SRM Institute of Science and Technology
College of Engineering and Technology
School of Computing

Mode of Exam
OFFLINE
SET-A

DEPARTMENT OF COMPUTING TECHNOLOGIES

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2022-2023(ODD)

Test: CLAT-1 **Date: 12.09.2022**
Course Code & Title: 18CSE351T – Computational Logic **Duration:** 50 minutes
Year & Sem: III/V **Max. Marks:** 25

Course Articulation Matrix: ***(to be placed)***

Part - A
(5 x 1 = 5 Marks)

Instructions: Choose the correct answer

Q. No	Question	Marks	BL	CO	PO	*PI Code
1	If P=T,Q=F,R=T, Then P → (Q V R) and P → (Q ∧ R) A) TF B) FT C) TT D) FF	1	3	1	1	1.3.1
2	Let us consider the propositional logic formula S is in the forms of p,q,r.If S is contingent means ,the valuation is _____ A) TTTTTTTT B) TTFT C) FFFFFFFT D) FFFF	1	3	1	1	1.3.1
3	"I'm tired" is an example of _____ Sentence A) Imperative B) Interrogative C) Exclamatory D) Declarative	1	1	1	1	1.3.1
4	A truth table is a convenient format for displaying the ____ A) statement with symbols B) Values C) semantics of a formula D) variables	1	1	1	1	1.3.1
5	PROPDET is used to A) Determine any proposition is tautology B) Determine any proposition is invalid C) Determine whether the given string is proposition or not D) Determine the possibility of unique parse tree	1	2	1	1	3.1.1

Part – B
(2 x 10 = 20 Marks)

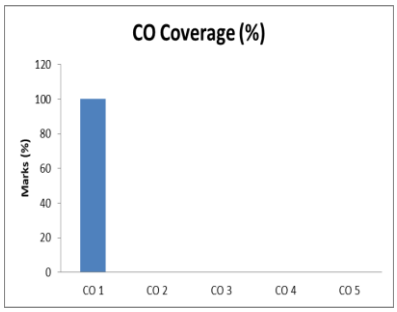
Instructions: Answer any 2 questions

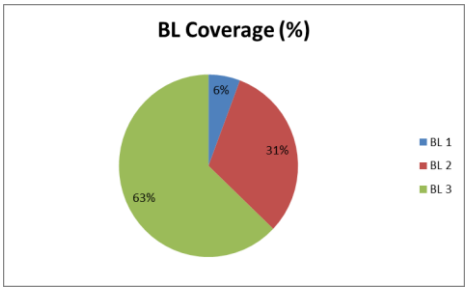
Q. No	Question	Marks	BL	CO	PO	*PI Code
6	Check whether the given formula is valid, satisfiable or contradiction and draw the parse tree. $((P \rightarrow \neg Q) \wedge (Q \rightarrow R)) \rightarrow (P \rightarrow R)$	10	3	1	1	1.3.1
7	Check the equivalence of given expression and justify your answer. a. $(p \leftrightarrow q) \equiv (p \rightarrow q) \wedge (\neg P \rightarrow \neg q)$ b. $((XVY) \wedge \neg X) \equiv Y$	10	3	1	3	1.3.1
8	For the given propositions list all possible prefix, proper prefix,	10	2			

	sub-proposition and draw the parse tree. a. $(p \leftrightarrow q) \leftrightarrow (p \rightarrow q) \wedge (\neg P \rightarrow \neg q)$ b. $((XVY) \wedge \neg X) \leftrightarrow Y$					

***Performance Indicators are available separately for Computer Science and Engineering in AICTE examination reforms policy.**

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





Approved by the Audit Professor/Course Coordinator

Department of Computing Technologies

18CSE351T - Computational logic - Answer key

Set - A

Part A

1. A. TF
2. c. FFFFFFFT
3. d. Declarative
4. c. semantics of a formula.
5. c. Determine whether the given string is proposition or not

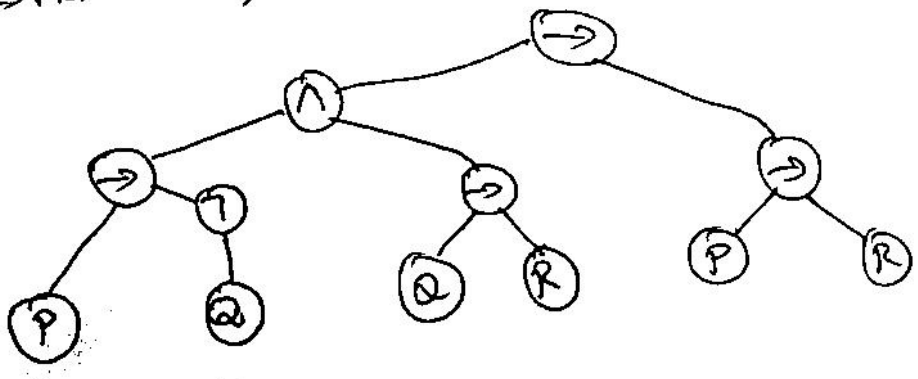
Part B

6.

