

POORNIMA

COLLEGE OF ENGINEERING

TUTORIAL SHEET

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SHEET No.....

Campus: PCE Course: B.Tech

Class/Section: 4th

Date:

Name of Faculty: Dr. Shilpi Jain

Name of Subject: DMS

Code: 4CS2-01

Date of Tut. Sheet Preparation: 04/04/2018 Scheduled Date of Tut 12/04/2018 Actual date of tute:

Name of Student:.....Scheduled & Actual Date of H.A. Submission:.....&.....

FIRST 20 MT. CLASS QUESTIONS

Q1. Determine the floor and ceiling function value of

(i)[3. 5] (ii)[-2.4] (iii)[3. 143].

Q2.Determine the value of remainder function the following:

(i) 35 (MOD 7) (ii) 20 (MOD 3) (iii) 4 (MOD 9)

Q3.Determine the value of logarithmic function of the following:

(i) $\log_2 16$ (ii) $\log_2 100$ (iii) $\log_2 0.001$.

2 HRS. SOLVABLE HOME ASSIGNMENT (H.A.) QUESTIONS

Q4. Let $f(x)=x+2$ and $g(x)=2x+1$, find $(fog)(x)$ and $(gof)(x)$

Q5. Prove that a function $f: R \rightarrow R$ defined by $f(x) = 2x - 3$ is a bijective function

OTHER IMPORTANT QUESTIONS

Q6 .Find the domain & Range of the functions

1. $f(x) = 1/x+2$

2. $f(x) = x-1/x-3$

3. $f(x) = 2x+3/x^2-3x+2$

4. $f(x) = x^2+3x+5/x^2-5x+4$

5. $f(x) = \sqrt{x-2}$

6. $f(x) = 1/\sqrt{1-x}$

7. $f(x) = \sqrt{4-x^2}$

8. $f(x) = x^2-9/x-3$

9. $f(x) = 1/\sqrt{x-3}$

10. $f(x) = \sqrt{16-x^2}$

11. $f(x) = 1/\sqrt{1-\cos x}$

12. $f(x) = \sqrt{4-x} + 1/\sqrt{x-2}$


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Tutorial - 3Ans 1

$[3.5]$

floor function $[3+0.5] = [3]$

Ceiling $\Rightarrow [4-0.5] = [4]$

2) $[-2.4]$

floor $\Rightarrow [-3+0.6] = [-3]$

Ceiling $\Rightarrow [-2-0.4] = [-2]$

(ii) $[3.143]$

floor function $[3+0.143] = [3]$

Ceiling $\Rightarrow [4-0.857] = [4]$

Ans 2

$35 \pmod{7}$

~~$35 \div 7 \rightarrow \text{Remainder}$~~

$35 \div 7 \rightarrow \text{Remainder} = 0$

$20 \pmod{3}$

$20 \div 3 \Rightarrow \text{Remainder} = 2$

$4 \pmod{9}$

$4 \div 9 \rightarrow \text{Remainder} = 4$

Ans 3

$$\begin{aligned}
 \text{i.e., } \log_2 16 &= 4 \\
 2^4 &= 16 \\
 2^4 &= 2^4 \\
 4 &= 4
 \end{aligned}$$

(ii) $\log_2 100 = y$
 $2^y = 100$
 $2^y = 2^6$
 $y = 6$

(iii) $\log_2 0.001 = y$
 $2^y = 0.001$
 $2^y = \frac{1}{1000}$
 $y = -9$

(iv)

Ans: 7

$f(n) = n + 2$, $g(n) = 2n + 1$
 $f(g(n)) = f(2n + 1)$
 $f(g(n)) = (2n + 1) + 2$
 $= 2n + 3$

$g \circ f(n) = g(f(n))$
 $g(n) = 2n + 1$
 $g(f(n)) = 2(n + 2) + 1$
 $= 2n + 4 + 1$
 $= 2n + 5$

Ans: 5

check one one function

$f(n) = 2n - 3$
 $f(n_1) = f(n_2)$
 $2n_1 - 3 = 2n_2 - 3$
 $n_1 = n_2$

Hence

Check onto $y = f(x)$
 $y = x - 3 \Rightarrow 2\left(\frac{y+3}{2}\right) - 3$

$y = y$ so function is onto and bijective
 $y = f(x)$
 $f^{-1}(y) = x = \frac{y+3}{2}$

