

Based on the above information answer the following

- i. The number of students reading only chemistry is
 - a. 5
 - b. 4
 - c. 2
 - d. 1
- ii. The number of students reading only mathematics is
 - a. 4
 - b. 3
 - c. 5
 - d. 1
- iii. The number of students reading only one of the subject
 - a. 5
 - b. 8
 - c. 11
 - d. 6
- iv. The number of students reading at least one of the subject
 - a. 20
 - b. 22
 - c. 23
 - d. 21
- v. The number of students reading none of the subject
 - a. 2
 - b. 4
 - c. 3
 - d. 5

CHAPTER -2 (RELATIONS AND FUNCTIONS)

Solve the following questions:-

- Q.1** Let $n(A) = m$ and $n(B) = n$. Then, the total number of non-empty relations that can be defined from A to B is
- a. m^n
 - b. $n^m - 1$
 - c. $mn - 1$
 - d. $2^{mn} - 1$
- Q.2** The relation R defined on the set of natural numbers as $\{(a, b): a \text{ differs from } b \text{ by } 3\}$, is given by
- a. $\{(1, 4), (2, 5), (3, 6), \dots\}$
 - b. $\{(4, 1), (5, 2), (6, 3), \dots\}$
 - c. $\{(1, 3), (2, 6), (3, 9), \dots\}$
 - d. None of these
- Q.3** The domain for which the functions defined by $f(x) = 3x^2 - 1$ and $g(x) = 3 + x$ are equal to
- a. $\left\{-1, \frac{4}{3}\right\}$
 - b. $\left\{-1, -\frac{4}{3}\right\}$
 - c. $\left\{1, \frac{4}{3}\right\}$
 - d. None of these
- Q.4** If $f(x) = \frac{1}{2 - \sin 3x}$, then range (f) is equal to
- a. $[-1, 1]$
 - b. $\left[-\frac{1}{3}, \frac{1}{3}\right]$
 - c. $\left[\frac{1}{3}, 1\right]$
 - d. None of these
- Q.5** The domain of the function f defined by $f(x) = \sqrt{a^2 - x^2}$ ($a > 0$) is
- a. $(-a, a)$
 - b. $[-a, a]$
 - c. $[0, a]$
 - d. $(-a, 0]$
- Q.6** If $A = \{1, 2\}$, $B = \{2, 3, 4\}$, $C = \{4, 5\}$, then find $A \times (B \cap C)$.
- Q.7** Find a and b if $(a-1, b+5) = (2, 3)$.
- Q.8** If $P = \{1, 3\}$, $Q = \{2, 3, 5\}$, find the number of relations from A to B.
- Q.9** If $f(x) = x^3$, find the value of $f(5) - f(1)$.
- Q.10** Find the domain of the real function $f(x) = \sqrt{x^2 - 4}$.
- Q.11** Is $g = \{(1, 1), (2, 3), (3, 5), (4, 7)\}$ a function? If this is described by the formula, $g(x) = \alpha x + \beta$, then what values should be assigned to α and β ?
- Q.12** Express the function $f : X \rightarrow R$ given by $f(x) = x^3 + 1$ as set of ordered pairs, where $X = \{-1, 0, 3, 9, 7\}$
- Q.13** If $y = f(x) = \frac{ax - b}{bx - a}$, show that $x = f(y)$
- Q.14** Find the domain of the function f given by $f(x) = \frac{1}{\sqrt{[x]^2 - [x] - 6}}$
- Q.15** Find the domain and range of the function f given by $f(x) = 2 - |x-5|$

Q.16 Let f be defined by $f(x) = x-4$ and g be defined by $g(x) = \begin{cases} \frac{x^2-16}{x+4}, & x \neq -4 \\ \lambda, & x = -4 \end{cases}$ find λ such that $f(x) = g(x)$ for all x .

Q.17 Let f and g be real functions defined by $f(x) = \sqrt{x+2}$ and $g(x) = \sqrt{4-x^2}$, then find $f+g, \frac{f}{g}, fg$.

Q.18 Find the domain of the functions -

i. $f(x) = \frac{x^2+3x+5}{x^2-5x+4}$ ii. $f(x) = \frac{x^2+2x+1}{x^2-8x+12}$

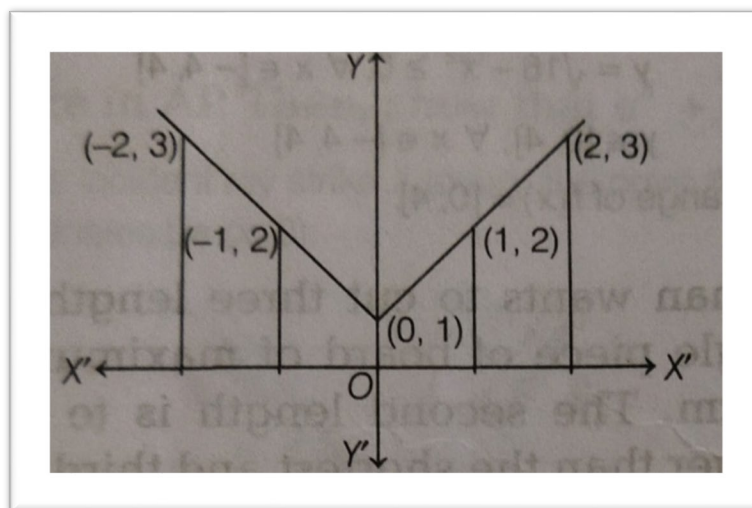
Q.19 Find domain and range of the following functions

i. $\sqrt{16-x^2}$ ii. $|x-1|$ iii. $\sqrt{x^2-25}$ iv. $\sqrt{x-1}$

Q.20 If $f(x) = x^3 - \frac{1}{x^3}$, then find the value of $f(x) + \frac{1}{f(x)}$

