New Syllabus

15E

MATHEMATICS, Paper – I

[Real Numbers, Sets, Polynomials, Pair of Linear Equations in two variables, Quadratic Equations, Progressions, Co-ordinate Geometry]

(English version)

Time : 2 hours 45 minutes]   **[Maximum Marks : 40**

Instructions :

1. *Read the following Question paper and understand every question thoroughly without writing anything. 15 minutes time is allotted for this.*

2. *Answer **all** the questions from the given **four** sections.*

3. *Write answers to the Objective type questions (Section-IV) on Answer sheet, but at same place.*

4. *In Section-III, every question has internal choice. Answer to **anyone** alternative.*

SECTION - I   *(Marks : 7×1=7)*

1. *Answer **all** the following questions.*

2. *Each question carries **1** mark.*

1. If $x \neq -1$, then find the quotient of $\dfrac{x^5 + x^4 + x^3 + x^2}{x^3 + x^2 + x + 1}$.

2. Insert 4 rational numbers between $\dfrac{3}{4}$ and 1 without using $\dfrac{a+b}{2}$ formula.

3. If $A = \{x : x \in N \text{ and } x < 20\}$ and

$B = \{x : x \in N \text{ and } x \leq 5\}$,

then write the set $A - B$ in the Set-Builder form.

4. For what value of K, the following system of equations has a unique solution.

$x - Ky = 2$

$3x + 2y = -5$

5. " We can write a trinomial having degree 7."

Justify the above statement by giving one example.

6. Find the centroid of a triangle, whose vertices are (3, 4), (–7, –2) and (10, – 5).

7. The hand-borewell driller charges ₹ 200/- for the first one metre only and raises drilling charges at the rate of ₹ 30/- for every subsequent metre. Write a progression for the above data.

SECTION - II   (*Marks : 6×2=12*)

*1. Answer **all** the following questions.*

*2. Each question carries **2** marks.*

8. Write any three numbers of two digits. Find the L.C.M. and H.C.F. for the above numbers by the "Prime Factorization method."

9. "If we multiply or divide both sides of a linear equation by a non-zero number, then the roots of that linear equation will remain the same."

Is it true ? If so, justify with an example.

10. In a flower garden, there are 23 plants in the first row, 21 plants in the second row, 19 plants in the third row and so on. If there are 10 rows in that flower garden, then find the total number of plants in the last row with the help of the formula $t_n = a + (n-1)d$.

11. Give an example for each of the following :

(i) The product of two irrational numbers is a rational number.

(ii) The product of two irrational numbers is an irrational number.

12. If $A = \{x : x \in N, x < 6\}$ and

$B = \{x : x \in N, 3 < x < 8\}$,

then show that $A - B \neq B - A$ with the help of Venn diagram.

13. Show that the points A(4, 2), B(7, 5) and C(9, 7) are collinear.

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SECTION - III

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(Marks : 4×4=16)

1. *In this section, every question has internal choice.*

2. *Answer the **any one** alternative.*

3. *Each question carries **4** marks.*

14. (A) Prove that $3 + 2\sqrt{5}$ is an irrational number.

<div align="center">

OR

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14. (B) Name the type of the quadrilateral formed by joining the points

A(–1, –2), B(1, 0), C(–1, 2) and D(–3, 0) on a graph paper.

Justify your answer.

15. (A) Laxmi does not want to disclose the length, breadth and height of a cuboid of her project. She has constructed a polynomial $x^3 - 6x^2 + 11x - 6$ by taking the values of length, breadth and height as its zeros. Can you open the secret [i.e., find the measures of length, breadth and height] ?

<div align="center">OR</div>

15. (B) Solve the following pair of equations by reducing them to a pair of linear equations

$$\frac{5}{x-1} + \frac{1}{y-2} = 2 \quad \text{and} \quad \frac{6}{x-1} - \frac{3}{y-2} = 1.$$

16. (A) Draw a graph for the following pair of linear equations in two variables and find their solution from the graph.

$$2x + y = 5$$

$$3x - 2y = 4$$

<div align="center">OR</div>

16. (B) Draw a graph for the polynomial $p(x) = x^2 + 3x - 4$ and find its zeroes from the graph.

