

Standard X
MATHEMATICS

Time: 3.00 hrs.

Marks: 100

Instructions: 1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

2) Use Blue or Black ink to write and underline and pencil to draw diagrams.

Note : This question paper contains four parts.

Part - I (Marks : 14)

Note: i) Answer all the 14 questions.

ii) Choose the most suitable answer from the given four alternatives and write the option code with the corresponding answer.

14x1=14

1. If there are 1024 relations from a set $A = \{1, 2, 3, 4, 5\}$ to a set B, then the number of elements in B is
a) 3 b) 2 c) 4 d) 8
2. If (5, 7), (3, p) and (6, 6) are collinear, then the value of p is
a) 3 b) 6 c) 9 d) 12
3. A line segment that extends from one vertex of a triangle to the opposite side is
a) Ceva b) Cevian c) Giovanni d) Menelaus
4. If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is
a) 3 b) 5 c) 6 d) 8
5. If the standard deviation of x, y, z is p, then the standard deviation of $3x + 5, 3y + 5, 3z + 5$ is
a) $3p + 5$ b) $3p$ c) $p + 5$ d) $9p + 15$
6. If $\operatorname{cosec} \theta = \cot \theta$ then $\theta =$
a) 0° b) 30° c) 60° d) 90°
7. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is
a) 2025 b) 5220 c) 5025 d) 2520
8. The volume (in cm^3) of the greatest sphere that can be cut off from a cylindrical log of wood of base radius 1 cm and height 5 cm is
a) $\frac{4}{3}\pi$ b) $\frac{10}{3}\pi$ c) 5π d) $\frac{20}{3}\pi$
9. is called Square Pyramidal Numbers.
a) $1 + 2 + 3 + \dots + n$ b) $1^2 + 2^2 + \dots + n^2$
c) $1^3 + 2^3 + \dots + n^3$ d) $1 + 3 + 7 + \dots + 2n - 1$

10. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3} : 1$, then the angle of elevation of the sun has measure.
- a) 45° b) 30° c) 90° d) 60°
11. In an A.P., the first term is 1 and the common difference is 4. How many terms of the A.P. must be taken for their sum to be equal to 120?
- a) 6 b) 7 c) 8 d) 9
12. In $\triangle LMN$, $\angle L = 60^\circ$, $\angle M = 50^\circ$. If $\triangle LMN \sim \triangle PQR$ then the value of $\angle R$ is
- a) 40° b) 70° c) 30° d) 110°
13. Which of the following is incorrect?
- a) $P(A) > 1$ b) $0 \leq P(A) \leq 1$ c) $P(\phi) = 0$ d) $P(A) + P(\bar{A}) = 1$
14. If number of columns and rows are not equal in a matrix then it is said to be a
- a) Diagonal matrix b) Rectangular matrix c) Square matrix d) Identity matrix

Part - II (Marks : 20)

10x2=20

Note: i) Answer ten questions.

ii) Question No.28 is compulsory.

15. Find the remainders when 70004 and 778 is divided by 7?
16. From the top of a rock $50\sqrt{3}$ m high, the angle of depression of a car on the ground is observed to be 30° . Find the distance of the car from the rock.
17. If α and β are the roots of $5x^2 - px + 1 = 0$ and $\alpha - \beta = 1$, then find p.
18. A relation R is given by the set $\{(x, y) / y = x + 3, x \in \{0, 1, 2, 3, 4, 5\}\}$. Determine its domain and range.
19. If radii of two concentric circles are 4 cm and 5 cm then find the length of the chord of one circle which is a tangent to the other circle.
20. Find the LCM of $(2x^2 - 3xy)^2$, $(4x - 6y)^3$, $(8x^3 - 27y^3)$.
21. A hollow sphere of internal and external diameters are 4 cm and 8 cm. Find its volume.
22. Find the slope and y-intercept of $\sqrt{3}x + (1 - \sqrt{3})y = 3$.
23. Let f be a function from R to R defined by $f(x) = 3x - 5$. Find the values of a and b given that (a, 4) and (1, b) belong to f.
24. If a_1, a_2, a_3, \dots are in A.P such that $\frac{a_4}{a_7} = \frac{3}{2}$, then find the 13th term of the A.P.
25. A cone of height 24 cm is made up of modeling clay. A child reshapes it in the form of a cylinder of same radius as cone. Find the height of the cylinder.

