Naman Duhan

FIRST TERM EXAMINATION (2025-26)

CLASS - X

SUBJECT - STANDARD MATHEMATICS

Time : 3 Hrs. **Max. Marks : 80**

General Instructions:

1. This question paper has 5 sections A-E.
2. Section A has 20 questions carrying 1 mark each.
3. Section B has 5 questions carrying 2 marks each.
4. Section C has 6 questions carrying 3 marks each.
5. Section D has 4 questions carrying 5 marks each.
6. Section E has 3 case based integrated units of assessment (4 marks each)
7. All questions are compulsory, however internal choices have been provided in two questions of 5 marks, two questions of 3 marks and two questions of 2 marks.
8. Draw neat figures wherever required and take $\pi=22/7$ if not stated.

Section- A

1. The LCM of the smallest prime number and the smallest odd composite number is:

(a) 10 (b) 6 (c) 9 (d) 18

2. The pair of linear equation $\frac{3x}{2} + \frac{5y}{3} = 7$ and $9x + 10y = 14$ are

(a) consistent
(b) inconsistent
(c) consistent with one solution
(d) consistent with many solutions

3. If a and ß are the zeros of the polynomial $p(x) = kx^2 - 30x + 45k$ and $\alpha + \beta = \alpha\beta$, then the value of k is

(a) $\frac{-2}{3}$ (b) $\frac{-3}{2}$ (c) $\frac{3}{2}$ (d) $\frac{2}{3}$

4. Let p be a prime number. The quadratic equation having its roots as factors of p is

(a) $x^2 - px + p = 0$
(b) $x^2 + (p + 1)x + p = 0$
(c) $x^2 - (p + 1)x + p = 0$
(d) $x^2 - px + p + 1 = 0$

5. The distance between the points P(cosθ, sinθ) and Q(sinθ, - cosθ) is

(a) $\sqrt{2\cos\theta \sin\theta}$ (b) $\sqrt{2}$ (c) 1 (d) 2

6. Given that m+ 2, where m is a positive integer, is a zero of the polynomial $q(x) = x^2 - mx - 6$. Which of these is the value of m?

(a) 1 (b) 2 (c) 3 (d) 4

7. The pair of equations $ax + 2y = 9$ and $3x + by = 18$ represents parallel lines, where a, b are integers, if:

(a) $a = b$ (b) $3a = 2b$ (c) $2a = 3b$ (d) $ab = 6$

8. If the point P(x, y) is equidistant from A(5, 1) and B(-1, 5), then

(a) $5x = y$ (b) $x = 5y$ (c) $3x = 2y$ (d) $2x = 3y$

9. One of the roots of the quadratic equation $x^2 + 5x - (a + 1)(a + 6) = 0$, where a is constant, are:

(a) $(a + 1)$ (b) $-a + 6$ (c) $(a + 6)$ (d) $-(a + 1)$

10. ΔABC is such that AB = 3cm, BC = 2cm, CA = 2.5cm. If $\Delta ABC \sim \Delta DEF$ and EF = 4cm, then perimeter of ΔDEF is

(a) 7.5cm (b) 15cm (c) 22.5cm (d) 30 cm

11. Which of the following quadratic equations has the sum of its roots as 4?

(a) $2x^2 - 4x + 8 = 0$
(b) $-x^2 + 4x + 4 = 0$
(c) $4x^2 - 4x + 4 = 0$
(d) $\sqrt{2}x^2 - \frac{4x}{\sqrt{2}} + 1 = 0$

12. The 11th term from the end of the AP: 10, 7, 4, ..., -62 is:

(a) 25 (b) 16 (c) -32 (d) 0

13. If $\sec^2 A = \cot^2 30° + 2\cos^2 45°$, then value of $\sin^2 A$ is equal to

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) 1

14. Two AP's have the same common difference. The first term of one of these is 8 and that of the other is 3. The difference between their 30th terms is

(a) 11 (b) 3 (c) 8 (d) 5

15. $(\text{cosec}\theta - \sin\theta)(\sec\theta - \cos\theta)(\tan\theta + \cot\theta)$ is equal to

