Class- X Session- 2023-24

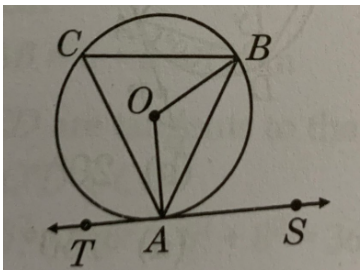
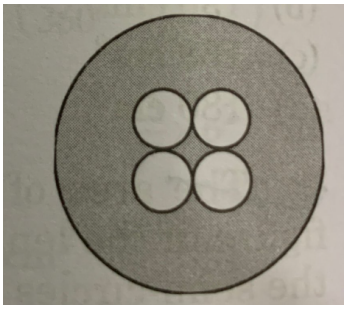
Subject- Mathematics (Standard)

SP3

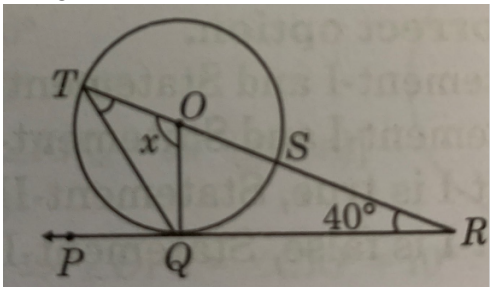
Time Allowed: 3 Hrs. **Maximum Marks : 80**

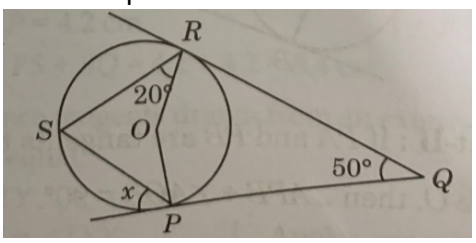
General Instructions:

1. This Question Paper has 5 Sections A-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 2 marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

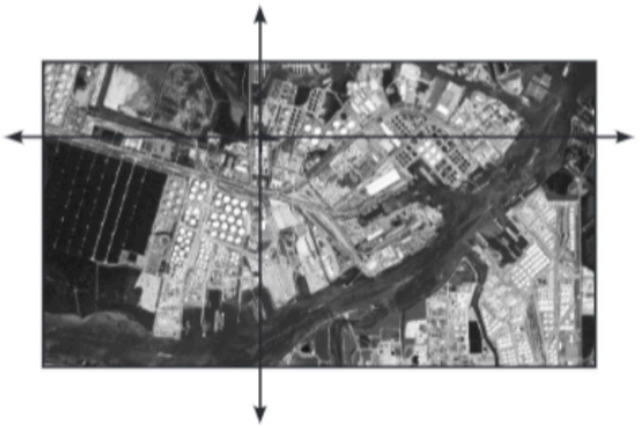
	SECTION A **Section A consists of 20 questions of 1 mark each.**	
S.NO		MARKS
1	In the given figure TAS is a tangent to a circle with center O,at the point A ,if $\angle AOB = 116°$,then $\angle BAS$ is  a)32° b)64° c)58° d)116°	1
2	If a chord of a circle of radius 10 cm subtend an angle of 30° at the center of the circle then the area of the corresponding minor segment of the circle will be - a)1.19 b)1.25 c)2.12 d3.47 (all in sq cm)	1
3	In the given figure the diameter of each of the smaller identical circles is $\frac{1}{5}$ th of the diameter of the larger circle whose radius is 17.5 cm .  Area of the shaded region will be - a)962.5 b)808.5 c)1771 d)1925 (all in sq cm)	1