P	Q	R	¬Q	(P→¬Q)	(Q→R)	∧	P→R	final
T	T	T	F	F	T	F	T	T
T	T	F	F	F	F	F	F	T
T	F	T	T	T	T	T	T	T
T	F	F	T	T	T	T	F	F
F	T	T	F	T	T	T	T	T
F	T	F	F	T	F	F	T	T
F	F	T	T	T	T	T	T	T
F	F	F	T	T	T	T	T	T

3 marks

→ not valid, satisfiable, not contradiction ↳ 3 marks



4 marks

① a.

P	Q	P ↔ Q	P → Q	¬P → ¬Q	(P → Q) ∧ (¬P →
T	T	T	T	T	T
T	F	F	F	T	F
F	T	F	T	F	F
F	F	T	T	T	T

same value for all interpretation

hence, equivalent.

b. $((x \vee y) \wedge \neg x) \equiv y$

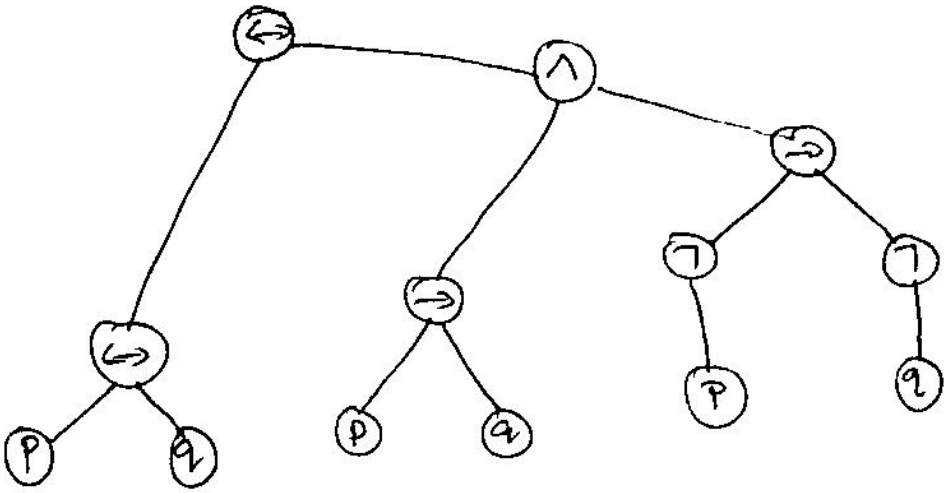
x	y	x ∨ y	¬x	((x ∨ y) ∧ ¬x)
T	T	T	F	F
T	F	T	F	F
F	T	T	T	T
F	F	F	T	F

not same hence not equivalent.

②. a. $(P \leftrightarrow Q) \leftrightarrow (P \rightarrow Q) \wedge (\neg P \rightarrow \neg Q)$

prefix : {E, C, CP, (P↔, (P↔Q), (P↔Q)↔, (P↔Q)↔C, (P↔Q)↔(P→, (P↔Q)↔(P→Q, (P↔Q)↔(P→Q)
(P↔Q)↔(P→Q)∧, (P↔Q)↔(P→Q)∧C, (P→Q)↔(P→Q)∧(¬, (P↔Q)↔(P→Q)∧(¬P, (P↔Q)↔(P→Q)∧(¬P→, (P↔Q)↔(P→Q)∧(¬P→¬, (P↔Q)↔(P→Q)∧(¬P→¬Q)

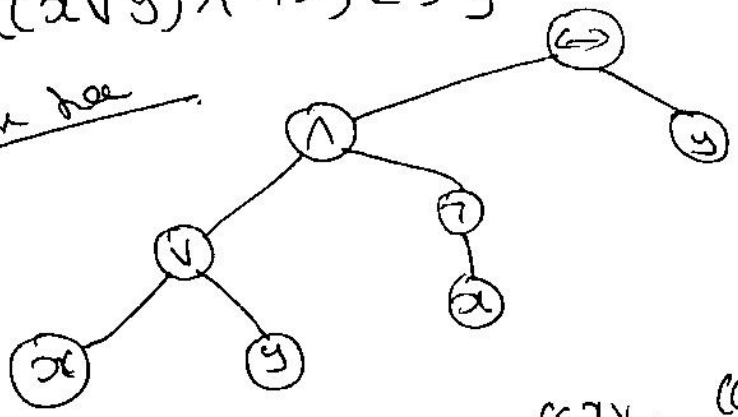
proper prefix: exclude Q, and (P↔Q)↔(P→Q)∧(¬P→¬Q) from above list



