

ELECTRONICS AND COMMUNICATION ENGINEERING

QUESTION BANK

Course Title: Electronics Devices and Circuits

Course Code: 25EC303

Regulation: NR25

UNIT-II

BIPOLAR JUNCTION TRANSISTOR

S.No	Questions	BT	CO	PO
Part –A(Short Answer Questions)				
1	What is a BJT and draw its symbol.	L2	2	1
2	What do you mean by early effect.	L1	2	1
3	Compare CE, CB and CC configurations	L2	2	1
4	Which of the BJT configurations are suitable for impedance matching applications? Why?	L2	2	1
5	Write a short note on switching characteristics of a transistor	L2	2	1
6	Write a short note on transistor as a switch	L4	2	2
7	What are the three regions of a transistor?	L2	2	2
8	In a CB transistor circuit, the emitter current I_E is 10mA and collector current is 9.8mA.find the value of the base current I_B	L2	2	1
9	If a transistor has α of 0.97,find the value of β . If $\beta=200$,find the value of α .	L2	2	1
10	Define ON time and OFF time of a transistor	L2	2	1
11	How are the junctions of a transistor biased for saturation region operation?	L1	2	1
12	When does a transistor act as(a) a closed switch and (b) an open switch?	L1	2	1
13	When the emitter current of a transistor is changed by 1mA, there is a change in collector current by 0.99 mA. Find the current gain of the transistor.	L2	2	1
14	Why we call BJT is a current controlled device?	L2	2	1

Part– B(Long Answer Questions)					
11	a)	Explain the structure and working principle of NPN and PNP transistors.	L3	2	3
	b)	Explain the transistor action with suitable diagrams.	L3	2	3
12	a)	Describe the current components in a transistor and derive the relation among emitter, collector and base currents.	L3	2	2
	b)	Derive the relationship between α and β of a transistor.	L3	2	2

13	a)	Explain the operation of a transistor in Common Base (CB) configuration.	L3	2	3
	b)	Draw and explain the input and output characteristics of CB configuration.	L4	2	3
14	a)	Explain the operation of a transistor in Common Emitter (CE) configuration.	L3	2	3
	b)	Draw and explain the input and output characteristics of CE configuration.	L4	2	3
15	a)	Explain the operation of a transistor in Common Collector (CC) configuration.	L3	2	3
	b)	Draw and explain the input and output characteristics of CC configuration.	L4	2	3
16	a)	Compare CB, CE and CC configurations based on input impedance, output impedance, current gain, voltage gain and applications.	L4	2	2
	b)	Explain the procedure for determining h-parameters from transistor characteristics.	L4	2	2
17	a)	Define h-parameters and explain their significance in transistor analysis.	L3	2	2
	b)	Determine h_{ie} , h_{re} , h_{fe} and h_{oe} from CE characteristics.	L3	2	2
18	a)	Discuss the advantages, disadvantages and applications of CB, CE and CC configurations.	L4	2	2
	b)	For an NPN transistor with $\alpha_N = 0.98$, $I_{CO} = 2 \mu A$ and $I_{EO} = 1.6 \mu A$ connected in Common Emitter Configuration, calculate the minimum base current for which the transistor enters into saturation region. V_{CC} and load resistance are given as 12 V and $4.0 K\Omega$ respectively.	L3	2	1,2
19	a)	A Silicon BJT is connected in common Emitter configuration with collector-to-Base bias. Calculate the base resistance R_b for the quiescent collector-to-Emitter voltage, V_{CE} has to be 4 V. V_{CC} and R_C are given as 12 V and $1 K\Omega$ respectively. Assume $\beta = 100$, V_{BE} to be zero volts. Also find the stability factor of the circuit	L3	2	1,2
	b)	An NPN transistor with $\beta = 50$ is used in common Emitter configuration with $V_{CC} = 10V$ and $R_C = 2.2 K\Omega$. Biasing is done through a $100 K\Omega$ resistance from collector-to-Base. Assuming V_{BE} to be zero volts, Find i) The quiescent point ii) The stability factor, S.	L3	2	1,2
20	a)	A transistor is operated at a forward emitter current of 2 mA and with the collector open-circuited. Assuming $\alpha_N = 0.98$, $I_{EO} = 1.6 \mu A$ and	L3	2	1,2

		$I_{CO} = 2 \mu A$, determine i) The junction voltages V_C and V_E ii) The collector to Emitter voltage V_{CE} iii) The region of transistor operation (Saturation/Active/Cut-off). Assume any other values necessary.			
	b)	Determine the collector current of a BJT with both of its junctions reverse biased. Assume $I_{CO} = 5 \mu A$, $I_{EO} = 3.58 \mu A$, $\alpha_N = 0.98$ and any other parameter values as required.	L3	2	1,2
21		The reverse leakage current of the transistor when connected in CB configuration is $0.2 \mu A$ while it is $18 \mu A$ when the same transistor is connected in CE configuration. Calculate α and β of the transistor.	L3	2	1,2