Assignment

Order and Degree of Differential Equation

Basic Level

1. The order of the differential equation of a family of curves represented by an equation containing four arbitrary constants, will be
(a) 2 (b) 4 (c) 6 (d) None of these

2. The order and degree of the differential equation $\frac{d^2y}{dx^2} = \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$ is **[DCE 2002]**
(a) 4, 2 (b) 1, 2 (c) 2, 2 (d) $2, \frac{1}{2}$

3. The order and degree of the differential equation $\left(\frac{d^2s}{dt^2}\right)^2 + 3\left(\frac{ds}{dt}\right)^3 + 4 = 0$ are
(a) 2, 2 (b) 2, 3 (c) 3, 2 (d) None of these

4. The order and degree of differential equation $\frac{d^4y}{dx^4} - 4\frac{d^3y}{dx^3} + 8\frac{d^2y}{dx^2} - 8\frac{dy}{dx} + 4y = 0$ are respectively
(a) 4, 1 (b) 1, 4 (c) 1, 1 (d) None of these

5. The order and the degree of the differential equation $\sqrt{\frac{dy}{dx}} - 4\frac{dy}{dx} - 7x = 0$ are **[MP PET 1993]**
(a) 1 and 1/2 (b) 2 and 1 (c) 1 and 1 (d) 1 and 2

6. The order and the degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right)^4 - xy = 0$ are respectively **[MP PET 2003]**
(a) 2 and 4 (b) 3 and 2 (c) 4 and 5 (d) 2 and 3

7. $\frac{d^3y}{dx^3} + 2\left[1 + \frac{d^2y}{dx^2}\right] = 1$ has degree and order as **[UPSEAT 2003]**
(a) 1, 3 (b) 2, 3 (c) 3, 2 (d) 3, 1

8. The order and the degree of the differential equation $x\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 + y^2 = 0$ are respectively **[Karnataka CET 2001]**
(a) 2 and 2 (b) 1 and 1 (c) 2 and 1 (d) 1 and 2

9. The order of the differential equation whose general solution is given by $y = c_1 e^{2x+c_2} + c_3 e^x + c_4 \sin(x + c_5)$ is **[AMU 2000]**
(a) 5 (b) 4 (c) 3 (d) 2

10. The order and the degree of the differential equation representing the family of curves $y^2 = 2k(x + \sqrt{k})$ (where k is a positive parameter) are respectively **[MP PET 2002]**
(a) 1 and 2 (b) 2 and 4 (c) 1 and 4 (d) 1 and 3

11. The degree of differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3 + 6y = 0$ is **[Kerala (Engg.) 2002]**
(a) 1 (b) 3 (c) 2 (d) 5

12. The differential equation of first order and first degree is
(a) $x\left(\frac{dy}{dx}\right)^2 - x + a = 0$ (b) $\frac{d^2y}{dx^2} + xy = 0$ (c) $dy + dx = 0$ (d) None of these

Advance Level

13. Order and degree of differential equation $\frac{d^2y}{dx^2} = \left\{y + \left(\frac{dy}{dx}\right)^2\right\}^{1/4}$ are **[MP PET 1996]**

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

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

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

15. The differential equation $\left(\frac{d^2y}{dx^2}\right)^2 - \left(\frac{dy}{dx}\right)^{1/2} = y^3$ has the degree **[Roorkee 1999]**

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

16. The degree and order of the differential equation of the family of all parabolas whose axis is x-axis are respectively **[AIEEE 2003]**

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

17. Degree of the given differential equation $\left(\frac{d^2y}{dx^2}\right)^3 = \left(1 + \frac{dy}{dx}\right)^{1/2}$, is **[MP PET 1997]**

(a) 2 (b) 3 (c) $\frac{1}{2}$ (d) 6

18. The differential equation $x\left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right)^4 + y = x^2$ is of

(a) Degree 3 and order 2 (b) Degree 1 and order 1 (c) Degree 4 and order 3 (d) Degree 4 and order 4

19. The second order differential equation is **[MP PET 2000]**

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

20. The order and degree of the differential equation $\left(1 + 3\frac{dy}{dx}\right)^{\frac{2}{3}} = 4\frac{d^3y}{dx^3}$ are **[AIEEE 2002]**

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

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

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

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

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

23. 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

24. If m and n are the order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^5 + 4\frac{\left(\frac{d^2y}{dx^2}\right)^3}{\left(\frac{d^3y}{dx^3}\right)} + \frac{d^3y}{dx^3} = x^2 - 1$, then **[Karnataka CET 1999]**

(a) $m = 3$ and $n = 5$ (b) $m = 3$ and $n = 1$ (c) $m = 3$ and $n = 3$ (d) $m = 3$ and $n = 2$

25. The order and degree of the differential equation $\rho = \frac{\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/2}}{d^2y/dx^2}$ are respectively **[MP PET 2001; UPSEAT 2002]**

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

26. Order of the differential equation of the family of all concentric circles centred at (h, k) is **[EAMCET 2002]**

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

27. Let a and b be respectively the degree and order of the differential equation of the family of circles touching the lines $y^2 - x^2 = 0$ and lying in the first and second quadrant then

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

28. The order and degree of differential equation of all tangent lines to the parabola $x^2 = 4y$ is

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

29. The order and degree of differential equation $xy\frac{dy}{dx} = \left(\frac{1+y^2}{1+x^2}\right)(1+x+x^2)$ are

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

30. The differential equation $\frac{d^2y}{dx^2} + x\frac{dy}{dx} + \sin y + x^2 = 0$ is of the following type

(a) Linear (b) Homogeneous (c) Order two (d) Degree one

31. The order and degree of differential equation $(xy^2 + x)dx + (y - x^2y)dy = 0$ are

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

32. Family $y = Ax + A^3$ of curve represented by the differential equation of degree **[MP PET 1999]**

(a) Three (b) Two (c) One (d) None of these

33. Which of the following differential equations has the same order and degree **[Kurukshetra CEE 1998]**

(a) $\frac{d^2y}{dx^4} + 8\left(\frac{dy}{dx}\right)^6 + 5y = e^x$ (b) $5\left(\frac{d^3y}{dx^3}\right)^4 + 8\left(1+\frac{dy}{dx}\right)^2 + 5y = x^8$

(c) $\left[1+\left(\frac{dy}{dx}\right)^3\right]^{2/3} = 4\frac{d^3y}{dx^3}$ (d) $y = x^2\frac{dy}{dx} + \sqrt{1+\left(\frac{dy}{dx}\right)^2}$

34. 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 **[IIT 1998]**

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

35. The degree of the differential equation $3\frac{d^2y}{dx^2} = \left\{1+\left(\frac{dy}{dx}\right)^2\right\}^{3/2}$ is **[MP PET 1994, 95]**

(a) 1 (b) 2 (c) 3 (d) 6

36. The order of the differential equation $y\left(\frac{dy}{dx}\right) = x/\left[\frac{dy}{dx} + \left(\frac{dy}{dx}\right)^3\right]$ is **[MP PET 1994]**

