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10ES32

Third Semester B.E. Degree Examination, Dec.2015/Jan.2016
Analog Electronic Circuit

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, selecting
atleast TWO questions from each part.**

PART – A

- 1 a. With necessary equivalent circuit, explain the various diode equivalent circuits. (06 Marks)
 b. What do you understand by reverse recovery time? Explain its importance in selection of a diode for an application. (06 Marks)
 c. For the diode circuit shown in Fig. Q1(c) draw the transfer characteristics. The input is $40 \sin \omega t$. Show clearly the steps of analysis. All diodes are ideal. (08 Marks)

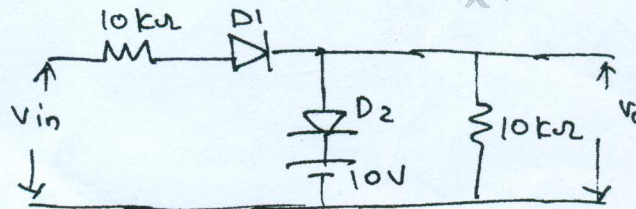


Fig.Q1(c)

- 2 a. Discuss the effect of varying I_B and V_{CC} on the Q – point. Explain your answer with relevant diagram. (06 Marks)
 b. An emitter bias circuit has $R_C = 2 \text{ k}\Omega$, $R_E = 680 \Omega$, $V_E = 2.1 \text{ V}$, $V_{CE} = 7.3 \text{ V}$, $I_B = 20 \mu\text{A}$. Find V_{CC} , R_B and β . (06 Marks)
 c. A voltage divider biased circuit has $R_1 = 39 \text{ k}\Omega$, $R_2 = 8.2 \text{ k}\Omega$, $R_C = 3.3 \text{ k}\Omega$, $R_E = 1 \text{ k}\Omega$, $V_{CC} = 18 \text{ V}$. The silicon transistor used has $\beta = 120$. Find Q – point and stability factor. (08 Marks)
- 3 a. Derive an expression for voltage gain, input impedance and output impedance of an emitter follower amplifier using re-model. (06 Marks)
 b. A voltage divider biased amplifier has $R_1 = 82 \text{ k}\Omega$, $R_2 = 22 \text{ k}\Omega$, $R_E = 1 \text{ k}\Omega$, $R_C = 2.2 \text{ k}\Omega$, $V_{CC} = 18 \text{ V}$. The silicon transistor has $\beta = 100$. Take $R_S = 1 \text{ k}\Omega$, $R_L = 5.6 \text{ k}\Omega$. Find voltage gain, input impedance, output impedance. (06 Marks)
 c. A transistor in CE mode has $h_{ie} = 1100 \Omega$, $h_{fe} = 100$, $h_{re} = 2.5 \times 10^{-4}$, $h_{oe} = 25 \mu\text{S}$. Find voltage gain, input impedance and output impedance. Take $R_S = 1 \text{ k}\Omega$, $R_L = 1 \text{ k}\Omega$. Also find current gain. (08 Marks)
- 4 a. Discuss with relevant equivalent circuit the method of determination of lower cutoff frequency for a voltage divider biased CE amplifier. (10 Marks)
 b. A voltage divider biased CE amplifier has $R_S = 1 \text{ k}\Omega$, $R_1 = 40 \text{ k}\Omega$, $R_2 = 10 \text{ k}\Omega$, $R_E = 2 \text{ k}\Omega$, $R_C = 2.2 \text{ k}\Omega$, $C_S = 10 \mu\text{F}$, $C_C = 1 \mu\text{F}$, $C_E = 20 \mu\text{F}$, $\beta = 100$, $V_{CC} = 20$. The parasitic capacitance are $C_{\pi}(C_{be}) = 36 \text{ pF}$, $C_{\mu}(C_{bc}) = 4 \text{ pF}$, $C_{ce} = 1 \text{ pF}$, $C_{wi} = 6 \text{ pF}$, $C_{wo} = 8 \text{ pF}$. Determine higher cutoff frequency. (10 Marks)

Important Note : 1. On completing your answers, carefully 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.



PART – B

- 5 a. Obtain expression for voltage gain, input impedance and output impedance of a Darlington emitter follower. Draw necessary equivalent circuit. (08 Marks)
- b. Mention the different configuration of feedback amplifiers and obtain expression for voltage gain with feedback for any one configuration. (06 Marks)
- c. What are the advantages of cascading amplifiers? Obtain expression for overall voltage gain for an n – stage cascaded amplifier. (06 Marks)

- 6 a. Prove that the maximum conversion efficiency of class A transformer coupled amplifier is 50%. (08 Marks)
- b. With neat diagram, explain the methods of obtaining phase shift of input signal for class B operation. (06 Marks)
- c. The harmonic distortion component in an power amplifier is $D_2 = 0.1$, $D_3 = 0.02$, $D_4 = 0.03$. The fundamental current amplitude is 4 A and it supplies a load of 8Ω . Find total harmonic distortion, fundamental power and total power. (06 Marks)

- 7 a. What is Barkhausen criteria for sustained oscillation? Explain basic principle of operation of oscillators. (08 Marks)
- b. With a neat circuit diagram, explain the working of Hartley oscillator. Write the equation for frequency of oscillations. (08 Marks)
- c. A crystal has mounting capacitance of 10 pF. The inductance equivalent of mass is 1 mH, the frictional resistance = 1 k Ω and compliance = 1 pF. Find series and parallel resonant frequency. (04 Marks)

- 8 a. Obtain the expression for voltage gain, input impedance output impedance for a JFET common source amplifier with self – bias configuration. (08 Marks)
- b. For the FET amplifier in Fig. Q8(b), find voltage gain, input impedance and output impedance. The FET has $I_{DSS} = 15 \text{ mA}$, $V_p = -6\text{V}$, $Y_{OS} = 25 \mu\text{s}$. (08 Marks)

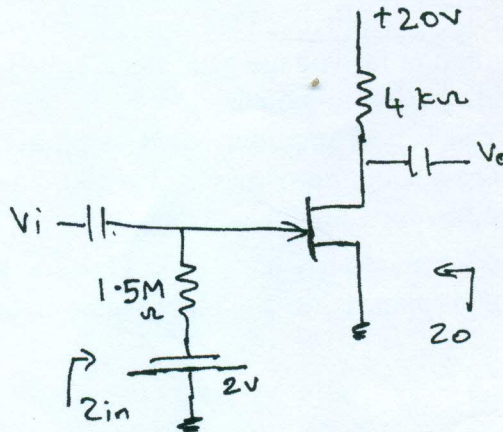


Fig.Q8(b)

- c. Mention the difference between BJT and FET. (04 Marks)
