CHAPTER – 1

SETS, RELATIONS AND FUNCTIONS

1. If $A = \{(x, y): y = e^x, x \in R\}$ and $B = \{(x, y): y = e^{-x}, x \in R\}$ then $n(A \cap B)$is

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

2. If $A = \{(x, y): y = sinx, x \in R\}$ and $B = \{(x, y): y = cosx, x \in \mathcal{R}\}$ then $A \cap B$ contains

   (a) No element (b) infinity many elements

   (c) only one element (d) cannot be determined

3. The relation R defined on a set $A = \{0, -1, 1, 2\}$ by xRy if $|x^2 + y^2| \leq 2$, then which one of the following is true?

   (a) $R = \{(0,0), (0, -1), (0,1), (-1,0), (-1,1), (1,2), (1,0)\}$

   (b) $R^{-1} = \{(0,0), (0, -1), (0,1), (-1,0), (1,0)\}$

   (c) Domain of R is $\{0, -1, 1, 2\}$ (d) Range of R is $\{0, -1, 1\}$

4. If $f(x) = |x - 2| + |x + 2|, x \in \mathbb{R}$, then

   (a) $f(x) = \begin{cases} -2x & if \quad x \in (-\infty, -2] \\ 4 & if \quad x \in (-2, 2] \\ 2x & if \quad x \in (2, \infty) \end{cases}$ (b) $f(x) = \begin{cases} 2x & if \quad x \in (-\infty, -2] \\ 4x & if \quad x \in (-2, 2] \\ -2x & if \quad x \in (2, \infty) \end{cases}$

   (c) $f(x) = \begin{cases} -2x & if \quad x \in (-\infty, -2] \\ -4x & if \quad x \in (-2, 2] \\ 2x & if \quad x \in (2, \infty) \end{cases}$ (d) $f(x) = \begin{cases} -2x & if \quad x \in (-\infty, -2] \\ 2x & if \quad x \in (-2, 2] \\ 2x & if \quad x \in (2, \infty) \end{cases}$

5. Let $\mathbb{R}$be the set of all real numbers. Consider the following subsets of the plane $\mathbb{R} \times \mathbb{R}$:

   $S = \{(x, y): y = x + 1 \text{ } and \text{ } 0 < x < 2\}$ and $T = \{(x, y): x - y \text{ } is \text{ } an \text{ } integer\}$

   Then which of the following is true?

   $(a)$$T$ is an equivalence relation but S is not an equivalence relation.

   (b) Neither S nor T is an equivalence relation.

   (c) Both S and T are equivalence relation.

   (d) S is an equivalence relation but T is not an equivalence relation.

6. Let A and B be subsets of the universal set $\mathbb{N}$, the set of natural numbers.

   Then $A' \cup [(A \cap B) \cup B']$ is

   (a) A (b) A' (c) B (d) $\mathbb{N}$

7. The number of students who take both the subjects Mathematics and Chemistry is 70. This represents 10% of the enrollment in Mathematics and 14% of the enrolment in Chemistry. The number of students take at least one of these two subjects, is

(a) 1120 (b) 1130 (c) 1100 (d) insufficient data

8. If $n\big((A \times B) \cap (A \times C)\big) = 8$ and $n(B \cap C) = 2$, then $n(A)$ is

(a) 6 (b) 4 (c) 8 (d) 16

9. If $n(A) = 2$ and $n(B \cup C) = 3$, then $n[(A \times B) \cup (A \times C)]$ is

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

10. If two sets $A and$ B have 17 elements in common, then the number of elements common to the set $A \times B$ and $B \times A$ is

(a) 2^{17} (b) 17^2 (c) 34 (d) insufficient data

11. For non-empty sets A and B, if $A \subset B$ then $(A \times B) \cap (B \times A)$is equal to

(a) $A \cap B$ (b) $A \times A$ (c) $B \times B$ (d) none of these

12. The number of relations on a set containing 3 elements is

(a) 9 (b) 81 (c) 512 (d) 1024

13. Let R be the universal relation on a set X with more than ne element, then R is

(a) not reflexive (b) not symmetric (c) transitive (d) none of the above

14. Let $X = \{1,2,3,4\}$ and $R = \{(1,2),(1,2),(1,3),(2,2),(3,3)(2,1)(3,1),(1,4),(4,1)\}$. Then R is

(a) reflexive (b) symmetric (c)transitive (d) equivalence

15. The range of the function $\frac{1}{1-2sinx}$ is

(a) $(-\infty,-1) \cup \left(\frac{1}{3},\infty\right)$ (b) $\left(-1,\frac{1}{3}\right)$

