General Instructions:

Read the following instructions very carefully and strictly follow them:

1. *This question paper contains **38** questions. **All** questions are **compulsory**.*
2. *This question paper is divided into **five** Sections – **A, B, C, D** and **E**.*
3. *In **Section A** – Question numbers **1** to **18** are multiple choice questions (MCQs) and question numbers **19** and **20** are Assertion – Reason based questions of **1** mark each.*
4. *In **Section B** – Question numbers **21** to **25** are Very Short Answer (VSA) type questions, carrying **2** marks each.*
5. *In **Section C** – Question numbers **26** to **31** are Short Answer (SA) type questions, carrying **2** marks each.*
6. *In **Section D** – Question numbers **32** to **35** are Long Answer (LA) type questions carrying **5** marks each.*
7. *In **Section E** – Question numbers **36** to **38** are **Case Study Based** questions carrying **4** marks each. Internal choice is provided in **2** marks questions in each case study.*
8. *There is no overall choice. However, an internal choice has been provided in **2** questions in Section **B**, **2** questions in Section **C**, **2** questions in Section **D** and **3** questions of **2** marks each in Section E.*
9. *Draw neat diagrams wherever required. Take $\pi = \frac{22}{7}$ wherever required, if not stated.*
10. *Use of calculator is **not allowed**.*

SECTION – A **$20 \times 1 = 20$**

Question numbers 1 to 20 are multiple choice questions of 1 mark each.

1. The natural number 2 is:

a. a prime number

b. a composite number
c. prime as well as composite number
d. neither prime nor composite number

2. For any natural number n, 6^n ends with the digit:

a. 0 b. 6 c. 3 d. 2

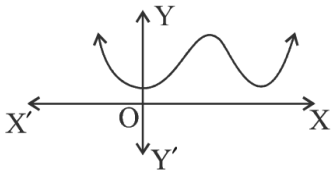
3. The HCF of 960 and 432 is:

a. 48 b. 54 c. 72 d. 36

4. For an event E, $P(E) + P(\bar{E}) = x$, then the value of $x^2 - 3$ is:

a. -2 b. 2 c. 1 d. -1

5. The graph of $y = f(x)$ is given. The number of zeroes of $f(x)$ is:



a. 0 b. 1 c. 2 d. 4

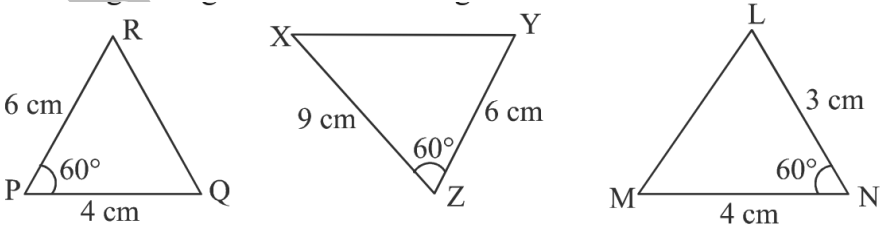
6. If a pair of linear equations in two variables is represented by two coincident lines, then the pair of equations has:

a. a unique solution
b. two solutions
c. no solution
d. an infinite number of solutions

7. The first term of an AP is p and the common difference is q, then its 10th term is:

a. $q - 9p$ b. $p - 9q$ c. $p + 9q$ d. $2p + 9q$

8. Shown below are three triangles. The measures of two adjacent sides and included angle are given for each triangle:



Which of these triangles are similar?

a. ΔRPQ and Δ XZY
b. ΔRPQ and ΔMNL
c. ΔXZY and ΔMNL
d. ΔRPQ, ΔXZY and ΔMNL are similar to one another

