OBJECTIVE TYPE QUESTIONS

Unit - 1 (Functions and Limits)

TYPE - 1 : [Multiple Choice Questions (M. C. Qs)].

Each question has four possible answers. Tick (√) the correct one.

1. The function $I(x) = x$ is called :

   (a) A linear function (b) An identity function
   (c) A quadratic function (d) A cubic function

2. If y is expressed in terms of a variable x as $y = f(x)$, then y is called :

   (a) An explicit function (b) An implicit function
   (c) A linear function (d) An identity function

3. $\text{Cossh}^2 x - \sinh^2 x =$?

   (a) -1 (b) 0 (c) 1 (d) none of these

4. cosech$x$ is equal to

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

5. $\lim\limits_{x \to a} \dfrac{x^3 - a^3}{x - a} = ?$

   (a) undefined (b) $3a^2$ (c) a^2 (d) 0

6. $\lim\limits_{x \to 0} (1 + x)^{\frac{1}{x}} = ?$

   (a) $\dfrac{1}{e}$ (b) e (c) e^2 (d) undefined

7. The notation : $y = f(x)$ was invented by

   (a) Leibnitz (b) Euler (c) Newton (d) Lagrange

8. If $f(x) = x^2 - 2x + 1$, then $f(0) = ?$

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

9. When we say that f is a function from set X to set Y, then set X is called

(a) Domain of f (b) Range of f

(c) Codomain of f (d) none of these

10. The term " function " was recognised by —— to describe the dependence of one quantity on another :

(a) Leibnitz (b) Euler (c) Newton (d) Lagrange

11. If $f(x) = x^2$ then range of f is :

(a) $[0,\infty[$ (b) $]-\infty,0]$ (c) $]0,\infty[$ (d)+ve real numbers

12. If $f(x) = \frac{x}{x^2-4}$ then domain of f :

(a) All real numbers (b) All real numbers except 0

(c) All real numbers except – 2, 2 (d) only +ve real numbers

13. If a graph expresses a function, then a vertical line must cut the graph at

(a) One point only (b) Two points

(c) More than two points (d) No point

14. If $f(x) = \begin{cases} x & , \text{ when } 0 \le x \le 1 \\ x-1 & , \text{ when } 1 < x \le 2 \end{cases}$, then domain of f is :

(a) $[0,2]$ (b) $(0,2)$ (c) $[1,2]$ (d) all real numbers

15. The graph of a linear equation is always a

(a) straight line (b) parabola

(c) circle (d) cube

16. The domain and range of the identity function , $I : X \longrightarrow X$ is :

(a) X (b) +ve real number

(c) –ve real number (d) integer

17. The linear function $f(x) = ax + b$ is constant function if

(a) $a \neq 0, b = 1$ (b) $a = 1, b = 0$

(c) $a = 1, b = 1$ (d) $a = 0$

18. The linear function $f(x) = ax + b$ is identity function if

(a) $a \neq 0, b = 1$ (b) $a = 1, b = 0$

(c) $a = 1, b = 1$ (d) $a = 0$

19. If $y = \cos x$, domain = R, then range is

(a) $]-1, 1[$ (b) $[-1, 1]$ (c) $R-[-1, 1]$ (d) $R-]-1, 1[$

20. If $y = \tan x$, domain $= \left\{ x \mid x \in R, x \neq (2n+1)\frac{\pi}{2}, n \text{ integer} \right\}$, then range is

(a) $]-1, 1[$ (b) $[-1, 1]$ (c) $R-[-1, 1]$ (d) all real numbers

21. If $y = \sec x$, domain $= \left\{ x \mid x \in R, x \neq (2n+1)\frac{\pi}{2}, n \text{ integer} \right\}$, then range is

(a) $]-1, 1[$ (b) $[-1, 1]$ (c) $R-[-1, 1]$ (d) $R-]-1, 1[$

22. If $y = \cot x$, domain $= \left\{ x \mid x \in R, x \neq n\pi, n \text{ integer} \right\}$, then range is

(a) $y \geq 1, y \leq -1$ (b) $y \leq 1, y \geq -1$

c) $y < 1, y > -1$ (d) all real numbers

23. If $y = \operatorname{cosec} x$ domain $= \left\{ x \mid x \in R, x \neq n\pi, n \text{ integer} \right\}$, then range is

(a) $y \geq 1, y \leq -1$ (b) $y \leq 1, y \geq -1$

c) $y < 1, y > -1$ (d) all real numbers

24. If $x = a^y$, then $y = \log_a x$ is called logarithmic function when

(a) $a < 0$ (b) $a = 0$ (c) $a > 0$ (d) $a > 0, a \neq 1$

25. If $\cosh x = \dfrac{e^x + e^{-x}}{2}$, then its domain is set of all real numbers and range is

(a) set of all real numbers (b) set of +ve real numbers

(c) $[1, \infty]$ (d) $[-\infty, 1]$

26. In logarithmic form, $\sinh^{-1}x$ can be written as

(a) $ln\left(x + \sqrt{x^2+1}\right)$ (b) $ln\left(x + \sqrt{x^2-1}\right)$

(c) $ln\left(x - \sqrt{x^2+1}\right)$ (d) $ln\left(x - \sqrt{x^2-1}\right)$

27. In logarithmic form, $\cosh^{-1}x$ can be written as

(a) $ln\left(x + \sqrt{x^2+1}\right)$ (b) $ln\left(x + \sqrt{x^2-1}\right)$

(c) $ln\left(x - \sqrt{x^2+1}\right)$ (d) $ln\left(x - \sqrt{x^2-1}\right)$

28. In logarithmic form, $\tanh^{-1}x$ can be written as

(a) $\frac{1}{2}\ ln\left(\frac{1+x}{1-x}\right)$, $|x|<1$ (b) $\frac{1}{2}\ ln\left(\frac{x+1}{x-1}\right)$, $|x|<1$

(c) $ln\left(\frac{1}{x}+\frac{\sqrt{1-x^2}}{x}\right)$, $0\le x\le 1$ (d) $ln\left(\frac{1}{x}+\frac{\sqrt{1+x^2}}{|x|}\right)$, $x\ne 0$

29. In logarithmic form, $\coth^{-1}x$ can be written as

(a) $\frac{1}{2}\ ln\left(\frac{1+x}{1-x}\right)$, $|x|<1$ (b) $\frac{1}{2}\ ln\left(\frac{x+1}{x-1}\right)$, $|x|<1$

(c) $ln\left(\frac{1}{x}+\frac{\sqrt{1-x^2}}{x}\right)$, $0\le x\le 1$ (d) $ln\left(\frac{1}{x}+\frac{\sqrt{1+x^2}}{|x|}\right)$, $x\ne 0$

30. In logarithmic form, $\text{sech}^{-1}x$ can be written as

(a) $\frac{1}{2}\ ln\left(\frac{1+x}{1-x}\right)$, $|x|<1$ (b) $\frac{1}{2}\ ln\left(\frac{x+1}{x-1}\right)$, $|x|<1$

(c) $ln\left(\frac{1}{x}+\frac{\sqrt{1-x^2}}{x}\right)$, $0\le x\le 1$ (d) $ln\left(\frac{1}{x}+\frac{\sqrt{1+x^2}}{|x|}\right)$, $x\ne 0$

31. In logarithmic form, $\text{cosech}^{-1}x$ can be written as

(a) $\frac{1}{2}\log\left(\frac{1+x}{1-x}\right)$, $|x|<1$ (b) $\frac{1}{2}\log\left(\frac{x+1}{x-1}\right)$, $|x|<1$

(c) $\log\left(\frac{1}{x}+\frac{\sqrt{1-x^2}}{x}\right)$, $0\le x\le 1$ (d) $\log\left(\frac{1}{x}+\frac{\sqrt{1+x^2}}{|x|}\right)$, $x\ne 0$

32. $x^2+xy+y^2=2$ is an example of

(a) linear function (b) quadratic function

(c) explicit function (d) implicit function

33. $x=at^2$, $y=2at$ are the parametric equations of

(a) circle (b) parabola (c) ellipse (d) hyperbola

34. $x=a\cos\theta$, $y=a\sin\theta$ are the parametric equations of

(a) circle (b) parabola (c) ellipse (d) hyperbola

35. $x=a\cos\theta$, $y=b\sin\theta$ are the parametric equations of

(a) circle (b) parabola (c) ellipse (d) hyperbola

36. $x=a\sec\theta$, $y=b\tan\theta$ are the parametric equations of

(a) circle (b) parabola (c) ellipse (d) hyperbola

37. The function, $f(x) = 3x^4 + 7 - 2x^2$ is

(a) even (b) odd (c) neither (d) none of these

38. The function, $f(x) = \sin x + \cos x$ is

(a) even (b) odd (c) neither (d) none of these

39. If $f(x) = 2x + 1$, $g(x) = x^2 - 1$, then $(fog)(x) = ?$

(a) $2x^2 - 1$ (b) $4x^2 + 4x$ (c) $4x + 3$ (d) $x^4 - 2x^2$

40. If $f(x) = 2x + 3$, $g(x) = x^2$, then $(gof)(x) = ?$

(a) $2x^2 - 1$ (b) $4x^2 + 4x$ (c) $4x + 3$ (d) $x^4 - 2x^2$

41. If $f(x) = 2x + 3$, $g(x) = x^2$, then $(fof)(x) = ?$

(a) $2x^2 - 1$ (b) $4x^2 + 4x$ (c) $4x + 3$ (d) $x^4 - 2x^2$

42. If $f(x) = 2x + 3$, $g(x) = x^2$, then $(gog)(x) = ?$

(a) $2x^2 - 1$ (b) $4x^2 + 4x$ (c) $4x + 3$ (d) $x^4 - 2x^2$

43. The inverse of a function exists only if it is

(a) an into function (b) an onto function

(c) (1–1) and onto function (d) trigonometric function

44. If $f(x) = 2 + \sqrt{x-1}$, then domain of $f^{-1} = ?$

(a) $]2, \infty[$ (b) $[2, \infty[$ (c) $[1, \infty[$ (d) $]1, \infty[$

45. If $f(x) = 2 + \sqrt{x-1}$, then range $f^{-1} = ?$

(a) $]2, \infty[$ (b) $[2, \infty[$ (c) $[1, \infty[$ (d) $]1, \infty[$

46. $\lim\limits_{x \to 0} \dfrac{\sin x}{x} = 1$ if and only if

(a) x is an obtuse angle (b) x is a right angle

(c) $0 < x < \frac{\pi}{2}$ (d) $x \in \left(-\frac{\pi}{2}, 0\right)$ and $\left(0, \frac{\pi}{2}\right)$

47. A function $f(x)$ is said to be continuous at $x = c$, if

(a) $\lim\limits_{x \to c} f(x)$ exists (b) $f(c)$ is defined

(c) $\lim\limits_{x \to c} f(x) = f(c)$ (d) All of these

48. $f(x) = ax + b$ with $a \neq 0$ is

(a) A linear function (b) A quadratic function

(c) A constant function (d) An identity function

49. If $f: X \to Y$ is a function, then the subset of Y containing all the images is called :

(a) domain of f (b) range of f (c) co domain of f (d) subset of X

50. The graph of $2x - 10 = 0$ is a line

(a) parallel to x-axis (b) parallel to y-axis

(c) inclined at angle θ (d) through I^{st} and 2^{nd} quadrants

51. $\operatorname{cosech} x$ is equal to

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

52. $\dfrac{e^{2x} + e^{-2x}}{e^{2x} - e^{-2x}}$ is equal to

(a) $\sinh 2x$ (b) $\cosh 2x$ (c) $\tanh 2x$ (d) $\coth 2x$

53. The function $f(x) = \dfrac{1}{x+1}$ is discontinuous at $x =$

(a) 1 (b) -1 (c) 0 (d) all real numbers

54. If $f(x) = x^3 - 2x^2 + 4x - 1$, then, $f(-1) =$

(a) 8 (b) -8 (c) 0 (d) -6

55. The quantity which is used as a variable as well as constant is called

(a) Parameter (b) Constraint (c) Real number (d) Non of these

56. If $f(x) = \dfrac{x-1}{x+4}$, $x \neq -4$, then range of f is

(a) $R - \{1\}$ (b) $R - \{-4\}$ (c) $R - \{0\}$ (d) all real numbers

57. $\lim\limits_{x \to -\infty} e^x =$

(a) 1 (b) ∞ (c) 0 (d) -1

58. $\lim\limits_{x \to 0} \dfrac{\sin(x-3)}{x-3} =$

(a) 1 (b) ∞ (c) $\dfrac{\sin 3}{3}$ (d) -3

59. $\lim\limits_{x \to a} \dfrac{\sin(x-a)}{x-a} =$

(a) 1 (b) ∞ (c) $\dfrac{\sin a}{a}$ (d) 0

60. $f(x) = x^3 + x$ is:

(a) Even (b) Neither even nor odd (c) Odd (d) None of these

61. $\lim\limits_{x\to 0}(1+x)^{\frac{1}{x}}$ is equal to :

(a) e (b) e^{-1} (c) 0 (d) 1

62. If f : X → Y is a function ,then elements of x are called

(a) Images (b) Pre – images (c) Constants (d) Ranges

63. $\lim\limits_{x\to 0}\left(\frac{x}{1+x}\right)^{x}$

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

64. If the degree of a polynomial function is 1, then it is a.

(a) Identity function (b) Constant function

(c) Linear function (d) Exponential function

65. $f(x) = \text{Sin } x + \text{Cos } x$ is :

(a) Even function (b) Odd function

(c) Even & odd function (d) Neither even nor odd function

66. Cos h^2 x + Sin h^2 x =

(a) 1 (b) Cos h 2x (c) Sin h 2x (d) 0

67. If f (x) = $x^2 - 2x + 1$ then f (0) =

(a) – 1 (b) 0 (c) 1 (d) 2

68. $\lim\limits_{x\to 0}\frac{x}{\sin x}$ is equal to

(a)0 (b) 1 (c) –1 (d) Undefined

69. The function of the form, x = a cos t :

(a) Odd function (b) Explicit function (c) Parametric function (d) Even

70. If f (x) = $\sqrt{x+2}$ then range of f^{-1} is:

(a) [– 2 , + ∞) (b) [2 , + ∞) (c) (– ∞ , ∞) (d) [1, + ∞)

71. $\lim\limits_{x\to -\infty}\frac{-5}{\sqrt{x}}$ is equal to:

(a) 0 (b) – ∞ (c) + ∞ (d) Not exists

72. The volume V of a cube as a function of the area A of its base is:

(a) $(A)^{5/2}$ (b) $\sqrt{A}$ (c) $A^{3/2}$ (d) $2\sqrt{A}$

73. $\lim\limits_{x\to 0}\frac{a^x - 1}{x}$ is equal to

(a) $\log_e x$ (b) $\log_a x$ (c) a (d) $\log_e a$

74. $\lim\limits_{x\to 0}\frac{\sin x^\circ}{x}$ is equal to :

(a) $\frac{\pi}{180}$ (b) $\frac{180}{\pi}$ (c) 180π (d) 1

75. If $f(x) = x \text{ Sec } x$ then $f(\pi)$ =

(a) -2π (b) $-\pi$ (c) π (d) 2π

Unit – 2 (Differentiation)

TYPE – 1 : [Multiple Choice Questions (M. C. Qs)].

