

DPP - Daily Practice Problems

Chapter-wise Sheets

Date :

Start Time :

End Time :

MATHEMATICS

(CM02)

SYLLABUS : Relations and Functions

Max. Marks : 120

Marking Scheme : (+4) for correct & (−1) for incorrect answer

Time : 60 min.

INSTRUCTIONS : This Daily Practice Problem Sheet contains 30 MCQs. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

1. For the following relation

$$R = \{(0, 0), (0, 1), (1, 1), (2, 1), (2, 2), (2, 0), (1, 0), (0, 2), (0, 1)\}$$

(a) domain = $\{0, 1\}$

(b) range = $\{0, 1, 2\}$

(c) both correct

(d) None of these

2. The domain of the function $\sqrt{x^2 - 5x + 6} + \sqrt{2x + 8 - x^2}$ is

(a) $[2, 3]$

(b) $[-2, 4]$

(c) $[-2, 2] \cup [3, 4]$

(d) $[-2, 1] \cup [2, 4]$

3. If $3f(x) - f\left(\frac{1}{x}\right) = \log x^4$, then $f(e^{-x})$ is

(a) $1+x$

(b) $1/x$

(c) x

(d) $-x$

4. The domain of the function $f(x) = \frac{1}{\sqrt{|x|} - x}$ is

(a) $(0, \infty)$

(b) $(-\infty, 0)$

(c) $(-\infty, \infty) - \{0\}$

(d) $(-\infty, \infty)$

RESPONSE GRID

1. (a)(b)(c)(d) 2. (a)(b)(c)(d) 3. (a)(b)(c)(d) 4. (a)(b)(c)(d)

Space for Rough Work

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5. $f(x) = \sqrt{|x|^2 - 5|x| + 6} + \sqrt{8 + 2|x| - |x|^2}$ is real for all x in
- (a) $[-4, -3]$ (b) $[-3, -2]$
(c) $[-2, 2]$ (d) $[3, 4]$
6. $f(x) = \frac{x(x-p)}{q-p} + \frac{x(x-q)}{p-q}$, $p \neq q$. What is the value of $f(p) + f(q)$?
- (a) $f(p-q)$ (b) $f(p+q)$
(c) $f(p(p+q))$ (d) $f(q(p-q))$
7. A real valued function $f(x)$ satisfies the functional equation $f(x-y) = f(x)f(y) - f(a-x)f(a+y)$ where a is a given constant and $f(0) = 1$, $f(2a-x)$ is equal to
- (a) $-f(x)$ (b) $f(x)$
(c) $f(a) + f(a-x)$ (d) $f(-x)$
8. Domain of definition of the function $f(x) = \frac{3}{4-x^2} + \log_{10}(x^3 - x)$, is
- (a) $(-1, 0) \cup (1, 2) \cup (2, \infty)$ (b) $(a, 2)$
(c) $(-1, 0) \cup (a, 2)$ (d) $(1, 2) \cup (2, \infty)$
9. Let $A = \{1, 2, 3, 4, 5\}$; $B = \{2, 3, 6, 7\}$. Then the number of elements in $(A \times B) \cap (B \times A)$ is
- (a) 18 (b) 6
(c) 4 (d) 0
10. A relation R is defined in the set Z of integers as follows $(x, y) \in R$ iff $x^2 + y^2 = 9$. Which of the following is false?
- (a) $R = \{(0, 3), (0, -3), (3, 0), (-3, 0)\}$
(b) Domain of $R = \{-3, 0, 3\}$
(c) Range of $R = \{-3, 0, 3\}$
(d) None of these
11. Let $f(x) = \sqrt{1+x^2}$, then
- (a) $f(xy) = f(x) \cdot f(y)$ (b) $f(xy) \geq f(x) \cdot f(y)$
(c) $f(xy) \leq f(x) \cdot f(y)$ (d) None of these
12. The domain of the function $f(x) = \sqrt{x - \sqrt{1-x^2}}$ is
- (a) $\left[-1, -\frac{1}{\sqrt{2}}\right] \cup \left[\frac{1}{\sqrt{2}}, 1\right]$
(b) $[-1, 1]$
(c) $\left(-\infty, -\frac{1}{2}\right] \cup \left[\frac{1}{\sqrt{2}}, +\infty\right)$
(d) $\left[\frac{1}{\sqrt{2}}, 1\right]$
13. Period of the function $\left|\sin^3 \frac{x}{2}\right| + \left|\cos^5 \frac{x}{5}\right|$ is :
- (a) 2π (b) 10π
(c) 8π (d) 5π
14. If $n(A) = 4$, $n(B) = 3$, $n(A \times B \times C) = 24$, then $n(C) =$
- (a) 288 (b) 1
(c) 12 (d) 2

RESPONSE
GRID

5. (a) (b) (c) (d) 6. (a) (b) (c) (d) 7. (a) (b) (c) (d) 8. (a) (b) (c) (d) 9. (a) (b) (c) (d)
10. (a) (b) (c) (d) 11. (a) (b) (c) (d) 12. (a) (b) (c) (d) 13. (a) (b) (c) (d) 14. (a) (b) (c) (d)