4	Which of the following equations has no real roots? a) $x^2 - 4x + 3\sqrt{2} = 0$ b) $x^2 + 4x - 3\sqrt{2} = 0$ c) $x^2 - 4x - 3\sqrt{2} = 0$ d) $3x^2 + 4\sqrt{3}x + 4 = 0$	1
5	The zeros of the polynomial $x^2 - 3x - m(m + 3)$ are (a) $m, m + 3$ (b) $-m, m + 3$ (c) $m, -(m + 3)$ (d) $-m, -(m + 3)$	1
6	Find the value of $\frac{\sin 30° - \sin 90° + 2\cos 0°}{\tan 30° \tan 60°}$ a) $\frac{3}{2}$ b) $\frac{5}{2}$ c) $\frac{2}{3}$ d) $\frac{7}{2}$	1
7	A quadratic equation whose one root is 2 and the sum of roots is 0 will be a) $x^2 + 4$ b) $x^2 - 2$ c) $4x^2 - 1$ d) $x^2 - 4$	1
8	The mean of 15 numbers is 25.If each number is multiplied by 4 the new mean is ____ a) 125 b) 30 c) 100 d) 25	1
9	If $\tan\theta = \frac{3}{4}$, $0 < \theta < 90°$, then the value of $\sin\theta \cos\theta$ is a) $\frac{3}{5}$ b) $\frac{4}{5}$ c) $\frac{12}{25}$ d) $\frac{16}{25}$	1
10	The LCM of two prime numbers p and q (p > q) is 221. Find the value of 3p – q. (a) 4 (b) 28 (c) 38 (d) 48	1
11	Which of the following cannot be the probability of an event ? a)0.1 b)$\frac{5}{3}$ c)3% d)$\frac{1}{3}$	1
12	Which term of the AP 21,18,15,..... Is -81 ? a)33 b)34 c)35 d)36	1
13	The coordinates of the points P and Q are respectively $(4, -3)$ and $(-1, 7)$. Then the abscissa of a point R on the line segment PQ such that PR : PQ= 3 : 5 is a) $\frac{18}{5}$ b) $\frac{17}{5}$ c) $\frac{17}{8}$ d) 1	1
14	If ABC and DEF are similar such that 2AB = DE and BC = 8 cm, then EF =_____ (a) 16 cm (b) 112 cm (c) 8 cm (d) 4 cm	1
15	A card is drawn from a deck of 52 cards. The event E is that the card is not an ace of hearts. The number if outcomes favourable to E is a) 4 b) 13 c) 48 d) 51	1
16	The value of p if $A(-1, 7), B(-5, 6), C(6, 7)$ and $D(p, 4)$ are vertices of a parallelogram will be $a)13$ $b)14$ $c)4$ $d)8$	1
17	How many tangents can be drawn to a circle from a point on it ? a)one b)two c)infinite d)zero	1
18	Two poles of height 6 m and 11 m stand vertically upright on a plane ground. If the distance between their foot is 12 m, the distance between their tops is_____	1

	(a) 14 cm (b) 12 cm (c) 13 cm (d) 11 cm	
19	**DIRECTION:** In the question number 19 and 20, a statement of **assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option ***Statement A (Assertion):*** Sum of natural numbers from 1 to 100 is 5050 ***Statement R(Reason)*** **:** Sum of n natural numbers is $\frac{n(n+1)}{2}$ (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A) (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A) (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true.	1
20	**DIRECTION:** In the question number 19 and 20, a statement of **assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option ***Statement A (Assertion):*** If you join two hemispheres of the same radii base to base then we get a sphere. ***Statement R(Reason)*** **:** A tank is in the shape of a cylinder with a hemispherical depression at one end .The height of the cylinder is 1.45m and the radius is 30 m.The total surface area is 3.3 sq.cm. (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A) (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A) (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true.	1
	SECTION B **Section B consists of 5 questions of 2 marks each.**	
21	In the given figure PQR is a tangent to a circle with center O ,at Q .TR is a straight line ,find x .  	2
22	In a circle of radius 21 cm an arc subtends an angle of 60° at the center	2

	.Find the length of arc and area of the sector formed by the arc. OR A chord of a circle of radius 15 cm subtends an angle of 120° at the center .Find the area of the corresponding minor segment .	
23	Find the HCF and LCM of 70 and 40 ,hence verify HCF X LCM = product of numbers .	2
24	Two sides and the perimeter of one triangle are respectively three times the corresponding sides and the perimeter of the other triangle. Are the two triangles similar? Why?	2
25	If $sin\alpha = \frac{1}{2}$ then find the value of $3cos\alpha - 4cos^3\alpha$. Or Prove the identity $sin^2\alpha + cos^2\alpha = 1$ using right angles triangle with base angle α .	2
	SECTION C **Section C consists of 6 questions of 3 marks each.**	
26	Prove that $tan^2 A - tan^2 B = \frac{cos^2 B - cos^2 A}{cos^2 B \; cos^2 A}$	3
27	In the given figure PQ and PR are tangents to a circle with center O ,at P and R resp .Find x .  OR Prove that the tangents drawn to a circle from an external point are equal in length .	3
28	If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 - 3x - 2$, then find a quadratic polynomial whose zeroes are $\frac{1}{2\alpha+\beta}$ and $\frac{1}{2\beta+\alpha}$	3
29	Seven times a two-digit number is equal to four times the number obtained by reversing the order of its digit. If the difference between the digits is 3, then find the number. **OR** A man's age is three times the sum of the ages of his two sons. After 5 years his age will be twice the sum of the ages of his two sons. Find the age of the man.	3
30	The following table gives the monthly consumption of electricity of 100 families .Find the median Monthly consumption | Number of families 130 -140 | 5	3

