NTK/KW/15–5993

First Semester B. Sc. (IT) Examination

APPLIED MATHEMATICS – I

Paper–VI

Time : Three Hours] [Max. Marks : 50

N. B. : All questions are compulsory and carry equal marks.

EITHER

1. (A) Show that $\neg(P \vee Q)$ follows from $\neg P \wedge \neg Q$. 5

(B) Show that the formula

$$P \vee (P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$$ is a tautology without using truth table. 5

OR

(C) Show that

$$\neg(P \wedge Q) \longrightarrow (\neg P \vee (\neg P \vee Q)) \Leftrightarrow (\neg P \vee Q)$$ 5

(D) Show that

$$\neg(P \leftrightharpoons Q) \Leftrightarrow (P \wedge \neg Q) \vee (\neg P \wedge Q)$$ without using the truth table. 5

EITHER

2. (A) Obtain the principal disjunctive normal form of

$$P \longrightarrow ((P \longrightarrow Q) \wedge \neg(\neg Q \vee \neg P))$$ 5

(B) Obtain the principal connective normal form of $(\neg P \rightarrow R) \wedge (Q \Leftrightarrow P)$ 5

OR

(C) Obtain principal disjunctive normal form of $(P \wedge Q) \vee (\neg P \wedge R) \vee (Q \vee R)$ 5

(D) Show that a formula $Q \vee (P \wedge \neg Q.) \vee (\neg P \vee \neg Q)$ is a tautology by using conjunctive normal form. 5

EITHER

3. (A) Show that $\neg (P \vee Q)$ follows from $\neg P \wedge \neg Q$. 5

(B) Show that SVR is tautologically implied by $(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$ 5

OR

(C) Show that R is a valid inference from the parmises $P \rightarrow Q$, $Q \rightarrow R$, and P. 5

(D) Show that the conclusion C follows logically from the premises H_1 and H_2

$H_1 : P \rightarrow Q$, $H_2 : P$, $C : Q$ 5

EITHER

4. (A) Show that

$(x)(P(x) \vee Q(x)) \rightleftarrows (x) P(x) \vee (\exists x) Q(x)$. 5

(B) Symbolize the expression "All the world loves a lover". 5

OR

(C) Show that $(\exists x)\ M(x)$ follows logically from the premises

$(x)(H(x) \rightarrow M(x))$ and $(\exists x)\ H(x)$ 5

(D) Show that

$P(x) \wedge (x)\, Q(x) \Rightarrow (\exists x)(P(x) \wedge Q(x))$ 5

5. Solve any **ten** :—

(a) What is the atomic statement ?

(b) Give the truth table of negation.

(c) What is disjunction ?

(d) Let A (P_1 , P_2 , ... P_n) be a statement formula and P_1 , P_2 , ... P_n are atomic variables. What is condition for formula A satisfiable ?

(e) What is elementory product ?

(f) What is decision problem ?

(g) What is formal proof ?

(h) What is rule P ?

(i) What is rate CP ?

(j) What is $(\forall x)$?

(k) What is a well – formed formula ?

(l) What is universe of discource ? 1 x 10