1. $\frac{d}{dx}\tan 3x = ?$

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

2. $\frac{d}{dx} 2^x = ?$

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

3. If $y = e^{2x}$, then $y_2 = ?$

(a) e^{2x} (b) $2e^{2x}$ (c) $4e^{2x}$ (d) $16e^{2x}$

4. $\frac{d}{dx}(ax+b)^n = ?$

(a) $n(a^{n-1}x+b)$ (b) $n(ax+b)^{n-1}$ (c) $n(a^{n-1}x)$ (d) $na(ax+b)^{n-1}$

5. The change in variable x is called increment of x. It is denoted by δx which is

(a) +ve only (b) –ve only (c) +ve or –ve (d) none of these

6. The notation $\frac{dy}{dx}$ or $\frac{df}{dx}$ is used by

(a) Leibnitz (b) Newton (c) Lagrange (d) Cauchy

7. The notation $\dot{f}(x)$ is used by

(a) Leibnitz (b) Newton (c) Lagrange (d) Cauchy

8. The notation $f'(x)$ or y' is used by

(a) Leibnitz (b) Newton (c) Lagrange (d) Cauchy

9. The notation $Df(x)$ or Dy is used by

(a) Leibnitz (b) Newton (c) Lagrange (d) Cauchy

Note. The symbol "$\frac{dy}{dx}$" is used for derivative of y w.r.t. "x". Here it is not the quotient of dy and dx.

10. $\lim_{x \to a} \frac{f(x)-f(a)}{x-a} = ?$

(a) $f'(x)$ (b) $f'(a)$ (c) $f(0)$ (d) $f(x-a)$

11. $\frac{d}{dx}(x^n) = nx^{n-1}$ is called :

(a) power rule (b) product rule

(c) quotient rule (d) constant rule

12. $\frac{d}{dx}(ax+b)^n = na(ax+b)^{n-1}$ is valid only when n must be :

(a) a real number (b) a rational number

(c) an imaginary number (d) an irrational number

13. $\frac{d}{dx}(\sin a) = ?$

(a) $\cos a$ (b) $a \cos a$ (c) 0 (d) $-a \cos a$

14. $\frac{d}{dx}[f(x)+g(x)] = ?$

(a) $f'(x)+g'(x)$ (b) $f'(x)-g'(x)$

(c) $f(x)\ g'(x)+f'(x)\ g(x)$ (d) $f(x)\ g'(x)-f'(x)\ g(x)$

15. $[f(x)g(x)]' = ?$

(a) $f'(x)+g'(x)$ (b) $f'(x)-g'(x)$

(c) $f(x)\ g'(x)+f'(x)\ g(x)$ (d) $f(x)\ g'(x)-f'(x)\ g(x)$

Remember that $[f(x)g(x)]' = \frac{d}{dx}\left[f(x)g(x)\right]$.

16. $\frac{d}{dx}\left[\frac{1}{g(x)}\right] = ?$

(a) $\frac{1}{[g(x)]^2}$ (b) $\frac{1}{g'(x)}$ (c) $\frac{g'(x)}{[g(x)]^2}$ (d) $\frac{-g'(x)}{[g(x)]^2}$

17. If $f(x) = \frac{1}{x}$, then $f''(a) = ?$

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

18. $(fog)'(x) = ?$

(a) $f'g'$ (b) $f'(g(x))$

c) $f'(g(x))\,g'(x)$ (d) cannot be calculated

Remember that $(fog)'(x) = \frac{d}{dx}\left[(fog)'(x)\right]$.

19. $\frac{d}{dx}(g(x))^n = ?$

(a) $n[g(x)]^{n-1}$ (b) $n[g(x)]^{n-1}g(x)$

(c) $n[g(x)]^{n-1}.g'(x)$ (d) $[g(x)^{n-1}]g'(x)$

20. $\frac{d}{dx}\sec^{-1}x = ?$

(a) $\frac{1}{|x|\sqrt{x^2-1}}$ (b) $\frac{-1}{|x|\sqrt{x^2-1}}$

(c) $\frac{1}{|x|\sqrt{1+x^2}}$ (c) $\frac{-1}{|x|\sqrt{1+x^2}}$

21. $\frac{d}{dx}\text{cosec}^{-1}x = ?$

(a) $\frac{1}{|x|\sqrt{x^2-1}}$ (b) $\frac{-1}{|x|\sqrt{x^2-1}}$

(c) $\frac{1}{|x|\sqrt{1+x^2}}$ (c) $\frac{-1}{|x|\sqrt{1+x^2}}$

22. The function $f(x) = a^x$, $a > 0, a \neq 0$, and x is any real number is called

(a) Exponential function (b) logarithmic function

(c) algebraic function (d) composite function

23. If $a > 0, a \neq 1$, and $x = a^y$, then the function defined by $y = \log_a x$ $(x > 0)$ is a logarithmic function with base

(a) 10 (b) e (c) a (d) x

24. $\log_a a = ?$

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

25. $\frac{d}{dx}\log_{10}x = ?$

(a) $\frac{1}{x}\log 10$ (b) $\frac{1}{x\ln 10}$ (c) $\frac{\ln x}{x\ln x}$ (d) $\frac{\ln 10}{x\ln x}$

26. $\frac{d}{dx}\ln[f(x)] = ?$

(a) $f'(x)$ (b) $\ln f'(x)$ (c) $\frac{f'(x)}{f(x)}$ (d) $f(x).f'(x)$

27. y = $\sinh^{-1}x$ if and only if $x = \sinh y$ is valid when

(a) $x > 0, y > 0$ (b) $x < 0, y < 0$

(c) $x \in R, y > 0$ (d) $x \in R, y \in \mathrm{R}$

28. $y = \cosh^{-1}x$ if and only if $x = \cosh y$ is valid when

(a) $x \in [1, \infty), y \in [0, \infty)$ (b) $x \in (1, \infty], y \in (0, \infty]$

(c) $x < 0, y < 0$ (d) $x \in R, y \in \mathrm{R}$

29. $y = \tanh^{-1}x$ if and only if $x = \tanh y$ is valid when

(a) $x \in R, y \in R$ (b) $x \in]-1, 1[, y \in R$

(c) $x \in [-1, 1], y \in R$ (d) $x > 0, y > 0$

30. $y = \coth^{-1}x$ if and only if $x = \coth y$ is valid when

(a) $x \in R, y \in R$ (b) $x \in]-1, 1[, y \in R$

(c) $x \in [-1, 1]', y \in R - \{0\}$ (d) $x > 0, y > 0$

31. $y = \operatorname{sech}^{-1}x$ if and only if $x = \operatorname{sech} y$ is valid when

(a) $x \in R, y \in R$ (b) $x \in [-1, 1], y \in R$

(c) $x \in]-1, 1[, y \in R$ (d) $x \in (0, 1], y \in [0, \infty\}$

32. $y = \operatorname{cosech}^{-1}x$ if and only if $x = \operatorname{cosech} y$ is valid when

(a) $x \in R, y \in R$ (b) $x \in R - \{0\}, y \in R - \{0\}$

(c) $x \in [-1, 1], y \in R$ (d) $x \in (0, 1], y \in [0, \infty]$

33. If $y = \sinh^{-1}(ax + b)$, then $\dfrac{dy}{dx} = ?$

(a) $\cosh^{-1}(ax + b)$ (b) $\dfrac{1}{\sqrt{1 + (ax + b)^2}}$

(c) $\dfrac{a}{\sqrt{1 + (ax + b)^2}}$ (d) $a \cosh^{-1}(ax + b)$

34. If $y = \cosh^{-1}(\sec x)$, then $\dfrac{dy}{dx} = ?$

(a) $\cos x$ (b) $\sec x$

(c) $-\sin(\sec x)$ (d) $-\sinh^{-1}(\sec x) . \tan x$

35. If $y = e^{-ax}$, then $y_2 = ?$

(a) $-a\, e^{-ax}$ (b) $-a^2 e^{-ax}$ (c) $a^2 e^{-ax}$ (d) $a^2 e^{ax}$

36. If $y = e^{-ax}$, then $y\dfrac{dy}{dx} = ?$

(a) $-a\, e^{-2ax}$ (b) $-a\, e^{2ax}$ (c) $a^2 e^{-2ax}$ (d) $-a^2 e^{-2ax}$

37. If $y = \cos(ax + b)$, then $y_2 = ?$

(a) $a^2 \sin(ax + b)$ (b) $-a^2 \sin(ax + b)$

(c) $-a^2 \cos(ax + b)$ (d) $a^2 \cos(ax + b)$

38. $f(x) = f(0) + x f'(x) + \dfrac{x^2}{2!} f''(0) + \ldots + \dfrac{x^n}{n!} f^{(n)}(0) + \ldots$ is called

(a) Maclaurin's series expansion (b) Taylor's series expansion

(c) Taylor's Theorem (d) convergennt series

39. $1 - x + x^2 - x^3 + x^4 - ... = ?$

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

[**Hint**: Use $S_\infty = \frac{a}{1-r}$, with $a = 1, r = -x$]

40. $\left.\frac{dy}{dx}\right|_{(x_1, y_1)}$ represents

(a) increments of x and y at (x_1, y_1) (b) slope of tangent at (x_1, y_1)

(c) slope of normal at (x_1, y_1) (d) slope of horizontal line at (x_1, y_1)

41. f is said to be increasing on $]a, b[$ if for $x_1, x_2 \in]a, b[$

(a) $f(x_2) > f(x_1)$ whenever $x_2 > x_1$

(b) $f(x_2) > f(x_1)$ whenever $x_2 < x_1$

(c) $f(x_2) < f(x_1)$ whenever $x_2 > x_1$

(d) $f(x_2) < f(x_1)$ whenever $x_2 < x_1$

42. f is said to be decreasing on $]a, b[$ if for $x_1, x_2 \in]a, b[$

(a) $f(x_2) > f(x_1)$ whenever $x_2 > x_1$

(b) $f(x_2) > f(x_1)$ whenever $x_2 < x_1$

(c) $f(x_2) < f(x_1)$ whenever $x_2 > x_1$

(d) $f(x_2) < f(x_1)$ whenever $x_2 < x_1$

43. If a function f is increasing within $]a, b[$, then slope of the tangent to its graph within $]a, b[$ remains

(a) positive (b) negative (c) zero (d) undefined

44. If a function f is decreasing within $]a, b[$, then slope of the tangent to its graph within $]a, b[$ remains

(a) positive (b) negative (c) zero (d) undefined

45. A point where Ist derivative of a funcion is zero, is called

(a) stationary point (b) corner point

(c) point of concurrency (d) common point

46. $f(x) =$ sin x is

(a) linear finction (b) odd function

(c) even function (d) identity function

47. The maximum value of the function : $f(x) = x^2 - x - 2$ is

(a) $-\frac{9}{2}$ (b) $-\frac{9}{4}$ (c) -1 (d) 0

48. $\frac{d}{dx}(\cos x) - \frac{d^2}{dx^2}(\sin x) = ?$

(a) $2 \sin x$ (b) $2 \cos x$ (c) 0 (d) $-2 \sin x$

49. If $f(x) = x^3 + 2x + 9$, then $f''(x) = ?$

(a) $3x^2 + 2$ (b) $3x^2$ (c) $6x$ (d) $2x$

50. $\frac{d}{dx}(10^{\sin x}) = ?$

(a) $10^{\cos x}$ (b) $10^{\sin x} . \cos x . \ln 10$

(c) $10^{\sin x} . \ln 10$ (d) $10^{\cos x} . \ln 10$

51. If $f(x) = \sin x$, then $f'(\cos^{-1} 3x) = ?$

(a) $\cos x$ (b) $\frac{-3}{\sqrt{1-9x^2}}$ (c) $\frac{-3}{\sqrt{1-9x^2}}$ (d) $3x$

52. $\frac{d}{dx}\left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)^2 = ?$

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

53. At $x = 0$, the function $f(x) = 1 - x^3$ has

(a) maximum value (b) minimum value

(c) point of inflection (d) no conclusion

54. If $y = \text{Sin}\sqrt{x}$, then $\frac{dy}{dx}$ is equal to:

(a) $\frac{\text{Cos}\sqrt{x}}{2\sqrt{x}}$ (b) $\frac{\text{Cos}\sqrt{x}}{\sqrt{x}}$ (c) $\text{Cos}\sqrt{x}$ (d) $\frac{\text{Cos}\, x}{2\sqrt{x}}$

55. Let f be differentiable function in neighborhood of c and $f'(c) = 0$, then $f(x)$ has relative maxima at c if:

(a) $f''(c) > 0$ (b) $f''(c) < 0$ (c) $f''(c) = 0$ (d) $f''(c) \neq 0$

56. $y = (x)^x$ has the value:

(a) Minimum at $x = e$ (b) Maximum at $x = e$

(c) Minimum at $x = \frac{1}{e}$ (d) Maximum at $x = \frac{1}{e}$

57. $\frac{d}{dx}\left(\frac{1}{Cot\ x}\right) =$

(a) $-$ Cosec$^2 x$ (b) Sec$^2 x$ (c) Sec$^2 x$ (d) $-$Sec$^2 x$

58. If $f(x) = e^{2x}$, then $f'''(x) =$

(a) $6\ e^{2x}$ (b) $\frac{1}{6}\ e^{2x}$ (c) $8\ e^{2x}$ (d) $\frac{1}{8}\ e^{2x}$

