THINK ACADEMY
MATH CLASSES By O.P. GUPTA

Class XI - Mathematics (041)
Topics - Relations & Functions

VISHWAS TEST SERIES - 2
(For Academic session 2023-24)

Max. Marks - 30
Time - 60 Minutes

Followings are of 2 Marks each (Q01-05).

Q01. If $M = \{x : x = a + 1, -2 < a < 3, a \in Z^+\}$, then find $M \times M \times M$.

OR

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

Q02. If $(x + 2y, 3x) = (-28, y)$ then, find the value of x and y. Hence write the value of $(-x)^{\frac{y}{3}}$.

Q03. Let $f = \{(1,3),(2,4),(3,5),(4,6)\}$ be a linear function given by $f(x) = ax + b$, for some real numbers 'a' and 'b'. Determine the value of a and b. Hence write the function f(x).

Q04. Sketch the graph of greatest integer function, $f(x) = [x]$ and write its domain and range.

Q05. Let $A = \{x : x$ is the name of month in a non leap year$\}$, $B = \{28, 29, 30, 31\}$.
Let $R : A \to B$ is defined by $R = \{(a, b) :$ 'a' month has 'b' number of days$\}$. Write the roster form of this relation. Hence write its range. $[2 \times 5 = 10$

Followings are of 3 Marks each (Q06-07).

Q06. Let $A = \{1,2,3,4\}$, $B = \{1,5,9,11,15,16\}$ and $f = \{(1,5),(2,9),(3,1),(4,5),(2,11)\}$.

Are the following true?

(a) f is a relation from A to B.

(b) f is a function from A to B.

Justify your answer in each case.

Q07. If $f(x) = \frac{1-x}{1+x}$, $x \neq -1$, then find the value of $\frac{f(x).f(x^2)}{1+[f(x)]^2}$.

OR

Find the domain of $f(x) = \frac{3x^2 + x + 5}{\sqrt{x^2 - 6x - 7}}$. Also show it on the number line. $[3 \times 2 = 6$

Following is of 4 Marks (Q08).

Q08. **CASE STUDY :** To make herself self-dependent and to earn her living, a college student decided to setup a small scale business of manufacturing hand sanitizers.

She estimated a fixed cost of ₹15000 per month and a cost of ₹30 per unit to manufacture.

Based on the above information, answer the following questions.

(a) Let x units of hand sanitizers are manufactured per month. What is the function of cost?

(b) If each unit is sold for ₹45, then what is the selling (revenue) function?

(c) How many units should be manufactured and sold, for break-even (that is, no profit, no loss situation) in a month?

(d) What is the monthly cost borne by the student, if the student decided to manufacture 1500 units in a month? $[1 \times 4 = 4$

Followings are of 5 Marks each (Q09-10).

Q09. Let $f = \left\{\left(x, \frac{x}{1+x^2}\right) : x \in R\right\}$ be a function from R into R. Determine the range of f.

OR

Find the domain of $f(x)=\dfrac{1}{\sqrt{[x]^2-2[x]-8}}$.

Q10. Redefine the function $f(x)=|x-1|+|x+2|,\ -3\le x\le 4$ and hence draw its graph. [5×2=10

This document contains MCQs for Mathematics (041) of class XI.

✪ Answers / Solutions shall be available on **YouTube channel – Mathematicia By O.P. Gupta**

You can **share this document** with other students.

With a lot of Blessings!

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