USN 4AD14EC028

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 ωt. Show clearly the steps of analysis. All diodes are ideal. **(08 Marks)**

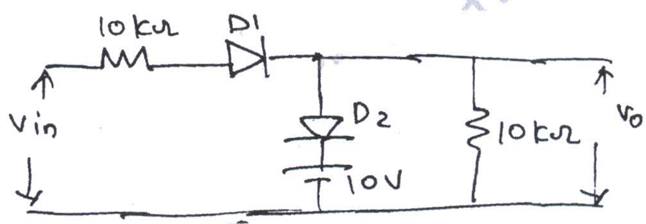

Fig.Q1(c)

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 kΩ, R_E = 680 Ω, V_E = 2.1V, V_{CE} = 7.3V, I_B = 20 μA. Find V_{CC}, R_B and β. **(06 Marks)**

c. A voltage divider biased circuit has R_1 = 39 kΩ, R_2 = 8.2 kΩ, R_C = 3.3 kΩ, R_E = 1 kΩ, V_{CC} = 18V. The silicon transistor used has β = 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 kΩ, R_2 = 22 kΩ, R_E = 1 kΩ, R_C = 2.2 kΩ, V_{CC} = 18 V. The silicon transistor has β = 100. Take R_S = 1 kΩ, R_L = 5.6 kΩ. Find voltage gain, input impedance, output impedance. **(06 Marks)**

c. A transistor in CE mode has h_{ie} = 1100 Ω, h_{fe} = 100, $h_{re} = 2.5 \times 10^{-4}$, h_{oe} = 25 μ℧. Find voltage gain, input impedance and output impedance. Take R_S = 1 kΩ, R_L = 1 kΩ. 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 k Ω, R_1 = 40 kΩ, R_2 = 10 kΩ, R_E = 2 kΩ, R_C = 2.2 kΩ, C_S = 10 μF, C_C = 1 μF, C_E = 20 μF, β = 100, V_{CC} = 20. The parasitic capacitance are $C_\pi(C_{be})$ = 36 pF, $C\mu(C_{bc})$ = 4 pF, C_{ce} = 1 pF, C_{wi} = 6 pF, C_{wo} = 8 pF. Determine higher cutoff frequency. **(10 Marks)**

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 8 Ω. Find total harmonic distortion, fundamental power and total power. **(06 Marks)**

7 a. What is Barkhansen 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 kΩ 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 mA, V_p = –6V, Y_{OS} = 25 μs. **(08 Marks)**

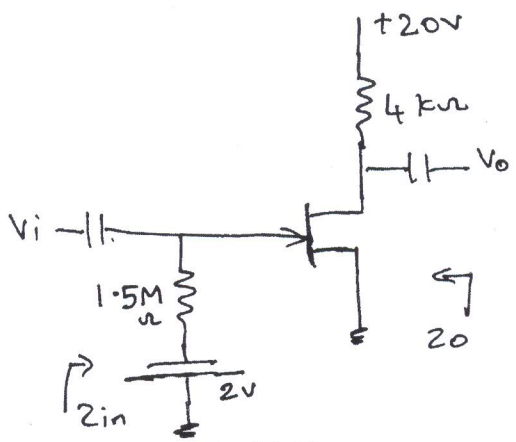

Fig.Q8(b)

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

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