Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) EXAMINATION – SUMMER 2019

Subject Code: 2131006 Date: 07/06/2019

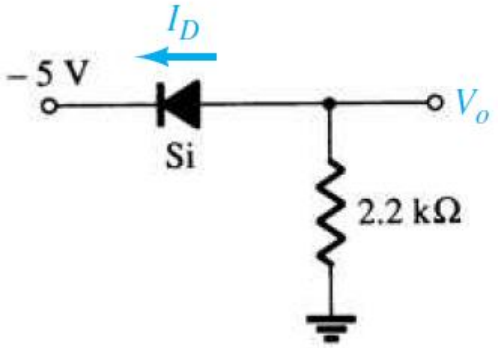
Subject Name: Electronic Devices and Circuits

Time: 02:30 PM TO 05:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

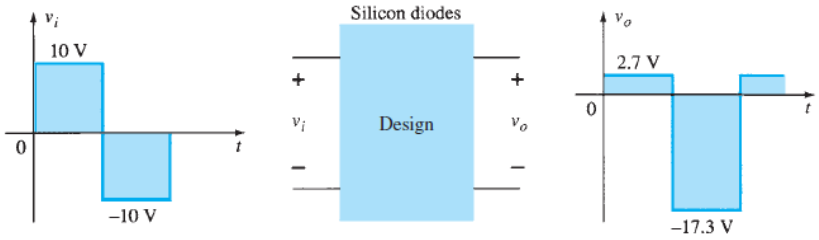
			MARKS
Q.1	**(a)**	Define i) an intrinsic material, ii) a negative temperature coefficient, and iii) covalent bonding.	**03**
	(b)	What names are applied to the two types of BJT transistors? Sketch the basic construction of each and label the various minority and majority carriers in each. Draw the graphic symbol next to each. Is any of this information altered by changing from a silicon to a germanium base?	**04**
	(c)	What is the major difference between a bipolar and a unipolar device? Draw the basic construction of a p-channel JFET. Apply the proper biasing between drain and source and sketch the depletion region for $V_{GS} = 0$ V.	**07**
Q.2	**(a)**	Determine V_0 and I_D for the networks of figure given below	**03**



	(b)	A feedback amplifier has a gain of 1000 without feedback. Find the gain with feedback and the amount of feedback in dB for a negative feedback of 10%.	**04**
	(c)	A full-wave bridge rectifier with a 220 V rms sinusoidal input has a load resistor of 10 kΩ. Assuming silicon diodes, calculate (a) dc output voltage and dc load current (b) peak output voltage and peak load current (c) peak and average diode currents (d) power rating of each diode (e) PIV across each diode	**07**

OR

	(c)	Design a clamper to perform the function indicated as show figure below.	**07**



Q.3 **(a)** For *npn* transistor, which of the transistor currents is always the largest? Which is always the smallest? Which two currents are relatively close in magnitude? **03**

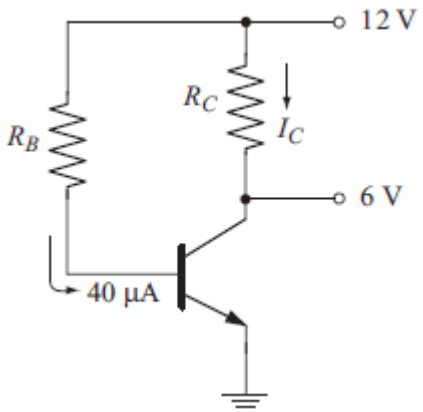
(b) For Zenor diode **04**

(i) draw schematic symbol with label,
(ii) draw characteristic with all notation,
(iii) list any two application.

(c) For the fixed-bias circuit shown, determine **07**

(i) Collector current, I_C
(ii) Collector resistance, R_C
(iii) Base resistance, R_B
(iv) $V_{CE.}$

Assume $\beta = 80$ and $V_{BE} = 0.7$ V.



OR

Q.3 **(a)** Draw Ebers-Moll model and π-model of a transistor. **03**

(b) Describe what coupling and bypass capacitors are supposed to do in amplifier circuit. **04**

(c) Calculate the divider current, base voltage, emitter voltage, emitter current, collector voltage, and collector-emitter voltage for an *npn* voltage-divider bias circuit. **07**

Q.4 **(a)** Describe the purpose of cascading CE and CC amplifiers. **03**

(b) List the advantages of negative feedback. **04**

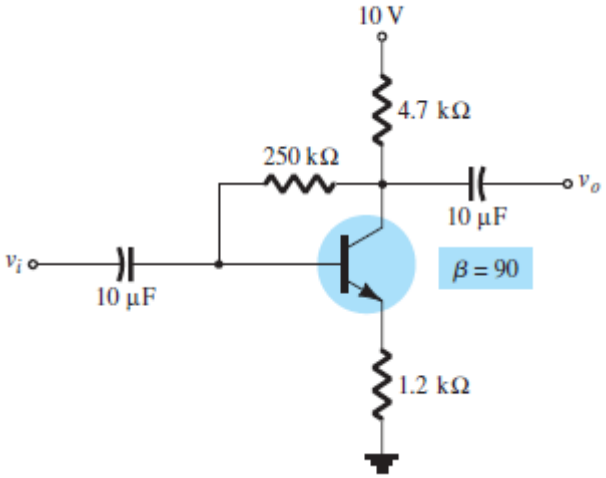
(c) Explain how the swamped amplifier works and list three of its advantages. **07**

OR

Q.4 **(a)** State the advantaged of a Darlington transistor. **03**

(b) Describe the difference between n-type and p-type semiconductor materials. **04**

(c) Determine the quiescent levels of I_{CQ} and V_{CEQ} for the network of Figure given below. **07**



Q.5	**(a)**	Label the three regions of operation on a bipolar junction transistor collector curve.	**03**
	(b)	Draw a schematic of class B push-pull amplifier and explain its operation.	**04**
	(c)	Describe the characteristics of amplifiers, including classes of operation, types of coupling, and frequency ranges.	**07**

OR

Q.5	**(a)**	Explain the working of voltage doubler circuit using diode.	**03**
	(b)	Describe JFET applications as analog switch.	**04**
	(c)	Explain the characteristics and operation of enhancement-mode MOSFET.	**07**

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