

Paper - IX, Sem - 4 (H)

Objective type :- each carries $1/2$ Marks

1.

- a) If P is true and Q is false then what would be the truth value of $P \cdot Q$?
- b) What do you understand by inclusive and exclusive sense of the word "or"?
- c) The Latin word 'vel' signifies i) inclusive or ii) exclusive disjunction?
- d) Symbolize the following two statements mentioning their difference:
 - i) Jane and Dick will **not both** be elected.
 - ii) Jane and Dick will both not be elected.
- e) If A, B and C are true statements and X, Y, and Z are false statements then what would be the truth value of: $\sim(X \vee Z), (\sim X \cdot \sim Y)$
- f) What do you understand by Material Implication?
- g) What is principle of Identity? Explain with example.
- h) State the rule of Inference by which conclusion of the argument follows from its premises:
 - i) $[N \supset (O \cdot P)], [Q \supset (O \cdot R)], N \vee Q, \therefore (O \cdot P) \vee (O \cdot R)$
 - ii) $(A \supset B), (C \supset D) \therefore (A \supset B), (\sim D \supset \sim C)$
- i) Make a distinction between a variable and a constant.
- j) Name the rule of replacement in this instance
 $(P \supset Q) \equiv (\sim Q \supset \sim P)$

K) What do you understand by truth-function?

L) Define truth-functional compound.

M) What do you understand by Schema?

N) Symbolize the following sentences using quantifiers, individual variables and logical connectives. [any two]

(a) Some roads are passable if and only if they are dry.

b) Any man is a coward who deserts.

c) All except previous winners are eligible.

O) What do you understand by quantifier?

P) What is Schemata?

Q) What do you understand by self-contradictory statement? Explain with example.

Short-type :- each carries 5 Marks

- 2/a) what are the Principle laws of thought? Give examples.
- b) which statement form is found by negating a tautological form of statement? Give arguments in favour of your answer.
- c) What kind of statement do we get by denying a contradictory statement? Give reason for your answer.
- d) Explain with examples the Paradoxes of Material Implication. How can the Paradoxes be resolved?
- e) Determine the validity or invalidity of the argument by means of truth table.
$$U \vee (V \vee W), (V \cdot W) \supset \sim U \therefore \sim U$$
- f) What do you understand by material Implication? What is its difference from other implications?
- g) Construct a formal proof of validity
$$K \supset L \therefore K \supset (L \vee M)$$
- h) Determine the truth value of the following Statement form by using truth-table method:
$$p \supset [(p \supset a) \supset a]$$
- i) What is need for quantification?
- j) What are the basic differences between Rules of Inference and Rules of Replacement?
- k) Write a short note on weak or inclusive disjunction and strong or exclusive disjunction.
- l) Write note on the rule of Universal Generalisation.

M) Distinguish between a truth functional compound and a non-truth functional compound.

A) Determine the validity of the following schema by the method of resolution:

$$Pq \vee \bar{P}\bar{r} \cdot \supset \cdot q \vee \bar{r}$$

B) Can it even happen that by a given schema, one set of substitution, we get a valid schema from it ~~and~~ and by another set of substitution an inconsistent schema? Illustrate

C) Prove the invalidity of any two of the following arguments: -

$$\begin{aligned} \text{(i)} \quad A &\equiv (B \vee C) \\ B &\equiv (C \vee A) \\ C &\equiv (A \vee B) \\ \sim A &\therefore B \vee C \end{aligned}$$

$$\begin{aligned} \text{ii)} \quad (\exists x) (Kx \cdot Lx) \\ (\exists x) (\sim Kx \cdot \sim Lx) \\ \therefore (\exists x) (\sim Kx \cdot Lx) \end{aligned}$$

iii) Some men are bohemians. Some men are artists. Therefore some artists are bohemians.

Broad type: each carries 15 Marks

3.

1. a) Explain with example the paradoxes of Material implication. 5

b) Test the validity of the argument by truth table

i) $A \supset (B \supset C), \sim C \supset (\sim A \supset \sim B) \therefore \sim B \supset (A \supset \sim C)$ 4X2

ii) $(I \vee J) \supset (I \cdot J), \sim I \vee J \therefore \sim (I \cdot J)$

c) Use truth table to decide whether the following biconditional is a tautology? 2

$$(P \supset Q) \equiv (\sim Q \supset \sim P)$$

2. a) Use the truth table to characterize the following statement forms as tautologous, self-contradictory or contingent. 4X3

i) $P \supset [P \supset (A \cdot \sim V)]$

ii) $[P \supset (A \supset R)] \supset [(P \supset A) \supset (P \supset R)]$

iii) $\{[(P \supset A) \cdot (R \supset S)] \cdot (A \vee S)\} \supset (P \vee R)$

b) Determine by the method of resolution whether the following statement is equivalent to — 3

$$(P \cdot A) \supset R ; \\ P \supset (A \supset R)$$

3. a) Construct the formal proof of validity. 4X3

i) If you plant marigold in your garden, your garden will bloom early and if you plant rose in your garden ~~it~~ ^(Any three) will bloom late. So if you either plant marigold or rose in your garden, your garden will bloom either early or late.

ii) Milton was blind but Keats was not. So, everyone is either blind or non-blind.

iii) A book is interesting only if it is well-written. A book is well-written only if it is interesting. Therefore Any book is both interesting and well-written if it is either interesting or well-written.

iv) $(B \vee D) \equiv (\sim B \cdot \sim D) / \therefore B \vee (A \cdot e)$

v) Socrates drank hemlock whether Einstein was
vi) Jew or not. Therefore, Socrates drank hemlock.

- vii) 1. $(A \vee B) \supset C$
2. $(C \vee B) \supset [A \supset (D \equiv E)]$
3. $A \cdot D / \therefore D \equiv E$

viii) $[H \vee (I \vee J)] \supset (K \supset J)$
 $L \supset [I \vee (J \vee H)] / \therefore (L \cdot K) \supset J$

b) . Test the invalidity by the method of assigning truth value :

$$(I \vee \sim J), \sim(\sim K \cdot L), \sim(\sim I \cdot \sim L) / \therefore \sim J \supset K$$

4) . Explain in brief the Rules of Resolution according to Quine. 3

5) . Determine the truth-value of the following Schemata with the help of the method of Resolution: 15

i) $pq \vee \bar{p}\bar{q} \cdot \supset \cdot q \equiv r \dots$

ii) $p \supset \cdot p \equiv q$

iii) $p \equiv q \cdot \vee \cdot p \equiv \bar{q}$

iv) $p \vee a \cdot r \cdot \equiv \cdot p \vee q \cdot p \vee r$

6) a) Symbolize the sentences using quantifier variables etc. 5 X 3' ~~4 X 3~~

i) Hume is a Sceptic but Locke is not a Sceptic

ii) A boxer who wins it and only it he is lucky is not skillful

iii) Everyone except the previous winners will join the election.