MATHEMATICAL LOGIC

6

1m	2m	3m	4m	5m	6m	Total
1(U)	1(K)	–	–	1(K)	–	8

1 MARK QUESTIONS

(Understanding)

1. Symbolise the following propositions: (i) 2 + 5 = 6 or all integers are rationals.
2. Write the verbal form of the following compound propositions given.
   p : x is a real no
   q : Mathematics is easy
   $p \wedge q$
3. Symbolise the proposition $3x = 9$ and $x < 7$
4. Symbolise the proposition "If two numbers are equal then their squares are not equal".
5. Symbolise the proposition $y + 4 \neq 4$ or e is not a vowel.
6. Negate the proposition : $p \vee \sim q$
7. Negate the proposition : $\sim p \wedge \sim q$
8. Negate the proposition : $\sim p \rightarrow \sim q$
9. Negate : 4 is an even integer or 7 is a prime number.
10. Negate : He likes Mathematics and he does not like Logic.
11. Negate : If 6 is a divisor of 120 then 486 is not divisible by 6.
12. Negate : If 2 triangles are similar then their areas are equal.

2 MARK QUESTIONS

(Knowledge)

1. If the truth values of the propositions p, q, r are T, T, F respectively, then find the truth values of the compound proposition : $p \rightarrow (q \wedge r)$
2. If $(\sim p \vee q) \wedge \sim r$ is a false proposition, then find the truth values of p, q and r.
3. If the compound proposition $(p \rightarrow q) \wedge (p \wedge r)$" is true, then find the truth values of p, q and r.
4. If the compound proposition $p \rightarrow (q \vee r)$ is false, then find the truth values of p, q and r.
5. If the truth value of the proposition $(p \wedge q) \rightarrow (r \vee \sim s)$ is false, then find the truth values of p, q, r and s.

6. Negate $p \rightarrow (q \wedge r)$
7. Negate $q \vee [\sim (p \wedge r)]$
8. Negate : If an integer is greater than 3 and less than 5 then it is a multiple of 5.
9. Negate : Weather is fine and my friends are not coming or we do not go to a movie.
10. Negate : 14 is a divisor of 48 and 28 is not divisible by 82.
11. Write converse and inverse of the proposition "If $x \in A \cap B$ then $x \in A$ and $x \in B$ ".
12. Write converse and contrapositive of "If I get a seat then I will watch a movie and have fun".
13. Write inverse and contrapositive of "If x is less than 1 then it is a prime number".
14. Write converse and inverse of "If 2 lines are parallel then they do not intersect".

5 MARK QUESTIONS

(Knowledge)

1. Construct truth table for $p \vee (q \wedge \sim r)$
2. Construct truth table for $(p \rightarrow q) \rightarrow \sim r$
3. Construct truth table for $(p \wedge \sim q) \leftrightarrow \sim q$
4. Show that the proposition $(p \rightarrow q) \leftrightarrow (\sim p \vee q)$ is a Tautology.
5. Show that the proposition $(p \wedge q) \wedge \sim (p \vee q)$ is a contradiction.
6. Verify whether the proposition $(p \wedge \sim q) \wedge (\sim p \vee q)$ is a contradiction or not.
7. Prove that $[p \vee (p \wedge r)] \leftrightarrow [(p \vee q) \wedge (p \vee r)$ is a tautology.
8. Show that $(p \rightarrow q) \leftrightarrow (\sim q \rightarrow \sim p)$ is a Tautology.
9. Show that $\sim (p \vee q) \rightarrow (\sim p \wedge \sim q)$ is a Tautology.
10. Prove that $(p \vee q) \wedge (\sim p \wedge \sim q)$ is a contradiction.
11. Show that $(\sim p \wedge q) \wedge (q \wedge r) \wedge (\sim q)$ is a contradiction.
12. Examine whether the propositions are logically equivalent $p \leftrightarrow q$ and $(p \rightarrow q) \wedge (q \rightarrow p)$
13. Examine whether the propositions are logically equivalent $p \leftrightarrow q$ and $(\sim p \vee q) \wedge (\sim q \vee p)$
14. Examine if the propositions $\sim (p \leftrightarrow q)$ and $(p \wedge \sim q) \vee (q \wedge \sim p)$ are logically equivalent.
15. Examine if the propositions $(p \wedge \sim q) \vee q$ and $(p \vee q)$ are logically equivalent.

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