

## General Instructions:

Read the following instructions very carefully and strictly follow them:

- (i) This question paper contains **38** questions. **All** questions are **compulsory**.
- (ii) This question paper is divided into **five** Sections – **A, B, C, D** and **E**.
- (iii) 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.
- (iv) In **Section B** – Question numbers **21** to **25** are Very Short Answer (VSA) type questions, carrying **2** marks each.
- (v) In **Section C** – Question numbers **26** to **31** are Short Answer (SA) type questions, carrying **2** marks each.
- (vi) In **Section D** – Question numbers **32** to **35** are Long Answer (LA) type questions carrying **5** marks each.
- (vii) In **Section E** – Question numbers **36** to **38** are **Case Study Based** questions carrying **4** marks each. Internal choice is provided in **2** marks question in each case study.
- (viii) 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**.
- (ix) Draw neat diagrams wherever required. Take  $\pi = \frac{22}{7}$  wherever required, if not stated.
- (x) Use of calculator is **not allowed**.

**SECTION – A**

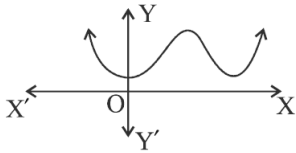
**20 × 1 = 20**

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

1. The HCF of 960 and 432 is:

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

2. The natural number 2 is:
- a prime number
  - a composite number
  - prime as well as composite
  - neither prime nor composite
3. For any natural number  $n$ ,  $6^n$  ends with the digit:
- 0
  - 6
  - 3
  - 2
4. The graph of  $y = f(x)$  is given. The number of zeroes of  $f(x)$  is:



- 0
  - 1
  - 2
  - 4
5. If a pair of linear equations in two variables is represented by two coincident lines, then the pair of equations has:
- a unique solution
  - two solutions
  - no solution
  - an infinite number of solutions
6. The common difference of the A.P.:  $\sqrt{2}, 2\sqrt{2}, 3\sqrt{2}, 4\sqrt{2}, \dots$  is:
- $\sqrt{2}$
  - 1
  - $2\sqrt{2}$
  - $-\sqrt{2}$
7. If  $\Delta ABC$  and  $\Delta DEF$  are similar such that  $2 AB = DE$  and  $BC = 8$  cm, then  $EF$  is equal to:
- 4 cm
  - 8 cm
  - 12 cm
  - 16 cm
8. The mid – point of the line segment joining the points  $(5, -4)$  and  $(6, 4)$  lies on:
- $x - axis$
  - $y - axis$
  - origin
  - neither  $x - axis$  nor  $y - axis$
9. Given that  $\sin \theta = \frac{a}{b}$ , then  $\cos \theta$  is equal to:
- $\frac{b}{\sqrt{b^2 - a^2}}$
  - $\frac{b}{a}$
  - $\frac{\sqrt{b^2 - a^2}}{b}$
  - $\frac{a}{\sqrt{b^2 - a^2}}$
10. If  $\cos A = \frac{1}{2}$ , then the value of  $\sin^2 A + 2 \cos^2 A$  is:
- $\frac{3}{2}$
  - $\frac{5}{4}$
  - 1
  - $\frac{1}{2}$

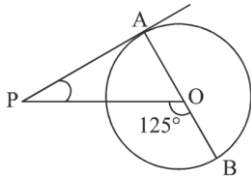
11. A car is moving away from the base of a 30 m high tower. The angle of elevation of the top of the tower from the car at an instant, when the car is  $10\sqrt{3}$  m away from the base of the tower is:

- a.  $30^\circ$       b.  $45^\circ$       c.  $90^\circ$       d.  $60^\circ$

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

- a.  $60^\circ$       b.  $70^\circ$       c.  $80^\circ$       d.  $90^\circ$

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



- a.  $25^\circ$       b.  $65^\circ$       c.  $90^\circ$       d.  $35^\circ$

14. The length of the arc of the sector of a circle with radius 21 cm and of central angle  $60^\circ$ , is:

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

15. 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.  $35^\circ$       d.  $70^\circ$

16. 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.  $\frac{3}{4}\pi d^2$

17. 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

18. A die is thrown once. Probability of getting a number other than 3 is:

- a.  $\frac{1}{6}$       b.  $\frac{3}{6}$       c.  $\frac{5}{6}$       d. 1

**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

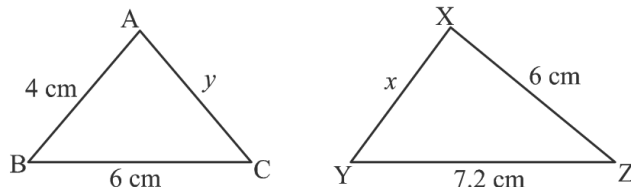
**Question numbers 21 to 25 are Very Short Answer (VSA) type questions, carrying 2 marks each.**

21. If  $\alpha, \beta$  are the zeroes of the polynomial  $p(x) = x^2 - 3x - 1$ , then find the value of  $\frac{1}{\alpha} + \frac{1}{\beta}$ .

