

GENERAL INSTRUCTIONS :

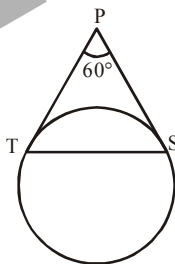
- ▶ The question paper consists of 14 questions divided into 3 sections A, B, C.
- ▶ All questions are compulsory.
- ▶ Section A comprises of 6 questions of 2 marks each. Internal choice has been provided in two questions.
- ▶ Section B comprises of 4 questions of 3 marks each. Internal choice has been provided in one question.
- ▶ Section C comprises of 4 questions of 4 marks each. An internal choice has been provided in one question. It contains two case study based questions.

SECTION-A

1. Find the 17th term from the end of the A.P. 1, 6, 11, 16, 211, 216.
2. Write the nature of roots of quadratic equation $4x^2 + 4\sqrt{3}x + 3 = 0$
3. Prove that the line segment joining the points of contact of two parallel tangents to a circle is a diameter of the circle.

OR

In the given figure, PT and PS are tangents to a circle from a point P such that $PT = 5$ cm and $\angle TPS = 60^\circ$. Find the length of chord TS.



4. A solid metallic hemisphere of diameter 21 cm is melted and recast into a number of smaller cones, each of diameter 7 cm and height 9 cm. Find the number of cones so formed.

OR

A solid cuboidal slab of iron of dimensions 66 cm \times 20 cm \times 27 cm is used to cast an iron pipe. If the outer diameter of the pipe is 10 cm and thickness is 1 cm, then calculate the length of the pipe.

5. If the mean of the following frequency distribution is 54, find the value of P.

Class Interval	0-20	20-40	40-60	60-80	80-100
Frequency	7	P	10	9	13

6. Find the roots of the quadratic equation : $a^2b^2x^2 + b^2x - a^2x - 1 = 0$.

SECTION-B

7. If the median of the following distribution is 58 and sum of all frequencies is 140, find x & y .

Class Interval	15 – 25	25 – 35	35 – 45	45 – 55	55 – 65	65 – 75	75 – 85	85 – 95
Frequency	8	10	x	25	40	y	15	7

8. Draw a circle of radius 3.5 cm. Draw two tangents to the circle which are perpendicular to each other
 9. The following data gives the information on the observed lifetime (in hours) of 225 electrical components

Lifetimes (in hours)	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	10	35	52	61	38	29

Determine the modal lifetimes of the components.

10. A man on the deck of a ship is 12 m above water level. He observes that the angle of elevation of the top of a cliff is 45° and angle of depression of the base is 30° . Calculate the height of the cliff.

OR

The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60° . If the tower is 50 m high, find the height of the building.

SECTION-C

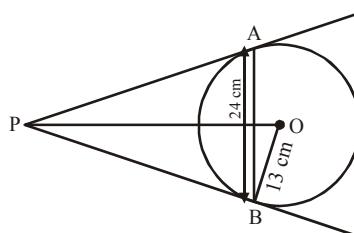
11. The internal and external radii of a hollow spherical shell are 3 cm and 5 cm respectively. If it is melted to form a solid cylinder of height $10\frac{2}{3}$ cm, find the diameter of the cylinder.

OR

A hemispherical tank, full of water, is emptied by a pipe at the rate of $1\frac{4}{7}$ litres per second. How much

time will it take to empty the tank, if it is 1 m in diameter ? $\left(\text{Use } \pi = \frac{22}{7} \right)$

12. In the given figure, AB is a chord of length 24 cm (see figure). The tangents at A and B intersect at point P. If the radius of circle is 13 cm. Find the length of PA.



13.

Case Study-1 (Pollution)

Sulphur dioxide (SO_2) can cause respiratory problems such as bronchitis and can irritate your nose, throat and lungs. It may cause cough, wheezing, phlegm and asthma attacks. The effects are worse when you are exercising. SO_2 has been linked to cardiovascular disease.



To find out the concentration of SO_2 in the air (in parts per million, i.e. ppm).

A student collects the data for 30 localities in a certain city and is presented below

Concentration of SO_2 (in ppm)	Frequency
0.00-0.04	4
0.04-0.08	9
0.08-0.12	9
0.12-0.16	2
0.16-0.20	4
0.20-0.24	2

- (i) Find the mean concentration of SO_2 in the air.
- (ii) Find the median of the given data.

14.

Case Study-2

In a potato race, a bucket is placed at the starting point, which is 6 m from the first potato and the other potatoes are placed 4 m apart in a straight line. There are ten potatoes in lines (see below figure)



A competitor starts from the bucket, picks up the nearest potato, runs back with it, drops it in the bucket, runs back to pick up the next potato, runs to the bucket to drop it in and she continues in the same way until all the potatoes are in the bucket.

- (i) What is the total distance covered by competitor in placing the second potato in basket ?
- (ii) What is the total distance, which the competitor has to run ?