

15E(A)

MATHEMATICS, Paper - I

(English version)

(Parts A and B)

Time : 2 hrs. 45 min.]

[Maximum Marks : 40

Instructions :

1. *In the time duration of 2 hours 45 minutes, 15 minutes of time is allotted to read and understand the Question paper.*
2. *Answer the Questions under Part - A on a separate answer book.*
3. *Write the answers to the questions under Part-B on the question paper itself and attach it to the answer book of Part-A.*

Part - A

Time : 2.15 Hours

Marks : 35

Note :

1. *Answer all the questions from the given three sections I, II and III of Part-A.*
2. *In section - III, every question has internal choice. Answer any one alternative.*

SECTION - I

(Marks : $7 \times 1 = 7$)

NOTE : (i) *Answer all the following questions.*

(ii) Each question carries 1 mark.

1. Find the value of $\log_5 125$.

2. If $A = \left\{ 1, \frac{1}{4}, \frac{1}{9}, \frac{1}{16}, \frac{1}{25} \right\}$, then write A in Set-builder form.

3. Write an example for a quadratic polynomial that has no zeroes.
4. If $b^2 - 4ac > 0$ in $ax^2 + bx + c = 0$; then what can you say about roots of the equation ? ($a \neq 0$)
5. Find the sum of first 200 natural numbers.
6. For what values of m , the pair of equations $3x + my = 10$ and $9x + 12y = 30$ have a unique solution.
7. Find the mid point of the line segment joining the points $(-5, 5)$ and $(5, -5)$

SECTION - II

(Marks : $6 \times 2 = 12$)

NOTE (i) Answer **all** the following questions.

(ii) Each question carries **2** marks.

8. If $x^2 + y^2 = 7xy$;
then show that $2 \log(x + y) = \log x + \log y + 2 \log 3$.
9. Length of a rectangle is 5 units more than its breadth. Express its perimeter in polynomial form.
10. Measures of sides of a triangle are in Arithmetic Progression. Its perimeter is 30 cm, and the difference between the longest and shortest side is 4 cm; then find the measures of the sides.
11. Show that the points $A(-3, 3)$, $B(0, 0)$, $C(3, -3)$ are collinear.

12. Solve the following pair of linear equations by Substitution method.

$$2x - 3y = 19 \text{ and } 3x - 2y = 21.$$

13. If $9x^2 + kx + 1 = 0$ has equal roots, find the value of k .

SECTION - III

(Marks : $4 \times 4 = 16$)

NOTE :

1. Answer **all** the following questions.
2. In this section, every question has internal choice.
3. Answer **any one** alternative.
4. Each question carries **4** marks.

14. Use Euclid's division lemma to show that the cube of any positive integer is of the form $7m$ or $7m+1$ or $7m+6$.

OR

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

15. Draw the graph for the polynomial $p(x) = x^2 - 3x + 2$ and find the zeroes from the graph.

OR

Draw the graph for the following pair of linear equations in two variables and find their solution from the graph.

$$3x - 2y = 2 \text{ and } 2x + y = 6.$$

16. Sum of the squares of two consecutive positive even integers is 100; find those numbers by using quadratic equations.

OR

X is a set of factors of 24 and Y is a set of factors of 36, then find sets $X \cup Y$ and $X \cap Y$ by using Venn diagram and comment on the answer.

17. Find the sum of all the three digit numbers, which are divisible by 4.

OR

Find the co-ordinates of the points of trisection of the line segment joining the points $(-3, 3)$ and $(3, -3)$.