17. (A) If the nth terms of the Geometric Progressions 162, 54, 18, ... and

$$\frac{2}{81}, \frac{2}{27}, \frac{2}{9}, \dots\dots\dots$$ are equal, then find the value of n.

<div align="center">OR</div>

17. (B) If the sum of first 7 terms of an Arithmatic Progression is 49 and that of first 17 terms is 289, then find the sum of the first 'n' terms.

1.   *Choose the correct answer and write the corresponding alphabet (A, B, C or D) in the given answer booklet.*

2.   *Answer **all** questions and write them at the same place in your booklet.*

3.   *Each question carries ½ mark.*

18. Which of the following is not a linear equation ?

(A) $5 + 4x = y + 3$

(B) $x + 2y = y - x$

(C) ∙ $3 - x = y^2 + 4$

(D) $x + y = 0$

19. A pair of linear equations in two variables are $2x - y = 4$ and $4x - 2y = 6$. This pair of equations are ....

(A)   Consistent equations.

(B) ∙ Dependent equations.

(C)   Inconsistent equations.

(D)   Cannot say.

20. The quadratic polynomial, whose zeros are 2 and 3, is ......

(A) $x^2 - 5x - 6$

(B) $x^2 + 5x - 6$

(C) ∙ $x^2 - 5x + 6$

(D) $x^2 + 5x + 6$

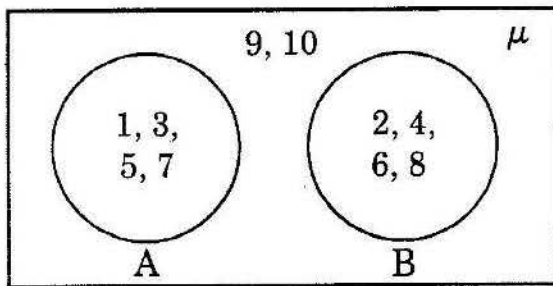**21.** Which of the following is a polynomial with only one zero ?

(A) $p(x) = 2x^2 - 3x + 4$

(B) $p(x) = x^2 - 2x + 1$

(C) $p(x) = 2x + 3$

(D) $p(x) = 5$

22. In Venn diagram given below :

(A) $A \cup B = \varnothing$

(B) $A \cup B = \mu$

(C) $A \cap B = \mu$

(D) $A \cap B = \varnothing$

23. The number of prime factors of 36 is .....

(A) 4

(B) 3

(C) 2

(D) 1

24. The exponential form of $\log_{10} 0.001 = -3$ is ......

(A) $(0.001)^{10} = -3$

(B) $(-3)^{10} = 0.001$

(C) $(10)^3 = -0.001$

(D) $(10)^{-3} = 0.001$

25. If a straight line passing through the points $P(x_1, y_1)$, $Q(x_2, y_2)$ is making an angle 'θ' with positive X-axis, then the slope of the straight line is ....

(A) $\dfrac{y_2 + y_1}{x_2 + x_1}$

(B) θ

(C) $\dfrac{y_2 - y_1}{x_2 - x_1}$

(D) $\sin \theta$

26. The common difference of an Arithmatic Progression, whose 3rd term is 5 and 7th term is 9, is ....
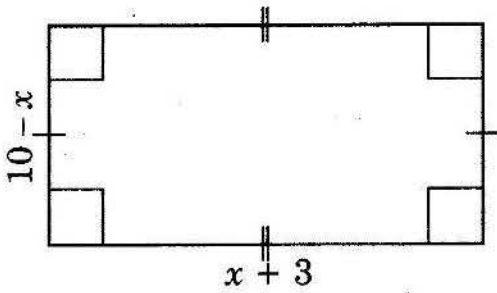
(A) 1

(B) 2

(C) 3

(D) 4

27. Observe the given rectangular figure, then its area in polynomial function is ......

(A) $A(x) = x^2 + 7x + 30$

(B) $A(x) = -x^2 + 7x + 30$

(C) $A(x) = x^2 - 7x + 30$

(D) $A(x) = -x^2 - 7x + 30$