Indian Institute of Technology, Kharagpur
Mid-Sem Examination Autumn Semester 2011
Dept. of Humanities & Social Sciences

SYMBOLIC LOGIC

Subj. No: HS30068   Time: 2 hours   Full marks: 60

READ THIS ► Keep all your rough work <u>separate</u> from your final work. For this, use a margin drawn on the right hand side of your work space and write "ROUGH WORK" on top.

►<u>No problem will be evaluated twice</u>. Cross out all previous efforts and keep only the final work.

1.   Use truth-tree method to determine whether the following argument is valid or invalid:

$(\sim L \equiv M) \lor (L \equiv M)$ / $\therefore \sim (L \equiv M) \lor (\sim L \equiv \sim M)$ **-8-**

2.   Construct a formal proof of validity for the following argument:

$(E \supset F) \cdot (B \supset D).$ / $\therefore (E \cdot B) \supset (F \cdot D)$ **-12-**

3.   Define and explain the following briefly with <u>your own</u> examples where applicable:
   (a) Deductive Soundness
   (b) The emergence of mathematical logic / symbolic logic
   (c) Abductive arguments
   (d) The difference between the connective ' $\supset$ ' and the ordinary English 'if- then '.   **-16-**

4.   Construct in English language your own example of each of the following, with a brief explanation:

   (a) An argument which has a set of exactly four premises, but *not* a consistent set of premises, and is *not* in standard format.
   (b) A sense of disjunction that is not the 'v'.
   (c)   A specific statement form that is contingent or truth-functionally indeterminate.
                    -12-

5.   Using the given key, translate each of the following into idiomatic, easy-flowing English sentence. Your sentences must not seem artificial or forced. Better marks for better translations:

(a) $(A \supset H) \equiv (C \cdot S)$ [A: This substance is acid, H: This substance contains Hydrogen, C: This substance is corrosive, S: This substance is sour to the taste]

(b) ~ [(R ⊃ ~T) v (T ⊃ ~R)] ⊃ [R ⊃ (T • K)]   [R: An artist is rich, T: An artist is talented, K: An artist knows how to market his talent]

(c) ((M • G) • (~R • F)   [M: The meaning of life is love, G: The goal of life is to connect with others, R: We tend to remember, F: Human nature is frail]

(d) S • [((A ∨ ~A) • C) ⊃ ~ (P • W)]   [S: The undergraduate classes will start, A: The Annex building is ready, C: The cafeteria will be functional, P: The parking lot will be fully utilized, W: The walkway will be fully utilized.]   **-12-**

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