(c) $\left[-1,\frac{1}{3}\right]$ (d) $(-\infty,-1] \cup \left[\frac{1}{3},\infty\right)$

16. The range of the function $f(x) = |\lfloor x \rfloor - x|, x \in \mathbb{R}$ is

(a) $[0,1]$ (b) $[0,\infty)$ (c) $[0,1)$ (d) $(0,1)$

17. The rule $f(x) = x^2$ is a bijection if the domain and the co-domain are given by

(a) $\mathbb{R}, \mathbb{R}$ (b) $\mathbb{R}, (0,\infty)$ (c) $(0,\infty), \mathbb{R}$ (d) $[0,\infty), [0,\infty)$,

18. The number of constant functions from a set containing m elements to a set containing n elements is

(a) mm (b) m (c) n (d) $m+n$

19. The function $f: [0,2\pi] \to [-1,1]$ defined by $f(x) = sin\ \ x$ is

(a) One-to-one (b) onto (c) bijection (d) cannot be defined

20. If the function $f: [-3,3] \to S$ defined by $f(x) = x^2$ is onto, then S is

(a) $[-9,9]$ (b) $\mathbb{R}$ (c) $[-3,3]$ (d) $[0,9]$

21. Let $X = \{1,2,3,4\}, Y = \{a,b,c,d\}$ and $f = \{(1,a),(4,b),(2,c),(3,d),(2,d)\}$. Then f is

(a) an one-to-one function (b) an onto function

(c) a function which is not one-to-one (d) not a function

22. The inverse of $f(x) = \begin{cases} x & if \quad x < 1 \\ x^2 & if \quad 1 \le x \le 4 \\ 8\sqrt{x} & if \quad x > 4 \end{cases}$ is

$(a)\ f^{-1}(x) = \begin{cases} x & if \quad x < 1 \\ \sqrt{x} & if \quad 1 \le x \le 16 \\ \frac{x^2}{64} & if \quad x > 16 \end{cases}$ $(b)\ f^{-1}(x) = \begin{cases} -x & if \quad x < 1 \\ \sqrt{x} & if \quad 1 \le x \le 16 \\ \frac{x^2}{64} & if \quad x > 16 \end{cases}$

$(c)\ f^{-1}(x) = \begin{cases} x^2 & if \quad x < 1 \\ \sqrt{x} & if \quad 1 \le x \le 16 \\ \frac{x^2}{64} & if \quad x > 16 \end{cases}$ $(d)\ f^{-1}(x) = \begin{cases} 2x & if \quad x < 1 \\ \sqrt{x} & if \quad 1 \le x \le 16 \\ \frac{x^2}{8} & if \quad x > 16 \end{cases}$

23. Let $f: \mathbb{R} \to \mathbb{R}$ is defined by $f(x) = 1 - |x|$. Then the range of f is

(a) $\mathbb{R}$ (b) $(1, \infty)$ (c) $(-1, \infty)$ (d) $(-\infty, 1]$

24. The function $f: \mathbb{R} \to \mathbb{R}$ is defined by $f(x) = sinx + cosx$ is

(a) an odd function (b) neither an odd function nor an even function

(c) an even function (d) both odd function and even function

25. The function $f: \mathbb{R} \to \mathbb{R}$ is defined by $f(x) = \frac{(x^2+cosx)(1+x^4)}{(x-sinx)(2x-x^3)} + e^{-|x|}$

(a) an odd function (b) neither an odd function nor an even function

(c) an even function (d) both odd function and even function

CHAPTER- 2

BASIC ALGEBRA

1. If $|x + 2| \le 9$, then x belongs to

(a) $(-\infty, -7)$ $(b)[-11,7]$ (c) $(-\infty, -7) \cup [11, \infty]$ (d) $(-11,7)$

