

Ex./Phil/PG/4.4.5/89/2018

MASTER OF ARTS EXAMINATION, 2018

(2nd Year, 4th Semester)

PHILOSOPHY

[Logic - III]

Full Marks : 30

Time : Two Hours

The figures in the margin indicate full marks.

1. Let R be an equivalence relation on a set S . Then, prove that the quotient set S/R is a partition of S . 10

Or;

2. Suppose $P = \{A_i\}$ is a partition of a set S . Then, prove that there is an equivalence relation \sim on S such that S/\sim is the same as the partition $P = \{A_i\}$. 10

3. Consider functions $f : A \rightarrow B$ and $g : B \rightarrow C$. Prove the following :

(a) If f and g are one-to-one, then $g \circ f$ is one-to-one.

[Turn over]

[2]

- (b) If f and g are onto functions, then $g \circ f$ is an onto function. 5+5=10

Or,

4. Consider functions $f : A \rightarrow B$ and $g : B \rightarrow C$. Prove the following :

(a) If $g \circ f$ is one-to-one, then f is one-to-one.

(b) If $g \circ f$ is onto, then g is onto. 5+5=10

5. Let $[A_1, A_2, \dots, A_m]$ and $[B_1, B_2, \dots, B_n]$ be partitions of X . Prove that the collection of sets $P = [\{A_i \cap B_j\}] \setminus \phi$ is also a partition of X . 5

Or,

6. Let A be a set of nonzero integers and let \approx be the relation on $A \times A$ defined as follows : $(a, b) \approx (c, d)$ whenever $ad = bc$. Prove that \approx is an equivalence relation. 5

7. Let $f : R \rightarrow R$ be defined by $f(x) = 2x - 3$. Find a formula for f^{-1} . 5

Or,

[Turn over]

[3]

8. Let the functions f and g be defined by $f(x) = 2x + 1$ and $g(x) = x^2 - 2$. Find the formulas defining the functions

(a) $g \circ f$

(b) $f \circ g$ $2\frac{1}{2} + 2\frac{1}{2} = 5$
