Question Bank for Class XI-Mathematics 2023-24

QUESTION BANK FOR CLASS XI

INDEX

13. 3-D Geometry
14. Statistics

SET THEORY

MCQ (1 marks)

1. Let U be the universal set containing 700 elements. If A and B are subsets of U such that n(A) = 200, n(B) = 300 and n(A ∩ B) = 100 then n(A' ∩ B') =

   a. 400 b. 300 c. 500 d. 800

2. If A = { 1, 2, 3, 4 } , B = { 4, 5, 6, 7 } , A ∩ B =

   a. { 4 } b. { 1, 2, 3, 4 } c. { 6 , 7 }. d. {1, 2}

3. If n (A) =3 and n (B) = 6 and A B , then n(A U B)

   a. 9 b. 3 c. 6 d. None

4. The number of proper subsets of the set { 1, 2 , 3 } is :

   a. 9 b. 7 c. 6 d. 3

5. If A class has 175 students . The following data shows the number of students offering one or more subjects. Mathematics 100 ; Physics 70 ; Chemistry 40 ; Mathematics and Physics 30 ; Mathematics and Chemistry 28 ; Physics and Chemistry 23 ; Mathematics Physics and Chemistry 18 . How many students have offered Mathematics alone?

   a. 35 b. 22 c. 48 d. 60

6. Let A and B be two sets such that n(A)= 35, n(B)= 42 and n(A ∩ B)= 17. Find n(A – B)

a. 25 b. 17 c. 18 d. 19

7. If A = { 2,3,4,8,10 } , B = { 3,4,5,10,12 } and C = { 4,5,6,12,14 } , then (A U B) ∩ (A U C)

a. { 4,5,8,10,12 } b. { 2,4,5,10,12} c. { 3,8,10,12 } d. { 2,3,4,5,8,10,12 }

8. If A and B are two sets then A ∩ (A ∩ B') =

a. Ø b. A c. B d. None

9. If A ⊆ B , then A ∩ B is equal to

a. B b. A' c. A d. B'

10. Let A and B be two sets such that n (A) = 0.16 , n (B) = 0.14 ,n (A U B) = 0.25 ,

n(A ∩ B) =

a. 0.5 b. 0.05 c. 0.3 d. none of these

11. Let A = { x: x ∉ R , x ≥ 4 } and B : { x: x ∈ R , x < 5} then A ∩ B is

a. { 5 , 4} b. {4, 5} c. { 4 } d. { x: x ∈ R , 4≤ x < 5}

12. In a city 20% of the population travels by car , 50% travels by bus and 10% travels by both car and bus . Then persons travelling by car or bus is

a. 60% b. 20% c. 30% d. 80%

13. If A and B are sets , then A ∩ (B – A) is

a. A' b. B c. Ø d. A

14. If A and B are not disjoint Set , then n (A U B) is equal to

a. A' b. B c. ∅ d. A

15. If A and B are two sets (A U B) = (A ∩ B) , then if

a. A ⊆ B b. B ⊆ A c. A=B d. None

16. Given n (U) = 20 , n (A) = 12 , n (B) = 9 , n (A ∩ B) = 4 , where U is the universal set

A and B are subsets of U , then n(A U B)'

a. 3 b. 11 c. 9 d. 17

17. If a set has n elements then total number of subsets of that set are:

a. 2^{n-1} b.2^{n-2} c.2^{n} d. n

18. If A = {1, 2, 3, 4, 5, 6} then the number of proper subsets is

a. 63 b. 64 c.32 d. 31

Assertion and Reasoning based question

19. Assertion(A) : A set has 4 elements. Then the number of proper subset is 15
Reason(R) : The formula for calculating the number of proper subset is $2^{n}-1$

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

20. Assertion(A) : A disjoint set has no common elements
Reason(R) : n(A U B) = n(A) + n(B)

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.

c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

VSAQ (2 marks)

1. Fill in the blanks:
If A = {1, 3, 5, 7, 9} and B = {2, 3, 5, 7, 11}, then A∪ B is _____.

2. Fill in the blanks:
A set, consisting of a single element, is called a _____.

3. List all the elements of set {x : x is a month of a year not having 31 days}.

4. State whether the statement is true or false: {a, e, i, o, u) and {a, b, c, d} are disjoint sets.

5. If A = {3, 5, 7, 9, 11} , B = {7, 9, 11, 13}, C = {11, 13, 15} and D = {15, 17} find: A ∩ C.

6. Describe {x R: x > x) set in Roster form.

7. Write the set of all natural numbers x such that 4x + 9 < 50 in roster form.

8. State whether each of the following sets is finite or infinite: The set of circles passing through the origin (0, 0).

9. If A and B are finite sets such that n(A) = m1 and n(B) = m2, then find the least and greatest values of n(A U B).

10. The Given statement is true or false: {2,3, 4, 5} and {3, 6} are disjoint sets.

SAQ (3 marks)

1. Fill in the blanks:
The set of vowels in the word "MATHEMATICS" in the roster form can be written as

2. Make correct statements by filling in the symbols ⊂ or || in the blank space: {x : x is a circle in the plane}.....{x : x is a circle in the same plane with radius 1 unit}

3. The pairs of set is disjoint: {x : x is an even integer} and {x : x is an odd integer}.Prove.

4. Write $\{x : x \in R, -12 \leq x \leq -10\}$, in the form of interval. Also, find the length of the interval and represent it on the number line.

5. In a group of 50 persons, 14 drink tea but not coffee and 30 drink tea. Find:

   i. how many drink tea and coffee both

   ii. how many drink coffee but not tea.

6. If S and T are two sets such that S has 21 elements T has 32 elements and $S \cap T$ has 11 elements. How many elements S U T has?

7. Show that $A \cap B' = A - B$.

8. Given the set A = {1, 3, 5}, B = {2, 4, 6} and C = {0, 2, 4, 6, 8}. {0, 1, 2, 3, 4, 5, 6} can it be considered as universal set(s) for all the three sets A, B and C?

LAQ (5 marks)

1. In a survey of 25 students, it was found that 15 had taken Mathematics, 12 had taken Physics and 11 had taken Chemistry, 5 had taken Mathematics and Chemistry, 9 had taken Mathematics and Physics, 4 had taken Physics and Chemistry and 3 had taken all the three subjects. Find the number of students that had taken (i) only Chemistry. (ii) only Mathematics. (iii) only Physics. (iv) Physics and Chemistry but not Mathematics. (v) Mathematics and Physics but not Chemistry, (vi) only one of the subjects. (vii) at least one of the three subjects. (viii) none of the subjects.

2. A college awarded 38 medals in Football, 15 in Basketball and 20 in Cricket. If these medals went to a total of 58 men and only three men got medals in all three sports, then how many received medals in exactly two of the three sports.

3. In a group of 50 persons, 14 drink tea but not coffee and 30 drink tea. Find:
   i. how many drink tea and coffee both
   ii. how many drink coffee but not tea.

4. In a town of 10,000 families it was found that 40% families buys newspaper A , 20% buy newspaper B , and 10% families buy newspaper C , 5% families buy A and B , 3% buy B and C and 4% buy A and C . If 2% buy all the three newspapers , then number of families which buy A only is

5. In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T, 26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all three newspapers.
   Find: the number of people who read at least one of the newspaper.

6. If A class has 175 students . The following data shows the number of students offering one or more subjects. Mathematics 100 ; Physics 70 ; Chemistry 40 ; Mathematics and Physics 30 ; Mathematics and Chemistry 28 ; Physics and Chemistry 23 ; Mathematics Physics and Chemistry 18 . How many students have offered Mathematics alone?

7. In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T, 26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all three newspapers.
   Find: the number of people who read at least one of the newspaper.

8. In a group of 100 people, 65 like to play Cricket, 40 like to play Tennis and 55 like to play Volleyball. All of them like to play at least one of the three games. If 25 like to play both Cricket and Tennis, 24 like to play both Tennis and Volleyball and 22 like to play both Cricket and Volleyball, then
   i. how many like to play all the three games?
   ii. how many like to play Cricket only?
   iii. how many like to play Tennis only?

Represent the above information in a Venn diagram.

CASE STUDY (4 marks each)

1. In a library, 25 students read physics, chemistry and mathematics books. It was found that 15 students read mathematics, 12 students read physics while 11 students read chemistry. 5 students read both mathematics and chemistry, 9 students read physics and mathematics. 4 students read physics and chemistry and 3 students read all three subject books.

Based on the above information, answer the

following questions.

(i) The number of students who reading only chemistry is

(a) 5 (b) 4

(c) 2 (d) 1

(ii) The number of students who reading only mathematics is

(a) 4 (b) 3

(c) 5 (d) 11

(iii) The number of students who reading only one of the subjects is

(a) 5 (b) 8

(c) 11 (d) 6

2. In a company, 100 employees offered to do a work. In out of them, 10 employees offered ground floor only, 15 employees offered first floor only, 10 employees offered second floor only, 30employees offered second floor and ground floor to work, 25 employees offered first and

second floor, 15 employees offered ground and first floor, 60 employees offered second floor.

Based on the above information, answer the

following questions:

Based on the above information answer the

following questions

(i) The number of employees who offered all three floors.

(a) 5 (b) 3

(c) 4 (d) 6

(ii) The number of employees who offered ground floor.

(a) 50 (b) 60

(c) 65 (d) 70

(iii) The number of employees who offered first floor.

(a) 40 (b) 45

(c) 50 (d) 55

(iv) The number of employees who offered ground and first floor but not second floor.

(a) 10 (b) 15

(c) 20 (d) 25

(v) The number of employees who did not offer any of the above three floors.

(a) 15 (b) 10

(c) 5 (d) 0

3. A class teacher Mamta Sharma of class XI write three sets A, B and C are such that

A = {1, 3, 5,7, 9}, B = {2, 4, 6, 8} and C = {2, 3, 5, 7, 11}.

Answer the following questions which are based on information

(i) Find A ∩ B.

(a) {3, 5, 7} (b) φ

(c) {1, 5, 7} (d) {2, 5, 7}

(ii) Find A ∩ C
(a) {3, 5, 7} (b) φ
(c) {1, 5, 7} (d) {3, 4, 7}

(iii) Which of the following is correct for two sets A and B to be disjoint?
(a) A ∩ B = φ (b) A ∩ B ≠φ
(c) A ∪ B = φ (d) A ∪ B ≠φ

(iv) Which of the following is correct for two sets A and C to be intersecting?
(a) A ∩ C = φ (b) A ∩ C ≠φ
(c) A ∪ C = φ (d) A ∪ C ≠φ

(v) Write the n[P (B)].
(a) 8 (b) 4
(c) 16 (d) 12

4.The school organised a cultural event for 100students. In the event, 15 students participated in dance, drama and singing. 25 students participated in dance and drama; 20 students participated in drama and singing; 30 students participated in dance and singing. 8 students participated in dance only; 5 students in drama only and 12 students in singing only.
Based on the above information, answer the following questions.
(i) The number of students who participated in dance, is
(a) 18 (b) 30
(c) 40 (d) 48

(ii) The number of students who participated in drama, is

(a) 35 (b) 30

(c) 25 (d) 20

(iii) The number of students who participated in singing, is

(a) 42 (b) 45

(c) 47 (d) 37

(iv) The number of students who participated in dance and drama but not in singing, is

(a) 20 (b) 5

(c) 10 (d) 15

(v) The number of students who did not participate in any of the events, is

(a) 20 (b) 30

(c) 25 (d) 35

TRIGONOMETRIC FUNCTIONS

MCQ (1 marks)

1. 3tan x=5sin x, what is the value of cos x

a. 4/5 b. 3/5 c. 3/4 d. none

2. cot θ = sin 2θ (θ≠ nπ , n is integer) if θ equals

a. 45^0 b. 90^0 c. 45^0 and 90^0 d. 60^0

3. The value of cos 0°. cos 1°. cos 2°. cos 3°… cos 89°. cos 90° is

a.$\sqrt{3}$ b. ½ c. 0 d. $1/\sqrt{2}$

4. If x tan 45° sin 30° = cos 30° tan 30°, then x is equal to

a. 1 b. -1 c. 1 d. $1/\sqrt{2}$

5. Value of Tan (-15^0) is:

a. √3 - 2 b. √3 + 2 c. 2 - √3 d. 2 + √3

6. If x and y are complementary angles, then

a. sin x=sin y b. cos x= cos y c. tan x=tan y d. sec x=cosec y

7. sin 2B = 2 sin B is true when B is equal to

a. 45^0 b. 0^0 c. 90^0 d. 60^0

8. The largest value of sin x cos x is

a.$\frac{1}{\sqrt{2}}$ b. $\frac{\sqrt{3}}{2}$ c. $\frac{1}{2}$ d. 1

9. The general value of satisfying sin = - $\frac{1}{2}$ and tan =$\frac{1}{\sqrt{3}}$ is n∈ I

a. $n\pi + \frac{\pi}{6}$ b. $n\pi + (-1)^n \frac{7\pi}{6}$ c. $2n\pi + \frac{7\pi}{6}$ d. $2n\pi + \frac{11\pi}{6}$

10. If (1 + tan x) (1 + tan y) = 2, then x + y =

a. 30^0 b. 75^0 c. 45^0 d. 60^0

11. The maximum value of $\sin(x + \frac{\pi}{6}) + \cos(x + \frac{\pi}{6})$ in the interval $(0, \frac{\pi}{2})$

a. 60^0 b. 30^0 c. 90^0 d. 15^0

12. If sin x - cos x = √2 , then x = (n is any integer)

a. $2n\pi \pm \pi - \frac{\pi}{4}$ b. $2n\pi$ c. $(2n + 1)\pi$ d. $2n\pi - \frac{\pi}{4}$

