

--	--	--	--	--	--	--	--	--	--

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

II B.TECH I SEMESTER END REGULAR/SUPPLEMENTARY EXAMINATIONS, JAN - 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) Draw the Fermi level in intrinsic and extrinsic Semiconductors	[2M]	1	1
	b) Describe breakdown mechanisms in the Zener diode	[2M]	2	2
	c) Define the diode resistance and diode capacitance,	[2M]	3	1
	d) Write the comparisons between BJT and FET	[2M]	4	1
	e) What is the need for biasing?	[2M]	5	1

PART-B

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

Q.No.	Questions	Marks	CO	KL
UNIT-I				
2.	a) Derive the continuity equation for the semiconductors	[5M]	1	4
	b) In an N-type semiconductor, the Fermi level lies 0.3eV below the conduction band at 27°C, if the temperature is increased to 55°C find the new position of the Fermi level.	[5M]	1	3
OR				
3.	a) What is meant by N-type and P-type impurities in a semiconductor? Explain.	[5M]	1	1
	b) Explain the law of junction with a neat sketch	[5M]	1	2
UNIT-II				
4.	a) The transition capacitance of an abrupt junction diode is 20pF at 5V. Compute the value of the decrease in capacitance for a 1.0-volt increase in the bias.	[5M]	2	3
	b) Explain the construction and operation of the Tunnel Diode with a neat sketch	[5M]	2	2
OR				
5.	a) Draw and explain the current components in the PN junction Diode	[5M]	2	2
	b) Explain the operation and characteristics of UJT	[5M]	2	2
UNIT-III				
6.	a) Derive the expression for ripple factor for HWR with and without C-filter.	[5M]	3	4
	b) Why filter circuit is necessary with rectifiers? Give the list of different filters used in rectifiers.	[5M]	3	1
OR				
7.	a) Explain the circuit diagram of a single-phase full-wave bridge rectifier and sketch the input and output waveforms.	[5M]	3	2

	b)	Explain the various voltage regulators with a neat sketch.	[5M]	3	2
UNIT-IV					
8.	a)	Explain the operation of the CE configuration of BJT and its input and output characteristics. Comparison of various filter circuits in terms of ripple factors.	[5M]	4	2
	b)	Explain the MOSFET construction and its operation.	[5M]	4	2
OR					
9.	a)	Explain how the transistor is used as an amplifier.	[5M]	4	2
	b)	Derive the transistor equation with an equivalent circuit	[5M]	4	4
UNIT-V					
10.	a)	Write a short note on i. Bias compensation and ii. Thermal stability.	[5M]	5	1
	b)	What are the different types of BJT biasing- methods? explain any one of the methods	[5M]	5	2
OR					
11.	a)	What is the importance of the DC Load line? Explain	[5M]	5	2
	b)	Given $I_E = 2.5\text{mA}$, $h_{fe} = 140$, $h_{oe} = 20\mu\text{s}$ and $h_{ob} = 0.5\mu\text{s}$. Determine the common-emitter hybrid equivalent circuit.	[5M]	5	5
