Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III • EXAMINATION – SUMMER 2013

Subject Code: 131101 Date: 31-05-2013

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)**	Define electron volt and draw general energy band diagram for insulator, semiconductor, and metal.	**07**
	(b)	State Bohr's postulates and derive expression for energy levels of electrons in Joules as a function orbit number surrounding nucleus.	**07**
Q.2	**(a)**	Explain the term mobility related to charged carriers and derive expression for point form of Ohm's law.	**07**
	(b)	Describe phenomenon of Hall effect with mathematical derivations. What are the different applications of Hall effect?	**07**
		OR	
	(b)	Obtain expression for potential difference across a semiconductor with non-uniform (graded) doping. Using the same, derive an expression for potential difference across open-circuited step-graded p-n junction.	**07**
Q.3	**(a)**	Define and explain following terms related to diode: 1. Transition capacitance and 2. Diffusion capacitance.	**07**
	(b)	Draw double-diode clipper circuit which limits output voltage at two independent levels. Explain its working with necessary waveforms.	**07**
		OR	
Q.3	**(a)**	Draw diode I-V characteristic and explain diode static and dynamic resistances.	**07**
	(b)	Explain working full-wave rectifier with necessary waveforms. Obtain expression for dc output voltage.	**07**
Q.4	**(a)**	Indicate and briefly explain various current components flowing in p-n-p transistor with forward-based emitter junction and reverse-biased collector junction.	**07**
	(b)	Define h-parameters, and draw h-parameter equivalent circuit for CE, CB and CC configured transistor.	**07**
		OR	
Q.4	**(a)**	Draw output and input characteristics for common-base configured transistor. Explain base-width modulation (Early effect) for the same.	**07**
	(b)	Derive expression for small-signal voltage gain of emitter follower circuit in terms of h-parameters.	**07**
Q.5	**(a)**	What do you understand by bias stability in transistor amplifier circuit? Explain thermal instability of bias point for the same.	**07**
	(b)	Draw structure of n-channel JFET and explain its working.	**07**
		OR	
Q.5	**(a)**	Draw and explain working of diode compensation circuit for V_{BE} for self-stabilization in amplifier circuit.	**07**
	(b)	Compare FET and BJT devices. Define small-signal parameters of FET and draw low-frequency small-signal model for the same.	**07**

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