



HANSRAJ PUBLIC SCHOOL  
SECTOR-6, PANCHKULA  
Class- X, HALF YEARLY (2022-23)  
SUBJECT-MATHS

Date- 12-09-2022

Time: 3 hours

General Instructions:

1. The question paper consists of 39 questions divided into 4 sections A, B, C, D.
2. All questions are compulsory.
3. Section A comprises of 25 questions of 1 mark each.
4. Section B comprises of 5 questions of 3 marks each.
5. Section C comprises of 5 questions of 4 marks each.
6. Section D comprises of four case study-based questions of 5 marks each.

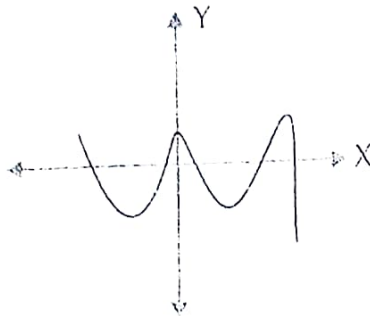
Roll No. 20  
Maximum Marks: 80

SECTION A

Q.1. Find the LCM of smallest two-digit composite number and smallest composite number

Q.2. Find the sum of exponents of prime factors in the prime factorisation of 196.

Q.3. The graph of  $y = p(x)$ , where  $p(x)$  is a polynomial in variable  $x$ , is as follows:



How many zeroes,  $p(x)$  has?

Q.4. If sum and product of the zeroes of a quadratic polynomial are 3 and -10 respectively then find the polynomial.

Q.5. What type of solution the following pair of equations  $X + 3Y - 5 = 0$  and  $2X + 3Y - 10 = 0$  has?

Q.6. Find whether the lines representing the following pair of linear equations intersect at a point, are parallel or coincident:

$$2x + y + 3 = 0$$

$$4x + 2y + 6 = 0$$

Q.7. If the common difference of an AP is 5, then what is  $a_{18} - a_{13}$ ?

Q.8. AOBC is a rectangle whose three vertices are A(0, -3), O(0, 0) and B(4, 0). The length of its diagonal is \_\_\_\_\_.

Q.9. Find the value of k for which the zeros of the polynomial  $3x^2 - 10x + k$  are reciprocal of each other.

Q.10. Form a pair of linear equation for the following problem - "The sum of the digits of a two-digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits."

Q.11. The equation of the form  $ax^2 + bx = 0$  will always have \_\_\_\_\_ roots.

#### ASSERTION & REASONING QUESTIONS

DIRECTION: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Write the correct choice as:

(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.

Q.12. Assertion:  $\sin A$  is the product of  $\sin$  and  $A$ .

Reason: The value of sine increases as  $\theta$  increases.

Q.13. Assertion:  $12^n$  ends with the digit zero, where  $n$  is natural number.

Reason: Any number ends with digit zero, if its prime factor is of the form  $2^m \times 5^n$ , where  $m, n$  are natural numbers.

Q.14. Assertion: The point (0, 4) lies on y-axis.

Reason: The x- co-ordinate of the point on y-axis is zero.

Q.15. If a point P is 17 cm from the centre of a circle of radius 8 cm, then find the length of the tangent drawn to the circle from point P.

Q.16. If  $\sin x + \cos y = 1$ ;  $x = 30^\circ$  and  $y$  is an acute angle, find the value of  $y$ .

MULTIPLE CHOICE TYPE QUESTIONS: - Write the correct choice.

Q.17. If HCF (336, 54) = 6, LCM (336, 54) will be

- (a) 2024 (b) 3024  
(c) 1012 (d) 1512

Q.18. If sum of the zeroes of the quadratic polynomial  $3x^2 - kx + 5$  is 3, then the value of k will be

- (a) 1 (b) 4  
(c) 6 (d) 9

Q.19. What are the values of x and y for the following system of linear equations?

$$2x - y = 2; \quad x + 3y = 15$$

- (a) 4 and 5 (b) 3 and 4  
(c) 5 and 4 (d) 4 and 4

Q.20.  $(x^2 + 1)^2 - x^2 = 0$  has

- (a) four real roots (b) two real roots  
(c) no real roots (d) one real roots

Q.21. The number of terms of the series 5, 7, 9, ..... that must be taken in order to have the sum 1020 is

- (a) 20 (b) 30  
(c) 40 (d) 50

Q.22. In what ratio does the point P (-4, 6), divides the line segment joining the points

A (-6, 10), and B (3, -8)?