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

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

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

38. The degree of the differential equation $\left(\frac{d^3y}{dx^3}\right)^{2/3} + 4 - 3\frac{d^2y}{dx^2} + 5\frac{dy}{dx} = 0$ is

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

Formation of Differential equation

Basic Level

39. $y = 4\sin 3x$ is a solution of the differential equation **[AI CBSE 1986]**

(a) $\frac{dy}{dx} + 8y = 0$ (b) $\frac{dy}{dx} - 8y = 0$ (c) $\frac{d^2y}{dx^2} + 9y = 0$ (d) $\frac{d^2y}{dx^2} - 9y = 0$

40. The differential equation of all straight lines passing through the origin is **[DCE 2002; Kerala (Engg.)2002]**

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

41. The differential equation obtained on eliminating A and B from the equation $y = A\cos\omega t + B\sin\omega t$ is **[Karnataka CET 2000]**

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

42. The elimination of the arbitrary constants A, B and C from $y = A + Bx + Ce^{-x}$ leads to the differential equation **[AMU 1999]**

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

43. A differential equation associated to the primitive $y=a+be^{5x}+ce^{-7x}$ is

(a) $y_3+2y_2+y_1=0$ (b) $4y_3+5y_2-20y_1=0$ (c) $y_3+2y_2-35y_1=0$ (d) None of these

44. The differential equation of the family of curves represented by the equation $(x-a)^2+y^2=a^2$ is

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

45. The differential equation of the family of curves $y=a\cos(x+b)$ is **[MP PET 1993]**

(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

46. The differential equation of all parabolas that have origin as vertex and y-axis as axis of symmetry is

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

47. The differential equation of the family of curves represented by the equation $x^2+y^2=a^2$ is

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

48. The differential equation whose general solution is $y = A\sin x + B\cos x$, is **[CEE 1993; Kerala (Engg.) 2002]**

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

49. The differential equation of the line $y=mx+c$ is (where c is arbitrary constant)

(a) $\frac{dy}{dx}=m$ (b) $\frac{dy}{dx}+m=0$ (c) $\frac{dy}{dx}=0$ (d) None of these

50. The differential equation of the family of curves represented by the equation $x^2y=a$, is

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

51. The differential equation corresponding to primitive $y=e^{cx}$ is

Or

The elimination of the arbitrary constant m from the equation $y=e^{mx}$ gives the differential equation **[MP PET 1995, 2000]**

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

52. The differential equation of all straight lines passing through the point (1, –1) is **[MP PET 1994]**

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

53. The differential equation found by the elimination of the arbitrary constant K from the equation $y=(x+K)e^{-x}$ is

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

54. Differential equation whose solution is $y=cx+c-c^3$, is **[MP PET 1997]**

(a) $\frac{dy}{dx}=c$ (b) $y=x\frac{dy}{dx}+\frac{dy}{dx}-\left(\frac{dy}{dx}\right)^3$ (c) $\frac{dy}{dx}=c-3c^2$ (d) None of these

55. Differential equation of $y=\sec(\tan^{-1}x)$ is **[UPSEAT 2002]**

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

56. The differential equation of the family of curves $v=\frac{A}{r}+B$, where A and B are arbitrary constants, is

(a) $\frac{d^2v}{dr^2}+\frac{1}{r}\frac{dv}{dr}=0$ (b) $\frac{d^2v}{dr^2}-\frac{2}{r}\frac{dv}{dr}=0$ (c) $\frac{d^2v}{dr^2}+\frac{2}{r}\frac{dv}{dr}=0$ (d) None of these

57. The differential equation of the famlily of parabolas with focus at the origin and the x-axis as axis is **[EAMCET 2003]**

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

58. The differential equation of all the lines in the xy-plane is

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

59. $y=ae^{mx}+be^{-mx}$ satisfies which of the following differential equations **[Karnataka CET 2002]**

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

60. The differential equation whose solution is $y=c_1\cos ax+c_2\sin ax$ is (where c_1, c_2 are arbitrary constants) **[MP PET 1996]**

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

61. If $y=ce^{\sin^{-1}x}$, then corresponding to this the differential equation is

(a) $\frac{dy}{dx}=\frac{y}{\sqrt{1-x^2}}$ (b) $\frac{dy}{dx}=\frac{1}{\sqrt{1-x^2}}$ (c) $\frac{dy}{dx}=\frac{x}{\sqrt{1-x^2}}$ (d) None of these

Advance Level

62. The differential 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) $x^2=r^2y_1+y_1^2$

63. 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

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

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

65. The differential equation of all ellipses centred at the origin is

(a) $y_2+xy_1^2-yy_1=0$ (b) $xyy_2+xy_1^2-yy_1=0$ (c) $yy_2+xy_1^2-xy_1=0$ (d) None of these

66. The differential equation for which $\sin^{-1}x+\sin^{-1}y=c$ is given by **[Karnataka CET 2003]**

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

67. The differential equation satisfied by the family of curves $y=ax\cos\left(\frac{1}{x}+b\right)$, where a, b are parameters, is **[MP PET 2003]**

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

68. Differential equation of central conics are

(a) $yy_1 = x(y_1^2 + yy_2)$ (b) $yy_1 = (y_1^2 + yy_2)$ (c) $y^2 = xy_1(y_1^2 + yy_2)$ (d) None of these

69. The differential equation for all the straight lines which are at a unit distance from the origin is **[MP PET 1993]**

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

70. Family of curves $y = e^x(A\cos x + B\sin x)$, represents the differential equation **[MP PET 1999]**

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

71. The differential equation for the family of curves $x^2 + y^2 - 2ay = 0$, where *a* is an arbitrary constant is **[AIEEE 2004]**

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

72. The differential equation of all circles which passes through the origin and whose centre lies on *y*-axis, is **[MNR 1986; DCE 2000]**

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

73. The differential equation of the family of curves $y = Ae^{3x} + Be^{5x}$, where *A* and *B* are arbitrary constants, is **[MNR 1988]**

(a) $\frac{d^2y}{dx^2} + 8\frac{dy}{dx} + 15y = 0$ (b) $\frac{d^2y}{dx^2} - 8\frac{dy}{dx} + 15y = 0$ (c) $\frac{d^2y}{dx^2} - \frac{dy}{dx} + y = 0$ (d) None of these

74. The differential equation whose solution is given by $ae^x + b\log y = 0$ is

(a) $\frac{dy}{dx} = -\frac{ay}{b}e^x$ (b) $\frac{d^2y}{dx^2} + \frac{1}{y} = 0$ (c) $\frac{d^2y}{dx^2} + y = 0$ (d) None of these

Variable Separable Type Differential Equation

Basic Level

75. The solution of $\frac{dy}{dx} = e^x(\sin x + \cos x)$ is

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

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

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

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

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

78. The solution of the differential equation $\frac{dy}{dx} + \frac{1 + x^2}{x} = 0$ is

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

79. The solution of the differential equation $\frac{dy}{dx} = \sec x(\sec x + \tan x)$ is

(a) $y = \sec x + \tan x + c$ (b) $y = \sec x + \cot x + c$ (c) $y = \sec x - \tan x + c$ (d) None of these