13. Which of the following statements is incorrect ?

a. $\cos x = \frac{1}{2}$ b. $\sec x = \frac{1}{2}$ c. $\tan x = 1$ d. $\sin x = 1$

14. If A and $(2A - 45°)$ are acute angles such that $\sin A = \cos(2A - 45°)$, then $\tan A$ is equal to

a. $\frac{1}{\sqrt{3}}$ b. $\frac{\sqrt{3}}{2}$ c. $\frac{1}{2}$ d. 1

15. If $\sin\theta + \sin^2\theta = 1$, then $\cos^2\theta + \cos^4\theta =$

a. 1 b. -1 c. 0 d. $1/\sqrt{2}$

16. Assertion(A) : $\text{Sin}(-\theta) = -\text{Sin}\,\theta$
Reason(R) : $\text{Sin}\,\theta$ is an odd function

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

17. Assertion(A) : Trigonometric ratios are true only for $\theta \leq 90^0$
Reason(R) : Trigonometric ratios can be expressed for $\theta \geq 90^0$

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

VSAQ (2 marks)

1. Evaluate: $\cos(-870^0)$

2. Evaluate: $\sin(-1080^0)$

3. Evaluate: $\text{cosec}(-870^0)$

4. Evaluate: sec (1170^0)

5. Evaluate: tan (1530^0)

6. Evaluate: cot (1890^0)

7. Evaluate: cot (-870^0)

8. Evaluate: sin (1560^0)

9. Evaluate: cos (1650^0)

10. Evaluate: sec (-15^0)

11. Evaluate: cos (375^0)

12. Evaluate: sin (-1545^0)

13. Prove $\sin^2 6x - \sin^2 4x = \sin 2x \sin 10x$

14. Solve: $\tan x + \tan 2x + \tan 3x = 0$

15. $4\sin x \cos x + 2\sin x + 2\cos x + 1 = 0$.

16. A horse is tied to a post by a rope. If the horse moves along a circular path always keeping the rope tight and describes 66 m when it has traced out 45° at the centre, find the length of the rope.

SAQ (3 marks)

1. Find the principal solution of the equation $\tan x = \frac{1}{\sqrt{3}}$

2. Prove $\frac{\sin x - \sin 3x}{x - x} = 2\sin x$

3. Prove that : $\sin x + \sin 3x + \sin 5x + \sin 7x = 4\cos x \cos 2x \sin 4x$

4. Prove that: $\sin 20^o \sin 40^o \sin 80^o = \frac{\sqrt{3}}{8}$

5. Prove that: $\frac{\sin\sin 5x + 3x}{\cos 5x + \cos\cos 3x} = \tan 4x$

6. Find the radian measure for $33^o\ 15'$.

7. Solve: $\sec x \cos 5x + 1 = 0,\ 9 < x < \frac{\pi}{2}$.

8. Prove that: $4\cos 12° \cos 48° \cos 72° = \cos 36°$

9. Solve : $\cos x + \cos 2x + \cos 3x = 0$

10. Prove that: $\sin 10° \sin 30° \sin 50° \sin 70° = \frac{1}{16}$

LAQ (5 marks)

1. Solve: $2\sin^2 x + \sqrt{3}\cos x + 1 = 0$

2. Prove that: $\tan 20° \tan 30° \tan 40° \tan 80° = 1$

3. Find the angle in radian through which a pendulum swings, if its length is 75 cm and tip describes an arc of length 21 cm.

4. Find the principal and general solution of the equation: $\sin x = \frac{\sqrt{3}}{2}$

5. Prove that: $\frac{\cos\cos 9x - 5x}{\sin 17x - \sin\sin 3x} = -\frac{\sin\sin 2x}{\cos\cos 10x}$

6. Find the principal and general solution of the following equation: $\operatorname{cosec} x = -2$

7. If $\theta + \emptyset = \alpha$ and $\sin\theta = k \sin\emptyset$, then prove that $\tan\theta = \frac{k\sin\sin \alpha}{1 + k\cos\cos \alpha}$ and $\tan \emptyset = \frac{\sin\sin \alpha}{k + \cos\cos \alpha}$

8. Prove that $\cos\frac{2\pi}{15} \cos\frac{4\pi}{15} \cos\frac{8\pi}{15} \cos\frac{16\pi}{15} = \frac{1}{16}$

SEQUENCES AND SERIES

MCQ (1 marks)

1. **The ratio of first to the last of n A.M.'s between 5 and 35 is 1:4. The value of n is**

a. 9 b. 11 c. 10 d. 19

2. **All the terms in A.P., whose first term is a and common difference d are squared. A different series is thus formed. This series is a**

a. AP b.GP c. HP d. None

3. **The next term of the sequence 1, 1, 2, 4, 7, 13,.... is**

a. 21 b.24 c. 18 d. 19

4. **The product of first n odd terms of a G.P. whose middle term is m is**

a. m^n b. n^m c. mn d. none

5. Sum of an infinitely many terms of a G.P. is 3 times the sum of even terms. The common ratio of the G.P. is

a. $\frac{1}{2}$ b. $\frac{3}{2}$ c. $\frac{1}{3}$ d. $\frac{1}{4}$

6. The sum of terms equidistant from the beginning and end in A.P. is equal to

a. last term b. first term c. 0 d. sum of the first and the last terms

7. If a, b, c are in A. P. as well as in G.P.; then

a. a= $b \neq c$ b. a$\neq b = c$ c. a= $b = c$ d. a$\neq b \neq c$

8. The sum of 40 A.M.'s between two number is 120. The sum of 50 A.M.'s between them is equal to

a. 130 b. 140 c. 150 d. 160

9. p th term of an A.P. is q and q th term is p, its (p+ q)th term is

a. p - q b. - (p + q) c. 0 d. (p + q)

10. If A and G denote respectively, the A.M. and G.M. between two positive numbers a and b, then A - G is equal to

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

11. If a, 4, b are in A.P.; a, 2, b are in G.P.; then a, 1, b are in

a. AP b.GP c. HP d. None

12. The A.M. between two positive numbers a and b is twice the G.M. between them. The ratio of the numbers is

a. $(\sqrt{3}+1):(\sqrt{3}-1)$ b. $(\sqrt{3}+2):(2-\sqrt{3})$ c. $\sqrt{3}+2):(\sqrt{3}-2)$ d. none

13. The nth term of the sequence 5 + 55 + 555 + …. Is

a. $\frac{5}{9}(10^n-1)$ b. $5(10^{n-1})$ c. $5(11^{n-1})$ d. None

ASSERTION AND REASONING

14. Assertion(A) : $\frac{a+b}{2}\geq\sqrt{ab}$

Reason(R) : AM is always greater than GM

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

15. Assertion(A) : An AP multiplied with GP gives a GP
Reason(R) : The new series so formed is called AGP

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

VSAQ (2 marks)

1. The sum of the following series of n terms: $2^3 + 4^3 + 6^3 + 8^3 + ...$ is

2. How many numbers of two digits are divisible by 7 ?

3. Find the sum of n terms of an A.P. whose kth term is 5k + 1 ?

4. Find the 10th term of GP: 5, 25, 125 ...
Also, find its nth term.

5. Find the sum of 20 terms of an AP, whose first term is 3 and last term is 57.

6. Find the sum to n terms of the sequence: log a, log ar, log ar^2,

7. The nth term of an AP is 4n + 1. Write down the first four terms and the 18th term of an AP.

8. Find the sum to n terms in each of the series $5^2 + 6^2 + 7^2 + ... + 20^2$

9. If a and b are the roots $x^2 - 3x + p = 0$ and c, d are roots of $x^2 - 12x + q = 0$ where a, b, c, d form a G.P. Prove that (q + p):(q - p) = 17:15.

10. Which term of the sequence $\sqrt{3}$, 3 , $3\sqrt{3}$ ……. is 729.

SAQ (3 marks)

1. If in an A.P. the sum of m terms is equal to n and the sum of n terms is equal to m, then prove that the sum of(m + n) terms is - (m + n). Also, find the sum of the first (m -

n) terms (m > n).

2. In an A.P., if p^{th} term is $\frac{1}{q}$, q^{th} term is $\frac{1}{p}$ then prove that the sum of first pq terms is $\frac{1}{2}(pq + 1)$

3. Find the sum to n terms in each of the series $\frac{1}{1\times 2} + \frac{1}{2\times 3} + \frac{1}{3\times 4}$ .....

4. Let the sequence an is defined as follows a1 = 2, $a_n = a_{n-1} + 3$ for $n \geq 2$. Find the first five terms and write corresponding series.

5. For what values of x, the numbers $\frac{-2}{7}$, x, $\frac{-7}{2}$ are in G.P.

6. If a, b, c are in A.P.; b, c, d are in G.P. and $\frac{1}{c}, \frac{1}{d}, \frac{1}{e}$ are in AP prove that a, c, e are in GP.

7. Find the sum of the sequence 7, 77, 777, ------ to n terms.

8. Let the sum of n, 2n, 3n terms of an A. P. be S1, S2 and S3 respectively show that S3 = 3 (S2 – S1)

9. If a, b, c and d are in G.P show that $(a^2+b^2+c^2)(b^2+c^2+d^2) = (ab + bc + cd)^2$

10. The number of bacteria in a certain culture double every hour. If there were 30 bacteria in the culture originally, how many bacteria will be present at the end of 2nd hour, 4th hour and nth hour.

LAQ (5 marks)

1. If arithmetic mean and geometric mean between two numbers is 5 and 4 respectively, then find the two numbers.

2. The third term of GP is 4. Find the product of its first 5 terms.

3. If arithmetic mean and geometric mean between two numbers is 5 and 4 respectively, then find the two numbers.

4. How many terms in the AP - 9, - 6, - 3, ... must be added together so that the sum may be 66?

5. The 2nd, 31st and last term of an AP are $7\frac{3}{4}, \frac{1}{2}$ and $-\ 6\frac{1}{2}$ respectively. Find the first term and the number of terms.

6. Find four numbers in GP, whose sum is 85 and product is 4096.

7. If $\frac{a^n+b^n}{a^{n-1}+b^{n-1}}$ is the A. M. between a and b. Then find the value of n.

CASE STUDY (4 MARKS EACH)

1.Read the Case study given below and attempt any 4 sub parts:
Father of Ashok is a builder, He planned a 12 story building in Gurgaon sector 5. For this, he bought a plot of 500 square yards at the rate of Rs 1000 /yard^2. The builder planned ground floor of 5 m height, first floor of 4.75 m and so on each floor is 0.25 m less than its previous floor.

Now Answer the following questions:

1. What is the height of the last floor?
   1. 2.5 m
   2. 2.75 m
   3. 2.25 m
   4. 3 m
2. Which floor no is of 3 m height?
   1. 5
   2. 7
   3. 10
   4. 9
2. What is the total height of the building?
   1. 40 m
   2. 43.5

3. 40.5 m
4. 44 m

2. Up to which floor the height is 33 m?
   1. 8
   2. 7
   3. 10
   4. 9
2. Which floor no. is half in height of ground floor?
   1. 10
   2. 9
   3. 12
   4. 11

2. A company produces 500 computers in 3rd year and 600 computes in 7th year. Assuming that the production increases uniformly at a constant rate every year answer the following questions based on the information provided above.

1. The value by which the production is increasing every year.

a. 25 b. 30 c. 20 d. 33.33

2. The production in 1st year is

a. 400 b. 250 c. 450 d. 300

3. Total production in 10 years is.

a. 5625 b. 5265 c. 6525 d. 2655

4. The number of computers produced in 21st year is:

a. 900 b. 875 c. 925 d. 950

3. A student draws a square of side 10 cm, his friend joins the midpoint of this square to draw a new square. Again another friend joins the midpoints of this new square to form a 3rd square. This process continues indefinitely.

   Based on the information provided above answer the following questions.

   1. The side of 4th square is:

      a. $\frac{\sqrt{5}}{2}$ b. 5 c. $\sqrt{5}$ d. None

   2. The area of the 5th square is

      a. $\frac{25}{2}$ b. 50 c. $\frac{25}{4}$ d. 25

   3. Perimeter of the 7th square:

      a. $\frac{5}{2}$ b. 10 c. 20 d. 5

   4. The sum of areas of all squares.

      a. 150 b. 200 c. 250 d. None

4. Each side of an equilateral triangle is 24 cm. The midpoints of the triangle are joined to form another equilateral triangle. The process continues. Based on the information provided answer the following questions.

