Topic : ..... Date. : ..... Page No. : .....

RELATION & FUNCTION

← Solutions of TEST NO : 2 →

Q.No 1 (1M) $A = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ Ans

Q.No 2 (1M) $B = \{1, 2^{P}-1, 2^1, 2^2, 2^3, \ldots 2^{P-1}\}$ Ans

Q.No 3 (1M)

$$\frac{x+5}{x-7} - 5 = \frac{4x-40}{13-x}$$

$$\Rightarrow \frac{x+5-5x+35}{x-7} = \frac{4x-40}{13-x}$$

$$\Rightarrow (40-4x)(13-x) = (4x-40)(x-7)$$

$$\Rightarrow (40-4x)(13-x) - (4x-40)(x-7) = 0$$

$$\Rightarrow (40-4x)[13-x-x+7] = 0$$

$$\Rightarrow (40-4x)(20-2x) = 0$$

$$\Rightarrow 4(10-x) \times 2(10-x) = 0$$

$$\Rightarrow (10-x)^2 = 0$$

$$\Rightarrow x = 10$$

$\therefore C = \{10\}$ Ans

Q.No 4 (1M) $A = \left\{x : x = \frac{n}{n^3+2} ; n \in N ; n \leq 10\right\}$ Ans

Q.No 5 (1M) $C = \{x : x^2 \leq 9 ; x \in Z\}$

(OR) $C = \{x : |x| \leq 3 ; x \in Z\}$ Ans

Q.No 6 (1M) $A = \{x : -6 < x \leq 12 ; x \in R\}$

Q.No 7 (1M) $A' = \{$ Set of all equilateral triangles $\}$

Q.No 8 (2M) $A = \phi$ $P(A) = \{\phi\}$

$P(P(A)) = \{\{\phi\}, \phi\}$ Ans

Topic : ..... Date. : ..... Page No. : ..... (2)

Solutions

[redacted] = [redacted], [redacted], [redacted]

Q.N. 9 → (2M)

$[B' \cup (B' - A)]'$

$= [B' \cup (B' \cap A')]'$

$= [B \cap (B' \cap A')']$ --- {demorgan's law}

$= B \cap (B \cup A)$ --- (demorgan's law

$= B$

∴ (d) part is the Ans

Q.N. 10 → (2M)

$X \cap (X \cup Y)'$

$= X \cap (X' \cap Y')$

$= (X \cap X') \cap (X \cap Y')$

$= \phi \cap (X \cap Y')$

$= \phi$

∴ (c) part is the Ans

Q.N. 11 → (2M)

$y = \frac{1}{x}$ also $y = -x$

$\Rightarrow \frac{1}{x} = -x$

$\Rightarrow x^2 = -1$

Then is no value (real value) of x

∴ $x \in \phi$

$\Rightarrow A \cap B = \phi$ ∴ (c) part is the Ans

Q.N. 12 → (2M)

$n(A) = m$ & $n(B) = n$

Given $2^m - 2^n = 56$

$\Rightarrow 2^m - 2^n = 64 - 8$

$\Rightarrow 2^m - 2^n = 2^6 - 2^3$

CLASSTIME

Topic : ..... Date. : ..... Page No. : .....

Solutions (3)

Company $m=6, \quad n=3$ Ans

Q.M 13 → $X_1 \cup X_2 \cup X_3 \dots X_{20} = S$

(4M)

Since each X contain 5 element.

∴ Maximum no. of element is set $S = 20 \times 5 = 100$

But in set S, every element is repeaty 10 times

$$\therefore n(S) = \frac{100}{10} = 10 \quad \text{--(1)}$$

$Y_1 \cup Y_2 \cup Y_3 \dots Y_n = S$

each set Y contains 2 element

∴ Max. no. of elements in set $S = 2 \times n = 2n$

But in set S, every element is repeaty 4 times

$$\therefore n(S) = \frac{2n}{4} = \frac{n}{2} \quad \text{--(2)}$$

from (1) & (2)

$$\frac{n}{2} = 10 \Rightarrow \boxed{n = 20} \text{ Ans}$$

Q. 14 → Given $n(F) = 38$

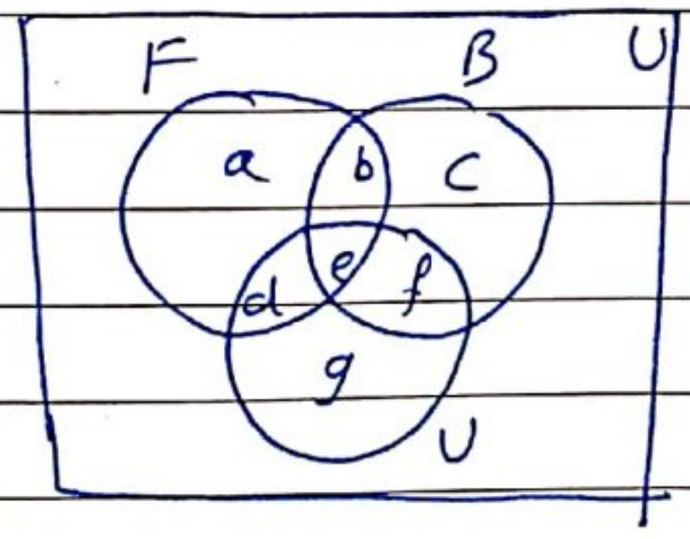
(4M)

