

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 : | 04 |
| (i) Advantages of JFET (ii) Difference between MOSFET and JFET | |
| (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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