

THE ZENITH Questions

For CRT - 04

BY O.P. GUPTA

Max. Marks : 40

INDIRA AWARD WINNER

Time : 60 Minutes

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Topics : Functions & Angle Measures

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

- Q01.** (a) If $\{(x, 2), (4, y)\}$ represents an identity function, then write the value of ordered pair (x, y) .
(b) If $\{(7, 11), (5, a)\}$ represents a constant function, then what is the value of 'a'?
(c) Given $f(x) = (-1)^x$ is a function from \mathbb{N} to \mathbb{Z} . Then obtain the range of f .
(d) If $f = \{(6, 3), (8, 9), (5, 3), (-1, 6)\}$, then what are the pre-images of 3?
- Q02.** Write the domain of: (a) $f(x) = \frac{|x|}{1+|x|}$ (b) $y = \sqrt{[x]-x}$.
(c) $f = \{(4, 2), (9, 1), (6, 1), (10, 3)\}$ (d) $y = \frac{1}{\log[x]}$.
- Q03.** (a) The minute hand of a watch is 1.4cm long. How far does its tip move in 45 minutes? [Use $\pi = \frac{22}{7}$.]
(b) A wheel makes 450 revolutions in one and half minutes. Through how many radians does it turn in twelve seconds?
- Q04.** (a) Convert $-36^\circ 30'$ into the radian measure. (b) Find the degree equivalent of $\left(\frac{11}{16}\right)$.
- Q05.** The difference between the two acute angles of a right-angled triangle is $\frac{2}{5}\pi$. Find these acute angles of the triangle in degrees.
- Q06.** What is the domain of $f(x) = \frac{1}{\sqrt{[x]^2 - 2[x] - 8}}$?
- Q07.** Draw the graph of $f(x) = \text{sgn} \cdot (x - 2)$. Also mention its domain and range. [4×7 = 28]
- Q08.** Let $f = \left\{ \left(x, \frac{x^2}{1+x^2} \right) : x \in \mathbb{R} \right\}$ be a function from \mathbb{R} into \mathbb{R} . Determine the range of f .
- Q09.** If $f(x) = x + \frac{1}{x}$, then prove that $[f(x)]^3 = f(x^3) + 3f(1/x)$.
OR Sketch the graph for greatest integer function. Hence mention its domain and range. [6×2 = 12]

Hints & Answers Of CRT-04

- Q01.** (a) (2, 4) (b) 11 (c) $\{-1, 1\}$ (d) 6, 5.
Q02. (a) $x \in \mathbb{R}$ (b) $x \in \mathbb{Z}$ (c) $\{4, 6, 9, 10\}$ (d) $x \in [2, \infty)$.
Q03. (a) See the Solutions in **Mathematicia** by **O.P. Gupta**.
(b) See the Solutions in **Mathematicia** by **O.P. Gupta**.

Q04. (a) As $-36^\circ 30' = -\left(36^\circ + \left(\frac{30}{60}\right)^\circ\right) = -\left(\frac{73}{2}\right)^\circ$

Now $-36^\circ 30' = -\left(\frac{73}{2}\right)^\circ \times \frac{\pi}{180} = -\frac{73\pi}{360}$.

(b) $\left(\frac{11}{16}\right)^\circ = \left(\frac{11}{16} \times \frac{180}{\pi}\right)^\circ = \left(\frac{11}{16} \times \frac{180}{22/7}\right)^\circ = 39.375^\circ$

$\Rightarrow = 39^\circ (0.375 \times 60)' = 39^\circ 22.5' = 39^\circ 22'(0.5 \times 60)'' = 39^\circ 22'30''$.

Q05. See the Solutions in **Mathematicia** by **O.P. Gupta**.

Q06. See the Examples in **Mathematicia** by **O.P. Gupta**.

Q07. See the Examples in **Mathematicia** by **O.P. Gupta**. Ans. Domain $D_f : x \in \mathbb{R}$, $R_f : \{\pm 1, 0\}$.

Q08. See the Solutions in **Mathematicia** by **O.P. Gupta**.

Q09. See the Solutions in **Mathematicia** by **O.P. Gupta**.

OR See the graph in **Mathematicia** by **O.P. Gupta**. Domain = \mathbb{R} and range = \mathbb{Z} .

❖ 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 :

O.P. Gupta, Math Mentor

[*Maths (Hons.), E & C Engg., Indira Award Winner*]

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