September – 2017

Time Allowed: 2½ Hours **Maximum Marks:100**

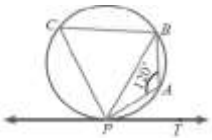
Note: This question paper contains four sections.

SECTION - I (MARKS: 15)

Note: (i) Answer all the 15 questions. **15x1=15**

(ii) Choose the correct answer from the given four alternatives and write the option code and corresponding 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 A.P. then $\frac{a-b}{b-c}$ is equal to
   A) $\frac{a}{b}$ B) $\frac{b}{c}$ C) $\frac{a}{c}$ D) 1
3. If $1+2+3+ \ldots. +n = k$ then $1^3+2^3+\ldots.+n^3$ is equal to
   A) k^2 B) k^3 C) $\frac{k(k+1)}{2}$ D) $(k+1)^3$
4. The LCM of a^k, a^{k+3}, a^{k+5} where $k \in \mathbb{N}$ is
   A) a^{k+9} B) a^k C) a^{k+6} D) a^{k+5}
5. If $ax^2 + bx + c = 0$ has equal roots, then c is equal
   A) $\frac{b^2}{2a}$ B) $\frac{b^2}{4a}$ C) $-\frac{b^2}{2a}$ D) $-\frac{b^2}{4a}$
6. If A is of order 3 x 4 and B is of order 4 x 3, then the order of BA is
   A) 3 x 3 B) 4 x 4 C) 4 x 3 D) not defined
7. The angle of inclination of a straight line parallel to x-axis is equal to
   A) 0^0 B) 60^0 C) 45^0 D) 90^0
8. The point of intersection of the straight lines $y = 0$ and $x = -4$ is
   A) $(0, -4)$ B) $(-4, 0)$ C) $(0, 4)$ D) $(4, 0)$
9. The sides of two similar triangles are in the ratio 2:3, then their areas are in the ratio
   A) 9:4 B) 4:9 C) 2:3 D) 3:2
10. In the figure, if $\angle PAB = 120^0$ then $\angle BPT =$
    A) 120^0 B) 30^0 C) 40^0 D) 60^0



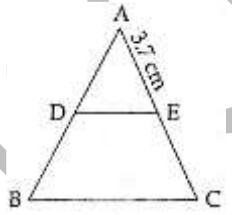
11. $(1 - \sin^2\theta)\sec^2\theta =$
    A) 0 B) 1 C) $\tan^2\theta$ D) $\cos^2\theta$
12. A man is 28.5 m away from a tower. His eye level above the ground is 1.5 m. The angle of elevation of the tower from his eyes is 45^0. Then the height of the tower is
    A) 30 m B) 27.5 m C) 28.5 m D) 27 m
13. If the surface area of a sphere is 100π cm^2, then its radius is equal to
    A) 25 cm B) 100cm C) 5 cm D) 10 cm
14. For a collection of 11 items, x=132, then the arithmetic mean is
    A) 11 B) 12 C) 14 D) 13
15. If p is the probability of an event A, then p satisfies
    A) $0 < p < 1$ B) $0 \leq p \leq 1$ C) $0 \leq p < 1$ D) $0 < p \leq 1$

SECTION - II (MARKS: 20)

Note: (i) Answer 10 questions. 10x2=20

(ii) Question number 30 is compulsory. Select any 9 questions from the first 14 questions.

16. Given $n(A) = 285, n(B) = 195, n(U) = 500, n(A \cup B) = 410$ find $n(A' \cup B')$
17. Find whether $f = \{(4,2), (1,2), (9,2), (16,2)\}$ is a function from $A = \{1,4,9,16\}$ to $B = \{-1,2,-3,-4,5,6\}$and write down its range if f is a function.
18. $-\frac{2}{7}, m, -\frac{7}{2}(m+2)$are in G.P. Find the value of m
19. Solve: $3x - 5y = -16, 2x + 5y = 31$
20. Form a quadratic equation whose roots are 3, 4
21. A matrix consists of 30 elements. What are the possible orders it can have?
22. If $A = \begin{pmatrix} 5 & 6 & -2 & 3 \\ 1 & 0 & 4 & 2 \end{pmatrix}$ and $B = \begin{pmatrix} 3 & -1 & 4 & 7 \\ 2 & 8 & 2 & 3 \end{pmatrix}$, then find $A + B$
23. Find the equation of straight line whose angle of inclination is 45^0 and y intercept is $\frac{2}{5}$
24. In $\Delta ABC, DE \| BC$ and $\frac{AD}{DB} = \frac{2}{3}$. If $AE = 3.7$ cm, find EC



