MATH TEST

Einstein Higher Secondary School, BBSR

Time: 1 Hour **Full Marks: 25**

SECTION A — Answer all the questions

1. If R is a relation from a finite set A having m elements to a finite set B having n elements, then the number of relations from A to B is:

(a) 2^{mn} (b) $2^{mn} - 1$

(c) $2mn$ (d) m^n

2. Let R be a relation from set A to set B, then:

(a) $R = A \cup B$ (b) $R = A \cap B$

(c) $R \subseteq A \times B$ (d) $R \subseteq B \times A$

3. If $A = \{1, 2, 4\}$, $B = \{2, 4, 5\}$, $C = \{2, 5\}$, then $(A - B) \times (B - C)$ is:

(a) $\{(1, 2), (1, 5), (2, 5)\}$ (b) $\{(1, 4)\}$

(c) $(1, 4)$ (d) None of these

4. Let $A = \{1, 2, 3\}$, $B = \{2, 3, 4\}$, then which is a function from A to B?

(a) $\{(1, 2), (1, 3), (2, 3), (3, 3)\}$ (b) $\{(1, 3), (2, 4)\}$

(c) $\{(1, 3), (2, 2), (3, 3)\}$ (d) $\{(1, 2), (2, 3), (3, 2), (3, 4)\}$

5. The values of a and b, if ordered pair $(2a - 5, 4) = (5, b + 6)$ is:

(a) $-2, 5$ (b) $2, 5$

(c) $5, 2$ (d) $5, -2$

SECTION B — Answer any two

(2 × 2 = 4 Marks)

1. If $A = \{1, 2, 5, 6\}$ and $B = \{1, 2, 3\}$, then find:

a) $(A \times B) \cap (B \times A)$

b) $(A - B) \times (B - A)$

2. If $A = \{1, 2, 3\}$, $B = \{4\}$, $C = \{5\}$, verify that:

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

3. A function f is defined by $f(x) = 2x - 5$. Write down the values of:

$$f(7), \quad f(-3)$$

SECTION C — Answer any two

(3 × 2 = 6 Marks)

1. Let $f(x) = x^2$ and $g(x) = 2x + 1$ be two real valued functions. Find:

$$(f + g)x, \quad (f - g)x, \quad (fg)x, \quad (f / g)x$$

2. If $f(x) = x^2$, find:

$$\frac{f(1.1) - f(1)}{1.1 - 1}$$

3. Determine the domain & range of relation R defined by:

$$R = \{ (x, x + 5) : x \in \{0, 1, 2, 3, 4, 5\} \}$$

SECTION D — Answer any two

(5 × 2 = 10 Marks)

1. If $A = \{2, 3\}$, $B = \{4, 5\}$, $C = \{5, 6\}$, find:

a) $A \times (B \cup C)$

b) $A \times (B \cap C)$

c) $(A \times B) \cup (A \times C)$

2. Let $A = \{1, 2, 3, 4, 5, 6\}$. Let R be a relation on A defined by:

$$R = \{ (a, b) : a, b \in A, \quad b \text{ is exactly divisible by } a \}$$

a) Write R in roster form.

b) Write domain & range of R.

3. Let $f = \{(1, 1), (2, 3), (0, -1), (-1, -3)\}$ be a function defined by formula $f(x) = ax + b$ for some integers a and b. Determine a and b.