Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–I • EXAMINATION – SUMMER • 2014

Subject Code: X11101 **Date: 21-06-2014**

Subject Name: Basic Electronics

Time: 02:30 pm - 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.**

Q.1 (a) **07**

1. State Pauli's exclusion principle.
2. What is cut-in voltage?
   Write approximate value of cut-in voltage for silicon and germanium diode.
3. Define volt-equivalent of temperature.
4. Define peak-inverse-voltage.
5. Define Barrier Potential.
6. What is electron volt? Define ev unit of energy.
7. What is mean life time of a carrier?

(b) Explain the concept of potential energy barrier. **07**

Q.2 (a) Explain Hall effect. Derive the expression for Hall voltage. State its applications. **07**

(b) Explain mobility and conductivity using electron-gas theory. Also derive the expression for current density. **07**

OR

(b) Explain energy band diagram of insulators, semiconductor and conductor. Explain the electrical properties of germanium and silicon. **07**

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Q.3 (a) Draw the circuit diagram of full wave bridge rectifier and give its input and output waveforms. Also derive the expression for the dc current. **07**

(b) A bar of n-type silicon has length of 10 cm and circular cross section area of 20 mm^2 When it is subjected to a voltage of 4 volt along its length, the current flowing through it is 10 mA.Calculate the concentration of free electrons and drift velocity of electrons. Assume mobility of free electrons to be 1300 cm^2/v-s. **07**

OR

Q.3 (a) Draw following diode circuits with input and output waveforms. **07**

1. Voltage doubler circuit
2. Positive clipping circuit.
3. Positive clamper circuit.

(b) A full wave rectifier circuit is fed from a transformer with a centre tap. The rms voltage from end of secondary to centre tap is 40 volt. If the diode forward resistance is 4Ω and that of the half secondary is 10Ω.Calculate the following for 2kΩ load. **07**

1. Power delivered to load.
2. Efficiency of rectification.
3. TUF of secondary.

Q.4 (a) Draw the circuit of CE configuration of transistor. Explain input and output characteristics. Derive **$\alpha=\beta/\beta+1$.** **07**

(b) Determine the h-parameter for the two port network. Draw the hybrid model for CE, CB and CC configuration. **07**

OR

Q.4	**(a)**	Explain the h-parameter model of CE amplifier with Bypass resistor R_E and derive the expression for A_i,A_v,R_i and R_o	**07**
	(b)	What is biasing? Why biasing is required for transistor? List biasing methods for transistor. Draw and explain the circuit of voltage divider biasing.	**07**
Q.5	**(a)**	Give constructional details of JFET and give its characteristics. Why FET is called voltage controlled device?	**07**
	(b)	Classify the power amplifier based on the position of Q-point on the ac load line. Also explain class-B push-pull amplifier.	**07**

OR

Q.5	**(a)**	State the role of voltage regulators in power supplies? Discuss working of a series voltage regulator.	**07**
	(b)	Explain the operation of Emitter follower amplifier. Why it is named as emitter follower.	**07**

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