

I. Choose The Correct Answer:

1. For any two sets P and Q, $P \cap Q$ is
 A) $\{x : x \in P \text{ or } x \in Q\}$ B) $\{x : x \in P \text{ and } x \notin Q\}$ C) $\{x : x \in P \text{ and } x \in Q\}$ D) $\{x : x \notin P \text{ and } x \in Q\}$
2. If a, b, c are in G.P, then $\frac{a-b}{b-c}$ is equal to
 A) a/b B) a/c C) b/a D) c/b
3. If $1 + 2 + 3 + \dots + n = k$ then $1^3 + 2^3 + 3^3 + \dots + n^3$ is equal to
 A) $\frac{k(k+1)}{2}$ B) $(k+1)^3$ C) k^2 D) k^3
4. The square root of $x^2 + y^2 + z^2 - 2xy + 2yz - 2zx$
 A) $|x + y + z|$ B) $|x + y - z|$ C) $|x - y - z|$ D) $|x - y + z|$
5. The G.C.D of $(x^3 + 1)$ and $x^4 - 1$ is
 A) $x^3 + 1$ B) $x - 1$ C) $x + 1$ D) $x^3 - 1$
6. A is of order $m \times n$ and B is of order $p \times q$, addition of A and B is possible only if
 A) $n = p$ B) $m = p, n = q$ C) $m = p$ D) $n = q$
7. Slope of the line joining the points (3, 2) and (-1, a) is $-3/2$, then the value of a is
 A) 3 B) 4 C) 1 D) 2
8. The equation of the straight line passing through the origin and perpendicular to the straight line $2x + 3y - 7 = 0$ is
 A) $y + 5 = 0$ B) $2x + 3y = 0$ C) $3x - 2y = 0$ D) $y - 5 = 0$
9. The areas of two similar triangles are 16cm^2 and 36cm^2 respectively. If the altitude of the first triangle is 3cm, then the corresponding altitude of the other triangle is
 A) 6.5cm B) 6cm C) 4cm D) 4.5cm
10. In ΔABC is right angled triangle where angle $B = 90^\circ$ and BD perpendicular to AC. If $BD = 8$ cm, $AD = 4$ cm, then CD is
 A) 24 cm B) 16 cm C) 32 cm D) 38 cm
11. A man is 28.5m away from a tower. His eye level above the ground is 1.5m. The angle of elevation of the tower from his is 45° . Then the height of the tower is
 A) 30m B) 27.5m C) 28.5m D) 27m
12. $9\tan^2\theta - 9\sec^2\theta =$
 A) 1 B) 0 C) 9 D) -9
13. Curved surface area of a solid sphere is 24cm^2 . If the sphere is divided into two hemispheres, then the total surface area of one of the hemispheres is
 A) 12cm^2 B) 8cm^2 C) 16cm^2 D) 18cm^2
14. If the variance of a data is 12.25, then the S.D is
 A) 3 B) 2.5 C) 3.5 D) 3.25
15. If A and B are mutually exclusive events and S is the sample space such that $p(A) = \frac{1}{3}$, $p(B) = \frac{1}{3}$ and $S = A \cup B$, Then $p(A) =$
 A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) $\frac{3}{4}$ D) $\frac{3}{8}$

