curve is

a) $y = e^{ax} - 1$ b) $y = e^{ax} + 1$ c) $y = e^{ax} - a$ d) $y = e^{a(x-1)}$

128. The solution of $\frac{dy}{dx} + y\tan x = \sec x$ is

a) $y\sec x = \tan x + c$ b) $y\tan x = \sec x + c$ c) $\tan x = y\tan x + c$ d) $x\sec x = y\tan y + c$

129. The solution of the differential equation $\frac{dy}{dx} = e^{y+x} + e^{y-x}$ is

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

130. The order and degree of the differential equation $\frac{d^2y}{dx^2} = \sqrt[3]{1 - \left(\frac{dy}{dx}\right)^4}$ are respectively

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

131. The solution of the differential equation $\frac{dy}{dx} = y\tan x - 2\sin x$, is

a) $y\sin x = c + \sin 2x$ b) $y \ \cos x = c + \frac{1}{2}\sin 2x$

c) $y\cos x = c - \sin 2x$ d) $y\cos x = c + \frac{1}{2}\cos 2x$

132. General solution of the differential equation $\frac{dy}{dx}=\frac{x+y+1}{x+y-1}$ is given by

a) $x+y=\log|x+y|+c$
b) $x-y=\log|x+y|+c$
c) $y=x+\log|x+y|+c$
d) $y=x\log|x+y|+c$

133. The differential equation of the family of lines whose slope is equal to y-intercept, is

a) $(x+1)\frac{dy}{dx}-y=0$
b) $(x+1)\frac{dy}{dx}+y=0$
c) $\frac{dy}{dx}=\frac{x-1}{y-1}$
d) $\frac{dy}{dx}=\frac{x+1}{y+1}$

134. The order and degree of the differential equation $\sqrt{\sin x}\,(dx+dy)=\sqrt{\cos x}\,(dx-dy)$ are

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

135. The solution of the differential equation $(3xy+y^2)dx+(x^2+xy)dy=0$ is

a) $x^2(2xy+y^2)=c^2$ b) $x^2(2xy-y^2)=c^2$ c) $x^2(y^2-2xy)=c^2$ d) None of these

136. The solution of $\frac{dy}{dx}+y=e^{-x}, y(0)=0$ is

a) $y=e^{-x}(x-1)$ b) $y=xe^{x}$ c) $y=xe^{-x}+1$ d) $y=xe^{-x}$

137. The solution of the differential equation $x\frac{dy}{dx}+2y=x^2$ is

a) $y=\frac{x^2+c}{4x^2}$ b) $y=\frac{x^2}{4}+c$ c) $y=\frac{x^4+c}{x^2}$ d) $y=\frac{x^4+c}{4x^2}$

138. The integrating factor of the differential equation $(y\log y)dx=(\log y-x)dy\ is$

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

139. The differential equation of the family of parabolas with focus at the origin and the x-axis as axis, is

a) $y\left(\frac{dy}{dx}\right)^2+4x\frac{dy}{dx}=4y$
b) $-y\left(\frac{dy}{dx}\right)^2=2x\frac{dy}{dx}-y$
c) $y\left(\frac{dy}{dx}\right)^2+y=2xy\frac{dy}{dx}$
d) $y\left(\frac{dy}{dx}\right)^2+2xy\frac{dy}{dx}+y=0$

140. The differential equation of the family of curves $y=a\cos(x+b)$ is

a) $\frac{d^2y}{dx^2}-y=0$ b) $\frac{d^2y}{dx^2}+y=0$ c) $\frac{d^2y}{dx^2}+2y=0$ d) None of these

141. The differential equation of all straight lines passing through origin is

a) $y=\sqrt{x}\frac{dy}{dx}$ b) $\frac{dy}{dx}=y+x$ c) $\frac{dy}{dx}=y-x$ d) None of these

142. Solution of $\frac{dy}{dx}=3^{x+y}$ is

a) $3^{x+y}=c$ b) $3^x+3^y=c$ c) $3^{x-y}=c$ d) $3^x+3^{-y}=c$

143. The differential equation of all circles in the first quadrant which touch the coordinate axes is of order

a) 1 b) 2 c) 3 d) None of these

144. The differential equation $y\frac{dy}{dx}+x=c$ represents

a) A family of hyperbolas
b) A family of circles whose centres are on the y-axis
c) A family of parabolas
d) A family of circles whose centres are on the x-axis

145. The order of the differential equation $\frac{d^2y}{dx^2}=\sqrt{1+\left(\frac{dy}{dx}\right)^2}$ is

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

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

a) 2, 2 b) 2, 3 c) 2, 1 d) None of these

147. The equation of the curve passing through the origin and satisfying the differential equation $(1+x^2)\frac{dy}{dx}+2xy=4x^2$ is

a) $(1+x^2)y=x^3$ b) $2(1+x^2)y=3\,x^3$ c) $3(1+x^2)y=4\,x^3$ d) None of these

148. An integrating factor of the differential equation $(1-x^2)\frac{dy}{dx}-xy=1$ is

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

149. If c is an arbitrary constant, then the general solution of the differential equation $y\,dx-x\,dy=xy\,dx$ is given by

a) $y=cxe^{-x}$ b) $y=cye^{-x}$ c) $y+e^x=cx$ d) $ye^x=cx$

150. The differential equation $(e^x+1)y\,dy=(y+1)e^x\,dx$, has the solution

a) $(y-1)(e^x-1)=ce^y$ b) $(y-1)(e^x+1)=ce^y$
c) $(y+1)(e^x-1)=ce^y$ d) $(y+1)(e^x+1)=ce^y$

151. The solution of the differential equation $\sec^2 x\tan y\ dx+\sec^2 y\tan x\ dy=0$ is

a) $\tan y\tan x=c$ b) $\frac{\tan y}{\tan x}=c$ c) $\frac{\tan^2 x}{\tan y}=c$ d) None of these

152. The order of the differential equation whose solution is $y=a\cos x+b\sin x+ce^{-x}$, is

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

153. The differential equation representing the family of curves $y^2=2c(x+\sqrt{c})$, where $c>0$ is a parameter is of order and degree as follows

a) Order 2, degree 2 b) Order 1, degree 3 c) Order 1, degree 1 d) Order 1, degree 2