Case-study based question

Q.21 The figure, show a graph of curve $y = f(x)$



Based on the above information answer the following

- i. The graph of $f(x)$ is
 - a. $|x - 1|$ b. $|x + 1|$ c. $1 + |x|$ d. $1 - |x|$
- ii. Domain of $f(x)$ is
 - a. $(0, \infty)$ b. $(-\infty, \infty)$ c. $(-\infty, 0)$ d. None of these
- iii. Range of $f(x)$ is
 - a. \mathbb{R} b. $\mathbb{R} - \{1\}$ c. (ϕ, ∞) d. None of these
- iv. The value of $f(1)$ is
 - a. 2 b. 3 c. 4 d. 5
- v. The value of $f(-2)$ is
 - a. 0 b. 3 c. 1 d. 4

CHAPTER -3 (TRIGONOMETRIC FUNCTIONS)

Solve the following questions:-

Q.1 If $\tan A = 1/2$ and $\tan B = 1/3$, then the value of $A + B$ is
 a. $\pi/6$ b. π c. 0 d. $\pi/4$

- a. $\sin^2 \theta$ b. $\sin^2 \theta \cos^2 \theta$ c. $\sin \theta \cos \theta$ d. $\tan^2 \theta$
- iv. The value of T_3 , if $\theta = \pi$ is
a. 1 b. -1 c. 2 d. -2
- v. The value of $\frac{T_5 - T_7}{T_3}$ is
a. $\sin^2 \theta \cos^2 \theta$ b. $\sin^3 \theta \cos^3 \theta$ c. $\cos^2 \theta$ d. None of these

CHAPTER -5 (COMPLEX NUMBERS AND QUADRATIC EQUATIONS)

Solve the following questions:-

- Q.1** The value of x and y if $(3y - 2) + i(7 - 2x) = 0$
a. $x = \frac{7}{2}, y = \frac{2}{3}$ b. $x = \frac{2}{7}, y = \frac{2}{3}$ c. $x = \frac{7}{2}, y = \frac{3}{2}$ d. $x = \frac{2}{7}, y = \frac{3}{2}$
- Q.2** The value of $\sqrt{-25} + 3\sqrt{-4} + 2\sqrt{-9}$ is
a. 13i b. -13i c. 17i d. -17i
- Q.3** If z lies on $|z| = 1$, then $\frac{2}{z}$ lies on
a. A circle b. An ellipse c. A straight line d. A parabola
- Q.4** If $a = 1 + i$, then a^2 is equal to
a. $1 - i$ b. $2i$ c. $(1 + i)(1 - i)$ d. $i - 1$
- Q.5** $(\sqrt{-2})(\sqrt{-3})$ is equal to
a. $-\sqrt{6}$ b. $6i$ c. $-3i$ d. None of these
- Q.6** Express the complex number $(1+i)(1+2i)$ in the standard form $a+ib$.
- Q.7** Find the conjugate of the complex number $(4-5i)$.
- Q.8** Find the modulus and argument of the complex number $(2\sqrt{3} - 2i)$
- Q.9** Express $3i^3 + 6i^{16} - 7i^{29} + 4i^{27}$ in the $x + iy$ form where $x, y \in \mathbb{R}$
- Q.10** Write the multiplicative inverse of $-1 + \sqrt{3}i$
- Q.11** Convert the complex number $\left(\frac{1}{1-4i} - \frac{2}{1+i}\right)\left(\frac{3-4i}{5+i}\right)$ into standard form.
- Q.12** Solve the quadratic equation $(x^2 - 5x + 7)^2 - (x-2)(x-3) = 7$
- Q.13** Solve the equation $x^2 + \frac{x^2}{(x+1)^2} = 3$
- Q.14** Find the real part of $\frac{1}{1 - \cos \theta + i \sin \theta}$
- Q.15** Find x, y if $\frac{(1+i)x - 2i}{3+i} + \frac{(2-3i)y + i}{3-i} = i$
- Q.16** Evaluate $(1 + i)^6 + (1 - i)^6$
- Q.17** What is the conjugate of $\frac{\sqrt{5+12i} + \sqrt{5-12i}}{\sqrt{5+12i} - \sqrt{5-12i}}$?

Case-study based question

- Q.18** The given complex number is $z = (1 + i)^2$ Based on this answer the following questions:
- i. The standard form of z is
a. $1 - i$ b. $2i$ c. $-2i$ d. $2 - 2i$
- ii. The conjugate of complex number z is
a. $2i$ b. $-2i$ c. $1 + i$ d. $2 + 2i$

Based on the above information, answer the following questions.