- (a) 7 : 8 (b) 7 : 2  
(c) 2 : 8 (d) 2 : 7

Q.23. If  $\sin \theta = \frac{5}{13}$ , then the value of  $\tan \theta$  is .....

- (a)  $\frac{5}{13}$  (b)  $\frac{12}{13}$   
(c)  $\frac{5}{12}$  (d)  $\frac{8}{12}$

Q.24. The value of the  $\tan^2 60^\circ + \sin^2 45^\circ$  is

- (a)  $\frac{1}{2}$  (b)  $\frac{3}{2}$   
(c) 1 (d)  $\frac{7}{2}$

Q.25. Number of tangents to a circle which are parallel to a secant, is

(a) 3

(b) 2

(c) 1

(d) infinite

## SECTION B

Q.26. Sumit is 3 times as old as his son. Five years later, he shall be two and a half times as old as his son. How old is Sumit at present?

Q.27. If the 10th term of an A.P. is 52 and the 17th term is 20 more than the 13th term, find A.P

Q.28. Evaluate:  $-\tan^2 30^\circ \sin 30^\circ + \cos 60^\circ \sin^2 90^\circ \tan^2 60^\circ - 2 \tan 45^\circ \cos^2 0^\circ \sin 90^\circ$

Q.29. A fast train takes 3 hours less than a slow train for a journey of 600 km. If the speed of the slow train is 10 km/h less than that of the fast train, find the speed of each train.

Q.30. If  $\sqrt{3}$  is an irrational number then prove that  $5 + \sqrt{3}$  is also an irrational number.

## SECTION C

Q.31. Solve for x and y:

$$27x + 31y = 85,$$

$$31x + 27y = 89$$

Q.32. The difference of two natural numbers is 5 and the difference of their reciprocals is  $\frac{1}{10}$ . Find the numbers.

Q.33. Prove that the parallelogram circumscribing a circle is a rhombus.

Q.34. The first term of an A.P. is 3, the last term is 83 and the sum of all its terms is 903. Find the number of terms and the common difference of the A.P.

Q.35. Prove that  $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$

## Section-D

### CASE STUDY-1

#### Q.36. VANMAHOTSAVA

Sarvodaya Vidyalaya is located in Champaran district of Bihar. The school decided to go for plantation drive on the occasion of VANMAHOTSAVA. It was decided that the number of trees, that each section of each class will plant, will be the same as the class in which they are studying, e.g., a section of Class I will plant 1 tree, a section of Class II will plant 2 trees and so on, till Class X. There are five sections of each class. Principal of the Vidyalaya asked forest department to provide plants for Vanmahotsava.

(I) How many plants were needed for plantation by all sections of class IV?

- (a) 20 (b) 25  
(c) 30 (d) 35

(II) How many plants were needed for plantation by all sections of Primary classes (1st to 5th)?

- (a) 65 (b) 75  
(c) 25 (d) 35

(III) How many plants were needed for plantation by all sections of class 7?

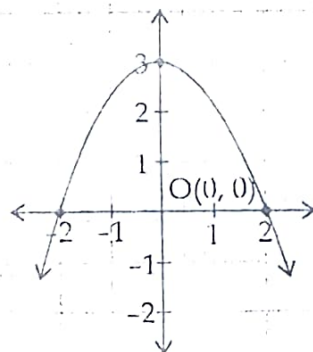
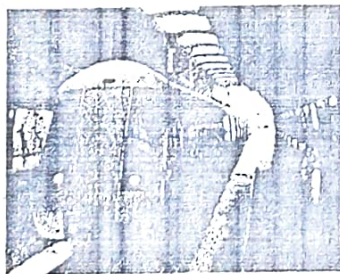
- (a) 30 (b) 35  
(c) 40 (d) 45

(IV) How many plants were needed for plantation by the whole school?