59. $\frac{d}{dx} e^{\tan x}$ is equal to

(a) $e^{\tan x}$ Sec$^2 x$ (b) $e^{\tan x}$ (c) $e^{\tan x}$ ln Sec$^2 x$ (d) $e^{\tan x}$ ln tan x

60. $x^3 \frac{d}{dx}(\ln 2x) =$

(a) x^2 (b) $2x^2$ (c) $3x^2$ (d) $6x^2$

61. $\frac{d}{dx}(5^x)$ equal:

(a) $\frac{5^x}{\ln 5}$ (b) $\frac{\ln 5}{5^x}$ (c) $5^x \ln 5$ (d) 5^x

62. If $y = e^{2x}$, then y_4 equal:

(a) $16\ e^{2x}$ (b) $8\ e^{2x}$ (c) $4\ e^{2x}$ (d) $2\ e^{2x}$

63. If $f'(c) = 0$, then f has relative maximum value at $x = c$, if:

(a) $f''(c) > 0$ (b) $f''(c) < 0$ (c) $f''(c) = 0$ (d) None

64. $\frac{d}{dx}$(Cosec x) is equal to

(a) Cosec x Cot x (b) Cosec x. tan x (c) $-$ Cosec x Cot x (d) Tan x

65. A function f is neither increasing nor decreasing at a point, provided that $f'(x) = 0$ at that point, then it is called :

(a) Critical point (b) Stationary point
(c) Maximum point (d) Minimum point

66. $\frac{d}{dx}(x^{-2})$ is equal to

(a) $-2x^3$ (b) $-2x^2$ (c) $-2x^{-3}$ (d) $-2x$

67. $\frac{d}{dx}(\cos^{-1} x)$ is equal to

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

68. The function $f(x) = ax^2 + bx + c$ has minimum value if:

(a) $a > 0$ (b) $a < 0$ (c) $a = 0$ (d) $a = -1$

69. $\lim\limits_{x \to -\infty} \frac{|\delta x|}{\delta x}$ is equal to:

(a) 1 (b) Not exists (c) -1 (d) Zero

70. $1 - x + x^2 - x^3 + x^4 + \ldots\ldots + (-1)^n x^n + \ldots$ is the expansion of:

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

71. Derivative of $y = \dfrac{3}{4}x^4 + \dfrac{2}{3}x^3$ is;

(a) $\dfrac{3}{4}(4x^4)$ (b) $3x^3 + 2x^2$ (c) $3x^3$ (d) None of these

72. If $f'(x) = 0$, $f''(x) \le 0$ at a point P, then P is called.

(a) Relative maxima (b) Relative minima
(c) point of inflection (d) None of these

73. If f be a real valued function, continuous in the interval $]x, x_1[\in D_f$, then the quotient $\dfrac{f(x_1) - f(x)}{x_1 - x}$ is called

(a) Derivative of f (b) Differential of f
(c) Average rate of change of f (d) Instantaneous change of f

74. If f be a real valued function, continuous in the interval $]x, x_1[\in D_f$, and if $\lim\limits_{x_1 \to x} \dfrac{f(x_1) - f(x)}{x_1 - x}$ exists, then the quotient is called

(a) Derivative of f (b) Differential of f
(c) Average rate of change of f (d) Actual change of f

75. If $f(x) = x^4 + 2x^3 + x^2$, then $f'(0) =$

(a) 4 (b) 0 (c) -4 (d) 1

76. If g is differentiable function at the point x and f is differentiable at point g(x), then $(f \circ g)'(x)$ or $\dfrac{d}{dx}(fog)(x) =$

(a) $f'(x).g'(x)$ (b) $(f \circ g)'(x)$ (c) $f'(g(x)).g'(x)$ (d) $f'(g'(x))$

77. If $y = \sinh^{-1}(x^3)$, then $\dfrac{dy}{dx} =$

(a) $\dfrac{1}{\sqrt{1+x^2}}$ (b) $\dfrac{3x^2}{\sqrt{1+x^3}}$ (c) $\dfrac{1}{\sqrt{1+x^6}}$ (d) $\dfrac{3x^2}{\sqrt{1+x^6}}$

78. If x and h are two independent quantities and $f(x+h)$ can be expanded in ascending powers of h as an infinite series, then

$f(x+h) = f(x) + h f'(x) + \dfrac{h^2}{2!} f''(x) + \ldots + \dfrac{h^n}{n!} f^{(n)}(x) + \ldots$ is called

(a) Power series (b) Maclarine series (c) Taylor series (d) all of these

79. A function $f(x)$ is such that, at a point $x = c$, $f'(x) > 0$ at $x = c$, then f is said to be

(a) Increasing (b) decreasing (c) constant (d) 1-1 function

80. A function $f(x)$ is such that, at a point $x = c$, $f'(x) < 0$ at $x = c$, then f is said to be

(a) Increasing (b) decreasing (c) constant (d) 1-1 function

81. A function $f(x)$ is such that, at a point $x = c$, $f'(x) = 0$ at $x = c$, then f is said to be

(a) Increasing (b) decreasing (c) constant (d) 1-1 function

82. A point where f is neither increasing nor decreasing is called —— {provided that $f'(x) = 0$ at that point.}

(a) stationary point (b) turning point
(c) critical point (d) point of inflection

83. A stationary point is called —— if it is either a maximum point or a minimum point.

(a) stationary point (b) turning point
(c) critical point (d) point of inflection

84. If $f'(c) = 0$ or $f'(c)$ is undefined, then the number c is called critical value and the corresponding point is called ———

(a) stationary point (b) turning point
(c) critical point (d) point of inflection

85. If $f'(c)$ does not change sign before and after $x = c$, then this point is called ———.

(a) stationary point (b) turning point
(c) critical point (d) point of inflection

Note. Every stationary point is also called critical point but the converse may or may not be true.

86. Let f be a differentiable function such that $f'(c) = 0$, then, if $f'(x)$ changes sign from positive to negative. i.e., before and after $x = c$, then it occurs relative —— at $x = c$.

(a) maximum (b) minimum (c) point of inflection (d) non

87. Let f be a differentiable function such that $f'(c) = 0$, then, if $f'(x)$ changes sign from negative to positive, i.e., before and after $x = c$, then it occurs relative —— at $x = c$.

(a) maximum (b) minimum (c) point of inflection (d) non

88. Let f be a differentiable function such that $f'(c) = 0$, then, if $f'(x)$ does not change sign ,i.e., before and after $x = c$, then it occurs ---at $x = c$.

(a) maximum (b) minimum (c) point of inflection (d) non

89. If $f(x) = e^{\sqrt{x}-1}$, then $f'(0) =$

(a) e^{-1} (b) e (c) ∞ (d) 1/2

90. $\frac{d}{dx}(\tan^{-1}x - \cot^{-1}x) =$

(a) $\frac{2}{\sqrt{1+x^2}}$ (b) $\frac{2}{1+x^2}$ (c) 0 (d) $-\frac{2}{1+x^2}$

91. If $f(\frac{1}{x}) = \tan x$, then $f'(\frac{1}{\pi}) =$

(a) π^2 (b) $-\pi^2$ (c) 1 (d) $\frac{-1}{\pi^2}$

92. $\lim_{h\to 0}\frac{f(a+h)-f(a)}{h} =$

(a) 0 (b) $f(a)$ (c) $f(h)$ (d) $f'(a)$

93. If $f(x) = \frac{1}{x}$, then a critical point of f is

(a) 0 (b) 1 (c) −1 (d) no point

Unit - 3 (Integration)

TYPE – 1 : [Multiple Choice Questions (M. C. Qs)].

1. If $y = f(x)$, then differential of y is

(a) $dy = f'(x)$ (b) $dy = f'(x)\,dx$ (c) $dy = f(x)dx$ (d) $\frac{dy}{dx}$

2. If $\int f(x)\,dx = \phi(x) + c$, then $f(x)$ is called

(a) integral (b) differential (c) derivative (d) integrand

3. If $n \neq 1$, then $\int (ax+b)^n\,dx = ?$

(a) $\frac{n(ax+b)^{n-1}}{a}$ (b) $\frac{(ax+b)^{n+1}}{n}$ (c) $\frac{(ax+b)^{n+1}}{n+1}$ (d) $\frac{(ax+b)^{n+1}}{a(n+1)}$

4. $\int \sin(ax+b)\,dx = ?$

(a) $-\frac{1}{a}\cos(ax+b)$ (b) $\frac{1}{a}\cos(ax+b)$

(c) $a\cos(ax+b)$ (d) $-a\cos(ax+b)$

5. $\int e^{-\lambda x}\,dx = ?$

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

6. $\int a^{\lambda x}\,dx = ?$

(a) $\frac{a^{\lambda x}}{\lambda}$ (b) $\frac{a^{\lambda x}}{\ln a}$ (c) $\frac{a^{\lambda x}}{\lambda \ln a}$ (d) $a^{\lambda x}\lambda . l\,n\,a$

7. $\int [f(x)]^n . f'(x)\,dx = ?$

(a) $\frac{[f(x)]^n}{n}$ (b) $f(x)$ (c) $\frac{[f(x)]^{n+1}}{n+1}$ (d) $n\,[f(x)]^{n+1}$

8. $\int \frac{f'(x)}{f(x)}\,dx = ?$

(a) $f(x)$ (b) $f'(x)$ (c) $\ln|f(x)|$ (d) $ln\,|f'(x)|$

9. $\int \frac{dx}{\sqrt{x+a}+\sqrt{x}}$ can be evaluated if

(a) $x>0, a>0$ (b) $x<0, a>0$ (c) $x<0, a<0$ (d) $x>0, a<0$

10. $\int \frac{x}{\sqrt{x^2+3}}\,dx = ?$

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

11. $\int a^{x^2}\ x\,dx = ?$

(a) $\frac{a^{x^2}}{\ln a}$ (b) $\frac{a^{x^2}}{2\,ln\,a}$ (c) $a^{x^2}\ .\ln a$ (d) (b) $\frac{a^{x^2}}{2}$

12. $\int e^{ax}[a\ f(x)+f'(x)]\,dx = ?$

(a) $e^{ax}\ f(x)$ (b) $e^{ax}\ f'(x)$ (c) $a\,e^{ax}\ f(x)$ (d) $a\,e^{ax}\ f'(x)$

13. $\int e^x[\sin x+\cos x]\,dx = ?$

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

14. To determine the area under a curve by the use of integration, the idea was given by

(a) Newton (b) Archimedes (c) Leibnitz (d) Taylor

15. The order of the differential equation : $x\frac{d^2y}{dx^2}+\frac{dy}{dx}-2x=0$ is

(a) 0 (b) 1 (c) 2 (d) more than 2

16. The equation $y = x^2 - 2x + c$ represents (c being a parameter)

(a) one parabola (b) family of parabolas

(c) family of lines (d) two parabolas

17. $\int e^{\sin x} . \cos x \; dx = ?$

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

18. $\int (2x+3)^{1/2} \; dx = ?$

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

19. $\int x^n \, dx = \dfrac{x^{n+1}}{n+1}$ is true for all values of n except

(a) $n = 0$ (b) $n = 1$

(c) $n = -1$ (d) n = any fractional value

20. $\int_1^2 a^x \, dx = ?$

(a) $(a^2 - a) \ln a$ (b) $\dfrac{(a^2-a)}{\ln a}$ (c) $\dfrac{(a^2-a)}{\log a}$ (d) $(a^2 - a) \ln a$

21. $\int \dfrac{e^{\mathrm{Tan}^{-1}x}}{1+x^2} dx = ?$

(a) $e^{\mathrm{Tan}x} + c$ (b) $\frac{1}{2}e^{\mathrm{Tan}^{-1}x} + c$ (c) $x\,e^{\mathrm{Tan}^{-1}x} + c$ (d) $e^{\mathrm{Tan}^{-1}x} + c$

22. $\int \dfrac{dx}{x\sqrt{x^2-1}} dx = ?$

(a) $\mathrm{Sec}^{-1} x + c$ (b) $\mathrm{Tan}^{-1} x + c$ (c) $\mathrm{Cot}^{-1} x + c$ (d) $\mathrm{Sin}^{-1} x + c$

23. $\int Sin\ 3x$ dx is equal to:

(a) $\dfrac{Cos 3x}{3} + c$ (b) $-\dfrac{Cos 3x}{3} + c$ (c) $3 \,\mathrm{Cos}\, 3x + c$ (d) $-3 \,\mathrm{Cos}\, 3x$

24. If $\int_{-2}^{1} f(x)dx = 5$, $\int_{-2}^{1} g(x)dx = 4$, then $\int_{-2}^{1} 3f(x)dx - \int_{-2}^{1} 2g(x)dx =$

(a) 7 (b) 9 (c) 12 (d) 8

25. $\int e^{f(x)} \cdot f'(x)\, dx =$

(a) $\ln f(x) + c$ (b) $e^{f(x)} + c$ (c) $\ln f'(x) + c$ (d) $e^{f'(x)} + c$

26. $\int Cos\ x\ dx =$

(a) $-\text{Sin}\ x + c$ (b) $\text{Sin}\ x + c$ (c) $-\text{Cos}\ x + c$ (d) $\text{Cos}\ x + c$

27. If $a > 0$ and $a \neq 1$ then, $\int a^x dx =$

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

28. $\int \frac{dx}{1+x^2} =$

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

29. $\int \frac{f'(x)}{f(x)} dx =$

(a) $\ln x$ (b) $\ln f(x)$ (c) $\ln f'(x)$ (d) $f'(x) \ln f(x)$

30. $\int \frac{dx}{x \ln x}$ is equal to :

(a) $\ln x + c$ (b) $x + c$ (c) $\ln(\ln x) + c$ (d) $\ln(\ln(\ln x)) + c$

31. $\int \sec x\, dx$ is equal to:

(a) $\ln(\sec x + \tan x) + c$ (b) $\ln(\text{cosec}\ x - \cot x) + c$
(c) $\ln(\sec x - \tan x) + c$ (d) $-\ln(\text{cosec}\ x - \cot x) + c$

32. $\int \frac{\cos x\, dx}{\sin x . \ln \sin x}$ is equal to :

(a) $\ln(\ln(\cos x)) + c$ (b) $\ln \ln(\sin x) + c$ (c) $\ln \sin x + c$ (d) $\ln \cos x + c$

