Silicon Institute of Technology

Silicon Hills, Bhubaneswar

| An Autonomous Institute |

3rd Semester B.Tech (LE) Mid Term Examination 2020-21

DISCRETE MATHEMATICS (18BS1T09)

Duration: 01:30 Full Marks: 25

1 ***Answer All***

a Find the inverse of the proposition " If X > 2 then Y < 5" 1

b Find the power set of the empty set. 1

c Every non empty set is a subset to it's power set. True or false. Justify your answer. 1

d Justify the truth value of the statement $\forall x\left(x^2 \neq x\right)$ where the universe of discourse if the set of all real numbers. 1

e How many derangements are there of a set with 7 elements? 1

f Evaluate $\sum_{i=1}^{3} \sum_{j=1}^{2}\left(i+2j\right)$ 1

2 ***Answer All***

a Find the truth table for: 3

(q p) (p q)

b Show that $(p \vee q) \wedge (\neg p \vee r) \rightarrow (q \vee r)$ is a tautology 3

c Among the numbers from 1 to 1000, how many are not divisible by any of the integers 3,5 and 7? 3

3 ***Answer any One***

a Show by a constructing a formal proof that the the following conclusion can be arrived from the given premises. 5

If it does not rain or if it is not foggy, then the sailing race will be held and the lifesaving demonstration will go on. If the sailing race is held then the trophy will be awarded. The trophy was not awarded. Therefore it rained.

b Find the converse, inverse and contra-positive of the statement " If X is not an integer then X^2 is not positive". 5

4 ***Answer any One***

a How many solutions are there to the inequality $x_1 + x_2 + x_3 + x_4 \leq 19$ where $x_1,\ x_2,\ x_3$ & x_4 are integers such that $x_i \geq i$. 5

b Use Induction to prove $n < 2^n$ for all positive integers n. 5