	140-150 | 9 150-160 | 17 160-170 | 28 170-180 | 24 180-190 | 10 190-200 | 7	
31	Find the largest number which divides 70 and 125,leaving remainders 5 and 8 respectively.	3
	SECTION D **Section D consists of 4 questions of 5 marks each**	
32	A well, whose diameter is 3m, has been dug 21m deep and the earth dug out is used to form an embankment 4 m wide around it. Find the height of the embankment. (1.69 m) **OR** In a cylindrical vessel of radius 10 cm, containing some water, 9000 spherical balls are dropped which are completely immersed in water which raises the water level. If each spherical ball of radius 0.5 cm, then find the rise in the level of water in the vessel. (15 cm)	5
33	In a flight for 3000 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 100 km/hr and consequently time of flight increased by one hour. Find the original duration of flight. **OR** Solve for x: $(a+b)^2x^2 + 8\left(a^2-b^2\right)x + 16(a-b)^2 = 0$	5
34	Prove Basic proportionality theorem .Using the theorem prove that the line passing through the mid point of one side of triangle parallel to the other bisects the third side .	2+3
35	The data on the number of patients attending a hospital in a month are given below. Find the average number of patients attending the hospital in a day. Also find the mean and mode for the data. **Numbers of Patients** | **Number of days attending hospital** 0 – 10 | 2 10 – 20 | 6 20 – 30 | 9 30 – 40 | 7 40 – 50 | 4 50 – 60 | 2	5
	SECTION E **Case study based questions are compulsory.**	
36	Satellite image of a colony is shown below. In this view, a particular house is pointed out by a flag, which is situated at the point of intersection of x and y −axis. If we go 2 cm east and 3 cm north from the house, then we reach a grocery store. If we go 4 cm west and 6 cm south from the house,	1+2+1

	then we reach a sweet shop. If we go 6 cm east and 8 cm south from the house, then we reach a Gym. If we go 6 cm west and 8 cm north from the house, then we reach the school. Based on the above information, answer the following questions: (i) Find the coordinates of the Gym. (ii) If the grocery store and sweet shop lie on a line, then the ratio of distance of the house from the grocery store to that from the sweet shop. **OR** Find the ratio of the distances of the house from school to Gym. (iii) Find the distance between sweet shop and Grocery shop Scale x-axis : 1 cm = 1 unit y-axis : 1 cm = 1 unit 	
37	A group of youths have formed a youth club to work on the project " Each one Teach one" .Their ages are in AP with a common difference of 3 months .Age of the youngest member is 7 years and the sum of ages of all members is 250 years .  Answer the following questions 1)Find the total number of members of the youth club ? Or Find the sum of ages if there were sixteen members in the group 2)Find the age of the eldest member ? (1) 3) What is the age difference between the eldest and the youngest member of the club. (1)	
38	A group of students of class X visited India Gate on an education trip. The teacher and students had interest in history as well. The teacher narrated that India Gate, official name Delhi Memorial, originally called All-India War Memorial, monumental sandstone arch in New Delhi, dedicated to the troops of British India who died in	4

wars fought between 1914 and 1919. The teacher also said that India Gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway), is about 138 feet (42 metres) in height.

1. What is the angle of elevation if they are standing at a distance of 42m away from the monument?

2. They want to see the tower at an angle of 60º. So, they want to know the distance where they should stand and hence find the distance.

3. If the altitude of the Sun is at 60º, then the height of the vertical tower that will cast a shadow of length 20 m is

OR

The ratio of the length of a rod and its shadow is 1:1. The angle of elevation of the Sun is