154. The solution of the differential equation $\left\{\frac{1}{x}-\frac{y^2}{(x-y)^2}\right\}dx+\left\{\frac{x^2}{(x-y)^2}-\frac{1}{y}\right\}dy=0$ is

a) In $\left|\frac{x}{y}\right|+\frac{xy}{(x-y)}=c$ b) In $|\,xy\,|+\frac{xy}{(x-y)}=c$ c) $\frac{xy}{(x-y)}=ce^{x/y}$ d) $\frac{xy}{(x-y)}=ce^{xy}$ (where c is arbitrary constant)

155. Form of the differential equation of all family of lines $y=mx+\frac{4}{m}$ by eliminating the arbitrary constant m is

a) $\frac{d^2y}{dx^2}=0$ b) $x\left(\frac{dy}{dx}\right)^2-y\frac{dy}{dx}+4=0$
c) $x\left(\frac{dy}{dx}\right)^2+y\frac{dy}{dx}+4=0$ d) $\frac{dy}{dx}=0$

156. The order of the differential equation whose general solution is given by $y=(c_1+c_2)\cos(x+c_3)-c_4e^{x+c_5}$ where $c_1,c_2,c_3,c_4$and c_5 are arbitrary constants is

a) 5 b) 6 c) 3 d) 2

157. The equation of the curve through the point (3, 2) and whose slope is $\frac{x^2}{y+1}$, is

a) $\frac{y^2}{2}+y=\frac{x^3}{3}+5$ b) $y+y^2-x^3-21$ c) $y^2+2y=\frac{2x^3}{3}-10$ d) $\frac{y^2}{2}+y=\frac{x^3}{3}-5$

158. The order of differential equation whose general solution is given by $y=c_1e^{2x+c_2}+c_3e^x+c_4\sin(x+c_5)$ is

a) 5 b) 4 c) 3 d) 2

159. A curve passes through the point $(0,1)$ and the gradient at (x,y) on it is $y(xy-1)$. The equation of the curve is

a) $y(x-1)=1$ b) $y(x+1)=1$ c) $x(y+1)=1$ d) $x(y-1)=1$

160. Solution of $x\frac{dy}{dx}+y=x\,e^x$, is

a) $xy=e^x(x+1)+C$ b) $xy=e^x(x-1)+C$ c) $xy=e^x(1-x)+C$ d) $xy=e^y(y-1)+C$

161. An integrating factor of the differential equation

$x+\frac{dy}{dx}+y\log x=xe^x x^{-\frac{1}{2}\log x}$, $(x,0)$ is

a) $x^{\log x}$ b) $(\sqrt{x})^{\log x}$ c) $(\sqrt{e})^{(\log x)^2}$ d) e^{x^2}

162. If $x^2+y^2=1$, then $\left(y'=\frac{dy}{dx}, y''=\frac{d^2y}{dx^2}\right)$

a) $yy''-(2y')^2+1=0$ b) $yy''+(y')^2+1=0$ c) $y''-(y')^2-1=0$ d) $y''+2(y')^2+1=0$

163. If $\frac{dy}{dx}=\frac{y+x\tan\frac{y}{x}}{x}$, then $\sin\frac{y}{x}$ is equal to

a) cx^2 b) cx c) cx^3 d) cx^4

164. The solution of the differential equation $\frac{dy}{dx}=\frac{x+y}{x}$ satisfying the condition $y(1)=1$ is

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

165. The differential equation of the family $y=ae^x+bx\,e^x+cx^2\,e^x$ of curves, where a,b,c are arbitrary constants, is

a) $y'''+3y''+3y'+y=0$ b) $y'''+3y''-3y'-y=0$

c) $y'''-3y''-3y'+y=0$ d) $y'''-3y'+3y'-y=0$

166. For solving $\frac{dy}{dx}=4x+y+1$, suitable substitution is

a) $y=vx$ b) $y=4x+v$ c) $y=4x$ d) $y+4x+1=v$

167. The integrating factor of the differential equation $\frac{dy}{dx}+\frac{y}{(1-x)\sqrt{x}}=1-\sqrt{x}$ is

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

168. The solution of differential equation $(\sin x+\cos x)dy+(\cos x-\sin x)dx=0$ is

a) $e^x(\sin x+\cos x)+c=0$ b) $e^y(\sin x+\cos x)=c$

c) $e^y(\cos x-\sin x)=c$ d) $e^x(\sin x-\cos x)=c$

169. If $y'=\frac{x-y}{x+y}$, then its solution is

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

170. The differential equation obtained by eliminating the arbitrary constants a and b from $xy=ae^x+be^{-x}$ is

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

c) $x\frac{d^2y}{dx^2}+2\frac{dy}{dx}+xy=0$ d) $\frac{d^2y}{dx^2}+\frac{dy}{dx}-xy=0$

171. The solution of the differential equation $x\frac{dy}{dx}+y=x\cos x+\sin x$, given that $y=1$ when $x=\frac{\pi}{2}$, is

a) $y=\sin x-\cos x$ b) $y=\cos x$ c) $y=\sin x$ d) $y=\sin x+\cos x$

172. 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) $\phi\left(\frac{y}{x}\right)=ky$

173. If $\frac{dy}{dx}=1+x+y+xy$ and $y(-1)=0$, then the function y is

a) $e^{(1-x)^2/2}$ b) $e^{(1+x)^2/2}-1$ c) $\log_e(1+x)-1$ d) $(1+x)$

174. 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). The equation of the curve is

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

175. The solution of $\frac{dy}{dx}+1=\text{cosec}\,(x+y)$ is

a) $\cos(x+y)+x=c$ b) $\cos(c+y)=c$

c) $\sin(x+y)+x=c$ d) $\sin(x+y)+\sin(x+y)=c$

176. Order of the differential equation of the family of all concentric circles centred at (h,k) is
a) 1 b) 2 c) 3 d) 4

177. $\tan^{-1}x+\tan^{-1}y=C$ is the general solution of the differential equation
a) $\frac{dy}{dx}=\frac{1+y^2}{1+x^2}$
b) $\frac{dy}{dx}=\frac{1+x^2}{1+y^2}$
c) $(1+x^2)dy+(1+y^2)dx=0$
d) $\frac{dy}{dx}=\frac{1-y^2}{1-x^2}$

178. A normal is drawn at a $P(x,y)$ of a curve. It meets the x-axis at Q. if PQ is of constant length k, then the differential equation describing such a curve is
a) $y\frac{dy}{dx}=\pm\sqrt{k^2-y^2}$ b) $x\frac{dy}{dx}=\pm\sqrt{k^2-x^2}$ c) $y\frac{dy}{dx}=\pm\sqrt{y^2-k^2}$ d) $x\frac{dy}{dx}=\pm\sqrt{x^2-k^2}$

