Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–I & II(NEW)EXAMINATION – SUMMER 2022

Subject Code:3110016 Date:24-08-2022

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
Q.1	**(a)**	What is a diode? Write its types and applications.	**03**
	(b)	Explain the diode V-I characteristics of ideal and practical PN junction semiconductor diode.	**04**
	(c)	Enumerate the different types of clipping circuits with their different names and input-output waveforms.	**07**
Q.2	**(a)**	Why are junction transistors called bipolar devices?	**03**
	(b)	The metal lead of the p-side of a p–n diode is soldered to the metal lead of the p-side of another p–n junction diode. Will the structure form an n–p–n transistor? If not, why?	**04**
	(c)	Sketch the circuit of the common collector mode of BJT and its output characteristics. Derive the expression for the collector current and gain.	**07**
		OR	
	(c)	Draw the fixed-biased circuit by considering an n–p–n transistor in the CE mode. Derive the expressions for stability factors. What are the functions of the coupling capacitors?	**07**
Q.3	**(a)**	Write a short note on the optocoupler device?	**03**
	(b)	Explain the sixteen segment display and its applications with the necessary circuit diagram.	**04**
	(c)	Draw the approximate hybrid model for any transistor configuration at low frequencies. Show that only h_{ie} and h_{fe} are essential in the model. Is the approximation justified?	**07**
		OR	
Q.3	**(a)**	Explain the varactor diode.	**03**
	(b)	Explain the contraction of the solar cell with its operational principle.	**04**
	(c)	What is self-bias? Draw the circuit showing self-bias of an n–p–n transistor in the CE mode. Explain physically how the self-bias improves stability.	**07**
Q.4	**(a)**	What is MOSFET device? Draw its construction diagram.	**03**
	(b)	Write short notes on the following : (i) Advantages of JFET (ii) Difference between MOSFET and JFET	**04**
	(c)	Compare the different characteristics of the following semiconductor devices: bipolar junction transistor, field-effect transistor.	**07**
		OR	
Q.4	**(a)**	How will you determine the drain characteristics of JFET? What do they indicate?	**03**
	(b)	Explain the common drain configuration for a JFET.	**04**
	(c)	Explain the JFET parameters and establish the relationship between them	**07**

Q.5	**(a)**	What is the thermal runaway in transistors, and how can it be avoided?	**03**
	(b)	What is an Early effect, and how can it account for the CB input characteristics?.	**04**
	(c)	What do you mean by the logic gate and its types? Explain the universal logic gates.	**07**

OR

Q.5	**(a)**	What is the ac load line in the transistor? Write its significance.	**03**
	(b)	The value of alpha increases with the increasing reverse-bias voltage of the collector junction. Why?	**04**
	(c)	Explain the logic families and their types. Describe the characteristics of the same.	**07**

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