22. (A) In  $\Delta ABC$ ,  $DE \parallel BC$ . 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 above,  $\Delta ABC \sim \Delta XYZ$ , then find the values of  $x$  and  $y$ .



23. 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.

24. (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  $\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)}$ .

25. Two concentric circles are of radii 5 cm and 4 cm. Find the length of the chord of the larger circle which touches the smaller circle.

### SECTION – C

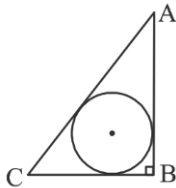
Question numbers 26 to 31 are Short Answer (SA) type questions, carrying 3 marks each.

26. Prove that  $\sqrt{3}$  is an irrational number.
27. Find the ratio in which the  $x$  – axis divides the line segment joining the points  $(-6, 5)$  and  $(-4, -1)$ . Also, find the point of intersection.
28. (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

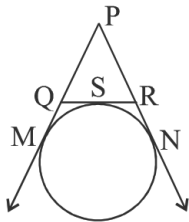
(B) Prove that:  $\frac{\tan A}{1+\sec A} - \frac{\tan A}{1-\sec A} = 2 \operatorname{cosec} A$ .

29. (A) In the given figure,  $\Delta ABC$  is a right triangle in which  $\angle B = 90^\circ$ ,  $AB = 4$  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  $\Delta PQR$  at  $S$  and extended sides  $PQ$  and  $PR$  at  $M$  and  $N$  respectively, then prove that:  $PM = \frac{1}{2} (PQ + QR + PR)$ .



30. 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. (Use  $\pi = \frac{22}{7}$ ).
31. Two dice of different colours are thrown at the same time. Write down all the possible outcomes. What is the probability that:
- same number appears on both the dice?
  - different number appears on both the dice?

**SECTION – D**

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

32. Determine graphically, the coordinates of vertices of a triangle whose equations are  $2x - 3y + 6 = 0$ ;  $2x + 3y - 18 = 0$  and  $x = 0$ . Also, find the area of this triangle.
33. (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**

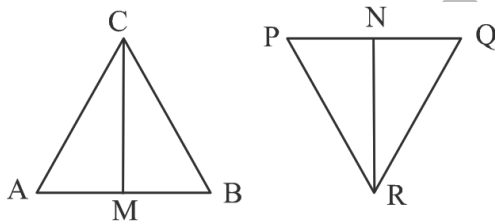
(B) The sum of the areas of two squares is  $640 m^2$ . If the difference in their perimeters is 64 m, find the sides of the two squares.

34. (A) State and prove Basic Proportionality Theorem.

**OR**

(B) In the given figure, CM and RN are respectively the medians of  $\Delta ABC$  and  $\Delta PQR$ . If  $\Delta ABC \sim \Delta PQR$ , then prove that:

- (i)  $\Delta AMC \sim \Delta PNR$   
(ii)  $\Delta CMB \sim \Delta RNQ$



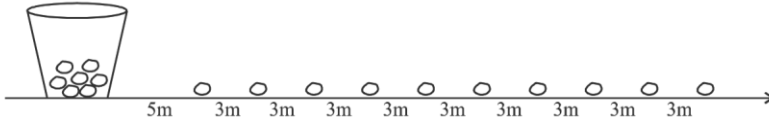
35. The mean of the following frequency distribution is 35. Find the values of  $x$  and  $y$ , if the sum of frequencies is 25:

Class	Frequency
0 – 10	1
10 – 20	$x$
20 – 30	5
30 – 40	7
40 – 50	$y$
50 – 60	3
60 – 70	1

## SECTION – E

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

36. 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.

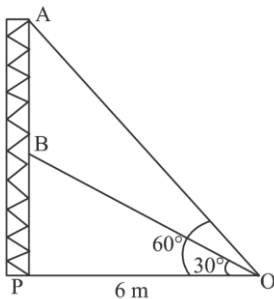
**Based on the above information, answer the following questions:**

- (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.

37. 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  $30^\circ$  and the angle of

elevation of the top of section 'A' is  $60^\circ$ .

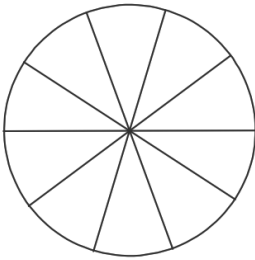
**Based on the above information, answer the following questions:**

- (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  $\Delta OPB$ .

38. 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?