

INSTRUCTIONS :

- (1) All the questions are compulsory. Internal options are available in certain questions.
- (2) In all **39 questions** in this question paper are divided into **four sections** A, B, C and D.
- (3) The numbers on the right side represent the marks of that question (Section).
- (4) Draw figure, wherever necessary. Maintain the lines and arcs of the construction.
- (5) Start writing a new section from a new page. Answer the questions in serial order.
- (6) Use of calculator is not permitted.

SECTION - A
Answer according to instruction : (Question no.1 to 16) [1 mark each]
[16]
State whether the following statements are True or False.

1. If the graph of a polynomial intersects the x-axis at only one point, it cannot be quadratic polynomial.
2. The quadratic equation $x^2 + x + 1 = 0$ has no real roots.

3. The sum of first n natural numbers is given by $\frac{n(n+1)}{2}$.

4. $(\tan \theta + 2)(2 \tan \theta + 1) = 5 \tan \theta + \sec^2 \theta$.

Select an option for correct statement.

5. For a frequency distribution, Mode – Median = \times (Median – Mean)

- (1) 1 (2) 2 (3) 3 (4) 4

6. Among the followings, cannot be the probability of an event.

- (1) $\frac{2}{3}$ (2) 0.7 (3) 0.15 (4) 1.5

7. If $P(A) : P(\bar{A}) = 3 : 5$, then $P(A) = \dots\dots\dots$

- (1) $\frac{3}{5}$ (2) $\frac{5}{3}$ (3) $\frac{5}{8}$ (4) $\frac{3}{8}$

8. The sum of the numerator and the denominator of a fraction is 12. If the denominator is increased by 3, the fraction becomes $\frac{1}{2}$. Then, that fraction is

- (1) $\frac{5}{7}$ (2) $\frac{7}{5}$ (3) $\frac{3}{8}$ (4) $\frac{8}{3}$

Fill in the blanks for correct statement.

9. If $x = 2, y = 3$ is a solution of equation $5x - 3y = k$. then $k = \dots\dots\dots$

10. The area of a triangle with vertices (3, 0), (7, 0) and (8, 4) is sq units.

11. If $\cos A = \frac{4}{5}$, then $\tan A = \dots\dots\dots$

12. The four sides of a quadrilateral ABCD are tangents to a circle. If $AB = 7.2$ cm $BC = 8.5$ cm and $DA = 6.9$ cm, then $CD = \dots\dots\dots$ cm.

Answer in one word or one number or one sentence:

13. The area of a circle is 220 cm^2 . Find the area of a square inscribed in the circle.
14. The diameter of the base of a right circular cylinder is 28 cm and its height is 21 cm. Find its curved surface area.
15. Find the probability of scoring 35 marks in a 50-mark test.
16. Find the probability that there are 5 Sundays in the month of February in a leap year.

SECTION - B

Do as directed (Q-17 to Q-26) [2 marks each]

[20]

17. The measurements of a room are 7 m 50 cm, 6 m and 3 m 75 cm. Find the length of the longest rod that can measure all the three dimensions of the room exactly.
18. Use Euclid's division lemma to show that the square of any positive integer is either of the form $3m$ or $3m + 1$ for some integer m .
19. Find the zeroes of the quadratic polynomial $x^2 + 7x + 10$, and verify the relationship between the zeroes and the coefficients.
20. Solve by the elimination method : $\frac{x+1}{2} + \frac{y-1}{3} = 9$ and $\frac{x-1}{3} + \frac{y+1}{2} = 8$

OR

Places A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 1 hour. What are the speed of the two cars?

21. If $\cot \theta = \frac{7}{8}$, evaluate $\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)}$

22. Find the value of x in the following equation:
 $\sin 2x = \sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$

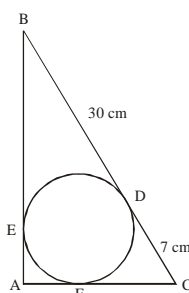
OR

If $\sin \theta + \sin^2 \theta = 1$, prove that $\cos^2 \theta + \cos^4 \theta = 1$.