(V) How many plants were needed for plantation by classes 6th to 8th?

### CASE STUDY-2

Q.37. Seema is studying in class X. She visited the Metro station several times. One day she noticed the roof of the Metro Station. She observed that the roof is formed in a Mathematical shape, that she has learned in Maths class. On reaching home, Seema draws the following graph of the figure:



(I) Seema shows the roof of the metro station in which shape?

- (a) Spiral (b) ellipse  
(c) linear (d) Parabola

(II) How many zeroes are possible for this shape?

- (a) 2 (b) 3  
(c) 1 (d) 0

(III) In the graph, the zeroes of the polynomial are:

- (a) -2, 2 (b) 0, 2  
(c) 2, 0 (d) 0, 0

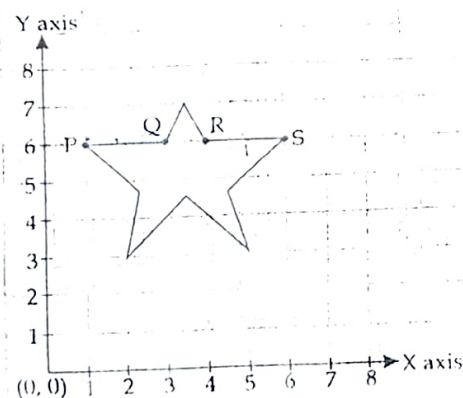
(IV) What will be the expression of the polynomial?

- (a)  $x^2 - 4x + 4$  (b)  $-x^2 - 4x + 4$   
(c)  $x^2 + 4x + 4$  (d)  $x^2 - 4$

(V) What is the value of the polynomial if  $x = 1$ ?

#### CASE STUDY-3

Q.38. Observe the given picture which shows a star shape on a Cartesian plane. Answer the following questions:



(I) What are the coordinates of point P?

- (a) (6, 1) (b) (1, 6)  
(c) (6, 6) (d) (0, 6)

(II) What is not true for points P, Q, R and S?

- (a) points P, Q, R and S are collinear.  
(b) ordinates of points P, Q, R and S are same.  
(c)  $PS = 6$  units  
(d)  $PQ = RS$

(III) What is the distance between P and Q?

(IV) What will be the coordinates of a point exactly between P and S?

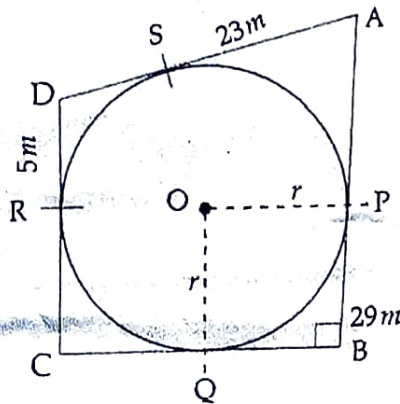
- (a) (6, 3.5)                      (b) (3.5, 6)  
(c) (7, 12)                        (d) (7, 6)

(V) The mid-point of line segment PQ divides it in the ratio:

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

#### CASE STUDY-4

Q.39. Q-2. ABCD is a playground. Inside the playground a circular track is present such that it touches AB at point P, BC at Q, CD at R and DA at S.  $AB=29\text{ m}$  and  $AD=23\text{ m}$ .



See the above figure and give answer of the following questions:

(I) If  $DR = 5\text{ m}$ , then  $DS$  is equal to:

- (a) 6 m                                (b) 11 m  
(c) 5 m                                (d) 18 m

(II) The length of  $AS$  is:

- (a) 18 m                                (b) 13 m  
(c) 14 m                                (d) 12 m

(III) The length of  $PB$  is:

- (a) 12 m                                (b) 11 m  
(c) 13 m                                (d) 20 m

(IV) What is the angle of  $OQB$ ?

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

(V) What is the diameter of given circle?