

MASTER OF ARTS EXAMINATION, 2025**(2nd Year, 2nd Semester)****PHILOSOPHY****Subject Code - PHIL/PG/4.4.5****LOGIC – III****Time : 2 Hours****Full Marks - 30**

1. Let I be an interpretation with domain D . Let A be an arbitrary wff. Let s and s' be two sequences such that for each free variable v in A , if v is the k^{th} variable in the fixed enumeration of the variables, then s and s' have the same member of D for their k^{th} terms. Then, prove that s satisfies A iff s' does.

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Or

2. Let t and u be terms. Let t' be the result of replacing each occurrence of v_k in t by u . Let s be a sequence and let $u^*s=d$. Let s' be $s(d/k)$, i.e. let s' be the sequence that results from substituting d for the k^{th} term of s . Then, prove that $t'^*s = t^*s'$.

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3. Let s be a sequence and let s' be a sequence that results from s by replacing the k^{th} term of s by t^*s . Then, prove that s satisfies At/v_k iff s' satisfies A .

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Or

4. If Δ is a set of closed wffs, then, prove that if $\Delta \vdash_{QS} A$, then $\Delta \vdash_{QS} \Lambda v_k A$.

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5. Let I be an interpretation with domain D . Let A be a wff with exactly one free variable, v_k . If each member of D is assigned by I to some closed term or other and At/v_k is true for I for each closed term t , then prove that $\Lambda v_k A$ is true for I .

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Or

6. If a formula A with exactly one free variable v_k is true for I , then, prove that each formula that results from substituting a closed term for the free occurrences of the variable is true for I .

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7. If A is a closed well-formed formula, then prove that exactly one of A and $\sim A$ is true for I and exactly one false for I .

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Or

8. Prove that $\Lambda v_k A \supset At/v_k$ is logically valid if t is free for v_k in A .

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