

S.S.C. PUBLIC EXAMINATIONS MARCH - 2011

**MATHEMATICS - Paper - I 15E(A)**

(English Version)

Time :  $2\frac{1}{2}$  Hours

Parts A and B

Maximum Marks : 50

Time : 2 Hours

Part-A

Marks : 35

**SECTION - I**

(Marks  $5 \times 2 = 10$ )

- I. Answer Any FIVE questions, choosing at least TWO from each of the following two Groups, i.e., A & B  
2. Each question carries 2 Marks.

**Group-A**

(Statements and Sets, Functions, Polynomials)

1. Define Implication and write the truth table.
2. If A and B are disjoint sets and  $n(A) = 4$ ,  $n(A \cup B) = 10$ , then find  $n(B)$ .
3. If function  $f : \mathbb{R} - \{2\} \rightarrow \mathbb{R}$  is defined as  $f(x) = \frac{2x+1}{x-2}$ ; then prove  $f\left(\frac{2x+1}{x-2}\right) = x$
4. Find the roots of the equation  $x^2 + x(c-b) + (c-a)(a-b) = 0$ .

**Group-B**

(Linear Programming, Real Numbers, Progressions)

5. Shade the region showing the inequation  $4x + 3y \geq 12$ .
6. If  $a + b + c = 0$ , then show  $x^{a^2b-1}c^{-1} \times x^{a-1}b^{2c-1} \times x^{a-1}b^{-1}c^2 = x^3$
7. Evaluate :  $\lim_{x \rightarrow a} \frac{x^{5/2} - a^{5/2}}{x - a}$
8. In A.P.  $t_n = (n-1)(n-2)$ , then show first and second terms are equal to '0' and find  $t_4$  and  $t_5$ .

**SECTION - II**

(Marks :  $4 \times 1 = 4$ )

Note : 1. Answer ANY (4) FOUR of the following (6) SIX questions. 2. Each question carries 1 mark.

9. "In a  $\Delta ABC$ ,  $AB > AC$ , then  $\angle C > \angle B$ ". Write inverse and contra-positive of the given statement.
10. Find  $f(2)$  for the function  $f(x) = \frac{2x-3}{x-1}$ .
11. If  $x^3 - 3x^2 + 4x + K$  is divisible by  $(x-2)$ , find the value of 'K'.
12. Find the maximum value of an objective function  $f = x + 4y$  at the given points  
(a) (3, 0), (b) (5, 0) (c) (0, 8), (d) (0, 4).

13. Solve  $|12 - 3c| = 9$ .

14. Find the sum to infinity of a G.P.  $5, \frac{20}{7}, \frac{80}{49}, \dots$

**SECTION - III**

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

Note : 1. Answer ANY FOUR questions, choosing TWO from each of the following Groups, i.e., A and B.

2. Each question carries 4 marks.

**Group-A**

(Statements and Sets, Functions, Polynomials)

15. Using elementwise, prove that  $(A \cap B)' = A' \cup B'$ .

16. Given  $f(x) = 1 + 2x$ ,  $g(x) = 3 - 2x$ ,  $\forall x \in \mathbb{R}$ . Find  $f \circ g(x)$ ,  $g \circ f(x)$ ,  $f \circ g(3)$  and  $g \circ f(3)$ .

17. Let  $f$  be given by  $f(x) = x + 2$  and  $f$  has the domain  $\{x : 2 \leq x \leq 5\}$ . Find  $f^{-1}$  and its domain and range.

18. Factorize  $x^4 + 5x^3 + 5x^2 - 5x - 6$ .

**Group-B**

(Linear Programming, Real Numbers, Progressions)

19. Draw the graph of the system of inequations

$$8x + 5y \leq 40, 4x + 3y \geq 12, x \geq 0, y \geq 0.$$

20. If  $a^{1/3} + b^{1/3} + c^{1/3} = 0$ , show that  $(a + b + c)^3 = 27abc$ .

21. Find the sum of ' $n$ ' term of the progression 9, 99, 999, 9999 .....

22. If A.M., G.M. and H.M. of two numbers are A, G, H respectively, show that  $A \geq G \geq H$ .

**SECTION - IV**

(Marks :  $1 \times 5 = 5$ )

(Linear Programming, Quadratic Equations and Inequations)

Note : Answer ANY ONE question from the following. 2. It carries 5 marks.

23. Solve  $x^2 - 4x + 3 = 0$  using the graph of  $y = x^2$ .

24. Maximise  $f = 5x + 7y$ , subject to the conditions.

$$2x + 3y \leq 12, 3x + y \leq 12, x \geq 0 \text{ and } y \geq 0.$$

**Mathematics - Paper - I**  
(English Version)

**15E(B)**

**Time : 30 Minutes**

**Part - B**

**Marks : 1**

Note : 1. Each question carries  $\frac{1}{2}$  mark. 2. Answers are to be written in the question paper only.  
3. All questions are to be answered. 4. Marks will not be given for over written, or erased answers.