II. Answer any 9 out of 14 (Q.NO:16 to 29) and 30th question is compulsory:

10X2 = 20

16. If $A \subset B$, then find $A \cap B$ and $A \setminus B$ (Use venn diagram)

17. Given $n(A) = 285$, $n(B) = 195$, $n(U) = 500$, $n(A \cup B) = 410$, Find $n(A' \cup B')$.

18. A geometric series consists four terms and has a positive common ratio. The sum of the first two terms is 9 and sum of the last two terms is 36. Find the series.
19. The sum of three consecutive odd numbers is 45. Find the numbers.
20. Prove that $A = \begin{pmatrix} 5 & 2 \\ 7 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 3 & -2 \\ -7 & 5 \end{pmatrix}$ are inverse to each other under matrix multiplication
21. Solve for x and y if $\begin{pmatrix} x^2 \\ y^2 \end{pmatrix} + 3 \begin{pmatrix} 2x \\ -y \end{pmatrix} = \begin{pmatrix} -9 \\ 4 \end{pmatrix}$
22. If p(x, y) is any point on the line segment joining the points (a, 0) and (0, b), then prove that $\frac{x}{a} + \frac{y}{b} = 1$
23. Find the equation of the line through the point (-5, 2) and parallel to the line joining the points A(12, -2) and B(-4, -10).
24. The points D, E and F are taken on the sides AB, BC and CA of a ΔABC , such that $DE \parallel AC$ and $FE \parallel AB$.
Prove that $\frac{AB}{AD} = \frac{AC}{FC}$
25. Prove that $\sqrt{\frac{1 - \sin\theta}{1 + \sin\theta}} = \sec\theta - \tan\theta$
26. A ladder leaning against a vertical wall makes an angle of 60° with the ground. The foot of the ladder is 3.5 m away from the wall. Find the length of the ladder.
27. The central angle and radius of a sector of a circular disc are 180° and 21 cm. If the edges of the sector are joined together to make a hollow cone, then find the radius of the cone.
28. The outer and inner radii of a hollow sphere are 12 cm and 10 cm. Find its volume.
29. A box contains 4 Green, 5 Blue and 3 Red balls. A ball is drawn at random. Find the probability that the selected ball is
i) Red in colour ii) not Green in colour
30. a) Find the square root of $x^2 + 4(x + 2) - 4$
(OR)
b) Find the standard deviation of the first 10 natural number.

III. Answer any 8 out of 14 (Q.NO:31 to 44) and 45th question is compulsory:

9X5 = 45

31. Using Venn diagram verify $A \setminus (B \cap C) = (A \setminus B) \cup (A \setminus C)$.
32. A function $f: [-7, 6] \rightarrow \mathbb{R}$ is defined as follows

$$F(x) = \begin{cases} X^2 + 2x + 1: & -7 \leq x < -5 \\ X + 5: & -5 \leq x \leq 2 \\ X - 1: & 2 < x < 6 \end{cases}$$
 Find i) $2f(-4) + 3f(2)$ ii) $\frac{4f(-3) + 2f(4)}{f(-6) - 3f(1)}$ iii) $f(-7) - f(-3)$
33. The digits of a 3-digit positive integer are in A.P. and their sum is 15. The number obtained by reversing the digits is 594 less than the original number. Find the number.

34. If s_1, s_2 and s_3 are the sum of first $n, 2n$ and $3n$ terms of a geometric series respectively then prove that $s_1(s_3 - s_2) = (s_2 - s_1)^2$.
35. Find the L.C.M of $10(9x^2 + 6xy + y^2), 12(3x^2 - 5xy - 2y^2), 14(6x^4 + 2x^3)$.
36. Find a quadratic equation whose roots are the reciprocal of the roots of the equation $4x^2 - 3x - 1 = 0$.
37. If $ax^4 - bx^3 + 40x^2 + 24x + 36$ is a perfect square, then find the value of 'a' and 'b'.
38. If $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ and $I_2 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, then show that $A^2 - (a+d)A = (bc - ad)I_2$.
39. Find the ratio in which the x-axis divides the line segment joining the points (6, 4) and (1, -7). Also, find the point of intersection?
40. Find the equation of the line passing through the point (22, -6) and having intercept on x-axis exceeds the intercept on y-axis by 5.
41. State and prove Pythagoras theorem.
42. Find the number of coins each of diameter 1.5 cm and thickness 0.2 cm to be melted to make a right circular cylinder of height 10 cm and diameter 4.5 cm.
43. For a collection of data, if $\sum x = 35, n = 5, \sum(x - 9)^2 = 82$, then find $\sum x^2$ and $\sum(x - x)^2$.
44. Three coins are tossed simultaneously. Using addition theorem on probability, find the probability that either exactly two tails or at least one head turn up.
45. a) If $\sin\theta, \cos\theta$ and $\tan\theta$ are in G.P., then prove that $\cot^6\theta - \cot^2\theta = 1$.
(OR)
b) The perimeter of the ends a frustum of a cone are 44cm and 8.4π cm .If the depth is 14cm.Then find its volume.

IV. Answer any one of the following:

10 X 1 =10

46. a) Draw a circle of radius 3cm. From an external point 7cm away its centre, construct the pair of tangents to the circle and measure their lengths.
(OR)
b) Construct a cyclic quadrilateral EFGH with $EF=5.2$ cm, $\angle GEF=50^\circ, FG=6$ cm and $\angle EGH=40^\circ$.

V) Answer any one of the following:

10x1 =10

47. a) Solve graphically $(2x + 1)(x - 3) = 0$

(OR)

b)

No of workers X	3	4	6	8	9	16
No of days y	96	72	48	36	32	18

Draw the graph. Hence find the number of days taken by 12 workers to complete the work.