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COURSE : Discrete Structure

PROGRAM : BS (SE)

SEMESTER : 4th

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Q1

(a) Explain the Concept of Bio Coditional Statement :

Ans: if we remove the if than Part of a ture Conditional Statment. Combine the hypothesis and concusion, & truck in a Phase "If and only if" we can Create biconditional Statement. A biconditional is true if and only if both the conditionals are true.

Bi- Conditional are represented by the Symbol $p \leftrightarrow q$

For biconditional Statment, we use a double arrow $\Longleftrightarrow$ Since the thruth works in both directions.

For examples:

Let p be the Statement "Shape is a triangle" and let q be the Statement "It has exactly three side".

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" Shape is a triangle if and only if it has exactly three Sides .

$(P \rightarrow q) \wedge (q \rightarrow P)$

The truth table for the Biconditional		$P \longleftrightarrow q$
P	q	$P \longleftrightarrow q$
T	T	T
T	F	F
F	T	F
F	F	T

" P is necessary and Sufficient for q"

" if P then q and Conversly.

Q1

(b) (i) Sam had Pizza last night

a Chris finished her homework.

$(p \wedge q)$

$p \Leftrightarrow q$

p	q	$p \Leftrightarrow q$
T	T	T
T	F	F
F	T	F
F	F	T

(ii) Chris and not finish her homework and Pat watched the news this morning $(\sim q \wedge r)$

$\sim r \Leftrightarrow p$

p	r	$\sim r$	$\sim r \Leftrightarrow p$
T	T	F	F
T	F	T	T
F	T	F	T
F	F	T	F

(iii) Sam did not have Pizza last night or Chris did not finish her homework

$(\sim p \vee \sim q)$

$\Leftrightarrow (q \wedge \sim p)$

p	q	r	~p	(q∧~p	r⇔(q∧~p)
T	T	T	F	F	F
T	T	F	F	F	T
T	F	T	F	F	F
T	F	F	F	F	T
F	T	T	T	T	T
F	T	F	T	T	F
F	F	T	T	F	F
F	F	F	T	F	T

(iv) $r \Leftrightarrow (p \wedge q)$

p	q	r	p∧q	r⇔(p∧q)
T	T	T	T	T
T	T	F	T	F
T	F	T	F	F
T	F	F	F	T
F	T	T	F	F
F	T	F	F	T
F	F	T	F	F
F	F	F	F	T

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Question No 2

(i)

$p \sim q \sim p$: Bi conditional

of truth table

p	q	$p \sim q$
T	T	T
T	F	F
F	T	F
F	F	T

(ii) $p \longleftrightarrow q \wedge r$

Solution

p	q	r	$q \wedge r$	$p \longleftrightarrow q \wedge r$
T	T	T	T	T
T	T	F	F	F
T	F	T	F	F
T	F	F	F	F
F	T	T	T	F
F	T	F	F	T
F	F	T	F	T
F	F	F	F	T

(iii) $p \leftrightarrow q \vee r$

Solution

p	q	r	$q \vee r$	$p \leftrightarrow q$
T	T	T	T	T
T	T	F	T	T
T	F	T	T	T
T	F	F	F	F
F	T	T	T	F
F	T	F	T	F
F	F	T	T	F
F	F	F	F	T

(iv) $r \leftrightarrow (p \vee q)$

Solution.

p	q	r	$p \vee q$	$r \leftrightarrow (p \vee q)$
T	T	T	T	T
T	T	F	T	F
T	F	T	T	T
T	F	F	T	F
F	T	T	T	T
F	T	F	F	T
F	F	T	T	T
F	F	F	F	T

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Question 3

Arguments:
A logical argument is a claim that a set of Premises Support a Conclusion. Two types of argument inductive and deductive argument

Types of Arguments:-
The inductive arguments uses a Collection of Specific examples as its Premises and uses them to Propose a General Conclusion.