I. Write the 'CAPITAL LETTER' of the correct answer in the brackets provided against each question.  $10 \times 1/2 =$

1. Symbol of Existential Quantifier is \_\_\_\_\_ ( )  
 A)  $\Rightarrow$                       B)  $\forall$                       C)  $\exists$                       D)  $\Leftrightarrow$
2. If  $A \subset \mu$ ,  $B \subset \mu$ , then which one of the following pair is disjoint? ( )  
 A)  $A - B, A$                       B)  $B - A, B$                       C)  $A - B, B - A$                       D)  $A', B$
3. If  $f(x) = x^2 - 3x - 4$ , then  $f(-2) =$  \_\_\_\_\_ ( )  
 A) 6                      B) 20                      C) 5                      D) -1
4. If the roots of the equation  $px^2 + qx + r = 0$  are equal, then \_\_\_\_\_ ( )  
 A)  $q^2 = pr$                       B)  $p^2 = 4pq$                       C)  $q^2 = 4pr$                       D)  $r^2 = pq$
5. The inequation for  $1 < x < 5$  is \_\_\_\_\_ ( )  
 A)  $x^2 - 5x + 6 < 0$                       B)  $x^2 - 6x + 5 < 0$                       C)  $x^2 - 5x + 6 > 0$                       D)  $x^2 - 6x + 5 > 0$
6.  $f\left(\frac{b}{a}\right) = 0$ , then the factor of  $f(x)$  is \_\_\_\_\_ ( )  
 A)  $ax + b$                       B)  $ax - b$                       C)  $bx + a$                       D)  $bx - a$
7. The point which does not satisfy the inequation  $3x + y > 6$  \_\_\_\_\_ ( )  
 A) (1, 0)                      B) (2, 3)                      C) (3, 2)                      D) (6, 0)
8.  $16^{1.25} =$  \_\_\_\_\_ ( )  
 A) 16                      B) 24                      C) 32                      D) 64
9.  $\lim_{x \rightarrow \infty} \frac{6x-3}{2x+1} =$  \_\_\_\_\_ ( )  
 A)  $\frac{2}{6}$                       B)  $\frac{3}{2}$                       C)  $\frac{3}{2}$                       D) 3
10. The sum of 10 terms in 1, 2, 3, 4 \_\_\_\_\_ ( )  
 A) 5050                      B) 505                      C) 55                      D) 50

II. Fill in the blanks with suitable answers.

$10 \times 1/2 = 5$

11. The inverse of  $p \Rightarrow \sim q$  is \_\_\_\_\_.
12.  $A \cap B' =$  \_\_\_\_\_.
13.  $(A)' =$  \_\_\_\_\_.

14. If a function is one-one and on-to, then the function is called = \_\_\_\_\_.
15. If  $a_0 + a_1 + \dots + a_n = 0$ , then \_\_\_\_\_ is the factor of  $a_0x^n + a_1x^{n-1} + \dots + a_n$ .
16. If  $(x^{\frac{2}{3}})^p = x^2$ , then  $p =$  \_\_\_\_\_.
17.  $y = 5x$  straight line passes through \_\_\_\_\_.
18. The limiting position of Secant of a Circle is \_\_\_\_\_.
19. Harmonic Mean of 6 and 3 is \_\_\_\_\_.
20.  $\sum n = 55$ , then  $n =$  \_\_\_\_\_.

III. For the following questions under Group A, choose the correct answer from the master list (Group B) and write the letter of the correct answer in the brackets provided against each item.

(i) Group A

Group B

21. If  $A \subset B$ , then  $A \cup B =$  \_\_\_\_\_ ( ) (A) Contradiction
22.  $f(2x - 5) = 5$  and  $f$  is Identity function, then the value of  $x$  is = \_\_\_\_\_ ( ) (B) A
23. If  $|x| \leq 6$ , then \_\_\_\_\_ ( ) (C) Tautology
24.  $B, C$  are disjoint sets, then  $(A - B) \cup (A - C)$  is equal to \_\_\_\_\_ ( ) (D) 5  
(E) B
25.  $p \wedge \sim p$  is a \_\_\_\_\_ ( ) (F)  $-6 \leq x \leq 6$   
(G)  $A - (B \cup C)$   
(H)  $p \vee \sim p$

(ii) Group A

Group B

26.  $P = \frac{1}{4}x + \frac{3}{2}y$ , then the value of  $P$  at  $(12, 0)$  is \_\_\_\_\_ ( ) (I) 85
27. If  $f(x) = 3\sqrt{x}$ , then  $\lim_{x \rightarrow 16} f(x) =$  \_\_\_\_\_ ( ) (J) 15
28.  $|6 - 9x| = 0$ , then  $x =$  \_\_\_\_\_ ( ) (K) 3
29.  $t_n = 2n^2 + 2n + 3$ , then  $t_2 =$  \_\_\_\_\_ ( ) (L) 12
30. Common difference of the A.P. 13, 8, 3, -2, ..... is ..... ( ) (M) 0  
(N)  $\frac{2}{3}$   
(O) -5  
(P) 5