P.G. Semester-II Examination, 2023

PHILOSOPHY

Course ID : 20654 **Course Code : PHIL204C**

Course Title : Western Logic

Time : 2 Hours Full Marks : 40

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer any **two** of the following questions : 12×2=24

a) i) Distinguish between the first nine rules of Inference and the last ten rules of Inference.

ii) Use these rules to construct formal proof of validity of the following arguments:

a) $A \supset \sim(B \supset C)$
$(D.B) \supset C$
D
$\therefore \sim A$

b) If I work, then I earn money, but if I am idle, then I enjoy myself. Either I work or I am idle. However, if I work, then I do not enjoy myself, while if I am idle, then I do not earn money. Therefore, I enjoy myself if and only if I do not earn money. (W, M, I, E) 4+(4+4)

b) i) State, following conventions, the quantification rule of Existential Instantiation.

ii) Construct a formal proof of validity for each of the following argument using quantification rule (revised version):

a) $(\exists x)\, Lx \supset (y)\, My$
$/\therefore (x)\, [Lx \supset (y)\, My]$

b) $(\exists x)\, Jx \vee (\exists y) Ky$ 4+(4+4)
$(x)\, (Jx \supset Kx) /\therefore (\exists y)\, Ky$

c) i) Why do we need the quantification theory?

ii) Symbolize the following sentences, using the logical notation of propositional function (as given in brackets) and quantifiers:

a) All fruits and vegetables are wholesome and delicious.(Fx, Vx, Wx, Dx)

b) No coat is waterproof, unless it has been specially treated. (Cx, Wx, Sx)

c) Snakes are not all poisonous. (Sx, Px)

d) Only policemen and firemen are both indispensable and underpaid. (Px, Fx, Ix, Ux) 4+(2×4)

d) i) Define the notion of counter-example.

ii) Test the validity of the argument by using Truth Tree method (if invalid, show the counter example.) :

a) If it is raining, then the roads are wet.
If the sun is shining, then the roads are dry.
It is raining or the sun is shining.
Therefore, the roads are wet and the roads are dry.

b) $K \rightarrow L$ 2+(5×2)
$/ \therefore K \rightarrow (L \vee M)$

2. Answer any **four** of the following questions: 4×4=16

a) Prove the invalidity of the following arguments: 2+2

i) $X \equiv (Y \supset Z)$
$Y \equiv (\sim X \cdot \sim Z)$
$Z \equiv (X \vee \sim Y)$
$Y /\therefore X \vee Z$

ii) $(x)\, Nx \supset (\exists x)\, Oy$
$(y)\, Oy \supset (\exists z)\, Pz$
$/\therefore (\exists x)\, Nx \supset (z)\, Pz$

b) Construct demonstration of each of the following:
$(\exists x)\,(Fx \cdot Gx) \supset [(\exists x)\, Fx \,.\, (\exists x)\, Gx]$ 4

c) i) Use the method of CP to verify that the following is tautology:
$(A \supset B) \supset [(\sim A \supset B) \supset B]$

ii) Use the method of IP to verify that the following is tautology:
$A \equiv [A \vee (A \cdot B)]$ 2+2

d) Verify whether the following is a tautology, or not, using the same method of Truth Tree :
$\neg (A \leftrightarrow B) \leftrightarrow (\neg A \leftrightarrow B)$ 4

e) Distinguish between logical truth and factual truth with examples. 4

f) Symbolize each of the following propositions: 2+2

i) If nothing is damaged, nobody will be blamed. (Dx, Px, Bx)

ii) If any bananas are yellow, then some bananas are ripe. (Bx, Yx, Rx)

g) Explain with example the difference between proposition and propositional function. 4

h) Construct formal proof of validity for the following argument, using the rule of Conditional Proof wherever you wish:
Only salesmen are retailers. Not all retailers are travellers. Therefore, some salesman are not travellers. (Sx, Rx, Tx) 4

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