33. The solution of differential equation $\frac{dy}{dx} = \sec^2 x$ is

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

34. $\int_0^2 2x\, dx$ is equal to :

(a) 9 (b) 7 (c) 4 (d) 0

35. $\int e^{ax} \sin bx\ dx$ is equal to:

(a) $\frac{e^{ax}}{a^2+b^2}(a \sin bx - b \cos bx) + c$ (b) $\frac{e^{ax}}{a^2+b^2}(b \sin bx + a \cos bx)$

(c) $\frac{e^{ax}}{a^2+b^2}(a \sin bx + b \cos bx)$ (d) $\frac{e^{ax}}{a^2+b^2}(b \sin bx - a \cos bx)$

36. $-\int_b^a f(x)\, dx$ is equal to:

(a) 0 (b) $\int_a^b f(x)dx$ (c) $-\int_a^b f(x)dx$ (d) $\int_a^a f(x)dx$

37. $\int \frac{1}{ax+b} dx$ equals:

(a) $\frac{1}{a} \ln |ax+b|$ (b) $\ln |ax+b|$ (c) $\frac{(ax+b)^2}{2}$ (d) $\ln |x+b|$

38. In $\int (x^2 - a^2)^{1/2}$ dx, , the substitution is:

(a) $x = a \tan \theta$ (b) $x = a \sec \theta$ (c) $x = a \sin \theta$ (d) $x = 2a \sin \theta$

39. $\int x \cos x$ dx is equal to:

(a) $\sin x + \cos x$ (b) $\cos x - \sin x$ (c) $x \sin x + \cos x$ (d) None

40. $\int_{\pi/6}^{\pi/3} \cos t \, dt =$

(a) $\frac{\sqrt{3}}{2} - \frac{1}{2}$ (b) $\frac{\sqrt{3}}{2} + \frac{1}{2}$ (c) $\frac{1}{2} - \frac{\sqrt{3}}{2}$ (d) None

41. Solution of differential equation $\frac{dv}{dt} = 2t - 7$ is:

(a) $v = t^2 - 7t^3 + c$ (b) $t^2 + 7t + c$ (c) $v = t - \frac{7t^2}{2} + c$ (d) $v = t^2 - 7t + c$

42. Inverse of $\int ....dx$ is:

(a) d/dx (b) dy/dx (c) d/dy (d) dx/dy

43. The suitable substitution for $\int \sqrt{2ax - x^2}$ dx is:

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

44. $\int u \, . \, dv$ equals to:

(a) $v.du - \int vu$ (b) $uv + \int v\,du$ (c) $uv - \int v\,du$ (d) $u.du + \int vdu$

45. $\int_0^{-\pi} \sin$ x dx equals to:

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

46. The general solution of differential equation $\frac{dy}{dx} = -\frac{y}{x}$ is :

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

47. $\int \frac{x+2}{x+1} dx$

(a) $\ln (x+1)$ (b) $\ln (x+1) - x$ (c) $x + \ln(x+1)$ (d) None

48. $\int \sin^3 x \cos x \, dx$

(a) $\frac{\sin^3 x}{3}$ (b) $\frac{1}{4}\sin^4 x$ (c) $-\frac{1}{4}\sin^4 x$ (d) $\sin^4 \frac{x}{4}$

49. $\int x e^x \, dx$

(a) $x e^x + x$ (b) $x e^x - e^x$ (c) $e^x - x$ (d) None of these

50. $\int_0^3 \frac{dx}{x^2+9}$

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{12}$ (c) $\frac{\pi}{2}$ (d) None of these

51. Solution of differential equation $\frac{dy}{dx} = -y$ is:

(a) $y = ce^{-x}$ (b) $y = ce^x$ (c) $xy = c$ (d) None of these

52. $\int f(x).\ g'(x)\, dx =$

(a) $f(x).g(x) - \int g(x).f'(x)dx$ (b) $f(x).g(x) + \int g(x).f'(x)dx$

(c) $f(x).g'(x) - \int g(x).f(x)dx$ (d) $f(x).g'(x) + \int g(x).f(x)dx$

53. $\int e^x[\frac{1}{x} + \ln x]\, dx =$

(a) $e^x \frac{1}{x}$ (b) $-e^x \frac{1}{x}$ (c) $e^x \ln x$ (d) $-e^x \ln x$

54. $\int_{-\pi}^{\pi} \sin x \, dx =$

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

55. $\int_{-1}^{2} |x|\, dx =$

(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) $\frac{5}{2}$ (d) $\frac{3}{2}$

56. If $\int_{-2}^{1} f(x)\, dx = 5$, $\int_{-2}^{1} g(x)\, dx = 4$, then $\int_{-2}^{1} [2f(x) + 3g(x)]\, dx =$

(a) 20 (b) 23 (c) 9 (d) 22

57. $\int_0^1 (4x + k)\, dx = 2$, then $k =$

(a) 8 (b) -4 (c) 0 (d) -2

58. If $\frac{d}{dx}\left(\frac{x}{1+2x}\right) = \frac{1}{(2x+1)^2}$, then $2\int_1^4 \frac{1}{(2x+1)^2}\,dx =$

(a) $\frac{9}{2}$ (b) $-\frac{9}{2}$ (c) $\frac{1}{9}$ (d) $\frac{2}{9}$

59. $\int e^{2\sec x}.\sec x \tan x\,dx =$

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

60. Solution of the differential equation : $\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$ is

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

61. $\int e^x\left[\frac{1}{x} - \frac{1}{x^2}\right]dx =$

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

Unit – 4 (Introduction to Analytic Geometry)

TYPE – 1 : [Multiple Choice Questions (M. C. Qs)].

Each question has four possible answers. Tick (√) the correct one.

1. If $x < 0$, $y < 0$ then the point P(x, y) lies in the quadrant

(a) I (b) II (c) III (d) IV

2. The point P in a plane that corresponds to the ordered pair (x, y) is called

(a) graph of (x, y) (b) mid-point of x, y

(c) abscissa of x, y (d) ordinate of x, y

3. If $x < 0$, $y > 0$ then the point P$(-x, -y)$ lies in the quadrant

(a) I (b) II (c) III (d) IV

4. The straight line which passes through one vertex and through the mid-point of the opposite side is called

(a) median (b)altitude (c) perpendicular bisector (d) normal

5. The straight line which paases through one vertex and perpendicular to the opposite side is called

(a) median (b)altitude (c) perpendicular bisector (d) normal

6. The point where the medians of a triangle intersect is called —— of the triangle
(a) centroid (b) centre (c) orthocentre (d) circumcentre

7. The point where the altitudes of a triangle intersect is called —— of the triangle
(a) centroid (b) centre (c) orthocentre (d) circumcentre

8. The centroid of a triangle divides each median in the ratio of
(a) 2 : 1 (b) 1 : 2 (c) 1 : 1 (d) none of these

9. The point where the angle bisectors of a triangle intersect is called — of the triangle
(a) centroid (b) incentre (c) circumcentre (d) orthocentre

10. If x and y have opposite signs then the point P(x, y) lies in quadrants
(a) I & II (b) I & III (c) II & IV (d) I & IV

11. A line bisecting the 2nd and 4th quadrants has inclination
(a) 0° (b) 45° (c) 135° (d) ∞

12. $y = x$ is the straight line
(a) bisecting the Ist and 3rd quadrants (b) parallel to x - axis
(c) bisecting the 2nd and 4th quadrants (d) parallel to y - axis

13. If all the sides of a four-sided polygon are equal but the four angles are not equal to 90° each then it is a
(a) kite (b) rhombus (c) parallelogram (d) trapezoid

14. If α is the inclination of a line l then it must be true that
(a) $0 \le \alpha < \frac{\pi}{2}$ (b) $\frac{\pi}{2} \le \alpha < \pi$
(c) $0 \le \alpha < \pi$ (d) $0 \le \alpha < 2\pi$

15. The slope-intercept form of the equation of a straight line is
(a) $y = mx + c$ (b) $y - y_1 = m(x - x_1)$
(c) $\frac{x}{a} + \frac{y}{b} = 1$ (d) $x \cos \alpha + y \sin \alpha = p$

16. The two-intercepts form of the equation of a straight line is
(a) $y = mx + c$ (b) $y - y_1 = m(x - x_1)$
(c) $\frac{x}{a} + \frac{y}{b} = 1$ (d) $x \cos \alpha + y \sin \alpha = p$

17. The normal form of the equation of a straight line is
(a) $y = mx + c$ (b) $y - y_1 = m(x - x_1)$
(c) $\frac{x}{a} + \frac{y}{b} = 1$ (d) $x\cos\alpha + y\sin\alpha = p$

18. In the normal form $x\cos\alpha + y\sin\alpha = p$ the value of p is
(a) positive (b) negative (c) positive or negative (d) zero

19. If α is the inclination of the line l then $\frac{x - x_1}{\cos\alpha} = \frac{y - y_1}{\sin\alpha} = r$ (say) is called
(a) point-slope form (b) normal form
(c) Symmetric form (d) none of these

20. The slope of the line $ax + by + c = 0$ is
(a) $\frac{a}{b}$ (b) $-\frac{a}{b}$ (c) $\frac{b}{a}$ (d) $-\frac{b}{a}$

21. The slope of the line perpendicular to $ax + by + c = 0$ is
(a) $\frac{a}{b}$ (b) $-\frac{a}{b}$ (c) $\frac{b}{a}$ (d) $-\frac{b}{a}$

22. The General Equation of the straight line in two variables x and y is
(a) $ax + by + c = 0$ (b) $ax^2 + by + c = 0$
(c) $ax + by^2 + c = 0$ (d) $ax^2 + by^2 + c = 0$

23. The x-intercept $4x + 6y = 12$ is
(a) 4 (b) 6 (c) 3 (d) 2

24. The lines $2x + y + 2 = 0$ and $6x + 3y - 8 = 0$ are
(a) parallel (b) perpendicular (c) neither (d) non coplanar

25. The point $(-2, 4)$ lies ——— the line $2x + 5y - 3 = 0$
(a) above (b) below (c) on (d) none of these

26. If three lines pass through one common point then the lines are called
(a) parallel (b) coincident (c) concurrent (d) congruent

27. $2x + y + k = 0$ (k being a parameter) represents
(a) one line (b) two lines
(c) family of lines (d) intersecting lines

28. If the equations of the sides of a triangle are given then the intersection of any two lines in pairs gives ——— the triangles.
(a) vertices (b) centre (c) mid-points of sides (d) centroid

29. A four-sided polygon (quadrilateral) having two parallel and two non-parallel sides is called ——— .

(a) square (b) rhombus (c) trapezium (d) parallelogram

30. Equation of vertical line through $(-5, 3)$ is

(a) $x-5=0$ (b) $x+5=0$ (c) $y-3=0$ (d) $y+3=0$

31. Equation of horizontal line through $(-5, 3)$ is

(a) $x-5=0$ (b) $x+5=0$ (c) $y-3=0$ (d) $y+3=0$

32. Equation of line through $(-8, 5)$ and having slope undefined is

(a) $x+8=0$ (b) $x-8=0$ (c) $y-5=0$ (d) $y+5=0$

33. If ϕ be the angle between two lines l_1 and l_2 with slopes m_1 and m_2, then angle from l_1 to l_2 is given by

(a) $\tan\phi = \dfrac{m_1 - m_2}{1 + m_1 m_2}$ (b) $\tan\phi = \dfrac{m_2 - m_1}{1 + m_1 m_2}$

(c) $\tan\phi = \dfrac{m_1 + m_2}{1 + m_1 m_2}$ (d) $\tan\phi = \dfrac{m_2 - m_1}{1 - m_1 m_2}$

34. If ϕ be the acute angle between two lines l_1 and l_2 with slopes m_1 and m_2, then acute angle from l_1 to l_2 is given by

(a) $\tan\phi = \left|\dfrac{m_1 - m_2}{1 + m_1 m_2}\right|$ (b) $\tan\phi = \left|\dfrac{m_2 - m_1}{1 + m_1 m_2}\right|$

(c) $\tan\phi = \left|\dfrac{m_1 + m_2}{1 + m_1 m_2}\right|$ (d) $\tan\phi = \left|\dfrac{m_2 - m_1}{1 - m_1 m_2}\right|$

35. Two lines l_1 and l_2 with slopes m_1 and m_2, are parallel if

(a) $m_1 - m_2 = 0$ (b) $m_1 + m_2 = 0$ (c) $m_1 \; m_2 = 1$ (d) $m_1 \; m_2 = -1$

36. Two lines l_1 and l_2 with slopes m_1 and m_2, are perpendicular if

(a) $m_1 - m_2 = 0$ (b) $m_1 + m_2 = 0$ (c) $m_1 \; m_2 = 0$ (d) $m_1 m_2 = -1$

37. For a homogeneous equation of degree n, n must be

(a) an integer (b) positive integer (c) rational number (d) real number

38. The equation $10x^2 - 23xy - 5y^2 = 0$ is homogeneous of degree

(a) 0 (b) 1 (c) 2 (d) more than 2

39. Every homogeneous equation of 2nd degree in two variables represents

(a) a line (b) two lines (c) two lines through origin (d) family of lines

40. Two lines represented by $ax^2 + 2hxy + by^2 = 0$ are real and distinct if

(a) $h^2 - ab < 0$ (b) $h^2 - ab = 0$ (c) $h^2 - ab > 0$ (d) $h = 0$

41. Two lines represented by $ax^2 + 2hxy + by^2 = 0$ are coincident if

(a) $h^2 - ab < 0$ (b) $h^2 - ab = 0$ (c) $h^2 - ab > 0$ (d) $h = 0$

42. Two lines represented by $ax^2 + 2hxy + by^2 = 0$ are imaginary if

(a) $h^2 - ab < 0$ (b) $h^2 - ab = 0$ (c) $h^2 - ab > 0$ (d) $h = 0$

43. The equation $10x^2 - 23xy - 5y^2 = 0$ represents a pair of lines which are

(a) real and distinct (b) real and coincident

(c) imaginary (d) parallel

44. Two lines represented by $ax^2 + 2hxy + by^2 = 0$ are perpendicular if

(a) $a = b$ (b) $a = -b$ (c) $a < b$ (d) $a > b$

45. If A(–2, 3), B(–4, 1) and C(3, 5) be the vertices of a triangle then its centroid is given by

(a) $\left(\frac{-3}{2}, \frac{9}{2}\right)$ (b) (– 1, 3) (c) (–3, 4) (d) none of these

