CHINMAYA ENGLISH PRIMARY SCHOOL, HUBBALLI

Preparatory– II - 2024 - 25

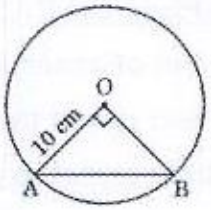
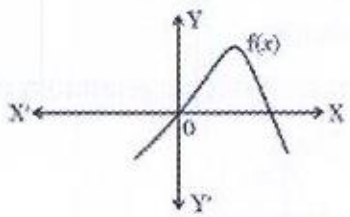
Std : X | Mathematics (Standard) | Marks : 80

TIME: 3HOURS

General Instructions:

1. This Question paper contains - **five** sections **A, B, C, D** and **E**. Each section is compulsory. However, there are internal choices in some questions.
2. Section **A** has **18 MCQ's** and **02 Assertion-Reason based question** of **1** mark each.
3. Section **B** has **5 Very Short Answer (VSA)-type questions** of **2** marks each.
4. Section **C** has **6 Short Answer (SA)-type questions** of **3** marks each.
5. Section **D** has **4 Long Answer (LA)-type questions** of **5** marks each.
6. Section **E** has **3 source based/case based/passage based/integrated units of assessment** (**4** marks each) with sub parts.
7. Internal choices provided in **2** questions in **Section B**, **2** questions in **Section C**, **2** questions in **Section D**. You have to attempt only one of the alternatives in all such questions.
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

	SECTION – A *(Multiple Choice Questions) Each question carries 1 mark*	
1	If $ax + by = a^2 - b^2$ and $bx + ay = 0$, then the value of $x + y$ is: a) $a^2 - b^2$ b) $a + b$ c) a – b d) $a^2 + b^2$	1
2	The zeroes of the polynomial $3x^2 + 11x - 4$ are : a) $\frac{1}{3}, 4$ b) $\frac{-1}{3}, -4$ c) $\frac{1}{3}, -4$ d) $\frac{-1}{3}, 4$	1
3	If the product of two co-prime numbers is 553, then their HCF is: a)1 b) 553 c) 7 d) 79	1
4	In a triangle ABC, $\angle A = 25°$ and $\angle B = 35°$; $AB = 16$ units. In another triangle PQR, $\angle P = 25°$ and $\angle Q = 35°$; $PQ = 4$ units. Which of the following is true? a) $\Delta ABC = \Delta PQR$ b) $\Delta ABC \approx \Delta PQR$ c) $\Delta ABC \cong \Delta PQR$ d) $\Delta ABC \sim \Delta PQR$	1
5	If the discriminant of the quadratic equation $3x^2 - 2x + c = 0$ is 16, then the value of c is: a) 1 b) 0 c) -1 d) $\sqrt{2}$	1

6	Three numbers in A.P. have the sum 30. What is its middle term? a)4 b) 10 c) 16 d) 8	1
7	A tangent to circle is a line that touches the circle at : a)one point only b) two points c) three points d) infinite number of points	1
8	The coordinates of the point where the line $\frac{x}{a}+\frac{y}{b}=7$ intersects y-axis are a) (a, 0) b) (0, b) c) (0, 7b) d) (7a, 0)	1
9	$\frac{1+tan^2A}{1+cot^2A}$ is equal to a) $\sec^2 A$ b) -1 c) $\cot^2 A$ d) $\tan^2 A$	1
10	A chord of a circle of radius 10 cm subtends a right angle at its centre. The length of the chord (in cm) is:  a)$5\sqrt{2}$ b) $10\sqrt{2}$ c) $\frac{5}{\sqrt{2}}$ d) 5	1
11	In the given figure, graph of a polynomial $f(x)$ is shown. The number of zeroes of polynomial $f(x)$ is :  a) 3 b) 1 c) 0 d) 2	1
12	The mean of five observations is 15. If the mean of first three observations is 14 and that of the last three observations is 17, then the third observation is a) 20 b) 19 c) 18 d) 17	1
13	For what value of θ, $\sin^2\theta + \sin\theta + \cos^2\theta$ is equal to 2? a) 45° b) 0° c) 90° d) 30°	1
14	The total surface area of a solid hemisphere of radius $7cm$ is : a) $98\,\pi cm^2$ b) $147\,\pi cm^2$ c) $196\,\pi cm^2$ d) $228\frac{2}{3}\,\pi cm^2$	1

