Time : 2½ Hours   **LOGIC**

Subject Code

H 5 5 2

Total No. of Questions : 32   **(Printed Pages : 4)**   **Maximum Marks : 80**

INSTRUCTIONS :   i)   **All** questions are **compulsory**.

             ii)   Figures at the **right** indicate **full** marks.

            iii)   Part – **A** is **one** mark **each**. For MCQ's in Part **A**, choose the correct alternative and write the answer.

            iv)   Part – **B** is **two** marks **each**. They are short answers, **not** to exceed **30** words.

            v)   Part – **C** is **three** marks **each**. Read instructions **carefully** and solve accordingly.

            vi)   Q. **25** and Q. **26** of Part – **D** are to be symbolized **first** and then determine validity.

           vii)   Q. **27** and Q. **28** are to be solved **carefully**.

           viii)   Q. **29** to Q. **32** of Part – **D** carries **4** marks **each**. Answers **not** to exceed **100** words.

PART – A   [8]

1. Rule of negation of implication in truth-tree method opens as a

    (branch, path, stem)

2. Small letters 'a to w' represent _____ in predicate logic.

    (individual variable, individual constant, predicate constant)

3. The condition in absence of which, event will not occur is

    (sufficient, necessary, prime)

4. When A is denied _____ is obtained.

   (A, E, I, O)

5. When a decision procedure satisfies three required conditions, then it is said to be

   (finite, effective, mechanical)

6. A hypothesis is said to be testable. Explain.

7. Give one point of difference between independent variable and dependent variable.

8. Insight is said to be source of hypothesis. Give reason.

<div align="center">PART – B   [16]</div>

9. Why does generalization established by simple enumeration have low degree of probability ?

10. Give two points of differences between complement of a class and null class.

11. What is Analogy ? State an example.

12. Bacon and Mill's view about scientific induction was refuted ? Give reason.

13. Why is good hypothesis said to be a result of rational activity ?

14. Explain 'Consilience of Induction'.

15. Explain 'sub contrary' relation.

16. How is 'Instantiation' different from 'Quantification' ?

<div align="center">PART – C   [24]</div>

17. Construct shorter truth table to determine if following is valid :

    $A \rightarrow (P \cdot Q)$

    $(P \cdot Q) \rightarrow A \quad / \therefore A \rightarrow D$

18. Construct Shorter Truth Table to determine if following is tautology :

$[(p \bullet q) \bullet \sim p] \rightarrow \sim q$.

19. Construct Truth Tree to determine if following is valid :

$\sim C \rightarrow (M \bullet N)$

$\sim M \rightarrow \sim C \quad / \therefore M$

20. Construct Truth Tree to determine if following is tautology :

$[p \vee (q \bullet r)] \rightarrow (p \vee q)$.

21. Construct Conditional Proof (C.P.) of validity for the following :

$P \rightarrow Q$

$P \vee \sim M \quad / \therefore \sim Q \rightarrow \sim M$

22. Construct Conditional Proof (C.P.) to determine if following is tautology :

$[(A \vee B) \bullet \sim A] \rightarrow B$

23. Construct Indirect Proof (I.P.) to determine if following is valid :

$P \vee (Q . R)$

$P \rightarrow R \quad / \therefore R$

24. Construct Indirect Proof (I. P.) to determine if following is tautology :

$(\sim A \vee \sim B) \vee B$

PART – D [32]

25. Determine validity of the following argument by Formal Proof Method :

1) If it rains then we will have water to drink and if there is a drought then our animals may die.

2) Either it will rain or there will be droughts. Therefore it is not the case that either we will get water to drink or our animals will die, then human life will get affected. [R, W, D, A, H]

26. Determine validity of the following by Formal Proof Method :

Picasso is a painter

Picasso is a chess player

Therefore some painters are chess players.

27. Translate the following into logical notations of propositional functions and quantifiers :

   1) All Indians practise Yoga.

   2) Some cricketers are famous.

   3) Some birds are not carnivorous.

   4) All flowers are not beautiful.

28. Symbolize the following using Venn diagram :

   1) Class with members

   2) Universal negative

   3) Particular affirmative

   4) Product of classes

29. Answer **any one** of the following :

   1) Solution to the problem of induction.

   2) Conditions of sound analogical arguments.

30. Explain **any one** of the following :

   1) Fallacy of Mal-observation.

   2) Law of functional dependence.

31. What is 'working hypotheses' ?

32. Explain characteristics of experiment.