Max Marks 60

Date: 09-10-2023   **Duration 90 Minutes**

*Instructions***:** Do not use any symbol other than the specified truth-functional connectives; do not use binary language. No marks, if the syllogism is not standard-form. Attempt parts of a question at one place.

1. Discuss with examples the concepts of "logical product" and "complementary class" and their usage in Venn technique.   (12)

2. Discuss the nature and significance of "form" in the contexts of statements and arguments.   (12)

3. Rewrite it into a standard-form categorical syllogism and determine its validity or invalidity by using Venn diagram. State fallacy(ies), if it is invalid.   (8)

   Some leprechauns are exasperating individuals, since all leprechauns are pranksters and all pranksters are exasperating individuals.

4. Use truth-table method to determine the validity or invalidity of the following argument.   (8)

   $(Q \cdot E) \supset (F \lor H)$
   $F \supset H$
   $H \supset E$
   $Q \cdot {\sim} F$ /$\therefore$ $E \lor F$

5. Symbolize the following statements.   (10)
   Propositional Logic
   (i)   The key will not work just in case it is twisted. (K, T)
   (ii)   I won't buy both a bicycle and a used car unless I either get a raise or inherit a lot of money. (B, U, R, I)
   (iii) Either Rado does not make a sapphire watch or if Movado makes one then so does Pulsar. (R, M, P)

   Categorical Propositions (Make them standard-forms and mention the subject and predicate terms)

   (iv)   There is a stiff competition where much money is at stake.
   (v)   Good counselors are not universally appreciated.

6. How many valid standard-form categorical syllogisms are possible with a particular conclusion in figures 3 and 4? Construct logical skeletons using S, P, M terms.   (6)

7. If A is true, B is false and C is true compute the truth-value of the following statement.   (4)

   $\sim [({\sim}A \equiv B) \equiv {\sim} C] \cdot [(A \equiv B) \equiv {\sim} C]$

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