2. Give that x, y and b are real numbers $x < y, b > 0$, then

(a) $xb < yb$ (b) $xb > yb$ (c) $xb \le yb$ (d) $\frac{x}{b} \ge \frac{y}{b}$

3. If $\frac{|x-2|}{x-2} \ge 0$, then x belongs to

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

4. The solution of $5x - 1 < 24$ and $5x + 1 > -24$ is

(a) $(4,5)$ (b) $(-5,-4)$ (c) $(-5,5)$ (d) $(-5,4)$

5. The solution set of the following inequality $|x-1| \geq |x-3|$ is

(a) $[0,2]$ (b) $[2,\infty)$ (c) $(0,2)$ (d) $(-\infty,2)$

6. The value of $log_{\sqrt{2}}512$ is

(a) 16 (b) 18 (c) 9 (d) 12

7. The value of $log_3 \frac{1}{81}$ is

(a) -2 (b) -8 (c) -4 (d) -9

8. If $log_{\sqrt{x}}0.25 = 4$, then the value of x is

(a) 0.5 (b) 2.5 (c) 1.5 (d) 1.25

9. The value of $log_a b \, log_b c \, log_c a$ is

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

10. If 3 is the logarithm of 343, then the base is

(a) 5 (b) 7 (c) 6 (d) 9

11. Find a so that the sum and product of the roots of the equation $2x^2 + (a-3)x + 3a - 5 = 0$ are equal is

(a) 1 (b) 2 (c) 0 (d) 4

12. If a and b are the roots of the equation $x^2 - kx + 16 = 0$ and satisfy $a^2 + b^2 = 32$, then the value of k is

(a) 10 (b) -8 (c) $-8,8$ (d) 6

13. The number of solutions of $x^2 + |x-1| = 1$ is

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

14. The equation whose roots are numerically equal but opposite in sign to the roots of $3x^2 - 5x - 7 = 0$ is

(a) $3x^2 - 5x - 7 = 0$ (b) $3x^2 + 5x - 7 = 0$ (c) $3x^2 - 5x + 7 = 0$ (d) $3x^2 + x - 7$

15. If 8 and 2 are the roots of $x^2 + ax + c = 0$ and 3,3 are the roots of $x^2 + dx + b = 0$, then the roots of the equation $x^2 + ax + b = 0$ are

(a) 1,2 (b) $-1,1$ (c) 9,1 (d) $-1,2$

16. If a and b are the real roots of the equation $x^2 - kx + c = 0$,then the distance between the points $(a,0)$ and $(b,0)$ is

(a) $\sqrt{k^2 - 4c}$ (b) $\sqrt{4k^2 - c}$ (c) $\sqrt{4c - k^2}$ (d) $\sqrt{k - 8c}$

17. If $\frac{kx}{(x+2)(x-1)} = \frac{2}{x+2} + \frac{1}{x-1}$, then the value of k is

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

18. If $\frac{1-2x}{3+2x-x^2} = \frac{A}{3-x} + \frac{B}{x+1}$, then value $A+B$ is

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

19. The number of roots of $(x+3)^4 + (x+5)^4 = 16$ is

(a) 4 (b) 2 (c) 3 (d) 0

20. The value of $\log_3 11 . \log_{11} 13 . \log_{13} 15 . \log_{15} 27 \log_{27} 81$ is

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

CHAPTER- 3

TRIGONOMETRY

1. $\frac{1}{cos80^\circ} - \frac{\sqrt{3}}{sin80^\circ} =$

(a) $\sqrt{2}$ (b) $\sqrt{3}$ (c) 2 (d) 4

2. If $cos28^\circ + sin28^\circ = k^3$, then $cos17^\circ$ is equal to

(a) $\frac{k^3}{\sqrt{2}}$ (b) $-\frac{k^3}{\sqrt{2}}$ (c) $\pm\frac{k^3}{\sqrt{2}}$ (d) $-\frac{k^3}{\sqrt{3}}$

