INDIAN SCHOOL SOHAR **No. of printed pages: 6**

PRE-BOARD 1 EXAMINATION (2023-24) **(SET - I)**

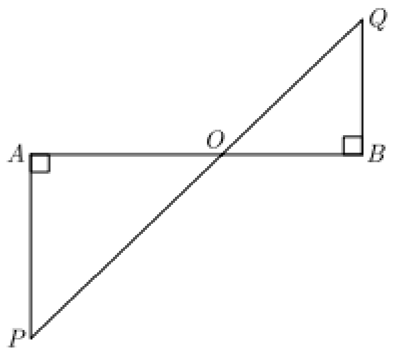
MATHEMATICS (241)

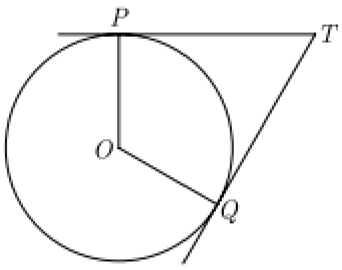
CLASS: X **MAX.MARKS: 80**

DATE: 20 /01 / 24 **TIME: 3 HOURS**

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub- parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

	Section A **Section A consists of 20 questions of 1 mark each.**	
1.	The quadratic equation $x^2 + 3x + 2 = 0$ has (a) two distinct real roots (b) two equal real roots (c) no real roots (d) more than 2 real roots	1
2.	Graphically, the pair of equations given by $6x – 3y + 10 = 0$ and $2x – y + 9 = 0$ represents two lines which are (a) intersecting at exactly one point. (b) parallel. (c) coincident. (d) intersecting at exactly two points.	1
3.	The value(s) of k for which the quadratic equation $2x^2 + kx + 2 = 0$ has equal roots, is (a) 4 (b) 0 (c) -4 (d) ± 4	1
4.	Area of a sector of a circle is $\frac{1}{6}$ to the area of circle. Find the degree measure of its minor arc. (a) 90° (b) 60° (c) 45° (d) 30°	1
5.	If HCF (156, 78) = 78, LCM(156, 78) is (a) 4 (b) 78 (c) 258 (d) 156	1
6.	In the given figure if $\angle A = 90°$, $\angle B = 90°$, OB = 4.5 cm, OA = 6 cm and AP = 4 cm then BQ is  (a) 3 cm (b) 6 cm (c) 4.5 cm (d) 3.5 cm	1

<table>
<tr><td>7.</td><td>The co-ordinates of the point P dividing the line segment joining the points A (1,3) and B (4,6) internally in the ratio 2:1 are
(a) (2,4) (b) (4,6) (c) (4,2) (d) (3,5)</td><td>1</td></tr>
<tr><td>8.</td><td>Value of cos 0° cos 30° cos 45° cos 60° cos 90° is
(a) 0 (b) 1 (c) 2 (d) $\frac{1}{\sqrt{3}}$</td><td>1</td></tr>
<tr><td>9.</td><td>What is the H.C.F of smallest prime number and the smallest composite number?
(a) 1 (b) 4 (c) 2 (d) 3</td><td>1</td></tr>
<tr><td>10</td><td>If in triangles ABC and DEF, $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar, when
(a) ∠B = ∠E (b) ∠A = ∠D (c) ∠B = ∠D (d) ∠A = ∠F</td><td>1</td></tr>
<tr><td>11.</td><td>The base radii of a cone and a cylinder are equal. If their curved surface areas are also equal, then the ratio of the slant height of the cone to the height of the cylinder is
(a) 2 : 1 (b) 1 : 2 (c) 1 : 3 (d) 3 : 1</td><td>1</td></tr>
<tr><td>12.</td><td>The mid-point of (3p, 4) and (-2, 2q) is (2, 6). Find the value of p + q
(a) 5 (b) 6 (c) 7 (d) 8</td><td>1</td></tr>
<tr><td>13.</td><td>A card is selected at random from a deck of 52 cards. Find the probability that the selected card is red face card.
(a) $\frac{1}{13}$ (b) $\frac{3}{13}$ (c) $\frac{1}{25}$ (d) $\frac{3}{26}$</td><td>1</td></tr>
<tr><td>14.</td><td>The prime factorization of 3825 is
(a) $3 \times 5^2 \times 21$ (b) $3^2 \times 5^2 \times 35$ (c) $3^2 \times 5^2 \times 17$ (d) $3^2 \times 2^5 \times 17$</td><td>1</td></tr>
<tr><td>15.</td><td>In the adjoining figure, TP and TQ are the two tangents to a circle with centre O. If ∠POQ = 110° then ∠PTQ is