Subproposition : {P, Q, P↔Q, P→Q, ¬P, ¬Q, (¬P→¬Q), (P→Q)∧(¬P→¬Q)}

- b. ((x∨y)∧¬x)↔y

Parse tree



Prefix : {ε, (, ((, ((x, ((x∨, ((x∨y, ((x∨y), ((x∨y)∧, ((x∨y)∧¬, ((x∨y)∧¬x), ((x∨y)∧¬x)↔, ((x∨y)∧¬x)↔y}

- Proper prefix : {(, ((, ((x, ((x∨, ((x∨y), ((x∨y)∧, ((x∨y)∧¬, ((x∨y)∧¬x), ((x∨y)∧¬x)↔}

Subproposition : {x, y, x∨y, ¬x, (x∨y)∧¬x}

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DEPARTMENT OF COMPUTING TECHNOLOGIES

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2022-2023(ODD)

Test: CLAT-1 **Date: 08.09.2022**
Course Code & Title: 18CSE351T – Computational Logic **Duration:** 50 minutes
Year & Sem: III/V **Max. Marks:** 25

Course Articulation Matrix: ***(to be placed)***

Part - A
(5 x 1 = 5 Marks)

Instructions: Choose the correct answer

Q. No	Question	Marks	BL	CO	PO	*PI Code
1	If P=T,Q=F,R=T, Then P → (Q → R) and (P ∧ Q) →R A) TF B) FT C) TT D) FF	1	3	1	1	1.2.1
2	Let us consider the propositional logic formula S is in the forms of p,q,r.If S is valid means ,the valuation is _____ A) TTTTTTTT B) TTFT C) FFFFFFFT D) FFFF	1	3	1	1	1.2.1
3	Declarative statements are A) statement with symbols B) statement with true or false C) statements with constants D) Statements with connectives	1	1	1	1	1.2.1
4	(p ∧ q) → ¬ r ∨ q means? A) 'if p and q then not r or q' B) 'if p or q then not r or q' C) 'if p and q then not r and q' D) 'if p and q then r or q'	1	2	1	1	1.2.1
5	The condition for the well-formed propositional logic formula is A) The number of left brackets is equal to the number of right brackets B) The number of left brackets should be Greater than the number of right brackets C) The number of left brackets should be Lesser than the number of right brackets D) The number of left brackets is not equal to the number of right brackets	1	1	1	1	1.2.1

Part – B
(2 x 10 = 20 Marks)

Instructions: Answer any 2 questions

Q. No	Question	Marks	BL	CO	PO	*PI Code
6	Check whether the given formulas are valid, satisfiable or contradiction and draw the parse tree. ((P → Q) →R) Λ(R→ (Q → P))	10	3	1	1	1.2.1

7	Check whether the given equation holds semantically entailment a. ((XVY) Λ¬X) |= Y b. (p ↔ q),(p → q) Λ (¬P → ¬q) |= T	10	3	1	1	1.2.1
8	Check whether the following formula is well formed using PROPDET function and draw parse tree. a. ((P ∧ ¬ Q) → R) V (¬ P → Q ∧ R) b. ((¬ P → Q V R) ↔ ¬R)	10	2	1	1	1.2.1

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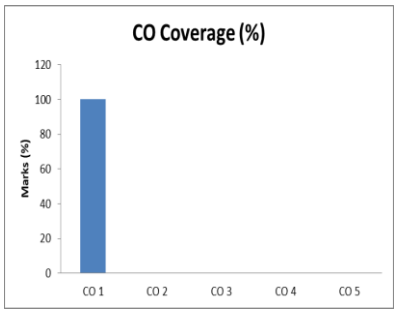
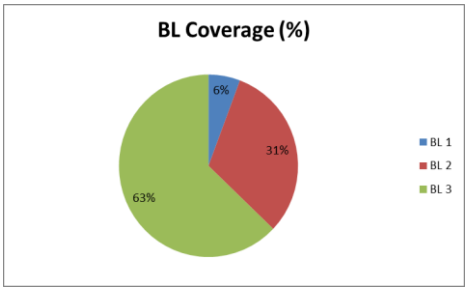
Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





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18CSE351T - Computational logic - Answer key CT1

Set - B

Part A

1. C. TT
2. A. TTTTTTTT
3. B. Statement with the or false
4. A. if p and q then not r or q
5. A. The number of Left brackets is equal to no of right brackets.

Part B

6.