Space for Rough Work

15. If $S = \{1, 2, 3, 4, 5\}$ and $R = \{(x, y) : x + y < 6\}$ then $n(R) =$
 (a) 8 (b) 10 (c) 6 (d) 5
16. The function $f(x) = \log\left(x + \sqrt{x^2 + 1}\right)$, is
 (a) neither an even nor an odd function
 (b) an even function
 (c) an odd function
 (d) a periodic function
17. Let $f(x) = \frac{x}{1-x}$ and 'a' be a real number. If $x_0 = a$,
 $x_1 = f(x_0)$, $x_2 = f(x_1)$, $x_3 = f(x_2)$, If $x_{2009} = 1$,
 then the value of a is
 (a) 0 (b) $\frac{2009}{2010}$
 (c) $\frac{1}{2009}$ (d) $\frac{1}{2010}$
18. The domain of the function
 $f(x) = \log_2\left(-\log_{1/2}\left(1 + \frac{1}{x^{1/4}}\right) - 1\right)$ is
 (a) (0, 1] (b) (0, 1)
 (c) [1, ∞) (d) (1, ∞)
19. The domain of the function $f(x) = \frac{1}{\sqrt{x^2 - 3x + 2}}$ is
 (a) $(-\infty, 1)$ (b) $(-\infty, 1) \cup (2, \infty)$
 (c) $(-\infty, 1] \cup [2, \infty)$ (d) $(2, \infty)$
20. If (1, 3), (2, 5) and (3, 3) are three elements of $A \times B$ and the
 total number of elements in $A \times B$ is 6, then the remaining
 elements of $A \times B$ are
 (a) (1, 5); (2, 3); (3, 5) (b) (5, 1); (3, 2); (5, 3)
 (c) (1, 5); (2, 3); (5, 3) (d) None of these
21. If $f(x) = \ln\left(\frac{x^2 + e}{x^2 + 1}\right)$, then range of $f(x)$ is
 (a) (0, 1) (b) (0, 1]
 (c) [0, 1) (d) {0, 1}
22. The function $f(x) = \log\left(\frac{1+x}{1-x}\right)$ satisfies the equation
 (a) $f(x+2) - 2f(x+1) + f(x) = 0$
 (b) $f(x+1) + f(x) = f(x(x+1))$
 (c) $f(x_1) \cdot f(x_2) = f(x_1 + x_2)$
 (d) $f(x_1) + f(x_2) = f\left(\frac{x_1 + x_2}{1 + x_1 x_2}\right)$
23. If $f : R \rightarrow R$ satisfies $f(x+y) = f(x) + f(y)$, for all x ,
 $y \in R$ and $f(1) = 7$, then $\sum_{r=1}^n f(r)$ is
 (a) $\frac{7n(n+1)}{2}$ (b) $\frac{7n}{2}$
 (c) $\frac{7(n+1)}{2}$ (d) $7n + (n+1)$
24. If $\{ \}$ denotes the fractional part of x , the range of the function
 $f(x) = \sqrt{\{x\}^2 - 2\{x\}}$ is
 (a) ϕ (b) $[0, 1/2]$
 (c) $\{0, 1/2\}$ (d) $\{0\}$

RESPONSE
GRID

15. (a) (b) (c) (d) 16. (a) (b) (c) (d) 17. (a) (b) (c) (d) 18. (a) (b) (c) (d) 19. (a) (b) (c) (d)
 20. (a) (b) (c) (d) 21. (a) (b) (c) (d) 22. (a) (b) (c) (d) 23. (a) (b) (c) (d) 24. (a) (b) (c) (d)

Space for Rough Work

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25. If $f(x) = \frac{x-1}{x+1}$, then $f(2x)$ is equal to
- (a) $\frac{f(x)+1}{f(x)+3}$ (b) $\frac{3f(x)+1}{f(x)+3}$
 (c) $\frac{f(x)+3}{f(x)+1}$ (d) $\frac{f(x)+3}{3f(x)+1}$
26. The range of the function $f(x) = \frac{x^2 - x + 1}{x^2 + x + 1}$ where $x \in \mathbb{R}$, is
- (a) $(-\infty, 3]$ (b) $(-\infty, \infty)$
 (c) $[3, \infty)$ (d) $\left[\frac{1}{3}, 3\right]$
27. The domain of the function $f(x) = \exp(\sqrt{5x-3-2x^2})$ is
- (a) $[3/2, \infty)$ (b) $[1, 3/2]$
 (c) $(-\infty, 1]$ (d) $(1, 3/2)$
28. If $f(x+y) = f(x) + 2y^2 + kxy$ and $f(a) = 2, f(b) = 8$, then $f(x)$ is of the form
- (a) $2x^2$ (b) $2x^2 + 1$
 (c) $2x^2 - 1$ (d) x^2
29. The relation R defined on the set $A = \{1, 2, 3, 4, 5\}$ by $R = \{(x, y) : |x^2 - y^2| < 16\}$ is given by
- (a) $\{(1, 1), (2, 1), (3, 1), (4, 1), (2, 3)\}$
 (b) $\{(2, 2), (3, 2), (4, 2), (2, 4)\}$
 (c) $\{(3, 3), (3, 4), (5, 4), (4, 3), (3, 1)\}$
 (d) None of these
30. Which of the following relation is NOT a function
- (a) $f = \{(x, x) | x \in \mathbb{R}\}$ (b) $g = \{(x, 3) | x \in \mathbb{R}\}$
 (c) $h = \{(n, \frac{1}{n}) | n \in \mathbb{I}\}$ (d) $t = \{(n, n^2) | n \in \mathbb{N}\}$

RESPONSE
GRID

25. (a) (b) (c) (d) 26. (a) (b) (c) (d) 27. (a) (b) (c) (d) 28. (a) (b) (c) (d) 29. (a) (b) (c) (d)
 30. (a) (b) (c) (d)

DAILY PRACTICE PROBLEM DPP CHAPTERWISE 2 - MATHEMATICS

Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	38	Qualifying Score	50
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct $\times$ 4) – (Incorrect $\times$ 1)			

Space for Rough Work