(a) $2\sqrt{2}$ (b) 0 (c) 1 (d) $\sqrt{2}$

16. The probability of guessing the correct answer to a certain question is $\frac{a}{b}$.

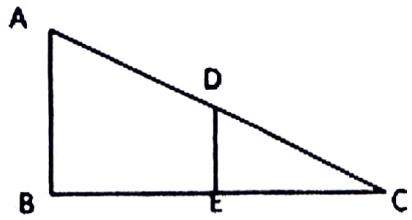
If the probability of not guessing the correct answer to this question is $\frac{2}{3}$ then

(a) $b = 4a$ (b) $b = 3a$ (c) $2b = 3a$ (d) $b = a$

17. A bag contains cards numbered from 1 to 25. A card is drawn at random from the bag. The probability that the number on this card is divisible by both 2 and 3 is

(a) $\frac{1}{5}$ (b) $\frac{3}{25}$ (c) $\frac{4}{25}$ (d) $\frac{2}{25}$

18. In ΔABC, $DE \| AB$. If $AB = a$, $DE = x$, $BE = b$ and $EC = c$. Then, $x =$



(a) $\frac{ac}{b}$ (b) $\frac{ac}{b+c}$ (c) $\frac{ab}{c}$ (d) $\frac{ab}{b+c}$

Direction: In Question 19 And 20, a statement of assertion(A)is followed by a statement of Reason (R). Choose the correct option

(a) Both Assertion(A)and Reason(R) are true and Reason(R)is the correct explanation of assertion (A).

(b) Both Assertion(A) and Reason(R) are true but Reason(R) is not the correct explanation of 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): 2 is a prime number
Reason(R): The square of an irrational number is always a prime number.

20. Assertion(A): The 11th term of a an AP 7, 9, 11, 13,..... is 26
Reason(R): If S_n is the sum of first n terms of an AP then its n^{th} term a_n is given by $a_n = S_n - S_{n-1}$.

SECTION B

21. Two numbers are in the ratio 2: 3 and their LCM is 180. What is the HCF of these numbers?

22. If the system of linear equations $2x + 3y = 7$ and $2ax + (a + b)y = 28$ have infinitely many solutions, then find the value of a and b.

OR

Solve the following system of equations algebraically:

$37x + 63y = 137$
$63x + 37y = 163$

23. Find the value of k, for which one root of the quadratic equation $kx^2 - 14x + 8 = 0$ is six times the other.

24. Find the value of x for which

$(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = x + \tan^2 A + \cot^2 A$

OR

Evaluate the following:

$$\frac{3 \sin 30° - 4 \sin^3 30°}{2 \sin^2 50° + 2 \cos^2 50°}$$

25. Find the coordinates of the point C which lies on the line AB produced such that AC =2BC, where coordinates of point A and B are (-1, 7) and (4, -3) respectively.

SECTION C

26. Prove that $5 + 2\sqrt{3}$ is an irrational number.

OR

The traffic lights at three different road crossings change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 7 am, at what time will they change together next?

27. A box contains cards bearing numbers from 6 to 70. If one card is drawn at random from the box, find the probability that it bears:

i) a number divisible by 5
ii) an odd number less than 30
iii) a composite number between 50 and 70

28. Prove that: $\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A} = 1 + \sec A \operatorname{cosec} A$

29. Find the coordinates of the centre of the circle passing through the points (0, 0), (-2,1) and (-3, 2).

OR

Find the area of a rhombus if the vertices are (3, 0), (4, 5), (-1, 4) and (-2, -1) taken in order.

30. If the ratio of the 11th term of an AP to its 18th term is 2: 3, find the ratio of the sum of the first five terms to the sum of its first ten terms.

31. If a line is drawn parallel to one side of a triangle intersecting the other two sides, then it divides the other two sides in the same ratio. Prove it.

SECTION D

32. Solve the following system of equations graphically
$x + 3y = 6$
$2x - 3y = 12$
and hence find the value of a, If $4x + 3y = a$

33. If the sum of the squares of the zeros of the quadratic polynomial $kx^2 + 4x + 4$ is 24, find the value of k.

OR

If α and β are the zeros of the quadratic polynomial $f(x) = 3x^2 - 4x + 1$, find the quadratic polynomial whose zeros are $\frac{\alpha^2}{\beta}$ and $\frac{\beta^2}{\alpha}$.