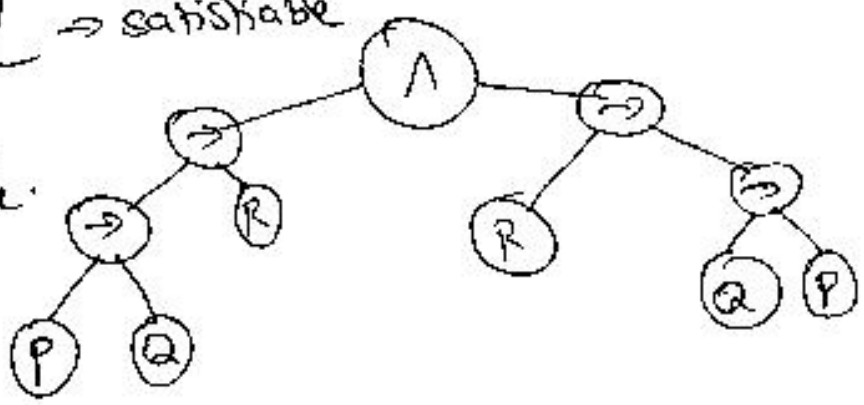
P	Q	R	P→Q	(P→Q)→R	(Q→P)	(R→(Q→P))	final
T	T	T	T	T	T	T	T
T	T	F	T	F	T	T	F
T	F	T	F	T	T	T	T
T	F	F	F	T	T	T	T
F	T	T	T	T	F	F	F
F	T	F	T	F	F	T	F
F	F	T	T	T	T	T	T
F	F	F	T	F	T	T	F

5) 3 marks

3 marks → not valid, not contradiction
→ satisfiable

3 marks

parse tree.



→ 3 marks.

(7) a.

x	y	x ∨ y	¬x	(x ∨ y) ∧ ¬x
T	T	T	F	F
T	F	T	F	F
F	T	T	T	T
F	F	F	T	F

$(x \vee y) \wedge \neg x) \models y$

i (T) ⊨ T

Hence above proposition holds semantic entilment.

b. $(P \Leftrightarrow Q),\ (P \to Q) \wedge (\neg P \to \neg Q) \models T$

P	Q	P ⇔ Q	P → Q	¬P → ¬Q	(P → Q) ∧ (¬P → ¬Q)
T	T	(T)	T	T	(T)
T	F	F	F	T	F
F	T	F	T	F	F
F	F	(T)	T	T	(T)

right ✓

the above proposition holds semantic entilment.

(8) a. $((P \wedge \neg Q) \to R) \vee (\neg P \to Q \wedge R)$

$((P \wedge P_0) \to R) \vee (\neg P \to Q \wedge R)$

$(P_0 \to R) \vee (\neg P \to Q \wedge R)$

$P_0 \vee (\neg P \to Q \wedge R)$

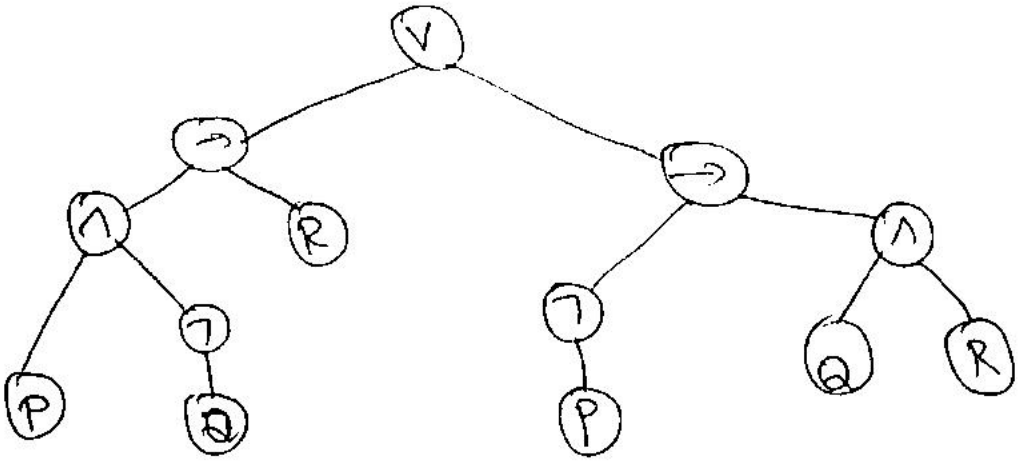
$P_0 \vee (P_0 \to Q \wedge R)$

$P_0 \vee (P_0 \wedge R)$

$P_0 \vee P_0$

P_0

valid and proof yes.



b. $((\neg P \rightarrow Q \vee R) \leftrightarrow \neg R)$

$((P_0 \rightarrow Q \vee R) \leftrightarrow \neg R)$

$((P_0 \vee R) \leftrightarrow \neg R)$

$(P_0 \leftrightarrow \neg R)$

$(P_0 \leftrightarrow P_0)$ — post yes proposition.

P_0