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Code No. : 13452 S N/O

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD**

Accredited by NAAC with A++ Grade

**B.E. (E.C.E.) III-Semester Supplementary Examinations, August-2023**

**Electronic Devices**

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	For a particular semiconductor material, $N_C = 1.5 \times 10^{18} \text{cm}^{-3}$ , $N_V = 1.3 \times 10^{19} \text{cm}^{-3}$ and $E_G = 1.43 \text{ eV}$ at $T = 300 \text{ Kelvin}$ . Determine the position of the intrinsic Fermi level with respect to the center of the band gap. Assume $n_i = 1.5 \times 10^{10} \text{cm}^{-3}$	2	3	1	1
2.	Is it true that a P-type silicon sample has a higher conductivity compared to an N-type silicon sample having the same doping concentration? Justify your answer.	2	3	1	1
3.	Draw piecewise linear model for Ideal diode and practical diode.	2	1	4	1
4.	Characteristics of PN-Junction Diode depends on Temperature changes. Justify the statement.	2	2	2	1
5.	For the given circuit the potential of the battery is varied from 10V to 16V. If by Zener diode breakdown voltage is 6V, find maximum current through Zener diode.	2	3	3	1
6.	Distinguish Schottky Barrier Diode and normal FN Junction Diode	2	2	2	1
7.	The transistor has $I_E = 10 \text{mA}$ and $\alpha_{dc} = 0.98$ . Determine the values of $I_C$ and $I_B$ .	2	3	5	1
8.	Distinguish Bipolar and MOS technologies with respect to package density and power dissipation.	2	2	5	1,7
9.	What is twin tub process in CMOS fabrication?	2	1	6	1
10.	List the advantages of CMOS inverter over other inverter circuits	2	2	5	1
<b>Part-B (5 × 8 = 40 Marks)</b>					
11. a)	Define Velocity saturation and what is the importance of it in the design of Semiconductor Devices.	4	2	1	1
b)	Distinguish lattice scattering and impurity scattering.	4	3	1	1

12. a)	Show that the diode current equation is $I = I_0 [ e^{(V/\eta VT)} - 1 ]$ when the diode is forward biased	4	3	2	1
b)	Draw the switching characteristics of PN Junction and Explain.	4	2	2	1
13. a)	State Clamping theorem and write any two applications of clampers.	4	1	3	1
b)	Draw the characteristics of Tunnel Diode and explain them with the help of Energy band diagram.	4	3	3	1
14. a)	Explain the operation of BJT in CB configuration with the help of its input and output characteristics.	4	1	5	1
b)	Draw and explain the C-V characteristics of MOS Structure.	4	2	5	1
15. a)	Explain the operation of CMOS inverter with capacitor as load.	4	2	5	1
b)	Discuss the process of ion implantation & Etching used in fabrication of Electronic Devices.	4	1	6	1,7
16. a)	Discuss the concept of Carrier generation and recombination that takes place in semiconductors and its affect on current density.	4	2	1	1
b)	Show that depletion capacitance of a step PN junction is	4	3	2	1
$C = \left  \frac{dq}{dv} \right  = \frac{\epsilon_0 A}{d}$					
17.	Answer any <i>two</i> of the following:	4	3	3	1,2
a)	Assume the diodes to be ideal and find the values of I and V				
b)	Distinguish CB, CE and CC configurations of BJT	4	3	5	1
c)	List the steps in MOS fabrication process and explain them briefly.	4	2	6	1,7

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level - 1	20%
ii)	Blooms Taxonomy Level - 2	40%
iii)	Blooms Taxonomy Level - 3 & 4	40%

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