$n(B) = 15$

$n(C) = 20$

$n(F \cup B \cup C) = 58$

$n(F \cap B \cap C) = 3 = e$



$n(F \cup B \cup C) = n(F) + n(B) + n(C) - n(F \cap B) - n(B \cap C) - n(F \cap C) + n(F \cap B \cap C)$

$\Rightarrow 58 = 38 + 15 + 20 - n(F \cap B) - n(B \cap C) - n(F \cap C) + 3$

$\Rightarrow n(F \cap B) + n(B \cap C) + n(F \cap C) = 76 - 58$

$\Rightarrow b + e + e + f + d + e = 18$

$\Rightarrow b + d + f + 3e = 18$

CLASSTIME

Topic : ..... Date. : ..... Page No. : .....

Solution (4)

$\Rightarrow b+d+f+3e = 18$

$\Rightarrow b+d+f+9 = 18$ ---{ $e=18-9$

$\Rightarrow b+d+f = 9$

∴ 9 persons get medals exactly in two sports Ans

Q.15 → (4M)

$n(U) = 60$

$n(H) = 25 = a+b+e+d$

$n(T) = 26 = b+c+e+f$

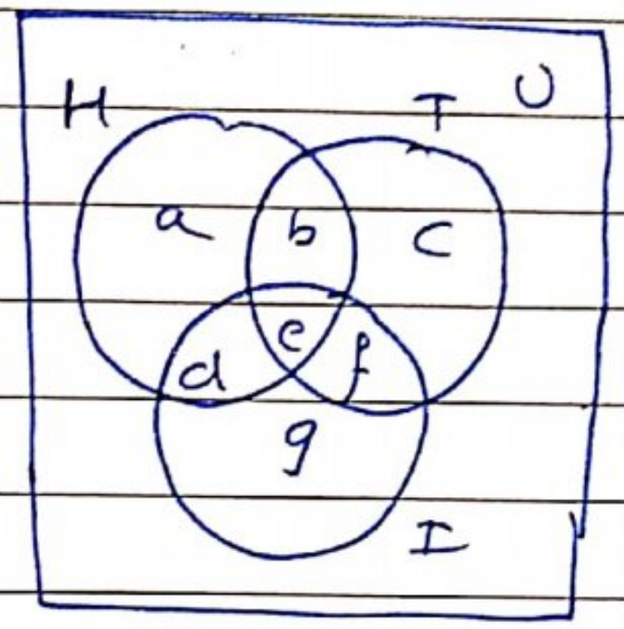
$n(I) = 26 = d+e+f+g$

$n(H \cap I) = 9 = d+e$

$n(H \cap T) = 11 = b+e$

$n(T \cap I) = 8 = e+f$

$n(H \cap T \cap I) = 3 = e$



$e=3,\ f=5,\ b=8,\ g=12\ ;\ c=10,\ a=8$

$d=6$

exactly

(2) one newspaper = $a+c+g = 8+10+12 = 30$

(1) other one newspaper = $a+b+c+d+e+f+g = 52$

Q.16 → (1M)

$A-(B-C)$

$= A-(B \cap C')$

$= A \cap (B \cap C')'$

$= A \cap (B' \cup C)$

$= (A \cap B') \cup (A \cap C)$

$= (A-B) \cup (A \cap C)$

∴ (b) part is the ans

CLASSTIME

Topic : ..... Date. : ..... Page No. : ..... (5)

Solution

Q.17 → (1M)

Given $C = A \cup B$

$A \cap B = \phi$

⇒

Now $C - B$

$= (A \cup B) - B$

$= (A \cup B) \cap B'$

$= (A \cap B') \cup (B \cap B')$

$= (A \cap B') \cup \phi$

$= A \cap B'$

$\therefore$ ~~[redacted]~~ proved (B) is Any

$A \cap B' = A - (A \cap B)$
$= A - \phi$
$= A$

since $A \cap B = \phi$ $\therefore A \cap B' = A$

Q.18 → (4M)

Let $n(U) = 100$

$n(A) = 76\%$ of $100 = 76$

$n(B) = 62\%$ of $100 = 62$

Let ~~we let~~ $n(A \cap B) = x$

We know that $n(A \cup B) \le n(U)$

$\Rightarrow n(A) + n(B) - n(A \cap B) \le n(U)$

$\Rightarrow 76 + 62 - x \le 100$

$\Rightarrow 138 - x \le 100$

$\Rightarrow x \ge 38$ ---(1)

also $n(A \cap B) \le n(A)$ and $n(A \cap B) \le n(B)$

$x \le 76$ and $x \le 62$

consider $x \le 62$ ---(2)

from (1) & (2)

$38 \le x \le 62$

$\therefore$ 38% to 62% like both banana & oranges Ans

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