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University under section 2(f) of UGC Act, 1956

Mid Term (Odd) Semester Examination October 2024

Roll no.....

Name of the Course and semester: _B.Tech Semester 1
Name of the Paper: Basic Electronics engineering
Paper Code: TEC -101
Time: 1.5 hour

Maximum Marks: 50

Note:

(i) Answer all the questions by choosing any one of the sub questions
(ii) Each question carries 10 marks.

Q1. (10 Marks) **CO1**

a.

(i) $(452.71)_8 = (?)_2 = (?)_{16}$
(ii) $(10101110.1011)_2 = (?)_8 = (?)_{16}$
(iii) $(465)_7 = (?)_{10} = (?)_9$
(iv) $(11011)_2 = (?)_4 = (?)_{16}$

OR

b.

(i) If $(45)_x = (41)_y$ and $(42)_x = (35)_y$ Find the values of x and y

(ii) If $(233)x + (156)x = (411)x$, find the value of base x

Q2. (10 Marks) **CO1**

a. Simplify using Boolean rules

(i)

$$\overline{A\overline{B} + ABC + A(B + A\overline{B})}$$

(ii)

$$X \oplus Y \oplus XY$$

OR

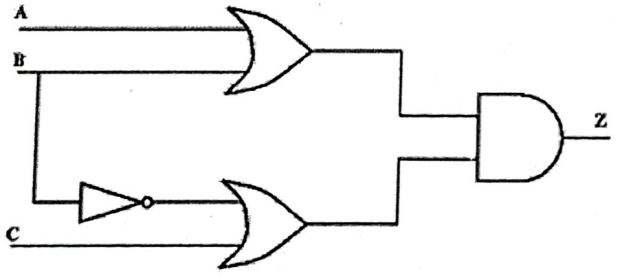
b.

State and prove De Morgan's laws of Boolean algebra.

Q3. (10 Marks) **CO1**

a.

(i) Express F (A, B, C,) = (A'+C). (A+B+C'). (A'+B) in canonical SOP form
(ii) Express the output Z of given circuit in canonical POS form



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OR

b.

Realize following Logic gates using NAND gates only
(i) OR Gate (ii) AND Gate (iii) EX-OR Gate (iv) EX-NOR Gate

Q4.

a. (10 Marks) **CO2**

Define conductivity. Differentiate conductor, semiconductor and insulator based on energy band diagram and conductivity

OR

b.

A bar of pure silicon has cross sectional area of $1mm^2$ and intrinsic concentration of silicon is $1.5x10^{16}m^{-3}$. The free electron and hole mobilities are $0.13m^2/V\text{-sec}$ and $0.05m^2/V\text{-sec}$ respectively. If resistance of bar is $50K\Omega$, evaluate the conductivity and length of bar

Q5.

a. (10 Marks) **CO2**

What is doping and its significance in semiconductors. Explain formation of n type semiconductor by doping.

OR

b.

An intrinsic semiconductor (Si) is doped with a acceptor type impurity such that there is one impurity atom on
10^6 atoms/m^3 of semiconductor. If total concentration of semiconductor is $5x10^{22}/m^3$ and intrinsic concentration is $2.5x10^{12}/m^3$.Calculate:
i)Resulting acceptor atom concentration. ii)Resulting electron concentration. iii)Resulting hole concentration. iv)Conductivity of the doped sample if mobility of holes is $0.17m^2/V\text{-s}$

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