46. The lines $3y = 2x + 5$ and $3x + 2y - 8 = 0$ intersect at an angle of

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $0°$

47. The equation $10x^2 - 23xy - 5y^2 = 0$ represents

(a) a circle (b) a straight line

(c) a pair of lines (d) a pair of circles

48. The point P(x, y) is in the 2nd quadrant if

(a) $x > 0, y < 0$ (b) $x < 0, y < 0$ (c) $x < 0, y > 0$ (d) $x > 0, y > 0$

49. The slope of y-axis is

(a) 0 (b) undefined (c) tan 180° (d) tan 45°

50. The equation $y^2 - 16 = 0$ represents two lines

(a) parallel to x-axis (b) parallel to y-axis

(a) not parallel to x-axis (b) not parallel to y-axis

51. The perpendicular distance of the line $3x + 4y + 10 = 0$ from the origin is

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

52. The lines represented by $ax^2 + 2hxy + by^2 = 0$ are orthogonal if

(a) $a - b = 0$ (b) $a + b = 0$ (c) $a + b > 0$ (d) $a - b < 0$

53. The lines lying in the same plane are called

(a) collinear (b) coplanar (c) non-collinear (d) non-coplanar

54. The distance of the point (3, 7) from the x - axis is

(a) 7 (b) -7 (c) 3 (d) -3

55. Two lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are parallel if

(a) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ (a) $\frac{a_1}{b_1} = -\frac{a_2}{b_2}$ (c) $\frac{b_1}{c_1} = \frac{b_2}{c_2}$ (d) $\frac{a_1}{c_1} = \frac{a_2}{c_2}$

56. Every homogeneous equation of second degree $ax^2 + 2hxy + by^2 = 0$ represents two straight lines

(a) through the origin (b) not through the origin

(c) two parallel lines (d) two perpendicular lines

57. The distance of the point (3, 7) from the y - axis is

(a) 7 (b) -7 (c) 3 (d) -3

58. The point-slope form of the equation of a straight line is

(a) $y = mx + c$ (b) $y - y_1 = m(x - x_1)$

(c) $\frac{x}{a} + \frac{y}{b} = 1$ (d) $x \cos\alpha + y \sin\alpha = p$

59. The equation $9x^2 + 24xy + 16y^2 = 0$ represents a pair of lines which are

(a) real and distinct (b) real and coincident

(c) imaginary (d) perpendicular

60. Let p(x_1, y_1) be a point in plane not lying on $\ell : ax + by + c = 0$, then point P lies above ℓ if:

(a) $ax_1 + by_1 + c = 0$ (b) $ax_1 + by_1 + c \neq 0$

(c) $ax_1 + by_1 + c < 0$ (d) $ax_1 + by_1 + c > 0$

61. If m_1 and m_2 are the slopes two orthogonal lines then:

(a) $m_1 . m_2 = 1$ (b) $m_1 . m_2 = -1$ (c) $m_1 . m_2 = 0$ (d) $m_1 = -m_2$

62. The lines represented by the equation $ax^2+2hxy+by^2=0$, are coincident if:

(a) $a + b = 0$ (b) $h^2 - ab = 0$ (c) $h^2 + ab = 0$ (d) None

63. Equation of x- axis is:

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

64. The equation of y- axis is:
(a) $x = 0$ (b) $y = 0$ (c) $x = 1$ (d) $y = 1$

65. The lines $\ell_1 : a_1x + b_1y + c_1 = 0$ and $\ell_2 : a_2x + b_2y + c_2 = 0$ are perpendicular if:
(a) $a_1b_2 - a_2b_1 = 0$ (b) $a_1b_2 + a_2b_1 = 0$
(c) $a_1a_2 - b_1b_2 = 0$ (d) $a_1a_2 + b_1b_2 = 0$

66. If line ℓ intersects x-axis at a point (3 , 0), then the x- intercept of the line ℓ is:
(a) -3 (b) 0 (c) 3 (d) $\frac{1}{3}$

67. Altitudes of a triangle are:
(a) Parallel (b) perpendicular (c) Concurrent (d) Non concurrent

68. The perpendicular distance of a point $P(x_1 , y_1)$ from the line $\ell : ax + by + c = 0$, is
(a) $d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 - b^2}}$ (b) $d = \frac{|ax_1 + by_1 + c|}{\sqrt{x_1^2 - y_1^2}}$
(c) $d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$ (d) $d = \frac{|ax_1 + by_1 + c|}{a^2 + b^2}$

69. Second degree homogeneous equation is:
(a) $ax^2 + bx + c = 0$ (b) $ax^3 + bx^2 + cx + d = 0$
(c) $ax + by + c = 0$ (d) $ax^2 + 2hxy + by^2 = 0$

70. If a straight line is parallel to x -axis then its slope is:
(a) -1 (b) 0 (c) 1 (d) Undefined

71. The distance between (1 , 2) and (2 , 1) is :
(a) 1 (b) $\sqrt{2}$ (c) 2 (d) $\sqrt{5}$

72. Intercept form of equation of line is:
(a) $\frac{x}{a} - \frac{y}{b} = 0$ (b) $\frac{x}{a} + \frac{y}{b} = 0$ (c) $\frac{x}{a} - \frac{y}{b} = 1$ (d) $\frac{x}{a} + \frac{y}{b} = 1$

73. The perpendicular distance of a line $12x + 5y = 7$ from (0 , 0) is :
(a) $\frac{1}{13}$ (b) $\frac{13}{7}$ (c) $\frac{7}{13}$ (d) 13

74. Line passes through the point of intersection of two lines ℓ_1 and ℓ_2 is:
(a) $k_1\ell_1 = k_2\ell_2$ (b) $\ell_1 + k\ell_2 = 0$ (c) $\ell_1 + k\ell_2 = 2$ (d) Both (b) and (c)

75. The coordinate axes divide the whole plane into —— equal parts
(a) 2 (b) 4 (c) 8 (d) infinity many

76. If b is positive, then the line $y = b$ lies
(a) above the x-axis (b) above the y-axis
(c) below the x-axis (d) below the y-axis

77. A line $x = a$ is on the right of y-axis if a =
(a) positive (b) negative (c) 0 (d) any real number

78. If $2x + 5y + k = 0$ and $kx + 10y + 3 = 0$ are parallel lines then $k =$

(a) 25 (b) -25 (c) 2 (d) 3

Unit – 5 (Linear Inequalities)

TYPE – 1 : [Multiple Choice Questions (M. C. Qs)].

Each question has four possible answers. Tick (√) the correct one.

1. The solution of $ax + by < c$ is

(a) closed half plane (b) open half plane

(c) circle (d) parabola

2. A function which is to be maximized or minimized is called

(a) subjective function (b) objective function

(c) qualitative function (d) quantitative function

3. The number of variables in $ax + by \le c$ are

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

4. $(0, 0)$ is the solution of the inequality

(a) $7x + 2y > 0$ (b) $2x - y > 0$ (c) $x + y \ge 0$ (d) $3x + 5y < 0$

5. $(0, 0)$ is satisfied by

(a) $x - y < 10$ (b) $2x + 5y > 10$ (c) $x - y \ge 13$ (d) None

6. The point where two boundary lines of a shaded region intersect is called

(a) boundary point (b) corner point

(c) stationary point (d) feasible point

7. If $x > b$, then

(a) $-x > -b$ (b) $-x < b$ (c) $x < b$ (d) $-x < -b$

8. The symbols used for inequality are

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

9. A linear inequality contains at least —— variables

(a) one (b) two (c) three (d) more than three

10. An inequality with one or two variables has —— solutions

(a) one (b) two (c) more than two (d) infinitely many

11. $ax + by < c$ is not a linear inequality if

(a) $a = 0,\ b = 0$ (b) $a \neq 0,\ b \neq 0$ (c) $a = 0,\ b \neq 0$ (d) $a \neq 0,\ b=0,\ c=0$

12. The graph of a linear equation of the form $ax + by = c$ is a line which divides the whole plane into —— disjoint parts

(a) two (b) four (c) more than four (d) infinitely many

13. The graph of corresponding linear equation of the linear inequality is a line called ——— .

(a) boundary line (b) horizontal line

(c) vertical line (d) inclined line

14. The graph of the inequality $x \leq b$ is

(a) upper half plane (b) lower half plane

(c) left half plane (d) right half plane

15. The graph of the inequality $y \leq b$ is

(a) upper half plane (b) lower half plane

(c) left half plane (d) right half plane

16. The graph of the inequality $ax + by \leq c$ is —— side of line $ax + by = c$

(a) origin side (b) non-origin side (c)right (d) lower

17. The graph of the inequality $ax + by \geq c$ is —— side of line $ax + by = c$

(a) origin side (b) non-origin side (c)upper (d) left

18. The feasible solution which maximizes or minimizes the objective function is called

(a) exact solution (b) optimal solution

(c) final solution (d) objective solution

19. Solution space consisting of all feasible solutions of system of linear in inequalities is called:

(a) Feasible solution (b) Optimal solution

(c) Feasible region (d) General solution

20. Corner point is also called:

(a) Origin (b) Focus (c) Vertex (d) Test point

21. For feasible region:

(a) $x \geq ,\ y \geq 0$ (b) $x \leq ,\ y \leq 0$ (c) $x \geq ,\ y \leq 0$ (d) $x \leq ,\ y \geq 0$

22. $x = 0$ is in the solution of the inequality:

(a) $x < 0$ (b) $x + 4 < 0$ (c) $2x + 3 > 0$ (d) $2x + 3 < 0$

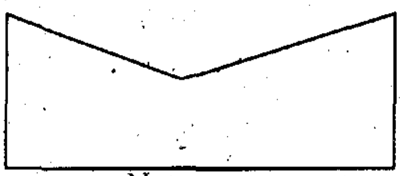
23. linear inequality $2x - 7y > 3$ is satisfied by the point

(a) (5, 1) (b) (–5, –1) (c) (0, 0) (d) (1, –1)

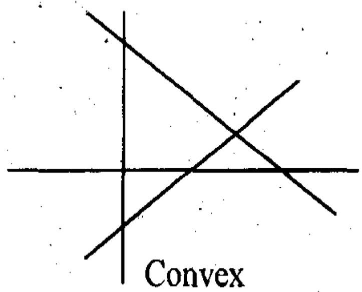
24. The non-negative constraints are also called:
    (a) Decision variable (b) Convex variable
    (c) Decision constraints (d) Concave variable

25. If the line segment obtained by joining any two points of a region lies entirely within the region, then the region is called
    (a) Feasible region (b) Convex region
    (c) Solution region (d) Concave region

Note that



Not convex



Convex

Unit – 6 (Conic Section)

TYPE – 1 : [Multiple Choice Questions (M. C. Qs)].

Each question has four possible answers. Tick (√) the correct one.

1. The locus of a revolving line with one end fixed and other end on the circumference of a circle is called

   (a) a sphere (b) a circle (c) a cone (d) a conic

2. Let A be any fixed point. All the lines through A and the points on the circumference of a circle generate

   (a) a sphere (b) a circle (c) a cone (d) a conic

3. A line which is perpendicular to base of a cone and passes through the vertex of the cone is called

   (a) ruling (b) nap (c) vertex (d) axis

4. A point where rulings (generators) of a cone becomes common is called

   (a) centre (b) nap (c) vertex (d) axis

5. If a cone is cut by a plane perpendicular to the axis of the cone, then the conic section is

   (a) circle (b) parabola (c) ellipse (d) hyperbola

6. If a cone is cut by a plane passing through the vertex of the cone and perpendicular to the axis of the cone, then the conic section is

   (a) point circle (b) parabola (c) ellipse (d) hyperbola

7. If the cutting plane is slightly tilted such that the plane is not perpendicular to the axis of the cone, then the conic section is

(a) circle (b) parabola (c) ellipse (d) hyperbola

8. If the cutting plane is parallel to the generator of the cone but cut only one nap of the cone, then the conic section is

(a) circle (b) parabola (c) ellipse (d) hyperbola

9. If the cutting plane is parallel to the generator of the cone and cutting both the naps is called

(a) circle (b) parabola (c) ellipse (d) hyperbola

10. The set of points which are at equal distance from a fixed point is called

(a) circle (b) parabola (c) ellipse (d) hyperbola

11. The circle whose radius is zero is called

(a) unit circle (b) point circle (c) circumcircle (d) in-circle

12. The circle whose radius is 1 is called

(a) unit circle (b) point circle (c) circumcircle (d) in-circle

13. The equation $x^2 + y^2 + 2gx + 2fy + c = 0$ represents the circle with centre

(a) (g, f) (b) $(g, -f)$ (c) $(-g, f)$ (d) $(-g, -f)$

14. The equation $x^2 + y^2 + 2gx + 2fy + c = 0$ represents the circle with radius

(a) $\sqrt{g^2 - f^2 - c}$ (b) $\sqrt{g + f - c}$ (c) $\sqrt{g^2 + f^2 - c}$ (d) $\sqrt{g^2 + f^2 + c}$

15. The second degree equation having each of x^2 and y^2 with equal coefficients alongwith no product term is

(a) circle (b) ellipse (c) parabola (d) hyperbola

16. The equation of the circle having $A(x_1, y_1)$ and $B(x_2, y_2)$ as the ends of its diameter is

(a) $(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$

(b) $(x - x_1)(x - x_2) - (y - y_1)(y - y_2) = 0$

(c) $(x - x_1)(y - y_1) - (x - x_2)(y - y_2) = 0$

(d) $(x - x_1)(y - y_1) + (x - x_2)(y - y_2) = 0$

17. The angle inscribed in a semi-circle is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) cannot be determined

18. The circle which touches both the axes with radius a lying in the II quadrant. has centre as

(a) (a, a) (b) $(a, -a)$ (c) $(-a, a)$ (d) $(-a,-a)$

19. The straight line which touches a curve without cutting it is called

(a) chord (b) tangent (c) normal (d) bisector

20 The straight line perpendicular to the tangent at the point of contact is called

(a) chord (b) tangent (c) normal (d) bisector

21. The number of tangents that can be drawn from a point $P(x_1, y_1)$ to a circle are

(a) one (b) two (c) more than two (d) infinitely many

22. Two tangents drawn from a point to a circle are real and distinct if $P(x_1, y_1)$ lies —— the circle

(a) outside (b) inside (c) on (d) none of these

23. Two tangents drawn from a point to a circle are real and coincident if $P(x_1, y_1)$ lies —— the circle.

(a) outside (b) inside (c) on (d) none

24. Two tangents drawn from a point to a circle are imaginary if $P(x_1, y_1)$ lies —— the circle

(a) outside (b) inside (c) on (d) none

25. If the point $P(x_1, y_1)$ lies inside the circle then tangential distance (or length of tangent) is

(a) zero (b) positive (c) imaginary (d) negative

26. A line segment whose end points lie on a circle is called

(a) chord (b) tangent (c) normal (d) radius

27. Congruent chords of a circle are equi-distant from the

(a) centre (b) origin (c) radius (d) tangent

28. The measure of the central angle of a minor arc is —— the measure of the angle subtended in the corresponding major arc