179. If $\frac{dy}{dx}=e^{-2y}$ and $y=0$ when $x=5$, the value of x and $y=3$ is
a) e^5 b) e^6+1 c) $\frac{e^6+9}{2}$ d) $\log_e 6$

180. Let F denotes the family of ellipses whose centre is at the origin and major axis is the y-axis. Then, equation of the family F is
a) $\frac{d^2y}{dx^2}+\frac{dy}{dx}\left(x\frac{dy}{dx}-y\right)=0$ b) $xy\frac{d^2y}{dx^2}-\frac{dy}{dx}\left(x\frac{dy}{dx}-y\right)=0$
c) $xy\frac{d^2y}{dx^2}+\frac{dy}{dx}\left(x\frac{dy}{dx}-y\right)=0$ d) $\frac{d^2y}{dx^2}-\frac{dy}{dx}\left(x\frac{dy}{dx}-y\right)=0$

181. The order and degree of the differential equation $\left(1+\left(\frac{dy}{dx}\right)^2\right)^{3/4}=\left(\frac{d^2y}{dx^2}\right)^{1/3}$ is
a) (2,4) b) (2,3) c) (6,4) d) (6,9)

182. The differential equation $\cot y\,dx=x\,dy$ has a solution of the form
a) $y=\cos x$ b) $x=c\sec y$ c) $x=\sin y$ d) $y=\sin x$

183. The real value of n for which the substitution $y=u^n$ will transform the differential equation $2x^4y\frac{dy}{dx}+y^4=4x^6$ into a homogenous equation is
a) 1/2 b) 1 c) 3/2 d) 2

184. The general solution $e^x\cos y\ dx-e^x\sin y\ dy=0$, is
a) $e^x(\sin y+\cos y)=C$ b) $e^x\sin y=C$ c) $e^x=C\cos y$ d) $e^x\cos y=C$

185. The solution of the differential equation $\frac{x+y\frac{dy}{dx}}{y-x\frac{dy}{dx}}=x^2+2y^2+\frac{y^4}{x^2}$ is
a) $\frac{y}{4}+\frac{1}{x^2+y^2}=c$ b) $\frac{y}{x}-\frac{1}{x^2+y^2}=c$ c) $\frac{x}{y}-\frac{1}{x^2+y^2}=c$ d) None of these

186. The equation of curve through point (1,0) which satisfies the differential equation $(1+y^2)dx-xy\,dy=0$ is
a) $x^2+y^2=4$ b) $x^2-y^2=1$ c) $2x^2+y^2=2$ d) None of these

187. A curve having the condition that the slope of tangent at some point is two times the slope of the straight line joining the same point to the origin of coordinates, is a/an
a) Circle b) Ellipse c) Parabola d) Hyperbola

188. If $x=A\cos 4t+B\sin 4t$, then $\frac{d^2x}{dt^2}$ is equal to
a) $-16x$ b) $16x$ c) x d) $-x$

189. The curve in which the slope of the tangent at any point equals the ratio of the abscissa to the ordinate of the point is

a) An ellipse
b) A parabola
c) A rectangular hyperbola
d) A circle

190. The integrating factor of the differential equation $\frac{dy}{dx}+\frac{1}{x}.y=3x$ is

a) x b) $\ln x$ c) 0 d) ∞

191. The solution of $\frac{dy}{dx}=\cos(x+y)+\sin(x+y)$ is

a) $\log\left[1+\tan\left(\frac{x+y}{2}\right)\right]+c=0$
b) $\log\left[1+\tan\left(\frac{x+y}{2}\right)\right]=x+c$
c) $\log\left[1-\tan\left(\frac{x+y}{2}\right)\right]=x+c$
d) None of these

192. $y+x^2=\frac{dy}{dx}$ has the solution

a) $y+x^2+2x+2=ce^x$
b) $y+x+x^2+2=ce^{2x}$
c) $y+x+2x^2+2=ce^x$
d) $y^2+x+x^2+2=ce^x$

193. An integrating factor of the differential equation $x\frac{dy}{dx}+y\log x=xe^x x^{-\frac{1}{2}\log x},(x>0)$, is

a) $x^{\log x}$ b) $(\sqrt{x})^{\log x}$ c) $(\sqrt{e})^{(\log x)^2}$ d) e^{x^2}

194. The order and degree of the following differential equation $\left[1+\left(\frac{dy}{dx}\right)^2\right]^{5/2}=\frac{d^3y}{dx^3}$ are respectively

a) 3,2 b) 3,10 c) 2,3 d) 3,5

195. The order of the differential equation of all circles of radius r, having centre on y −axis and passing through the origin, is

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

196. If c_1,c_2,c_3,c_4,c_5 and c_6 are constants, then the order of the differential equation whose general solution is given by
$y=c_1\cos(x+c_2)+c_3\sin(x+c_4)+c_5e^x+c_6$ is

a) 6 b) 5 c) 4 d) 3

197. The differential equation for the family of curves $x^2+y^2-2ay=0$, where a is an arbitrary constant, is

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

198. The solution of the differential equation $y_1y_3=3y_2^2$ is

a) $x=A_1y^2+A_2y+A_3$ b) $x=A_1y+A_2$ c) $x=A_1y^2+A_2y$ d) None of these

199. The equation of the curve satisfying the equation $(xy-x^2)\frac{dy}{dx}=y^2$ and passing through the point $(-1,1)$ is

a) $y=(\log y-1)x$ b) $y=(\log y+1)x$ c) $x=(\log x-1)y$ d) $x=(\log x+1)y$

200. The solution of the differential equation $y'=1+x+y^2+xy^2, y(0)=0$ is

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

201. If $\frac{dy}{dx}=\frac{xy}{x^2+y^2}, y(1)=1$, then one of the values of x_0 satisfying $y(x_0)=e$ is given by

a) $e\sqrt{2}$ b) $e\sqrt{3}$ c) $e\sqrt{5}$ d) $e/\sqrt{2}$

202. The solution of $\frac{dy}{dx}+2y\tan x=\sin x$, is

a) $y\sec^3 x=\sec^2 x+C$ b) $y\sec^2 x=\sec x+C$ c) $y\sin x=\tan x+C$ d) None of these

203. The differential equation for which $\sin^{-1}x+\sin^{-1}y=c$ is given by

a) $\sqrt{1-x^2}dy+\sqrt{1-y^2}dx=0$ b) $\sqrt{1-x^2}\,dx+\sqrt{1-y^2}\,dy=0$

c) $\sqrt{1-x^2}\,dx-\sqrt{1-y^2}\,dy=0$ d) $\sqrt{1-x^2}\,dy-\sqrt{1-y^2}\,dx=0$