   1. The side of the 5th triangle

      a. 3 b. 6 c. 1.5 d. 0.75

   2. The sum of perimeter of first 6 triangle is

      a. $\frac{569}{4}$ b. $\frac{567}{4}$ c. 144 d. 120

   3. Area of all the triangles.

      a. 576 b. $192\sqrt{3}$ c. $144\sqrt{3}$ d. $169\sqrt{3}$

   4. The sum of the perimeters of all the triangles.

      a. 144 b. 169 c. 625 d. 400

RELATIONS AND FUNCTIONS

MCQ (1 marks)

1. If P X Q is an empty set then which of the following is a null set?

   a. Only P b. Only Q c. Either P or Q d. Both P and Q

2. If (a, b) = (x, y) then

   a. a = x b. b = 0 c. a = y d. b = x

3. If set P has 4 elements and set Q has 5 elements then find the number of elements in P X Q.

   a. 9 b. 4^5 c. 5^4 d. 20

4. If (x+2, y-3) = (5,7) then find values of x and y.

   a. x=3 and y=10 b. x=3 and y=4 c. x=7 and y=4 d. x=7 and y=10

5. If P X Q has 10 elements then which is not possible?

   a. n(P)=1 and n(Q)=10

   b. n(P)=10 and n(Q)=1

   c. n(P)=2 and n(Q)=5

   d. n(P)=5 and n(Q)=4

6. If A X B = {(1, a), (1, b), (1, c), (2, a), (2, b), (2, c)} then find set A

a. {1} b. {1, 2} c. {1, a} d. {a, b, c}

7. If A X B = {(1, a), (1, b), (1, c), (2, a), (2, b), (2, c)} then find set B.

a. {1} b. {1, 2} c. {1, a} d. {a, b, c}

8. If set A has 2 elements and set B has 3 elements then how many subsets does A X B have?

a. 6 b. 8 c. 32 d. 64

9. Let A={1,2,3,4,5} and R be a relation from A to A, R = {(x, y): y = x + 1}. Find the domain.

a. {1,2,3,4,5} b. {2,3,4,5} c. {1,2,3,4} d. {1,2,3,4,5,6}

10. Let A={1,2,3,4,5} and R be a relation from A to A, R = {(x, y): y = x + 1}. Find the codomain.

a. {1,2,3,4,5} b. {2,3,4,5} c. {1,2,3,4} d. {1,2,3,4,5,6}

11. Let A={1,2,3,4,5} and R be a relation from A to A, R = {(x, y): y = x + 1}. Find the range.

a. {1,2,3,4,5} b. {2,3,4,5} c. {1,2,3,4} d. {1,2,3,4,5,6}

12. If set A has 2 elements and set B has 4 elements then how many relations are possible?

a. 32 b. 128 c.256 d. 64

13. If A={1,4,8,9} and B={1, 2, -1, -2, -3, 3,5} and R is a relation from set A to set B {(x, y): $x=y^2$}. .
Find domain of the relation.

a. {1,4,9} b. {-1,1, -2,2, -3,3} c. {1,4,8,9} d. {-1,1, -2,2, -3,3,5}

14. If A={1,4,8,9} and B={1, 2, -1, -2, -3, 3,5} and R is a relation from set A to set B {(x, y): $x=y^2$}.
Find range of the relation.

a. {1,4,9} b. {-1,1, -2,2, -3,3} c. {1,4,8,9} d. {-1,1, -2,2, -3,3,5}

15. 10. Let A={1,2} and B={3,4}. Which of the following cannot be relation from set A to set B?

a. {(1,1), (1,2), (1,3), (1,4)} b. {(1,3), (1,4)} c. {(2,3), (2,4)} d. {(1,3), (1,4), (2,3), (2,4)}

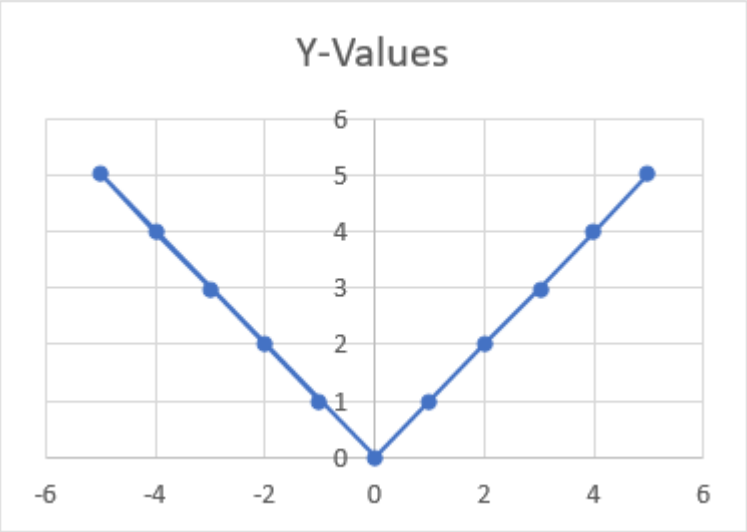
16. In a function from set A to set B, every element of set A has_____ image in set B

a. one and only one b. different c. same d. many

17. Which of the following is not a function?

a. {(1,2), (2,4), (3,6)} b. {(-1,1), (-2,4), (2,4)} c) {(1,2), (1,4), (2,5), (3,8)} d. {(1,1), (2,2), (3,3)}

18. Which function is shown in graph?



a. Constant b. Modulus c. Identity d. Signum

19. Find domain of function |x|

a. Set of real numbers
b. Set of positive real numbers
c. Set of integers
d. Set of natural numbers

20. f(x) = $\sqrt{(9 - x^2)}$. Find the domain of the function.

a. (0, 3) b. [0,3] c. [-3,3] d. (-3,3)

21. Assertion(A) : f(x)= x^2 has a Range over all Real numbers
Reason(R) : Domain of the function can be defined over all real numbers.

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

22. Assertion(A) : Range and Codomain are equivalent sets
Reason(R) : Range is a subset of Codomain.

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

VSAQ (2 marks)

1. Find the domain and range of the function f(x)= $\sqrt{(16 - x^2)}$
2. Let A= {9,10,11,12,13} and let f: A → **N** be defined by $f(n)$ =the highest prime factor of n.
   Find the range of 'f'.
3. Let f = { (-1,-8), (1,-2),(2,1) ,.....} be a function from Z to Z defined by f(x) = px + q,
   for some integers p and q. Determine p and q.
4. Determine the domain and the range of the relation R,
   where R={(x, x^3) : x is a prime number less than 10}.
5. Find the domain and range of $f(x) = \frac{x-2}{x-1}$
6. Let R be a relation defined on Z as R= {(a,b) ; $a^2+b^2=25$ } , the domain of R is
7. What is the range of the function. f(x) = $\frac{mod(x-1)}{x-1}$, x ≠ 1?
8. Determine the domain and range of the function $f(x) = x^2$
9. Determine the domain and range of the function $f(x) = x^2 + 2x + 1$
10. Determine the domain and range of the function $f(x) = x^3 + 2$
11. Determine the domain and range of the function $f(x) = \sin x$
12. Determine the domain and range of the function $f(x) = \tan x$
13. Determine the domain and range of the function $f(x) = \log x$
14. Determine the domain and range of the function $f(x) = e^x$

SAQ (3 marks)

1. If A = {-1, 2, 3 } and B = {1, 3}, then determine
   (i) A x B (ii) B x A (c) B x B (iv) A x A

2. In each of the following cases, find a and b. (2a + b, a – b) = (8, 3) (ii) $\{\frac{a}{4}$, a – 2b) = (0, 6 + b)

3. Given A = {1,2,3,4, 5}, S= {(x, y) :x∈ A, y∈ A}.Find the ordered pairs which satisfy the conditions given below
   (i) x + y = 5 (ii) x + y<5 (iii) x + y>8

4. Is the given relation a function? Give reasons for your answer.
   (i) h={(4,6), (3,9), (-11,6), (3,11)}
   (ii) f = {(x, x) | x is a real number}
   (iii) g = {(n, 1 In)| nis a positive integer}
   (iv) s= {(n, n^2) | n is a positive integer}
   (v) t= {(x, 3) | x is a real number}

5. Express the following functions as set of ordered pairs and determine their range.
   f:X->R,f{x) = x^3 + 1, where X= {-1,0, 3, 9, 7}

6. Find the values of x for which the functions f(x) = $3x^2$ -1 and g(x) = 3+ x are equal.

7. Redefine the function f(x) = |x-2| + |2+x| , -3 ≤x ≤3

8. If f(x)= y = $\frac{ax-b}{cx-a}$ then prove that f (y) = x

9. 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

10. Let f and g be two real functions given by
    f = {(0, 1), (2,0), (3,.-4), (4,2), (5, 1)}
    g = {(1,0), (2,2), (3,-1), (4,4), (5, 3)} then the domain of (f x g) is given by

LAQ (5 marks)

1. If f and g are two real valued fumctions defined as f(x) = 2x + 1, g(x) = x^2 + 1, then find.
   i. f + g
   ii. f – g
   iii. f x g
   iv. f/g

2. Find the domain and range of each of the following functions given by

i. f(x) = $\frac{x^3-x+3}{x^2-1}$

ii. f(x) = $\frac{1}{\sqrt{(1-cosx)}}$

iii. f(x) = $\frac{3x}{28-x}$

3. f(x) = $[X]$ – X, find its domain and range.

4. f(x) : $[X]^2 - 5[X] + 6 = 0$, find its domain and range.

5. Find the domain of the function f defined by $\sqrt{4 - x} + \frac{1}{\sqrt{x^2-1}}$

6. Find the domain and range of the function f(x) = $\frac{x^2-9}{x-3}$

7. Let R be the relation on the set Z of all integers defined by R = {(x, y): x - y is divisible by n}. Prove that
   a. (x, y) ∈ R
      (y, x) ∈ R for all (x, y)∈ Z.
   b. (x, y) ∈ R and (y, z) ∈ R
      (x, z) ∈ R for all x, y, z ∈ Z

LINEAR INEQUALITIES

MCQ (1 marks)

1. The solution set of the inequation $3x < 5$, when x is a natural number is
   a. { 1,2}
   b. { 1 }
   c. {4 }
   d. { 0,1}

2. The longest side of a triangle is three times the shortest side and the third side is 2cm shorter than the longest side if the perimeter of the triangles at least 61cm, find the minimum length of the shortest side.
   a. 16cm
   b. 61cm
   c. 9cm
   d. 11cm

3. What is the solution set for $\frac{2(x-1)}{5} \leq \frac{3(x+2)}{7}$

   a. [-44,∞) b. (-24, ∞) c. (-12, ∞) d. (-4, ∞)

4. The graph of the inequalities $x \geq 0$, $y \geq 0$, $2x + y + 6 \leq 0$

5. $-3x + 17 < -13$, then $x \in$

a. $(-\infty, 10]$ b. $[10, \infty)$ c. $(10, \infty)$ d. none

6. If a , b , c are real numbers such that $a > b$, $b < c$

a. $ac > bc$ b. $ac < bc$ c. $ac \geq bc$ d. none

7. The solution set for $\frac{|2(3-x)|}{5} \leq \frac{3}{5}$

a. $(\frac{1}{2}, \frac{3}{2})$ b.$(\frac{3}{2}, \frac{9}{2})$ c. $(\frac{1}{4}, \frac{3}{4})$ d. none

8. Identify the solution set for $\frac{7x-5}{8x+3}$

a. $(-\frac{5}{7}, -\frac{3}{8})$ b.$(\frac{-31}{28}, \frac{-3}{8})$ c. $(\frac{-17}{25}, \frac{-3}{8})$ d. none

9. Solve the system of inequalities $(x + 5) - 7(x - 2) \geq 4x + 9$; $2(x-3) - 7(x + 5) \leq 3x - 9$

a.$-\frac{9}{4} \leq x \leq 1$ b. $-4 \leq x \leq 1$ c. $-1 \leq x \leq 1$ d. $-4 \leq x \leq 4$

10. If x is a real number and $|x| \leq 3$

a. $-3 < x < 3$ b. $x \geq -3$ c. $-3 \leq x \leq 3$ d. none

11. Assertion(A) : The length of a rectangle is three times the breadth. The minimum perimeter of the rectangle is 160cm
Reason(R) : only possible if breadth ≥ 20

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

12. Assertion(A) : $x-5 > 0$, $\frac{2x-4}{x+2} < 2$
Reason(R) : valid if $x > 5$

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.

b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

VSAQ (2 marks)

1. The solution set of linear inequallity $3x - 5 < x + 7$, when x is a real number is _____.
2. If a and b are real numbers, such that $a < b$, then the set of all real numbers x, such that $a \leq x \leq b$, is called a _____ interval and is denoted by [a, b].
3. Check whether the half plane $x + 2y \geq 4$ contains origin.
4. A solution of 8% boric acid is to be diluted by adding a 2% boric acid solution to it. The resulting mixture is to be more than 4% but less than 6% boric acid. If we have 640 litres of the 8% solution, how many litres of the 2% solution will have to be added?
5. Solve: $3x - 7 > x + 1$
6. Check that the plane $5x + 2y \leq 5$ contains origin or not.
7. Find all pairs of consecutive odd natural number, both of which are larger than 10, such that their sum is less than 40.
8. In the first four examinations, each of 100 marks, Mohan got 94, 73, 72 and 84 marks. If a final average greater than or equal to 80 and less than 90 is needed to obtain a final grade B in a course, then what range of marks in the fifth (last) examination will result if Mohan receiving B in the course?
9. Solve the inequalities and show the graph of the solution in case on number line.

$\frac{x}{2} \leq \frac{5x-2}{3} - \frac{7x-3}{5}$

10. Solve the inequalities: $-12 < 4 - \frac{3x}{-5} \leq 2$

SAQ (3 marks)

1. Find all pairs of consecutive odd positive integers both of which are smaller than 10 such that their sum is more than 11.

2. Solve $\frac{x-4}{2} \geq \frac{x+1}{4} - 1$

3. Solve: x + 5 > 4x -10

4. Find all pairs of consecutive odd positive integers, both of which are smaller than 18, such that their sum is more than 20.

