

2021

ASUTOSH COLLEGE

Department of Mathematics

Subject: Mathematics Honours (MTMA)

Semester: IV

Time: 30 mins.

Paper: SEC-B (Mathematical Logic)

F.M- 10

INTERNAL (5x2=10 MARKS)

Choose the correct option from below with a proper justification

[Answer any 5 (five) questions. Each question carry 2 marks. 1 mark for correct option & 1 mark for justification]

- i) Which one is correct
- $p, p \rightarrow q \vdash q$
 - $p, p \rightarrow \neg q \vdash q$
 - $p, p \rightarrow q \vdash \neg q$
 - $p, p \rightarrow \neg q \vdash \neg q$
- ii) If $P(p, q), Q(p, q)$ be any propositions which are equivalent statements
- $P(p, q) \rightarrow Q(p, q)$
 - The argument $P(p, q) \vdash Q(p, q)$ is valid
 - $P(p, q) \rightarrow Q(p, q)$ is a tautology
 - $P(p, q) \rightarrow Q(p, q) \forall p, q$
- iii) Choose the correct options
- $\neg \forall x P(x) \equiv \exists x \neg P(x)$
 - $\neg \forall x P(x) \equiv \exists \neg x P(x)$
 - $\neg \forall x P(x) \equiv \exists x P(\neg x)$
 - $\neg \forall x P(x) \equiv \exists x P(x)$
- iv) $\neg \forall x P(x) \wedge Q(x)$ is equivalent to
- $\exists x \neg P(x) \wedge \neg Q(x)$
 - $\exists x \neg P(x) \vee \neg Q(x)$
 - $\exists x \neg P(x) \wedge \neg Q(x)$
 - $\forall x \neg P(x) \wedge \neg Q(x)$
- v) $\exists x \neg P(x) \vee \neg Q(x)$ is equivalent to
- $\exists x \neg P(x) \wedge \neg Q(x)$
 - $\forall x \neg P(x) \wedge \neg Q(x)$
 - $\forall x \neg (P(x) \wedge Q(x))$
 - $\forall x \neg P(x) \wedge \neg Q(x)$
- vi) $\exists x \neg P(x, y) \wedge \neg Q(x, y)$ is equivalent to
- $\exists x \forall y \neg P(x, y) \wedge \neg Q(x, y)$
 - $\exists x \exists y \neg P(x, y) \wedge \neg Q(x, y)$

- c. $\forall x \exists y \neg (P(x, y) \wedge Q(x, y))$
- d. $\exists x \forall y \neg P(x, y) \wedge \neg Q(x, y)$