15	If in two triangles ΔDEF and ΔPQR, $\angle D = \angle Q$ and $\angle R = \angle E$, then which of the following is **not** true? a) $\frac{DE}{QR} = \frac{DF}{PQ}$ b) $\frac{DE}{PQ} = \frac{EF}{RP}$ c) $\frac{EF}{PR} = \frac{DF}{PQ}$ d) $\frac{EF}{RP} = \frac{DE}{QR}$	1
16	The mean and median of a statistical data are 21 and 23 respectively. The mode of the data is: a) 27 b) 22 c) 17 d) 23	1
17.	The zeroes of the quadratic polynomial $x^2 + 88x + 125$ are a) both negative b) both positive c) both equal d) one positive and one negative	1
18	The area of the sector of a circle of radius 12 cm is 60π cm^2. The central angle of this sector is: a)120° b) 6° c) 75° d) 150°	1

ASSERTION-REASON BASED QUESTIONS

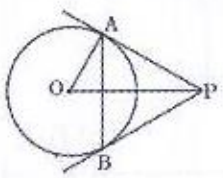
In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

(i) Both A and R are true and R is the correct explanation of A.

(ii) Both A and R are true but R is not the correct explanation of A.

(iii) A is true but R is false.

(iv) A is false but R is true.

19	***Assertion*** (A): PA and PB are tangents to the circle centred at O and $\angle OPA = 30°$. Then, ΔPAB is an equilateral triangle. ***Reason*** (R): Lengths of tangents from an external point to a circle are equal in length. 	1
20	***Assertion*** (A): The diameter of a sphere, whose surface area is 616 cm^2, is 7 cm. ***Reason*** (R): The surface area of a sphere of radius r is $4\pi r^2$.	1

SECTION – B

This section comprises of very short answer type-questions (VSA) of 2 marks each

21	E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\Delta ABE \sim \Delta CFB$. **OR**	2

	A girl of height 90 cm is walking away from the base of a lamp-post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground, find the length of her shadow after 4 seconds.	
22	The HCF of 65 and 117 is expressible in the form $65m-117$. Find the value of m.	2
23	If the point (x, y) is equidistant from the points $(a+b, b-a)$ and $(a-b, a+b)$, prove that $bx = ay$.	2
24	Determine the value of x, such that $2cosec^2 30^o + xsin^2 60^o - \frac{3}{4}tan^2 30^o = 10$	2
25	Find the zeros of the polynomial $\sqrt{3}\,x^2 - 8x + 4\sqrt{3}$ and verify the relationship between its zeros and coefficients. **OR** If α and β are the zeroes of the polynomial $p(x) = x^2 - 5x + 6$, write the value of $\alpha + \beta - 3\alpha\beta$.	2
	SECTION – C ***(This section comprises of short answer type questions (SA) of 3 marks each***	
26	Prove that $(\sqrt{2}+\sqrt{3})^2$ is an irrational number, given that $\sqrt{6}$ is an irrational number	3
27	The p^{th} term of an A.P. is q and q^{th} term is p. Find the $(p+q)^{th}$ term. **OR** A sum of Rs 700 is to be used to give seven cash prizes to students of a school for their overall academic performance. If each prize is Rs 20 less than its preceding prize, find the value of each of the prizes.	3
28	Points P, Q, R and S divide the line segment joining the points $A(1,2)$ and $B(6,7)$ in 5 equal parts. Find the coordinates of the points P, Q and R.	3
29	If $\operatorname{cosec}\theta - \sin\theta = m$ *and* $\sec\theta - \cos\theta = n$, prove that $(m^2n)^{\frac{2}{3}} + (mn^2)^{\frac{2}{3}} = 1$. **OR** Prove that: $\frac{\sin^3\theta + \cos^3\theta}{\sin\theta + \cos\theta} + \sin\theta\cos\theta = 1$	3
		3

30. Sum of the areas of two squares is $468m^2$. If the difference of their perimeters is 24m, find the sides of the squares.

