

Department of Humanities and Social Sciences, IIT Delhi
HUL 251 Introduction to Logic

Major Examination C

Veque: VI 301

Maximum Marks 40

Date: November 26, 2013

Time: 13.00 - 15.00 Hrs

Note: There are no points for so called correct steps. For given question, you will get full points or no points.

State whether the following statements are true or false ($1 \times 5 = 5$ points). A wrong answer will earn $-\frac{1}{2}$ point)

1. A proposition and its double negation are logically equivalent. T
2. The word "because" usually indicates that the next sentence is the conclusion of an argument. T
3. If an argument is bad, the conclusion must be false. T
4. A deductively valid argument can have false premises and a true conclusion. T
5. A conclusion can also be a reason for another conclusion. _____

Fill in the blanks ($5 \times 1 = 5$ points)

6. An argument is deductively invalid if _____
7. Write the contrapositive of the proposition: If John is tall, then John is qualified for the basketball team. _____
8. The then part of a conditional is called the _____.
9. What fallacy labels best describe the following?
(a) You are giving reasons why the umpire's decision was a bad one because you are for Pakistan. So I don't accept your conclusion. _____
(b) If the price of onion remains high, Sheila will not be voted to power.
The price of onion does not remain high.
Therefore Sheila will be voted to power. _____
10. If an argument has a conditional proposition as a premise and the affirmation of the antecedent of the conditional as a premise, then it is deductively valid to conclude _____

Proofs (10 points each)

11. Prove that the following QL argument is valid using tree method:

$$\begin{aligned} 1. & \forall x(\exists y(Ay \wedge Bxy) \supset Cx) \\ 2. & \exists y(Dy \wedge \exists x((Ex \wedge Fx) \wedge Bxy)) \checkmark \\ 3. & \forall x(Fx \supset Ax) \\ \therefore & \exists x(Cx \wedge Dx) \checkmark \end{aligned}$$

12. Prove that the following WFF is a tautology by using Natural Deduction method.

$$(A \equiv B) \equiv (\neg A \equiv \neg B)$$

Translate into the language PL, PLC or QL using the scheme given in brackets

13. Only if an eye witness comes forward will the prosecution be able to prove its case. (P: An eye witness comes forward; Q: The prosecution will be able to prove its case) $P \supset Q$
14. Modi will win elections in spite of the fact that media is against him (P: Modi will win elections; Q: Media is against modi) $P \wedge \neg Q$
15. Only celebrities can be elected president (E: x is elected president; C: x is a celebrity)
16. All barbers who do not shave themselves don't shave any barbers. (B: x is a barber; S: x shaves y)
17. Honest candidates always get defeated by dishonest ones. (C: x is a candidate; H: x is honest; D: x defeats y)
18. Students of logic will pass their examination just in case they prepare well and apply their mind during their examination. (P: Students of logic will pass their examination; Q: Students prepare well for the examination; R: Students apply their mind during the examination) $P \leftrightarrow (Q \wedge R)$
19. No one knows everybody (P: x is a person; K: x knows y)
20. Candy bars are neither nutritious nor a good source for quick energy (P: Candy bars are nutritious; Q: Candy bars are a good source for quick energy) $\neg (P \vee Q)$
21. There are no ignorant people who have attended college. (I: x is ignorant; P: x is a member of the class of people; A: x attended college.) $\neg (I \wedge P)$
22. Children under 12 years of age are not allowed into the lift unless they are accompanied by an adult. (P: Children under 12 years of age are not allowed into the lift; Q: Children are accompanied by an adult.) $\neg (P \wedge \neg Q)$

$$\neg (P \wedge \neg Q) \equiv \neg P \vee Q$$

$$\neg (P \wedge \neg Q) \equiv \neg P \vee Q$$

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