25. Simplify: $\frac{\sin\theta - \sin^3\theta}{\cos\theta - \cos^3\theta}$
26. If a girl of height 150 cm stands in front of a lamp-post and casts a shadow of length $150\sqrt{3}$ cm on the ground, find the angle of eleveation of the top of the lamp-post.
27. The radius of two right circular cylinders are in the ratio of 3:2 and their heights are in the ratio 5 : 3. Find the ratio of their curved surface areas.
28. The smallest value of a collection of data is 12 and the range is 59. Find the largest value of the collection of data.
29. Two coins are tossed together. What is the probability of getting at most one head?
30. a) The side BC of and equilateral ΔABC is parallel to x-axis. Find the slope of AB and BC **(Or)**
    b) If the volume of a solid sphere is $7241\frac{1}{7}$ cu.cm, then find its radius. $\left(\text{Take } \pi = \frac{22}{7}\right)$

SECTON – III (MARKS: 45)

Note: (i) Answer 9 questions. 9 x 5 = 45

(ii) Question number 45 is compulsory. Select any 8 questions from the first 14 questions.

31. $A = \{a, b, c, d, e, f, g, x, y, z\}, B = \{1, 2, c, d, e\}$ and $C = \{d, e, f, g, 2, y\}$ Verify $A \setminus (B \cup C) = (A \setminus B) \cap (A \setminus C)$
32. Let $A = \{6, 9, 15, 18, 21\}$ and $B = \{1,2,4,5,6\}$ and $f: A \to B$ be defined by $f(x) = \frac{x-3}{3}$ Represent f by (i) an arrow diagram (ii) a set of ordered pairs (iii) a table (iv) a graph.
33. In an arithmetic series, the sum of first 14 terms is -203 and the sum of the next 11 terms is -572. Find the arithmetic series.
34. Find the sum of n terms of the series $7 + 77 + 777 + \cdots$
35. Factorize : $x^3 - 3x^2 - 10x + 24$

36. The sum of the numerator and denominator of a fraction is 12. If 3 is added to the denominator, it is 2 times of the numerator. Find the fraction.
37. If $A = \begin{pmatrix} 5 & 2 \\ 7 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -1 \\ -1 & 1 \end{pmatrix}$, Verify that $(AB)^T = B^T A^T$
38. Find the area of the quadrilateral whose vertices are $(-3, 4), (-5, -6), (4, -1)$ and $(1, 2)$
39. If $P(a, -2)$ and $Q\left(\frac{5}{3}, b\right)$ trisect the line segment joining the points $(3, -4)$ and $(1, 2)$. Find the values of a and b
40. If all sides of parallelogram touch a circle, prove that the parallelogram is a rhombus.
41. The angle of elevation of the top of a hill from the foot of a tower is 60^0 and the angle of elevation of the top of the tower from the foot of the hill is 30^0. If the tower is 50m high, then find the height of the hill.
42. A tent is in the shape of a right circular cylinder surmounted by a cone. The total height and the diameter of the base are 13.5 m and 28 m. If the height of the cylindrical portion is 3m, find the total surface area of the tent.
43. The marks obtained by 10 students in a test in Mathematics are: 80, 70, 40, 50, 90, 60, 100, 60, 30, 80. Find the standard deviation.
44. If a die is rolled twice, find the probability of getting an even number in the first time or a total of 8.
45. a) One year ago, a man was 8 times as old as his son. Now his age is equal to the square of his son's age. Find their present ages.
    b) The diameter of a road roller of length 120 cm is 84cm. If it takes 500 complete revolutions to level a play ground, then find the cost of leveling it at the cost of 75 paise per square meter . $\left(\text{Take } \pi = \frac{22}{7}\right)$

SECTION –IV (MARKS: 20)

Note: Answer both the questions choosing either of the alternatives. **2 x 10 = 20**

46. (a) Construct a ΔPQR in which the base $PQ = 6$ cm, $\angle R = 60^0$ and the altitude from R to PQ is 4 cm

(Or)

(b) Construct a cyclic quadrilateral $ABCD$ in which $AB = 6$ cm, $AC = 7$ cm, $BC = 6$ cm and $AD = 4.2$ cm

47. (a) Draw the graph of $y = x^2 + x - 12$ and hence solve $x^2 + 2x + 2 = 0$ (Or)

(b) The following table gives the cost and number of notebooks bought

No.of note books x	2	4	6	8	10	12
Cost Rs. y	30	60	90	120	150	180

Draw the graph and hence (i) find the cost of seven note books

(ii) How many note books can be bought for Rs. 165