(a) half (b) equal (c) double (d) triple

29. The perpendicular at the outer end of a radial segment is —— of the circle.

(a) tangent (b) normal (c) chord (d) diametre

30. The mid-point of the hypotenuse of a right triangle is —— of the triangle

(a) in-centre (b) circumcentre (c) orthocentre (d) e-centre

31. Perpendicular dropped from any point of the circle on a diametre is the mean proportion between the segments into which it divides the

(a) diametre (b) any chord (c) radius (d) circle

32. The set of points in a plane whose distance from a fixed point and from a fixed line remains the same is called

(a) parabola (b) ellipse

(c) hyperbola (d) rectangular hyperbola

33. The set of points which bears a constant ratio (e) equal to 1 from a fixed point to a fixed line is called

(a) ellipse (b) parabola

(c) hyperbola (d) rectangular hyperbola

34. The set of points which bears a constant ratio (e) : $0 < e < 1$ from a fixed point to a fixed line is called

(a) ellipse (b) parabola

(c) hyperbola (d) rectangular hyperbola

35. The set of points which bears a constant ratio (e) : $e > 1$ from a fixed point to a fixed line is called

(a) ellipse (b) parabola

(c) hyperbola (d) rectangular hyperbola

36. For any parabola in the standard form, if the directrix is $x = a$, then its equation is

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

37. For any parabola in the standard form, if the directrix is $x = -a$, then its equation is

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

38. For any parabola in the standard form, if the directrix is $y = a$, then its equation is

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

39. For any parabola in the standard form, if the directrix is $y = -a$, then its equation is

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

40. A line segment whose end points lie on a parabola —— of the parabola

(a) chord (b) focal chord (c) latus rectum (d) diametre

41. A line segment passing through the focus and perpendicular to the directrix is called —— of the parabola

(a) chord (b) focal chord (c) axis (d) latus rectum

42. A line segment passing through the focus and perpendicular to the axis is called —— of the conic

(a) chord (b) focal chord (c) axis (d) latus rectum

43. A line segment passing through the focus is called —— of the conic

(a) chord (b) focal chord (c) axis (d) latus rectum

44. A line segment passing through the focus and perpendicular to the directrix is called —— of the ellipse

(a) chord (b) focal chord (c) major axis (d) latus rectum

45. The point where the axis of a parabola meets the parabola is called

(a) centre (b) vertex (c) focus (d) directrix

46. $x = at^2$, $y = 2at$ are the parametric equations of

(a) parabola (b) circle (c) ellipse (d) hyperbola

47. $x = a \cos t$, $y = a \sin t$ are the parametric equations of

(a) parabola (b) circle (c) ellipse (d) hyperbola

48. $x = a \cos t$, $y = b \sin t$ are the parametric equations of

(a) parabola (b) circle (c) ellipse (d) hyperbola

49. $x = a \sec t$, $y = b \tan t$ are the parametric equations of

(a) parabola (b) circle (c) ellipse (d) hyperbola

50. $x = a \cosh t$, $y = b \sinh t$ are the parametric equations of

(a) parabola (b) circle (c) ellipse (d) hyperbola

51. The second degree equation $ax^2 + by^2 + 2gx + 2fy + c = 0$ with either $a = 0$ or $b = 0$ but not both zero represents

(a) parabola (b) circle (c) ellipse (d) hyperbola

52. The parabola $y^2 = -12x$ opens

(a) downwards (b) upwards (c) rightwards (d) leftwards

53. In the case of an ellipse it is always true that

(a) $a^2 > b^2$ (b) $a^2 < b^2$ (c) $a^2 = b^2$ (d) $a < 0, b < 0$

54. In a conic section, if $e = 0$, then it is called

(a) parabola (b) circle (c) ellipse (d) hyperbola

55. The mid-point of the foci of an ellipse is called

(a) focus (b) latus rectum (c) centre (d) covertices

56. The distance between centre and either vertex of an ellipse is length of

(a) major axis (b) semi-major axis

(c) minor axis (d) semi-minor axis

57. The mid point of the vertices of a hyperbola is called

(a) focus (b) latus rectum (c) centre (d) covertices

58. The mid point of the foci of a hyperbola is called

(a) focus (b) latus rectum (c) centre (d) covertices

59. The distance between centre and either vertex of a hyperbola is length of

(a) transverse axis (b) imaginary axis

(c) semi-focal axis (d) latus rectum

60. The distance between two vertices of an ellipse is the length of

(a) major axis (b) minor axis (c) transverse axis (d) conjugate axis

61. The distance between covertices of an ellipse is called

(a) major axis (b) minor axis

(c) focal axis (d) latus rectum

62. The distance between vertices of a hyperbola is called

(a) major axis (b) minor axis

(c) focal axis (d) conjugate axis

63. The length of latus rectum of a hyperbola is

(a) $4a$ (b) $\frac{b^2}{a}$ (c) $\frac{2b^2}{a}$ (d) $a^2 e^2$

64. The length of semi-latus rectum of a hyperbola is

(a) $4a$ (b) $\frac{b^2}{2a}$ (c) $\frac{b^2}{a}$ (d) $\frac{a^2 e^2}{2}$

65. The length of latus rectum of an ellipse is

(a) $4a$ (b) $\frac{b^2}{a}$ (c) $\frac{2b^2}{a}$ (d) $a^2 e^2$

66. The length of semi-latus rectum of an ellipse is

(a) $4a$ (b) $\frac{b^2}{2a}$ (c) $\frac{b^2}{a}$ (d) $\frac{a^2 e^2}{2}$

67. The length of semi-latus rectum of a parabola is

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

68. $y^2 = 4ax$ is symmetric about the

(a) x - axis (b) y - axis (c) both axes (d) line $y = x$

69. $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is symmetric about the

(a) x - axis (b) y - axis (c) both axes (d) line $y = x$

70. $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is symmetric about the

(a) x - axis (b) y - axis (c) both axes (d) line $y = x$

Note. *The symmetry of a curve.*

(i) If we get the same equation by replacing x by $-x$ the curve is symmetric about the y–axis.

(ii) If we get the same equation by replacing y by $-y$ the curve is symmetric about the x–axis.

(iii) If we get the same equation by replacing x by $-x$ and y by $-y$ the curve is symmetric about the origin or about both the axes.

(iv) If we get the same equation by interchanging x and y the curve is symmetric about the line $y = x$.

71. The directrix of the parabola $y^2 = 4ax$ is

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

72. The directrices of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ are

(a) $x = \pm \frac{a}{e}$ (b) $y = \pm \frac{a}{e}$ (c) $x = \pm c$ (d) $y = \pm c$

73. The directrices of the ellipse $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$ are

(a) $x = \pm \frac{a}{e}$ (b) $y = \pm \frac{a}{e}$ (c) $x = \pm c$ (d) $y = \pm c$

74. The eccentricity of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

(a) $e = \frac{c}{a} < 1$ (b) $e = \frac{c}{a} > 1$ (c) $e = \frac{c}{a} = 1$ (d) $e = \frac{c}{a} = 0$

75. For the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ which of the following is true ?

(a) $a > b$ (b) $a < b$ (c) $a = b$ (d) all of these

76. Asymptotes of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ are

(a) $y = \pm x$ (b) $y = \pm bx$ (c) $y = \pm ax$ (d) $y = \pm \frac{b}{a} x$

77. If the distance between a straight line and a curve approaches zero but never intersects it, then the straight line is called

(a) tangent (b) normal (c) chord (d) asymptote

78. An ellipse and a hyperbola have a common name ―――――― (as each has a centre of symmetry)

(a) degenerate conic (b) central conic
(c) symmetrical conic (d) circular conic

79. If $c = \sqrt{65}$, $b = 7$, $a = 4$, then the eccentricity of the hyperbola is

(a) $\frac{\sqrt{65}}{4}$ (b) $\frac{65}{16}$ (c) $\frac{\sqrt{65}}{7}$ (d) $\frac{7}{4}$

80. The equation of the tangent to the hyperbola $\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$ at the point (x_1, y_1) is

(a) $\dfrac{yy_1}{a^2} + \dfrac{xx_1}{b^2} = 1$ (b) $\dfrac{yy_1}{a^2} - \dfrac{xx_1}{b^2} = 1$

(c) $\dfrac{yy_1}{b^2} - \dfrac{xx_1}{a^2} = 1$ (d) $\dfrac{yy_1}{b^2} + \dfrac{xx_1}{a^2} = 1$

81. The equation of the tangent to the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$ at the point $(2, -3)$ is

(a) $\dfrac{2x}{a^2} - \dfrac{3y}{b^2} = 1$ (b) $-\dfrac{2x}{a^2} + \dfrac{3y}{b^2} = 1$

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

82. The straight line $y = mx + c$ is tangent to the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$, if

(a) $c = \pm\sqrt{a^2m^2 + b^2}$ (b) $c = \pm\sqrt{a^2b^2+ m^2}$

(c) $c = \pm\sqrt{a^2+ b^2 m^2}$ (d) $c = \pm\sqrt{a^2m^2 - b^2}$

83. The straight line $y = mx + c$ is tangent to the hyperbola $\dfrac{x^2}{a^2} - \dfrac{y^2}{b^2} = 1$, if

(a) $c = \pm\sqrt{a^2m^2 + b^2}$ (b) $c = \pm\sqrt{a^2b^2+ m^2}$

(c) $c = \pm\sqrt{a^2+ b^2 m^2}$ (d) $c = \pm\sqrt{a^2m^2 - b^2}$

84. The equation of the tangent to the parabola $y^2 = 4ax$ at the point (x_1, y_1) is

(a) $yy_1 = 4a(x - x_1)$ (b) $yy_1 = 4a(x + x_1)$

(c) $yy_1 = 2a(x + x_1)$ (d) $yy_1 = -2a(x + x_1)$

85. Two conics will always intersect each other in —— points

(a) no (b) one (c) two (d) four

86. Two conics are said to touch each other if they intersect in —— coincident point/s

(a) one (b) two (c) more than two (d) two or more

87. If the origin O(0, 0) is shifted to some other point O′(h, k) such that the new coordinate axes remain parallel to the original ones, then this process is called

(a) translation of axes (b) rotation of axes

(c) shifting of origin (d) transfer of axes

88. Centre of the circle $(x-b)^2+(y-a)^2=r^2$ is

(a) (b, a) (b) $(-b, -a)$ (c) (a, b) (d) $(-a, -b)$

89. The equation $4x^2+4y^2-16x+24y-117=0$ represents

(a) circle (b) parabola (c) ellipse (d) hyperbola

90. If the major axis of an ellipse is of length 12 and minor axis of 6, then equation of the ellipse is

(a) $\frac{x^2}{12}+\frac{y^2}{6}=1$ (b) $\frac{x^2}{6}+\frac{y^2}{3}=1$

(c) $\frac{x^2}{12}-\frac{y^2}{12}=1$ (d) $x^2-2y^2=12$

91. In an ellipse, the foci lie on

(a) major axis (b) minor axis (c) directrix (d) z - axis

92. The foci of the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ are

(a) $(\pm c, 0)$ (b) $(0, \pm c)$ (c) $(\pm a, 0)$ (d) $(0, \pm a)$

93. The centre of the circle $45x^2+45y^2-60x+36y+19=0$ is

(a) $\left(-\frac{2}{3}, \frac{2}{5}\right)$ (b) $\left(\frac{2}{3}, -\frac{2}{5}\right)$ (c) $\left(\frac{2}{5}, \frac{2}{3}\right)$ (d) $\left(-\frac{2}{5}, -\frac{2}{3}\right)$

94. The value of a for which the parabola $y^2=4ax$ passes through (2, 3) is

(a) $\frac{9}{8}$ (b) $\frac{8}{9}$ (c) $\frac{1}{3}$ (d) $-\frac{1}{3}$

95. The eccentricity of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ is

(a) $\frac{\sqrt{7}}{4}$ (b) $\frac{7}{4}$ (c) 16 (d) 9

96. The vertices of the hyperbola $\frac{y^2}{a^2}-\frac{x^2}{b^2}=1$ are

(a) $(\pm a, 0)$ (b) $(0, \pm a)$ (c) $(\pm ae, 0)$ (d) $(0, \pm ae)$

97. If $\frac{(x-h)^2}{a^2}-\frac{(y-k)^2}{b^2}=1$ is the hyperbola with centre (h, k) then the equation of directrices are

(a) $x = \pm \frac{a}{e}$ (b) $y = \pm \frac{a}{e}$ (c) $x = \pm \frac{a}{e} + h$ (d) $y = \pm \frac{a}{e} + k$

98. If the discriminant $h^2 - ab < 0$, then the conic will be
(a) ellipse (or circle) (b) parabola
(c) hyperbola (d) degenerate conic

99. If the discriminant $h^2 - ab = 0$, then the conic will be
(a) ellipse (or circle) (b) parabola
(c) hyperbola (d) degenerate conic

100. If the discriminant $h^2 - ab > 0$, then the conic will be
(a) ellipse (or circle) (b) parabola
(c) hyperbola (d) degenerate conic

101. For parabola $x^2 = 4ay$. Its vertex is:
(a) $(a, 0)$ (b) $(0, 0)$ (c) $(-a, 0)$ (d) $(0, a)$

102. The length of major axis of an ellipse is equal to:
(a) $2a$ (b) $2b$ (c) a (d) $4a^2$

103. For hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, the centre is the point:
(a) $(a, 0)$ (b) $(0, a)$ (c) $(0, 0)$ (d) $(0, -a)$