80. The solution of the differential equation $y\,dx - x\,dy = 0$ is

(a) $x = cy$ (b) $xy = c$ (c) $x = c\log x$ (d) None of these

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

(a) $y=1+cxy$ (b) $y=\log\{cxy\}$ (c) $y+1=cxy$ (d) $y=c+xy$

82. The solution of differential equation $\frac{dy}{dx}+\sin^2 y=0$ **[MP PET 1994]**

(a) $y+2\cos y=c$ (b) $y-2\sin y=c$ (c) $x=\cot y+c$ (d) $y=\cot x+c$

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

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

84. The solution of the differential equation $x\cos y\,dy=(xe^x\log x+e^x)dx$ is **[DSSE 1988]**

(a) $\sin y=\frac{1}{x}e^x+c$ (b) $\sin y+e^x\log x+c=0$ (c) $\sin y=e^x\log x+c$ (d) None of these

85. The solution of the differential equation $\frac{dy}{dx}=\frac{1+y^2}{1+x^2}$ is **[SCRA 1986]**

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

86. Solution of $\frac{dy}{dx}=\frac{x\log x^2+x}{\sin y+y\cos y}$ is **[EAMCET 2003]**

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

87. The solution of the differential equation $3e^x\tan y\,dx+(1-e^x)\sec^2 y\,dy=0$ is **[MP PET 1993; AISSE 1985]**

(a) $\tan y=c(1-e^x)^3$ (b) $(1-e^x)^3\tan y=c$ (c) $\tan y=c(1-e^x)$ (d) $(1-e^x)\tan y=c$

88. The solution of the differential equation $\frac{dy}{dx}=1+x+y+xy$ is **[AISSE 1985; AI CBSE 1990; MP PET 2003]**

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

89. If $\frac{dy}{dx}=\frac{xy+y}{xy+x}$, then the solution of the differential equation is **[SCRA 1980]**

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

90. The solution of the differential equation $(1+\cos x)dy=(1-\cos x)dx$ is **[AISSE 1984]**

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

91. The solution of the differential equation $x(e^{2y}-1)dy+(x^2-1)e^y dx=0$ is **[AISSE 1990]**

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

92. Solution of the equation $(1-x^2)dy+xy\,dx=xy^2dx$ **[DSSE 1989]**

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

93. The equation of the curve that passes through the point (1, 2) and satisfies the differential equation $\frac{dy}{dx}=\frac{-2xy}{(x^2+1)}$ is

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

94. The solution of $(\text{cosec}\,x\log y)dy+(x^2y)dx=0$ is **[AISSE 1986]**

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

(c) $\frac{(\log y)^2}{2}+(2-x^2)\cos x+2x\sin x=c$ (d) None of these

95. The general solution of the 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) $x^2 - y^2 = C$

96. The general solution of the differential equation $\frac{dy}{dx} = \cot x \cot y$ is **[AISSE 1983; MP PET 1994]**

(a) $\cos x = c \operatorname{cosec} y$ (b) $\sin x = c \sec y$ (c) $\sin x = c \cos y$ (d) $\cos x = c \sin y$

97. The solution of $\frac{dy}{dx} = \frac{1}{x}$ is

(a) $y + \log x + c = 0$ (b) $y = \log x + c$ (c) $y^{\log x} + c = 0$ (d) None of these

98. Solution of the differential equation $\frac{dx}{x} + \frac{dy}{y} = 0$ is **[Karnataka CET 2002]**

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

99. The differential equation $\cot y\, dx = x\, dy$ has a solution of the form **[Orissa JEE 2002]**

(a) $y = \cos x$ (b) $x = c \sec y$ (c) $x = \sin y$ (d) $y = \sin x$

100. The solution of differential equation $dy - \sin x \sin y\, dx = 0$ is **[MP PET 1996]**

(a) $e^{\cos x} \tan \frac{y}{2} = C$ (b) $e^{\cos x} \tan y = C$ (c) $\cos x \tan y = C$ (d) $\cos x \sin y = C$

101. The solution of the equation $(2y - 1)\, dx - (2x + 3)\, dy = 0$ **[Kerala (Engg.) 2002]**

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

102. 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) $\log(xy) + \frac{1}{x} + \frac{1}{y} = c$

103. The solution of the differential equation $\frac{dy}{dx} = (ae^{bx} + c \cos mx)$ is

(a) $y = \frac{ae^x}{b} + \frac{c}{m} \sin mx + k$ (b) $y = ae^x + c \sin mx + k$ (c) $y = \frac{ae^{bx}}{b} + \frac{c}{m} \sin mx + k$ (d) None of these

104. The solution of $\frac{dy}{dx} = x \log x$ is **[MP PET 2003]**

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

105. The solution of the differential equation $\sec^2 x \tan y\, dx + \sec^2 y \tan x\, dy = 0$ is **[AISSE 1983; Karnataka CET 1999; MP PET 2003]**

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

106. The solution of the differential equation $x^2 dy = -2xy\, dx$ is **[SCRA 1990]**

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

107. The solution of the differential equation $x \sec y \frac{dy}{dx} = 1$ is

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

108. If $\frac{dy}{dx} + \frac{1}{\sqrt{1-x^2}} = 0$, then **[MNR 1983]**

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

109. The solution of the differential equation $\sin x \sin y\, dx + \cos x \cos y\, dy = 0$ is

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

110. The general solution of the differential equation $y\, dx + (1 + x^2)\tan^{-1} x\, dy = 0$, is **[MP PET 1995]**

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

111. The solution of the differential equation $\frac{dy}{dx}+\frac{1+\cos 2y}{1-\cos 2x}=0$ **[AISSE 1982]**

(a) $\tan y+\cot x=c$ (b) $\tan y.\cot x=c$ (c) $\tan y-\cot x=c$ (d) None of these

112. Solution of the equation $\cos x\cos y\frac{dy}{dx}=-\sin x\sin y$ is **[DSSE 1987]**

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

113. The solution of the equation $\frac{dy}{dx}=y(e^x+1)$ is **[AISSE 1986; AI CBSE 1984]**

(a) $y+e^{(e^x+x+c)}=0$ (b) $\log y=e^x+x+c$ (c) $\log y+e^x=x+c$ (d) None of these

114. The general solution of $x^2\frac{dy}{dx}=2$ is **[AISSE 1984]**

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

115. The solution of the differential equation $dy=\sec^2 x\,dx$ is

(a) $y=\sec x\tan x+c$ (b) $y=2\sec x+c$ (c) $y=\frac{1}{2}\tan x+c$ (d) None of these

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

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

117. The solution of the differential equation $\frac{dy}{dx}=e^x+\cos x+x+\tan x$ is

(a) $y=e^x+\sin x+\frac{x^2}{2}+\log\cos x+c$ (b) $y=e^x+\sin x+\frac{x^2}{2}+\log\sec x+c$

(c) $y=e^x-\sin x+\frac{x^2}{2}+\log\cos x+c$ (d) $y=e^x-\sin x+\frac{x^2}{2}+\log\sec x+c$