204. The differential equation of all parabolas whose axes are parallel to y-axis, is

a) $\frac{d^3y}{dx^3}=0$ b) $\frac{d^2x}{dy^2}=c$ c) $\frac{d^3y}{dx^3}+\frac{d^2x}{dy^2}=0$ d) $\frac{d^2y}{dx^2}+2\frac{dy}{dx}=c$

205. The solution of the differential equation $\frac{dy}{dx}=\frac{1}{x^2+y^2}$ is

a) $y=-x^2-2x-2+ce^x$ b) $y=x^2+2x+2-ce^x$

c) $x=-y^2-2y+2-ce^y$ d) $x=-y^2-2y-2+ce^y$

206. If $y=y(x)$ and $\frac{2+\sin x}{y+1}\left(\frac{dy}{dx}\right)=-\cos x,y(0)=1$, then $y\left(\frac{\pi}{2}\right)$ equals

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

207. The degree of the differential equation corresponding to the family of curves $y=a(x+a)^2$, where a is an arbitrary constant is

a) 1 b) 2 c) 3 d) None of these

208. If $x=A\cos 4t+B\sin 4t$, then $\frac{d^2x}{dt^2}$ is equal to

a) $-16\,x$ b) $16\,x$ c) x d) $-x$

209. The differential equation for which $\sin^{-1}x+\sin^{-1}y=c$, is given by

a) $\sqrt{1-x^2}dx+\sqrt{1-y^2}dy=0$ b) $\sqrt{1-x^2}dy+\sqrt{1-y^2}dx=0$

c) $\sqrt{1-x^2}dy-\sqrt{1-y^2}dx=0$ d) $\sqrt{1-x^2}dx-\sqrt{1-y^2}dy=0$

210. The solution of $\frac{dy}{dx}-y=1,y(0)=1$ is given by $y(x)=$

a) $-\exp(x)$ b) $-\exp(-x)$ c) -1 d) $2\exp(x)-1$

211. If $x\frac{dy}{dx}=y(\log y-\log x+1)$, then the solution of the equation is

a) $\log\left(\frac{x}{y}\right)=cy$ b) $\log\left(\frac{y}{x}\right)=cx$ c) $x\log\left(\frac{y}{x}\right)=cy$ d) $y\log\left(\frac{x}{y}\right)=cx$

212. The differential equation of the family of circles with fixed radius 5 unit and centre on the line $y=2$, is

a) $(x-2)^2y'^2=25-(y-2)^2$ b) $(x-2)y'^2=25-(y-2)^2$

c) $(y-2)y'^2=25-(y-2)^2$ d) $(y-2)^2y'^2=25-(y-2)^2$

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

a) $xy=c$ b) $x+y=c$ c) $\log x\log y=c$ d) $x^2+y^2=c$

214. The solution of the differential equation $x\,dy-y\,dx=\sqrt{x^3+y^2}\,dx$, is

a) $x+\sqrt{x^2+y^2}=Cx^2$ b) $y-\sqrt{x^2+y^2}=Cx$ c) $x-\sqrt{x^2+y^2}=Cx$ d) $y+\sqrt{x^2+y^2}=Cx^2$

215. If $\phi(x)=\phi'(x)$ and $\phi(1)=2$, then $\phi(3)$ equals

a) e^2 b) $2\,e^2$ c) $3\,e^2$ d) $2\,e^3$

216. The differential equation whose solution is $(x-h)^2+(y-k)^2=a^2$ is (a is a constant)

a) $\left[1+\left(\frac{dy}{dx}\right)^2\right]^3=a^2\frac{d^2y}{dx^2}$

b) $\left[1+\left(\frac{dy}{dx}\right)^2\right]^3=a^2\left(\frac{d^2y}{dx^2}\right)^2$

c) $\left[1+\left(\frac{dy}{dx}\right)\right]^3 = a^2\left(\frac{d^2y}{dx^2}\right)^2$

d) None of these

217. The order of the differential equation associated with the primitive $y = c_1 + c_2e^x + c_3e^{-2x+c_4}$, where c_1, c_2, c_3, c_4 are arbitrary constants, is

a) 3 b) 4 c) 2 d) None of these

218. The general solution of $ydx - xdy - 3x^2\,y^2\,e^{x^3}dx = 0$, is equal to

a) $\frac{x}{y} = e^{x^3} + C$ b) $\frac{y}{x} = e^{x^3} + C$ c) $xy = e^{x^3} + C$ d) $xy = e^x + C$

219. The differential equation of all parabolas having their axis of symmetry coinciding with the axis of X, is

a) $y\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 = 0$ b) $x\frac{d^2x}{dy^2} + \left(\frac{dx}{dy}\right)^2 = 0$ c) $y\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$ d) None of these

220. If $dx + dy = (x+y)(dx - dy)$, then $\log(x+y)$ is equal to

a) $x + y + c$ b) $x + 2y + c$ c) $x - y + c$ d) $2x + y + c$

221. The order of the differential equation whose general solution is given by $y = (c_1 + c_2)\cos(x + c_3) - c_4e^{x+c_5}$ where c_1, c_2, c_3, c_4, c_5 are arbitrary constants, is

a) 4 b) 3 c) 2 d) 5

222. The solution of $\frac{dy}{dx} = \left(\frac{y}{x}\right)^{1/3}$, is

a) $x^{2/3} + y^{2/3} = C$ b) $x^{1/3} + y^{1/3} = C$ c) $y^{2/3} - x^{2/3} = C$ d) $y^{1/3} - x^{1/3} = C$