3. The maximum value of $4sin^2x + 3cos^2x + sin\frac{x}{2} + cos\frac{x}{2}$ is

(a) $4+\sqrt{2}$ (b) $3+\sqrt{2}$ (c) 9 (d) 4

4. $\left(1+COS\frac{\pi}{8}\right)\left(1+COS\frac{3\pi}{8}\right)\left(1+COS\frac{5\pi}{8}\right)\left(1+COS\frac{7\pi}{8}\right) =$

(a) $\frac{1}{8}$ (b) $\frac{1}{2}$ (c) $\frac{1}{\sqrt{3}}$ (d) $\frac{1}{\sqrt{2}}$

5. If $\pi < 2\theta < \frac{3\pi}{2}$, then $\sqrt{2+\sqrt{2+2cos4\theta}}$ equals to

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

6. If $tan40^\circ = \lambda$, then $\frac{tan140^\circ - tan130^\circ}{1+tan140^\circ tan130^\circ} =$

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

7. $cos1^\circ + cos2^\circ + cos3^\circ + \cdots . cos179^\circ =$

(a) 0 (b) 1 (c) -1 (d) 89

8. Let $f_k(x) = \frac{1}{k}[sin^k x + cos^k x]$ where $x \epsilon \mathcal{R}$ and $k \geq 1$. Then $f_4(x) - f_6(x) =$

(a) $\frac{1}{4}$ (b) $\frac{1}{12}$ (c) $\frac{1}{6}$ (d) $\frac{1}{3}$

9. Which of the following is not true?

$(a)\ sin\theta = -\frac{3}{4}$ $(b)\ cos\theta = -1$ $(c)\ tan\theta = 25$ $(d)\ sec\theta = \frac{1}{4}$

10. $cos2\theta cos2\phi + sin^2(\theta - \phi) - sin^2(\theta + \phi)$ is equal to

    $(a)\ sin2(\theta + \phi)$ $(b)\ cos2(\theta + \phi)$ $(c)\ sin2(\theta - \phi)$ $(d)\ cos2(\theta - \phi)$

11. $\frac{sin(A-B)}{cosAcosB} + \frac{sin(B-c)}{cosBcosC} + \frac{sin(C-A)}{cosCcosA}$ is

    $(a)\ sinA + sinB + sinC$ $(b) 1$ $(c)\ 0$ $(d)\ cosA + cosB + cosC$

12. If $cosp\theta + cosq\theta = 0$ and if $p \neq q$, then θ is equal to $(n\ is\ any\ integer)$

    $(a)\ \frac{\pi(3n+1)}{p-q}$ $(b)\ \frac{\pi(2n+1)}{p\pm q}$ $(c)\ \frac{\pi(n\pm1)}{p\pm q}$ $(d)\ \frac{\pi(n+2)}{p+q}$

13. If $tan\alpha$ and $tan\beta$ are the roots of $x^2 + ax + b = 0$, then $\frac{sin(\alpha+\beta)}{sin\alpha sin\beta}$ is equal to

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

14. In a triangle $ABC, sin^2A + sin^2B + sin^2C = 2$, then the triangle is

    (a) Equilateral triangle (b) isosceles triangle

    (c) right triangle (d) scalene triangle

15. If $f(\theta) = |sin\theta| + |cos\theta|, \theta \epsilon R$, then $f(\theta)$ is in the interval

    (a) [0,2] $(b)[1, \sqrt{2}]$ $(c)[1,2]$ (d) [0,1]

16. $\frac{cos6x+6cos4x+15cos2x+10}{cos5x+5cos3x+10cosx}$ is equal to

    $(a)\ cos2x$ $(b) cosx$ $(c) \cos 3x$ $(d) 2cosx$

17. The triangle of maximum area with constant perimeter $12m$

    (a) Is an equilateral triangle with side $4m$ (b) is an isosceles triangle with sides $2m, 5m, 5m$

