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10ES32

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Analog Electronic Circuit

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the different diode equivalent circuits with necessary approximations if any. **(06 Marks)**

b. For the circuit shown in Fig.Q1(b) write transfer characteristic equations and draw the transfer characteristic. The input $V_{in} = 40\sin\omega t$. Assume ideal diodes.

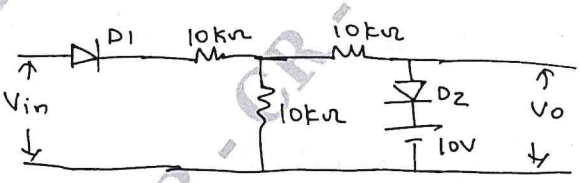

Fig.Q1(b) **(08 Marks)**

c. With a neat circuit explain the working of a biased positive peak clamper. **(06 Marks)**

2 a. Discuss the causes of bias instability in a transistor. **(06 Marks)**

b. With a neat diagram, explain the various time components of practical transistor switching. **(06 Marks)**

c. A voltage divider biased circuit has $R_1 = 33k\Omega$, $R_2 = 8.2k\Omega$, $R_C = 3.9k\Omega$, $R_E = 1k\Omega$, $V_{CC} = 20V$. The silicon transistor used has β of 100. Find Q – point and stability factor S_{ICO}. **(08 Marks)**

3 a. What is modelling of transistor? Draw the different transistor models used with neat labeling of parameters. **(06 Marks)**

b. Derive expression for A_V, Z_0, Z_{in} for a voltage divider biased amplifier using re-model. **(06 Marks)**

c. A transistor in CE-mode has $h_{ie} = 1100\Omega$, $h_{re} = 2 * 10^{-4}$, $h_{fe} = 100$, $h_{oe} = 25\mu\mho$. Find A_V, Z_0, Z_{in}, A_I. Take $R_L = 1.0k\Omega$ and $R_S = 500\Omega$. Also find overall voltage and current gain. **(08 Marks)**

4 a. Draw the high frequency ac equivalent circuit of a voltage divider biased amplifier. Explain with relevant expression the effect of parasitic and wiring capacitance on the high frequency response of amplifier. **(10 Marks)**

b. Derive an expression for miller input and output capacitance. **(10 Marks)**

PART – B

5 a. With neat diagram explain the advantage of using :
i) Cascade connection ii) Darlington pair. **(06 Marks)**

b. What are the different types of feedback connections? Derive the expression for gain, input impedance and output impedance for a voltage–series feedback circuit. **(10 Marks)**

c. List the advantages of negative feedback circuit. **(04 Marks)**

6 a. What are the classification of power amplifiers based on location of operating point. Also mention the operating cycle in each case. **(06 Marks)**

b. Explain the working of a class-A transformer coupled power amplifier and devise expression for maximum efficiency. **(08 Marks)**

c. Define harmonic distortion. A power amplifier has harmonic distortions $D_2 = 0.1$, $D_3 = 0.02$, $D_4 = 0.01$, The fundamental current $I_1 = 5A$ and $R_L = 10\Omega$. Calculate total harmonic distortion, fundamental power and total power. **(06 Marks)**

7 a. Draw the equivalent circuit of a crystal with a neat diagram, explain working of series-resonant crystal oscillator circuit. **(08 Marks)**

b. With a circuit diagram, explain working of Hartley oscillator. Give expression for frequency generator. **(06 Marks)**

c. Calculate the frequency generated by a BJT RC-phase shift oscillator given $R = 10k\Omega$, $C = 1200pt$, $R_C = 20k\Omega$. Determine minimum current gain of the transistor required for sustained oscillations. **(06 Marks)**

8 a. List the differences between BJT and FET. **(06 Marks)**

b. With necessary equivalent circuit obtain the expression for A_V, Z_{in}, Z_0 of a fixed biased common source JFET amplifier. **(10 Marks)**

c. A JFET has $9_m = 6m\mho$ at $V_{as} = -1V$. Find I_{DSS} if pintch off voltage $V_p = -2.5V$. **(04 Marks)**

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