

EXAMINATION

Duration: 2.5 Hours

Max. Marks: 80

General Instructions :

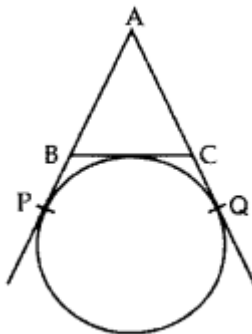
- (i) All questions are compulsory.
- (ii) This question paper consists of 30 questions divided into four sections – A, B, C and D.
- (iii) Section A contains 6 questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 10 questions of 3 marks each. Section D contains 8 questions of 4 marks each.
- (iv) There is no overall choice. However, an internal choice has been provided in two questions of 1 mark, two questions of 2 marks, four questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternative in all such questions.
- (v) Use of calculator is **not** permitted.

SECTION - A

Q1. Find the value of m so that the quadratic equation $mx(x - 7) + 49 = 0$ has two equal roots.

Q2. The tops of two towers of height x and y , standing on level ground, subtend angles of 30° and 60° respectively at the centre of the line joining their feet, then find $x : y$.

Q3. In the given figure, AP, AQ and BC are tangents to the circle. If $AB = 5$ cm, $AC = 6$ cm and $BC = 4$ cm, then calculate the length of AP (in cm).



Q4. If the value of mean and mode are respectively 30 and 15, then calculate median.

Also, if the numbers are arranged in ascending order:

5, 7, 10, 12, $2x-8$, $2x+10$, 35, 41, 42, 50

It is known that their median is 25. Calculate x.

OR

$\sum f_i = 15, \sum f_i x_i = 3p + 36$ and the mean of the distribution is 3, then what is the value of p?
Further, In an arranged series of an even number of $2n$ terms, which term is median?

Q5. A solid right circular cone is cut into two parts at the middle of its height by a plane parallel to its base. Find the ratio of the volume of the smaller cone to the whole cone.

Q6. Find the common difference of the AP $\frac{1}{p}, \frac{1-p}{p}, \frac{1-2p}{p}, \dots$?

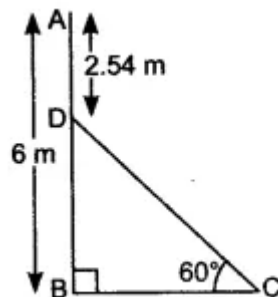
OR

Find the 9th term from the end (towards the first term) of the A.P. 5, 9, 13,, 185.

SECTION-B

Q7. The 4th term of an A.P. is zero. Prove that the 25th term of the A.P. is three times its 11th term.

Q8. In Figure, AB is a 6 m high pole and CD is a ladder inclined at an angle of 60° to the horizontal and reaches up to a point D of pole. If $AD = 2.54$ m, find the length of the ladder. (use $\sqrt{3} = 1.73$)



Q9. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

Q10. If α and β are the roots of the equation $3x^2 - 6x + 4 = 0$, find the value of $\alpha^2 + \beta^2$.

Further, Solve $x - \frac{6}{x} = 5$

Q11. Two cubes, each of side 4 cm are joined end to end. Find the surface area of the resulting cuboid.

Further, a right circular cone of radius 3 cm, has a curved surface area of 47.1 cm^2 . Find the volume of the cone.

Q12. Draw a pair of tangents to a circle of radius 3 cm, which are inclined to each other at an angle of 60° .

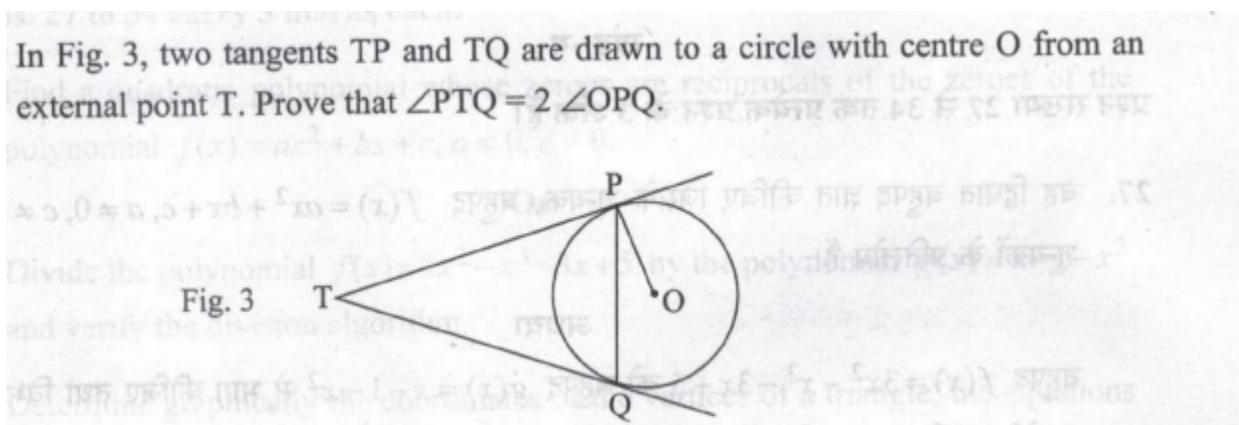
SECTION-C

Q13. How many three-digit natural numbers are divisible by 7?

