Reg No :……

SET 1

ALL KERALA COMMON MODEL EXAMINATION

MATHEMATICS
CLASS X [2023-24]

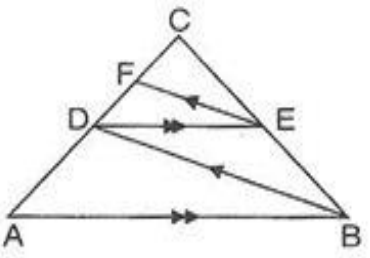
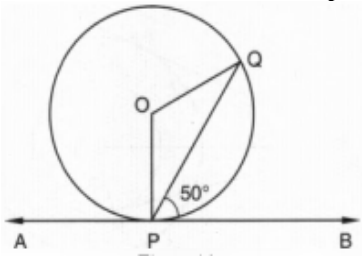
Time Allowed : 180 Minutes **Maximum Marks :** 80

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	
1	The number$\left(\sqrt{3}+\sqrt{5}\right)^2$ is a) an irrational number b) an integer c) a rational number d) not a real number	**[1]**
2	If **p** and **q** are natural numbers and **p** is the multiple of **q** , then what is the HCF of **p** and **q** ? a) p	**[1]**

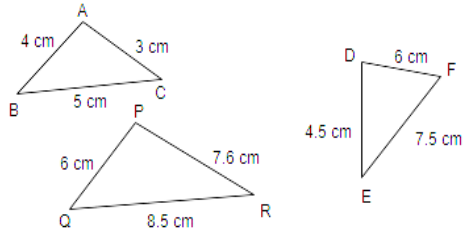
	b) q c) pq d) p + q	
3	$(x^2 + 1)^2 - x^2 = 0$ has a) two real roots b) no real roots c) one real root. d) four real roots	**[1]**
4	The larger of two supplementary angles exceeds the smaller by 18 degrees. What is the measure of larger angle? a) 81^o b) 54^o c) 99^o d) 36^o	**[1]**
5	If 2 is a root of the equation $x^2 + ax + 12 = 0$ and the quadratic equation $x^2 + ax + q = 0$ has equal roots, then q = a) 20 b) 16 c) 12 d) 8	**[1]**
6	If the point R(x, y) divides the join of P(x_1 ,y $_{$)and Q(x_2 , y_2) internally in the given ratio $m_1 : m_2$, then the coordinates of the point R are a) $\left(\frac{m_2x_1-m_1x_2}{m_1+m_2}, \frac{m_2y_1-m_1y_2}{m_1+m_2}\right)$ b) $\left(\frac{m_2x_1-m_1x_2}{m_1-m_2}, \frac{m_2y_1-m_1y_2}{m_1-m_2}\right)$ c) $\left(\frac{m_2x_1+m_1x_2}{m_1+m_2}, \frac{m_2y_1+m_1y_2}{m_1+m_2}\right)$ d) None of these	**[1]**

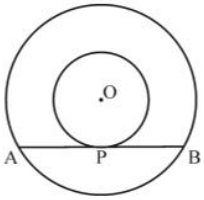
7	The line segments joining the midpoints of the adjacent sides of a quadrilateral form a) a rhombus b) a square c) a parallelogram d) a rectangle	**[1]**
8	 We have,$AB\|\quad\|DE$ and $BD\|\quad\|EF$. Then, a) $BC^2 = AB\,.\,CE$ b) $AC^2 = BC\,.\,DC$ c) $AB^2 = AC\,.\,DE$ d) $DC^2 = CF \times AC$	**[1]**
9	If $\tan\theta = \frac{5}{12}$, then the value of $\frac{\sin\theta+\cos\theta}{\sin\theta-\cos\theta}$ is: a) $\frac{17}{13}$ b) $-\frac{17}{7}$ c) $\frac{17}{7}$ d) $-\frac{7}{13}$	**[1]**
10	In Figure, APB is a tangent to a circle with centre O at point P. If∠ QPB = 50°, then the measure of ∠ POQ is 	**[1]**

	a) 120^o b) 150^o c) 140^o d) 100^o	
11	A tree 12m high is broken by the wind in such a way that its top touches the ground and makes an angle30° with the ground. The height at which from the bottom the tree is broken by the wind is a) 8 m b) 6 m c) 4 m d) 9 m	**[1]**
12	Find the area of a sector of a circle of radius 28 cm and central angle 45^o . a) 308 cm^2 b) 208 cm^2 c) 318 cm^2 d) 305 cm^2	**[1]**
13	If a sinθ + b cos θ = c, then the value of a cos θ - b sin θ is a) $\sqrt{a^2+b^2-c^2}$ b) $\sqrt{a^2+b^2+c^2}$ c) $\sqrt{a^2-b^2+c^2}$ d) None of these	**[1]**
14	The length of the minute hand of a clock is 21 cm. The area swept by the minute hand in 10 minutes is a) 252 cm^2 b) 126 cm^2 c) 231 cm^2 d) 210 cm^2	**[1]**