(a) 60 ° (b) 70 ° (c) 80 ° (d) 90 °</td><td>1</td></tr>
<tr><td>16.</td><td>$\sqrt{3}\cos^2 A + \sqrt{3}\sin^2 A$ is equal to
(a) 1 (b) $\frac{1}{\sqrt{3}}$ (c) $\sqrt{3}$ (d) 0</td><td>1</td></tr>
<tr><td>17.</td><td>For the following distribution,
<table><tr><td>Class</td><td>0 - 5</td><td>5 - 10</td><td>10 - 15</td><td>15 - 20</td><td>20 – 25</td></tr><tr><td>Frequency</td><td>10</td><td>15</td><td>12</td><td>20</td><td>9</td></tr></table>the sum of the lower limits of the median and modal class is
(a) 15 (b) 25 (c) 30 (d) 35</td><td>1</td></tr>
<tr><td>18.</td><td>A tree casts a shadow 15 m long on the level of ground, when the angle of elevation of the sun is 45°. The height of a tree is:
(a) 10 m (b) 14 m (c) 8 m (d) 15 m</td><td>1</td></tr>
</table>

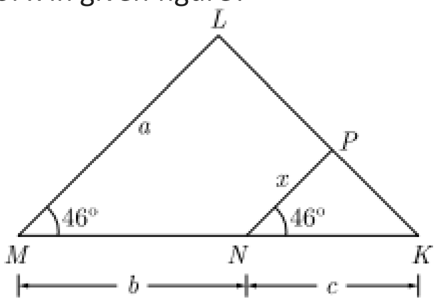
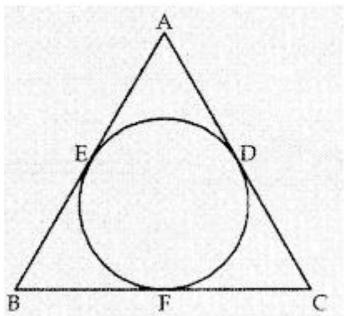
Questions number 19 and 20 are Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
(c) Assertion (A) is true, but Reason (R) is false.
(d) Assertion (A) is false, but Reason (R) is true.

19.	Assertion (A): In a circle of radius 6 cm, the angle of a sector is 60°. Then the area of the sector is $\frac{132}{7}$ cm^2. Reason (R): Area of the circle with radius r is πr^2.	1
20.	Assertion (A): If the value of mode and mean is 60 and 66 respectively, then the value of median is 64. Reason (R): Median = $(\frac{mode+2\ mean}{2})$	1

Section B

Section B consists of 5 questions of 2 marks each.

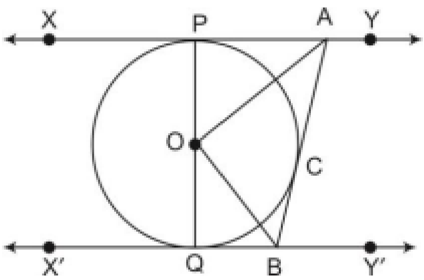
21.	The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes. **OR** The circumference of a circle is 22 cm. Calculate the area of its quadrant (in cm^2).	2
22.	In a ΔABC, if ∠A = 90° and AD ⊥ BC, prove that $AD^2 = BD \times DC$ **OR** What is the value of x in given figure? 	2
23.	For what values of k will the following pair of linear equations have infinitely many solutions? 2x + 3y = 4 and (k + 2) x + 6y = 3k + 2.	2
24.	In figure, a circle is inscribed in a ΔABC touching BC, CA and AB at F, D and E respectively. If AB = 10 cm, AD = 7 cm, CD = 5 cm, find the length of BC. 	2

25.	If 3cot θ = 4, find the value of $\frac{cosec^2\theta + 1}{cosec^2\theta - 1}$	2

Section C

Section C consists of 6 questions of 3 marks each.

26.	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 prime number less than 15.	3
27.	The owner of a taxi company decides to run all the taxis on CNG fuel instead of petrol/diesel. The taxi charges in city comprises of fixed charges together with the charge for the distance covered. For a journey of 13 km, the charge paid is ₹ 129 and for a journey of 22 km, the charge paid is ₹ 210.What will a person have to pay for travelling a distance of 32 km? **OR** Solve 2x + 3y = 11 and x − 2y = −12 algebraically and hence find the value of 'm' for which y = mx + 3.	3
28.	Given that √2 is irrational, prove that 5 + 3√2 is irrational.	3
29.	Prove that if x = a sin θ + b cos θ and y = a cos θ - b sin θ, then $x^2 + y^2 = a^2 + b^2$ **OR** Prove that $\frac{\sin\theta - 2sin^3\theta}{2cos^3\theta - \cos\theta} = \tan\theta$	3
30.	In given figure XY and X' Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X' Y' at B. Prove that ∠ AOB = 90°.	3