OR

Find the number of natural numbers between 101 and 999 which are divisible by both 2 and 5.

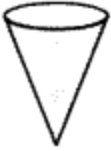
Q14.



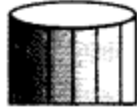
Q15. An icecream seller sells his icecreams in two ways:

(A) In a cone of $r = 5 \text{ cm}$, $h = 8 \text{ cm}$

(B) In a cup in shape of cylinder with $r = 5 \text{ cm}$, $h = 8 \text{ cm}$



Type 'A'



Type 'B'

He charges the same price for both but prefers to sell his icecream in a cone.

- (a) Find the volume of the cone and the cup.
- (b) Which out of the two has more capacity?

Q16. Solve the following quadratic equation for x : $4x^2 - 4a^2x + (a^4 - b^4)$.

Also, calculate, the value of $\sqrt{6 + \sqrt{6 + \sqrt{6 + \sqrt{6}}}}$

Q17. An aeroplane, when flying at a height of 4000 m from the ground passes vertically above another aeroplane at an instant when the angles of elevation of the two planes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the aeroplanes at that instant.

Q18. The average score of boys in the examination of a school is 71 and that of the girls is 73. The average score of the school in the examination is 71.8. Find the ratio of number of boys to the number of girls who appeared in the examination.

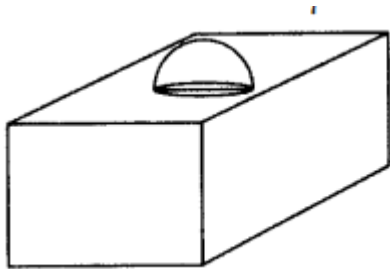
OR

Weekly income of 600 families is given below:

<i>Income in (₹)</i>	<i>No. of families</i>
0-1000	250
1000-2000	190
2000-3000	100
3000-4000	40
4000-5000	15
5000-6000	5

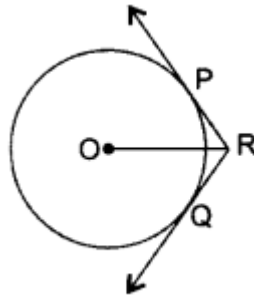
Find the median.

Q19. In Figure, is a decorative block, made up of two solids—a cube and a hemisphere. The base of the block is a cube of side 6 cm and the hemisphere fixed on the top has a diameter of 3.5 cm. Find the total surface area of the block. (Use $\pi = \frac{22}{7}$)



Q20. Draw two concentric circles of radii 3 cm and 5 cm. Construct a tangent to smaller circle from a point on the larger circle. Also measure its length.

Q21. In the figure, two tangents RQ and RP are drawn from an external point R to the circle with centre O. If $\angle PRQ = 120^\circ$, then prove that $OR = PR + QR$.



Q22. Find the value of the middle term of the following A.P.: -6, -2, 2, ..., 58.

SECTION-D

Q23. If p^{th} , q^{th} and r^{th} terms of an A.P. are a , b , c respectively, then show that $(a - b)r + (b - c)p + (c - a)q = 0$.

Q24. The sum of first n terms of an A.P. is $5n^2 + 3n$. If its m^{th} term is 168, find the value of m . Also find the 20th term of this A.P.

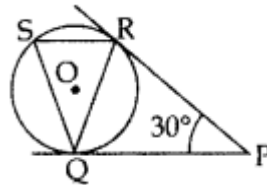
Q25. Find the missing frequencies f_1 and f_2 in the following frequency distribution table, if $N = 100$ and median is 32.

<i>Class</i>	<i>Frequency</i>
0-10	10
10-20	f_1
20-30	25
30-40	30
40-50	f_2
50-60	10
Total	100

Q26. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact. Also, prove that the lengths of tangents drawn from an external point to a circle are equal.

OR

In the figure, tangents PQ and PR are drawn from an external point P to a circle with centre O, such that $\angle RPQ = 30^\circ$. A chord RS is drawn parallel to the tangent PQ. Find $\angle RQS$.



Q27. Solve the following for x: $\frac{1}{2a + b + 2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$

Q28. A hemispherical bowl of internal diameter 36 cm contains liquid. This liquid is filled into 72 cylindrical bottles of diameter 6 cm. Find the height of the each bottle, if 10% liquid is wasted in this transfer.

OR

Water in a canal, 6 m wide and 1.5 m deep, is flowing at a speed of 4 km/h. How much area will it irrigate in 10 minutes, if 8 cm of standing water is needed for irrigation?

Q29. While boarding an aeroplane, a passenger got hurt. The pilot, showing promptness and concern, made arrangements to hospitalise the injured and so the plane started late by 30 minutes. To reach the destination, 1500 km away in time, the pilot increased the speed by 100 km/hour. Find the original speed/hour of the plane.

OR

To fill a swimming pool two pipes are to be used. If the pipe of larger diameter is used for 4 hours and the pipe of smaller diameter for 9 hours, only half the pool can be filled. Find, how long it would take for each pipe to fill the pool separately, if the pipe of smaller diameter takes 10 hours more than the pipe of larger diameter to fill the pool.

Q30. In the figure, O is the centre of a circle of radius 5 cm. T is a point such that $OT = 13$ cm and OT intersects circle at E. If AB is a tangent to the circle at E, find the length of AB, where TP and TQ are two tangents to the circle.