15	From a well - shuffled deck of 52 playing cards, a card is drawn at random. What is the probability of getting a red queen? a) $\frac{1}{13}$ b) $\frac{3}{26}$ c) $\frac{1}{2}$ d) $\frac{1}{26}$	**[1]**
16	Consider the frequency distribution of the heights of 60 students of a class: The sum of the lower limit of the modal class and the upper limit of the median class is a) 320 b) 315 c) 330 d) 310	**[1]**
17	The maximum volume of a cone that can be carved out of a solid hemisphere of radius 'r' is a) πr^3 b) $\frac{2}{3}\pi r^3$ c) $\frac{1}{3}\pi r^3$ d) $\frac{1}{3}\pi r^2 h$	**[1]**
18	If the mode of the data: 16, 15, 17, 16, 15, x, 19, 17, 14 is 15, then x = a) 19	**[1]**

Height (in cm)	No. of Students	Cumulative Frequency
150-155	16	16
155-160	12	28
160-165	9	37
165-170	7	44
170-175	10	54
175-180	6	60

	b) 15 c) 16 d) 17	
19	**Assertion (A):** Point A is on the y - axis at a distance of 4 units from the origin. If the coordinates of the point Bare (- 3, 0), then the length of AB is 5 units. **Reason (R):** Distance between points A(x_1 , y_1) and B(x_2 , y_2) is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$. a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	**[1]**
20	**Assertion (A):** For any two positive integers aand b, HCF(a, b) × LCM(a, b) = a × b **Reason (R):** The HCF of two numbers is 5 and their product is 150.Then their LCM is 40. a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	**[1]**
	Section B	
21	Is the pair of linear equation consistent/inconsistent? If consistent, obtain the solution graphically: 2x – 2y – 2 = 0; 4x – 4y – 5 = 0	**[2]**
22	In a$\triangle ABC$, AD is the bisector of $\angle A$, meeting side BC at D. If AD = 5.6 cm, BC = 6 cm and BD = 3.2 cm, find AC. **OR** State which pairs of triangles in the given figure are similar? Also, state the similarity criterion used. 	**[2]**

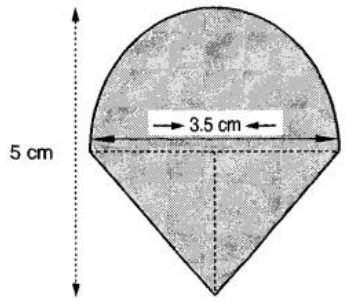
23	Two concentric circles with centre O are of radii 3 cm and 5 cm. Find the length of chord AB of the larger circle which touches the smaller circle at P.  	**[2]**
24	If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, show that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$	**[2]**
25	Find the area of a sector of a circle with radius 6 cm, if the angle of the sector is 60^o . **OR** A chord 10 cm long is drawn in a circle whose radius is $5\sqrt{2}$ cm. Find the areas of both the segments. [Take π = 3.14.	**[2]**
	Section C	
26	Prove that $3 + 2\sqrt{5}$ is irrational.	**[3]**
27	If one root of the quadratic polynomial $2x^2 - 3x + p$ is 3, find the other root. Also, find the value of p.	**[3]**
28	Solve the pair of linear equations 3x + 4y = 10and 2x – 2y = 2 by elimination and substitution method. **OR** The sum of a two - digit number and the number obtained by reversing the order of its digits is 165. If the digits differ by 3, find the number.	**[3]**
29	Two concentric circles are of radii 5 cm and 3 cm, find the length of the chord of the larger circle which touches the smaller circle.	**[3]**
30	In$\triangle ABC$,right angled at B, if $\tan A = \frac{1}{\sqrt{3}}$.Find the value of cos A cos C - sin A sin C **OR** If $\sin\theta + \cos\theta$ = p and $\sec\theta + \text{cosec}\,\theta$ = q, show that $q(p^2 - 1) = 2p$	**[3]**
31	Two different dice are thrown together. Find the probability that the numbers obtained 1. have a sum less than 7 2. have a product less than 16 3. is a doublet of odd numbers.	**[3]**

<table>
<tr><td></td><td>Section D</td><td></td></tr>
<tr><td>32</td><td>A rectangular field is 20 m long and 14 m wide. There is a path of equal width all around it, having an area of 111 sq m. Find the width of the path.