    (c) Is a triangle with sides $3m, 4m, 5m$ (d) does not exist

18. A wheel is spinning at 2 radians/second. How many seconds will it take to make 10 complete rotations?

    $(a) 10\pi$ seconds $(b) 20\pi$ seconds $(c)\ 5\pi$ seconds $(d) 15\pi$ seconds

19. If $sin\alpha + cos\alpha = b$, then $sin2\alpha$ is equal to

    $(a)\ b^2 - 1, if\ b \leq \sqrt{2}$ $(b)\ b^2 - 1, if\ b > \sqrt{2}$ $(c)\ b^2 - 1, if\ b \geq 1$ $(d)\ b^2 - 1, if\ b \geq \sqrt{2}$

20. In a ΔABC if $(i) sin\frac{A}{2}sin\frac{B}{2}sin\frac{C}{2} > 0$ $(ii)\ sinAsinBsinC > 0$

    (a) Both (i) and (ii) are true (b) only (i) is true

    (c) Only (ii) is true (d) Neither (i) nor (ii) is true.

CHAPTER- 4

1. The sum of the digits at the digits at the 10^{th} place of all numbers formed with the help of 2,4,5,7 taken all at a time is

   (a) 432 (b) 108 (c) 36 (d) 18

2. In an examination there are three multiple choice questions and each question has 5 choice. Number of ways in which a student can fail to get all answer correct is

   (a) 125 (b) 124 (c) 64 (d) 63

3. The number of ways in which the following prize be given to a class of 30 boys first and second in mathematics, first and second in physics, first in chemistry and first in English is

   $(a)\ 30^4 \times 29^2$ $(b)\ 30^3 \times 29^3$ $(c)\ 30^2 \times 29^4$ $(d)\ 30 \times 29^5$

4. The number of 5 digit numbers all digits of which are odd is

   (a) 25 $(b)\ 5^5$ $(c)\ 5^6$ (d) 625

5. In 3 fingers, the number of ways four rings can be worn is .... ways

   $(a)\ 4^3 - 1$ $(b)\ 3^4$ (c) 68 (d) 64

6. If $(n+5)P_{(n+1)} = \left(\frac{11(n-1)}{2}\right)(n+3)P_n$, then the value of n are

   (a) 7 *and* 11 (b) 6 *and* 7 (c) 2 *and* 11 (d) 2 *and* 6.

7. The product of r consecutive positive integer is divisible by

   $(a)\ r!$ $(b)\ (r-1)!$ $(c)\ (r+1)!$ $(d)\ r^r$

8. The number of five-digit telephone numbers having at least one of their digits repeated is

   (a) 90000 (b) 10000 (c) 30240 (d) 69760

9. If $(a^2 - a)C_2 = a^2 - a\ C_4$ then the value of $'a'$ is

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

10. There are 10 points in a plane and 4 of them are collinear. The number of straight lines joining any two points is

    (a) 45 (b) 40 (c) 39 (d) 38

11. The number of ways in which a host lady invite 8 people for a party of 8 out of 12 people of whom two do not want to attend the party together is

    $(a)\ 2 \times 11C_7 + 10C_8$ $(b)\ 11C_7 + 10C_8$ $(c)\ 12C_8 - 10C_6$ $(d)\ 10C_6 + 2!$

12. The number of parallelograms that can be formed from a set of four parallel lines intersecting another set of three parallel lines.

    (a) 6 (b) 9 (c) 12 (d) 18

13. Everybody in a room shake hands with everybody else. The total number of shake hands is 66 .The number of persons in the room is

(a) 11 (b)12 (c)10 (d) 6

14. Number of sides of a polygon having 44 diagonals is

(a) 4 (b) 4! (c) 11 (d) 22

15. If 10 lines are drawn in a plane such that no two of them are parallel and no three are concurrent, then the total number of points of intersection are

(a) 45 (b)40 (c) 10! (d) 2^{10}

16. In a plane there are 10 points are there out of which 4 points are collinear, then the number of triangles formed is

(a) 110 (b) $10C_3$ (c) 120 (d) 116

17. In $2nC_3 : nC_3 = 11 : 1$ then n is

(a) 5 (b) 6 (c) 11 (d) 7

18. $(n-1)C_r + (n-1)C_{(r-1)}$ is

(a) $(n+1)C_r$ (b) $(n-1)C_r$ (c) nC_r (d) nC_{r-1}

19. The number of ways of choosing 5 cards out of a deck of 52 cards which include at least one king is

(a) $52C_5$ (b) $48C_5$ (c) $52C_5 + 48C_5$ (d) $52C_5 - 48C_5$

20. The number of rectangles that a chessboard has

(a) 8 (b) 9^9 (c) 1296 (d) 6561

21. The number of 10 digit number that can be written by using the digits 2 and 3 is

(a) $10C_2 + 9C_2$ (b) 2^{10} (c) $2^{10} - 2$ (d) 10!

