Bachelor of Science (B.Sc.I.T.) Semester—I
(C.B.S.) Examination
APPLIED MATHEMATICS—I
Paper—VI

Time—Three Hours] [Maximum Marks—50

N.B. :—(1) All questions are compulsory and carry equal marks.
(2) Draw neat and labelled diagram wherever necessary.

EITHER

1. (A) Show that :

$(\grave{u}\ P \wedge (\grave{u}\ Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R) \Leftrightarrow R$. 5

(B) Construct the truth table for

$(P \wedge Q) \vee (\grave{u}\ P \wedge Q) \vee (P \wedge \grave{u}\ Q) \vee (\grave{u}\ P \wedge \grave{u}\ Q)$ 5

OR

(C) Show that :

$((P \vee Q) \wedge \grave{u}\ (\grave{u}\ P \wedge (\grave{u}\ Q \vee \grave{u}\ R))) \vee (\grave{u}\ P \wedge \grave{u}\ Q) \vee (\grave{u}\ P \wedge \grave{u}\ R)$ is a tautology. 5

(D) Prove $(P \rightarrow Q) \Leftrightarrow (\grave{u}\ P \vee Q)$ using truth table. 5

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

$(P \rightarrow ((P \rightarrow Q) \wedge \neg (\neg Q \vee \neg P))$. 5

(B) Obtain the principal conjunctive form of :

$\neg (P \rightleftharpoons Q)$. 5

OR

(C) Obtain the disjunctive normal form of :

$\neg (P \vee Q) \rightleftharpoons (P \wedge Q)$. 5

(D) Obtain the principal disjunctive normal form of :

$\neg (P \rightarrow R) \wedge (Q \rightleftharpoons P)$. 5

EITHER

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

(B) Show that $R \wedge (P \vee Q)$ is a valid conclusion from the premises :

$P \vee Q$, $Q \rightarrow R$, $P \rightarrow M$ and $\neg M$. 5

OR

(C) Show that the following sets of premises are inconsistent :

$P \rightarrow Q$, $P \rightarrow R$, $Q \rightarrow \neg R$, P. 5

(D) Show that R is a valid inference from the premises

$P \rightarrow Q$, $Q \rightarrow R$ and P. 5

EITHER

4. (A) What are the rules of generalization and specification ? 5

(B) Prove that :

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

OR

(C) Show that : $\neg P(a, b)$ follows logically from $(x)(y)(P(x, y) \rightarrow W(x, y))$ and $\rightarrow \neg W(a, b)$. 5

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

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

5. (A) Construct the truth table for $\neg (\neg P \wedge \neg Q)$. 2½

(B) Obtain the disjunctive normal form of $P \wedge (P \rightarrow Q)$. 2½

(C) What is the rule P and rule T ? 2½

(D) What is the rule EG and rule UG ? 2½