223. The solution of the differential equation $\frac{dy}{dx} = \frac{x-y+3}{2(x-y)+5}$ is

a) $2(x-y) + \log(x-y) = x + c$

b) $2(x-y) - \log(x-y+2) = x + c$

c) $2(x-y) + \log(x-y+2) = x + c$

d) None of the above

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

a) Straight lines b) Circles c) Parabola d) Ellipse

225. The solution of differential equation $y - x\frac{dy}{dx} = a\left(y^2 + \frac{dy}{dx}\right)$ is

a) $(x+a)(x+ay) = cy$

b) $(x+a)(1-ay) = cy$

c) $(x+a)(1-ay) = -cy$

d) None of these

226. The differential equation of all circles of radius a is of order

a) 2 b) 3 c) 4 d) None of these

227. The equation of family of a curve is $y^2 = 4a(x+a)$ then differential equation of the family is

a) $y = y' + x$ b) $y = y'' + x$ c) $y = 2y'x + yy'^2$ d) $y'' + y' + y^2 = 0$

228. The solution of $\frac{dy}{dx} = 1 + y + y^2 + x + xy + xy^2$ is

a) $\tan^{-1}\left(\frac{2y+1}{\sqrt{3}}\right) = x + x^2 + c$

b) $4\tan^{-1}\left(\frac{4y+1}{\sqrt{3}}\right) = \sqrt{3}(2x + x^2) + c$

c) $\sqrt{3}\tan^{-1}\left(\frac{3y+1}{3}\right) = 4\,(1 + x + x^2) + c$

d) $4\tan^{-1}\left(\frac{2y+1}{\sqrt{3}}\right) = \sqrt{3}(2x + x^2) + c$

229. The degree of the differential equations $x = 1 + \left(\frac{dy}{dx}\right) + \frac{1}{2!}\left(\frac{dy}{dx}\right)^2 + \frac{1}{3!}\left(\frac{dy}{dx}\right)^3 + \cdots$

a) 3 b) 2 c) 1 d) Not defined

230. The solution of the equation $\frac{d^2y}{dx^2} = e^{-2x}$ is

a) $\frac{e^{-2x}}{4}$ b) $\frac{e^{-2x}}{4} + cx + d$ c) $\frac{1}{4}\,e^{-2x} + cx^2 + d$ d) $\frac{1}{4}\,e^{-2x} + c + d$

231. The differential equation representing the family of curves $y^2 = 2c(x + c^{2/3})$, where c is a positive parameter, is of

a) Order 3, degree 3 b) Order 2, degree 4 c) Order 1, degree 5 d) Order 5, degree 1

232. The order of differential equation of all parabolas having directrix parallel to x-axis is

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

233. Degree of differential equation $e^{dy/dx} = x$ is

a) 1 b) 2 c) 3 d) None of these

234. The solution of the differential equation $xy^2 dy - (x^3 + y^3)dx = 0$ is

a) $y^3 = 3x^3 + c$ b) $y^3 = 3x^3 \log(cx)$ c) $y^3 = 3x^3 + \log(cx)$ d) $y^3 + 3x^3 = \log(cx)$

235. The solution of the differential equation $x\,dy - y\,dx - \sqrt{x^2 - y^2}\,dx = 0$ is

a) $y - \sqrt{x^2 + y^2} = cx^2$ b) $y + \sqrt{x^2 + y^2} = cx^2$

c) $y + \sqrt{x^2 + y^2} = cy^2$ d) $x - \sqrt{x^2 + y^2} = cy^2$

236. The solution of the differential equation $\frac{dy}{dx} = \frac{x \log x^2 + x}{\sin y + y \cos y}$, is

a) $y \sin y = x^2 \log x + C$

b) $y \sin y = x^2 + C$

c) $y \sin y = x^2 + \log x + C$

d) $y \sin y = x \log x + C$

237. The solution of differential equation $t = 1 + (ty)\frac{dy}{dt} + \frac{(ty)^2}{2!}\left(\frac{dy}{dx}\right)^2 + \ldots\infty$ is

a) $y = \pm\sqrt{(\log t)^2 + c}$ b) $ty = t^y + c$ c) $y = \log t + c$ d) $y = (\log t)^2 + c$

238. The differential equation of the family of the curves $x^2 + y^2 - 2ax = 0$ is

a) $x^2 - y^2 - 2xy'' = 0$ b) $y^2 - x^2 = 2xyy'$

c) $x^2 + y^2 + 2y'' = 0$ d) None of these

239. The solution of differential equation $\frac{dt}{dx} = \frac{t\left(\frac{d}{dx}(g(x))\right) - t^2}{g(x)}$ is

a) $t = \frac{g(x) + c}{x}$ b) $t = \frac{g(x)}{x} + c$ c) $t = \frac{g(x)}{x + c}$ d) $t = g(x) + x + c$

240. The degree of the differential equation $y_3^{2/3} + 2 + 3y_2 + y_1 = 0$, is

a) 1 b) 2 c) 3 d) None of these

241. If integrating factor of $x(1 - x^2)dy + (2x^2 y - y - ax^3)dx = 0$ is $e^{\int P dx}$, then P is equal to

a) $\frac{2x^2 - ax^3}{x(1 - x^2)}$ b) $2x^2 - 1$ c) $\frac{2x^2 - 1}{ax^3}$ d) $\frac{2x^2 - 1}{x(1 - x^2)}$

242. The solution of the differential equation $\frac{dy}{dx} + \frac{2x}{1 + x^2} . y = \frac{1}{(1 + x^2)^2}$ is

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

c) $y(1 + x^2)^2 = \tan^{-1} x + c$ d) $y(1 - x^2)^2 = \tan^{-1} x + c$

243. The solution of the equation $x^2 \frac{d^2 y}{dx^2} = \log x$ when $x = 1, y = 0$ and $\frac{dy}{dx} = -1$ is

a) $y = \frac{1}{2}(\log x)^2 + \log x$ b) $y = \frac{1}{2}(\log x)^2 - \log x$

c) $y = -\frac{1}{2}(\log x)^2 + \log x$ d) $y = -\frac{1}{2}(\log x)^2 - \log x$

244. Differential equation of $y = \sec(\tan^{-1} x)$ is

a) $(1 + x^2)\frac{dy}{dx} = y + x$ b) $(1 + x^2)\frac{dy}{dx} = y - x$ c) $(1 + x^2)\frac{dy}{dx} = xy$ d) $(1 + x^2)\frac{dy}{dx} = \frac{x}{y}$

245. The equation of the curve whose slope is $\frac{y - 1}{x^2 + x}$ and which passes through the point $(1, 0)$ is

a) $xy + x + y - 1 = 0$ b) $xy - x - y - 1 = 0$ c) $(y - 1)(x + 1) = 2x$ d) $y(x + 1) - x + 1 = 0$

246. Solution of the differential equation $\frac{dy}{dx} + \frac{y}{x} = \sin x$ is

a) $x(y + \cos x) = \sin x + c$ b) $x(y - \cos x) = \sin x + c$

c) $x(y \cos x) = \sin x + c$ d) $x(y - \cos x) = \cos x + c$

247. The solution of differential equation $(\sin x + \cos x)dy + (\cos x - \sin x)dx = 0$ is

a) $e^x(\sin x + \cos x) + c = 0$
b) $e^y(\sin x + \cos x) = c$
c) $e^y(\cos x - \sin x) = c$
d) $e^x(\sin x - \cos x + x) = c$

