SECI1013: DISCRETE STRUCTURE (SEM 1 2024/2025)

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Marks 12.5 / 15

Question 1 [7 Marks]

Let U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, A = {2, 3, 6, 9}, $B = \{x | x \in Z, x = 7 - 2a, 1 < a \leq 3\}$, and C = { 1, 5, 6, 7, 9}

Answer the following questions:

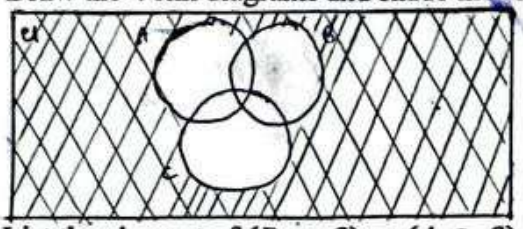
a. List the elements of set B (1 m)

B = {1, 3}

b. List 2 proper subsets of set A (2 m)

proper subsets of set A = {2}, {3}

c. Draw the Venn diagrams and shade the area representing $(A' \cup B) \cap (C' - A)$ (2m)



d. List the element of $(B \cap C) \times (A \cap C)$ (2m)

$(B \cap C) \times (A \cap C)$ = {1} × {6, 9}

= {(1, 6), (1, 9)}

Question 2 [8 Marks]

Let

p = The user enters a valid password

q = Access is granted

r = The user has paid the subscription fee

a) Express the following statement using the propositions p, q and r and logical connectives.

i) The user has paid the subscription fee, but does not enter a valid password. (2m)

$r \wedge \neg p$

ii) Access is granted whenever the user has paid the subscription fee and enters a valid password. (2m)

$q \leftrightarrow (r \wedge p)$

iii) Access is denied if the user has not paid the subscription fee. (2m)

$\neg q \rightarrow \neg r$

b) Suppose you found out that the statement aii) was a lie even you have paid the subscription fee. What can you conclude? (2m)

~~$\neg q \rightarrow (r \wedge \neg p)$~~

$\neg q \rightarrow (r \wedge \neg p)$

Access is denied if the password is invalid even you have paid the subscription fee.