- i. How many goods must be sold to realize some profit?
 - a. $x < 50$
 - b. $x > 50$
 - c. $x \geq 50$
 - d. $x \leq 50$
- ii. Let x and b are real numbers, if $b > 0$ and $x < b$, then
 - a. x is always positive
 - b. x is always negative
 - c. x is real
 - d. None of these
- iii. If the cost and revenue functions of a product are given by $C(x) = 3x + 400$ and $R(x) = 5x + 20$ respectively, where x is the number of items produced by the manufacturer, then how many items must be sold to realize some profit?
 - a. $x \geq 190$
 - b. $x \leq 190$
 - c. $x < 190$
 - d. $x > 190$
- iv. The solution of the inequality $3x - 5 < x + 7$, where x is a whole number is
 - a. $\{0, 1, 2, 3, 4, 5\}$
 - b. $(-\infty, 6)$
 - c. $[0, 5]$
 - d. None of these

CHAPTER-7 (PERMUTATIONS AND COMBINATIONS)

Solve the following questions:-

- Q.1** The value of $P(n, n-1)$ is
 - a. n
 - b. $n!$
 - c. $2n$
 - d. $2n!$
- Q.2** The number of ways in which 8 students can be seated in a line is
 - a. 5040
 - b. 50400
 - c. 40230
 - d. 40320
- Q.3** If ${}^n P_5 = 60^{n-1} P_3$, the value of n is
 - a. 6
 - b. 10
 - c. 12
 - d. 16
- Q.4** The number of squares that can be formed on a chessboard is
 - a. 64
 - b. 160
 - c. 204
 - d. 224
- Q.5** The number of ways 4 boys and 3 girls can be seated in a row so that they are alternate is
 - a. 12
 - b. 104
 - c. 144
 - d. 256
- Q.6** How many 4 letter code can be formed using the first 10 letter of the English alphabet, if no letter can be repeated?
- Q.7** In how many ways can five children stand in a queue?
- Q.8** In how many ways can 4 letters be posted in 3 letter boxes?
- Q.9** Write the number of diagonals of n side polygon.
- Q.10** If ${}^{20}C_r = {}^{20}C_{r-10}$, then find ${}^{18}C_r$.
- Q.11** If $\frac{1}{9!} + \frac{1}{10!} = \frac{x}{11!}$, find x .
- Q.12** Prove that $n! (n + 2) = n! + (n + 1)!$
- Q.13** How many numbers are there between 100 and 1000 in which all the digits are distinct?
- Q.14** A gentleman has 6 friends to invite. In how many ways can he send invitation cards to them, if he has three servants to carry the cards?
- Q.15** Evaluate: ${}^{12}P_4 \cdot {}^6P_3$
- Q.16** If ${}^{56}P_{r+6} : {}^{54}P_{r+3} = 30800 : 1$, find r .
- Q.17** We wish to select 6 persons from 8, but if the person A is chosen, then B must be chosen. In how many ways can the selection be made?
- Q.18** A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has
 - i. no girl
 - ii. at least one boy and one girl
 - iii. at least 3 girls
- Q.19** How many arrangements can be made by the letters of the word MATHEMATICS? In how many of them vowels are
 - i. together
 - ii. not together
- Q.20** How many different 4 digits numbers can be formed from the digits 2, 3, 4 and 6 if each digit is used only once in a number. Further how many of these numbers.
 - i. End in a 4
 - ii. End in a 3
 - iii. End in a 3 or 6
- Q.21** A polygon has 44 diagonals, find the number of sides.

Q.22 If $\frac{n!}{2!(n-2)!}$ and $\frac{n!}{4!(n-4)!}$ are in the ratio 2:1. Find the value of n.

Case-study based question

Q.23 On Diwali festival, few people are playing cards. One person choose 4 cards from a pack of 52 playing cards.

Based on the above information, answer the following questions



- i. The number of ways choosing these 4 cards such that they are of the same suit are

a. 2860	b. 2960	c. 2350	d. 3460
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- ii. The number of ways choosing these 4 cards such that two Red and two are Black cards are

a. 103543	b. 102345	c. 105625	d. 102032
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- iii. The number of ways choosing these 4 cards such that they are face cards are

a. 423	b. 485	c. 495	d. 325
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CHAPTER -8 (BINOMIAL THEOREM)

Solve the following questions:-

- Q.1** The coefficient of y in the expansion of $(y^2 + c/y)^5$ is
 a. $10c$ b. $10c^2$ c. $10c^3$ d. None of these
- Q.2** The fourth term in the expansion $(x - 2y)^{12}$ is
 a. $-1670 x^9 \times y^3$ b. $-7160 x^9 \times y^3$ c. $-1760 x^9 \times y^3$ d. $-1607 x^9 \times y^3$
- Q.3** If the third term in the binomial expansion of $(1 + x)^m$ is $(-1/8)x^2$ then the rational value of m is
 a. 2 b. $1/2$ c. 3 d. 4
- Q.4** The greatest coefficient in the expansion of $(1 + x)^{10}$ is
 a. $10!/(5!)$ b. $10!/(5!)^2$ c. $10!/(5! \times 4!)^2$ d. $10!/(5! \times 4!)$
- Q.5** The coefficient of x^n in the expansion of $(1 - 2x + 3x^2 - 4x^3 + \dots)^{-n}$ is
 a. $(2n)!/n!$ b. $(2n)!/(n!)^2$ c. $(2n)!/\{2 \times (n!)^2\}$ d. None of these
- Q.6** Expand the expression $(2x-3)^6$ using the binomial theorem.
- Q.7** Write the general term in the expansion of $(a^2 - b)^6$.
- Q.8** Find x, if T_{11} and T_{12} in the expansion of $(2+ x)^{50}$ are equal.
- Q.9** Find the coefficient of m^5 in $(m + 3)^8$.
- Q.10** Find the general term in the expansions of $(3 - a^3/6)^7$
- Q.11** Expand $\left(2x - \frac{3}{y}\right)^5$ by the binomial theorem.
- Q.12** Find the general term in the expansion of $\left(\frac{x}{a} - \frac{a}{x}\right)^{10}$
- Q.13** In the expansion of $(1 + a)^{m+n}$, prove that coefficient of a^m and a^n are equal.
- Q.14** Find the term independent of x in the expansion of $\left(x + \frac{1}{x}\right)^{10}$
- Q.15** Find the value of r, if the coefficient of $(2r + 4)^{\text{th}}$ and $(r - 2)^{\text{th}}$ terms in the expansion of $(1 + x)^{18}$ are equal.