A deductive argument used Collection of General Statment at its Premises and uses them Propose a Specific Situation as the Conclusion.

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[redacted]

we have developed the basic language of logic, we shall start to consider how logic can be used to determine whether or not a given argument is valid. In order to do this we shall first formally define exactly argument.

" An argument is valid if whenever true statment are substituted in the statement variable the conclusion is always true. when a conclusion is reached using a valid argument. Before we consider examples, we shell briefly examine how one can tell if a give argument from valid or invalid.

(i) Identify the premises the conclusion

(ii) ~~to~~ truth value premises & conclusion

(iii) Look all the rows where the premises are all ture. we call such critical row

Examples:-

$p \to q \qquad q \to r$

$\therefore \; p \vee q \to r$

Constructing a truth table we have

p	q	r	$p \to q$	$q \to r$	$p \vee q$	$p \vee q \to r$
T	T	T	T	T	T	T
T	T	F	T	F	T	F
T	F	T	F	T	T	T
T	F	F	F	T	T	F
F	T	T	T	T	T	~~F~~ T
F	T	F	T	F	T	F
F	F	T	T	T	F	T
F	F	F	T	T	F	T

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Question #04

(a)

Unions:

The unions of two sets A and B are the set of element which are in A in or in both. It is denoted by A∪B and it is A Union B.

Example # 1

A	B	B A U
1	1	1
1	0	1
0	1	1
0	0	0

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(b) Intersection

The Intersection of two sets A and B denoted by A∩B is the Set of Containg all element of A that also belong to B (or frequivalently all element of B that also belong to A)

Example :-

C	D	C∩D
1	1	1
1	1	1
1	0	0
1	0	0
0	1	0
0	1	0
0	0	0
0	0	0

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Question 5

(a)

Venn diagram:
A venn diagram is an illustration of relationships b/w and among sets, groups of objects that share something in common. venn diagram are used to depict set intersection (upside-down letter U) This types of diagram is used scientific & engineering presentations in computer application and in statistics.
Example: Point that belong set X, Y, Z are gray. Points X only set cyan color Point belonging only set Y are magenta. Point Z belongs to yellow. Point belonging to X and Y but Not to Z are blue Y & Z but not to X are red.

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X and Z but not Y

(e) green : Points Contained in all three Set are black.

Practical example how venn diagram Can illustrate a Situation . Let universe be the Set of all Computer in the world. X represent the set of all notebook Computer in the world , Y represent the Set of all Computer in the world , that are Connected to the Internet .

Let Z represent the Set of all Computer in the world that have anti-virus Software intalled .

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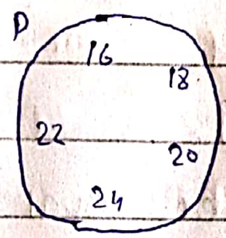
Q5

(b)

Solution: List out the element of P

P = {16, 18, 20, 22, 24} "between" does not include 15 and 25

Draw a cricle or oval. Label it P, Put the element in P

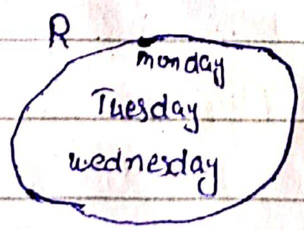


Example.

(C)

Solution R= monday, Tuesday, wednesday

Draw a Cricle or ovel. Label it R Put then element in R



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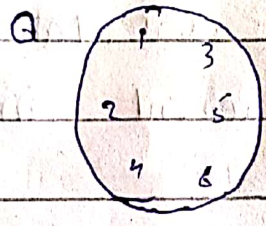
(C)

Solution:

Since an equation is given, we need to first solve for x

$2x-3<11 \Rightarrow 2x<14 \Rightarrow x<7$



So $Q = \{1, 2, 3, 4, 5, 6\}$

Draw a circle or oval

Label it Q

Put the element in Q.

"The End"

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