9. The mid – point of the line segment joining the points $(5, -4)$ and $(6, 4)$ lies on:

a. $x - axis$
b. $y - axis$
c. Origin
d. neither $x - axis$ nor $y - axis$

10. If $\cos y = 0$, then what is the value of $\frac{1}{2}\cos\left(\frac{y}{2}\right)$?

a. 0 b. $\frac{1}{2}$ c. $\frac{1}{\sqrt{2}}$ d. $\frac{1}{2\sqrt{2}}$

11. If $\cos A = \frac{1}{2}$, then the value of $\sin^2 A + 2\cos^2 A$ is:

a. $\frac{3}{2}$ b. $\frac{5}{4}$ c. -1 d. $\frac{1}{2}$

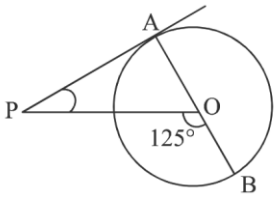
12. A car is moving away from the base of a 30 m high tower. The angle of elevation of the top of the tower from the car at an instant, when the car is $10\sqrt{3}$ m away from the base of the tower, is:

a. $30°$ b. $45°$ c. $90°$ d. $60°$

13. If TP and TQ are two tangents to a circle with centre O from an external point T so that $\angle POQ = 120°$, then ∠PTQ is equal to:

a. $60°$ b. $70°$ c. $80°$ d. $90°$

14. In the given figure, PA is a tangent from an external point P to a circle with centre O. If $\angle POB = 125°$, then ∠APO is equal to:



a. $25°$ b. $65°$ c. $90°$ d. $35°$

15. The length of the arc of the sector of a circle with radius 21 cm and of central angle 60°, is:

a. 22 cm b. 44 cm c. 88 cm d. 11 cm

16. The hour hand of a clock is 7 cm long. The angle swept by it between 7:00 a.m. and 8:10 a.m. is:

a. $\left(\frac{35}{4}\right)^\circ$ b. $\left(\frac{35}{2}\right)^\circ$ c. $35°$ d. $70°$

17. The total surface area of a solid hemisphere of diameter $2d$ is:

a. $3\pi d^2$ b. $2\pi d^2$ c. $\frac{1}{2}\pi d^2$ d. $\frac{3}{4}\pi d^2$

18. If the mean and mode of a data are 12 and 21 respectively, then its median is:

a. 6 b. 13.5 c. 15 d. 14

Directions: Question numbers 19 and 20 are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

a. Both, Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
b. Both, Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
c. Assertion (A) is true, but Reason (R) is false.
d. Assertion (A) is false, but Reason (R) is true.

19. **Assertion (A):** The probability that a leap year has 53 Mondays is $\frac{2}{7}$.

Reason (R): The probability that a non-leap year has 53 Mondays is $\frac{5}{7}$.

20. **Assertion (A):** The polynomial $p(y) = y^2 + 4y + 3$ has two zeroes.
Reason (R): A quadratic polynomial can have at most two zeroes.

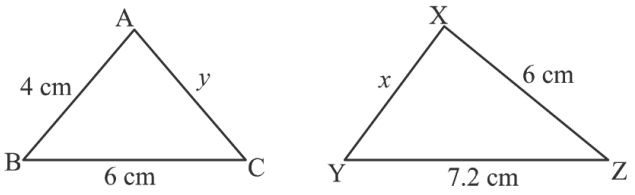
SECTION – B

Question numbers 21 to 25 are Very Short Answer (VSA) type questions, carrying 2 marks each.

21. **(A)** In ΔABC, DE || BC. If AD = x, DB = $x - 2$, AE = $x + 2$ and EC = $x - 1$, then find the value of x.

OR

(B) In the figure given below, ΔABC ~ ΔXYZ, then find the values of x and y.



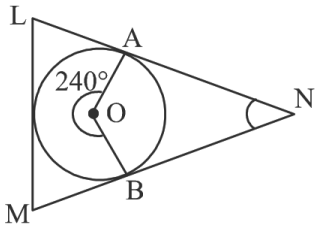
22. The coordinates of the centre of a circle are $(x - 7, 2x)$. Find the value(s) of x, if the circle passes through the point $(-9, 11)$ and has radius $5\sqrt{2}$ units.