5. Solve: 24x < 100, when x is a natural number.

6. Solve the following system of inequalities 2x - y > 1, x - 2y < -1

7. Solve the system of inequalities.

$X + Y \leq 5$

$4X + Y \geq 4$

$X + 5Y \geq 5$

$X \leq 4$

$Y \leq 3$

8. Solve the following system of inequalities $2X + Y \geq 8$, $X + 2y \geq 10$

LAQ (5 marks)

1. In the first three papers each of 100 marks , Rishi got 95 , 72 , 83 marks . If he wants an average of greater than or equal to 75 marks and less than 80 marks, find the range of marks he should score in the 4th paper .

2. Solve: $\frac{3x-2}{5} \leq \frac{4x-3}{2}$

3. Solve: $\frac{2(x-1)}{5} \leq \frac{3(x+2)}{7}$

4. The cost and revenue functions of a product are given by C(x) = 20x + 4000 and R(x) = 60x + 2000 respectively, where x is the number of items produced and sold. How many items must be sold to realise some profit?

5. Check whether the half plane $2x + 3y \leq 24$ contains the origin. If so, shade the half plane.

6. The longest side of a triangle is 3 times the shortest side and the third side is 2 cm

shorter than the longest side. If the perimeter of the triangle is at least 61 cm. Find the minimum length of the shortest side.

7. Solve the following system of inequations graphically: $2x + y \geq 8$, $x + 2y \geq 8$, $x + y \leq 6$

8. Solve the linear inequality in R:

$\frac{5x+8}{4-x} < 2$

CASE STUDY (4 MARKS EACH)

1. **Read the Case study given below and attempt any 4 sub parts:**

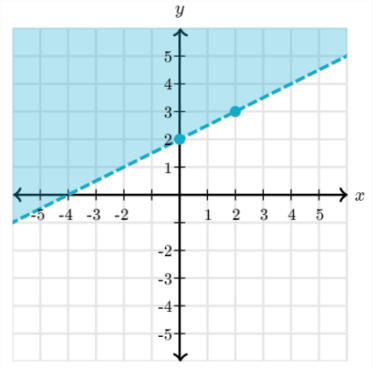
The world's deepest hole, the Kola Superdeep Borehole, the deepest manmade hole on Earth and deepest artificial point on Earth, as a result of a scientific drilling project, it was found that the temperature T in degree Celsius, x km below the surface of Earth, was given by:

$T = 30 + 25 (x - 3)$, $3 < x < 15$.

If the required temperature lies between 200° C and 300° C, then

1. the depth, x will lie between
   1. 9 km and 13 km
   2. 9.8 km and 13.8 km
   3. 9.5 km and 13.5 km
   4. 10 km and 14 km
2. Solve for x. $-9x+2 > 18$ OR $13x+15 \leq -4$
   1. $\mathbf{x \leq -1913}$
   2. $x < -1613$
   3. $-1613 < x < -1913$
   4. There are no solution.

2. **Find the inequality represented by the graph**

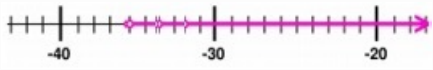


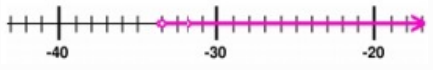
1. $y \leq 12x+2$
2. $y > 12x+2$
3. $y \geq 12x+2$
4. $y < 12x+2$

2. If $|x| < 5$ then the value of x lies in the interval
   1. $(-\infty, -5)$
   2. $(\infty, 5)$
   3. $(-5, \infty)$
   4. $(-5, 5)$

2. Graph the following inequality on the number line: $x > -32$

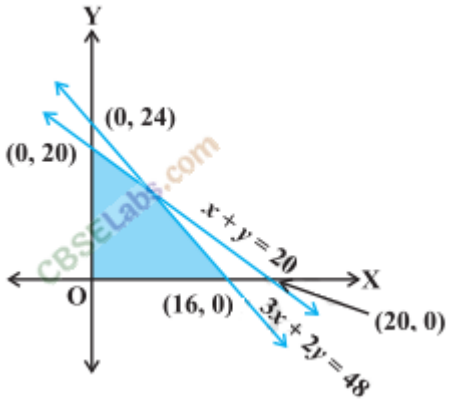
1. 

2. 

3. 

4. 

2. Find the linear inequalities for which the shaded region in the given figure is the solution set.



3. A solution of 9% acid is to be diluted by adding 3% acid solution to it. The resulting mixture is to be more than 5% but less than 7% acid. If there is 460 litres of the 9% solution, how many litres of 3% solution will have to be added?

4. A sol of 10% acid is to be diluted by adding a 2% acid solution to it. The resulting mixture should be more than 4% and less than 6% of acid.If we have 700 litres of 10% solutions. How much litre of the 2% solution should be used.

5. A company produces certain items. The manager in the company used to make a data record on daily basis about the cost and revenue of these items separately. The cost and revenue function a product are given by:
C(x) = 20x + 4000
R(x) = 60x + 2000
respectively, where x is the number of items produced and sold. The company manager wants to know

i. How many items must be sold to realise some profit?
ii. Also if the cost and revenue function
a product are given by:
C(x) = 2x + 400
R(x) = 6x + 200
respectively, where x is the number of items produced, then minimum number of items to be sold to realise some profit.

6. A psychology student studying on IQ has come to the conclusion that IQ= $\frac{mental\ age}{physical\ age}$ x 100

i. What could be the mental age of children with physical age 15 have if their IQ is between 90 and 125.
ii. What could be the IQ range of children of 12 years if their mental age is between 9 to 15 years.

7. A man working in Chemical factory has to maintain the chemicals between certain range of temperature. He knows the relation between Celsius and Fahrenheit is

$F = \frac{9}{5} C + 32$

i. He needs to keep the temperature between 40 to 50 degree Celsius. What would be the range in Fahrenheit scale.

ii. He wants to dilute 500 ml acid solution of 30% concentration by adding water to it. How much water should he add to keep the concentration between 20% to 25 %.

COMPLEX NUMBERS

MCQ (1 marks)

1. The inequality $|Z - 6| < |Z - 2|$ represents the region given by

a. Re(z) > 4 b. Re(z) < 2 c. Re(z) > 2 d. none of these

2. Find Argument of the complex number (0 + 0 i)

a. $-\pi$ b. π c. 0 d. none of these

3. The least value of n for which $\frac{(i+1)^n}{(1-i)^n}$ is a positive integer is

a. 8 b. 1 c. 2 d. 4

4. If z is any complex number, then $\frac{z-z'}{2i}$ is

a. either 0 or purely imaginary b. purely imaginary c. purely real d. none

5. The points z = x + iy which satisfy the equation $|z| = 1$ lie on

a. the line x = 1 b. the line y = 1

c. the line x + y = 1 d. the circle whose centre is origin and radius = 1

6. If $x = \omega^2 + \omega - 3$, ω being a non real cube root of unity , then the value of

$x^4 + 6x^3 + 10x^2 - 12x - 19$ is

a. 5 b. 12 c. 19 d. none

7. Find the Amplitude of – i

a. $\frac{\pi}{2}$ b.– $\frac{\pi}{2}$ c.– π d. none

8. Square roots of i are

a. $\pm \frac{1}{\sqrt{2}}(1+ i)$ b. $\pm \frac{1}{\sqrt{2}}(1 - i)$ c. ± 1 d. none

9. Find the Amplitude of $-1 - i$

a. $-\frac{3\pi}{4}$ b. $\frac{3\pi}{4}$ c. $\frac{\pi}{4}$ d. none

10. Distance of the representative of the number 1 +i from the origin (in Argand's diagram) is

a. 1 b. $\sqrt{2}$ c. 2 d. none

11. If z is purely real and Re (z) >0 , then Amp. (z) is

a. 0 b. $-\sqrt{\pi}$ c. π d. none

12. If z = x + iy ; x, y∈ R then :

a. $zz' < |z|^2$ b. $zz' = |z|^2$ c. $zz' > |z|^2$ d. none

13. The complex numbers sinx + i cos2x and cosx – i sin2x are conjugate to each other, for

a. x=0 b. $x = n\pi$ c. No value of x d. none

14. Assertion(A) : Re(Z) > 0, amp Z = 0
Reason(R) : Z is purely Real

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

15. Assertion(A) : Z = X + iY, where Z is a complex number
Reason(R) : $Z\bar{Z} = |Z|^2$

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

VSAQ (2 marks)

1. The roots of the equation $x^2 + 4 = 0$ are

2. $5(\cos 270^o + i \sin 270^o)$ is written in Cartesian form as:

3. Evaluate $\frac{1}{i^7}$

4. Express (5 + 4 i) + (5 - 4 i) in the form of a + ib.

5. If z1, z2 and z3, z4 are two pairs of conjugate complex numbers, then find

$arg(\frac{z1}{z4}) + Arg(\frac{z2}{z3})$

6. If arg (z - 1) = arg (z + 3i), then find x - 1 : y.

7. Find the square root of $(3-4\sqrt{7}\,i\,)$

8. Find the real numbers x and y if (x - iy) (3+ 5i) is the conjugate of -6 - 24i.

9. Express the complex number 3 (cos 300° - i sin 30°) in polar form.

10. The complex number (cos135° - i sin135°) is written in standard form as:

11. The conjugate of complex number 3 + i is:

SAQ (3 marks)

1. Express the complex number sin 50° + i cos 50° in the polar form.
2. Find the product of complex number (- 5 + 7i), (- 13 - 3i).
3. If $z_1 = 3 + 2i$ and $z_2 = 2 - i$, then verify that $\overline{(z1z2)} = \overline{z1}\,\overline{z2}$
4. Simplify the following complex number $\overline{(9 - i)} + \overline{(6 + i^2)} - \overline{(9 - i^3)}$
5. if $x + iy = \frac{(a+i)^2}{2a-i}$, show that $x^2 + y^2 = \frac{(a^2+1)\text{^}2}{4a^2+1}$
6. Write the complex number $z = \frac{i-1}{\cos\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}}$ in the polar form.
7. The complex numbers sinx + i cos2x and cosx – i sin2x are conjugate to each other, for X= ?
8. Find the value of $(4 + 3\sqrt{(-20)})^{1/2} + (4 - 3\sqrt{(-20)})^{1/2}$
9. Show that $i^n + i^{n+1} + i^{n+2} + i^{n+3} = 0$ for all $n \in N$
10. Find the value of i^{-30}
11. Find the value of $\sqrt{-25} + 3\sqrt{-4} + 2\sqrt{-9}$
12. Find the value of $6i^3 + 2i^2 + 6i + 7$

LAQ (5 marks)

1. Find the modulus and argument of the following complex number 1 + i tan.
2. Find the multiplicative inverse of 4 - 5i
3. Solve $x^2 + 3x + 9 = 0$
4. Find the conjugate and modulus of the following complex number $\frac{3+2i}{2-5i} + \frac{3-2i}{2+5i}$
5. Solve the equation $z^2 = \bar{z}$.
6. If ω is a cube root of unity , then the linear factors of $X^3 + Y^3$ in complex numbers are:
7. If z1 and z2 are complex numbers, then prove that Re (z1 z2) = Re (Z1) Re (z2) − Im (z1)

Im (z2).

8. If z1 = 3 + 5i and z2 = 2 - 3i, then verify that $\overline{\left(\frac{z1}{z2}\right)} = \frac{\overline{z1}}{\overline{z2}}$

9. If z1 and z2 are two complex numbers such that |z1| = |z2| and arg (z1) + arg (z2) = , then prove that z2 = $\overline{-\ z1}$

10. If Z1 is a complex number other than √-1 such that |z1| = 1 and z2 = $\frac{z1-1}{z1+1}$, then show that the real parts of z2 is zero

STRAIGHT LINE

MCQ (1 marks)

1. The lines x + 2y – 3 = 0, 2x + y – 3 = 0 and the line l are concurrent . If the line I passes through the origin, then its equation is.

   a. x – y = 0

   b. x + y + 0

   c. x + 2y = 0

   d. none of these

2. Projection (the foot of perpendicular) from (x , y) on the x – axis is

   a. (- x , 0)

   b. (0 , y)

   c. (x , 0)

   d. (0 , - y)

3. **The distance of the point (A, B) from x- axis is**

   a. $|B|$

   b. $|A|$

   c. A

   d. None

4. A line is drawn through the points (3 , 4) and (5 , 6) . If the is extended to a point whose ordinate is – 1, then the abscissa of that point is

   a. none of these

   b. 1

   c. 0

   d. - 2

5. The line which is parallel to X axis and crosses the curve y =$\sqrt{x}$ at an angle of 45^0 is:

   a. y = $\frac{1}{2}$

   b. y = 1

   c. none of these

   d. y = $\frac{1}{4}$

6. A line L passes through the points (1 , 1) and (2 , 0) and another line M which is perpendicular to L passes through the point (1/2 , 0) . The area of the triangle formed by these lines with y axis is :

   a. $\frac{25}{8}$ b. $\frac{25}{16}$ c. $\frac{25}{4}$ d. None

7. The line which passes through the point (0 , 1) and perpendicular to the line x – 2y +11 = 0 is

   a. none

   b. 2x + y – 1 = 0

   c. 2x – y + 1 = 0

   d. 2x – y + 3 = 0

8. The equation $y-y_1 = m (x - x_1)$ where $m \in R$ represents all lines through the point (x_1,y_1) Except the line

   a. parallel to Y axis

   b. parallel to the line x – y = 0

   c. parallel to X axis

   d. None

9. Two opposite vertices of a rectangle are (1 , 3) , (5 , 1) . If the equation of a diagonal

of this rectangle is y = 2x + c , then the value of c is:

a. 2 b. – 4 c. −9 d. 1

10. The point on the axis of y which is equidistant from (−1 , 2) and (3 , 4) is

a. (0,4) b. (0,5) c. (5,0) d. None

11. The point which divides the joint of (1, 2) and (3,4) externally in the ratio 1 : 1 .

a. lies in the 2nd quadrant

b. lies in 1st quadrant

c. lies in the 3rd quadrant

d. cannot be determined

12. A line is equally inclined to the axis and the length of perpendicular from the origin upon the line is √2 . A possible equation of the line is

a. y =√2x + 2 .

b. x + y = 2

c. y = x + 1

d. y = x + √2

13. The locus of the inequation xy ≥ 0 is

a. a straight line

b. the set of all points either in the 1st quadrant or in the 3rd quadrant including the points on coordinate axis

c. a pair of straight lines

d. none

14 The locus of a point, whose abscissa and ordinate are always equal is

a. x – y = 0

b. x + y + 1 = 0

c. x + y = 1

d. none of these.

