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**Third Semester B.E. Degree Examination, Dec.2013/Jan.2014**  
**Analog Electronic Circuits**

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.**  
**2. Missing data, if any, may be assumed suitably.**

**PART - A**

- 1 a. Explain the working of full wave rectifier circuit with relevant waveforms. Assume the diodes of silicon. Also find the PIV rating of each diode. (08 Marks)
- b. Determine  $I_D$ ,  $V_{D2}$  and  $V_O$  for the network shown in Fig. Q1(b). (06 Marks)

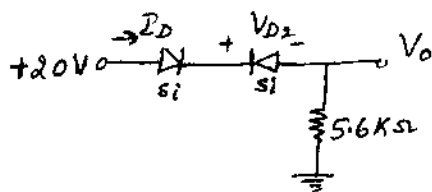


Fig. Q1(b)

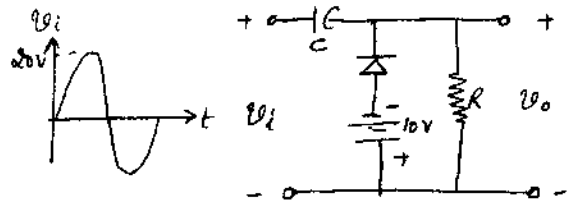


Fig. Q1(c)

- c. Obtain the output waveform for the circuit shown in Fig. Q1(c) (06 Marks)
- 2 a. Derive expressions for  $I_B$ ,  $I_C$ ,  $I_E$ ,  $V_B$ ,  $V_C$ ,  $V_E$ ,  $V_{CE}$  and  $I_{csat}$  in a BJT voltage divider bias circuit. Use exact analysis. (08 Marks)
- b. For the bias configuration as shown in Fig. Q2(b), determine  $R_C$ ,  $R_E$  and  $R_B$ , if  $I_{CQ} = \frac{1}{2} I_{csat}$ ,  $I_{csat} = 8 \text{ mA}$  and  $V_C = 18 \text{ V}$ ,  $\beta = 110$ . (06 Marks)

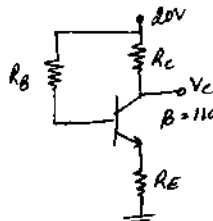


Fig. Q2(b)

- c. Calculate stability factor and change in collector current from  $25^\circ\text{C}$  to  $100^\circ\text{C}$  for the transistor having the following parameters with emitter bias: (06 Marks)
- $\frac{R_B}{R_E} = 10, \beta_{25^\circ\text{C}} = 50, \beta_{100^\circ\text{C}} = 80, I_{CQ_{25^\circ\text{C}}} = 0.1 \text{ nA}, I_{CQ_{100^\circ\text{C}}} = 20 \text{ nA}$
- 3 a. Derive the Hybrid equivalent circuit of a BJT. (06 Marks)
  - b. For the network shown in Fig. Q3(b), determine  $Z_o$ ,  $Z_i$  and  $A_v$  if  $r_o = 50 \text{ k}\Omega$ . (06 Marks)

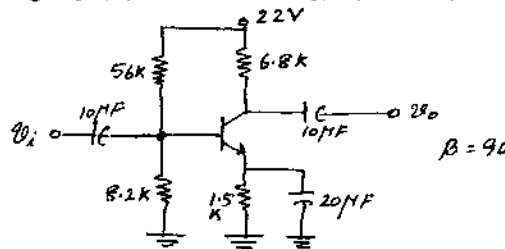


Fig. Q3(b)

- c. Derive an expression for the voltage gain of a CE BJT amplifier considering the effect of source and load resistances. (08 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.

- 4 a. Explain the general frequency response of an amplifier. (06 Marks)  
 b. Determine the lower cut off frequency and midband gain for the RC coupled amplifier shown in Fig. Q4(b). (06 Marks)

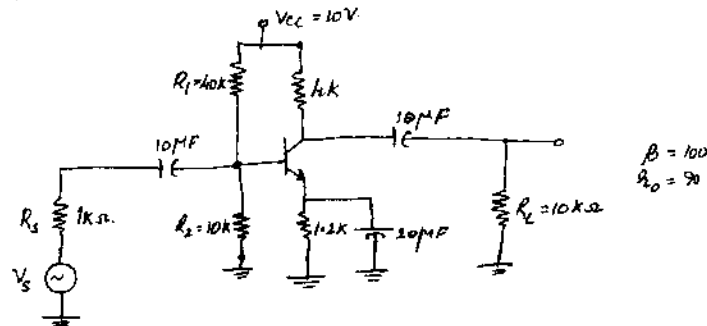


Fig. Q4(b)

- c. Derive expressions for Miller effect input and output capacitances. (08 Marks)

**PART – B**

- 5 a. Derive expressions for DC bias currents and voltages in a Darlington connection of BJTs. (06 Marks)  
 b. Explain the types of feedback amplifiers. Also derive expression for input and output impedances of any one type. (08 Marks)  
 c. For the network shown in Fig. Q5(c), determine  $Z_o$ ,  $Z_i$  and  $A_v$ . (06 Marks)

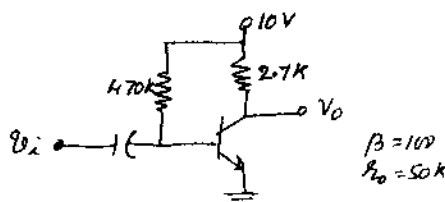


Fig. Q5(c)

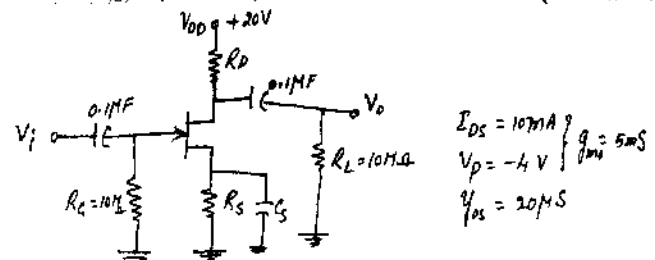


Fig. Q8(b)

- 6 a. Explain the transformer coupled class-A amplifier. (04 Marks)  
 b. Explain the role of heat sink in power transistor. (04 Marks)  
 c. For a class B amplifier proving 20 V peak signal to a 16 Ω speaker and a power supply of  $V_{CC} = 30V$ , determine the input power, output power and efficiency. Also find their maximum values. (12 Marks)
- 7 a. Explain the Barkhausen criterion for oscillations. (04 Marks)  
 b. What are tuned oscillators? Explain any one type of tuned oscillator. (06 Marks)  
 c. Explain the working of series resonant crystal oscillator. (06 Marks)  
 d. Determine the frequency of a BJT phase shift oscillator, if  $R = 3 k\Omega$ ,  $C = 1500 pF$  and  $R_c = 12 k\Omega$ . (04 Marks)
- 8 a. Derive expressions for,  $Z_i$ ,  $Z_o$  and  $A_v$  of a common drain configuration of JFET source follower. (08 Marks)  
 b. Determine  $R_D$  and  $R_S$  for the network shown in Fig. Q8(b) to establish a gain of 8 if the bypass capacitor  $C_S$  is removed. (06 Marks)  
 c. Explain the small signal models of D-MOSFET and E-MOSFET. (06 Marks)