22. If P_r stands for rP_r then the sum of the series $1 + P_1 + 2P_2 + 3P_3 + \cdots + nP_n$ is

(a) P_{n+1} (b) $P_{n+1} - 1$ (c) $P_{n+1} + 1$ (d) $(n+1)P_{n+1}$

23. The product of first n odd natural numbers equals

(a) $2nC_n \times nP_n$ (b) $\left(\frac{1}{2}\right)^n \times 2nC_n \times nP_n$ (c) $\left(\frac{1}{4}\right)^n \times 2nC_n \times 2nP_n$ (d) $nC_n \times nP_n$

24. If nC_4 , nC_5 , nC_6 are in AP the value of n can be

(a) 14 (b) 11 (c) 9 (d) 5

25. $1 + 3 + 5 + 7 + \cdots + 17$ is equal to

(a) 101 (b) 81 (c) 71 (d) 61

CHAPTER- 5

BINOMIAL THEOREM, SEQENCES AND SERIES

1. The value of $2+4+6+\cdots+2n$ is

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

2. The coefficient of x^6 in $(2+2x)^{10}$ is

   $(a)\ 10C_6$ $(b)\ 2^6$ $(c)\ 10C_6 2^6$ $(d)\ 10C_6 2^{10}$

3. The coefficient of x^8y^{12} in the expansion of $(2x+3y)^{20}$ is

   $(a)\ 0$ $(b)\ 2^8 3^{12}$ $(c)\ 2^8 3^{12}+2^{12}3^8$ $(d)\ 20C_8 2^8 3^{12}$

4. If $nC_{10} > nC_r$ for all possible r, then a value of n is

   $(a)\ 10$ $(b)\ 21$ $(c)\ 19$ $(d)\ 20$

5. If a is the arithmetic mean and g is the geometric mean of two numbers, then

   $(a)\ a \le g$ $(b)\ a \ge g$ $(c)\ a = g$ $(d)\ a > g$

6. If $(1+x^2)^2(1+x)^n = a_0 + a_1x + a_1x^2 + \cdots + x^{n+4}$ and if a_0, a_1, a_2 are in AP,then n is

   $(a)\ 1$ $(b)\ 5$ $(c)\ 2$ $(d)\ 4$

7. If $a, 8, b$ are in AP , $a, 4, b$ are in GP, and if a, x, b are in HP then x is

   $(a)\ 2$ $(b)\ 1$ $(c)\ 4$ $(d)\ 16$

8. The sequence $\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}+\sqrt{2}}, \frac{1}{\sqrt{3}+2\sqrt{2}}$, ...form an

   $(a)\ AP$ $(b)\ GP$ $(c)\ HP$ $(d)\ AGP$

9. The HM of two positive number whose AM and GM are 16,8 respectively is

   $(a)\ 10$ $(b)\ 6$ $(c)\ 5$ $(d)\ 4$

10. If S_n denotes the sum of n terms of an AP whose common difference is d, the value of $S_n - 2S_{n-1} + S_{n-2}$

    $(a)\ d$ $(b)\ 2d$ $(c)\ 4d$ $(d)\ d^2$

11. The remainder when 38^{15} is divided by 13 is

    $(a)\ 12$ $(b)\ 1$ $(c)\ 11$ $(d)\ 5$

12. The n^{th} term of the sequence 1,2,4,7,11,.. is

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

13. The sum up to n term of the series $\frac{1}{\sqrt{1}+\sqrt{3}}, \frac{1}{\sqrt{3}+\sqrt{5}}, \frac{1}{\sqrt{5}+\sqrt{7}}+$, ... is