31	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 aluminium 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.)	3

SECTION – D

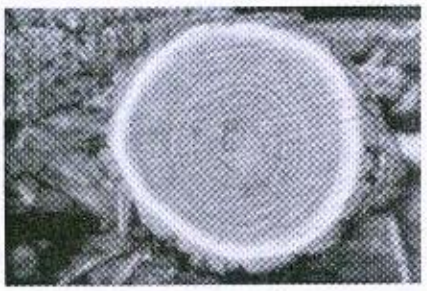
(This section comprises of long answer-type questions (LA) of 5 marks each)

32	From a point P on the ground, the angles of elevation of the top of a 10m tall building is 30°. A flag is hosted at the top of the building and angle of elevation of the top of the flagstaff from P is 45°. Find the length of the flagstaff and the distance of the building from the point P. (you may take $\sqrt{3} = 1.732$). **OR** The angle of elevation of a cloud from a point h meters above a lake is α and the angle of depression of its reflection in the lake be β, prove that the height of the cloud from the lake is $\frac{h(\tan\alpha + \tan\beta)}{\tan\beta - \tan\alpha}$.	5
33	Calculate the median from the following data Rent (in Rs) : 15 – 25 25 – 35 35 – 45 45 – 55 55 – 65 65 – 75 75 – 85 85 – 95 No. of Houses: 8 10 15 25 40 20 15 7 **OR** The mode of the following series is 36. Find the missing frequency in it. *Class interval* | 0–10 | 10–20 | 20–30 | 30–40 | 40–50 | 50–60 | 60–70 *Frequency* | 8 | 10 | ... | 16 | 12 | 6 | 7	5
34	Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of Δ PQR . Show that Δ ABC ~ Δ PQR.	5
35	The students of a class are made to stand in rows. If 4 students are extra in each row, there would be 2 rows less. If 4 students are less in each row, there would be 4 rows more. Find the number of students in the class.	5

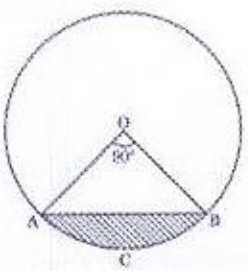
SECTION – E

(This section comprises of 3 case-study/passage-based questions of4 marks each with two sub-parts. First two case study questions have three sub-parts (i), (ii), (iii) of marks 1, 1, 2 respectively. The Third case study question has two sub-parts of 2 marks each)

36. Age of a tree : The most accurate way to determine the age of a tree is to count the annual rings of wood growth. One such trunk has been shown here.

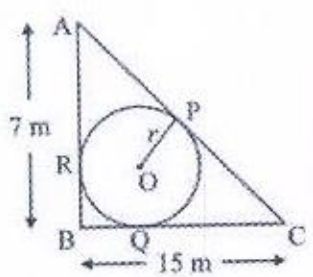


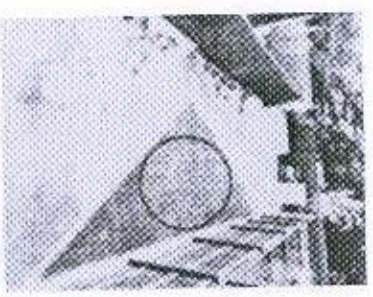
To make an identification mark, the forest department has painted segment ACBA. (See diagram) If chord AB makes an angle 90° at the centre and radius of the trunk is 21 cm, then find the :



i)	length of chord AB.	1
ii)	area of ΔOAB.	1
iii)	(a) area of segment ACBA. **OR** (b) perimeter of sector OACBO.	2

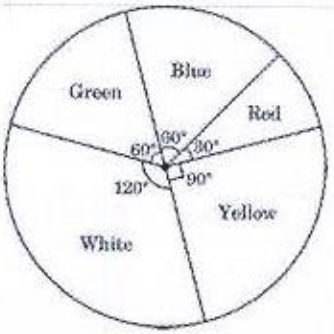
37 A backyard is in the shape of a triangle ABC with right angles at B. $AB = 7m$ and $BC = 15m$. A circular pit was dug inside it such that it touches the walls AC, BC and AB at P, Q and R respectively such that $AP = x\ m$.





Based on the above information, answer the following questions:

i)	Find the length of AR in terms of x.	1
ii)	Write the type of quadrilateral $BQOR$.	1
iii)	(a) Fin the length PC in terms of x and hence find the value of x. **OR** (b) Find x and hence find the radius r of the circle.	2

38	Some students were asked to list their favourite colour. The measure of each colour is shown by the central angle of a pie chart given below :  Study the pie chart and answer the following questions:		
	i)	If a student is chosen at random, then find the probability of his/her favourite colour being white?	1
	ii)	What is the probability of his/her favourite colour being blue or green?	1
	iii)	(a) If 15 students liked the colour yellow, how many students participated in the survey? **OR** (b) What is the probability of the favourite colour being red or blue?	2