- Q.16** If x^p occurs in the expansion of $\left(x^2 + \frac{1}{x}\right)^{2n}$. Prove that its coefficient is $\frac{2n!}{\left[\frac{1}{3}(4n-P)!\right]\left[\frac{1}{3}(2n+P)!\right]}$.
- Q.17** If P be the sum of odd terms and Q that of even terms in the expansion of $(x+a)^n$. Prove that $P^2 - Q^2 = (x^2 - a^2)^n$
- Q.18** Find the r^{th} term in the expansion of $\left(x + \frac{1}{x}\right)^{2r}$
- Q.19** Find the term independent of x in the expansion of $\left(\frac{\sqrt{x}}{\sqrt{3}} + \frac{\sqrt{3}}{2x^2}\right)^{10}$
- Q.20** The 3rd, 4th, 5th terms in the expansion of $(x+a)^n$ are respectively 84, 280, 560. Find the values of x, a and n.
- Q.21** In the binomial expansion of $(1+x)^n$, the coefficients of the fifth, sixth and seventh terms are in A.P. Find the values of n for which this can happen.

CHAPTER -9 (SEQUENCE AND SERIES)

Solve the following questions:-

- Q.1** The number of terms in the G.P. $2, \sqrt{2}, 4, \dots, 256$ is
 a. 10 b. 2 c. 15 d. None of these
- Q.2** The third term of a G.P. is 4. The product of the first five terms is
 a. 4^3 b. 4^5 c. 4^4 d. None of these
- Q.3** The sum of all terms of an infinite G.P. is 5 times of the odd terms, then common ratio is
 a. 1 b. 0 c. 3 d. 4
- Q.4** The 12th term of the G.P. $\frac{1}{b^3 x^3}, bx, b^5 x^5$ is
 a. $b^{41} x^{41}$ b. $b^4 x^4$ c. $b^{40} x^{40}$ d. $b^1 x^1$
- Q.5** The 20th term of the G.P. $5/2, 5/4, 5/8$ is
 a. $\frac{5}{2^{20}}$ b. $\frac{5}{2^{19}}$ c. $\frac{5}{2^{10}}$ d. None of these
- Q.6** How many terms of the G.P. $3, 3/2, 3/4, \dots$ be taken together to make $3069/512$?
- Q.7** Find the sum of series $2 + 6 + 18 + \dots + 4374$.
- Q.8** Find the sum of 7th terms of the G.P. $3, 6, 12, \dots$
- Q.9** The fifth term of a G.P. is 81 whereas its second term is 24. Find the series and sum of its first eight terms.
- Q.10** If a, b, c are in G.P. then find $\frac{1}{a^2 - b^2} + \frac{1}{b^2}$.
- Q.11** If the mth term of a G.P. is n and nth term is m, find $(m+n)^{\text{th}}$ term.
- Q.12** If g_1, g_2 be two G.M.'s between a and b and A is the A.M. between a and b, then prove that $\frac{g_1^2}{g_2} + \frac{g_2^2}{g_1} = 2A$
- Q.13** The first term of a G.P. is 1. The sum of the 3rd and 5th terms is 90. Find the common ratio of G.P.

Case-study based question

- Q.14** If $a < b < c$ are numbers lying between 2 and 18 such that
 i. $a + b + c = 25$ ii. b, c, 18 are three consecutive terms of a G.P. in that order.
 Based on the above information answer the following

- i. The relation between b and c
 a. $c^2 = 18b$ b. $b^2 = 18c$ c. $c^2 = 10b$ d. $b^2 = 10c$
- ii. The value of a
 a. 2 b. 5 c. 4 d. 6
- iii. The possible value of b
 a. 8, 32 b. 9, 20 c. 15, 30 d. 19, 30
- iv. The possible value of c
 a. 2, 24 b. 10, 15 c. 15, 35 d. 19, 30
- v. The product of abc
 a. 470 b. 480 c. 410 d. 490

CHAPTER -10 (STRAIGHT LINES)

