QPC: RJ19BTECH157 AR 19 Reg. No | | | | | | | | | | |

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fourth Semester – Regular) Examinations, June – 2021

BPCEC4030– SEMICONDUCTOR DEVICES

(E.C.E)

Time: 2 hrs Maximum: 50 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) **(1 x 10 = 10 Marks)**

Q.1. Answer ***ALL*** questions [CO#] [PO#]

a. Intrinsic semiconductors are those 1 1
(i) Which are made of semiconductor material in its purest form (ii) Which have zero energy gap
(iii) Which have more electrons than holes (iv) Which are available locally

b. A pure semiconductor behaves like an insulator at 0^0 K because 1 1
(i) There is no recombination of electrons with holes (ii) Drift velocity of free electrons is very small
(iii) Free electrons are not available for current conduction (iv) Energy possessed by electrons at that low temperature is almost zero

c. Which of the following is a semi-conductor 1 1
(i) Diamond (ii) Arsenic
(iii) Phosphorous (iv) Gallium arsenide

d. In a PN junction with no external voltage, the electric field between acceptor and donor ions is called a 2 1
(i) Peak (ii) Barrier
(iii) Threshold (iv) Path

e. The capacitance of a reverse biased PN junction 2 1
(i) Increases as reverse bias is increased (ii) Decreases as reverse bias is increased
(iii) Increases as reverse bias is decreased (iv) Is insignificantly low

f. A PN junction 2 1
(i) Has low resistance in forward as well as reverse directions (ii) Has high resistance in forward as well as reverse directions
(iii) Conducts in forward direction only (iv) Conducts in reverse direction only

g. In a BJT 3 1
(i) The base region is sandwiched between emitter and collector (ii) The collector is sandwiched between base and emitter
(iii) The emitter region is sandwiched between base and collector (iv) None of the above

h. Amplifiers and oscillators using BJT, operate in ..... region 3 1
(i) Inverted mode (ii) Active
(iii) Cut off (iv) Saturation

i. MOSFET has greatest application in digital circuit due to 4 1
(i) Low power consumption (ii) Less noise
(iii) Small amount of space it takes on a chip (iv) All of the above

j. In MOSFETs N-channel is more preferred than P-channel because 4 1
(i) It is cheaper (ii) It is faster

(iii) It has better drive capability (iv) It has better noise immunity

PART – B: (Short Answer Questions) (2 x 5 = 10 Marks)

Q.2. Answer ***ALL*** questions	[CO#]	[PO#]
a. What is energy band?	1	1
b. How doping concentration is calculated?	2	1
c. Explain the formation of PN Junction diode.	3	1
d. How punch through mechanism is taking place in MOSFET?	4	1
e. Draw basic MOS structure	5	1

PART – C: (Long Answer Questions) (6 x 5 = 30 Marks)

Answer ***ANY FIVE*** questions	Marks	[CO#]	[PO#]
3. Explain in detail about Fermi energy	(6)	1	1
4. Explain in detail about intrinsic semiconductor	(6)	1	2
5. How Carrier generation and recombination take place in semiconductors?	(6)	2	1
6. With neat diagram discus about the formation of depletion layer in PN Junction diode	(6)	2	2
7. Explain the operation of BJT.	(6)	3	1
8. With neat sketch explain the I-V Characteristics of Schottky Diode	(6)	4	2
9. Draw and explain energy band diagram of MOS capacitor in accumulation, depletion and inversion layer.	(6)	5	2
10. With neat diagram discuss in detail about introduction to MOSFET	(6)	6	2

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