O.P.Code: 23EC0402 | R23 | H.T.No.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech. II Year I Semester Regular Examinations February-2025

ELECTRONIC DEVICES AND CIRCUITS

(Electronics & Communications Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Define clipper and list types.	CO4	L2	2M
	b	Formulate the Diode current equation.	CO2	L1	2M
	c	Define BJT and Draw its symbol.	CO1	L1	2M
	d	List applications of BJT.	CO1	L1	2M
	e	What is the trans conductance g_m in a BJT?	CO2	L1	2M
	f	Name the applications of CC amplifier.	CO1	L1	2M
	g	Define Pinchoff Voltage.	CO2	L1	2M
	h	Draw the CMOS structure.	CO1	L1	2M
	i	List the small-Signal Parameters of MOSFET.	CO1	L1	2M
	j	Draw an alternative representation of the T model.	CO5	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Discuss about the forward and reverse resistances of a PN junction diode.	CO1	L2	5M
	b	Calculate the forward resistance of a PN Junction Diode when the forward current is 5mA at T = 300 K. Assume Silicon diode.	CO3	L3	5M

OR

3	a	Define the basic principle of Varactor diode and list its applications.	CO1	L1	3M
	b	Draw the circuit symbol of Tunnel diode. Explain the VoltAmpere (V-I) characteristics.	CO2	L2	7M

UNIT-II

4	a	Derive the relation among α, β and Υ of a Transistor.	CO2	L2	5M
	b	If the base current in a transistor is 20μA when the emitter current is 6.4mA, what are the values of α and β? Also calculate the collector current.	CO3	L3	5M

OR

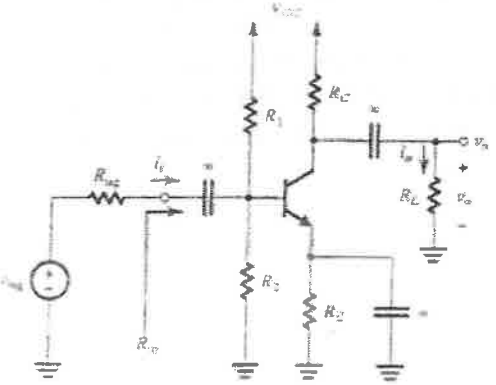
5	a	Differentiate among CE, CB & CC configurations.	CO4	L2	5M
	b	Discuss the Input and Output characteristics of a BJT in CE Configuration. Indicate the regions of operations in the output characteristics.	CO4	L3	5M

UNIT-III

6	a	Derive the transconductance gm for a given collector current IC.	CO2	L2	5M
	b	Determine base current and input resistance at Base of BJT.	CO1	L3	5M

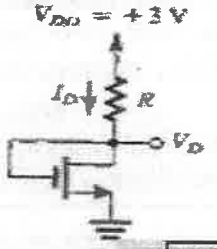
OR

7		For the common emitter amplifier shown in figure Vcc = 9V, R1 = 27 kΩ R2 = 15 kΩ, R_E=1.2 kΩ and Rc = 2.2 kΩ. The transistor has β =100, VA=100 V. Calculate the DC bias current I_E. If the amplifier operates between source for which Rsig = 10 kΩ and a load of 2 kΩ, replace the transistor with its hybrid π model, and Compute the values of Rin, Volatge gian Vo/Vsig.	CO3	L4	10M



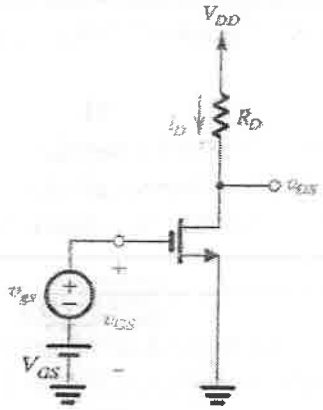
UNIT-IV

8	a	Discuss the Transfer and output characteristics of N-channel JFET with neat sketches.	CO4	L6	5M
	b	Distinguish between Depletion MOSFET and Enhancement MOSFET.	CO6	L5	5M
		OR			
9	a	Distinguish between BJT and FET.	CO6	L2	5M
	b	Design the circuit in Fig. below to obtain a current ID of 80 μA. Find the value required for R, and find the dc voltage VD. Let the NMOS transistor have Vt = 0.6 V, μnCox = 200 μA/V^2 .L = 0.8 μm, and W = 4μm. Neglect the channel-length modulation effect (i.e., assume λ = 0).	CO5	L1	5M



UNIT-V

10	a	Explain the separating the DC Analysis and the Signal Analysis	CO4	L2	5M
	b		CO5	L3	5M



For the above amplifier, let V_{DD}= 5V, R_D = 10KΩ, V_t = 1V, K'_n = 20μ A/V^2 , W/L = 20, V_{GS}=2V, and λ = 0. Determine

i) the dc current I_D and dc voltage V_{DS}
ii) g_m
iii) Voltage gain iv)If V_{GS} = 0.2 sin wt, find V_{DS}

OR

11	a	Define the MOSFET Transconductance gm with mathematical expression.	CO3	L1	3M
	b	Develop and Illustrate the T Equivalent-Circuit Model for the MOSFET.	CO5	L5	7M

*** END ***