Solve the following questions:-

- Q.1** The angle between the lines $x - 2y = 5$ and $y - 2x = 5$ is
 a. $\tan^{-1} \frac{1}{4}$ b. $\tan^{-1} \frac{3}{5}$ c. $\tan^{-1} \frac{5}{4}$ d. None of these
- Q.2** In a ΔABC , if A is the point (1, 2) and equations of the median through B and C are respectively $x + y = 5$ and $x = 4$, then B is
 a. (1, 4) b. (7, -2) c. (4, 1) d. None of these
- Q.3** The length of the perpendicular from the origin to a line is 7 and the line makes an angle of 150 degree with the positive direction of the y-axis. Then the equation of line is
 a. $x + y = 14$ b. $\sqrt{3}y + x = 14$ c. $\sqrt{3}x + y = 14$ d. None of these
- Q.4** If two vertices of a triangle are (3, -2) and (-2, 3) and its orthocentre is (-6, 1) then its third vertex is
 a. (5, 3) b. (-5, 3) c. (5, -3) d. (-5, -3)
- Q.5** The sum of squares of the distances of a moving point from two fixed points (a, 0) and (-a, 0) is equal to $2c^2$ then the equation of its locus is
 a. $x^2 - y^2 = c^2 - a^2$ b. $x^2 - y^2 = c^2 + a^2$ c. $x^2 + y^2 = c^2 - a^2$ d. $x^2 + y^2 = c^2 + a^2$
- Q.6** If A(-2, 1), B(2, 3) and C(-2, -4) are the three points, find the angle between BA and BC.
- Q.7** Determine x so that 2 is the slope of the line through (2, 5) and (x, 3).
- Q.8** What is the value of y so that the line through (3, y) and (2, 7) is parallel to the line through (-1, 4) and (0, 6)?
- Q.9** Find the slope of a line passing through the points (-3, 2) and (1, 4).
- Q.10** Reduce the equation $\sqrt{3}x + y + 2 = 0$ to the slop-intercept form.
- Q.11** A line passing through the point A (3, 0) makes 30° angle with the positive direction of x - axis. If this line is rotated through an angle of 15° in clockwise direction, find its equation in new position.
- Q.12** Find the equations to the altitudes of the triangle whose angular points are A(2, -2), B(1, 1) and C (-1, 0)
- Q.13** A straight line cuts intercepts from the axes of coordinates the sum of whose reciprocals is a constant. Show that it always passes through a fixed point.
- Q.14** If the sum of the distances of a moving point in a plane from the axes is 1, then find the locus of the point.
- Q.15** The slope of a straight line through A (3, 2) is $\frac{3}{4}$. Find the coordinates of the points on the line that are 5 units away from A.
- Q.16** Find the coordinates of one vertex of an equilateral triangle with centroid at the origin and the opposite side $x + y - 2 = 0$.

- Q.17** A point moves such that its distance from the point (4, 0) is half that of its distance from the line $x = 16$. Find its locus.
- Q.18** A vertex of an equilateral triangle is (2, 3) and the opposite side is $x + y = 2$. Find the equations of other sides.
- Q.19** Find the angle between the lines $y - \sqrt{3}x - 5 = 0$ and $\sqrt{3}y - x + 6 = 0$
- Q.20** Reduce the equation $\sqrt{3}x + x - 8 = 0$ into normal form. Find the values of ρ and ω .
- Q.21** Equation of a line is $3x - 4y + 10 = 0$. Find its i. slope ii. x and y - intercepts.
- Q.22** Show that the locus of the mid-point of the distance between the axes of the variable line $x \cos \alpha + y \sin \alpha = p$ is $\frac{1}{x^2} + \frac{1}{y^2} = \frac{4}{p^2}$
- Q.23** A ray of light coming from the point (1, 2) is reflected at a point A on the x-axis and then passes through the point (5, 3). Find the coordinates of the point A.

Case-study based question

- Q.24** Three girls, Rani, Mansi, Sneha are talking to each other and maintaining a social distance for due to covid-19. They stand on a vertices of triangle, whose coordinates are Rani (2, -2), Mansi (1, 1) and Sneha (-1, 0).

Based on the above information answer the following

- i. The equation of lines formed by Rani and Mansi is
 a. $3x - y = 4$ b. $3x + y = 4$ c. $x - 3y = 4$ d. $x + 3y = 4$
- ii. Slope of equation of the line formed by Rani and Sneha is
 a. $\frac{2}{3}$ b. $\frac{-3}{2}$ c. $\frac{-2}{3}$ d. $\frac{1}{3}$
- iii. The equation of median of lines through Rani is
 a. $5x + 4y = 2$ b. $5x - 4y = 2$ c. $4x - 5y = 1$ d. None of these
- iv. The equation of altitude through Mansi is
 a. $3x - 2y = 1$ b. $2x + 3y = 5$ c. $x + 2y = 3$ d. None of these
- v. The equation of line passing through the Rani and parallel to line formed by Mansi and Sneha is
 a. $x - 2y = 4$ b. $x + 2y = 6$ c. $x - 2y = 3$ d. None of these

CHAPTER -11 (CONIC SECTIONS)