118. The general solution of the differential equation $e^y\frac{dy}{dx}+(e^y+1)\cot x=0$ is

(a) $(e^y+1)\cos x=K$ (b) $(e^y+1)\text{cosec}\, x=K$ (c) $(e^y+1)\sin x=K$ (d) None of these

119. Solution of differential equation $\frac{dy}{dx}=\sin x+2x$, is **[MP PET 1997]**

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

120. Solution of differential equation $\frac{dy}{dx}=2xy$, is **[MP PET 1997]**

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

121. The general solution of differential equation $(4+5\sin x)\frac{dy}{dx}=\cos x$ is

(a) $y=\frac{1}{5}\log|4+5\sin x|+C$ (b) $y=\frac{1}{5}\log|4+5\cos x|+C$

(c) $y=-\frac{1}{5}\log|4-5\sec x|+C$ (d) None of these

122. The general solution of differential $\frac{dy}{dx}=\log x$ is

(a) $y=x(\log x+1)+C$ (b) $y+x(\log x+1)=C$ (c) $y=x(\log x-1)+C$ (d) None of these

123. For solving $\frac{dy}{dx}=(4x+y+1)$, suitable substitution is **[MP PET 1999]**

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

Advance Level

124. The solution of $\frac{dy}{dx}+\sqrt{\left(\frac{1-y^2}{1-x^2}\right)}=0$ is **[DCE 1999]**

(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

125. The solution of the differential equation $\sqrt{a+x}\frac{dy}{dx}+xy=0$ is **[MP PET 1998]**

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

Where A is an arbitrary constant

126. The solution of the given differential equation $\frac{dy}{dx}+2xy=y$ is **[Roorkee 1995]**

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

127. The general solution of the differential equation $\log\left(\frac{dy}{dx}\right)=x+y$ is **[DSSE 1984; MP PET 1994, 95]**

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

128. The solution of the differential equation $\cos y\log(\sec x+\tan x)dx=\cos x\log(\sec y+\tan y)dy$ is **[AI CBSE 1990]**

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

129. Solution of $y\,dx-x\,dy=x^2y\,dx$ is **[MP PET 1999]**

(a) $ye^{x^2}=cx^2$ (b) $ye^{-x^2}=cx^2$ (c) $y^2e^{x^2}=cx^2$ (d) $y^2e^{-x^2}=cx^2$

130. If $\frac{dy}{dx}=1+x+y+xy$ and $y(-1)=0$, then function y is **[MP PET 1998]**

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

131. The differential equation $\frac{dy}{dx}=\frac{4x+6y+5}{3y+2x+4}$, which is not with separated variables, can be transformed into one which is with separated variables, by the substitution

(a) $2x+3y=v$ (b) $4x+6y+5=v$ (c) $2x+3y+4=v$ (d) $3x+2y=v$

132. The solution of the differential equation $y-x\frac{dy}{dx}=a\left(y^2+\frac{dy}{dx}\right)$ is **[AISSE 1989, 90; MP PET 2002]**

(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

133. The solution of $\frac{dy}{dx}-\frac{1}{xy}+\frac{1}{y}=0$ is

(a) $cx=e^{x+y^2/2}$ (b) $cy=e^{x+y^2/2}$ (c) $cx=e^{y^2+x/2}$ (d) None of these

134. The solution of the equation $x\frac{dy}{dx}=\frac{1-y^2}{\sqrt{1-x^2}}$ is

(a) $x=\sec\{\lambda(1+y)/(1-y)\}$ (b) $x=\sec\{\lambda(1+x)/(1-x)\}$ (c) $x=\lambda\sec\{(1+y)/(1-y)\}$ (d) None of these

135. The solution of the differential equation $xy\frac{dy}{dx}=\frac{(1+y^2)(1+x+x^2)}{(1+x^2)}$ is **[AISSE 1983]**

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

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

136. The solution of the differential equation $(1+x^2)(1+y)dy+(1+x)(1+y^2)dx=0$ is **[DSSE 1986]**

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

(c) $\tan^{-1} x + \frac{1}{2}\log(1+x^2) + \tan^{-1} y + \frac{1}{2}\log(1+y^2) = c$ (d) None of these

137. The solution of $\frac{dy}{dx} = \frac{e^x(\sin^2 x + \sin 2x)}{y(2\log y + 1)}$ is **[AISSE 1990]**

(a) $y^2(\log y) - e^x \sin^2 x + c = 0$ (b) $y^2(\log y) - e^x \cos^2 x + c = 0$ (c) $y^2(\log y) + e^x \cos^2 x + c = 0$ (d) None of these

138. The solution of the differential equation $(x - y^2 x)dx = (y - x^2 y)dy$ is **[DSSE 1984]**

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

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

(a) $\frac{1}{3}\log\left|\frac{y-2}{y+1}\right| = \frac{1}{4}\log\left|\frac{x+3}{x-1}\right| + c$ (b) $\frac{1}{3}\log\left|\frac{y+1}{y-2}\right| = \frac{1}{4}\log\left|\frac{x-1}{x+3}\right| + c$

(c) $4\log\left|\frac{y-2}{y+1}\right| = 3\log\left|\frac{x-1}{x+3}\right| + c$ (d) None of these

140. The general solution of the differential equation $(\tan^2 x + 2\tan x + 5)\frac{dy}{dx} = 2(1+\tan x)\sec^2 x$ is

(a) $y = \log|\tan^2 x + 2\tan x + 5| + c$ (b) $y = \log|\tan^2 x - 2\tan x + 5| + c$

(c) $y = \log|\sec^2 x - 2\tan x + 5| - c$ (d) None of these

141. The solution of the equation $\sqrt{a+x}\,\frac{dy}{dx} + x = 0$ is **[DSSE 1988]**

(a) $3y + 2\sqrt{a+x}.(x-2a) = 3c$ (b) $3y + 2\sqrt{x+a}.(x+2a) = 3c$

(c) $3y + 2\sqrt{x-a}.(x+2a) = 3c$ (d) None of these

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

(a) $e^{5x} + e^{5y} = c$ (b) $e^{5x} - e^{5y} = c$ (c) $e^{5x+5y} = c$ (d) None of these

143. The solution of $(x\sqrt{1+y^2}\,dx + (y\sqrt{1+x^2})dy = 0$ is

(a) $\sqrt{1+x^2} + \sqrt{1+y^2} = c$ (b) $\sqrt{1+x^2} - \sqrt{1+y^2} = c$ (c) $(1+x^2)^{3/2} + (1+y)^{3/2} = c$ (d) None of these

144. Solution of the equation $(e^x + 1)y\,dy = (y+1)e^x\,dx$ is **[AISSE 1988]**

(a) $c(y+1)(e^x+1) + e^y = 0$ (b) $c(y+1)(e^x-1) + e^y = 0$ (c) $c(y+1)(e^x-1) - e^y = 0$ (d) $c(y+1)(e^x+1) = e^y$