23. **(A)** If $tan\ \theta = \frac{24}{7}$, then find the value of $sin\ \theta + cos\ \theta$.

OR

(B) If $cot\ \theta\ = \frac{7}{8}$, then find the value of $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$.

24. In the given figure, a circle with centre O is inscribed inside ΔLMN. A and B are the points of tangency. Find ∠ANB.



25. Find the zeroes of the quadratic polynomial $x^2 + 7x + 10$, and verify the relationship between the zeroes and its coefficients.

SECTION – C

Question numbers 26 to 31 are Short Answer (SA) type questions, carrying 3 marks each.

26. Prove that $\sqrt{2}$ is an irrational number.

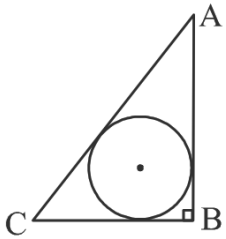
27. **(A)** If $x = h + a\ cos\ \theta, y = k + b\ sin\ \theta$, then prove that:

$\left(\frac{x-h}{a}\right)^2 + \left(\frac{y-k}{b}\right)^2 = 1.$

OR

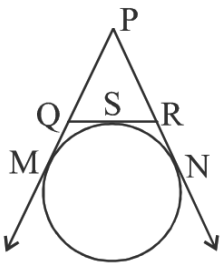
(B) Prove that: $\frac{\tan A}{1+\sec A} - \frac{\tan A}{1-\sec A} = 2\ cosec\ A.$

28. **(A)** In the given figure, ΔABC is a right triangle in which ∠B = 90°, AB = 4 cm and BC = 3 cm. Find the radius of the circle inscribed in the triangle ABC.



OR

(B) In the given figure, if a circle touches the side QR of ΔPQR at S and extended sides PQ and PR at M and N respectively, then prove that: $PM = \frac{1}{2}(PQ + QR + PR)$.



29. A solid is in the form of a cylinder with hemispherical ends. The total height of the solid is 20 cm and the diameter of the cylinder is 7 cm. Find the total volume of the solid. $\left(Use\ \pi\ = \frac{22}{7}\right)$.

30. Two dice of different colours are thrown at the same time. Write down all the possible outcomes. What is the probability that:

(i) same number appears on both the dice?

(ii) different number appears on both the dice?

31. Parthi and Alisha found a treasure that is exactly on the straight line joining their locations. Parthi's location is at point $(-6, -5)$ and Alisha's location is at point $(10, 11)$. The distance from the treasure to Parthi's location is three times that of the distance to Alisha's location. Find the coordinates of the location of the treasure.

SECTION – D

Question numbers 32 to 35 are Long Answer (LA) type questions, carrying 5 marks each.

32. **(A)** A faster train takes one hour less than a slower train for a journey of 200 km. If the speed of the slower train is 10 km/hr less than that of the faster train, find the speeds of the two trains.

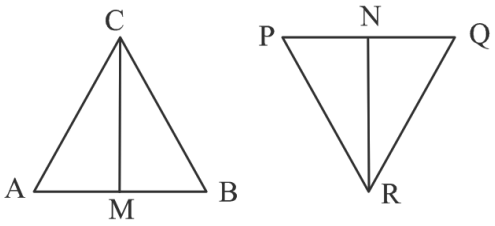
OR

(B) The sum of the areas of two squares is 640 m^2. If the difference in their perimeters is 64 m, find the sides of the two squares.

33. **(A)** State and prove Basic Proportionality Theorem.

OR

(B) In the given figure, CM and RN are respectively the medians of Δ ABC and ΔPQR. If ΔABC ~ ΔPQR, then prove that:



(i) $\Delta AMC \sim \Delta PNR$

(ii) $\Delta CMB \sim \Delta RNQ$

34. The monthly expenditure on fruits in 200 families of a Housing Society is given below. Find the value of x and also find the **mode** and **mean** expenditure on fruits.