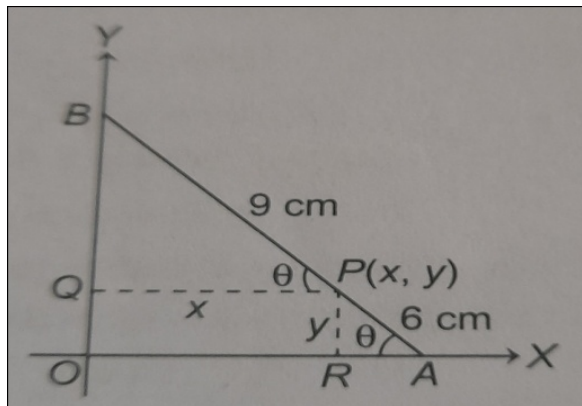
Solve the following questions:-

- Q.1** The locus of the point from which the tangent to the circles $x^2 + y^2 - 4 = 0$ and $x^2 + y^2 - 8x + 15 = 0$ are equal is given by the equation
 a. $8x + 19 = 0$ b. $8x - 19 = 0$ c. $4x - 19 = 0$ d. $4x + 19 = 0$
- Q.2** A man running a race course notes that the sum of the distances from the two flag posts from him is always 10 meter and the distance between the flag posts is 8 meter. The equation of posts traced by the man is
 a. $x^2/9 + y^2/5 = 1$ b. $x^2/9 + y^2/25 = 1$ c. $x^2/5 + y^2/9 = 1$ d. $x^2/25 + y^2/9 = 1$
- Q.3** The centre of the ellipse $(x + y - 2)^2/9 + (x - y)^2/16 = 1$ is
 a. (0, 0) b. (0, 1) c. (1, 0) d. (1, 1)
- Q.4** The parametric coordinate of any point of the parabola $y^2 = 4ax$ is
 a. $(-at^2, -2at)$ b. $(-at^2, 2at)$ c. $(a \sin^2 t, -2a \sin t)$ d. $(a \sin t, -2a \sin t)$
- Q.5** The equation of parabola with vertex at origin, the axis is along x-axis and passing through the point (2, 3) is
 a. $y^2 = 9x$ b. $y^2 = 9x/2$ c. $y^2 = 2x$ d. $y^2 = 2x/9$
- Q.6** Find the equation of circle whose centre is (2, -3) and radius is 8.

- Q.7 Find the centre and radius of the circle $x^2 + (y - 0)^2 = 5^2$
- Q.8 Find the vertex, focus, directrix, axis and latus-rectum of the parabola $y^2 = 4x + 4y$.
- Q.9 Find the equation of the circle having centre at $(3, -4)$ and touching the line $5x + 12y - 12 = 0$
- Q.10 Find the equation of the circle which touches both axes and the line $3x - 4y + 8 = 0$ and lies in the third quadrant.
- Q.11 If the line $lx + my + n = 0$ touches the parabola $y^2 = 4ax$, prove that $ln = am^2$
- Q.12 If the length of latus rectum of an ellipse is equal to half of minor axis, find its eccentricity.
- Q.13 Find the eccentricity, coordinates of the foci, equations of directrix and length of latus-rectum of the hyperbola $9x^2 - 16y^2 = 144$.
- Q.14 If the distance between the foci of a hyperbola is 16 and its eccentricity is $\sqrt{2}$, then obtain its equation.
- Q.15 Find the equation of the parabola with vertex at the origin, the axis along the x-axis and passing through the point P $(2, 3)$.
- Q.16 Find the equation of ellipse which passes through $(-3, 1)$ and eccentricity is $\frac{\sqrt{2}}{5}$, with x-axis as its major axis & centre at the origin.

Case-study based question

- Q.17 A rod AB of length 15 cm rests in between two coordinate axes in such a way the end point A lies on X-axis and end point B lies on Y-axis. A point P(x, y) is taken on the rod in such a way that AP = 6 cm.



Let the rod AB making an angle θ with OX as shown in figure.

- i The value of $\cos \theta$ is equal to
- | | | | |
|------------------|------------------|------------------|------------------|
| a. $\frac{x}{9}$ | b. $\frac{y}{6}$ | c. $\frac{9}{x}$ | d. $\frac{6}{y}$ |
|------------------|------------------|------------------|------------------|
- ii. The value of $\sin \theta$ is
- | | | | |
|------------------|------------------|------------------|------------------|
| a. $\frac{6}{y}$ | b. $\frac{9}{x}$ | c. $\frac{x}{9}$ | d. $\frac{y}{6}$ |
|------------------|------------------|------------------|------------------|
- iii. The length of major axis is
- | | | | |
|------------|-------------|-------------|-------------|
| a. 9 units | b. 18 units | c. 12 units | d. 81 units |
|------------|-------------|-------------|-------------|
- iv. The length of minor axis is
- | | | | |
|------------|-------------|-------------|-------------|
| a. 6 units | b. 18 units | c. 12 units | d. 36 units |
|------------|-------------|-------------|-------------|
- v. The locus of P is
- | | | | |
|-------------|---------------|--------------|------------------|
| a. Parabola | b. An ellipse | c. Hyperbola | d. None of these |
|-------------|---------------|--------------|------------------|

CHAPTER -12 (INTRODUCTION TO THREE-DIMENSIONAL GEOMETRY)

