B.Tech Mid Semester Examination 2023

I Semester

Basic Electronics Engineering (TEC-101)

Time: 1:30 Hours MM: 50

NOTE: Answer all questions by choosing any one of the sub questions (either part a or part b)
Each question carries 10 marks

Q.1 (a) CO 1

Perform the following number system conversions:

(i) $(45.2)_8=(?)_{10}$

(ii) $(11001010)_2=(?)_6$

(iii) $(789)_{10}=(?)_{16}$

(iv) $(33)_{10}-(13)_{10}$ in Binary using1'scomplement.

(v) $(12)_{10}+(20)_{10}$ in Binary using2'scomplement.

OR

Q.1(b) CO 1

What are universal logic gates and why they are called so? Realize the following:

(i)1 x-Ok gate using NAND gates.

(ii)$AB\bar{C}+\bar{A}\bar{B}C+A\bar{B}\bar{C}$ using NAND gates.

Q.2 (a) CO 1

(i)State and prove DeMorgan'slaws of Boolean Algebra.

(ii)Realize the following Boolean functions using basic gates:

(i)$A+B.C$ (ii)$\bar{B}.C+\bar{A}.B$ (iii)$(A+B).\bar{C}$

OR

Q.2 (b) CO 1

Writeshort notesonthetopicsgivenbelow:

(i) SOP and POS form of logic expression

(ii) canonical form of logical expression

Q.3 (a) CO 1

Solve the following expression using K-Map and realize the logic circuit using basic gates.

$F(A,B,C,D)=\sum m(0, 2, 4, 6, 9, 12)+\sum d(1, 14)$

OR

Q.3 (b) For the given truth table, express output Y in minimized SOP and minimized POS form. CO 1

A	B	C	Y
	0	0	0
	0	1	0
	1	0	0
	1	1	1
	0	0	1
	0	1	0
	1	0	0
	1	1	1

Q.4

(a) CO2

What is significance of doping in semiconductors. With the help of neat diagram explain formation of n type semiconductor by doping.

Calculate the drift current produced in anintrinsic Ge semiconductor having area of cross section $2cm^2$ and length 1 cm. If concentration of free electron is 2×10^{19} m^3 and a battery of 2 Volts is applied across its length. Given that mobility of free electrons and holes is $0.36m^2$/V-sec and $0.17m^2$/V-sec respectively.

OR

Q.4 (b) Briefly explain mass action law insemiconductors. CO2

Assuming that the two diodes D1 and D2 used in the electric circuit shown in the figure are ideal, find out the value of the current flowing through 1Ω resistor.

Q.5 (a) CO2

Define following:

(i) Mobility

(ii) Conductivity

(iii) Drift velocity

(iv) Drift and Diffusion currents

OR

Q.5 (b) CO2

Explain how a depletion region is formed in a junction diode. How does its Width change when the junction is

(i) forward biased, and

(ii) reverse biased

A Si diode has reverse saturation current of 2.5μA at room temperature. Determine forward voltage to obtain a forward current of 10 mA.