

[2]

Ex/PHIL/PG/3.4.5/2023

MASTER OF ARTS EXAMINATION, 2023

(2nd Year, 3rd Semester)

PHILOSOPHY

[Logic - I]

Time : Two Hours

Full Marks : 30

Group – A

1. State and prove the Replacement Theorem in system AX. 2+8

OR

2. Prove the following in System AX. 2·5×4=10

a) $D5: ((p \vee q) \vee r) \supset ((p \vee q) \vee (q \vee r))$

b) $D7: (r \vee (p \vee q)) \supset (r \vee (p \vee (q \vee s)))$

c) $D9: ((p \vee q) \vee r) \supset (p \vee (q \vee r))$

d) $D12: p \supset (q \supset (p \cdot q))$

3. How do Russell and Whitehead state the definition of Implication (*1·01) in *Principia Mathematica*. 5

OR

4. What are the required conditions for an Axiom system? 5

Group – B

5. a) Prove the following in System T: 5

[Turn over

- i) $(Lp \cdot Lq) \supset (p = q)$
ii) $(p \varepsilon q) \cdot M(p \cdot r) \supset M(q \cdot r)$
b) Construct falsifying T models for the following invalid formula: 5

i) $L(p \vee Mq) \supset (Lp \vee Mq)$

ii) $M(p \cdot Mq) \supset (LMp \supset MLq)$

OR

6. a) What is meant by iterated modality? State with examples. 5

- b) Prove in system S4: 5

i) $LMp \supset LMLMp$

ii) $MLp \equiv MLMLp$

7. Is $Lp \equiv p$ a valid formula in system T? If not, why not? Discuss. 5

OR

8. What are the four basic notions of modal logic? Are they mutually exclusive? Discuss. 5