31	Find the zeroes of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and the coefficients.	3

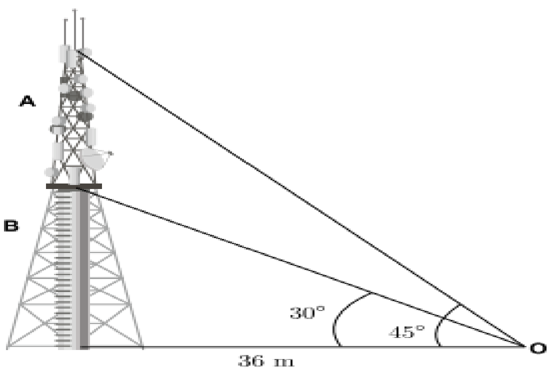
Section D

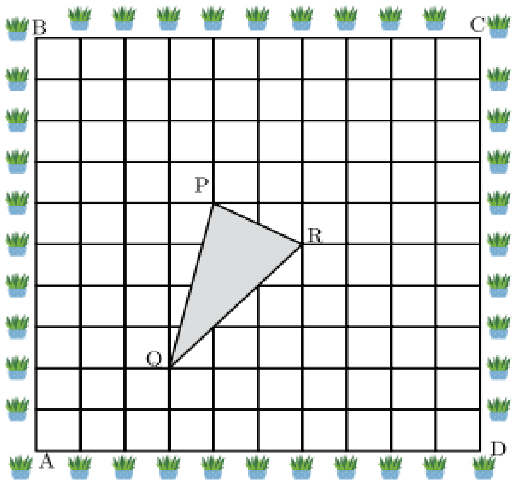
Section D consists of 4 questions of 5 marks each.

32. Daily wages of 110 workers, obtained in a survey, are tabulated below: (5)

Daily wages (in Rs.)	100-120	120-140	140-160	160-180	180-200	200-220	220-240
Number of workers	10	15	20	22	18	12	13

Compute the mean daily wages and modal daily wages of these workers.

33.	State and prove Basic proportionality theorem. In ΔABC, DE ∥ BC such that AD = 2.4 cm, AB = 3.2 cm and AC = 8 cm then what is the length of AE?	5
34.	A journey of 192 km from a town A to town B takes 2 hours more by an ordinary passenger train than a super-fast train. If the speed of the faster train is 16 km/h more, find the speeds of the faster and the passenger train. **OR** Find two consecutive positive integers, the sum of whose squares is 365.	5
35.	From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm^2. (Use $\pi = \frac{22}{7}$) **OR** Rachel, an engineering student, was asked to make a model shaped like a cylinder with two cones attached at its two ends by using a thin aluminum sheet. The diameter of the model is 3 cm and its length is 12 cm. If each cone has a height of 2 cm, find the volume of air contained in the model that Rachel made. (Assume the outer and inner dimensions of the model to be nearly the same.)	5
SECTION E **Section E has 3 case based integrated units of assessment with sub-parts of the values of 1, 1 and 2 marks each respectively.**		
36.	**Case Study – 1** Salary : In investigating different job opportunities, you find that firm A will start you at Rs 25,000 per year and guarantee you a raise of Rs 1,200 each year whereas firm B will start you at Rs 28,000 per year but will guarantee you a raise of only Rs 800 each year. (i) What would be your annual salary at firm A for the tenth year? (ii) What would be your annual salary at firm B for the tenth year**?** (iii) Over a period of 15 years, how much would you receive from firm A? **OR** Over a period of 15 years, how much would you receive from firm B?	 1 1 2
37	**Case Study – 2** Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure, including microwave dishes. They are among the tallest human-made structures. There are 2 main types: guyed and self-supporting structures. On a similar concept, a radio station tower was built in two sections A and B. Tower is supported by wires from a point O. Distance between the base of the tower and point O is 36 m. From point O, the angle of elevation of the top of section B is 30° and the angle of elevation of the top of section A is 45°.  	

	Based on the above information answer the following questions: (i) What is the height of the section B? (ii) What is the height of the section A? (iii) What is the length of the wire structure from the point O to the top of section A? **OR** What is the length of the wire structure from the point O to the top of section B?	 1 1 2
38.	**Case Study – 3** A garden is in the shape of rectangle. Gardener grew sapling of Ashoka tree on the boundary of garden at the distance of 1 m from each other. He wants to decorate the garden with rose plants. He choose triangular region inside the park to grow rose plants. On the above situation, gardener took help from the students of class 10th. They made a chart for it which looks as the above figure.  (i) If A is taken as origin, What are the coordinates of Δ PQR? (ii) What is distance between P and Q if origin is taken A? (iii) Name the type of triangle formed by P, Q and R. **OR** What is distance between Q and R if origin is taken A?	 1 1 2

******THE END*****