

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

M.A./M.Sc. FOURTH SEMESTER EXAMINATION, MAY 2017

SECOND YEAR [BATCH 2015-17]

Date : 03/05/2017

PHILOSOPHY

Time : 11 am – 3 pm

Paper : X (Logic)

Full Marks : 100

[Use a separate Answer Book for each Group]

Group – A

Unit - I

1. a) Symbolize (using quantifier, variables etc.) **any four** of the following : (4 × 1.5)
- i) Everything has a cause.
 - ii) Every lover loves everyone.
 - iii) If any survivors are women, then if all women are fortunate, they are fortunate.
 - iv) A Jack of all trades is master of none.
 - v) There are exactly two girls in the class.
 - vi) Cain and Abel were brothers.
 - vii) What is fair for one is fair for all.
 - viii) The present queen of India is very beautiful.
- b) Construct formal proof of validity for the following arguments (**any three**) : (3 × 3)
- i) $(x)(\exists y)(Fx \bullet Gy)$
 $(\exists y)(x)(Fx \bullet Gy)$
 - ii) There is a painting that all critics admire. Therefore every critic admires some painting or other.
 - iii) Whoever supports Jadu will vote for Shyam. Madhu will vote for no one but a friend of Sunil. No friend of Rahim has Shyam for a friend. Therefore, if Sunil is a friend of Rahim, Madhu will not support Jadu.
 - iv) All pets are gentle. Therefore, if any dogs are excitable and no excitable dogs are gentle, they are not pets.
 - v) There is a professor who is liked by every student who likes at least one professor. Every student likes some professor or other. Therefore, there is a professor who is liked by every student.
 - vi) Some boys like all girls. No boys like any witches. So, no girls are witches.
2. a) Prove the validity, of the following enthymemes, adding obviously true premises where necessary (**any two**) : (2 × 4)
- i) Any man on the first team can outrun any man on the second team. Therefore, no man on the second team can outrun any man on the first team.
 - ii) All Olympic champions have gold medals. So, some sports-men have metal medals.
 - iii) Professor Smith is Tom's teacher. So Tom is a student of professor Smith.

- iv) Al is older than Bill. Bill is older than Charlie. Charlie is older than David. Therefore, Al is older than David.
- b) Prove the validity of the following arguments using the identity symbol (**any two**) : (2 × 3.5)
- $(\exists x)[Px \bullet (y)(py \supset y = x)]$
 $\therefore (\exists x)(y)(py \equiv y = x)$
 - The only survivor of the battle is an Indian. Therefore, all survivors of the battle are Indians.
 - The smallest state is in New England. All states in New England are primarily industrial. Therefore, the smallest state is primarily industrial.
 - The fastest running person is a Scandinavian. Therefore, anyone who is not a Scandinavian can be outrun by someone (or other).
3. Construct demonstrations for the following (**any two**) : (2 × 2.5)
- $(x)(y)(z)[(x = y \bullet y = z) \supset x = z]$
 - $(\exists x)(y)(py \equiv y = x) \rightarrow (\exists x)[px \bullet (y)(py \supset y = x)]$
 - $(\exists x)[(\exists x)Fx \supset Fy]$
 - All totally reflexive relations are reflexive.

Unit – II

4. a) Test the following inferences for validity by the tree method (**any three**) : (3 × 4)
- Everyone loves every lover. Therefore, every lover loves everyone.
 - The logician at Temple University is a philosopher. Therefore, every logician at Temple University is a philosopher.
 - Someone has red hair. Someone has brown hair. Therefore, someone has red and brown hair.
 - No one had more than one student. Plato was taught by an autodidact. Therefore, Plato was an autodidact.
 - All entrants will win. There will be, at most, one winner. There is at least one entrant. Therefore, there is exactly one entrant.
 - Jones is the only person who owns a Ferrari. Smith is the only person who owns a Maruti. There is someone who owns both Ferrari and Maruti. Therefore, Jones is Smith.
- b) Determine by the tree method whether the following statements are logical truths (**any one**) : (1 × 3)
- $(\exists x)(y)[xGy \rightarrow (y)(\exists x)xGy]$
 - $(\exists x)(y)(Py \leftrightarrow y = x) \rightarrow (\exists x)Px$

Group – B

Unit - I

5. Answer **any one** question of the following : (1 × 5)
- State the syntactical rules or the rules of formation of the PM system of truth functions.
 - What are the essential conditions to be satisfied by a set of postulates of a deductive system?

6. Derive **any two** of the following in the PM (from the base) : (2 × 6)
- $(p \supset \sim q) \supset (q \supset \sim p)$
 - $(p \supset q) \supset (\sim q \supset \sim p)$
 - $q \supset (p \supset q)$
 - $(p \supset \sim p) \supset \sim p$
7. Derive the following in the PM (**any two**) : (2 × 4)
- $[p \supset (q \supset r)] \supset [q \supset (p \supset r)]$
 - $p \supset (p \vee p)$
 - $p \supset p$
 - $(\sim p \supset p) \supset p$

Unit – II

8. Answer **any one** question of the following : (1 × 5)
- Are the modal operators truth functional?
 - Prove in T : if $\vdash (\alpha \equiv \beta)$ then $\vdash (L\alpha \equiv L\beta)$.
9. Prove the following in the T system. (**any two**) : (2 × 6)
- $L(p \bullet q) \equiv (Lp \bullet Lq)$
 - $Lp \equiv \sim M \sim p$ (Do not use LMI)
 - $[(p \Rightarrow q) \bullet (p \Rightarrow \sim q)] \equiv L \sim p$
 - $M(p \bullet q) \supset (Mp \bullet Mq)$
10. Prove by construction of T – models, that the following formulae are not valid in the system T : **any two** (2 × 4)
- $L(p \vee q) \supset (Lp \vee Lq)$
 - $M(Lp \bullet \sim q) \vee L(p \supset Lq)$
 - $L(Lp \vee Mq) \equiv (Lp \vee Mq)$
 - $(Mp \bullet Mq) \supset (p \Rightarrow q)$

_____ × _____