15. The area of the triangle whose sides are along the lines x = 0 , y = 0 and 4x + 5y = 20 is

a. none of these

b. 10

c. 1/10

d. 20

16. Two points (a , 0) and (0 , b) are joined by a straight line. Another point on this line is

a. (- 3a , 2b)

b. (a , - 2b)

c. none of these

d. (3a , - 2b)

17. Two points (a , 0) and (0 , b) are joined by a straight line. Another point on this line is

a. (- 3a , 2b)

b. (a , - 2b)

c. none of these

d. (3a , - 2b)

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

a. (2/5 , 3/5)

b. (3/2 , 5/2)

c. (2/5 , 2/5)

d. (3/5 , 3/5)

19. The perpendicular distance of the origin from the line 3x +4y + 1 = 0 is

a. none of these

b. 1/5

c. 1/2

d. 1

VSAQ (2 marks)

1. If a, b, c are in A.P., then the straight line ax + by + c = 0 will always pass through
2. The slope of the line, whose inclination is 150^{o} is
3. Prove that the line through the point (x1, y1) and parallel to the line Ax + By + C = 0 is A(x - x1) + B(y - y1) = 0.
4. Prove that the points A (1, 4), B (3, -2) and C (4, - 5) are collinear.
5. Find the equation of the line, where length of the perpendicular segment from the origin to the line is 4 and the inclination of the perpendicular segment with the positive direction of X - axis is 30^{o}.
6. If a, b, c are variables such that 3a + 2b + 4c = 0, then show that the family of lines given by ax + by + c = 0 pass through a fixed point. Also, find the point.
7. Show that the lines 4x + y - 9 = 0, x - 2y + 3 = 0, 5x - y - 6 = 0 make equal intercepts on any line of gradient 2.
8. A line forms a triangle in the first quadrant with the coordinate axes. If the area of the triangle is $54\sqrt{3}$ sq units and perpendicular drawn from the origin to the line makes an angle 60o with X-axis, then find the equation of the line.

SAQ (3 marks)

1. A rectangle has two opposite vertices at the points (1, 2) and (5,5). If the other vertices lie on the line x = 3, find the equations of the sides of the rectangle.
2. Find the equation of the line joining the point (3,5) to the point of intersection of the lines 4x + y - 1 = 0 and 7x - 3y - 35 = 0.
3. Find the direction in which a straight line must be drawn through the point (-1, 2) so that its point of intersection with the line x + y = 4 may be at a distance of 3 units from this point.
4. Find the area of the triangle formed by the lines y - x = 0, x + y = 0 and x - k = 0.
5. In the Δ ABC with vertices A(2, 3), B(4, -1) and C(1, 2), find the equation and length of altitude from the vertex A.
6. Determine the angle B of the triangle with vertices A(-2, 1), B(2, 3) and C(-2, -4).

7. The slope of a line is double the slope of another line. If tangent of the angle between them is , then find the slope of the lines.

8, Show that the straight lines given by x(a + 2b) + y(a + 3b) = a + b for different values of a and b pass through a fixed point.

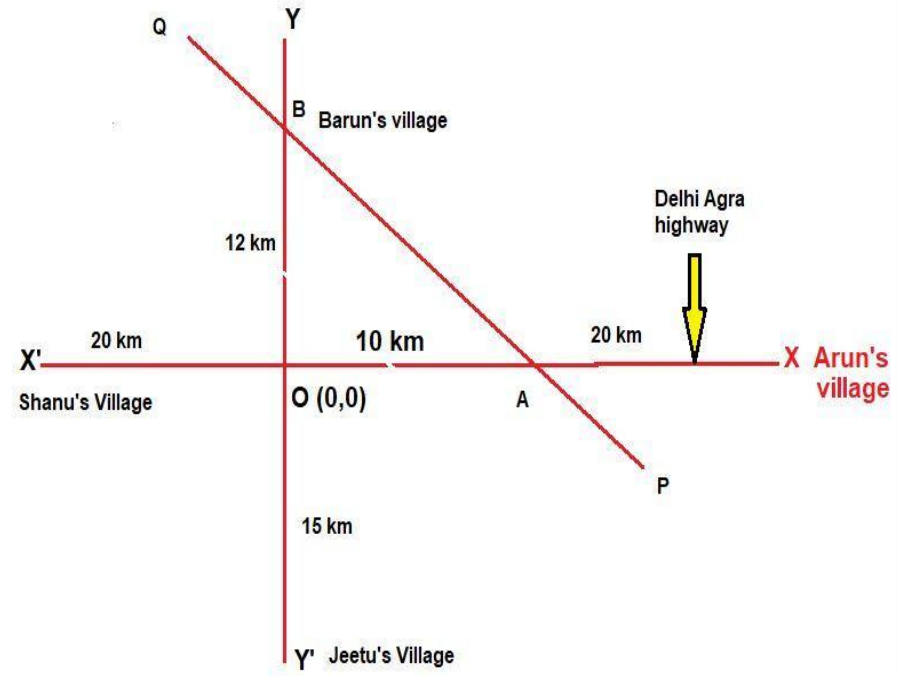
9. A line passes through the point (3, - 2). Find the locus of the middle point of the portion of the line intercepted between the axes.

LAQ (5 marks)

1. A line 4x + y = 1 through the point A (2, -7) meets the line BC whose equation is 3x - 4y + 1 = 0 at the point B. Find the equation to the line AC so that AB = AC.
2. Find the area of a Δ ABC, whose vertices are A (6, 3), B (-3, 5) and C (4, - 2).
3. Find the equation of the line passing through (-3, 5) and perpendicular to the line through the points (2, 5) and (-3, 6).
4. Show that the perpendicular drawn from the point (4, 1) on the line segment joining (6, 5) and (2, -1) divides it internally in the ratio 8 : 5.
5. A straight line moves so that the sum of the reciprocals of its intercepts made on axes is constant. Show that the line passes through a fixed point.
6. Without using distance formula, show that the points (-2, -1), (4, 0), (3, 3) and (-3, 2) are the vertices of a parallelogram.
7. A person standing at the junction (crossing) of two straight points represented by the equations 2x - 3y + 4 = 0 and 3x - 4y - 5 = 0wants to reach the path whose equation is 6x - 7y + 8 = 0 in the least time. Find equation of the path that he should follow.
8. Find the equations of the medians of a triangle formed by the lines x + y - 6 = 0, x - 3y - 2 = 0 and 5x - 3y + 2 = 0

CASE STUDY (4 marks)

1.Villages of Shanu and Arun's are 50km apart and are situated on Delhi Agra highway as shown in the following picture. Another highway YY' crosses Agra Delhi highway at O(0,0). A small local road PQ crosses both the highways at pints A and B such that OA=10 km and OB =12 km. Also, the villages of Barun and Jeetu are on the smaller high way YY'. Barun's village B is 12km from O and that of Jeetu is 15 km from O.



Now answer the following questions:

1. What are the coordinates of A?
   1. (10, 0)
   2. (10, 12)
   3. (0,10)
   4. (0,15)
2. What is the equation of line AB?
   1. 5x + 6y = 60
   2. 6x + 5y = 60
   3. x = 10
   4. y = 12
2. What is the distance of AB from O(0, 0)?
   1. 60 km
   2. 60/√61 km
   3. √61 km
   4. 60 km

2. What is the slope of line AB?
   1. 6/5
   2. 5/6
   3. -6/5
   4. 10/12

2. What is the length of line AB?
   1. √61 km
   2. 12 km
   3. 10 km
   4. 2√ 61 km

PERMUTATION AND COMBINATION

MCQ (1 Marks)

1. How many 3 digit numbers can be formed using the digits 1,2,3 exactly ones

   a. 3 b. 4 c. 6 d. 8

2. $^{11}P_r = {}^{11}P_{r+1}$ then find the value of r

   a. 8 b. 9 c. 10 d. 11

3. In how many ways can the letters of the word DISPLAY be arranged

   a. 1430 b. 5040 c. 4840 d. 2410

4. Out of 7 consonants and 4 vowels how many words of 3 consonants and two vowels be formed

   a. 20300 b. 2400 c. 25200 d. 24100

5. How many 4 digit number can be formed using the digits 0,1,2,3,4 without repetition?

   a. 120 b. 4^5 c. 5^4 d. 96

6. How many two digit numbers with repetition can be formed by using the digits 3,5 and 7

   a. 10 b. 9 c. 7 d. 8

7. In how many different ways the letters of the word GEOGRAPHY can be arranged such that the vowels must come together .

   a. 2520 b. 2530 c. 15130 d. 15120

8. How many three digit numbers can be formed from 5,6,7,8,9 with repetition

   a. 55 b.75 c. 70 d. 85

9. From a group of 7 men and 6 women a 5 person committee is to be formed with at least 3 men.

In how many ways can it be done.

a. 756 b. 253 c. 1513 d. 1120

10. In how many different ways can the letters of the word FIGHT be arranged.

a. 220 b. 230 c. 130 d. 120

11. In how many ways the word CHRISTMAS be arranged so that the letter C and M are never adjacent.

a. 8! *(7/2) b. 9!(7/2) c. 8! *(9/2) d. None

12. How many 4 digit number can be made with the digits 4,5,6,7 and 8 ?

a. 224 b. 230 c. 130 d. 120

13. Number of ways of arranging 4 people in 4 chair.

a. 5040 b. 4050 c. 5130 d. 4120

14. Assertion: Permutation is arrangement of objects

Reason: Combination is selection of objects.

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

15. Assertion: Total words formed from SSSMMMPPPDD is 11!/(3!3!3!2!)

Reason: The denominator signify repetition

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

VSAQ(2 marks)

1. Given 5 flags of different colours here many different signals can be generated if each signal requires the use of 2 flags. One below the other.
2. How many 4 letter code can be formed using the first 10 letter of the English alphabet, if no letter can be repeated?
3. A coin is tossed 3 times and the outcomes are recorded. How many possible out comes are there?

4. In how many ways of selecting 9 balls from 6 red balls, 5 white balls and 5 blue balls if each selection consists of 3 balls of each colours.
5. How many words, with or with not meaning each of 2 vowels and 3 consonants can be flamed from the letter of the word DAUGHTER?
6. Convert the following products into factorials
7. How many 3 digit numbers can be formed by using the digits 1 to 9 if no. digit is repeated.
8. How many words with or without meaning can be formed using all the letters of the word 'EQUATION' at a time so that vowels and consonants occur together.
9. Evaluate $^{10}C_7 + {}^{10}C_5$
10. Find "n" if $^{2n}C_3 : {}^{n}C_3 = 11:1$
11. Find the value of $^{n}C_0 + {}^{n}C_1 + {}^{n}C_2 + {}^{n}C_3 + {}^{n}C_4 \ldots\ldots {}^{n}C_n$
12. Convert into factorial 2.4.6.8.10.12

SAQ(3 Marks)

1. How many words, with or without meaning can be made from the letters of the word MONDAY. Assuming that no. letter is repeated, if
   (i) 4 letters are used at a time
   (ii) All letters are used but first letter is a vowel?
2. Prove that $^{n}C_r + {}^{n}C_{r-1} = {}^{n+1}C_r$
3. A bag contains 5 black and 6 red balls determine the number of ways in which 2 black and 3 red balls can be selected.
4. In how many ways can 5 girls and 3 boys be seated in a row so that no two boys are together?
5. How many words, with or without meaning, each of 3 vowels and 2 consonants can be formed from the letters of the word INVOLUTE.
6. Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements
   (i) do the words start with P
   (ii) do all the vowels always occur together

7. In how many ways can one select a cricket team of eleven from 17 players in which only 5 players can bowl if each cricket team of 11 must include exactly 4 bowlers?
8. How many numbers greater than 1000000 can be formed by using the digits 1,2,0,2,4,2,4?
9. In how many ways can the letters of the word ASSASSINATION be arranged so that all the S's are together?
10. The English alphabet has 5 vowels and 21 consonants. How many words with two different vowels and 2 different consonants can be flamed from the alphabet?
11. In how many of the distinct permutations of the letters in MISSISSIPPI do the four I's not come together?
12. In how many ways can 4 red, 3 yellow and 2 green discs be arranged in a row if the discs of the same colours are in distinguishable?
13. How many 4 letter code can be formed using the first 10 letters of the English alphabet if no letter can be repeated?
14. Determine the number of ways of choosing 5 cards out of a deck of 52 cards which include exactly one ace.