104. The centre of the circle $x^2 + y^2 + 2fy + c = 0$ is :
(a) $(f, 0)$ (b) $(0, f)$ (c) $(-f, 0)$ (d) $(0, -f)$

105. The line $y = mx + c$, intersects the circle $x^2 + y^2 = a^2$, if :
(a) $c^2 = a^2(1 + m^2)$ (b) $c^2 < a^2(1 + m^2)$ (c) $c^2 > a^2(1 + m^2)$ (d) None

106. The focal chord perpendicular to the axis of parabola is called:
(a) diretrix (b) Axis (c) Latus–rectum (d) None

107. For the eccentricity of the ellipse:
(a) $e < 0$ (b) $0 < e < 1$ (c) $e = 1$ (d) $e > 1$

108. Radius of the circle $x^2 + y^2 - 6x + 4y + 13 = 0$ is:
(a) 0 (b) $\sqrt{39}$ (c) $\sqrt{65}$ (d) $\sqrt{26}$

109. Co vertices of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ are
(a) $(\pm a, 0)$ (b) $(0, \pm a)$ (c) $(\pm b, 0)$ (d) $(0, \pm b)$

110. Length of transverse axis of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is:
(a) $2a$ (b) a (c) $2b$ (d) b

111. $x^2 + y^2 = r^2$ represents an equation of a circle with centre at:
(a) (h, k) (b) $(0, 0)$ (c) $(1, 1)$ (d) $(1, k)$

112. The line through the focus and perpendicular to directrix is called
(a) Direcrix (b) latus rectum
(c) Axis of parabola (d) Tangent at the vertex

113. For the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ $(a>b)$ equation of latus rectum is:

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

114. The hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is symmetrical about:

(a) x-axis (b) y-axis (c) Both axis (d) z-axis

115. General equation of the circle is:

(a) $x^2+2y^2+2gx+2fy+c=0$ (b) $2x^2+y^2+2gx+2fy+c=0$
(c) $x^2+y^2+2gx+2fy+c=0$ (d) $x^2-y^2+2gx+2fy+c=0$

116. The vertex of the parabola $(x+1)^2=8(y-2)$ is:

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

117. $\frac{x^2}{b^2}+\frac{y^2}{a^2}=1(a>b)$ are

(a) $(\pm a, 0)$ (b) $(0, \pm a)$ (c) $(\pm b, 0)$ (d) $(0, \pm b)$

118. The eccentricity e of the hyperbola is always such that:

(a) $e<0$ (b) $0<e<1$ (c) $e=1$ (d) $e>1$

119. The radius of the circle $(x-1)^2+(y+3)^2=3$ is

(a) $\sqrt{3}$ (b) 3 (c) $3\sqrt{3}$ (d) 9

120. The directrix of the parabola $y^2=8x$ is:

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

121. Transverse axis of hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is

(a) $x=\frac{a}{e}$ (b) $y=\frac{a}{e}$ (c) $y=0$ (d) $x=0$

122. Equation of the circle with centre at the origin and radius $\sqrt{5}$ is :

(a) $x^2+y^2=\sqrt{5}$ (b) $x^2+y^2=5$ (c) $x^2+y^2=25$ (d) None

123. The centre of the circle having equation $x^2+y^2+12x-10y=0$ is:

(a) $(6, 5)$ (b) $(-6, -5)$ (c) $(-6, 5)$ (d) $(6, -5)$

124. The end points of the major axis of the ellipse are called its:

(a) Foci (b) Vertices (c) Covertices (d) Directices

125. Vertices of the hyperbola $\frac{x^2}{16}-\frac{y^2}{4}=1$ are:

(a) $(\pm 2, 0)$ (b) $(0, \pm 2)$ (c) $(\pm 4, 0)$ (d) $(0, \pm 4)$

126. The equation of tangent to the parabola $x^2=4ay$:

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

127. Transverse axis of $\frac{y^2}{16}-\frac{x^2}{49}=1$

(a) lies on x-axis (b) lies on y-axis
(c) pass through (4, 7) (d) pass through (7, 4)

128. The length of the tangent drawn from the point (1 , 1) to the circle $x^2 + y^2 - 3x + 9y + 8 = 0$ is :

(a) 1 (b) $\sqrt{6}$ (c) 4 (d)12

129. The equation $ax^2 + by^2 + 2gy + 2fy + c = 0$,with either $a = 0$ or $b = 0$ but not both zero represents:

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

130. The length of semi latus rectum of an ellipse is:

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

131. The foci of hyperbola always lie on:

(a) x- axis (b) Transverse axis (c) y -axis (d) Conjugate axis

132. Tangent line to the curve $x^2 + y^2 = a^2$ at the point (x_1, y_1) is :

(a) $xx_1 + yy_1 = a^2$ (b) $x_1^2 + y_1^2 = a^2$

(c) $xy_1 + yx_1 = a^2$ (d) None

133. The line through P, perpendicular to the tangent to the curve at P is called

(a) Normal at P (b) Tangent at P

(c) Slope at P (d) Chord at P

134. If foci of an ellipse are (4, 1) and (0, 1) then its centre is

(a) (4, 2) (b) (2, 1) (c) (2, 0) (d) (1, 2)

135. The second degree equation of the form $Ax^2 + By^2 + Gx + Fy + C = 0$,if $A = B \neq 0$ represents ———.

(a) parabola (b) circle (c) ellipse (d) hyperbola

136. The second degree equation of the form $Ax^2 + By^2 + Gx + Fy + C = 0$,if $A \neq B$ and both have same sign ,represents ———.

(a) parabola (b) circle (c) ellipse (d) hyperbola

137. The second degree equation of the form $Ax^2 + By^2 + Gx + Fy + C = 0$,if $A \neq B$ and both have opposite sign ,represents ———

(a) parabola (b) circle (c) ellipse (d) hyperbola

138. The most general second degree equation

$ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a conic. The quantity $h^2 - ab$ is called ——.

(a) Discriminant (b) a pair of lines

(c) degenerate conic (d) conic section

139. Under certain conditions, the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ does not represent any conic, then it represents

(a) central conic (b) point circle

(c) degenerate conic (d) pair of lines through (0, 0)

NOTE. One of the degenerate conic is a pair of straight lines. The necessary and sufficient condition of the pair of straight lines is

$$\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix} = 0$$

or $abc + 2fgh - af^2 - bg^2 - ch^2 = 0$

Remark. This is a well-known determinant, its expansion should also be ***memorised.***

e.g. to check whether $2x^2 - xy + 5x - 2y + 2 = 0$ represents a pair of lines:

Here, on comparing with $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$,

$a = 2,\ h = -\frac{1}{2},\ b = 0,\ g = \frac{5}{2},\ f = -1, c = 2$

$$\therefore \begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix} = \begin{vmatrix} 2 & -\frac{1}{2} & \frac{5}{2} \\ -\frac{1}{2} & 0 & -1 \\ \frac{5}{2} & -1 & 2 \end{vmatrix}.\ \text{Expand by } R_2, \text{ then}$$

$$= \frac{1}{2}\left(-1 + \frac{5}{2}\right) + 1\left(-2 + \frac{5}{4}\right) = \frac{3}{4} - \frac{3}{4} = 0$$

Hence the given equation represents a pair of straight lines.

Unit - 7 (Vectors)

TYPE - 1 : [Multiple Choice Questions (M. C. Qs)].

Each question has four possible answers. Tick (√) the correct one.

1. The vector whose magnitude is 1 is called

   (a) null vector (b) unit vector (c) free vector (d) scalar

2. If the terminal point B of the vector $\overrightarrow{AB}$ coincides with its initial point A, thhen $|\overrightarrow{AB}| = |\overrightarrow{BB}| = ?$

   (a) 1 (b) 0 (c) 2 (d) undefined

3. Two vectors are said to be negative of each other if they have the same magnitude and —— direction

   (a) same (b) opposite (c) negative (d) parallel

4. Parallelogram law of vecor addition to describe the combined action of two forces, was used by

   (a) Cauchy (b) Aristotle (c) Alkhwarzmi (d) Leibnitz

5. The vector whose initial point is at the origin and terminal point is P, is called

(a) null vector (b) unit vector

(c) position vector (d) normal vector

6. If R be the set of real numbers, then the Cartesian plane is defined as

(a) $R^2 = \{ (x^2, y^2) : x, y \in R \}$ (b) $R^2 = \{ (x,y) : x, y \in R \}$

(c) $R^2 = \{ (x,y) : x,y \in R, x = -y \}$ (d) $R^2 = \{ (x,y) : x, y \in R, x = y \}$

7. The element $(x, y) \in R^2$ represents a

(a) space (b) point (c) vector (d) line

8. The set of all ordered pairs $[x, y]$ of real numbers together with the rules of addition and scalar multiplication is called the set of

(a) vectors in R (b) vectors in R^2

(c) vectors in space (d) all vectors

9. If $\mathbf{u} = [x, y]$ in R^2, then $|\mathbf{u}| = ?$

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

10. If $|\mathbf{u}| = \sqrt{x^2 + y^2} = 0$, then it must be true that

(a) $x \geq 0, y \geq 0$ (b) $x \leq 0, y \leq 0$ (c) $x \geq 0, y \leq 0$ (d) $x = 0, y = 0$

11. Each vector $[x, y]$ in R^2 can be uniquely represented as

(a) $x\mathbf{i} - y\mathbf{j}$ (b) $x\mathbf{i} + y\mathbf{j}$ (c) $x + y$ (d) $\sqrt{x^2 + y^2}$

12. The lines joining the mid-points of any two sides of a triangle is always —— to the third side.

(a) Equal (b) parallel (c) perpendicular (d) base

13. A point P in space has —— coordinates

(a) 1 (b) 2 (c) 3 (d) infinitely many

14. The set of all ordered triples $[x, y, z]$ of real numbers, together with the rules of addition and scalar multiplication is called a set of

(a) vectors in R (b) vectors in R^2

(c) vectors in R^3 (d) all vectors

15. In space the vector $\mathbf{i}$ can be written as

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

16. In space the vector j can be written as

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

17. In space the vector k can be written as

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

18. **u** = 2**i** + 3**j** + **k**, **v** = −6**i** − 9**j** − 3**k** are —— vectors

(a) parallel (b) perpendicular (c) reciprocal (d) negative

19. The angles α, β and γ, which a non-zero vector $\boldsymbol{r}$ makes with x-axis, y-axis and z-axis respectively are called —— of $\boldsymbol{r}$

(a) direction cosines (b) direction ratios
(c) direction angles (d) inclinations

20. Measure of direction angles α, β and γ are

(a) $\alpha \le 0, \beta \le 0, \gamma \le 0$ (b) $0 \le \alpha \le \frac{\pi}{2}$, $0 \le \beta \le \frac{\pi}{2}$, $0 \le \gamma \le \frac{\pi}{2}$

(c) $\alpha \ge 0, \beta \ge 0, \gamma \ge 0$ (d) $0 \le \alpha \le \pi$, $0 \le \beta \le \pi$, $0 \le \gamma \le \pi$

21. If **u** = 3**i** − **j** + 2**k**, then [3, −1, 2] are called —— of **u**

(a) direction cosines (b) direction ratios

(c) direction angles (d) elements

22. Which of the following can be the directoon angles of some vector

(a) 45°, 45°, 60° (b) 30°, 45°, 60° (c) 45°, 60°, 60° (d) none of these

Recall that here $\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$ should hold.

23. Measure of angle θ between two vectors is always

(a) $0 < \theta < \pi$ (b) $0 \le \theta \le \frac{\pi}{2}$ (c) $0 \le \theta \le \pi$ (d) obtuse

24. If the dot product of two vectors is zero, then the vectors must be

(a) parallel (b) orthogonal (c) reciprocal (d) equal

25. If the cross product of two vectors is zero, then the vectors must be

(a) parallel (b) orthogonal (c) reciprocal (d) non-coplanar

26. If θ be the angle between two vectors $\boldsymbol{a}$ and $\boldsymbol{b}$, then $\cos\theta = ?$

(a) $\dfrac{\vec{a}\times\vec{b}}{|\vec{a}||\vec{b}|}$ (b) $\dfrac{\vec{a}\cdot\vec{b}}{|\vec{a}||\vec{b}|}$ (c) $\dfrac{\vec{a}\cdot\vec{b}}{|\vec{a}|}$ (d) $\dfrac{\vec{a}\cdot\vec{b}}{|\vec{a}|}$

27. If θ be the angle between two vectors $\boldsymbol{a}$ and $\boldsymbol{b}$, then projection of $\boldsymbol{b}$ along $\boldsymbol{a}$ is

(a) $\frac{\vec{a}\times\vec{b}}{|\vec{a}||\vec{b}|}$ (b) $\frac{\vec{a}\cdot\vec{b}}{|\vec{a}||\vec{b}|}$ (c) $\frac{\vec{a}\cdot\vec{b}}{|\vec{a}|}$ (d) $\frac{\vec{a}\cdot\vec{b}}{|\vec{a}|}$

28. If θ be the angle between two vectors $\boldsymbol{a}$ and $\boldsymbol{b}$ then projection of $\boldsymbol{a}$ along $\boldsymbol{b}$ is

(a) $\frac{\vec{a}\times\vec{b}}{|\vec{a}||\vec{b}|}$ (b) $\frac{\vec{a}\cdot\vec{b}}{|\vec{a}||\vec{b}|}$ (c) $\frac{\vec{a}\cdot\vec{b}}{|\vec{a}|}$ (d) $\frac{\vec{a}\cdot\vec{b}}{|\vec{a}|}$

29. Let $\mathbf{u} = a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$, then projection of **u** along **i** is

(a) a (b) b (c) c (d) **u**

30. Let $\mathbf{u} = a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$, then projection of **u** along **j** is

(a) a (b) b (c) c (d) **u**

31. Let $\mathbf{u} = a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$, then projection of **u** along **k** is

(a) a (b) b (c) c (d) **u**

32. In any triangle ABC, the Law of Cosines is

(a) $a^2 = b^2 + c^2 - 2bc \cos A$ (b) $a = b \cos C + c \cos B$

(c) $\boldsymbol{a} + \boldsymbol{b} + \boldsymbol{c} = \boldsymbol{0}$ (d) $\cos(\alpha - \beta) = \cos\alpha \cos\beta - \sin\alpha \sin\beta$

