THE ZENITH Questions For CRT - 03

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Max. Marks : **40**
Time : **60 Minutes**
Topics : **Relations & Functions**

◘ **Advanced MATH Classes**, 1st Floor (Above Master Of Burgers), Opp. HP Petrol Pump, Thana Road, Najafgarh

Q01. **(a)** If $(1, 3a-b) = (2a+b, 11)$ then, find the values of a and b.

(b) If $M = \{a, b\}$, then find $M \times M \times M$. Also state how many elements will $M \times M$ have?

(c) If A and B are two sets containing 3 and 7 elements respectively, how many different relations can be defined from the set A to the set B?

(d) State True or False : $A \times B \neq \phi \Leftrightarrow A \neq \phi$ and $B \neq \phi$. Cite the reason.

(e) A set is defined by $A = \{x : x = n + 1 \text{ where } n < 4,\ n \in N\}$. Find A^2.

(f) Let $f = \{(2,2), (4,16), (5,25), (2,4)\}$. Then state whether f is a function or not. $[1 \times 6 = 6$

Q02. Find the domain and range of the relation $\{(x, x^3) : x \text{ is a prime number less than } 10\}$.

Q03. If $A = \{2, 3\}$ and $B = \{1, 3, 5\}$, show that $A \times B \neq B \times A$.

Q04. Let A and B be two sets such that $n(A) = 3$ and $n(B) = 2$. If (x, 1), (y, 2) and (z, 1) are in $A \times B$ then, find the sets A and B, where x, y and z are distinct elements. Also write the remaining elements of $A \times B$.

Q05. If $R = \{(x, y) : x, y \in W,\ x^2 + y^2 = 25\}$, then find the domain and range of R. $[4 \times 4 = 16$

Q06. Define a relation R on the set N of natural numbers by $R = \{(x, y) : y = x + 5\ \forall\ x, y \in N, x < 4\}$. Depict this relationship using roster form. Write down the domain, co-domain and range of R. Draw an arrow diagram of R as well.

Q07. Sketch the graph of $f(x) = |x - 2|$. Also write its domain and range.

OR Write the domain and range of the relation $R = \{(x, y) : y = |x - 1|, x \in Z \text{ and } |x| \leq 3\}$.

Q08. Redefine the function $f(x) = |x - 2| + |x + 2|$, $-3 \leq x \leq 3$ and hence draw its graph.

$[6 \times 3 = 18$

 # Test held on : 09 July, 2017

Hints & Answers Of CRT-03

Q01. **(a)** $a = \frac{12}{5}, b = -\frac{19}{5}$

(b) Here $M \times M = \{a, b\} \times \{a, b\} = \{(a,a),(a,b),(b,a),(b,b)\}$

Clearly $n(M \times M) = 4$.

$\therefore M \times M \times M = \{a, b\} \times \{(a,a),(a,b),(b,a),(b,b)\} = \begin{Bmatrix} (a,a,a),(b,a,a),(a,a,b),(b,a,b), \\ (a,b,a),(b,b,a),(a,b,b),(b,b,b) \end{Bmatrix}$

(c) No. of different relations that can be defined from the set A to the set $B = 2^{3\times 7} = 2^{21}$

(d) True.

(e) Here $A = \{2,3,4\}$

$\therefore A \times A = A^2 = \{2,3,4\} \times \{2,3,4\} = \{(2,2),(2,3),(2,4),(3,2),(3,3),(3,4),(4,2),(4,3),(4,4)\}$.

(f) No, f isn't a function. Note that pre-image 2 has two different images.

Q02. R = {(2, 8), (3, 27), (5, 125), (7, 343)}, Dom. R = {2, 3, 5, 7}, Range = {8, 27, 125, 343}.

Q03. $A \times B = \{(1,2),(1,3),(3,2),(3,3),(5,2),(5,3)\}$

and $A \times B = \{(2,1),(3,1),(2,3),(3,3),(2,5),(3,5)\}$

$\therefore A \times B \neq B \times A$ as $(1,2) \in A \times B$ but $(1,2) \notin B \times A$

Q04. A = {x, y, z}, B = {1, 2}, Remaining elements of $A \times B$ are = (x. 2), (y, 1), (z, 2).

Q05. See **Exemplar Solutions (Q06)** by **O.P. Gupta**.

Q06. R = {(1, 6), (2, 7), (3, 8)}, Dom. R = {1, 2, 3}, Co-domain = N, Range = {6, 7, 8}.

Q07. Sketch the graph of f (x) = |x – 2| yourself. Domain = R and range = $R^+ \cup \{0\}$.

OR See **Mathematicia** by **O.P. Gupta**.

Q08. See **Exemplar Solutions (Q19)** by **O.P. Gupta**.

❖ Dear Student/Teacher,

I would urge you for a little favour. Please notify me about any error (s) which you notice in this (or other Maths) work. It would be beneficial for all the future learners of Maths like us. Any constructive criticism will be well acknowledged.

Please find below my contact info when you decide to offer your valuable suggestions. I am looking forward for a response.

Moreover, I would wish **if you inform your friends/students** about my efforts for Maths so that they may also be benefited.

Let's *learn* Maths with smile :-)

☞ For any clarification(s), please contact :

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