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

14. The n^{th} term of the sequence $\frac{1}{2}, \frac{3}{4}, \frac{7}{8}, \frac{15}{16}, \ldots$ is

$(a)\ 2^n - n - 1$ $(b)\ 1 - 2^{-n}$ $(c)\ 2^{-n} + n - 1$ $(d)\ 2^{n-1}$

15. The sum up to n terms of the series $\sqrt{2} + \sqrt{8} + \sqrt{18} + \sqrt{32} + \cdots$ is

$(a)\ \frac{n(n+1)}{2}$ $(b)\ 2n(n+1)$ $(c)\ \frac{n(n+1)}{\sqrt{2}}$ $(d)\ 1$

16. The value of the series $\frac{1}{2} + \frac{7}{4} + \frac{13}{8} + \frac{19}{16} + \cdots$ is

$(a)\ 14$ $(b)\ 7$ $(c)\ 4$ $(d)\ 6$

17. The sum of an infinite GP is 18. If the first term is 6, the common ratio is

$(a)\ \frac{1}{3}$ $(b)\ \frac{2}{3}$ $(c)\ \frac{1}{6}$ $(d)\ \frac{3}{4}$

18. The coefficient of x^5 in the series e^{-2x} is

$(a)\ \frac{2}{3}$ $(b)\ \frac{3}{2}$ $(c)\ -\frac{4}{15}$ $(d)\ \frac{4}{15}$

19. The value of $\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \ \ldots$ is

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

20. The value of $1 - \frac{1}{2}\left(\frac{2}{3}\right) + \frac{1}{3}\left(\frac{2}{3}\right)^2 - \frac{1}{4}\left(\frac{2}{3}\right)^3 + \cdots$ is

$(a)\ \log\left(\frac{5}{3}\right)$ $(b)\ \frac{3}{2}\log\left(\frac{5}{3}\right)$ $(c)\ \frac{5}{3}\log\left(\frac{5}{3}\right)$ $(d)\ \frac{2}{3}\log\left(\frac{2}{3}\right)$

CHAPTER- 6

TWO DIMENTIONAL ANALYTICAL GEOMETRY

1. The equation of the locus of the point whose distance from y −axis is half the distance from origin is

$(a)\ x^2 + 3y^2 = 0$ $(b)\ x^2 - 3y^2 = 0$ $(c)\ 3x^2 + y^2 = 0$ $(d)\ 3x^2 - y^2 = 0$

2. Which of the following equation is the locus of $(at^2, 2at)$

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

3. Which of the following point lie on the locus of $3x^2 + 3y^2 - 8x - 12y + 17 = 0$

$(a)\ (0,0)$ $(b)\ (-2,3)$ $(c)\ (1,2)$ $(d)\ (0,-1)$

4. If the point $(8,-5)$ lies on the locus $\frac{x^2}{16} - \frac{y^2}{25} = k$, then the value of k is

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

5. Straight line joining the points $(2,3)$ and $(-1,4)$ passes through the point (α, β) if

$(a)\ \alpha + 2\beta = 7$ $(b)\ 3\alpha + \beta = 9$ $(c)\ \alpha + 3\beta = 11$ $(d)\ 3\alpha + \beta = 11$

6. The slope of the line which makes an angle 45° with the line $3x - y = -5$ are

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

7. Equation of the straight line that forms an isosceles triangle with coordinate axes in the $I -$ quadrant

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

8. The coordinates of the four vertices of a quadrilateral are $(-2,4), (-1,2), (1,2)$ and $(2,4)$ taken in order. The equation of the line passing through the vertex $(-1,2)$ and dividing the quadrilateral in the equal areas is

$(a)\ x + 1 = 0$ $(b)\ x + y = 1$ $(c)\ x + y + 3 = 0$ $(d)\ x - y + 3 = 0$

9. The intercepts of the perpendicular bisector of the line segment joining $(1,2)$ and $(3,4)$ with coordinate axes are

$(a)\ 5, -5$ $(b)\ 5, 5$ $(c)\ 5, 3$ $(d)\ 5, \ -4$

10. The equation of the line with slope 2 and the length of the perpendicular from the origin equal to $\sqrt{5}$ is

$(a)\ x - 2y = \sqrt{5}$ $(b)\ 2x - y = \sqrt{5}$ $(c)\ 2x - y = 5$ $(d)\ x - 2y - 5 = 0$

