63 (FY)SEM–3/MAJ/PHLMAJ2024

2025

PHILOSOPHY

Paper : PHLMAJ2024

(Formal Logic)

Full Marks : 70

Pass Marks : 28

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct answer : 1×6=6

(a) What is the name of the symbol $(\exists X)$?

(i) Universal quantifier

(ii) Existential quantifier

(iii) Universal instantiation

(iv) Universal generalization

(b) Which rule is applied when we conclude 'p∨q' from '*P*'?

(i) Addition

(ii) Modus ponens

(iii) Disjunctive syllogism

(iv) Conjunction

(c) What is the name of the rule?

$$[(p.q) \supset r] \equiv [p \supset (q \supset r)]$$

(i) Transposition

(ii) Commutation

(iii) Distribution

(iv) Exportation

(d) Under what condition, a disjunctive function becomes false?

(i) If both p and q are false

(ii) If p is true and q is false

(iii) If p is false and q is true

(iv) If both p and q are true

(e) Two sets are said to be equal if—

(i) They have same number of elements

(ii) Their elements are same

(iii) One is subset of the other

(iv) Both are null sets

(f) '$\subseteq$' is the symbolic form of

(i) Superset

(ii) Null set

(iii) Subset

(iv) Intersection

2. Answer the following questions : ***(any five)*** 2×5=10

(a) What do you mean by Truth–Function?

(b) What is General Proposition?

(c) What is Subset?

(d) Define Truth-Table method.

(e) Write the symbolic form of Existential Instantiation.

(f) Construct truth table for conjunctive function.

(g) Why is shorter truth table method called an indirect truth-table ?

3. Answer the following questions : ***(any six)*** 5×6=30

(a) Prove the validity or invalidity of the following argument through shorter truth table method.

If common people are intelligent, then politicians are honest.

Common people are intelligent.

∴ Politicians are honest.

(b) Name *any five* rules of replacement with appropriate symbolic expression.

(c) What are the rules of quantification ?

(d) Write a short note on predicate logic.

(e) What is shorter truth table method ?

Explain the procedure with a proper example.

(f) Write a short note on operation of sets.

(g) Prove the following arguments using quantification rules.

(i) $(X)\,(Cx \supset Vx)$

$(\exists x)(Hx.\,Cx) / \therefore (\exists x)(Hx \cdot Vx)$

(ii) $(X)(Hx \supset Mx)$

$(X)(Gx \supset Hx) / \therefore (x)(Gx \supset Mx)$

(h) Prove that the following rules of inference are tautological.

(i) Modus tollens

(ii) Conjunction

(iii) Hypothetical syllogism

(iv) Disjunctive syllogism

(v) Modus ponens

(i) Express the following statements in set notation.

(a) All men are mortal

(b) Some birds can fly

(c) No dog is cat

(d) All students are literate

(e) Some students are not diligent.

4. Answer the following questions : ***(any two)*** 12×2=24

(a) Prove the following arguments by the rules of formal proof of validity : 4+4+4=12

(i) 1. $(A \cdot B) \supset (A \supset (D \cdot E)$

2. $(A.B) \cdot C$

3. $\therefore D \vee E$

(ii) 1. $(J \cdot K) \supset L$

2. $(J \supset L) \supset M$

3. $\sim K \vee N$

4. $\therefore K \supset (M \cdot N)$

(iii) 1. $X \supset (Y \supset 2)$

2. $X \supset (A \supset B)$

3. $X \cdot (Y \vee A)$

4. ~ 2

5. $\therefore B$

(b) What is quantification ? Explain how traditional AEIO propositions are symbolized with the help of quantifiers.

(c) Construct truth table for the following compound expressions and determine whether they are tautologous. Contradictory or Contingent. 4+4+4=12

(i) $\sim (p \cdot q) \cdot (q \supset p)$

(ii) $[q \equiv (p \supset q)] \supset p$

(iii) $(p \cdot \sim p) \supset q$

(d) Explain the concept of set. Discuss the different types of set with suitable examples. 4+8=12