Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III • EXAMINATION – SUMMER • 2014

Subject Code: 131101 Date: 30-05-2014

Subject Name: Basic Electronics

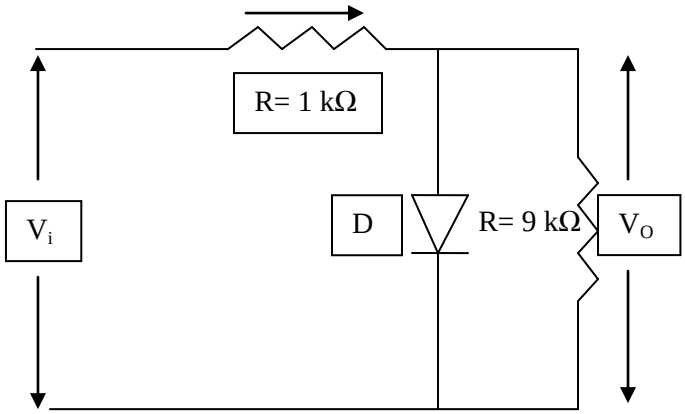
Time: 02.30 pm - 05.00 pm Total Marks: 70

Instructions:

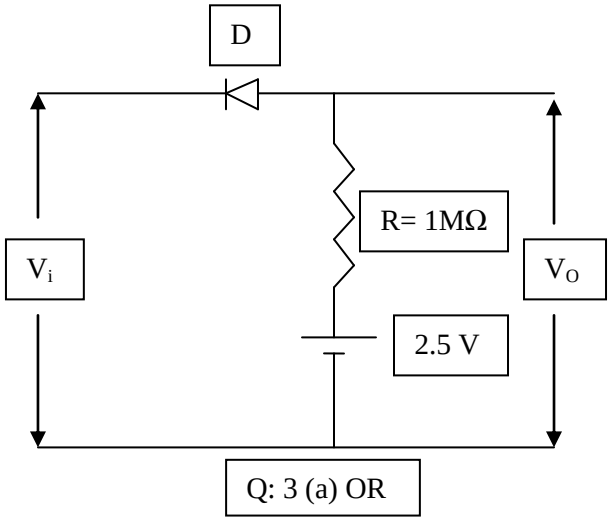
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain Hall effect phenomenon and list out its applications. Quantitatively discuss the use of Hall effect to determine mobility.	**07**
	(b)	Derive continuity equation for carrier concentration in body of a semiconductor.	**07**
Q.2	**(a)**	Discuss the process of splitting of energy levels of isolated atoms into energy bands as these atoms are brought into close proximity to form a crystal.	**07**
	(b)	Draw diode I-V characteristic, discuss its temperature dependence and obtain expression for diode dynamic resistance.	**07**
		OR	
	(b)	Explain working of Tunnel diode. Draw its I-V characteristic and symbol. List out applications of Tunnel diode.	**07**
Q.3	**(a)**	For a sinusoidal input of 10 V peak, sketch I_R and V_O in the circuit shown in Fig. Q. 3 (a). Assume ideal diode with cut-in voltage equal to 0.7 V.	**07**
	(b)	Draw BJT circuit in common-base configuration as well as its input and output characteristics. Explain base-width modulation for the same.	**07**
		OR	
Q.3	**(a)**	A symmetrical 5 KHz square wav that varies between + 10 V and -10 V is impressed upon the clipping circuit shown in Fig. Q: 3(a) OR. Assume for diode: R_f (forward bias resistance) = 0, R_r (reverse bias resistance) = 2 MΩ, Cut-in voltage = 0. Sketch the steady state output waveform, indicating value of maximum, minimum, and constant portion.	**07**
	(b)	In diode connected transistor circuit shown in Fig. Q: 3 (b) OR, the transistor has $\beta = 19$. If $V_E = 4$ V, determine the value of R_B. Neglect base-to-emitter junction voltage in the calculations.	**07**
Q.4	**(a)**	Derive expression for A_I, A_V, Z_i, and Y_O for a basic amplifier circuit in terms of h-parameters.	**07**
	(b)	What do you understand bias compensation? Draw and explain diode compensation circuit for V_{BE}.	**07**
		OR	
Q.4	**(a)**	Derive expression for A_I, A_V, Z_i, and Y_O for a common-collector amplifier circuit using simplified hybrid model.	**07**
	(b)	Explain thermal runaway. Show graphically that thermal runaway cannot take place if the quiescent point is located at $V_{CE} < (1/2)\ V_{CC}$.	**07**
Q.5	**(a)**	Draw two-dimensional structure of n-channel MOSFET. Explain its working.	**07**
	(b)	Explain push-pull arrangement of transistors and discuss its advantages.	**07**
		OR	
Q.5	**(a)**	Explain the use of FET as a voltage variable resistor.	**07**
	(b)	Draw transformer-coupled audio amplifier circuit. Show that the maximum value of conversion efficiency for this circuit is 50 %.	**07**

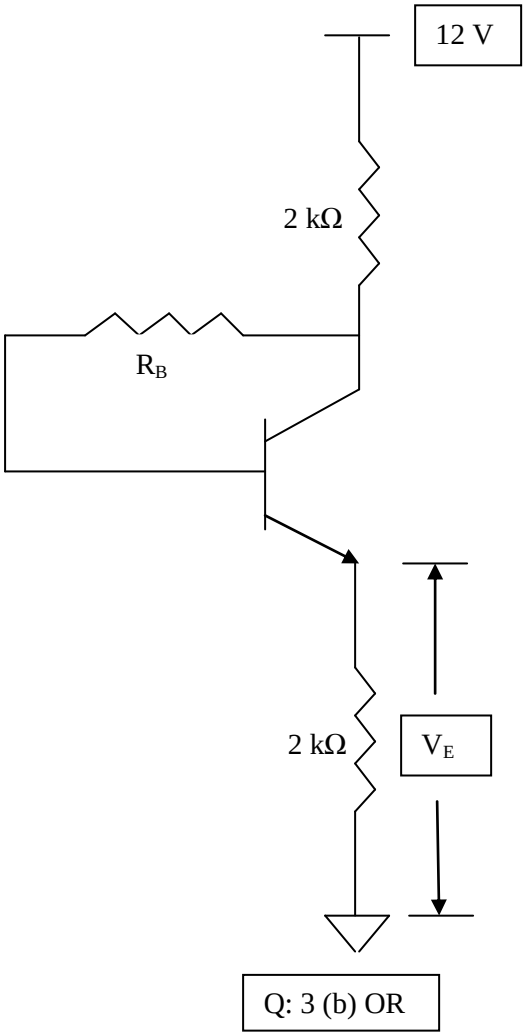
i_R



Q: 3 (a)



Q: 3 (a) OR



Q: 3 (b) OR