33. In any triangle ABC, the Law of Projection is

(a) $a^2 = b^2 + c^2 - 2bc \cos A$ (b) $a = b \cos C + c \cos B$

(c) $\boldsymbol{a} \cdot \boldsymbol{b} = 0$ (d) $\boldsymbol{a} - \boldsymbol{b} = 0$

34. If **u** is a vector such that **u . i** = 0, **u . j** = 0 and **u . k** = 0, then **u** is

(a) unit vector (b) null vector (c) [**i, j, k**] (d) none of these

35. Cross product or vector product is defined

(a) in plane only (b) in space only (c) everywhere (d) in a vector field

36. If **u** and **v** be any vectors, then **u** × **v** is a vector

(a) parallel to **u** and **v** (b) parallel to **u**

(c) perpendicular to **u** and **v** (d) orthogonal to **u**

37. If **u** and **v** be any vectors, along the adjacent sides of a parallelogram then the area of the parallelogram is

(a) $\mathbf{u} \times \mathbf{v}$ (b) $|\mathbf{u} \times \mathbf{v}|$ (c) $\frac{1}{2}(\mathbf{u} \times \mathbf{v})$ (d) $\frac{1}{2}|\mathbf{u} \times \mathbf{v}|$

38. If u and v be any vectors, along the adjacent sides of a triangle then the area of the triangle is

(a) $\mathbf{u} \times \mathbf{v}$ (b) $|\mathbf{u} \times \mathbf{v}|$ (c) $\frac{1}{2}(\mathbf{u} \times \mathbf{v})$ (d) $\frac{1}{2}|\mathbf{u} \times \mathbf{v}|$

39. The scalar triple product of $\boldsymbol{a}$, $\boldsymbol{b}$ and $\boldsymbol{c}$ is denoted by

(a) $\boldsymbol{a} \cdot \boldsymbol{b} \cdot \boldsymbol{c}$ (b) $\boldsymbol{a} \times \boldsymbol{b} \times \boldsymbol{c}$ (c) $\boldsymbol{a} \cdot \boldsymbol{b} \times \boldsymbol{c}$ (d) $(\boldsymbol{a} \cdot \boldsymbol{b}) \times \boldsymbol{c}$

40. The vector triple product of $\boldsymbol{a}$, $\boldsymbol{b}$ and $\boldsymbol{c}$ is denoted by

(a) $\boldsymbol{a} + \boldsymbol{b} \times \boldsymbol{c}$ (b) $\boldsymbol{a} \cdot \boldsymbol{b} \times \boldsymbol{c}$ (c) $\boldsymbol{a} \times \boldsymbol{b} \cdot \boldsymbol{c}$ (d) $\boldsymbol{a} \infty (\boldsymbol{b} \times \boldsymbol{c})$

41. Notation for scalar triple product of $\boldsymbol{a}$, $\boldsymbol{b}$ and $\boldsymbol{c}$ is

(a) $\boldsymbol{a} \cdot \boldsymbol{b} \times \boldsymbol{c}$ (b) $\boldsymbol{a} \times \boldsymbol{b} \cdot \boldsymbol{c}$ (c) $[\boldsymbol{a} \ \boldsymbol{b} \ \boldsymbol{c}]$ (d) all of these

42. If the scalar triple product of three vectors is zero, then vectors are

(a) collinear (b) coplanar (c) non-coplanar (d) non-collinear

43. If $\mathbf{u} = [x, y]$, $\mathbf{v} = [x_1, y_1]$, then $\mathbf{u} - \mathbf{v}$ is

(a) $[x + x_1,\ y - y_1]$ (b) $[x - x_1,\ y - y_1]$

(c) $[x - x_1,\ y + y_1]$ (d) $[x + x_1,\ y + y_1]$

44. If A and B have the same direction, then $\mathbf{A} \cdot \mathbf{B} = ?$

(a) AB (b) $-$AB (c) AB $\sin\theta$ (d) AB $\tan\theta$

45. For a vector A, $\mathbf{A} \cdot \mathbf{A} = ?$

(a) 2A (b) A^2 (c) $\frac{A}{2}$ (d) $\frac{A^2}{2}$

46. If A and B have the opposite direction, then $\mathbf{A} \cdot \mathbf{B} = ?$

(a) AB (b) $-$AB (c) AB $\sin\theta$ (d) AB $\tan\theta$

47. The angle in a semi–circle is equal to:

(a) $\frac{\pi}{2}$ (b) π (c) $\frac{\pi}{3}$ (d) 3π

48. Tow non– zero vectors $\underline{u}$ and $\underline{v}$ are $\perp$ ar iff:

(a) $\underline{u} \cdot \underline{v} = 1$ (b) $\underline{u} \cdot \underline{v} \neq 1$ (c) $\underline{u} \cdot \underline{v} \neq 0$ (d)) $\underline{u} \cdot \underline{v} = 0$

49. If any two vectors of triple scalar product are equal. Then its value is equal to:

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

50. If $\vec{a}$ and $\vec{b}$ are orthogonal, then:

(a) $\vec{a} \cdot \vec{b} = ab$ (b) $\vec{a} \cdot \vec{b} = -ab$ (c) $\vec{a} \cdot \vec{b} = ab \operatorname{Sin}\theta$ (d) $\vec{a} \cdot \vec{b} = 0$

51. If $\hat{n}$ is a unit vector perpendicular to the plane containing $\vec{a}$ and $\vec{b}$, then:

(a) $\hat{n} = \frac{\vec{a} \cdot \vec{b}}{ab}$ (b) $\hat{n} = \frac{|\vec{a} \times \vec{b}|}{ab}$ (c) $\hat{n} = \frac{\vec{a} \times \vec{b}}{|\vec{a} \times \vec{b}|}$ (d) $\hat{n} = \vec{a} \times \vec{b}$

52. If $\vec{u} = [x, y], \vec{v} = [x_1, y_1]$ then $\vec{u} - \vec{v}$ is
   (a) $[x + x_1, y - y_1]$ (b) $[x - x_1, y - y_1]$
   (c) $[x - x_1, y + y_1]$ (d) $[x + x_1, y + y_1]$

53. If α, β, γ are the direction angles of a vector $\underline{r}$, then
   $\text{Cos}^2\alpha + \text{Cos}^2\beta + \text{Cos}^2\gamma =$
   (a) 3 (b) 2 (c) 1 (d) 0

54. The position vector of any point in xy -plane is:
   (a) $x i + yj = r$ (b) $r = yj + z k$
   (c) $r = x i + zk$. (d) $r = x i + yj + zk$

55. If the vectors $2i - 6j - 7k$ and $-2i + 6j + xk$ are perpendicular, then x equal
   (a) $-40/7$ (b) $40/7$ (c) -7 (d) 7

56. If $\underline{u} = -2\hat{i} + \hat{j} - 3\hat{k}$ then $|\underline{u}|$ equal to:
   (a) 14 (b) $\sqrt{14}$ (c) -12 (d) -4

57. Area of triangle is whose $\underline{u}$ & $\underline{v}$ are adjacent vectors:
   (a) $|\underline{u} \times \underline{v}|$ (b) $\frac{1}{2}|\underline{u} \times \underline{v}|$ (c) $\frac{1}{2}|\underline{u} . \underline{v}|$ (d) $\underline{u} . \underline{v}$

58. If $\underline{a}$ and $\underline{b}$ are perpendicular to each other, then $\underline{a} . \underline{b} =$
   (a) ab (b) $-ab$ (c) $ab \sin\theta$ (d) 0

59. A vector perpendicular to each of vectors $2i$ and k is:
   (a) i (b) $+2j$ (c) $-2j$ (d) k

60. The product of vectors $\underline{u} . (\underline{v} \times \underline{w})$ represents:
   (a) Area of parallelogram (b) Volume of parallelepiped
   (c) Height of parallelepiped (d) None of these

61. For the vectors $\underline{a} = 2i + 4j - k$ and $\underline{b} = 2i + 6j + xk$. if $\underline{a}$ is perpendicular to $\underline{b}$, then $x =$
   (a) -1 (b) 1 (c) 28 (d) -28

62. The cross product is also called:
   (a) Scalar product (b) Dot product (c) Vector product (d) None

63. The position vector of any point in yz -plane is:
   (a) $x i + yj = r$ (b) $r = yj + z k$
   (c) $r = x i + zk$ (d) $r = x i + yj + zk$

64. The position vector of any point in xz -plane is:
   (a) $x i + yj = r$ (b) $r = yj + z k$
   (c) $r = x i + zk$ (d) $r = x i + yj + zk$

ANSWERS

Unit – 1 ANSWERS

Type 1. (M. C. Qs)

1. b	2. a	3. c	4. c	5. b	6. b	7. b	8. c	9. a	10. a
11. a	12. c	13. a	14. a	15. a	16. a	17. d	18. b	19. b	20. d
21. d	22. d	23. a	24. d	25. b	26. a	27. b	28. a	29. b	30. c
31. d	32. d	33. b	34. a	35. c	36. d	37. a	38. c	39. a	40. b
41. c	42. d	43. c	44. b	45. c	46. d	47. d	48. a	49. b	50. b
51 d	52. d	53. b	54. b	55. a	56. a	57. c	58. c	59. a	60. c
61. a	62. b	63. b	64. c	65. d	66. b	67. c	68. b	69. c	70. a
71. a	72. c	73. d	74. a	75. b					

Unit – 2 ANSWERS

Type 1. (M. C. Qs)

1. a	2. c	3. c	4. d	5. c	6. a	7. b	8. c	9. d	10. b
11. a	12. b	13. c	14. a	15. c	16. d	17. d	18. c	19. c	20. a
21. b	22. a	23. c	24. a	25. b	26. c	27. d	28. a	29. b	30. c
31. d	32. b	33. c	34. b	35. c	36. a	37. c	38. a	39. a	40. b
41. a	42. c	43. a	44. b	45. a	46. b	47. b	48. c	49. c	50. b
51. d	52. b	53. c	54. a	55. d	56. c	57. c	58. c	59. a	60. b
61. c	62. a	63. b	64. d	65. b	66. c	67. d	68. a	69. c	70. b
71. b	72. d	73. c	74. a	75. b	76. c	77. d	78. c	79. a	80. b
81. c	82. a	83. b	84. c	85. d	86. a	87. b	88. c	89. c	90. b
91. b	92. d	93. a							

Unit - 3 ANSWERS

Type 1. (M. C. Qs)

1. b 2. d 3. d 4. a 5. d 6. c 7. c 8. c 9. a 10. a
11. b 12. a 13. a 14. b 15. c 16. b 17. a 18. a 19. c 20. b
21. d 22. a 23. b 24. a 25. b 26. a 27. c 28. b 29. b 30. c
31. a 32. b 33. b 34. c 35. a 36. d 37. a 38. b 39. c 40. a
41. d 42. a 43. b 44. c 45. c 46. c 47. c 48. b 49. b 50. b
51. a 52. a 53. c 54. a 55. d 56. d 57. c 58. d 59. a 60. a
61. a

Unit - 4 ANSWERS

Type 1. (M. C. Qs)

1. c 2. a 3. d 4. a 5. b 6. a 7. c 8. a 9. b 10. c
11. c 12. a 13. b 14. c 15. a 16. c 17. d 18. a 19. c 20. b
21. c 22. a 23. c 24. a 25. a 26. c 27. c 28. a 29. c 30. b
31. c 32. a 33. b 34. b 35. a 36. d 37. b 38. c 39. c 40. c
41. b 42. a 43. a 44. b 45. b 46. a 47. c 48. c 49. b 50. a
51. c 52. b 53. b 54. a 55. a 56. a 57. c 58. b 59. b 60. d
61. b 62. b 63. b 64. a 65. a 66. c 67. c 68. c 69. d 70. b
71. b 72. d 73. c 74. b 75. b 76. a 77. a 78. a

Unit - 5 ANSWERS

Type 1. (M. C. Qs)

1. b 2. b 3. b 4. c 5. c 6. b 7. d 8. d 9. a 10. d
11. a 12. a 13. a 14. c 15. b 16. a 17. b 18. b 19. c 20. c
21. a 22. c 23. d 24. a 25. b

Unit – 6 ANSWERS

Type 1. (M. C. Qs)

1. c	2. c	3. d	4. c	5. a	6. a	7. c	8. b	9. d	10. a
11. b	12. a	13. d	14. c	15. a	16. a	17. a	18. c	19. b	20. c
21. b	22. a	23. c	24. b	25. c	26. a	27. a	28. c	29. a	30. b
31. a	32. a	33. b	34. a	35. c	36. b	37. a	38. d	39. c	40. a
41. c	42. d	43. b	44. c	45. b	46. a	47. b	48. c	49. d	50. d
51. a	52. d	53. a	54. b	55. c	56. b	57. c	58. c	59. c	60. a
61. b	62. c	63. c	64. c	65. c	66. c	67. b	68. a	69. c	70. c
71. b	72. a	73. b	74. b	75. d	76. d	77. d	78. b	79. a	80. b
81. a	82. a	83. d	84. c	85. d	86. d	87. a	88. a	89. a	90. b
91. a	92. a	93. b	94. a	95. a	96. b	97. c	98. a	99. b	100. c
101. b	102. a	103. c	104. d	105. a	106. c	107. b	108. b	109. d	110. a
111. b	112. c	113. b	114. a	115. c	116. b	117. b	118. d	119. a	120. d
121. c	122. b	123. c	124. b	125. c	126. c	127. b	128. c	129. b	130. d
131. b	132. a	1333. a	134. b	135. b	136. c	137. d	138. a	139. c	

Unit – 7 ANSWERS

Type 1. (M. C. Qs)

1. b	2. b	3. b	4. b	5. c	6. b	7. b	8. b	9. b	10. d
11. b	12. b	13. c	14. c	15. a	16. b	17. c	18. a	19. c	20. d
21. b	22. c	23. c	24. b	25. a	26. b	27. c	28. d	29. a	30. b
31. c	32. a	33. b	34. b	35. b	36. c	37. b	38. d	39. c	40. d
41. d	42. b	43. b	44. a	45. b	46. b	47. a	48. d	49. b	50. d
51. c	52. b	53. c	54. a	55. d	56. b	57. b	58. d	59. c	60. b
61. c	62. c	63. b	64. c						