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06ES32

**Third Semester B.E. Degree Examination, December 2010**  
**Analog Electronic Circuits**

Time: 3 hrs.

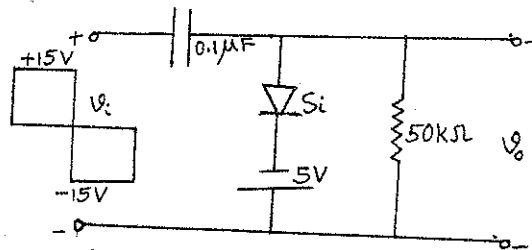
Max. Marks:100

**Note: Answer any FIVE full questions, selecting atleast TWO Questions from each of Part - A and Part - B.**

**PART - A**

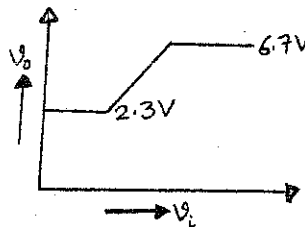
- 1 a. What is an equivalent circuit of a device? Explain the different equivalent circuits for semiconductor diode. (07 Marks)
- b. Analyse the circuit shown below, Fig. Q1(b), and draw the output waveform. Assume  $V_f = 0.7V$ . (08 Marks)

Fig. Q1(b)



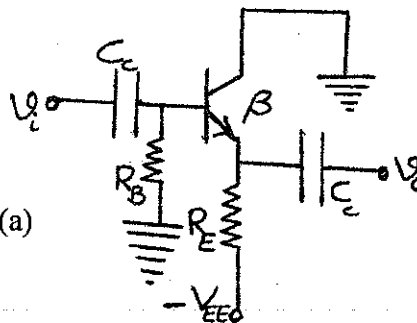
- c. Write a suitable circuit to get the following transfer characteristics fig. Q1(c), and explain its working. (05 Marks)

Fig. Q1(c)



- 2 a. Find  $I_{CQ}$  and  $V_{CEQ}$  for the circuit shown, Fig. Q2(a). (05 Marks)

Fig. Q2(a)



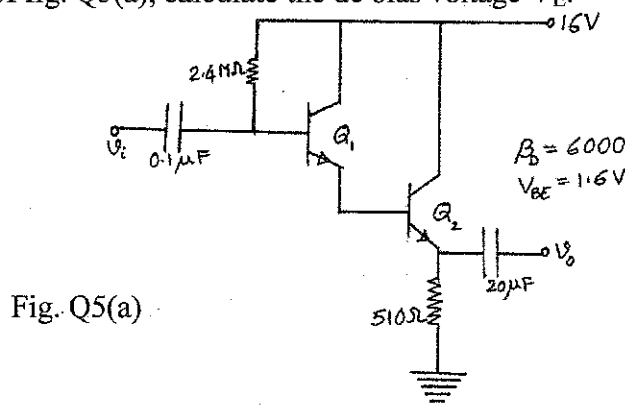
- b. Find the coordinates of the Q point and locate it on the dc load line for the voltage divider configuration. Given  $V_{CC} = 16V$ ,  $R_1$  (upper resistor) =  $62 k\Omega$ ,  $R_2 = 9.1 k\Omega$ ,  $R_C = 3.9k\Omega$ ,  $R_E = 0.68k\Omega$  and  $\beta = 80$ . The coupling capacitors are  $10\mu F$  each. Also find  $V_C$ ,  $V_E$  and  $V_B$ . (08 Marks)
- c. Define turn ON time and turn OFF time of a transistor. Design a transistor inverter if  $V_{CC} = 10V$ ,  $I_{C_{sat}} = 10mA$  and  $\beta = 250$ . Assume input to be a pulse of amplitude  $10V$ . (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 3 a. What is bias stabilization? Explain. Derive an expression for  $S(I_{CO})$  and  $S(V_{BE})$  for fixed bias configuration. (08 Marks)
- b. For an emitter bias circuit (capacitor is bypassed), determine  $r_e$ ,  $Z_i$ ,  $Z_o$  and  $A_v$ . Given  $R_B = 470 \text{ k}\Omega$ ,  $R_C = 2.2 \text{ k}\Omega$ ,  $V_{CC} = 20 \text{ V}$ ,  $R_E = 0.56 \text{ k}\Omega$ ,  $C_E = 10 \mu\text{F}$ ,  $\beta = 120$ ,  $r_o = 40 \text{ k}\Omega$ ,  $C_C = 10 \mu\text{F}$ . (08 Marks)
- c. Determine i) the common logarithm of the number  $2.2 \times 10^3$ . ii) the power gain in decibels for  $P_o = 100 \text{ m watts}$ ,  $P_i = 5 \text{ m watts}$ . (04 Marks)
- 4 a. The transistor is connected as a CE amplifier. Determine  $Z_o$ ,  $Z_i$  and  $A_v$  using complete hybrid model. (10 Marks)
- b. Discuss the low frequency and high frequency response of a RC coupled amplifier. (10 Marks)

**PART - B**

- 5 a. For the circuit of fig. Q5(a), calculate the dc bias voltage  $V_E$ . (05 Marks)



- b. With a block diagram, explain the difference between voltage series and voltage shunt feedback. (05 Marks)
- c. Using the block diagram approach, derive an expression for  $A_f$  and  $Z_{of}$  for current series feedback amplifier. (10 Marks)
- 6 a. With a neat circuit diagram, explain the operation of a transformer coupled class A power amplifier. (10 Marks)
- b. For a class B amplifier with  $V_{CC} = 25 \text{ V}$  driving an  $8 \Omega$  load, determine i) maximum I/P power ii) maximum O/P power iii) maximum circuit efficiency. (06 Marks)
- c. Calculate the second harmonic distortion for an O/P waveform having measured values of  $V_{CE_{min}} = 2.4 \text{ V}$ ,  $V_{CE_Q} = 10 \text{ V}$  and  $V_{CE_{max}} = 20 \text{ V}$ . (04 Marks)
- 7 a. With a neat circuit diagram, explain the working principle of RC phase shift oscillator, with relevant equations. (10 Marks)
- b. What are the tuned oscillators? Explain any one type of tuned oscillator. (10 Marks)
- 8 a. Define  $g_m$  and  $r_d$  of field effect transistor. Explain the procedure to determine the above values graphically. (06 Marks)
- b. Write the ac equivalent circuit for voltage divider JFET configuration and determine  $Z_i$ ,  $Z_o$  and  $A_v$ . (10 Marks)
- c. Differentiate between enhancement and depletion MOSFET. (04 Marks)

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