LAQ(5 Marks)

1. From a class of 25 students 10 are to be chosen for an excursion Party. There are 3 students who decide that either all of them will join or none of them will join. In how many ways can excursion party be chosen?
2. Find the number of ways of selecting 9 balls from 6 red balls, 5 white balls and 5 blue balls if each selection consists of 3 balls of each colour.
3. Find the number of 3 digit even number that can be made using the digits 1, 2, 3, 4, 5, 6, 7, if no digit is repeated?

4. 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?

5. Find the number of words with or without meaning which can be made using all the letters of the word. AGAIN If these words are writer as in a dictionary, what will be the 50th word?

6. What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of there
   (i) Four cards one of the same suit
   (ii) Four cards belong to four different suits
   (iii) Are face cards.
   (iv) Two are red cards & two are black cards.
   (v) Cards are of the same colour?

7. A committee of 7 has to be farmed from 9 boys and 4 girls in how many ways can this be done when the committee consists of
   (i) Exactly 3 girls?
   (ii) Attest 3 girls?
   (iii) Atmost 3 girls?

8. In how many ways can final eleven be selected from 15 cricket players' if
   (i) there is no restriction
   (ii) one of then must be included
   (iii) one of them, who is in bad form, must always be excluded
   (iv) Two of then being leg spinners, one and only one leg spinner must be included?

9. How many four letter words can be formed using the letters of the letters of the word 'FAILURE' so that
   (i) F is included in each word
   (ii) F is excluded in each word.

CASE STUDY(4 MARKS)

1. A committee of 5 is to be formed out of 6 gents and 4 Ladies. In how many ways this can be done, when
   (i) at least two ladies are included?
   (ii) at most two ladies are included?

2. In how many ways can the letters of the word PERMUTATIONS be arranged if the
   (i) words start with P and with S
   (ii) vowels are all together
   (iii) There are always 4 letters between P and S?

3.

6	8	2
6	1	4
2	0	6
7	3	8
7	8	0

i. One number is correct and well placed
ii. One number is correct but wrongly placed
iii. Two numbers are correct but wrongly placed
iv. Nothing is correct.
v. One number is correct but wrongly placed

FIND THE COMBINATION OF THE LOCK

4. In a ROOM there are 1000 doors and each door is numbered from 1 to 1000. Initially all the doors are closed. In a group of 1000 people all the people are numbered from 1 to 1000. Person with numbered 1 goes opens all the doors. Person with number 2 goes inside and closes all the doors which are multiple of 2. In general the r^{th} goes inside and changes the status of all the doors which are multiple of r(that is closes the open doors and opens the closed doors). All the 1000 person does the same. After this practise how many doors will remain open.

BINOMIAL THEOREM

MCQ(1 Marks)

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

2. Evaluate the expression $(y+1)^4 - (y-1)^4$

a) $3y^2 + 2y^5$ b) $7(y^4 + y^2 + y)$ c) $8(y^3 + y^1)$ d) $y + y^2 + y^3$

3. Find the coefficient of x^7 in $(x+4)^9$.

a) 523001 b) 428700 c) 327640 d) 129024

4. Determine the 7th term in the expansion of $(x-2y)^{12}$.

a) $6128y^7$ b) $59136y^6$ c) $52632x^6$ d) $39861y^5$

5. What is the middle term in the expansion of $(x/2 + 6y)^8$?

a) $45360x^4$ b) $34210x^3$ c) $1207x^4$ d) $3250x^5$

6. By the expression $\left(\frac{x}{3} + \frac{1}{x}\right)^5$, evaluate the middle term in the expression.

a) $10*(x^5)$ b) $\frac{1}{5} * \frac{x}{4}$ c) $10 * \frac{x}{3}$ d) $6 * x^3$

7. Calculate the value of ${}^8C_5$.

a) 79 b) 43 c) 120 d) 56

8. What is the coefficient of x^9 in the expansion of $(x+5)^{14}$?

a) $5! * {}^{14}C_6$ b) ${}^{14}C_5$ c) $54 * {}^{14}C_5$ d) $34 * {}^{11}C_5$

9)Find the coefficient of x^8 in the expansion of $(x+2)^{11}$

a) 640 b) 326 c) 1320 d) 456

10. The independent term of x is 80000 in the expansion of $(3x+b/x)^6$, where b is a positive constant. What the value of b?

a) 3.97 b) 6.87 c) 8.3 d) 5.2

11. Assertion: Pascal's triangle is valid upto n=10 for binomial coefficients.

Reason: Binomial series for fractional and negative values of n goes upto infinity.

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

12. Assertion: The sum of ${}^nC_0+{}^nC_1+{}^nC_2\ldots\ldots\ldots{}^nC_n= 2^n$

Reason: The value is derived from the expression $(1+x)^n$ by putting X=1

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

VSAQ (2 Marks)

1. What is The middle term in the expansion of $(1+x)^{2n+1}$
2. When n is a positive integer, the no. of terms in the expansion of $(a+x)^n$
3. Write the general term $(x^2+y)^5$
4. In the expansion of $(x + \frac{1}{x})^6$ find the 3rd term from the end.
5. Expand $(1+x)^n$
6. The middle term in the expansion of $(1+x)^{2n}$
7. Find the no. of terms in the expansions of$(1-2x+x^2)^7$
8. Find the coefficient of x^5 in $(x+3)^9$
9. Find the term independent of x in $(x+\frac{1}{x})^{10}$
10. Expand$(a+b+c)^4$ using binomial expansion.

SAQ (3 Marks)

1. Which is larger $(1.01)^{1000000}$ or 10,000.
2. Prove that $\sum_{r=0}^{n} 3^r {}^nC_r = 4^n$
3. Using binomial theorem, prove that(6^n-5n) always leaves remainder 1 when divided by 25
4. Find the 13th term in the expansion of $\left(9x - \frac{3}{\sqrt{x}}\right)^{18}$

5. Find the term independent of in the expansion of $\left(\sqrt[3]{x} - \frac{1}{2\sqrt[3]{x}}\right)^{18}$

6. Find the coefficient of x^5 in the expansion of the product $(1+2x)^5(1-x)^7$

7. Compute $(98)^5$

8. Expand $(x + \frac{1}{x})^6$

9. Find the middle term of $(2x - \frac{x^2}{4})^9$

10. Find the coefficient of $a^5b^7(a+2b)^{12}$

LAQ (5 Marks)

1. Find n , if the ratio of the fifth term from the beginning to the fifth term from the end in the expansion of $(\sqrt[4]{2} + \frac{1}{\sqrt[4]{3}})^n$ is $\sqrt{6}$:1

2. The coefficients of three consecutive terms in the expansion $(1+a)^n$ of are in the ratio 1:7:42. Find n.

3. The second, third and fourth terms in the binomial expansion $(a+x)^n$ are 240, 720 and 1080 respectively. Find x , a and n.

4. If a and b are distinct integers, prove that a-b is a factor of a^n-b^n whenever n is positive.

5. Show that the middle term in the expansion of $(1+x)^{2n}$ is $\frac{1.3.5.....(2n-1)}{n!}2^n x^n$

6. In the expansion of $\left(\sqrt[3]{2} + \frac{1}{\sqrt[3]{3}}\right)^n$ the ratio of 7th term from the beginning to the 7th term the end is 1:6 find n.

7. If the coefficient of 5^{th}, 6 th and 7th terms in the expansion of $(1+x)^n$ are in A.P, then find the value of n.

8. If P be the sum of odd terms and Q that of even terms in the expansion of prove that $(x+a)^n$ Prove that P^2-Q^2=$(x^2$-$a^2)^n$

9. If three successive coefficient in the expansion $(1+x)^n$ of are 220,495 and 792 then find n.

10. Find an approximation of $(0.99)^5$ using the first three terms of its expansion.

PROBABILITY

1. In a blindfolded game, a boy can hit the target 8 times out of 12. If he fired 8 shots, find out

the probability of more than 4 hits?

a) 2.530 b) 0.1369 c) 0.5938 d) 3.998

2. A fair coin is tossed 15 times. Determine the probability in which no heads turned up.

a) $2.549 * 10^{-3}$ b) 0.976 c) $3.051 * 10^{-5}$ d) 5.471

3. An event in the probability that will never be happened is called as -

a. Unsure event b.Sure event

c. Possible event d. Impossible event

4. What will be the probability of getting odd numbers if a dice is thrown?

a) 1/3 b) 2/3 c) ½ d) ¼

5. What is the probability of getting a sum as 3 if a dice is thrown twice?

a) 2/18 b)1/18 c)1/6 d) 1/36

6. The probability of getting two tails when two coins are tossed is -

a) 2/4 b)1/4 c)1/6 d) 1/3

7. What is the probability of getting the sum as a prime number if two dice are thrown?

a) 5/24 b) 5/12 c) 5/6 d) 5/30

8. What is the probability of getting atleast one head if three unbiased coins are tossed?

a) 7/8 b) 5/8 c) 1/3 d) 5/9

9. What is the probability of getting 1 and 5 if a dice is thrown once?

a) 2/3 b) 1/3 c) 1/2 d) ¼

10. If two dice are thrown together, what is the probability of getting an even number on one dice and an odd number on the other dice?

a) 1/3 b) 2/3 c) 1/2 d) ¼

11. In a box, there are 8 orange, 7 white, and 6 blue balls. If a ball is picked up randomly, what is the probability that it is neither orange nor blue?

a) 1/3 b) 1/21 c) 2/21 d) 3/21

12. A card is drawn from a pack of 52 cards. What is the probability of getting a king of a black suit?

a) 1/52 b) 3/26 c) 2/26 d) 1/26

13. Assertion: Probability cannot be greater than 1

Reason: $0 \leq P(x) \leq 1$

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

14. Assertion: Mutually exclusive events cannot occur simultaneously

Reason: $A \cap B$= NULL for two mutually exclusive events.

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

VSAQ(2 Marks)

1. A dice is thrown twice. What is the probability of getting two numbers whose product is even?
2. Suppose a number x is chosen from the numbers -2, -1, 0, 1, 2. What will be the probability of $x^2 > 0$?
3. In 30 balls, a batsman hits the boundaries 6 times. What will be the probability that he did not hit the boundaries?
4. If three coins are tossed simultaneously, what is the probability of getting two heads together?
5. The probability of winning the first prize in a lottery of a girl is 8/100. If the total of 6000 tickets are sold, then how many tickets the girl purchased?
6. There are 3 blue socks, 5 brown socks, and 4 white socks in a drawer. If two socks are picked up randomly, what is the probability that the selected socks are of the same colour?
7. A stock of pens consists of 144 ball pens in which 20 pens are defective, and others are good. A girl went to the shop to purchase a pen. The shopkeeper randomly draws one pen and gives it to her. What is the probability that a girl will buy the good pen?
8. The probability of randomly selecting a rotten apple is 0.18 from the heap of 900 apples. So, what is the number of rotten apples in a heap?
9. If a number is selected at random from the first 100 natural numbers, what will be

the probability that the selected number is a perfect cube?

10. Two people X and Y apply for a job in a company. The probability of the selection of X is 2/5, and Y is 4/7. What is the probability that both of them get selected?

12. A school has five houses named as A, B, C, D, and E. There are 23 students in a class in which 4 students are from house A, 8 students are from house B, 5 from C, 2 from D, and the rest from house E. Class teacher randomly selects a student to be the class monitor. What is the probability that the selected student is not from house A, B, and C?

SAQ(3 Marks)

1. A carton consists of 100 shirts of which 88 are good, 8 have minor defects and 4 have major defects. Jimmy, a trader, will only accept the shirts which are good, but Sujatha, another trader, will only reject the shirts which have major defects. One shirt is drawn at random from the carton. What is the probability that
(i)it is acceptable to Jimmy?
(ii)it is acceptable to Sujatha?

2. Two dice, one blue and one grey, are thrown at the same time. Write down all the possible outcomes. What is the probability that the sum of the two numbers appearing on the top of the dice is (i) 8 (ii)13 (iii)less than or equal to 12

3. It is given that in a group of 3 students, the probability of 2 students not having the same birthday is 0.992. What is the probability that the 2 students have the same birthday?

4. A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is (i) red ? (ii)not red?

5. Suppose we throw a die once. (i) What is the probability of getting a number greater than 4 ? (ii) What is the probability of getting a number less than or equal to 4 ?

6. One card is drawn from a well-shuffled deck of 52 cards. Calculate the probability that the card will (i)be an ace, (ii)not be an ace.

7. There are 40 students in Class X of a school of whom 25 are girls and 15 are boys. The class teacher has to select one student as a class representative. She writes the name of each student on a separate card, the cards being identical. Then she puts cards in a bag and

stirs them thoroughly. She then draws one card from the bag. What is the probability that the name written on the card is the name of (i) a girl? (ii) a boy?

8. A box contains 3 blue, 2 white, and 4 red marbles. If a marble is drawn at random from the box, what is the probability that it will be (i)white? (ii)blue? (iii)red?

9. Harpreet tosses two different coins simultaneously (say, one is of Rs.1 and other of Rs.2). What is the probability that she gets at least one head?

10. In a musical chair game, the person playing the music has been advised to stop playing the music at any time within 2 minutes after she starts playing. What is the probability that the music will stop within the first half-minute after starting?

11. Complete the following statements:
(i) Probability of an event E + Probability of the event 'not E' = .
(ii)The probability of an event that cannot happen is . Such an event is called .
(iii)The probability of an event that is certain to happen is . Such an event is called .
(iv)The sum of the probabilities of all the elementary events of an experiment is .
(v)The probability of an event is greater than or equal to and less than or equal to .

