UNIT – I

2 marks

1. When we say that two propositions are logically equivalent?
2. Define negation.
3. Define Bi-conditional proposition
4. State any 2 laws of algebra of Proposition.
5. Define contradiction
6. Show that $P \wedge (\sim p \vee q) \equiv p \wedge q$.
7. Show that $P \wedge \neg P$ is a tautology
8. Define Tautology, Give an example.
9. Show that $P \to q$ and $q \to p$ are not logically equivalent.
10. Define conjunction and disjunction.
11. Show That $(P \wedge q) \wedge \sim(p \vee q)$ is a contradiction
12. Define conditional Statement.
13. Construct the truth table for $\sim p \vee \sim q$
14. Prove: [illegible]

5 marks

14. PT $p \to (q \to r) \equiv (p \wedge \sim r) \to \sim q$.
15. Prove De-morgan's laws on Proposition
16. Prove $\sim(p \vee q) \vee (\sim p \wedge q) \equiv \sim p$ by constructing its truth table.
17. Show that p is equivalent to the following formulae (i) $(p \wedge q) \vee (p \wedge \neg q)$
    (ii) $(p \vee q) \wedge (p \vee \neg q)$
18. Form the Truth table for $p \wedge (q \vee r)$.
19. PT the proposition $p \vee \sim(p \wedge q)$ is a tautology.
20. ST $p \Leftrightarrow q \equiv (p \wedge q) \vee (\sim p \wedge \sim q)$.
21. Verify whether the following are tautology.
    $[(p \vee r) \wedge (q \vee r) \wedge (\sim p \vee \sim r)]$
22. ST $p \to q$, $p \to r$, $q \to \sim r$ are inconsistant.

23) ST $((\sim q) \wedge p) \wedge q$ is contradiction.

24). Prove by truth table $p \to (q \vee r) \equiv (p \to q) \wedge (p \to r)$

25. Translate to symbolic form and test the Validity of the argument.

"If 6 is even then 2 does not divide 7 either 5 is not prime or 2 divides 7 but 5 is a prime, Therefore 6 is odd".

26. PT $(p \wedge q) \vee \sim p \equiv \sim p \vee q$ by using algebra of proposition.

10 marks

27. Prove by truth table

$$p \to (q \vee r) \equiv (p \to q) \wedge (p \to r)$$

28. Test the validity of the argument

$$p \to \sim q, \; r \to p, \; \therefore \sim r.$$

29. Test the Validity of the argument.

If a man is a bachelor he is unhappy

If a man is unhappy he dies young

Therefore bachelor dies young.

30, ST $\sim (p \vee q) \equiv (\sim p) \wedge (\sim q)$ and.

$$\sim (p \wedge q) \equiv (\sim p) \vee (\sim q).$$

31. Prove: $\sim p \vee q$, $\sim q \vee r$, $r \to s \iff p \to s$