ATOMIC ENERGY CENTRAL SCHOOL NO. 2, MUMBAI
PERIODIC TEST III - 2023 - 24
CLASS X - MATHEMATICS
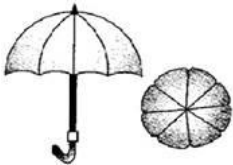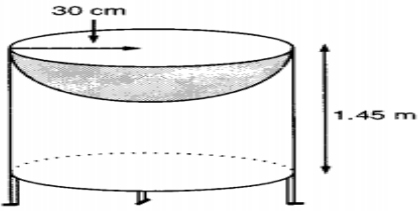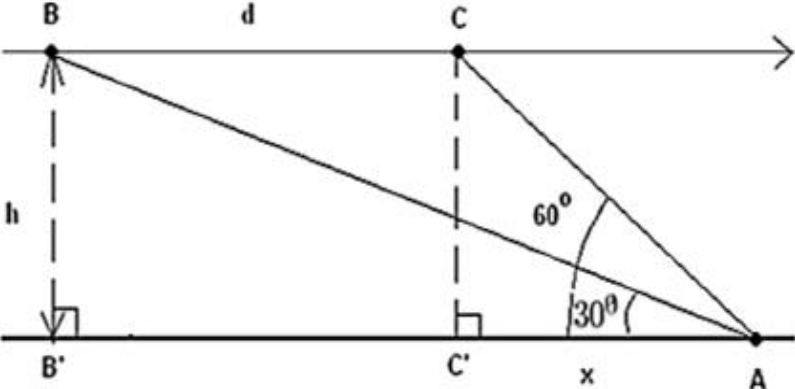**Time Allowed :** 1 ½ hours   **Maximum Marks :** 40

General Instructions:
 1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 10 MCQs carrying 1 mark each
3. Section B has 3 questions carrying 02 marks each.
4. Section C has 2 questions carrying 03 marks each.
5. Section D has 2 questions carrying 05 marks each.
6. Section E has 2 case study based questions carrying 04 marks each

	Section A	Marks
1	$\sin^2 A + \sin^2 A\tan^2 A =$ a) $\tan^2 A$ b) $\cos^2 A$ c) $\sin^2 A$ d) None of these	**[1]**
2	If$\sqrt{3} \tan \theta = 1$, then the value of θ is a) 45° b) 30° c) 90° d) 60°	**[1]**
3	A vertical stick 20 cm long casts a shadow 15 cm long. At the same time, a tower casts a shadow 30 m long. The height of the tower is a) 15 m b) 20 m c) 30 m d) 40 m	**[1]**
4	Find the area of the sector if the radius is 12 cm and with an angle of 134° . a) 167.38 cm b) 158.38 cm c) 168.00 cm d) 168.38 cm	**[1]**
5	A man goes to a walking track twice a day in the shape of a sector with an angle of 123° and a radius of 138 m. Find the area covered by the man of the walking track in a day. a) 20882.8 m² b) 81765.6 m² c) 40882.8 m² d) 20441.4 m²	**[1]**
6	From a point P which is at a distance 13 cm from the centre O of a circle of radius 5 cm, the pair of tangents PQ and PR to the circle are drawn. Then the area of the quadrilateral PQOR is a) 65 cm² b) 32.5 cm² c) 30 cm² d) 60 cm²	
7	The interior of a building is in the form of cylinder of diameter 4.3 m and height 3.8 m, surmounted by a cone whose vertical angle is a right angle. Find the volume and curved surface area of the building respectively. (Use$\pi = 3.14$) a) 72.26 m³ , 66.46 m ² b) 70.24 m³ , 62.24 m ² c) 62.26 m³ , 75.56 m ² d) 65.56 m³ , 71.83 m ²	**[1]**