LAQ(5 Marks)

1. A piggy bank contains hundred 50p coins, fifty ` 1 coins, twenty ` 2 coins and ten ` 5 coins. If it is equally likely that one of the coins will fall out when the bank is turned upside down, what is the probability that the coin (i) will be a 50 p coin ?(ii) will not be a ` 5 coin?

2. Two customers Shyam and Ekta are visiting a particular shop in the same week (Tuesday to Saturday). Each is equally likely to visit the shop on any day as on another day. What is the probability that both will visit the shop on
(i) the same day?(ii)consecutive days?(iii)different days?

3. A box contains 12 balls out of which x are black. If one ball is drawn at random from the box, what is the probability that it will be a black ball? If 6 more black balls are put in the box, the probability of drawing a black ball is now double of what it was before. Find x.

4. A jar contains 24 marbles, some are green and others are blue. If a marble is drawn at random from the jar, the probability that it is green is 2/3 · Find the number of blue balls in the jar.

5. A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random

from the box, find the probability that it bears
(i) a two-digit number (ii) a perfect square number (iii) a number divisible by 5.

6. (i) A lot of 20 bulbs contain 4 defective ones. One bulb is drawn at random from the lot. What is the probability that this bulb is defective?
(ii)Suppose the bulb drawn in (i) is not defective and is not replaced. Now one bulb is drawn at random from the rest. What is the probability that this bulb is not defective ?

7. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting
(i)a king of red colour (ii)a face card (iii)a red face card (iv) the jack of hearts (v)a spade (vi)the queen of diamonds.

8. Five cards—the ten, jack, queen, king and ace of diamonds, are well-shuffled with their face downwards. One card is then picked up at random.
(i)What is the probability that the card is the queen?
(ii) If the queen is drawn and put aside, what is the probability that the second card picked up is (a) an ace? (b) a queen?

CASE STUDY (4 MARKS)

1. Two die are thrown simultaneously

i. Find the probability of getting 2 sixes

ii. Find the probability of getting a sum of eleven.

iii. Given that no die ever show the same number when rolled find probability of getting a sum of 4.

iv. What is the probability of getting exactly same numbers on the die rolled.

2. 3 Coins are tossed simultaneously.

i. Find the probability of getting at least 2 heads.

ii. Find the probability of getting at most 2 heads.

iii. Find the probability of getting at 2 heads and 1 tails.

iv. Find the probability of getting all Tails.

LIMITS AND DERIVATIVES

MCQ(1 Marks)

1. Evaluate the Limit $\frac{\cos\cos 5x-\cos\cos 7x}{\cos\cos x-\cos\cos 5x}$

a. 1 b. π/2 c. 0 d. dose not exist

2. Evaluate the Limit $\frac{\frac{1}{x}+\frac{1}{2}}{x+2}$

a. 2 b. $-1/4$ c. 0 d. 1

3. Evaluate the Limit $\frac{x^2-1}{x^2+3x-4}$

a. 1/5 b. 2/5 c. 3/5 d. 4/5

4. Evaluate the Limit $\frac{x-4}{x^2-x-12}$

a. undefined b. 0 c. 3/7 d. 1/7

5. Evaluate the Limit $\frac{\tan\tan x}{x}$

a. undefined b. 0 c. π/180 d. 2π/7

6. Evaluate the Limit $\frac{sin^{-1}x}{x}$

a. undefined b. 0 c.1 d. -1

7. Evaluate the Limit $\frac{x^2-a^2}{x-a}$

a. a b. 2a c. 0 d. dose not exist

8. Evaluate the Limit $\frac{e^{5x}-1}{3x}$

a. 1/5 b. 2/5 c. 3/5 d. dose not exist

9. Evaluate the Limit $\frac{e^{\log\log x}-1}{e^{x-1}-1}$

a. 1 b. 0 c. e d. -1

10. Evaluate the Limit $\frac{5^x-4^x}{x}$

a. ln(3/4) b. ln(5/4) c. ln 5 d. -1

11. Find the Derivative of the following function w.r.t x
y=Sin(2x)

a. 2sin 2x b. 2cos 2x c. cos2x d. tan2x

12. Find the Derivative of the following function w.r.t x
y=x^{100}

a. $100x^{99}$ b. 99x c. 100x d. $99x^{100}$

13. Find the Derivative of the following function w.r.t x

$$y=\frac{x^3-4x+3}{x-1}$$

a. 2x−1 b. 2x+1 c. 1−2x d. 2x

14. Find the Derivative of the following function w.r.t x

$$y=x+\frac{x^3}{3}+\frac{x^5}{5}+\frac{x^7}{7}\ldots\ldots\ldots$$

a. $\frac{1}{1-x^2}$ b. $\frac{1+x}{1-x^2}$ c. $\frac{x}{1-x^2}$ d. $\frac{-1}{1-x^2}$

15. Assertion: Derivative of a function gives tangent to the curve

Reason: Derivative of a function gives normal to the curve

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

14. Assertion: Derivatives exist only when limits exist.

Reason: Limits exist but derivative may not exist.

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.

d) Assertion is false but Reason is true.

VSAQ(2 Marks)

1. Evaluate the following Limit

$$\frac{x^2+5x-6}{x^2-3x+2}$$

2. Evaluate the following Limit

$$\frac{\sqrt{1+x^2}-\sqrt{1+x}}{\sqrt{1+x^3}-\sqrt{1+x}}$$

3. Evaluate the following Limit

$$e^{\frac{1}{x^2}+2}$$

4. Evaluate the following Limit

$$\frac{2x-\pi}{\cos\cos x}$$

5. Evaluate the following Limit

$$\frac{\cos ax-\cos\cos bx}{x^2}$$

6. Evaluate the following Limit

$$\frac{1+\cos\cos x}{\pi-x}$$

7. Evaluate the following Limit

$$\frac{e^{ax}-1}{\sin\sin bx}$$

8. Find the Derivative of the following function w.r.t x using 1st Principle

y = lox x

9. Find the Derivative of the following function w.r.t x using 1st Principle

y= $\sqrt{x}$

10. Find the Derivative of the following function w.r.t x using 1st Principle

y = cos x

11. Find the Derivative of the following function w.r.t x using 1st Principle

y = cot x

12. Find the Derivative of the following function w.r.t x using 1st Principle

y = cosec x

13. Find the Derivative of the following function w.r.t x using 1st Principle

y = tan $tan\ x$

14. Find the Derivative of the following function w.r.t x using 1st Principle

y= cot x

SAQ(3 Marks)

1. Evaluate the following Limit

$$\frac{1^2+2^2+3^2+\ldots n^2}{n^3}$$

2. Evaluate the following Limit

$$x\ cos\frac{1}{x}$$

3. Evaluate the following Limit

$$\frac{ae^x+be^{-x}}{ce^x+de^{-x}}$$

4. Evaluate the following Limit

$$\frac{\text{tan}tan\ x-\text{sin}sin\ x}{x^3}$$

5. Find the Derivative of the following function w.r.t x

$$y = \frac{\text{cot}cot\ x+cosec\ x}{\text{cot}cot\ x-cosec\ x}$$

6. Find the Derivative of the following function w.r.t x

$$y = \frac{x+cos\ x}{x-sin\ x}$$

7. $y = \frac{\text{sin}sin\ x}{\text{log}log\ x}$

8. y = (sin x + sec x)(cos x + cosec x)

9. y = $x^3 log x$

10. y = x $\frac{e^x+e^{3x}}{e^x+e^{-x}}$

11. y = $\frac{tan\, x}{x} log(\frac{e^x}{x^x})$

12. y = xsec x log(xe^x)

LAQ(5 Marks)

1. y = x|x| show that y' = 2 |x|

2. Find the Derivative of the following function w.r.t x using 1st Principle

y = cosec 3x

3. Find the Derivative of the following function w.r.t x using 1st Principle

y = $tan^{-1} x$

4. Find the Derivative of the following function w.r.t x using 1st Principle

y = $\sqrt{cot\, cot\, x}$

5. Find the Derivative of the following function w.r.t x using 1st Principle

y = cos log x

6. Find the Derivative of the following function w.r.t x using 1st Principle

y = sin(x^2)

7. Find the Derivative of the following function w.r.t x

$$y = \sqrt{3}x - \sqrt{\frac{3}{x}} + \frac{x+6}{6-x} \text{ at } x = 3$$

8. Find the Derivative of the following function w.r.t x

$$y = \frac{x+\cos x}{x^2 \log \log x}$$

9. Find the Derivative of the following function w.r.t x

$$y = \frac{2x - \cos 2x}{x + \cos 2x}$$

10. $y = \frac{x}{x+4}$ P.T $x\frac{dy}{dx} + y(y-1) = 0$

CASE STUDY (4 Marks)

1. A student travelling in a bus to his destination records the reading of the milestone at fixed time Intervals. He decided to measure the velocity of the bus by deriving the displacement time equation as the bus had only moved along the highway.
He derives the following equation.
$x = t^3 - \frac{1}{t}$ (where x= distance travelled, t=time)

i. Find the instantaneous velocity equation.
ii. Find the instantaneous acceleration equation.
iii. Find the derivative of the following function y= sin x log x
iv. Prove that the $\frac{\sin x}{x} = 1$

2. Derivative can be interpreted as Rate of Change. Keeping the following idea in mind answer the following questions.
i. Rate of change of the Area of circle with respect to its radius at r = 6 cm.
ii. Rate of change of the Volume of Sphere with respect to its radius at r = 6 cm.
iii. Rate of change of the Volume of a cone with respect to its radius at r = 6 cm.(h= constant)

iv. y = tan v, x = cot v. Find $\frac{dy}{dx}$

CONIC SECTIONS

MCQ (1 Marks)

1. The sections cut by a plane on a right circular cone are called as _____
   a) Parabolic sections b) Conic sections
   c) Elliptical sections d) Hyperbolic sections

2. Which of the following is a conic section?
   a) Circle b) Rectangle c) Triangle d) Square

3. While cutting, if the plane is at an angle and it cuts all the generators, then the conic formed is called as _____

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

4. When the plane cuts the cone at angle parallel to the axis of the cone, then ____ is formed.

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

5. The locus of point moving in a plane such that the distance between a fixed point and a fixed straight line is constant is called as _____
   a) Circle b) Rectangle c) Square d) Parabola

6. Which of the following conics has an eccentricity of unity?
   a) Circle b) Parabola c) Hyperbola d) Ellipse

7. Which of the following has an eccentricity less than one?
   a) Circle b) Parabola c) Hyperbola d) Ellipse

8. If the distance from the focus is 10 units and the distance from the directrix is 30 units, then what is the eccentricity?
   a) 0.3333 b) 0.8333 c) 1.6667 d) 0.0333

9. If the value of eccentricity is 12, then what is the name of the conic?
   a) Ellipse b) Hyperbola c) Parabola d) Circle

10. If the distance from the focus is 2 mm and the distance from the directrix is 0.5 mm then what

is the name of the conic section?

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

11. What is the eccentricity of an ellipse?

A. $0 < e < 1$ B. $e > 1$ C. $e < 1$ D. $e = 1$

12. Find the equation of circle with center at origin and radius 5 units.

a) $x^2+y^2=25$ b) $x^2+y^2=5$ c) $x^2=25$ d) $y^2=25$

13. Find the equation of circle with center at (2, 5) and radius 5 units.

a) $x^2+y^2+4x-10y+4=0$ b) $x^2+y^2-4x-10y+4=0$

c) $x^2+y^2+4x+10y+4=0$ d) $x^2+y^2+4x-10y-4=0$

14. Find the equation of circle which pass through (5, 9) and center at (2, 5).

a) $x^2+y^2+4x-10y+4=0$ b) $x^2+y^2-4x-10y+4=0$

c) $x^2+y^2+4x+10y+4=0$ d) $x^2+y^2+4x-10y-4=0$

15. Find the coordinates of foci of ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1$

a) (±3,0) b) (±4,0) c) (0,±3) d) (0,±4)

16. What is major axis length for ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1$

a) 5 units b) 4 units c) 8 units d) 10 units

17. What is equation of latus rectums of ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1$

a) x=±3 b) y=±3 c) x=±2 d) y=±2

18. Find the equation of directrix of parabola $x^2=100y$.

a) x=25 b) x=-25 c) y=-25 d) y=25

19. Find the equation of directrix of parabola $x^2=-100y$.

a) x=25 b) x=-25 c) y=-25 d) y=25

20. Find the equation of axis of the parabola $y^2=24x$.

a) x=0 b) x=6 c) y=6 d) y=0

21. Find the length of latus rectum of the parabola $y^2=40x$.

a) 4 units b) 10 units c) 40 units d) 80 units

22. Assertion: The eccentricity of Circle is 0

Reason: As the a and b of circle are its radius and equal

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

23. Assertion: The asymptotes of hyperbola are tangents

Reason: Asymptotes meet Hyperbola at infinity.

a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
c) Assertion is true and Reason is false.
d) Assertion is false but Reason is true.

