2010

M.A.

4th Semester Examination

PHILOSOPHY

PAPER—PHI-2206

Full Marks : 40

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

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

[Advanced Logic]

Group—A

Answer any *two* questions from the following :

1. (a) Determine the truth values of the following statements (for sets A, B and C) If true, explain why it is true and if false, five counter examples.

(i) If $A \subseteq B$ & $B \in C$, then $A \in C$.

(ii) If $B \in A$ and $A \subset C$, then $B \in C$.

(iii) If $A \subset B$ & $B \subseteq C$, then — $(C \subset A)$. 2×3

(b) Given the principle of extensionality for sets, can you show that any two empty sets are identical and therefore there is just one empty set? 4

(c) Let $V = \{6, 7, 8, 9, 10\}$

$A = \{6, 7\}$ &

$B = \{7, 8\}$

What are the following?

(i) $\sim A \sim (\sim B)$

(ii) $\sim A \cap B$ 2×2

(d) Find the following :

(i) $\wedge \wedge \{\wedge\}$

(ii) $\{\wedge, \{\wedge\}\} \sim \{\wedge\}$ 1×2

2. (a) When can we say that two ordered couples are identical? 2

(b) Suppose the ordered pair $\langle x+y, 6\rangle$, $\langle 10, x-y\rangle$ are equal. Find x and y. 2

(c) What is binary relation? 2

(d) Determine whether or not the following are, binary relations

(i) $\{\langle \text{Tom, Anu} \rangle\}$

(ii) $\langle \text{Tom, Anu} \rangle$

(iii) $\{\{\langle \text{Tom, Anu} \rangle\}\}$ 2×3

(e) Let, $A = \{ 2, 8 \}$,

$B = \{ \wedge \}$,

$R = \{\langle 2, 8 \rangle, \langle 8, \wedge \rangle\}$

(i) Is D(R) a subset of A?

(ii) Is F(R) a subset of $A \cup B$? 2×2

3. (a) Give examples of the following relations and justify your answer.

(i) A family relation which is irreflexive, neither symmetric nor asymmetric nor anti symmetric but transitive.

(ii) A family relation which is irreflexive, symmetric and transitive.

(iii) Let, $A = \{1, 2, 3\}$

Give an example of a binary relation which is reflexive and transitive, but not symmetric in A. 3×3

(b) State whether the relation of being greater than (>) is reflexive or symmetric or transitive or connected in the set of all numbers. 4

(c) Is the relation of having the same weight an equivalence relation in the set of all persons? 3

4. (a) Translate the following statements in terms of set theoretic symbols. (any four)

(i) Some sportsman who drink Pepsi do not drink either Coke or Thums Up.

(ii) All French murderers drink coffee, tea and wine.

(iii) Apples and Oranges are sweet and nutritions.

(iv) Some philosophers drink neither tea nor coffee.

(v) No men are perfect.

(vi) Some boys and girls are intelligent and studious. 2×4

(b) Test the validity of the following arguments by Venn diagrams. State in terms of regions of the diagrams why the argument is valid or invalid.

(i) $B \cap C = \wedge$

$A \wedge \sim B = \wedge \ / \ \therefore A \cap C = \wedge$

(ii) All liars are prejudiced

Some witnesses are not liars.

$\therefore$ Some witness are not Prejudiced.

(iii) $A \cap B \subseteq \sim C$

$A \cup C \subseteq B \ / \ \therefore A \cap C = \wedge$ 3×2

(c) Given : All unicorns are dead.

No unicorns are dead.

Can you infer that there are no unicorns?

Group—B

Answer any *one* questions from the following :

5. (a) Let, $A = \{1\}$

$B = \{1, \{1\}\}$

$C = \{1, 2\}$

Find the following :

(i) $(A \cup B) \sim C$

(ii) $\{A\} \cap C$ 2×2

(b) Let, $\vee$ = The set of all positive integers.

A = The set of all even positive integers.

B = The set of all odd positive integers.

C = The set of all positive integers greater than 10.

(i) $\sim (A \cup B)$

(ii) $A \sim (\sim C)$ 2×2

6. (a) What is a Cartesian product? 2

(b) Let, $A = \{a, b\}$

$B = \{3, 4\}$

and $C = \{4, 5\}$

Find : $(A \times B) \cap (A \times C)$ 3

(c) Let, $M = \{\text{John, Jim, Tom}\}$

$N = \{\text{Betty, Mary}\}$

Find : $M \times N$ 3

7. (a) What is asymmetric relation? Give one example. 2+1

(b) Give an example of a family relationship which is both transitive intransitive. 3

(c) Is the relation of being a grandmother irreflexive and connected in the set of all persons? 2