145. The solution of the differential equation $(1-x^2)(1-y)dx = xy(1+y)dy$ is

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

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

146. The solution of $\frac{dy}{dx} = 2^{y-x}$ is **[Karnataka CET 2000]**

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

147. The solution of 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

148. 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, centre on the x-axis

(c) A set of ellipses (d) None of these

149. The general solution of differential equation $\frac{dy}{dx} = \sin^3 x \cos^2 x + xe^x$ is

(a) $y = \frac{1}{5}\cos^5 x + \frac{1}{3}\text{cosec}^3 x + (x+1)e^x + c$
(b) $y = \frac{1}{5}\cos^5 x - \frac{1}{3}\cos^3 x + (x-1)e^x + c$
(c) $y = -\frac{1}{5}\cos^5 x - \frac{1}{3}\text{cosec}^3 x - (x-1)e^x - c$
(d) None of these

150. 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 these

151. Solution of $(x+y-1)dx + (2x+2y-3)dy = 0$ is **[MP PET 1999]**

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

152. The solution of $\cos(x+y)dy = dx$ is **[DCE 1999]**

(a) $y = \tan\left(\frac{x+y}{2}\right) + c$ (b) $y + \cos^{-1}\left(\frac{y}{x}\right) = c$ (c) $y = x\sec\left(\frac{y}{x}\right) + c$ (d) None of these

153. 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

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

(a) $\tan(x+y)+\sec(x+y) = x+c$
(b) $\tan(x+y)-\sec(x+y) = x+c$
(c) $\tan(x+y)+\sec(x+y)-x+c = 0$
(d) None of these

155. The solution of the differential equation $\log\left(\frac{dy}{dx}\right) = 4x-2y-2$, $y = 1$ when $x = 1$ is

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

156. The solution of the equation $\frac{dy}{dx} = \frac{3x-4y-2}{3x-4y-3}$ is

(a) $(x-y)^2 + c = \log(3x-4y+1)$
(b) $x-y+c = \log(3x-4y+4)$
(c) $(x-y)^2 + c = \log(3x-4y-3)$
(d) $x-y+c = \log(3x-4y+1)$

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

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

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

159. The solution of the equation $\frac{dy}{dx} = \cos(x-y)$ is

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

160. The solution of the differential equation $(x+y)^2\frac{dy}{dx} = a^2$ is **[AMU 2001]**

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

Homogeneous Equation

Basic Level

161. Solution of differential equation $2xy\frac{dy}{dx}=x^2+3y^2$ is (where p is constant) **[MP PET 1993]**

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

162. The solution of the equation $\frac{dy}{dx}=\frac{x+y}{x-y}$ is **[AI CBSE 1990]**

(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 these

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

(a) $ay^2=e^{x^2/y^2}$ (b) $ay=e^{x/y}$ (c) $y=e^{x^2}+e^{y^2}+c$ (d) $y=e^{x^2}+y^2+c$

164. The solution of the equation $\frac{dy}{dx}=\frac{x}{2y-x}$ is

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

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

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

166. The solution of $\frac{dy}{dx}=\left(\frac{y}{x}\right)^{1/3}$ is **[EAMCET 2002]**

(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) $y^{1/3}-x^{1/3}=C$

167. If $y'=\frac{x-y}{x+y}$, then its solution is **[MP PET 2000]**

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

168. The solution of the equation $x\frac{dy}{dx}+3y=x$ is

(a) $x^3y+\frac{x^4}{4}+c=0$ (b) $x^3y+\frac{x^4}{4}+c$ (c) $x^3y+\frac{x^4}{4}=0$ (d) None of these

Advance Level

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

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

170. The general solution of $y^2dx+(x^2-xy+y^2)dy=0$ **[EAMCET 2003]**

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

171. The solution of the differential equation $(x^2+y^2)dx=2xy\,dy$ is **[MP PET 2003]**

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

172. The solution of the equation $x\frac{dy}{dx} = y - x\tan\left(\frac{y}{x}\right)$ is **[Roorkee 1982]**

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

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

(a) $y - \sqrt{x^2 + y^2} = cx^2$ (b) $y + \sqrt{x^2 + y^2} = cx^2$ (c) $y + \sqrt{x^2 + y^2} + cx^2 = 0$ (d) None of these

174. The solution of the differential equation $(3xy + y^2)dx + (x^2 + xy)dy = 0$ is **[AISSE 1990]**

(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

175. 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 **[DCE 2002]**

(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) $y\phi\left(\frac{y}{x}\right) = k$

176. The solution of $(x^3 - 3xy^2)dx = (y^3 - 3x^2y)dy$ is

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

177. The solution $(x^3 + y^3)dx - 3xy^2dy = 0$ is

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

178. Solution of differential equation $\frac{dy}{dx} = \frac{y - x}{y + x}$ is **[MP PET 1997]**

(a) $\log_e(x^2 + y^2) + 2\tan^{-1}\frac{y}{x} + c = 0$ (b) $\frac{y^2}{2} + xy = xy - \frac{x^2}{2} + c$

(c) $\left(1 + \frac{x}{y}\right)y = \left(1 - \frac{x}{y}\right)x + c$ (d) $y = x - 2\log_e y + c$

179. Solution of $(x - y - 1)dx + (4y + x - 1)dy = 0$ is

(a) $\log\{4y^2 + (x - 1)^2\} + \tan^{-1}\{2y/(x - 1)\} = c$ (b) $\log\{4x^2 + (y - 1)^2\} + \tan^{-1}\{2y/(x + 1)\} = c$

(c) $\log\{4y^2 + (x + 1)^2\} + \tan^{-1}\{2y/(x + 1)\} = c$ (d) None of these

180. Solution of $(3y - 7x + 7)dx + (7y - 3x + 3)dy = 0$ is

(a) $(y - x + 1)^2(y + x - 1)^5 = c$ (b) $(y - x + 1)^2(y + x - 1)^3 = c$

(c) $(y + x - 1)^2(y - x + 1)^4 = c$ (d) None of these

181. Solution of $\frac{dy}{dx} = \frac{6x - 2y - 7}{2x + 3y - 6}$ is

(a) $3x^2 - 7xy = c$ (b) $2x - 3y + xy = c$

(c) $3x^2 - 2xy - 7x - \frac{3}{2}y^2 + 6y = c$ (d) None of these

Exact Differentials

Basic Level

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

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

183. The solution of $(x+2y^3)\frac{dy}{dx}=y$ is

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

184. The solution of $(1+xy)y\,dx+(1-xy)x\,dy=0$ is

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

185. The solution of the differential equation $y\,dx+(x+x^2y)dy=0$ is **[AIEEE 2004]**

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

186. The solution of the 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) $e^x(\sin x+\cos x)=c$

187. Solution of the equation $y\,dx-x\,dy+\log x\,dx=0$ is

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

188. Solution of the equation $(x+\log y)dy+y\,dx=0$ is

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

189. Solution of $(xy\cos xy+\sin xy)dx+x^2\cos xy\,dy=0$ is

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

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

(a) $\log x+\frac{x}{y^3}=k$ (b) $\log x+\frac{y^3}{x}=k$ (c) $\log x-\frac{x}{y^3}=k$ (d) $\log xy-y^3=k$