VSAQ(2 Marks)

1. Find the coordinates of foci of hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 1$

2. What is eccentricity for $\frac{x^2}{9} - \frac{y^2}{16} = 1$

3. What is transverse axis length for hyperbola $\frac{x^2}{16} - \frac{y^2}{25} = 1$

4. What is equation of latus rectums of ellipse $\frac{x^2}{16} + \frac{y^2}{25} = 1$

5. Find the equation of circle which pass through (5, 9) and center at (2, 5).

6. Find the center of the circle with equation $x^2 + y^2 - 4x - 10y + 4 = 0$.

7. If a circle pass through (2, 0) and (0, 4) and center at x-axis then find the radius of the circle.

8. If a circle pass through (4, 0) and (0, 2) and center at y-axis then find the radius of the circle.

9. Find the equations of the directrix & the axis of the parabola $3x^2$=8y

10. Find the coordinates of the foci of the ellipse $x^2 + 4y^2 = 100$

SAQ(3 Marks)

1. Find the equation of the circle passing through (0,0) and making intercepts a and b on the coordinate axes.

2. Find the equation of a circle with centre (2,2) and passes through the point (4,5).

3. Does the point (–2.5, 3.5) lie inside, outside or on the circle $x^2 + y^2 = 25$?

4. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum for the following parabola.

$y^2 = 10x$

5. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum for the following hyperbola.

$\frac{x^2}{9} - \frac{y^2}{16} = 1$

6. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum for the following Ellipse.

$\frac{x^2}{16} + \frac{y^2}{25} = 1$

7. Find the equation of the ellipse, whose length of the major axis is 20 and foci are (0, ± 5)
8. Find the equation of the ellipse, with major axis along the x-axis and passing through the points (4, 3) and (– 1,4).
9. Find the equation of the ellipse Centre at (0,0), major axis on the y-axis and passes through the points (3, 2) and (1,6).
10. Find the coordinates of the foci and the vertices, the eccentricity,the length of the latus rectum of the hyperbola

$\frac{x^2}{100} - \frac{y^2}{196} = 1$

LAQ(5 Marks)

1. The focus of a parabolic mirror as shown in is at a distance of 5 cm from its vertex. If the mirror is 45 cm deep, find the distance AB at its edges.
2. A beam is supported at its ends by supports which are 12 metres apart. Since the load is concentrated at its centre, there is a deflection of 3 cm at the centre and the deflected beam is in the shape of a parabola. How far from the centre is the deflection 1 cm?
3. A rod AB of length 15 cm rests in between two coordinate axes in such a way that 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. Show that the locus of P is an ellipse.
4. An arch is in the form of a parabola with its axis vertical. The arch is 10 m high and 5 m wide at the base. How wide is it 2 m from the vertex of the parabola?
5. The cable of a uniformly loaded suspension bridge hangs in the form of a parabola. The roadway which is horizontal and 100 m long is supported by vertical wires attached to the cable, the longest wire being 30 m and the shortest being 6 m. Find the length of a supporting wire attached to the roadway 18 m from the middle.

6. An arch is in the form of a semi-ellipse. It is 8 m wide and 2 m high at the centre. Find the height of the arch at a point 1.5 m from one end.

7. Find the lengths of the axis , the coordinates of the vertices & the foci the eccentricity & length of the lat us rectum of the hyperbola $25x^2 - 9y^2 = 225$

CASE STUDY(4 Marks)

1. A rod of length 12 cm moves with its ends always touching the coordinate axes. Determine the equation of the locus of a point P on the rod, which is 3 cm from the end in contact with the x-axis.

2. A man running a racecourse notes that the sum of the distances from the two flag posts from him is always 10 m and the distance between the flag posts is 8 m. Find the equation of the path traced by the man.

3. An equilateral triangle is inscribed in the parabola y 2 = 4 ax, where one vertex is at the vertex of the parabola. Find the length of the sides of the triangle.

3D GEOMETRY

MCQ (1 Marks)

1. The point (4, 0, 0) lie on _____

   a) X-axis b) Y-axis c) Z-axis d) Y-Z plane

2. Find the distance of point (2, 3, 5) from Y-Z plane.

   a) 2 units b) 3 units c) 5 units d) 1 unit

3. The point (3, 0, 4) lie on _____

   a) X-Y plane b) Y-Z plane c) X-Z plane d) X-axis

4. Find the distance of point (2, 3, 5) from X-Y plane.

   a) 2 units b) 3 units c) 5 units d) 1 unit

5. 3-D geometry has _____ octants.

   a) 1 b) 2 c) 4 d) 8

6. In which octant does the point (-1, – 5, -7) lies?

   a) 1^{st} b) 2^{nd} c) 6^{th} d) 7^{th}

7. Find midpoint of (1, 4, 6) and (5, 8, 10).
   a) (6, 12, 8) b) (3, 6, 8) c) (1, 9, 12) d) (4, 9, 12)

8. The coordinates of a point dividing the line segment joining (1, 2, 3) and (4, 5, 6) internally in the ratio 2:1 is _____
   a) (3, 4, 5) b) (5, 4, 3) c) (5, 3, 4) d) (4, 5, 3)

9. In which ratio (3, 4, 5) divides the line segment joining (1, 2, 3) and (4, 5, 6) internally?
   a) 1:2 b) 2:1 c) 3:4 d) 4:3

10. The coordinates of a point dividing the line segment joining (1, 2, 3) and (4, 5, 6) externally in the ratio 2:1 is _____
   a) (4, 5, 6) b) (6, 8, 9) c) (7, 8, 9) d) (8, 6, 4)

VSAQ (2 Marks)

1. Find the distance between two points (5, 6, 7) and (2, 6, 3)
2. The three points A (1, 2, 3), B (3, 1, 2), C (2, 3, 1) form _____ triangle
3. The three points A (3, 0, 3), B (5, 3, 2), C (6, 5, 5) form_____ triangle
4. The three points A (7, 0, 10), B (6, -1, 6), C (9, -4, 6) form_____ triangle
5. The points A (1, 2, -1), B (5, -2, 1), C (8, -7, 4), D (4, -3, 2) form
6. Name the octants in which the following points lie: (1, 2, 3), (4, –2, 3), (4, –2, –5), (4, 2, –5),
7. Name the octants in which the following points lie: (– 4, 2, –5), (– 4, 2, 5), (–3, –1, 6) (– 2, – 4, –7).
8. Find the octant in which the points (–3,1,2) and (–3,1,– 2) lie
9. Find the distance between the points P(1, –3, 4) and Q (– 4, 1, 2).
10. Show that the points P (–2, 3, 5), Q (1, 2, 3) and R (7, 0, –1) are collinear.

SAQ (3 Marks)

1. Are the points A (3, 6, 9), B (10, 20, 30) and C (25, – 41, 5), the vertices of a right angled triangle?
2. Find the equation of set of points P such that PA2 + PB2 = 2k 2 , where A and B are the points (3, 4, 5) and (–1, 3, –7), respectively.
3. Prove that (0, 7, –10), (1, 6, – 6) and (4, 9, – 6) are the vertices of an isosceles triangle.
4. Find the equation of the set of points which are equidistant from the points (1, 2, 3) and (3, 2, –1).
5. Find the equation of the set of points P, the sum of whose distances from A (4, 0, 0) and B (– 4, 0, 0) is equal to 10.
6. Find the equation of the set of the points P such that its distances from the points

A (3, 4, –5) and B (– 2, 1, 4) are equal.

7. The centroid of a triangle ABC is at the 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.

LAQ (5 Marks)

1. Three vertices of a parallelogram ABCD are A(3, – 1, 2), B (1, 2, – 4) and C (– 1, 1, 2). Find the coordinates of the fourth vertex.
2. Find the lengths of the medians of the triangle with vertices A (0, 0, 6), B (0,4, 0) and (6, 0, 0).
3. 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 and c.
4. Show that the points A (1, 2, 3), B (–1, –2, –1), C (2, 3, 2) and D (4, 7, 6) are the vertices of a parallelogram ABCD, but it is not a rectangle.

CASE STUDY (4 Marks)

1. Show that the points A (1, 2, 3), B (–1, –2, –1), C (2, 3, 2) and D (4, 7, 6) are the vertices of a parallelogram ABCD, but it is not a rectangle. Find the length of the diagonals. Find the point of intersection of the diagonals.

STATISTICS

MCQ(1 Marks)

1. Find the mean deviation about the median of the scores of a batsman given below.

Innings	Scores
1	20
2	56
3	0
4	84
5	11
6	120

a) 10 b) 10.5 c) 11 d) 9

2. What is the mean deviation from the mean for the following data?

117	156	206	198	223

a) 0 b) 3 c) 1 d) ½

3. The mean deviation of an ungrouped data is 150. If each observation is increased by 3.5%, then what is the new mean deviation?
a) 153.5 b) 3.5 c) 155.25 d) 150

4. Find the mean deviation about mean from the following data:

x_i	3	5	20	25	27
f_i	5	12	20	8	15

a) 7.7 b) 15 c) 8.7 d) 6.2

5. What is the geometric mean of $5,5^2, \ldots,5^n$?
a) $5^{n/2}$ b) $5^{(n+1)/2}$ c) $5^{n(n+1)/2}$ d) 5^n

6. In a class there are 20 juniors, 15 seniors and 5 graduate students. If the junior averaged 65 in the midterm exam, the senior averaged 70 and the graduate students averaged 91, then what is the mean of the centre class approximately?
a) 71 b) 74 c) 70 d) 72

7. Find the variance of the observation values taken in the lab.

4.2	4.3	4	4.1

a) 0.27 b) 0.28 c) 0.3 d) 0.31

8. If the standard deviation of a data is 0.012. Find the variance.
   a) 0.144 b) 0.00144 c) 0.000144 d) 0.0000144

9. Assertion: Mean of grouped data is an approximation

   Reason: Standard Deviation helps us in measuring the deviation from actual mean.

   a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
   b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
   c) Assertion is true and Reason is false.
   d) Assertion is false but Reason is true.

10. Assertion: Range is the difference between highest vale and the lowest value.

   Reason: Range helps us in understanding the deviation of data about its extreme.

   a) Assertion is true and Reason is true . Reason is correct explanation for Assertion.
   b) Assertion is true and Reason is true . Reason is not the correct explanation for Assertion.
   c) Assertion is true and Reason is false.
   d) Assertion is false but Reason is true.

VSAQ(2 Marks)

1. The mean of two samples of the sizes 250 and 320 were found to be 20,12 respectively. Their standard deviations were 2 & 5, respectively. Find the variance of combined sample of size 650.
2. Find the variance of the first 10 natural numbers.
3. If the standard deviation of the numbers 2, 4, 5 & 6 is a constant a, then find the standard deviation of the numbers 4, 6, 7 & 8.
4. Assuming the variance of four numbers w, x, y, and z as 9. Find the variance of 5w, 5x, 5y and 5z.

5. A fisherman is weighing each of 50 fishes. Their mean weight worked out is 50 gm and a standard deviation of 2.5 gm. Later it was found that the measuring scale was misaligned and always under reported every fish weight by 2.5 gm. Find the mean and standard deviation of fishes.

6. If the S.D. is a set of observations is 4 and if each observation is divided by 4, find the S.D. of the new observations.
7. The mean and Standard deviation of a sample were found to be 9.5 and 2.5, respectively. Later, an additional observation 15 was added to the original data. Find the S.D. of the 11 observation.
8. What is the Median of the following data sample?
   2, 7, 4, 8, 9, 10, 6, 12, 13
9. Find the Median of the following grouped data.

Marks	Frequency
0-10	9
10-20	10
20-30	24
30-40	16
40-50	11

10. Find the Median of given Grouped data.

Rating	Frequency
0-5	12
5-10	20
10-15	10
15-20	6

SAQ(3 Marks)

1. From the table given below, what is mean of marks obtained by 20 students?

Marks x_i	**No. of Students f_i**
3	1
4	2
5	2
6	4
7	5
8	3
9	2
10	1
Total	**20**

2. Height of 7 students (in cm) is given below. If the mean of height of 7 students is 165, what is the value of x?
   168 170 x 160 162 164 162

3. Find the mean deviation about the mean for the following data: 6, 7, 10, 12, 13, 4, 8, 12

4. Find the mean deviation about the median for the following data: 3, 9, 5, 3, 12, 10, 18, 4, 7, 19, 21.

5. Find the mean deviation about the median for the following data:

X_i	3	6	9	12	13	15	21	22
f_i	3	4	5	2	4	5	4	3

6. Find the mean deviation about the mean for the following data.

Marks obtained	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Number of Students	2	3	8	14	8	3	2	1

LAQ(5 Marks)

1. Calculate the mean deviation about median for the following data :

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	2	4	5	10	11	7	8	4

2. Find the mean deviation about the mean for the data in

Income/day	0-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800
Number of persons	4	8	9	10	7	5	4	4

3. Find the variance of the following data: 6, 8, 10, 12, 14, 16, 18, 20, 22, 24. Form a table.

4. Find the variance and standard deviation for the following data:

X_i	4	8	11	17	20	24	32	34
Frequency	3	5	9	5	4	3	2	1

5. Calculate the mean, variance and standard deviation for the following distribution :

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

CASE STUDY(4 MARKS)

1. Find the mean , mean deviation about median, variance and standard deviation for the following frequency distributions

Classes	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110
Frequency	3	7	12	15	8	3	2	1

2. Find the mean , mean deviation about median, variance and standard deviation for the following frequency distributions

3.

Height in cms	70-75	75-80	80-85	85-90	90-95	95-100	100-105	105-110	110-115
Number of Children	3	4	7	7	15	9	6	6	3

The mean and standard deviation of 20 observations are found to be 10 and 2, respectively. On rechecking, it was found that an observation 8 was incorrect. Calculate the correct mean and standard deviation in each of the following cases: (i) If wrong item is omitted.
(ii) If it is replaced by 12