M 2511

I Semester B.A./B.Sc./B.Com./B.B.A./B.B.A.T.T.M./B.B.M./B.C.A./B.S.W./ B.A. Afsal Ul Ulama Degree (CCSS-Reg./Supple./Improv.) Examination, November 2012 CORE COURSE IN MATHEMATICS 1B01 MAT : Methodology and Perspectives of Sciences

Time : 3 Hours

Max. Weightage : 30

1. Fill in the blanks :
   a) If p is false and q is true then pvq is _____
   b) A counter example for the statement $\forall x \in IR \ x^2 > 10$ is _____
   c) By DeMorgan's laws $\neg(p \vee q)$ is _____
   d) The negation of the statement 'Paris is in England is' _____.   (Wt. 1)

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

2. Why are note books valuable in science ?

3. Give an example of a research topic that requires an interdisciplinary approach. Explain.

4. Differentiate between hard sciences and soft sciences.

5. Why is it said that individuals should know science ?

6. Write the truth table for the proposition $p \wedge (q \vee r)$.

7. Define the inverse and the contrapositive of the implication $p \rightarrow q$.

8. Explain the terms tautology, contradiction and contingency.

P.T.O.

9. Explain the terms conjunction and disjunction. Give one example for each.

10. Explain the terms argument, premises and conclusion.

11. Prove that $p \vee \neg p \equiv T$ and $p \wedge \neg p \equiv F$. (7×1=7)

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

12. What are the important steps in positivism ?

13. "Science can never be truly objective". What are the subjective elements of science.

14. Distinguish between hypothesis, theory and law.

15. Why are samples used in research ?

16. Find a counter example for each statement where $U = \{3, 5, 7, 9\}$ is the universal set (i) $\forall x, x + 3 \geq 7$ (ii) $\forall x, |x| = x$.

17. Verify that $(p \wedge q) \wedge \neg(p \vee q)$ is a contradiction.

18. State and prove the law of syllogism.

19. Explain the term biconditional statement and give the truth table.

20. Prove that $\neg(\exists x p(x)) \equiv \forall x \neg p(x)$.

21. Show that the following argument is a fallacy :

$$p \to q, \neg p \vdash\!\!\!-\!\!\!- \neg q$$

22. Prove that $p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$. (7×2=14)

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

23. Write a note on two experiments that proved the theory of relativity.

24. Explain to a person who has never really thought about the value of education, why learning about science is important.

25. Explain the terms Direct Proof and proof by contradiction. Illustrate each of them by an example. (2×4=8)