Sub Code:KEC301

Paper Id: 130321 Roll No:

B. TECH
(SEM-III) THEORY EXAMINATION 2019-20
ELECTRONIC DEVICES

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

Q. no.	Question	Marks	CO
a.	What is base width modulation?	2	4
b.	What is difference between Direct and Indirect semiconductors?	2	1
c.	Differentiate EMOSFET with DMOSFET.	2	5
d.	Brief the Avalanche breakdown mechanism.	2	4
e.	In which mode BJT can be used as switch and amplifier?	2	4
f.	What is fluorescence?	2	3
g.	What do you mean by effective mass of carriers?	2	2
h.	How does direct recombination lifetime differ from indirect recombination lifetime?	2	2
i.	Write difference between Drift and diffusion.	2	3
j.	Define sheet resistance.	2	2

SECTION B

2. Attempt any *three* of the following: 3 x 10 = 30

Q. no.	Question	Marks	CO
a.	Differentiate between direct and indirect band gap semiconductor. Also discuss the variation of energy band with alloy composition.	10	1
b.	Calculate the Fermi level position in Si containing 10^{16} Phosphorus atoms/cm^3 at 100°K assuming 50% of the impurities are ionized at this temperature. Also calculate the equilibrium electrons and holes concentrations.	10	2
c.	Define mobility of a charge carrier. Show that μ/D=e/kT.	10	3
d.	Explain the single stage MOS amplifier and MOS capacitances.	10	5
e.	Explain the working principle and V-I characteristics of Zener diode	10	4

SECTION C

3. Attempt any *one* part of the following: 1 x 10 = 10

Q. no.	Question	Marks	CO
a.	Derive the expression for Schrodinger Wave Equation.	10	1
b.	What is the principle of Heisenberg uncertainty and why is it important? Write its applications.	10	1

4. Attempt any *one* part of the following: 1 x 10 = 10

Q. no.	Question	Marks	CO
a.	What do you mean by Fermi level? Discuss the effect of temperature & doping on mobility.	10	2
b.	Draw the schematic band diagram of Fermi level, density of states, Fermi-Dirac distribution function, and carrier concentrations for intrinsic and extrinsic semiconductor.	10	2

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5. Attempt any *one* part of the following: 1 x 10 = 10

Q. no.	Question	Marks	CO
a.	Explain and draw the small signal models of MOS transistor.	10	5
b.	Explain the working principle and characteristics of following: (i) LED (ii) Solar cell	10	5

6. Attempt any *one* part of the following: 1 x 10 = 10

Q. no.	Question	Marks	CO
a.	Explain Ebers-Moll model.	10	4
b.	Explain Schottky diode in detail and also write its applications.	10	4

7. Attempt any *one* part of the following: 1 x 10 = 10

Q. no.	Question	Marks	CO
a.	Using the concept of diffusion and drift of carriers derive the continuity equation and diffusion length.	10	3
b.	Derive an expression for diode current in PN junction diode.	10	3