248. The solution of the equation $x^2 \frac{d^2y}{dx^2} = \log x$ when $x = 1, y = 0$ and $\frac{dy}{dx} = -1$ is

a) $\frac{1}{2}(\log x)^2 + \log x$
b) $\frac{1}{2}(\log x)^2 - \log x$
c) $-\frac{1}{2}(\log x)^2 + \log x$
d) $-\frac{1}{2}(\log x)^2 - \log x$

249. The differential equation of all straight lines touching the circle $x^2 + y^2 = a^2$ is

a) $\left(y - \frac{dy}{dx}\right)^2 = a^2\left[1 + \left(\frac{dy}{dx}\right)^2\right]$
b) $\left(y - x\frac{dy}{dx}\right)^2 = a^2\left[1 + \left(\frac{dy}{dx}\right)^2\right]$
c) $\left(y - x\frac{dy}{dx}\right) = a^2\left[1 + \frac{dy}{dx}\right]$
d) $\left(y - \frac{dy}{dx}\right) = a^2\left[1 - \frac{dy}{dx}\right]$

250. The solution of $2(y + 3) - xy\frac{dy}{dx} = 0$ with $y = -2$, where $x = 1$, is

a) $y + 3 = x^2$
b) $x^2(y + 3) = 1$
c) $x^4(y + 3) = 1$
d) $x^2(y + 3)^3 = e^{y+2}$

251. The general solution of $y^2dx + (x^2 - xy + y^2)dy = 0$ is

a) $\tan^{-1}\left(\frac{y}{x}\right) = \log y + c$
b) $2\tan^{-1}\left(\frac{x}{y}\right) + \log x + c = 0$
c) $\log(y + \sqrt{x^2 + y^2}) + \log y + c = 0$
d) $\sinh^{-1}\left(\frac{x}{y}\right) + \log y + c = 0$

252. Solution of the differential equation $\frac{dy}{dx} + y\sec^2 x = \tan x \sec^2 x$ is

a) $y = \tan x - 1 + ce^{-\tan x}$
b) $y^2 = \tan x - 1 + ce^{\tan x}$
c) $ye^{\tan x} = \tan x - 1 + c$
d) $ye^{-\tan x} = \tan x - 1 + c$

253. The differential equation of the family of curve $y^2 = 4a(x + 1)$, is

a) $y^2 = 4\frac{dy}{dx}\left(x + \frac{dy}{dx}\right)$
b) $2y = \frac{dy}{dx} + 4a$
c) $y^2\left(\frac{dy}{dx}\right)^2 + 2xy\frac{dy}{dx} - y^2 = 0$
d) $y^2\frac{dy}{dx} + 4y = 0$

254. Solution of the equation $x\left(\frac{dy}{dx}\right)^2 + 2\sqrt{xy}\frac{dy}{dx} + y = 0$ is

a) $x + y = a$
b) $\sqrt{x} - \sqrt{y} = \sqrt{a}$
c) $x^2 + y^2 = a^2$
d) $\sqrt{x} + \sqrt{y} = c$

255. The solution of the differential equation $x(x - y)\frac{dy}{dx} = y(x + y)$, is

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

256. The equation of the curve whose subnormal is twice the abscissa, is

a) A circle
b) A parabola
c) An ellipse
d) A hyperbola

257. The equation of the curve whose subnormal is equal to a constant a is

a) $y = ax + b$
b) $y^2 = 2ax + 2b$
c) $ay^2 - x^3 = a$
d) None of these

258. The integrating factor of $x\frac{dy}{dx} + (1 + x)y = x$ is

a) x
b) $2x$
c) $e^{x\log x}$
d) xe^x

259. Observe the following statements.

I. IF $dy + 2xy\,dx = 2e^{-x^2}\,dx$, then $ye^{x^2} = 2x + c$

II.IF $ye^{x^2} - 2x = c$, then $dx = \left(2e^{-x^2} - 2xy\right)dy$

Which is/are correct statements?

a) Both I and II are true
b) Neither I nor II is true
c) I is true, II is false
d) I is false, II is true

260. The differential equation of the family of curves $y^2 = 4\,a\,(x+a)$, is

a) $y^2 = 4\frac{dy}{dx}\left(x+\frac{dy}{dx}\right)$

b) $y^2\left(\frac{dy}{dx}\right)^2 + 2xy\,\frac{dy}{dx} - y^2 = 0$

c) $2y\,\frac{dy}{dx} = 4a$

d) $y^2\frac{dy}{d} + 4y = 0$

261. The solution of $(x+y+1)\frac{dy}{dx} = 1$ is

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

262. The general solution of the differential equation $\frac{dy}{dx} + \sin\left(\frac{x+y}{2}\right) = \sin\left(\frac{x-y}{2}\right)$ is

a) $\log\tan\left(\frac{y}{2}\right) = c - 2\sin x$
b) $\log\tan\left(\frac{y}{4}\right) = c - 2\sin\left(\frac{x}{2}\right)$
c) $\log\tan\left(\frac{y}{2}+\frac{\pi}{4}\right) = c - 2\sin x$
d) $\log\tan\left(\frac{y}{4}+\frac{\pi}{4}\right) = c - 2\sin\left(\frac{x}{2}\right)$

263. The solution of the differential equation $\frac{dy}{dx} + \frac{y}{x} = x^2$, is

a) $y = \frac{x^2}{4} + C\,x^{-2}$
b) $y = x^{-1} + C\,x^{-3}$
c) $y = \frac{x^3}{4} + C\,x^{-1}$
d) $xy = x^2 + C$

264. If $x\sin\left(\frac{y}{x}\right)dy = \left[y\sin\left(\frac{y}{x}\right) - y\right]dx$ and $y(1) = \frac{\pi}{2}$, then the value of $\cos\left(\frac{y}{x}\right)$ is equal to

a) x
b) $\frac{1}{x}$
c) $\log x$
d) e^x

265. The equation of the curve in which the portion of y-axis cut off between the origin and the tangent varies as the cube of the abscissa of the point of contact is

a) $y = \frac{k\,x^3}{3} + c\,x$
b) $y = -\frac{k\,x^2}{2} + c$
c) $y = -\frac{k\,x^3}{2} + c\,x$
d) $y = \frac{k\,x^3}{3} + \frac{c\,x^2}{2}$
(k is constant of proportionality)
(where c is arbitrary constant)