Solve the following questions:-

- Q.1** X-axis is the intersection of two planes
a. XY and YZ b. XY and XZ c. YZ and ZX d. None of these
- Q.2** The coordinate of foot of perpendicular drawn from the point A(1, 0, 3) to the join of the point B(4, 7, 1) and C(3, 5, 3) are
a. $(5/3, 7/3, 17/3)$ b. (5, 7, 17) c. $(5/3, -7/3, 17/3)$ d. $(5/7, -7/3, -17/3)$
- Q.3** The equation of the set of point P, the sum of whose distance from A(4, 0, 0) and B(-4, 0, 0) is equal to 10 is
a. $9x^2 + 25y^2 + 25z^2 + 225 = 0$ b. $9x^2 + 25y^2 + 25z^2 - 225 = 0$
c. $9x^2 + 25y^2 - 25z^2 - 225 = 0$ d. $9x^2 - 25y^2 - 25z^2 - 225 = 0$
- Q.4** The maximum distance between points $(3\sin \theta, 0, 0)$ and $(4\cos \theta, 0, 0)$ is
a. 3 b. 4 c. 5 d. Can not be find
- Q.5** A point C with z-coordinate 8 lies on the line segment joining the points A(2, -3, 4) and B(8, 0, 10). Find its coordinate.
- Q.6** The coordinate of the foot of the perpendicular from a point (6, 7, 8) on x-axis.
- Q.7** What is the locus of point for which $y = 0, z = 0$?
- Q.8** Write the distance of the point P(3, 4, 5) form z-axis.
- Q.9** Write the coordinates of the point P which is five-sixth of the way from A(-2, 0, 6) to B(10, -6, -12).
- Q.10** The centroid of a triangle ABC is at point (1, 1, 1). If the coordinates of A and B are (3, -5, 7) and (-1, 7, -6) respectively, find the coordinates of the point C.
- Q.11** If the origin is the centroid of the triangle PQR with vertices P(2a, 2, 6) , Q(-4, 3b, -10) and R (8, 14, 2c), then find the values of a, b, c.
- Q.12** Find the equation of the set of points which are equidistant from the points (1, 2, 3) and (3, 2, -1)
- Q.13** The three vertices of the parallelogram are A(3, -1, 2), B(1, 2, -4) and C(-1, 1, 2), then find the coordinate of the fourth vertex .

Case-study based question

- Q.14** Four students in traditional dresses represent four states of India, standing at points represented by O(0, 0, 0), A(a, 0, 0), B(0, b, 0) and C(0, 0, c). If a girl representing BHARATMATA be placed in such a way that she is equidistant from the four students, then answer the following questions which are based on above it.
- x-coordinate of girl representing BHARATMATA is
a. a b. $\frac{a}{2}$ c. $\frac{a}{3}$ d. $\frac{a}{4}$
 - y-coordinate of girl representing BHARATMATA is
a. a b. $\frac{b}{2}$ c. 2b d. 3b
 - z-coordinate of girl representing BHARATMATA is
a. b b. c c. $\frac{c}{2}$ d. 2c
 - Which concept is used for finding the coordinates of point?
a. Distance formula b. Section formula c. Mid-point formula d. All of these
 - What is the coordinates of origin point?
a. (0, 0, 0) b. (0, b, 0) c. (a, 0, 0) d. (0, 0, c)

Case-study based question

Q.18 Let $f(x)$ be a real function defined as

$$f(x) = \begin{cases} \frac{\log(1+ax) - \log(1-bx)}{x} & \text{if } x < 0 \\ \frac{5}{\sqrt{1+bx} - 1} & \text{if } x = 0 \\ \frac{5}{x} & \text{if } x > 0 \end{cases}$$

Based on the above information, answer the following question

- i. $\lim_{x \rightarrow 0^+} f(x)$ is
- a. b b. $\frac{b}{2}$ c. $\frac{b}{3}$ d. None of these
- ii. $\lim_{x \rightarrow 0^-} f(x)$
- a. $a + b$ b. $a - b$ c. $b - a$ d. $-a - b$
- iii. $\lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^+} f(x)$, then a relation between a and b is
- a. $a + 2b = 0$ b. $2a - b = 0$ c. $2a + b = 0$ d. $3a + 2b = 0$
- iv. The value of b , if $\lim_{x \rightarrow 0^+} f(x) = f(0)$ is
- a. 5 b. 15 c. 20 d. 10
- v. The value of a and b if $\lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^+} f(x) = f(0)$ are
- a. $-5, 5$ b. $-5, 10$ c. $5, 10$ d. $10, 15$

CHAPTER -15 (STATISTICS)

Solve the following questions:-

- Q.1** The quantity which leads to a proper measure of dispersion, is
- a. $\sum (x_i - \bar{x})^2$ b. $\frac{1}{n} \sum (x_i - \bar{x})$ c. $\sum (x_i - \bar{x})$ d. None of these
- Q.2** Variance of the data 2, 4, 5, 6, 8, 17, is 23.33 Then, variance of 4, 8, 10, 12, 16, 34 will be
- a. 23.33 b. 25.33 c. 46.66 d. None of these
- Q.3** The measure of variability which is independent of units, is called
- a. Mean deviation b. Variance c. Standard deviation d. None of these
- Q.4** If v is the variance and σ is the standard deviation, then
- a. $v = \frac{1}{\sigma}$ b. $v = \frac{1}{\sigma^2}$ c. $v = \sigma^2$ d. $v^2 = \sigma$
- Q.5** The mean deviation from the median is
- a. To that measured from another value
- b. Maximum if all observations are positive
- c. Greater than that measured from any other value
- d. Less than that measured from any other value
- Q.6** Find the mean deviation of the numbers 3, 4, 5, 6, 7 from the mean.
- Q.7** Find the standard deviation of the observations 6, 5, 9, 13, 12, 8, 10.
- Q.8** Find the variance of first five natural numbers.

Q.9 If a is a positive integer and the frequency distribution

x	a	29	39	49	59	69
f	2	1	1	1	1	1

has a variance of 160. Determine the value of a .

Q.10 If for a distribution of 18 observations $\sum(x_i - 5) = 3$ and $\sum(x_i - 5)^2 = 43$, find the mean and variance.