11. A line perpendicular to the line $5x - y = 0$ forms a triangle with the coordinate axes. If the area of the triangle is $5\ sq.unit$, then its equation is

$(a)\ x + 5y \pm 5\sqrt{2} = 0$ $(b)\ x - 5y \pm 5\sqrt{2} = 0$

$(c)\ 5x + y \pm 5\sqrt{2} = 0$ $(d)\ 5x - y \pm 5\sqrt{2} = 0$

12. Equation of the straight line perpendicular to the line $x - y + 5 = 0$, through the point of intersection the $y -$ axis and the given line

$(a)\ x - y - 5 = 0$ $(b)\ x + y - 5 = 0$ $(c)\ x + y + 5 = 0$ $(d)\ x + y + 10 = 0$

13. Equation of the base opposite to the vertex $(2,3)$ of an equilateral triangle is $x + y = 2$,then the length of a side is

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

14. The line $(p + 2q)x + (p - 3q)y = p - q$ for different values of p and q passes through the point

$(a)\ \left(\frac{3}{2}, \frac{5}{2}\right)$ $(b)\ \left(\frac{2}{5}, \frac{2}{5}\right)$ $(c)\ \left(\frac{3}{5}, \frac{3}{5}\right)$ $(d)\ \left(\frac{2}{5}, \frac{3}{5}\right)$

15. The point on the line $2x - 3y = 5$ is equidistance from $(1,2)$ and $(3,4)$ is

(a) (7,3) (b) (4,1) (c) $(1,-1)$ (d) $(-2,3)$

16. The image of the point (2,3) in the line $y=-x$ is

(a) $(-3,\ -2)$ (b) $(-3,2)$ (c) $(-2,\ -3)$ (d) $(3,2)$

17. The length of $\perp$ from the origin to the line $\frac{x}{3}-\frac{y}{4}=1$, is

(a) $\frac{11}{5}$ (b) $\frac{5}{12}$ (c) $\frac{12}{5}$ (d) $-\frac{5}{12}$

18. The $y-$ intercept of the straight line passing through (1,3) and perpendicular to $2x-3y+1=0$ is

(a) $\frac{3}{2}$ (b) $\frac{9}{2}$ (c) $\frac{2}{3}$ (d) $\frac{2}{9}$

19. If the two straight lines $x+(2k-7)y+3=0$ and $3kx+9y-5=0$ are perpendicular then the value of k is

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

20. If a vertex of a square is at the origin and its one side lies along the line $4x+3y-20=0$, then the area of the square is

(a) 20 $sq.units$ (b) 16 $sq.units$ (c) 25 $sq.units$ (d) 4 $sq.units$

21. If the lines represented by the equation $6x^2+41xy-7y^2=0$ make angles α and β with $x-$ axis then $\tan\alpha\tan\beta=$

(a) $-\frac{6}{7}$ (b) $\frac{6}{7}$ (c) $-\frac{7}{6}$ (d) $\frac{7}{6}$

22. The area of the triangle formed by the lines $x^2-4y^2=0$ and $x=a$ is

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

23. If one of the lines given by $6x^2-xy+4cy^2=0$ is $3x+4y=0$,then c equals to

(a) -3 (b) -1 (c) 3 (d) 1

24. θ is acute angle between the lines $x^2-xy-6y^2=0$, then $\frac{2\cos\theta+3\sin\theta}{4\sin\theta+5\cos\theta}$ is

(a) 1 (b) $-\frac{1}{9}$ (c) $\frac{5}{9}$ (d) $\frac{1}{9}$

25. One of the equation of the lines given by $x^2+2xy\cot\theta-y^2=0$ is

(a) $x-y\cot\theta=0$ (b) $x+y\tan\theta=0$

(c) $x\cos\theta+y(\sin\theta+1=0)$ (d) $x\sin\theta+y(\cos\theta+1=0)$