8	In the formula $\bar{X} = a + h \left(\frac{1}{N} \sum f_i u_i \right)$ for finding the mean of grouped frequency distribution $u_i =$ a) $\frac{x_i + a}{2h}$ b) $h(x_i - a)$ c) $\frac{x_i - a}{h}$ d) $\frac{x_i + a}{h}$	[1]
9	A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and these values are equally likely outcomes. The probability that it will point at a number greater than 5 is a) $\frac{1}{2}$ b) $\frac{1}{4}$ c) $\frac{1}{5}$ d) $\frac{1}{3}$	[1]
10	A piggy bank contains 100 fifty paise coins, 50 one rupee coins, 20 two rupee coins and 10 five rupee coins. One coin is drawn at random. The probability that the coin drawn will not be a five rupee coin is a) $\frac{5}{9}$ b) $\frac{7}{18}$ c) $\frac{8}{9}$ d) $\frac{17}{18}$	[1]
	Section – B	
11	Calculate the mean for the following distribution: <table><tr><td>x</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr><tr><td>f</td><td>4</td><td>8</td><td>14</td><td>11</td><td>3</td></tr></table>	[2]
12	An umbrella has 8 ribs which are equally spaced (see figure). Assuming umbrella to be a flat circle of radius 45 cm, Find the area between the two consecutive ribs of the umbrella.	[2]
13	A carton consists of 100 shirts of which 88 are good and 8 have minor defects. Rohit, a trader, will only accept the shirts which are good. But, Kamal, an another trader, will only reject the shirts which have major defects. One shirt is drawn at random from the carton. What is the probability that it is acceptable to (i)Rohit and (ii)Kamal?	[2]
	Section – C	

14	Metallic sphere of radii 6cm, 8cm and 10cm respectively are melted to form a single solid sphere. Find the radius of the resulting sphere.	**[3]**
15	Prove the trigonometric identity: $$\frac{\cos\theta\ cosec\theta - \sin\theta\sec\theta}{\cos\theta + \sin\theta} = cosec\theta - \sec\theta$$	**[3]**
	Section – D	
16	The following data gives the distribution of total monthly household expenditure of 200 families of a village. Find the modal monthly expenditure of the families. Also, find the mean monthly <table><thead><tr><th>Expenditure (in ₹)</th><th>Frequency</th></tr></thead><tbody><tr><td>1000-1500</td><td>24</td></tr><tr><td>1500-2000</td><td>40</td></tr><tr><td>2000-2500</td><td>33</td></tr><tr><td>2500-3000</td><td>28</td></tr><tr><td>3000-3500</td><td>30</td></tr><tr><td>3500-4000</td><td>22</td></tr><tr><td>4000-4500</td><td>16</td></tr><tr><td>4500-5000</td><td>7</td></tr></tbody></table> expenditure:	**[5]**
17	If from an external point B of a circle with centre 'O', two tangents BC, BD are drawn such that∠ DBC = 120°, prove that BC + BD = BO.	**[5]**
	Section - E	
18	**Question No. 18 and 19 are based on the given text. Read the text carefully and answer the questions:** Mayank a student of class 7th loves watching and playing with birds of different kinds. One day he had an idea in his mind to make a bird - bath on his garden. His brother who is studying in class 10 th helped him to choose the material and shape of the birdbath. They made it in the shape of a cylinder with a hemispherical depression at one end as shown in the Figure below. They opted for the height of the hollow cylinder as 1.45 m and its radius is 30 cm. The cost of material used for making bird	**[4]**

	bath is ₹ 40per square meter.		
(i)	Find the curved surface area of the hemisphere.		
(ii)	Find the total surface area of the bird - bath. (Take$\pi = \frac{22}{7}$)		
(iii)	Mayank and his brother thought of increasing the radius of hemisphere to 35 cm with same material sothat birds get more space, then what is the new height of cylinder?		
19	Mr. Vinod is a pilot in Air India. During the Covid - 19 pandemic, many Indian passengers were stuck at Dubai Airport. The government of India sent special aircraft to take them. Mr. Vinod was leading this operation. He is flying from Dubai to New Delhi with these passengers. His airplane is approaching point A along a straight line and at a constant altitude h. At 10:00 am, the angle of elevation of the airplane is 30° and at 10:01 am, it is $60^{\,o}$.	[4]	
(i)	What is the distance **d** is covered by the airplane from 10:00 am to 10:01 am if the speed of the airplane is constant and equal to 600 miles/hour?		
(ii)	What is the altitude **h** of the airplane? (round answer to 2 decimal places)		
(iii)	Find the distance between passenger and airplane when the angle of elevation is 30° .		