

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER-I & II EXAMINATION – WINTER 2024****Subject Code:3110016****Date:17-01-2025****Subject Name:Basic Electronics****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		Marks
<b>Q.1</b>	(a) Sketch the characteristics of ideal diode and approximate characteristics of practical diodes. Briefly explain it.	<b>03</b>
	(b) Draw two-diode full-wave rectifier circuit and explain its operation.	<b>04</b>
	(c) Explain positive and negative voltage clamper circuit with waveforms.	<b>07</b>
<b>Q.2</b>	(a) What are three modes of transistor operation, explain it.	<b>03</b>
	(b) What is you understand by transistor biasing and why it is required.	<b>04</b>
	(c) Compare CB, CE and CC configuration.	<b>07</b>
	<b>OR</b>	
	(c) Explain the operation of voltage divider bias circuit using an npn transistor and write its voltage and current equation.	<b>07</b>
<b>Q.3</b>	(a) What is photo-diode and how it works?	<b>03</b>
	(b) What is varactor diode, and explain how it works?	<b>04</b>
	(c) In CE amplifier has $h_{ie} = 2.1 \text{ K}\Omega$ , $h_{fe} = 75$ and $h_{oe} = 1 \text{ }\mu\text{S}$ , voltage divider resistance $R_1 = 68 \text{ k}\Omega$ and $R_2 = 56 \text{ k}\Omega$ , $R_c = 3.9 \text{ k}\Omega$ , $R_E = 4.7 \text{ k}\Omega$ and $R_L = 82 \text{ k}\Omega$ . Calculate input impedance, output impedance and voltage gain.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) What is tunnel diode, and explain how it works?	<b>03</b>
	(b) Explain how Zener diode maintains constant voltage across load with circuit.	<b>04</b>
	(c) Draw single stage CE amplifier and analyze and explain how it works.	<b>07</b>
<b>Q.4</b>	(a) Define saturation current, pinch off voltage and transconductance in JFET.	<b>03</b>
	(b) Do comparison between BJT and FET and write it.	<b>04</b>
	(c) Analyze and explain CB amplifier and find its input impedance, output impedance and voltage gain	<b>07</b>
	<b>OR</b>	
<b>Q.4</b>	(a) Define performance parameter of JFET a.c. drain resistance, transconductance and amplification factor.	<b>03</b>
	(b) In n-channel JFET with $V_{GS(off)} = -6 \text{ V}$ and $I_{DSS} = 3 \text{ mA}$ Solve $I_D$ value for $V_{GS} = -1, -3, \text{ and } -5 \text{ V}$ .	<b>04</b>
	(c) Consider a CB amplifier utilizing a BJT biased at $I_c = 1 \text{ mA}$ with $R_c = 5 \text{ k}\Omega$ , $R_L = 5 \text{ k}\Omega$ . Determine $R_{in}$ , $A_{vo}$ , $A_v$ , and $R_o$ .	<b>07</b>
<b>Q.5</b>	(a) What is logic gates and state the rule used for OR and AND gate.	<b>03</b>
	(b) Why NAND and NOR gates are called universal gate and draw truth table of NAND gate.	<b>04</b>
	(c) Write and explain application of FET as amplifier and as a switch.	<b>07</b>

**OR**

- Q.5** (a) Draw the logic circuit for the Boolean expression  $Y = ABC + \bar{D}$ . **03**  
(b) Explain Transistor Transistor Logic (TTL). **04**  
(c) Using common source circuit have a  $R_1 = 5.6 \text{ M}\Omega$ ,  $R_2 = 1 \text{ M}\Omega$ ,  $R_D = R_S = 2.7 \text{ K}\Omega$ ,  $r_d = 100 \text{ K}\Omega$  and  $Y_{fs} = 3000 \text{ }\mu\text{S}$  calculate input impedance, output impedance and voltage gain. **07**

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