M 6645

Reg. No. : .....

Name : .....

First Semester B.Sc. Degree Examination, November 2009
MATHEMATICS (Core)
Course – I : Methodology and Perspective of Science (IB 01 MAT)

Time: 3 Hours Max. Weightage : 30

1. Fill in the blanks :

   a) Let $A = \{2, 5, 7, 9\}$. The truth value of the statement $(\exists x \in A)(x + 7 = 10)$ is _____

   b) If p and q are false then the truth value of $p \leftrightarrow q$ is _____

   c) By De Morgan's laws $\neg\neg(p \vee q)$ is _____

   d) The negation of the proposition $2 + 5 < 10$ is _____

(Weightage 1)

Answer **any seven** from the following (weightage **1 each**) :

2. What are the quantities of a good hypothesis ?
3. Explain the term variable in an experiment.
4. What distinguishes science from other approaches to gaining knowledge.
5. Why should scientific tests be reproducible.
6. Write the truth table for the following proposition $p \wedge (q \wedge r)$.
7. Let p be the proposition "Jose is handsome" and q is be the proposition "Hari is intelligent". Give a simple English sentence which describes the following proposition.

   i) $p \rightarrow \neg q$ ii) $q \leftrightarrow p$.

8. Verify the proposition $p \vee \neg(p \wedge q)$ is a tautology.
9. Prove that $\neg\forall x Q(x)$ is logically equivalent to $\exists x \neg Q(x)$.
10. Show that $\neg p \rightarrow \neg q$ and $q \rightarrow p$ are logically equivalent.
11. Let $R(x, y, z)$ be the propositional function "$xy = z$". Find the proposition $R(2, 8, 4)$ and hence determine its truth value.

P.T.O.

Answer **any seven** from the following (weightage **2 each**) :

12. Which are the difference between basic research and applied research ?
13. Explain the terms
    i) Empiricism
    ii) Positivism
    iii) Pseudo science.
14. What are the strengths and limitations of model in science.
15. Write a short note on falsification.
16. Show that $p \rightarrow q \equiv \neg p \vee q$
17. Define Tautology and contradictions. Give an example for each of them.
18. Prove that $p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$.
19. Show that the argument : $p \rightarrow q, \neg q \vdash \neg p$ is a fallacy.
20. State and prove the law of syllogism.
21. Show that $p \leftrightarrow \neg q$ does not logically imply $p \rightarrow q$.
22. Show that $\neg(p \vee q) \vee (\neg p \wedge q) \equiv \neg p$.

Answer **any two** from the following (weightage **4 each**) :

23. "There are no absolute scientific "truths" in science". What are your comments.
24. Write a note on two experiments that proved the theory of relativity.
25. Explain contrapositive proof method. Using this method prove the following : If n is an integer and n^2 is even then n is even. **(Weightage 2×4=8)**