Q.11 Calculate mean, variance & standard deviation for the following distribution,

Classes	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	15	8	3	2

Q.12 Find the mean, variance and standard deviation for the following data

x_i	4	8	11	17	20	24	32
f_i	3	5	9	5	4	3	1

Q.13 Find the mean and standard deviation of first n terms of an A.P. whose first term is 'a' and common difference is 'd'.

Q.14 Mean and standard deviation of 100 observations were found to be 40 and 10 respectively. If at the time of calculation two observations were wrongly taken as 30 and 70 in place of 3 and 27 respectively, find the correct standard deviation.

Case-study based question

Q.15 For a group of 200 candidates, the mean and the standard deviation of scores were found to be 40 and 15, respectively. Later on it was discovered that the scores of 43 and 35 were misread as 34 and 53, respectively.

i. The sum of correct scores is

- a. 7991 b. 8000 c. 8550 d. 6572

ii. The correct mean is

- a. 42.924 b. 39.955 c. 38.423 d. 41.621

iii. The formula for finding the variance is

- a. $\frac{\sum_{i=1}^n (x_i - x)^2}{n}$ b. $\sum_{i=1}^n (x_i - x)^2$ c. $\sum_{i=1}^n f_i (x_i - \bar{x})^2$ d. None of these

iv. Correct standard deviation is

- a. 14.971 b. 11.321 c. 16.441 d. 12.824

v. Correct variance is

- a. 280.3 b. 235.6 c. 224.143 d. 226.521

CHAPTER -16 (PROBABILITY)

Solve the following questions:-

Q.1 What is the total number of sample spaces when a die is thrown 2 times?

- a. 6 b. 12 c. 18 d. 36

Q.2 Three identical dice are rolled. What is the probability that the same number will appear on each of them?

- a. 1/6 b. 1/36 c. 1/18 d. 3/28

Q.3 Events A and B are said to be mutually exclusive if

- a. $P(A \cup B) = P(A) + P(B)$ b. $P(A \cap B) = P(A) \times P(B)$ c. $P(A \cup B) = 0$ d. None of these

Q.4 A die is rolled. What is the probability that an even number is obtained?

- a. 1/2 b. 1/4 c. 2/3 d. None of these

Q.5 An urn contains 6 balls of which two are red and four are black. Two balls are drawn at random. What is the probability that they are of different colours?

- a. 2/15 b. 1/15 c. 8/15 d. 4/15

- Q.6** Find the probability that a leap year selected at random will contain 53 Sunday.
- Q.7** If A and B are any two events having $P(A \cup B) = \frac{1}{2}$ and $P(\text{not } A) = \frac{2}{3}$ then find the probability of not $(A \cap B)$.
- Q.8** If A, B, C are three mutually exclusive and exhaustive events of an experiment such that $3P(A) = 2P(B) = P(C)$ then find $P(A)$.
- Q.9** A coin is tossed once. Write its sample space.
- Q.10** In a single throw of three dice, find the probability of getting a total of 17 or 18.
- Q.11** Two unbiased dice are thrown. Find the probability that the total of numbers on the dice is more than 10.
- Q.12** Find the probability that in a random arrangement of the letters of the word 'SOCIAL' vowels come together.
- Q.13** One urn contains 2 black balls (labelled B1 and B2) and one white ball. A second urn contains one black ball and two white balls (labelled W1 and W2). Suppose the following experiment is performed. One of the two urns is chosen at random. Next a ball is randomly chosen from the urn. Then a second ball is chosen at random from the same urn without replacing the first ball.
- Write the sample space showing all possible outcomes.
 - What is the probability that two black balls are chosen?
 - What is the probability that 2 balls of opposite colour are chosen?
- Q.14** An urn contains 9 red, 7 white and 4 black balls. If two balls are drawn at random, find the probability that
- Both the balls are red
 - One ball is white
 - The balls are of the same colour
 - One is white and other red
- Q.15** If the letters of the word ATTRACTION are written down at random, find the probability that :
- All the T's occur together
 - No two T's occur together
- Q.16** If the letters of the word ALGORITHM are arranged at random in a row, what is the probability that the letters GOR must remain together as a unit?
- Q.17** An experiment consists of rolling die until a 2 appears.
- How many elements of the sample space correspond to the event that 2 appears on the k^{th} roll of the die?
 - How many elements of the sample space correspond to the event that 2 appears not later than the k^{th} roll of die?
- Q.18** Suppose an integer from 1 through 1000 is chosen at random, find the probability that the integer is a multiple of 2 or a multiple of 9.
- Q.19** If A and B are mutually exclusive events such that $P(A)=0.35$ and $P(B)= 0.45$, find
- $P(A \cup B)$
 - $P(A \cap B)$

Case-study based question

- Q.20** In a class of 60 students, 30 opted for NCC, 32 opted for NSS and 24 opted for both NCC and NSS. One of these students is selected at random.



Based on the above information, answer the following questions

- i The probability that the student opted for NCC or NSS is
- a. $\frac{19}{30}$ b. $\frac{19}{32}$ c. $\frac{15}{30}$ d. None of these
- ii The probability that the student has opted NSS but not NCC is
- a. $\frac{2}{15}$ b. $\frac{3}{15}$ c. $\frac{4}{15}$ d. None of these
- iii. The probability that the student has opted neither NSS nor NCC is
- a. $\frac{19}{30}$ b. $\frac{12}{30}$ c. $\frac{11}{30}$ d. None of these