

## General Instructions:

Read the following instructions very carefully and strictly follow them.

1. This question paper contains **14** questions. **All** questions are compulsory.
2. This question paper is divided into **three** sections – **A, B** and **C**.
3. **Section – A** comprises of **6** questions (Q. no. **1** to **6**) of **2** marks each. Internal choice has been provided in **two** questions.
4. **Section – B** comprises of **4** questions (Q. no. **7** to **10**) of **3** marks each. Internal choice has been provided in **one** question.
5. **Section – C** comprises of **4** questions (Q. no. **11** to **14**) of **4** marks each. Internal choice has been provided in **one** question. It also contains two case study – based questions.
6. Use of a calculator is **not** permitted.

### Section – A

Question numbers **1** to **6** carry **2** marks each.

1. Find the sum of first 30 terms of an A.P.:  $-30, -24, -18, \dots$

**OR**

In an A.P. if  $S_n = n(4n + 1)$ , then find the A.P.

2. A solid metallic sphere of radius 10.5 cm is melted and recast into several smaller cones, each of radius 3.5 cm and height 5 cm. Find the number of cones so formed.
3. Find the value of  $m$  for which the quadratic equation  $(m - 1)x^2 + 2(m - 1)x + 1 = 0$  has two real and equal roots.

**OR**

Solve the following quadratic equation for  $x$ :

$$\sqrt{3}x^2 + 10x + 7\sqrt{3} = 0$$

4. Find the mode of the following frequency distribution:

Class	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Frequency	15	10	12	17	4

5. The product of Rehan's age (in years) 5 years ago and his age 7 years from now, is one more than twice the present age. Find his present age.
6. Two concentric circles are of radii 4 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.

### Section – B

Question numbers 7 to 10 carry 3 marks each.

7. For what value of  $x$ , is the median of the following frequency distribution 34.5?

Class	Frequency
0 – 10	3
10 – 20	5
20 – 30	11
30 – 40	10
40 – 50	$x$
50 – 60	3
60 – 70	2

8. Draw a circle of radius 3 cm. Take two points P and Q on one of its extended diameter each at a distance of 7 cm from its centre. Construct tangents to the circle from these two points P and Q.
9. The angle of elevation of the top of a building from the foot of the tower is  $30^\circ$  and the angle of elevation of the top of the tower from the foot of the building is  $60^\circ$ . If the tower is 50 m high, then find the height of the building.

**OR**

From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are  $30^\circ$  and  $45^\circ$  respectively. If the bridge is at a height of 3 m from the banks, then find the width of the river.

10. Following is the daily expenditure on lunch by 30 employees of a company:

Daily Expenditure (in rupees)	Number of Employees
100 – 120	8

120 – 140	3
140 – 160	8
160 – 180	6
180 – 200	5

Find the mean daily expenditure of the employees.

### Section – C

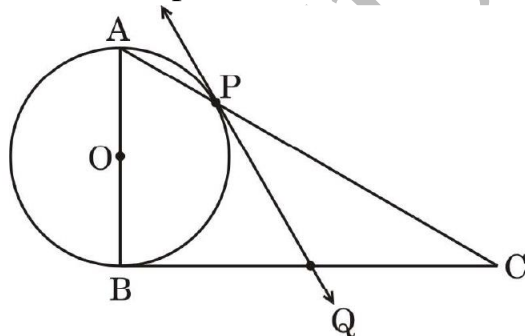
Question numbers **11** to **14** carry **4** marks each.

11. From a solid cylinder of height 30 cm and radius 7 cm, a conical cavity of height 24 cm and same radius is hollowed out. Find the total surface area of the remaining solid.

**OR**

Water in a canal 8 m wide and 6 m deep, is flowing with a speed of 12 km/hour. How much area will it irrigate in one hour, if 0.05 m of standing water is required?

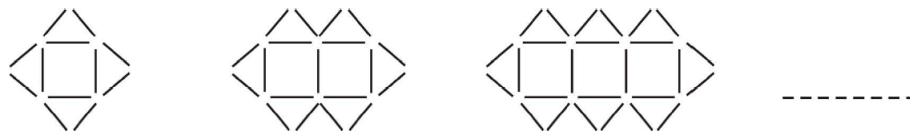
12. In the given figure, a  $\Delta ABC$  with  $\angle B = 90^\circ$  is shown. Taking AB as the diameter, a circle has been drawn intersecting AC at point P. Prove that the tangent drawn at point P bisects BC.



### Case Study 1

13. In Mathematics, relations can be expressed in various ways. The matchstick patterns are based on linear relations. Different strategies can be used to calculate the number of matchsticks used in different figures.

One such pattern is shown below. Observe the pattern and answer the following questions using Arithmetic Progression.



- Write the A.P. for the same number of triangles used in the figures. Also, write the  $n^{\text{th}}$  term of this A.P.
- Which figure has 61 matchsticks?

### Case Study 2

14. Gadisar Lake is in Jaisalmer District of Rajasthan. It was built by King of Jaisalmer and rebuilt by Gadsji Singh in the 14th century. The lake has many Chhatris. One of them is shown below:



Observe the picture. From a point A,  $h$  meters above water level, the angle of elevation of the top of Chhatri (point B) is  $45^\circ$  and the angle of depression of its reflection in water (point C) is  $60^\circ$ . If the height of the Chhatri above water level is approximately 10 m, then:

- Draw a well labelled figure based on the above information.
- Find the height ( $h$ ) of the point A above water level. (Use  $\sqrt{3} = 1.73$ )