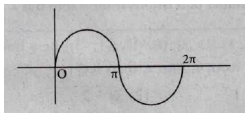
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Answers Key:

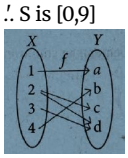
Multiple Choice Question

1. (c) n
2. It is onto not one-one

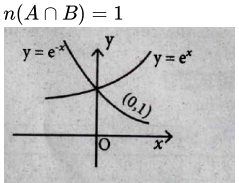


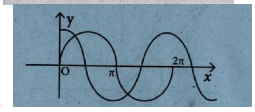
Since $\sin 30^\circ = \frac{1}{2}$
$\sin 150^\circ = \frac{1}{2}$

3. f(0) = 0, f(-3) = 9 and f(3) = 9
∴ S is [0,9]



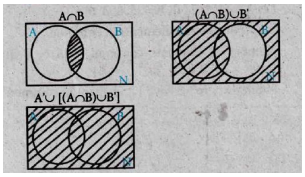
4. It is not a function since it has two images
5. i) Let $y = x$ then $x = y \Rightarrow f^{-1}(x) = x$
ii) Let $y = x^2$ then $y = \sqrt{x} \Rightarrow f^{-1}(x) = \sqrt{x}$
iii) Let $y = 8\sqrt{x}$ then $\frac{y^2}{64} = x \Rightarrow \mathrm{f}^{-1}(x) = \frac{x^2}{64}$
$\therefore \mathrm{f}^{-1}(x) = \begin{cases} x & x < 1 \\ \sqrt{x} & 1 \le x \le 16 \\ \frac{x^2}{64} & x > 16 \end{cases}$
6. $\mathrm{f} : \mathbb{R} \to \mathbb{R}$ is defined by
$\mathrm{f}(x) = 1 - |x|$
The range is $(-\infty, 1]$ as $f(-\infty) = -\infty$
$f(0) = 1$
$f(\infty) = -\infty$
7. $f(x) = \sin x + \cos x$
$f(-x) = \sin(-x) + \cos(-x)$
$= -\sin x + \cos x$
$-f(-x) = \sin x - \cos x$
$f(x) \neq -f(-x)$
f(x) is neither odd function nor even function.
8. $f(x) = \frac{(x^2+\cos x)(1+x^4)}{(x-\sin x)(2x-x^3)} + e^{-|x|}$
$f(-x) = \frac{[(-x)^2+\cos(-x)][1+(-x)^4]}{[-x-\sin(-x)][-2x-(-x^3)]} + e^{+x|}$
$= \frac{(x^2+\cos x)(1+x^4)}{(x-\sin x)(2x-x^3)} + e^{-|x|}$
$= f(x)$
Hence f(x) is an even function
9. $n(A \cap B) = 1$



10. 

11. Since $|x^2 + y^2| < 2, x, y$ must be $0, 1, -1$.
12. If $x \in (-\infty, -2)$, Let $x = -3$
then $f(x) = |-5| + |1| = 6 = -2x$
If $x \in (-2, -2)$, Let $x = 0$ then
$f(x) = |0 - 2| + |0 + 2| = 4$
If $x \in (2, \infty)$, Let $x = 4$
then $f(x) = |2| + |6| = 8 = 2x$
$\therefore \mathrm{f}(x) = \begin{cases} -2x & x \in (-\infty, -2] \\ 4 & x \in (-2, 2] \\ 2x & x \in (2, \infty) \end{cases}$

13. T : $x - y$ is an integer $\Rightarrow xRy$
i) $x - x = 0$ is an integer
$\therefore$ T is reflexive.
ii) $(x - y)$ is an integer $\Rightarrow y - x$ is also an integer
$\therefore$ T is symmetry
iii) If (x - y)is an integer and y- z is also an integer, by adding
x - z is also an integer.
$\therefore$ T is transitive
Thus, T is an equivalence relation.
S : y $= x + 1 \Rightarrow x\ Sy$
i) $x = x + 1 \Rightarrow xSx$ is not true.
$\therefore$ S is not reflexive.
Hence T is an equivalence relation but S is not an equivalence relation

14. 

15. $M \cap C = 70$ which is 10% of M and 14% of C
$M = 700, C = 500$
$M \cup C = 700 + 500 - 70 = 1130$

16. $(A \times B) \cap (A \times C) = A \times (B \cap C)$
$n[(A \times B) \cap (A \times C)] = n(A) \times n(B \cap C)$
$\Rightarrow 8 = n(A) \times 2 \Rightarrow n(A) = 4$

17. $n[(A \times B) \cup (A \times C)] = n(A) \times n(B \cup C)$
= 2 $\times$ 3 = 6

18. Let A = {1, 2,3,4,8} = {5, 2,3,6}
A and B have two elements in common.
Number of elements common to A $\times$ B and B x A = 2 $\times$2 = 2^2
Similarly here we have 17^2 element in common

19. LetA = (a, b),B = (a,b,c)
A $\times$B = {(a, a), (a, b), (a, c), (b, a), (b, b), (b, c)}
B $\times$A = {(a, a),(a, b), (b, a), (b, b), (c, a),(c, b)}
(A $\times$B) $\cap$ (B $\times$A) = {(a, a), (a,b), (b, a): (b, b)}
= A $\times$A

20. (c) 512

21. Let X = (a,b,c)
Then R = Universal relation
= {(a, a), (a, b), (a, c), (b, a), (b, b), (b, c), (c, a), (c, b), (c, c)}.
It is transitive

22. If $4 \in X$ then $(4, 4) \notin$ R
R is not reflexive
Symmetric can be easily checked

23. $-1 \leq \sin x \leq 1$
$-2 \leq 2 \sin x \leq 2$
$2 \geq -2 \sin x \geq -2$
$-2 \leq -2 \sin x \leq 2$
Adding 1,
$1 - 2 \leq 1 - 2 \sin x \leq 1 + 2$
$-1 \leq 1 - 2 \sin x \leq 3$
$-1 \geq \frac{1}{1-2\sin x} \geq \frac{1}{3}$
$\frac{1}{3} \leq \frac{1}{1-2\sin x} \leq -1$
$\therefore$ Range is $(-\infty, -1] \cup \left[\frac{1}{3}, \infty\right)$

24. f$(x) = \lfloor\ x\ \ -x\ \rfloor$, f$(x)\ \ = \lfloor\ x\ \ -x$
$f(0) = 0 - 0 = 0$
$f(6.5) = 6 - 6.5 = |-0.5| = 0.5$
$f(-7.2) = 8 - 7.2 = 0.8$
$\therefore$ Range is $[0, 1)$

25. The domain is $[0, \infty)$
The codomain is also $[0, \infty)$

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QUESTION BANK 365