26. The probability that atleast one of A and B occur is 0.6. If A and B occur simultaneously with probability 0.2, then find $P(\bar{A}) + P(\bar{B})$.
27. Show that the matrices $A = \begin{pmatrix} 1 & 2 \\ 3 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 1 & -2 \\ -3 & 1 \end{pmatrix}$ satisfy commutative property $AB = BA$.
28. Find the sum of first 28 terms of an A.P whose n^{th} term is $4n - 3$

Part - III (Marks : 50)

Note: i) Answer ten questions.

10x5=50

ii) Question No.42 is compulsory.

29. The function 't' which maps temperature in Celsius (C) into temperature in Fahrenheit (F) is defined by $t(C) = F$ where $F = \frac{9C}{5} + 32$. Find, (i) $t(0)$ (ii) $t(28)$ (iii) $t(-10)$ (iv) the value of C when $t(C) = 212$. (v) the temperature when the Celsius value is equal to the Fahrenheit value.
30. If $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$, $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ show that $A^2 - (a+d)A = (bc - ad)I_2$.
31. If $f(x) = x - 3$, $g(x) = 2x - 5$ and $h(x) = 5x$ then verify that the composition of three functions is associative.
32. A solid sphere of radius 6 cm is melted into a hollow cylinder of uniform thickness. If the external radius of the base of the cylinder is 5 cm and its height is 32 cm then find the thickness of the cylinder.
33. State and prove "Alternate segment theorem".
34. Find the equation of the straight line passing through the point (3, 4) and has intercepts which are in the ratio 3 : 2.
35. A card is drawn from a pack of 52 cards. Find the probability of getting a king or a heart or a red card.
36. In an A.P., sum of four consecutive terms is 28 and their sum of their squares is 276. Find the four numbers.
37. Find the sum $\left[\frac{a-b}{a+b} + \frac{3a-2b}{a+b} + \frac{5a-3b}{a+b} + \dots \text{ to 12 terms} \right]$.
38. If $\frac{\cos^2 \theta}{\sin \theta} = p$ and $\frac{\sin^2 \theta}{\cos \theta} = q$ then prove that $p^2 q^2 (p^2 + q^2 + 3) = 1$.

39. The sum of first 10 terms of an A.P is 25 and the common difference is twice the first term. Find the 10th term.
40. There are 12 pieces of five, ten and twenty rupee currencies whose total value is ₹105. When first 2 sorts are interchanged in their numbers its value will be increased by ₹20. Find the number of currencies in each sort.
41. The measurements of the diameters (in cms) of the plates prepared in a factory are given below. Find its standard deviation.

Diameter (cm)	21-24	25-28	29-32	33-36	37-40	41-44
Number of plates	15	18	20	16	8	7

42. A right angled triangle whose sides are 6 cm, 8 cm and 10 cm is revolved about the sides containing the right angle in two ways. Find the difference in volumes of the two solids so formed.

Part - IV (Marks : 16)

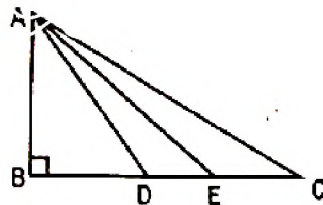
Note: Answer both the questions:

2x8=16

43. a) Draw a circle of diameter 6 cm from a point P, which is 8 cm away from its centre. Draw the two tangents PA and PB to the circle and measure their lengths.

(OR)

- b) In figure, ABC is a right angled triangle with right angle at B and points D, E trisect BC. Prove that $3AE^2 = 3AC^2 + 5AD^2$.



44. a) Draw the graph $y = x^2 - 4$ and hence solve $x^2 - x - 12 = 0$.

(OR)

- b) Music is been played in two opposite galleries with certain group of people. In the first gallery a group of 4 singers were singing and in the second gallery 9 singers were singing. The two galleries are separated by the distance of 70 m. Where should a person stand for hearing the same intensity of the singers voice? [Hint : The ratio of the sound intensity is equal to the square of the ratio of their corresponding distances]