

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
First Semester - 2023-2024
SYMBOLIC LOGIC HSS F236
Comprehensive Examination (Closed Book)

Date: 06-12-2023

Max Marks 80.0
Duration 3 Hours

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

1. Explain the nature and process of Conditional Proof for proving validity of arguments. [10]
2. Discuss the need for quantification theory and explain the rule of Universal Generalization. [10]
3. Explain and state the differences of the following: [10]
 - (i) Material Equivalence and Logical Equivalence
 - (ii) Propositional Function and Proposition
4. Symbolize the following statements in relational logic. [6]
 - (i) Some teachers with bright students give no failing grades.
 - (ii) There is a person whom all persons admire.
 - (iii) Ann is not the trainer of both John and Stephen but of Douglas.
5. Prove the validity (formal proof only) or invalidity of the following quantified arguments. [16]
 - (i) Doctors and lawyers are professional people. Professional people and executives are respected. Therefore, doctors are respected. (Dx, Lx, Px, Ex, Rx)
 - (ii) Argon compounds and sodium compounds are either oily or volatile. Not all sodium compounds are oily. Therefore, some argon compounds are volatile. (Ax, Sx, O_x, V_x)
6. Symbolize and prove the validity of the following argument by Indirect Proof. [8]

If Betty received the wire, then she took the plane; and if she took the plane, then she will not be late for the meeting. If the telegram was incorrectly addressed, then Betty will be late for the meeting. Either Betty received the wire or the telegram was incorrectly addressed. Therefore, either Betty took the plane or she will be late for the meeting. (R- Betty received the wire; P- Betty took the plane; L-Betty will be late for the meeting; T- the telegram was incorrectly addressed)

P.T.O.

7. Discuss with symbolizations and examples totally reflexive, intransitive and asymmetrical relations. [6]
8. Translate the following into standard-form A, E, I, O categorical propositions, specify the subject and predicate terms and write whether they are distributed or undistributed. [4]
- (i) If Peter is asked to say a few words, he talks for hours.
- (ii) Error of opinion may be tolerated where reason is left free to combat it.
9. Re-write it in the standard-form categorical syllogism, write its mood and figure, and prove its validity or invalidity by using Venn diagram. Write fallacy(ies), if the syllogism is invalid. [6]
- The after-image is not a brain-process; for, the after-image is not in physical space, but the brain-process is.
10. Prove validity of the following argument by the Shorter Truth-Table Method. [4]

$(N \vee O) \supset P$
 $(P \vee Q) \supset R$
 $Q \vee N$
 $\sim Q \therefore R$