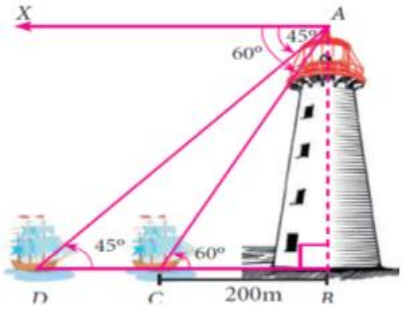
OR

The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages (in years) was 124. Determine their present age.</td><td>[5]</td></tr>
<tr><td>33</td><td>Prove that a line drawn parallel to one side of a triangle to intersect the other two sides in distinct points, divides the two sides in the same ratio.</td><td>[5]</td></tr>
<tr><td>34</td><td>A tent is of the shape of a right circular cylinder upto a height of 3 metres and then becomes a right circular cone with a maximum height of 13.5 metres above the ground. Calculate the cost of painting the inner side of the tent at the rate of₹ 2 per square metre, if the radius of the base is 14 metres.

OR

Rasheed got a playing top (lattu) as his birthday present, which surprisingly had no colour on it. He wanted to colour it with his crayons. The top is shaped like a cone surmounted by a hemisphere. The entire top is 5 cm in height and the diameter of the top is 3.5 cm. Find the area he has to colour. (Take$\pi = \frac{22}{7}$).
 
</td><td>[5]</td></tr>
<tr><td>35</td><td>The following table shows the ages of the patients admitted in a hospital during a year:
<table><tr><td>Age (in years)</td><td>5-15</td><td>15-25</td><td>25-35</td><td>35-45</td><td>45-55</td><td>55-65</td></tr><tr><td>Number of patients</td><td>6</td><td>11</td><td>21</td><td>23</td><td>14</td><td>5</td></tr></table>
Find the mode and the mean of the data given above. Compare and interpret the two measures of central tendency.</td><td>[5]</td></tr>
<tr><td></td><td>Section E</td><td></td></tr>
<tr><td>36</td><td>Read the text carefully and answer the questions: Deepa has to buy a scooty. She can buy scooty either making cashdown payment of₹ 25,000 or by making 15 monthly instalments as below. Ist month - ₹ 3425, Ilnd month - ₹</td><td>[4]</td></tr>
</table>

	3225, Illrd month - ₹ 3025, IVth month - ₹ 2825 and so on   1. Find the amount of 6th instalment. 2. Total amount paid in 15 instalments. **OR** 3. If Deepa pays₹ 2625 then find the number of instalment. 4. Deepa paid10th and 11th instalment together find the amount paid that month.	
37	**Read the text carefully and answer the questions:** The Chief Minister of Delhi launched the, 'Switch Delhi', an electric vehicle mass awareness campaign in the National Capital. The government has also issued tenders for setting up 100 charging stations across the city. Each station will have five charging points. For demo charging station is set up along a straight line and has charging points at $A\left(\frac{-7}{3}, 0\right)$, $B\left(0, \frac{7}{4}\right)$, C(3, 4), D(7, 7) and E(x, y). Also, the distance between C and E is 10 units.  1. What is the distance DE? 2. What is the value of x + y? **OR** 3. What is the ratio in which B divides AC? 4. Points C, D, E are collinear or not?	**[4]**
38	**Read the text carefully and answer the questions:** A man is watching a boat speeding away from the top of a tower. The boat makes an angle of depression	**[4]**

	of 60^o with the man's eye when at a distance of 200 m from the tower. After 10 seconds, the angle of depression becomes 45^o .  1. What is the approximate speed of the boat (in km/hr), assuming that it is sailing in still water? 2. How far is the boat when the angle is 45^o ? **OR** 3. As the boat moves away from the tower, angle of depressionwill decrease/increase? 4. What is the height of tower?	