Advance Level

191. The solution of $ye^{-x/y}dx-(xe^{-x/y}+y^3)dy=0$ is

(a) $\frac{y^2}{2}+e^{-x/y}=k$ (b) $\frac{x^2}{2}+e^{-x/y}=k$ (c) $\frac{x^2}{2}+e^{x/y}=k$ (d) $\frac{y^2}{2}+e^{x/y}=k$

192. The solution of the differential equation $x\,dy+y\,dx-\sqrt{1-x^2y^2}\,dx=0$ is

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

193. Solution of the differential equation, $y\,dx-x\,dy+xy^2dx=0$ can be

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

194. The solution of the equation $\frac{dy}{dx}=\frac{(1+x)y}{(y-1)x}$ is **[AISSE 1986; AI CBSE 1982]**

(a) $\log(xy)+x+y=c$ (b) $\log\left(\frac{x}{y}\right)+(x-y)=c$ (c) $\log(xy)+x-y=c$ (d) None of these

195. The general solution of the equation $(e^y+1)\cos x\,dx+e^y\sin x\,dy=0$ is **[SCRA 1986]**

(a) $(e^y+1)\cos x = c$ (b) $(e^y-1)\sin x = c$ (c) $(e^y+1)\sin x = c$ (d) None of these

Linear Equation

Basic Level

196. The solution of differential equation $\frac{dy}{dx}+y=e^x$ is **[AI CBSE 1990]**

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

197. Which of the following equation is non-linear

(a) $\frac{dy}{dx}+\frac{y}{x}=\log x$ (b) $y\frac{dy}{dx}+4x=0$ (c) $dx+dy=0$ (d) $\frac{dy}{dx}=\cos x$

198. The solution of the differential equation $\frac{dy}{dx}+\frac{3x^2}{1+x^3}y=\frac{\sin^2 x}{1+x^3}$ is

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

(c) $y(1+x^3)=cx-\frac{1}{2}\sin 2x$ (d) $y(1+x^3)=\frac{x}{2}-\frac{1}{4}\sin 2x+c$

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

(a) $y\tan x=\sec x+c$ (b) $y\sec x=\tan x+c$ (c) $y\sec x=\cot x+c$ (d) None of these

200. Which of the following equation is linear

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

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

(a) $4xy=x^4+c$ (b) $xy=x^4+c$ (c) $\frac{1}{4}xy=x^4+c$ (d) $xy=4x^4+c$

202. Which of the following equation is non-linear

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

203. The integrating factor of the differential equation $\frac{dy}{dx}=y\tan x-y^2\sec x$, is **[MP PET 1995]**

(a) $\tan x$ (b) $\sec x$ (c) $-\sec x$ (d) $\cot x$

204. $\frac{dy}{dx}+y=\cos x$ is **[AISSE 1990]**

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

(c) $y=\cos x+\sin x+ce^{-x}$ (d) None of these

205. The solution of the equation $x\frac{dy}{dx}+3y=x$ is

(a) $x^3y+\frac{x^4}{4}+c=0$ (b) $x^3y=\frac{x^4}{4}+c$ (c) $x^3y+\frac{x^4}{4}=0$ (d) None of these

206. Integrating factor of the differential equation $\frac{dy}{dx}+y\tan x-\sec x=0$ is **[MP PET 2002]**

(a) $e^{\sin x}$ (b) $\frac{1}{\sin x}$ (c) $\frac{1}{\cos x}$ (d) $e^{\cos x}$

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

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

208. The solution of the differential equation $\frac{dy}{dx} + 2y \cot x = 3x^2 \text{cosec}^2 x$ is

(a) $y \sin^2 x = x^3 + c$ (b) $y \sin x = c$ (c) $y \cos x^2 = c$ (d) $y \sin x^2 = c$

209. The solution of $\frac{dy}{dx} + \frac{y}{3} = 1$ is **[EAMCET 2002]**

(a) $y = 3 + Ce^{x/3}$ (b) $y = 3 + Ce^{-x/3}$ (c) $y = C + e^{x/3}$ (d) $y = C + e^{-x/3}$

210. $y + x^2 = \frac{dy}{dx}$ has the solution **[EAMCET 2002]**

(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) $y^2 + x + x^2 + 2 = Ce^x$

211. Solution of differential equation $x \frac{dy}{dx} = y + x^2$ is **[MP PET 1997]**

(a) $y = \log_e x + \frac{x^2}{2} + a$ (b) $y = \frac{x^3}{3} + \frac{a}{x}$ (c) $y = x^2 + ax$ (d) None of these

212. Which of the following equation is linear

(a) $\sqrt{1 - x^2}\, dx + \sqrt{1 - y^2}\, dy = 0$ (b) $\left(\frac{ds}{dt}\right)^4 + 3s \frac{d^2 s}{dt^2} = 0$

(c) $\frac{1}{x} \frac{d^2 y}{dx^2} = e^x$ (d) $(xy^2 + x)dx + (y - x^2 y)dy = 0$

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

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

214. The integrating factor of the differential equation $x\,dy - y\,dx = xy^2 dx$ is

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

Advance Level

215. The solution of the equation $\frac{dy}{dx} + y \tan x = x^m \cos x$ is

(a) $(m+1)y = x^{m+1} \cos x + c(m+1) \cos x$ (b) $my = (x^m + c) \cos x$

(c) $y = (x^{m+1} + c) \cos x$ (d) None of these

216. An integrating factor for the differential equation $(1 + y^2)dx - (\tan^{-1} y - x)dy = 0$, is **[MP PET 1993]**

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

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

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

218. The solution of the equation $\frac{dy}{dx}=\frac{1}{x+y+1}$ is

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

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

(a) $y\sin x+\cos 2x=2c$ (b) $2y\sin x+\cos x=c$ (c) $y\sin x+\cos x=c$ (d) $2y\sin x+\cos 2x=c$

220. The solution of the equation $(x+2y^3\frac{dy}{dx}-y=0$ is (where A is any arbitrary constant) **[MP PET 1998, 2002]**

(a) $y(1-xy)=Ax$ (b) $y^3-x=Ay$ (c) $x(1-xy)=Ay$ (d) $x(1+xy)=Ay$

221. Solution of the differential equation $y'=y\tan x-2\sin x$, is **[AMU 1999]**

(a) $y=\tan x+2C\cos x$ (b) $y=\tan x+C\cos x$ (c) $y=\tan x-2C\cos x$ (d) None of these

222. The solution of $\frac{dv}{dt}+\frac{k}{m}v=-g$ is

(a) $v=ce^{-\frac{k}{m}t}-\frac{mg}{k}$ (b) $v=c-\frac{mg}{k}e^{-\frac{k}{m}}$ (c) $ve^{-\frac{k}{m}}=c-\frac{mg}{k}$ (d) $ve^{\frac{k}{m}t}=c-\frac{mg}{k}$