23. XY is a tangent to a circle with centre O touching the circle at Y. If $OX = 61$ cm and the diameter of the circle is 22 cm, find XY.

OR

In the given figure, BC, BA and AC are tangents to the circle touching the circle at D, E and F respectively. If $BD = 30$ cm, $CD = 7$ cm and $\angle A = 90^\circ$, find the radius of the circle.



24. The following data gives the information on the observed lifetime (in hours) of 225 electric components:

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

Determine the modal lifetime of the components.

25. A girl of height 90 cm is walking away from the base of a lamp-post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground, find the length of her shadow after 4 seconds.
26. A two digit number is such that the product of the digits is 20. If 9 is subtract from the number, the digits interchange their places. Find the number.

OR

Find the roots of the following quadratic equation using the quadratic formula : $\frac{1}{3}x^2 - \sqrt{11}x + 1 = 0$

SECTION - C

Do as directed : (Q-27 to Q-34) [3 marks each]

[24]

27. What must be added to polynomial $2x^3 + 9x^2 - 15$ so that the resulting polynomial is exactly divisible by $2x + 3$?
28. The difference of squares of two numbers is 180. The square of the smaller number is 8 times the larger number. Find the two numbers.
29. Find the 20th term from the last term of the AP : 3, 8, 13, ..., 253.

OR

Find the sum of the first 15 multiples of 8.

30. In what ratio does the point $(-4, 6)$ divide the line segment joining the point $A(-6, 10)$ and $B(3, -8)$?
31. The following distribution shows the daily pocket allowance of children of a location.

Daily pocket allowance (in Rs)	11-13	13-15	15-17	17-19	19-21	21-23	23-25
Number of children	7	6	9	13	f	5	4

The mean pocket allowance is Rs 18. Find the missing frequency f.

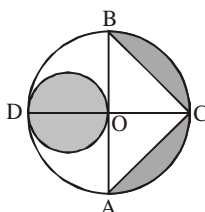
OR

The mode of the following frequency distribution of 165 observations is 34.5 :

Class	5-14	14-23	23-32	32-41	41-50	50-59	59-58
Frequency	5	11	a	53	b	16	10

Find the values of a and b.

32. Prove that the lengths of tangents drawn from an external point to a circle are equal.
33. In the given figure, AB and CD are two diameters of a circle (with centre O) perpendicular to each other and OD is the diameter of the smaller circle. If $OA = 7$ cm, find the area of the shaded region.



34. A farmer connects a pipe of internal diameter 20 cm from a canal into a cylindrical tank in her field, which is 10 m in diameter and 2 m deep. If water flows through the pipe at the rate of 3 km/h, in how much time will the tank be filled?

OR

A solid iron pole consists of a cylinder of height 220 cm and base diameter 24 cm, which is surmounted by another cylinder of height 60 cm and radius 8 cm. Find the mass of the pole, given that 1 cm³ of iron has approximately 8 g mass. (Use $\pi = 3.14$)

SECTION - D

Do as directed : (Q-35 to Q-39) [4 marks each]

[20]

35. Draw a triangle ABC with side BC = 6 cm, AB = 5 cm and $\angle ABC = 60^\circ$. Then construct a triangle whose sides are $\frac{3}{4}$ of the corresponding sides of the triangle ABC. Write the steps of construction.

OR

Draw a circle of radius 6 cm. From a point 10 cm away from its centre, construct the pair of tangents to the circle and measure their lengths. Write the steps of construction.

36. Roohi travels 300 km to her home partly by train and partly by bus. She takes 4 hours if she travels 60 km by train and the remaining by bus. If she travels 100 km by train and the remaining by bus, she takes 10 minutes longer. Find the speed of the train and the bus separately.
37. A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30° , which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60° . Find the time taken by the car to reach the foot of the tower from this point.
38. A hemispherical tank full of water is emptied by a pipe at the rate of $3\frac{4}{7}$ litres per second. How much time will it take to empty half the tank, if it is 3 m in diameter? (Take $\pi = \frac{22}{7}$)
39. In $\triangle PQR$, $\angle Q = 90^\circ$. Then, prove that $PQ^2 + QR^2 = PR^2$.

OR

Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.