SECTION A

1. Choose the correct option: **1X6=6**

  1) A set is defined a:

    a) Collection of an object   b) Collection of well defined object

    c) Nothing can be said   d) None of these

  2) If A and B are any two sets, then A-B is equal to:

    a) $A \cap B$ b) $A \cap B'$ c) $A' \cap B$ d) $A' \cap B'$

  3) If A = { 1, 2, 3 }, B = { x, y }, then the number of relations that can be defined from A to B is:

    a) 2×3 b) 2^3 c) 3^2 d) 2^6

  4) If $A = \{2,4,5\}, B = \{7,8,9\}$, then $n(A \times B) =$

    a) 6   b) 9   c) 3   d) 0

  5) Distance of a point (3,4,5) from Z – axis is

    a) 3   b) 4   c) 5   d) None of these

  6) The value of cos 1 °cos 2 °cos 3 ° .... cos 179 ° is:

    a) 0   b) 1   c) −1   d) None of these

2. Write True/False in the following statements: **1X5=5**

  1) For a non-empty set A, $A \cap A' = A'$.

  2) Power set of empty set is also empty.

  3) The relation $\{(2,1),(3,2),(4,3),(5,4)\}$ is not a function.

  4) Three mutually perpendicular planes divide the space into 8 octants.

  5) Coordinate of x on YZ-plane is 0.

3. Fill in the blanks: **1X6=6**

  1) If $A = \{1,2,3,4,5\}$, then the number of subsets are ....

  2) If $A = \emptyset$, then the number of elements in $P(A)$ will be ....

  3) Range of the function $f = \{(2,1),(3,1),(4,1),(5,1)\}$ is ....

  4) Point $(-2,5,-3)$ lies in .... octant.

  5) Distance between the points $(-1,3,-4)$ and $(1,-3,4)$ is ....

  6) Distance of a point (2, 6, 8) from XOY plane is ....

4. Match the column:-   **1x5=5**

  i. Cos 2x   a. $\frac{2\tan x}{1+\tan^2 x}$

  ii. $\sqrt{\frac{1-\cos 2x}{1+\cos +2x}}$ b. $\frac{1-\tan^2 x}{1+\tan^2 x}$

  iii. sin 2x   c. tan x

  iv. tan 2x   d. $\frac{1-\tan x}{1+\tan x}$

  v. $\tan\left(\frac{\pi}{4} - x\right)$ e. $\frac{2\tan x}{1-\tan^2 x}$

5. Match the column:-   **1x6=6**

  1. sin 765°   (a) $\frac{\sqrt{3}}{2}$

  2. cosec (−1410°)   (b) $\sqrt{3}$

  3. $\tan \frac{19\pi}{3}$ (c) 2

  4. $\sin\left(-\frac{11\pi}{3}\right)$ (d) 0

  5. $\cot\left(-\frac{15\pi}{4}\right)$ (e) $\frac{1}{\sqrt{2}}$

  6. cos (−1710°)   (f) 1

6. Write answer in one word: **1X4=4**

  1) Write the range of the function if $f(x) = -|x|$.

2) Domain of $f(x) = \sqrt{9 - x^2}$

3) Distance of a point (3, 4, 5) from origin.

4) Find the mid-point of the line segment joining the points $(-3, 4, -8)$ and $(5, -6, 4)$.

SECTION B (2 marks each)

7. Write the solution set of the equation $x^2 + 7x - 8 = 0$.

OR If X and Y are two sets, n(X)=17, n(Y)=23 and n(X∪Y)=38, then find n(X∩Y).

8. If A= $\{-1,1\}$, find A X A X A.

OR Let A= $\{1,2\}$ and B= $\{3,4\}$ Write A X B. How many subsets will A X B have? List them.

9. Find the domain and range of real function $f(x) = \sqrt{x - 1}$.

OR Let A= $\{9,10,11,12,13\}$ and let $f : A \to N$ be defined by $f(n)$= the highest prime factor of n. Find the range of f.

10. Draw the graph of the function. $f(x) = |x|$ **OR** $f(x) = x^3$.

11. Draw the range of the function: $f(x) = 2 - 3x, x \in R, x > 0$ **OR** $f(x) = x^2 + 2, x \in R$

12. Find the value of $\tan 15°$.

OR Prove that: $\frac{\sin x - \sin 3x}{\sin^2 x - \cos^2 x} = 2 \sin x$.

13. Find the radian measure of $40°20'$.

OR Find the degree measure of 6 radian.

14. Given that $P(3, 2, -4), Q(5, 4, -6)$ and $R(9, 8, -10)$ are collinear. Find the ratio in which Q divides PR.

OR In which ratio the point $(1, 1, 1)$ divides the line joining the points $(3, -2, 4)$ & $(-1, 4, 2)$

15. Find the distance between the points: $(-3, 7, 2)$ and $(2, 4, -1)$ **OR** $(2, 3, 5)$ and $(4, 3, 1)$

16. Find the value of $\cot^2 \frac{\pi}{6} + cosec \frac{5\pi}{6} + 3\tan^2 \frac{\pi}{6}$ **OR** $2 \sin^2 \frac{3\pi}{4} + 2\cos^2 \frac{\pi}{4} + 2sec^2 \frac{\pi}{3}$

SECTION C (3 marks each)

17. Let U = $\{1,2,3,4,5,6\}$, A = $\{2,3\}$, B = $\{3,4,5\}$, Find $A', B', A' \cap B', A \cup B, (A \cup B)', (A \cap B)'$.

OR If A and B are sets and U is the universal set such that n(U)= 700, n(A)= 200, n(B)= 300 and n(A∩B)= 100. Find n($A' \cap B'$).

18. The function f is defined by $f(x) = sgn(x)$. Draw the graph and also write its domain and range

OR Draw the graph of $f(x) = \frac{1}{x}$ and also write its domain and range.

19. A wheel makes 360 revolutions in 1 minute, then how many radians measure of an angle does it turn in 1 sec.

OR In a circle of diameter 40 cm, the length of chord is 20cm, then find the length of minor arc of the chord.

20. 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.

OR 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. https://www.mpboardonline.com

SECTION D (4 marks each)

21. There are 200 individuals with a skin disorder, 120 had been exposed to chemical C1, 50 to chemical C2 and 30 to both the chemicals C1 and C2. Find the number of individuals exposed to

(i) Chemical C1 but not chemical C2   (ii) Chemical C2 but not chemical C1

(iii) Chemical C1 or chemical C2   (iv) Neither chemical C1 nor chemical C2

OR 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 (i) the number of people who read at least one of the newspapers. (ii) the number of people who read exactly one newspaper.

22. Prove that: $\cos^2 x + \cos^2 \left(x + \frac{\pi}{3}\right) + \cos^2 \left(x - \frac{\pi}{3}\right) = \frac{3}{2}$.

OR If $\tan x = \frac{3}{4}, \pi < x < \frac{3\pi}{2}$, find the value of $\sin \frac{x}{2}, \cos \frac{x}{2}$ and $\tan \frac{x}{2}$.

23. Prove the following by using the principle of M.I. for all $n \in N$.

$10^{2n-1} + 1$ is divisible by 11   OR $P(n): \frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \cdots \ldots \ldots \ldots + \frac{1}{(3n-2)(3n+1)} = \frac{n}{(3n+1)}$

24. Find the coordinates of a point on Y-axis which are at a distance of $5\sqrt{2}$ from the point $P(3, -2, 5)$.

OR Find the ratio in which the YZ-plane divides the line segment formed by joining the points $(-2,4,7)$ and $(3, -5, 8)$.