

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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