266. The solution of the differential equation $(x^2 - yx^2)\frac{dy}{dx} + y^2 + xy^2 = 0$ is

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

267. The differential equation $\frac{dy}{dx} = \frac{x(1+y^2)}{y(1+x^2)}$ represents a family of

a) Parabola
b) Hyperbola
c) Circle
d) Ellipse

268. If $x\;dy = y(dx + y\,dy), y(1) = 1$ and $y(x) > 0$, then $y(-3)$ is equal to

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

269. The differential equation of all parabolas whose axes are parallel to axis of x, is

a) $\frac{d^3y}{dx^3} = 0$
b) $\frac{d^3x}{dy^3} = 0$
c) $\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$
d) $\frac{d^2x}{dy^2} = 0$

270. If $\frac{d^2y}{dx^2}\sin x = 0$, then the solution of differential equation is

a) $y = \sin x + cx + d$
b) $y = \cos x + cx^2 + d$
c) $y = \tan x + c$
d) $y = \log\sin x + cx$

271. The solution of differential equation $(1+x)y\,dx + (1-y)x\,dy = 0$ is

a) $\log_e(xy) + x - y = c$
b) $\log_e\left(\frac{x}{y}\right) + x + y = c$
c) $\log_e\left(\frac{x}{y}\right) - x + y = c$
d) $\log_e(xy) - x + y = c$

272. The order of differential equation of all parabola with it's axis parallel to y-axis and touch x-axis is

a) 2 b) 3 c) 1 d) None of these

273. $y = Ae^x + Be^{2x} + Ce^{3x}$ satisfies the differential equation

a) $y''' - 6y' + 11y' - 6y = 0$
b) $y''' + 6y'' + 11y' + 6y = 0$
c) $y''' + 6y'' - 11y' + 6y = 0$
d) $y''' - 6y'' - 11y' + 6y = 0$

274. The solution of differential equation $(1 + y^2) + \left(x - e^{\tan^{-1} y}\right)\frac{dy}{dx} = 0$ is

a) $2xe^{\tan^{-1} y} = e^{2\tan^{-1} y} + k$
b) $2xe^{\tan^{-1} y} = e^{\tan^{-1} y} + k$
c) $xe^{\tan^{-1} y} = e^{\tan^{-1} y} + k$
d) $xe^{\tan^{-1} y} = e^{\tan^{-1} y} + k$

275. The function $f(\theta) = \frac{d}{d\theta}\int_0^\theta \frac{dx}{1 - \cos\theta \cos x}$ satisfies the differential equation

a) $\frac{df}{d\theta} + 2f(\theta) = 0$ b) $\frac{df}{d\theta} - 2f(\theta) = 0$ c) $\frac{df}{d\theta} - 2f(\theta) = \tan\theta$ d) $\frac{df}{d\theta} + 2f(\theta)\cot\theta = 0$

276. $y = 2e^{2x} - e^{-x}$ is a solution of the differential equation

a) $y_2 + y_1 + 2y = 0$ b) $y_2 - y_1 + 2y = 0$ c) $y_2 + y_1 = 0$ d) $y_2 - y_1 - 2y = 0$

277. The differential equation of the system of all circles of radius r in the xy-plane, is

a) $\left[1 + \left(\frac{dy}{dx}\right)^3\right]^2 = r^2\left(\frac{d^2y}{dx^2}\right)^2$
b) $\left[1 + \left(\frac{dy}{dx}\right)^3\right]^2 = r^2\left(\frac{d^2y}{dx^2}\right)^3$
c) $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^3 = r^2\left(\frac{d^2y}{dx^2}\right)^2$
d) $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^3 = r^2\left(\frac{d^2y}{dx^2}\right)^3$

278. If $y = f(x)$ is the equation of the curve an its differential equation is given by $\frac{dy}{dx} = \frac{x+2}{y+3}$, then the equation of the curve, if it passes through (2, 2), is

a) $x^2 - y^2 + 4x - 6y + 4 = 0$
b) $x^2 - y^2 + 4x + 6y = 0$
c) $x^2 - y^2 - 4x - 6y = 0$
d) $x^2 - y^2 - 4x - 6y - 4 = 0$

279. $y = ae^{mx} + be^{-mx}$ satisfies which of the following differential equation?

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

280. The differential equation satisfied by the family of curves $y = ax\cos\left(\frac{1}{x} + b\right)$, where a and b are parameters, is

a) $x^2y_2 + y = 0$ b) $x^4y_2 + y = 0$ c) $xy_2 - y = 0$ d) $x^4y_2 - y = 0$

281. The solution of $\frac{dy}{dx} + \sqrt{\left(\frac{1-y^2}{1-x^2}\right)} = 0$ is

a) $\tan^{-1} x + \cot^{-1} x = c$
b) $\sin^{-1} x + \sin^{-1} y = c$
c) $\sec^{-1} x + \text{cosec}^{-1} x = c$
d) None of these

282. If $x = \sin t$, $y = \cos pt$, then

a) $(1 - x^2)y_2 + xy_1 + p^2y = 0$
b) $(1 - x^2)y_2 + xy_1 - p^2y = 0$
c) $(1 + x^2)y_2 - xy_1 + p^2y = 0$
d) $(1 - x^2)y_2 - xy_1 + p^2y = 0$

283. A solution of the differential equation $\left(\frac{dy}{dx}\right)^2 - x\frac{dy}{dx} + y = 0$ is

a) $y = 2$ b) $y = 2x$ c) $y = 2x - 4$ d) $y = 2x^2 - 4$

284. The differential equation $\frac{dy}{dx} = \frac{\sqrt{1-y^2}}{y}$ determines a family of circles with

a) Variable radii and a fixed centre t (0,1)
b) Variable radii and a fixed centre at (0,-1)
c) Fixed radius 1 and variable centres along the x-axis
d) Fixed radius 1 and variable centres along the y-axis

285. The differential equation of the family of circles passing through the fixed points $(a, 0)$ and

$(-a, 0)$ is

a) $y_1(y^2 - x^2) + 2xy + a^2 = 0$ b) $y_1y^2 + xy + a^2x^2 = 0$
c) $y_1(y^2 - x^2 + a^2) + 2xy = 0$ d) $y_1(y^2 + x^2) - 2xy + a^2 = 0$