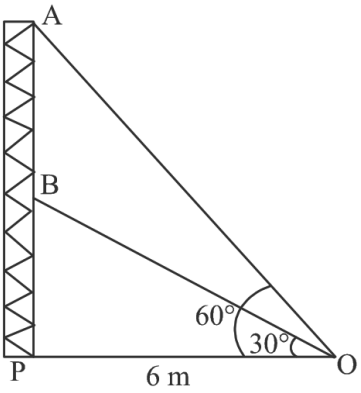
Monthly Expenditure (in ₹)	**No. of families**
1000 – 1500	24
1500 – 2000	40
2000 – 2500	33
2500 – 3000	28
3000 – 3500	x
3500 – 4000	22
4000 – 4500	16
4500 – 5000	7

35. Two sections, A and B, of class X contributed a total of ₹ 1500 for the Uttarakhand flood victims. The contribution from X-A was ₹ 100 less than that of X-B. Graphically, find the amounts contributed by both sections.

SECTION – E

Question numbers 36 to 38 are Case Study Based questions, carrying 4 marks each.

36. Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure. On a similar concept, a radio station tower was built in two sections 'A' and 'B'. Tower is supported by wires from a point 'O' (as shown in figure).



Distance between the base of the tower and point 'O' is 6 m. From point 'O', the angle of elevation of the top of the section 'B' is 30° and the angle of elevation of the top of section 'A' is 60°.

Based on the above information, answer the following questions:

(i) Find the length of the wire from the point 'O' to the top of section 'B'.

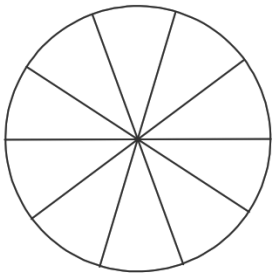
(ii) Find the length of the wire from the point 'O' to the top of section 'A'.

(iii) (a) Find the distance AB.

OR

(b) Find the area of Δ OPB.

37. A brooch is crafted from silver wire in the shape of a circle with a diameter of 35 cm. The wire is also used to create 5 diameters, dividing the circle into 10 equal sectors as shown in figure.



Based on the above information, answer the following questions:

(i) What is the radius of the circle?

(ii) What is the circumference of the brooch?

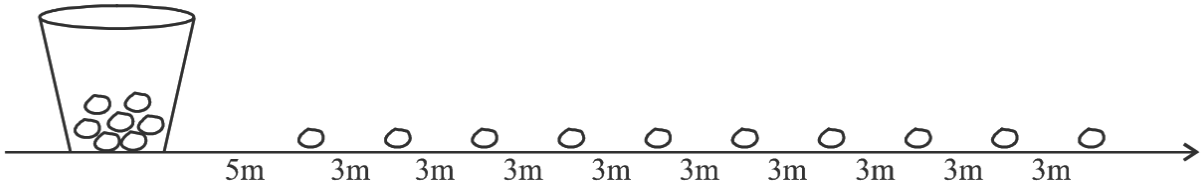
(iii) (a) What is the total length of the silver wire required?

OR

(b) What is the area of each sector of the brooch?

38. In a potato race, a bucket is placed at the starting point, which is 5 m from the first potato. The other potatoes are arranged 3 m apart in a straight line, with a total of 10 potatoes, as shown in the figure:

A competitor starts from the bucket, picks up the nearest potato, runs back to the bucket to drop it in, then returns to pick up the next potato. This process continues until all the potatoes are in the bucket.



Based on the above information, answer the following questions:

(i) What is the distance covered to pick up the first potato and drop it in bucket?

(ii) What is the distance covered to pick up the second potato and drop it in bucket?

(iii) (a) What is the total distance the competitor has to run?

OR

(b) If average speed of competitor is 5 m/s, then find the average time taken by competitor to put all the potatoes in the bucket.