223. Integrating factor of differential equation $\cos x\frac{dy}{dx}+y\sin x=1$ is **[MP PET 1996]**

(a) $\cos x$ (b) $\tan x$ (c) $\sec x$ (d) $\sin x$

224. Solution of differential equation $\frac{dy}{dx}+ay=e^{mx}$ is **[MP PET 1996]**

(a) $(a+m)y=e^{mx}+C$ (b) $ye^{ax}=me^{mx}+C$

(c) $y=e^{mx}+Ce^{-ax}$ (d) $(a+m)y=e^{mx}+Ce^{-ax}(a+m)$

225. The solution of $\frac{dy}{dx}+P(x)y=0$ is **[Kerala (Engg.) 2002]**

(a) $y=ce^{\int Pdx}$ (b) $y=ce^{-\int Pdy}$ (c) $y=ce^{-\int Pdx}$ (d) $y=ce^{\int Pdy}$

226. The solution of $\frac{dy}{dx}+y=e^{-x}$, $y(0)=0$ **[Kerala (Enggg.) 2002]**

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

227. Solution of the differential equation $\frac{dy}{dx}+y\sec^2 x=\tan x\sec^2 x$ is **[DCE 2001]**

(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) $ye^{-\tan x}=\tan x-1+c$

228. An integrating factor of the differential equation $\frac{dy}{dx}+\frac{2xy}{1-x^2}=\frac{x}{\sqrt{1-x^2}}$ is **[AMU 1999]**

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

229. The solution of $\left(\frac{dy}{dx}\right)\cdot(x^2y^3+xy)=1$

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

230. An integrating factor of the differential equation $(1-x^2)\frac{dy}{dx}-xy=1$, is **[MP PET 2001]**

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

231. If $y(t)$ is a solution of $(1+t)\frac{dy}{dt}-ty=1$ and $y(0)=-1$, then $y(1)$ is equal to **[IIT Screening 2003]**

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

232. Integrating factor of $\frac{dy}{dx}+\frac{y}{x}=x^3-3$ is **[MP PET 1999]**

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

233. Solution of $\cos x\frac{dy}{dx}+y\sin x=1$ is **[MP PET 1999]**

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

234. If integrating factor of $x(1-x^2)dy+(2x^2y-y-ax^3)dx=0$ is $e^{\int P\,dx}$, then P is equal to **[MP PET 1999]**

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

235. If $y=f(x)$ passing through (1, 2) satisfies the differential equation $y(1+xy)dx-x\,dy=0$, then

(a) $f(x)=\frac{2x}{2-x^2}$ (b) $f(x)=\frac{x+1}{x^2+1}$ (c) $f(x)=\frac{x-1}{4-x^2}$ (d) $f(x)=\frac{4x}{1-2x^2}$

236. Solution of the equation $x(dy/dx)+2y=x^2\log x$ is

(a) $16yx^2=x^4\log(x^4/e)+c$ (b) $yx^2=\frac{1}{4}x^4\log x-\frac{1}{16}x^4+c$

(c) $16yx^2=4x^4\log x-x^4+c$ (d) None of these

237. Solution of the differential equation $x\cos x\left(\frac{dy}{dx}\right)+y(x\sin x+\cos x)=1$ is

(a) $xy=\sin x+c\cos x$ (b) $xy\sec x=\tan x+c$ (c) $xy+\sin x+c\cos x=0$ (d) None of these

238. The solution of the equation $\frac{dy}{dx}-3y=\sin 2x$ is

(a) $ye^{-3x}=-\frac{1}{13}e^{-3x}(2\cos 2x+3\sin 2x)+c$ (b) $y=-\frac{1}{13}(2\cos 2x+3\sin 2x)+ce^{3x}$

(c) $y=\{-1/\sqrt{13}\}\cos(2x-\tan^{-1}(3/2))+ce^{3x}$ (d) $y=\{-1/\sqrt{13}\}\sin(2x-\tan^{-1}(2/3))+ce^{3x}$

239. Solution of the equation $\frac{dy}{dx}+\frac{1}{x}\tan y=\frac{1}{x^2}\tan y\sin y$ is

(a) $2x=\sin y(1+2cx^2)$ (b) $2x=\sin y(1+cx^2)$ (c) $2x+\sin y(1+cx^2)=0$ (d) None of these

240. Solution of the differential equation $(1+y^2)dx=(\tan^{-1}y-x)dy$ is

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

(c) $x=\tan^{-1}y-1+ce^{-\tan^{-1}y}$ (d) None of these

Application of Differential Equation

Basic Level

241. The equation of the curve which passes through the point (1, 1) and whose slope is given by $\frac{2y}{x}$, is **[Roorkee 1987]**

(a) $y = x^2$ (b) $x^2 - y^2 = 0$ (c) $2x^2 + y^2 = 3$ (d) None of these

242. Equation of curve through point (1, 0) which satisfies the differential equation $(1+y^2)dx - xy\,dy = 0$, is **[JEE West Bengal 1986]**

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

243. Equation of curve passing through (3, 9) which satisfies the differential equation $\frac{dy}{dx} = x + \frac{1}{x^2}$, is **[JEE West Bengal 1990]**

(a) $6xy = 3x^2 - 6x + 29$ (b) $6xy = 3x^3 - 29x + 6$ (c) $6xy = 3x^3 + 29x - 6$ (d) None of these

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

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

245. The equation of a curve passing through $\left(2, \frac{7}{2}\right)$ and having gradient $1 - \frac{1}{x^2}$ at (x, y) is

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

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

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

247. 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) $x^2 = y - 5$

248. Solution of differential equation $x\,dy - y\,dx = 0$ represents **[MP PET 1996]**

(a) Rectangular hyperbola (b) Straight line passing through origin

(c) Parabola whose vertex is at origin (d) Circle whose centre is at origin

249. 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) $y_1 y^2 + xy + a^2x^2 = 0$

(c) $y_1(y^2 - x^2 + a^2) + 2xy = 0$ (d) None of these

Advance Level

250. If the gradient of the tangent at any point (x, y) of a curve which passes through the point $\left(1, \frac{\pi}{4}\right)$ is $\left\{\frac{y}{x} - \sin^2\left(\frac{y}{x}\right)\right\}$, then the equation of the curve is **[MP PET 1998]**

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

251. The differential equation of displacement 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) $\frac{d^2x}{dt^2} + \frac{1}{n^2}x = 0$

252. 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 **[Orissa JEE 2003]**

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

253. If rate of decrement of N with time is proportional to N, k being proportionality constant, the solution of the differential equation formed is

(a) $N = N_0 + e^{-kt}$ (b) $N = N_0 + e^{kt}$ (c) $N = N_0 e^{kt}$ (d) $N = N_0 e^{-kt}$

254. The family of curves represented by $\frac{dy}{dx} = \frac{x^2+x+1}{y^2+y+1}$ and the family represented by $\frac{dy}{dx} + \frac{y^2+y+1}{x^2+x+1} = 0$

(a) Touch each other (b) Are orthogonal (c) Are one and the same (d) None of these

255. The equation of the curve whose subnormal is constant is

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

256. The curve for which the normal at any point (*x*, *y*) and the line joining origin to that point form an isosceles triangle with the *x*-axis as base is