34. Prove that $\frac{\sin A - \cos A + 1}{\sin A + \cos A - 1} = \frac{1}{\sec A - \tan A}$

35. An express train takes 1 hr less than a passenger train to travel 132 km between Mysore and Bengaluru (without taking into consideration the time they stop at Intermediate stations). If the average speed of the express train is 11km/h more than that of the passenger train, find the average speed of the two trains.

OR

A two digit number is such that the product of its digits is 18. When 63 is subtracted from the number, the digits interchange their places. Find the number.

SECTION E

Q36. In Mathematics, relations can be expressed in various ways. Matchstick patterns are an example of linear relations. Different strategies can be used to calculate the number of matchsticks used in different figures. One such pattern is given below. Observe the pattern and answer the following questions using Arithmetic Progression:

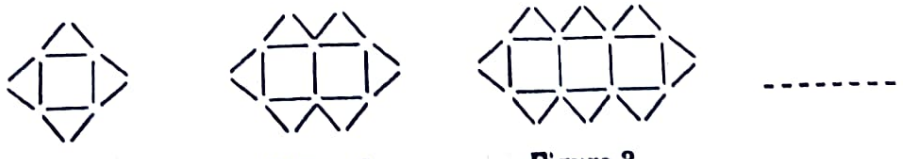


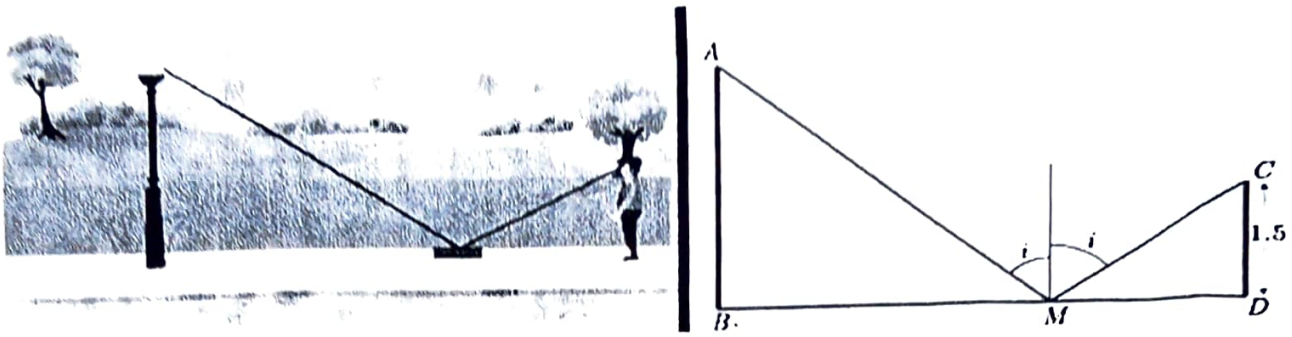
Figure 1 *Figure 2* *Figure 3*

i) Write the AP for the number of triangles used in the figures. Also, write the n^{th} term of this AP. (1)

ii) Which figure has 61 matchsticks? (1)

iii) If 2 more matchsticks are added in each figure, then the number of matchsticks in each figure forms an AP? If yes, find the number of matchsticks used in the 10^{th} figure. (2)

37. Ramesh places a mirror on level ground to determine the height of a pole. He stands at a certain distance so that he can see the top of the pole reflected in the mirror. Ramesh's eye level is 1.5 m above the ground. The distances from the mirror to Ramesh and from the mirror to the pole are 1.8 m and 6 m, respectively.



Based on the above information answer the following questions:

i) Which criterion of similarity is applicable to the formed triangles? (1)

ii) What is the height of the pole? (1)

iii) Now, Ramesh moves back so that the distance between him and the pole is 13m. He places the mirror between himself and the pole to see the reflection of the pole's top correctly. What is the distance between Ramesh and the mirror? (2)

Q38. Two friends, Richa and Sohan, decided to count the total coins they had saved in their piggy banks. After counting, they found that they had fifty ₹ 1 coins, forty eight ₹ 2 coins, thirty six ₹ 5 coins, twenty eight ₹ 10 coins, and eight ₹ 20 coins. They then asked their friend, Nisha, to randomly select one of the coins.

Based on the above information, answer the following questions:

i) Find the probability that the coin chosen is ₹ 5 coin. (1)

ii) Find the probability that the coin chosen is ₹ 20 coin. (1)

iii) Find the probability that the coin chosen is of denomination of at most ₹ 5. (2)