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VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (E.C.E.) III-Semester Main & Backlog Examinations, Jan./Feb.-2024

Electronic Devices

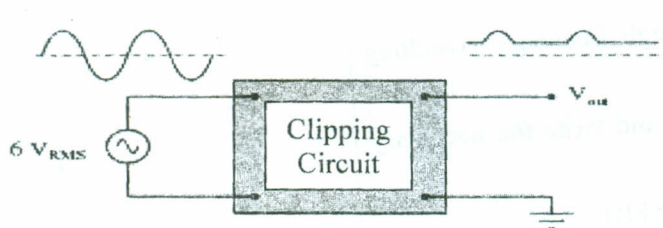
Time: 3 hours

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	PSO
1.	Define Diffusion current and what is the role of it in PN -junction formation?	2	1	1	1	1
2.	Define Velocity Saturation in semiconductors.	2	1	1	1	1
3.	Is it true that avalanche breakdown decreases by increasing temperature? Justify your answer.	2	2	2	1	1
4.	The reverse saturation current of a Germanium diode at 30°C is 0.1 μA. What would be the approximate value of the current if the temperature is increased by 22°C.	2	3	3	1,2	1
5.	In the circuit shown below, the knee current of the ideal Zener diode is 10 mA. To maintain 5 V across RL, the minimum value of RL in Ω and the minimum power rating of the Zener diode in mW, respectively are _____	2	3	3	1,2	1
6.	Schottky Barrier Diode is better suited for high frequency switching operations. True or False? Justify the answer.	2	2	2	1	1
7.	Draw Ebers-Moll model of a NPN transistor and write the necessary equations.	2	2	2	1	1
8.	Define threshold and pinch-off voltages in MOSFET.	2	1	2	1	1
9.	What is twin tub process in CMOS fabrication?	2	1	5	1	1
10.	Distinguish FinFET and MOSFET technologies with respect to package density and power dissipation.	2	2	4	1	1
	Part-B (5 × 8 = 40 Marks)					
11. a)	Calculate the built-in voltage of a junction in which the p and n regions are doped equally with 10^{16} atoms /cm ³ , assume $n_i = 1.5 \times 10^{10}$ /cm ³ . with the terminals left open, what is the width of the depletion region, and how far does it extend into the p and n regions? If	4	3	1	1,2	1

	the cross-sectional area of the junction is $100\mu\text{m}^2$, find the magnitude of the charge stored on either side of the junction.					
	b) Distinguish phonon scattering and ionized impurity scattering.	4	2	1	1,2	1
12.	a) Show that the diode current equation is $I = I_0 [e^{(V/\eta V_T)} - 1]$ when the diode is forward biased	4	3	2	1,2	1
	b) What do you understand from Switching Characteristics of PN diode? Elaborate with necessary wave forms.	4	3	2	1,2	1
13.	a) Design a DC power supply with 9V and 200mA specification using π -filter.	4	4	3	1,2,3	1
	b) Draw the characteristics of Tunnel diode and explain the operation with the help of energy band diagrams.	4	2	2	1,2	1
14.	a) Explain the operation of BJT in CB configuration with the help of its input and output characteristics.	4	1	2	1,2	1
	b) List the MOS structure operating modes and explain them with the aid of parallel plate capacitor.	4	2	2	1,2	1
15.	a) CMOS inverter is advantages when compared to BJT inverter & NMOS inverter with respect to package density and power dissipation. True or False? Justify the answer with proper reasoning.	4	3	4	1,2	1
	b) Discuss the process of oxidation, photolithography and masking used in fabrication of Electronic Devices.	4	1	5	1,2	1
16.	a) Explain the process of carrier generation and recombination that takes place in semiconductors with the help of relevant equations.	4	2	1	1,2	1
	b) Show that storage capacitance of a P+N junction is $C_D = \tau_T / \eta V_T$	4	3	2	1,2	1
17.	Answer any two of the following:					
	a) Design a circuit that clips any portion of the input AC waveform below 4 volts as shown below.	4	3	3	1,2,3	1
		4	2	4	1,2	1
	b) List the advantages of MOS technology over Bipolar technology					
	c) Explain the operation of CMOS inverter with capacitive load and draw the characteristics of it.	4	2	2	1,2	1

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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