286. A particle starts at the origin and moves along the x-axis in such a way that its velocity at the point $(x, 0)$ is given by the formula $\frac{dx}{dt} = \cos^2 \pi x$. Then, the particle never reaches the point on

a) $x = \frac{1}{4}$ b) $x = \frac{3}{4}$ c) $x = \frac{1}{2}$ d) $x = 1$

287. The solution of the differential equation $x\frac{dy}{dx} = 2y + x^3e^x$, where $y = 0$ when $x = 1$, is

a) $y = x^3(e^x - e)$ b) $y = x^3(e - e^x)$ c) $y = x^2(e^x - e)$ d) $y = x^2(e - e^x)$

288. The general solution of $\frac{dy}{dx} = \frac{2x-y}{x+2y}$ is

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

289. The order and degree of the differential equation $y = \frac{dy}{dx} + \sqrt{a^2\left(\frac{dy}{dx}\right)^2 + b^2}$ is

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

290. Solution of the differential equation $\frac{dy}{dx}\tan y = \sin(x + y) + \sin(x - y)$ is

a) $\sec y + 2\cos x = c$ b) $\sec y - 2\cos x = c$ c) $\cos y - 2\sin x = c$ d) $\tan y - 2\sec x = c$

291. The difference equation of the family of circles with fixed radius r and with centre on y-axis is

a) $y^2(1 + y_1^2) = r^2y_1^2$ b) $y^2 = r^2y_1 + y_1^2$ c) $x^2(1 + y_1^2) = r^2y_1^2$ d) $x^2 = r^2y_1 + y_1^2$

292. The degree of the differential equation satisfying $\sqrt{1 - x^2} + \sqrt{1 - y^2} = a(x - y)$ is

a) 1 b) 2 c) 3 d) None of these

293. The equation of family of curves for which the length of the normal is equal to the radius vector, is

a) $y^2 \mp x^2 = k^2$ b) $y \pm x = k$ c) $y^2 = kx$ d) None of these

294. Observe the following statements

A:Interating factor of $\frac{dy}{dx} + y = x^2$ is e^x

R: Integrating factor of $\frac{dy}{dx} + P(x)y = Q(x)$ is $e^{\int P(x)dx}$

Then, the true statement among the following is

a) A is true, R is false b) A is false, R is true
c) A is true, R is true, R ⇒ A d) A is false, R is false

295. To reduce the differential equation $\frac{dy}{dx} + P(x).y = Q(x).y^n$ to the linear form, the substitution is

a) $v = \frac{1}{y^n}$ b) $v = \frac{1}{y^{n-1}}$ c) $v = y^n$ d) $v = y^{n-1}$

296. The solution of the differential equation $\frac{dy}{dx} - y\tan x = e^x \sec x$ is

a) $y = e^x \cos x + c$ b) $y\cos x = e^x + c$ c) $y = e^x \sin x + c$ d) $y \sin x = e^x + c$

297. The solution of the differential equation $\left(e^{-2\sqrt{x}} - \frac{y}{\sqrt{x}}\right)\frac{dy}{dx} = 1$ is given by

a) $ye^{2\sqrt{x}} = x + c$ b) $ye^{-2\sqrt{x}} = \sqrt{x} + c$ c) $y = \sqrt{x}$ d) $y = 3\sqrt{x}$

298. If the function $y = \sin^{-1} x$, then $(1 - x^2)\frac{d^2y}{dx^2}$ is equal to

a) $-x\frac{dy}{dx}$ b) 0 c) $x\frac{dy}{dx}$ d) $x\left(\frac{dy}{dx}\right)^2$

299. Solution of the differential equation $\cos x\ dy = y(\sin x - y)dx, 0 < x < \frac{\pi}{2}$, is

a) $\sec x = (\tan x + c)y$ b) $y \sec x = \tan x + c$
c) $y\tan x = \sec x + c$ d) $\tan x = (\sec x + x)y$

300. The second order differential equation is

a) $y'^2 + x = y^2$ b) $y'y'' + y = \sin x$ c) $y''' + y'' + y = 0$ d) $y' = y$

301. If $y(t)$ is a solution of $(1+t)\frac{dy}{dt} - ty = 1$ and $y(0) = -1$ then $y(1)$ is equal to

a) $-\frac{1}{2}$ b) $e + \frac{1}{2}$ c) $e - \frac{1}{2}$ d) $\frac{1}{2}$

302. The solution of the differential equation $\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$ is

a) $y = e^{x-y} - x^2 e^{-y} + c$ b) $e^y - e^x = \frac{1}{3}x^3 + c$ c) $e^x + e^y = \frac{1}{3}x^3 + c$ d) $e^x - e^y = \frac{1}{3}x^3 + c$

303. The solution of $x\,dy - y\,dx + x^2 e^x\,dx = 0$ is

a) $\frac{y}{x} + e^x = c$ b) $\frac{x}{y} + e^x = c$ c) $x + e^y = c$ d) $y + e^x = c$

304. The solution of the differential equation $e^{-x}(y+1)dy + (\cos^2 x - \sin 2x)y\,dx = 0$ subjected to the condition that $y = 1$ when $x = 0$ is

a) $y + \log y + e^x \cos^2 x = 2$
b) $\log(y+1) + e^x \cos^2 x = 1$
c) $y + \log y = e^x \cos^2 x$
d) $(y+1) + e^x \cos^2 x = 2$

305. The number of solutions of $y' = \frac{y+1}{x-1}, y(1) = 2$ is

a) Zero b) One c) Two d) Infinite

306. The solution of the differential equation $\frac{dy}{dx} - \frac{\tan y}{x} = \frac{\tan y \sin y}{x^2}$ is

a) $\frac{x}{\sin y} + \log x = c$ b) $\frac{y}{\sin x} + \log x = c$ c) $\log x + x = c$ d) $\log x + y = c$

307. If $\frac{dy}{dx} + y = 2e^{2x}$, then y is equal to

a) $ce^x + \frac{2}{3}e^{2x}$
b) $(1+x)e^{-x} + \frac{2}{3}e^{2x} + c$
c) $ce^{-x} + \frac{2}{3}e^{2x}$
d) $e^{-x} + \frac{2}{3}e^{2x} + c$

308. A particular solution of $\log\left(\frac{dy}{dx}\right) = 3x + 4y$, $y(0) = 0$ is

a) $e^{3x} + 3e^{-4y} = 4$ b) $4e^{3x} - 3e^{-4y} = 3$ c) $3e^{3x} + 4e^{-4y} = 7$ d) $4e^{3x} + 3e^{-4y} = 7$

309. The solution of $\frac{dy}{dx} = \frac{ax+g}{by+f}$ represents a circle when

a) $a = b$ b) $a = -b$ c) $a = -2b$ d) $a = 2b$