Silicon Institute of Technology
Silicon Hills, Bhubaneswar
| An Autonomous Institute |

3rd Semester B.Tech. Mid Term Examination 2022-23

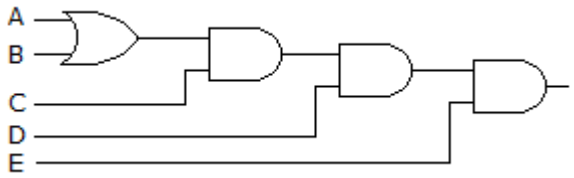
DIGITAL ELECTRONICS(BTEC-T-ES-003)

Duration: 01:30 Full Marks: 25

1 ***Answer All***

a Perform the subtraction of binary numbers using 2's compmement: 11011-10100 1

b Derive the Boolean expression for the logic circuit shown below: 1



c Find the decimal equivalent of $(1100.1011)_2$ 1

d What do you mean by standard form and canonical form of Boolean functions?Give example of each. 1

e Simplify the given expression using the Boolean Algebra method: 1
BD+B(D+E)+D'(D+E)

f Reduce the following Boolean expression: AB+BB+C+B'. 1

2 ***Answer All***

a Using Boolean theorem, simplify the expression Y=AB+A(B+C)+B(B+C). 3
Also mention the theorem used in each step.

b Obtain the canonical product of the sum expression of Y(ABC)=(A+B')(B+C)(A+C'). 3

c Simplify the Boolean function using K-MAP: F =A'B'D'+A'CD+A'BC and d=A'BC'D+ACD+AB'D', Where "d" indicates Don't care conditions. 3

3 ***Answer any One***

a 1.(a) Why do we reduce the boolean expression before realization. 5
(b) Explain with an example what is AND-OR realization.
(c) Realize XOR gate using AOI logic.
(d) Implement an OR gate with AND gates only.

b Design a combinational circuit that accepts a three bit binary number and generates an output binary number equal to the square of the input number. 5

4 ***Answer any One***

a Design a full subtractor and derive expressions for difference and borrow. 5
(i) Draw the truth table.
(ii) Design a full subtractor using only half subractors

b Given F= ∑m(0,1,4,5,6,8,12,13,14,15).Simplify using K-MAP.Find number of implicants, Prime Implicants(PIs),Essential PIs,Redundant PIs,Non-Essential PIs 5