

Ex./PG/LING-12/98/2017

MASTER OF ARTS EXAMINATION, 2017

(2nd Year, 3rd Semester)

LINGUISTICS

Logic and Mathematics in Linguistics

Paper - XII

Time : Two hours

Full Marks : 30

Answer any *three* questions.

1. Answer *all* questions : 1x10=10
- (a) Express in symbols : "x is not an element of the intersection of set P and set Q"
- (b) Translate the following expression into idiomatic English :
- $\{x: x \text{ is Danish}\} \cap \{x: x \text{ is a philosopher}\}$
- (c) What is logical form ?
- (d) If $p=T$, $q=T$ and $r=F$, then calculate the truth value of the following expression : $(p \vee (q \wedge r))$
- (e) Write the syntactic tree for the following expression : $((p \vee q) \rightarrow (r \wedge s))$
- (f) Formalize this sentence following the convention of predicate logic : "Every student reads some book".

(Turn Over)

(2)

- (g) Do you think the relation 'is a grandfather of' is transitive?—Justify your answer.
- (h) Write the power set of $\{\phi\}$.
- (i) What would be the cardinality of $\{\phi\}$?
- (j) Write the recursive rule for the following set : $\{5, 10, 15, 20, \dots\}$

2. Write the vocabulary, syntax, and semantics of Predicate Logic.
2+4+4=10

3. Consider the following interpretation : $2 \times 5 = 10$

a = Albert b = Burt c = Cuthbert

H 'horse' : $\{b, c\}$ L 'like' : $\{(a, b), (c, b), (b, b), (b, a)\}$

- (a) Give one sentence that is false in the interpretation.
- (b) Give one sentence with a negation which is true in the interpretation.
- (c) Give one universally quantified sentence which is true in the interpretation.
- (d) Give one existentially quantified sentence which is false in the interpretation.
- (e) Give one sentence with both an existential and a universal quantifier which is true in the interpretation.

(3)

4. After translating the following argument prove its validity following the informal method of indirect proof. To translate the argument, use the following abbreviations : P = "the violinist plays the concerto"; C = "Crowds will come", H = "Prices are too high."
If the violinist plays the concerto, then crowds will come if the prices are not too high. If the violinist plays the concerto, the prices will not be too high. Therefore, if the violinist plays the concerto, crowds will come.

3+7=10

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