Ans 6 (i) $f(x) = \frac{1}{x+2}$ domain = $\mathbb{R} - \{-2\}$

(ii) $f(x) = \frac{x-1}{x-3}$ domain = $\mathbb{R} - \{3\}$

(iii) $f(x) = \frac{2x+1}{x^2-3x+2} = \frac{2x+1}{(x-1)(x-2)}$ domain = $\mathbb{R} - \{1, 2\}$

(iv) $f(x) = \frac{x^2+3x+7}{x^2-5x+4} = \frac{x^2+3x+7}{(x-1)(x-4)}$
 domain = $\mathbb{R} - \{1, 4\}$

(v) $f(x) = \sqrt{x-2}$ $x-2 \geq 0$
 domain = $[2, \infty)$

(vi) $f(x) = \frac{1}{\sqrt{1-x}}$ domain = $(-\infty, 1)$

(vii) $f(x) = \sqrt{4-x^2}$
 $4-x^2 \geq 0 \rightarrow \odot (2-x)$
 domain $\rightarrow [-2, 2]$

(vii) $f(n) = \frac{n^2 - 9}{n - 3}$ domain $\mathbb{R} - \{3\}$

(ix) $f(n) = \frac{1}{\sqrt{n-3}}$ domain $\rightarrow (3, \infty)$

(x) $f(n) = \sqrt{16 - n^2}$ $16 - n^2 \geq 0$
 $(4 - n)(4 + n) \geq 0$
 domain $\rightarrow [-4, 4]$

Ans 4

$f(n) = \frac{n^2 + 3n + 5}{n^2 - 5n + 4} = y$

$\Rightarrow n^2 y - 5ny + 4y = n^2 + 3n + 5$
 $n^2 y - n^2 - 5ny - 3n + 4y - 5 = 0$
 $n^2 (y - 1) - n(5y + 3) + 4y - 5 = 0$
 $\Delta \geq 0$

$\Delta = \sqrt{b^2 - 4ac}$

$= (5y + 3)^2 - 4(y - 1)(4y - 5)$

$\Delta^2 = 25y^2 + 30y - 16y^2 + 36y$

$= 9y^2 + 66y - 1$

$y = \frac{-66 \pm \sqrt{4356 + 396}}{18}$

$y = \frac{-11 \pm 2\sqrt{33}}{3}$

Ans 5

$$f(n) = \sqrt{n-2}$$

Range of Radical function from a to b is
 $f(n) \geq k$ if $k=0$ then $f(n) \geq 0$

Ans 6

$$f(n) = \frac{1}{\sqrt{1-n}}$$

$$f(n) \geq 0$$

$$(0, \infty)$$

Ans 7

$$f(n) = \sqrt{4-n^2}$$

$$y^2 = 4-n^2$$

$$n^2 = 4-y^2$$

$$n^2 = (2-y)(2+y)$$

$$n = \sqrt{(2-y)(2+y)}$$

Ans 8

$$y' = \frac{n^2-9}{n-3}$$

$$y = n+3$$

$$y = 3+3 = 6$$

$$\text{Domain } [n \in \mathbb{R} - \{3\}]$$

$$\text{Range } [y \in \mathbb{R} - \{6\}]$$

Ans 9

$$y = \frac{1}{\sqrt{n-3}}$$

$$f(n) \geq 0$$

$$(0, \infty)$$

Ans. 10

$$y = \sqrt{16 - x^2}$$

$$y^2 = 16 - x^2$$

$$x^2 = 16 - y^2$$

$$x = \sqrt{(4-y)(4+y)}$$

Ans. 11

$$f(x) = \frac{1}{\sqrt{1 - \cos x}} \quad -1 \leq \cos x < 1$$

$$-1 - 1 \leq 1 - \cos x \leq 1 - 1$$

$$-2 \leq 1 - \cos x \leq 0$$

$$2 \geq 1 - \cos x \geq 0$$

$$\sqrt{2} \geq \sqrt{1 - \cos x} \geq 0$$

$$\frac{1}{\sqrt{2}} \geq \frac{1}{\sqrt{1 - \cos x}} \geq \frac{1}{0}$$

$$y \in \mathbb{R}, \quad y \geq \frac{1}{\sqrt{2}}$$