

Code No: P18ECT01

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HALL TICKET NUMBER

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PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE  
(AUTONOMOUS)

II B.TECH I SEMESTER END SUPPLEMENTARY EXAMINATIONS, MARCH/APRIL - 2023  
SEMICONDUCTOR DEVICES AND CIRCUITS  
(Common to EEE,ECE Branches)

Time: 3 hours

Max. Marks: 60

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answer all the questions in Part-A (5X2=10M)

Q.No.	Questions	Marks	CO	KL
1	a) Mention the reason for silicon devices work at higher temperatures when compared to germanium devices.	[2M]	1	
	b) Compare the various diodes in terms of doping levels.	[2M]	2	
	c) List the important features of FET	[2M]	3	
	d) Explain the significance of $\alpha$ and $\beta$ in BJT	[2M]	4	
	e) Define the thermal runaway	[2M]	5	

PART-B

Answer One Question from each UNIT (5X10=50M)

Q.No.	Questions	Marks	CO	KL
UNIT-I				
2.	a) Explain the Hall Effect with a neat sketch	[5M]	1	
	b) Explain the carrier concentration and Fermi level in intrinsic semiconductors. Derive the number of electrons and holes present in it.	[5M]	1	
OR				
3.	a) Explain the Fermi level in an extrinsic semiconductor with energy diagrams	[5M]	1	
	b) Discuss the following with respect to semiconductors (i) doping (ii) dopant (iii) donor (iv) acceptor	[5M]	1	
UNIT-II				
4.	a) Explain the breakdown mechanism in the Zener diode and its characteristics.	[5M]	2	
	b) Derive the P-N junction diode equation	[5M]	2	
OR				
5.	a) Explain the operation of the Photo Diode with a neat diagram	[5M]	2	
	b) Explain the energy band diagram of the PN junction Diode.	[5M]	2	
UNIT-III				
6.	a) Derive the expression for Ripple factor for Full Wave Rectifier with L-section filter.	[5M]	3	
	b) Over what range of input voltage the Zener regulator circuit will maintains 30V across 2K $\Omega$ resistor? Assuming $R_s = 200\Omega$ and the maximum Zener current is 25mA.	[5M]	3	
OR				
7.	a) Derive the expression for transition capacitance of a diode	[5M]	3	
	b) Comparison of various filter circuits in terms of ripple factors.	[5M]	3	
UNIT-IV				

8.	a)	Define ICBO and ICEO. How are they different? How are they related? Are they typically, close in magnitude? Explain.	[5M]	4	
	b)	Explain the construction and operation of N-Channel JFET with a neat diagram.	[5M]	4	
OR					
9.	a)	Draw the circuit diagram for finding the common base I/O characteristics of a transistor and explain briefly.	[5M]	4	
	b)	Write the comparison between JFET and MOSFET.	[5M]	4	
UNIT-V					
10.	a)	Draw a BJT self-bias circuit and obtain the expression for the stability factor. Why it is widely used? Explain.	[5M]	5	
	b)	Analyze a single-stage transistor amplifier using h-parameters.	[5M]	5	
OR					
11.	a)	With the help of a neat diagram explain the voltage divider biasing method for FET.	[5M]	5	
	b)	Find the stability factor for a PNP transistor that is used in a self-biasing arrangement circuit with circuit components $V_{CC}=4.5V$ ; $R_2=2.7 K\Omega$ ; $R_E=0.27K\Omega$ ; $R_1=27K$ of $\beta=44$ .	[5M]	5	

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