(a) An ellipse (b) A rectangular hyperbola (c) A circle (d) None of these

257. 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) $a = 2, b = 1$

258. 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) $y = x^2 + 3x + 2$ (b) $y^2 = x^2 + 3x + 1$ (c) $y = x^3 + 3x + 1$ (d) None of these

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

(a) e^2 (b) $2e^2$ (c) $3e^2$ (d) $2e^3$

260. If *f*(*x*), *g*(*x*) be twice differentiable functions on [0, 2] satisfying $f''(x) = g''(x)$, $f'(1) = 2g'(1) = 4$ and $f(2) = 3, g(2) = 9$, then $f(x) - g(x)$ at $x = 4$ equals

(a) 0 (b) 10 (c) 8 (d) 2

261. 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

262. 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 **[AMU 2000]**

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

263. 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 **[MP PET 2002]**

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

264. 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 equal to **[MP PET 2000]**

(a) – 5/3 (b) – 1 (c) 1 (d) 5/3

Miscellaneous Differential Equation

Basic Level

265. The solution of the differential equation $x\frac{d^2y}{dx^2} = 1$, given that $y = 1$, $\frac{dy}{dx} = 0$ when $x = 1$, is

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

266. the solution of the equation $\frac{d^2y}{dx^2} = -\frac{1}{x^2}$ is **[MP PET 2003]**

(a) $y = \log x + c_1x + c_2$ (b) $y = -\log x + c_1x + c_2$ (c) $y = \frac{-1}{x} + c_1x + c_2$ (d) None of these

267. The solution of the differential equation $\cos^2 x \frac{d^2y}{dx^2} = 1$ is

(a) $y = \log \cos x + cx$ (b) $y = \log \sec x + c_1x + c_2$ (c) $y = \log \sec x - c_1x + c_2$ (d) None of these

268. The solution of $y' - y = 1$, $y(0) = -1$ is given by $y(x) =$ **[MP PET 2000]**

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

269. The number of solutions of $y' = \frac{y+1}{x-1}, y(1) = 2$ is **[MP PET 2000]**

(a) None (b) One (c) Two (d) Infinite

270. The solution of $y' = 1 + x + y^2 + xy^2, y(0) = 0$ is **[MP PET 2000]**

(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) $y = \tan\left(x + \frac{x^2}{2}\right)$

271. $\frac{d^2y}{dx^2} = 0$, then **[UPSEAT 1999]**

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

Advance Level

272. The solution of the equation $\frac{d^2y}{dx^2} = e^{-2x}$ **[AIEEE 2002]**

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

273. If $x^2 + y^2 = 1$ then $\left(y' = \frac{dy}{dx}, y'' = \frac{d^2y}{dx^2}\right)$ **[IIT Screening 2000]**

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

274. If $\frac{d^2y}{dx^2} + \sin x = 0$, then the solution of the differential equation is **[Karnataka CET 2000]**

(a) $\sin x$ (b) $\cos x$ (c) $\tan x$ (d) $\log \sin x$

275. If $y^2 = ax^2 + bx + c$, then $y^3 \frac{d^2y}{dx^2}$ is **[DCE 1999]**

(a) A constant (b) A function of x only (c) A function of y only (d) A function of x and y

276. If $\frac{dy}{dx} = e^{-2y}$ and $y = 0$ when $x = 5$, then value of x for $y = 3$ is **[MP PET 2001]**

(a) e^5 (b) $e^6 + 1$ (c) $\frac{e^6 + 9}{2}$ (d) $\log_e 6$

277. 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

278. Solution of the differential equation $\sin\frac{dy}{dx}=a$ with $y(0)=1$ is **[Kurukshetra CEE 1998]**

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

279. If $y=ax^{n+1}+bx^{-n}$, then $x^2\frac{d^2y}{dx^2}$ equals to **[Rajasthan PET 2001]**

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

280. The solution of $\frac{d^2y}{dx^2}=\cos x-\sin x$ is

(a) $y=-\cos x+\sin x+c_1x+c_2$ (b) $y=-\cos x-\sin x+c_1x+c_2$

(c) $y=\cos x-\sin x+c_1x^2+c_2x$ (d) $y=\cos x+\sin x+c_1x^2+c_2x$

281. The solution of $\frac{d^2y}{dx^2}=\sec^2 x+xe^x$ is **[DSSE 1985]**

(a) $y=\log(\sec x)+(x-2)e^x+c_1x+c_2$ (b) $y=\log(\sec x)+(x+2)e^x+c_1x+c_2$

(c) $y=\log(\sec x)-(x+2)e^x+c_1x+c_2$ (d) None of these

282. 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 **[MP PET 2001]**

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

283. A solution of the differential equation $\left(\frac{dy}{dx}\right)^2-x\frac{dy}{dx}+y=0$ is **[IIT 1999; Karnataka CET 2002]**

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

284. If $\phi(x)=\int\{\phi(x)\}^{-2}dx$ and $\phi(1)=0$ then $\phi(x)=$

(a) $\{2(x-1)\}^{1/4}$ (b) $\{5(x-2)\}^{1/5}$ (c) $\{3(x-1)\}^{1/3}$ (d) None of these

285. Solution of the differential equation $\sin y\frac{dy}{dx}=\cos y(1-x\cos y)$ is

(a) $\sec y=x-1-ce^x$ (b) $\sec y=x+1+ce^x$ (c) $y=x+e^x+c$ (d) None of these

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Answer Sheet

Assignment (Basic and Advance Level)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
b	c	a	a	d	d	a	c	b	d	a	c	d	d	d	b	d	a	b	c
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
a	a	a	d	a	a	c	a	a	c,d	c	a	c	c	b	a	c	b	c	c
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
a	c	c	a	b	a	a	a	a	a	c	d	d	b	c	c	b	c	d	b
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
a	c	a	a	b	b	b	a	c	b	c	a	b	a	c	d	c	b	a	a
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
a	c	a	c	a,c	a	a	a	c	a	a	b	a	b	a	b	b	a	b	a
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
c	a	c	d	c	c	b	a	a	a	c	d	b	b	d	d	b	c	a	a
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
a	c	d	b	a	a	b	d	c	b	a,b,c	b	a	d	b	c	a	a	c	a
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
a	a	a	d	d	c	a	b	b	c	c	a	b	b	c	d	b	c	b	d
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
d	b	a	a	b	c	a	d	a	a	b	c	b	a	a	d	a	a	a	a
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
c	a	a	b	b	b	a	b	a	b	a	b	a	c	c	c	b	d	b	b
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
a	d	b	a	b	c	c	a	b	a	c	c	a	b	a	b	a	a	d	b
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
d	a	c	d	c	d	a	b	a	c	a	a	b	d	a	a,b,c	a,b	a,b,c,d	a,b	b,c
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260
a	b	c	a	b	a	c	b	c	c	b	c	d	b	b	b	c	c	b	b
261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280
c	c	a	c	b	a	b,c	c	a	d	a	b	b	a	a	c	a	b	b	a
281	282	283	284	285															
a	c	c	c	b															