CBCS SCHEME

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18EE34

Third Semester B.E. Degree Examination, July/August 2021
Analog Electronic Circuits

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Analyse the given clipper circuit and sketch the nature of its output voltage. Given input voltage $V_i = 25 \sin \omega t$ and assume diode is silicon diode.

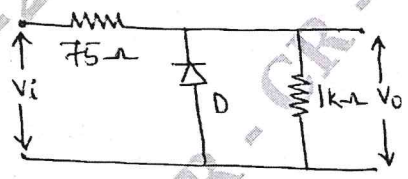

Fig.Q1(a) **(06 Marks)**

b. What is operating point of a transistor? Explain the significance of operating point. **(06 Marks)**

c. For the emitter bias network shown in Fig.Q1(c), determine I_B, I_C, V_{CE} and saturation current for the network. Given $\beta = 50$ and $V_{BE} = 0.7V$.

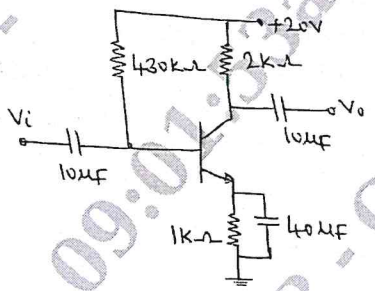

Fig.Q1(c) **(08 Marks)**

2 a. Design suitable circuit represented by the box shown Fig.Q2(a) which has input and output waveforms as indicated.

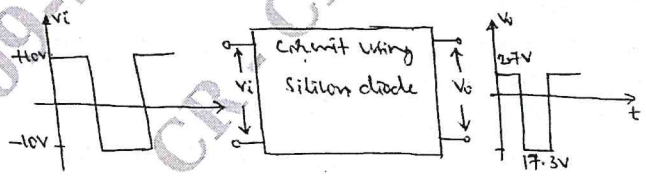

Fig.Q2(a) **(06 Marks)**

b. Derive an expression for V_{th}, I_B and V_{CE} for voltage divider bias circuit using exact analysis. **(08 Marks)**

c. Define the following stability factors : i) S ii) S_V iii) S_β. **(06 Marks)**

3 a. Define h-parameters. Draw the h-parameter model of a transistor. **(04 Marks)**

b. A CE transistor amplifier has $R_S = 1k\Omega$ and $R_L = 2k\Omega$. The h-parameters are $h_{ie} = 1250\Omega$, $h_{re} = 2.5 \times 10^{-4}$, $h_{fe} = 70$ and $h_{oe} = 25\mu A/V$. Find A_I, A_V, R_i and R_0. **(08 Marks)**

c. For the emitter follower circuit, derive expressions for input impedance and output impedance. Use h–parameter model. **(08 Marks)**

4 a. Obtain the expressions for input impedance, output impedance, voltage gain and current gain of common–base configuration using AC equivalent circuit with h–parameter model. **(10 Marks)**

b. For the circuit shown in Fig.Q4(b). Use Miller's theorem calculate Z_i, Z_i^1, A_V and A_I. Given $h_{ie} = 1100\Omega$, $h_{fe} = 50$, $h_{oe} = \frac{1}{40K}$ and $h_{re} = 2.5 \times 10^{-4}$.

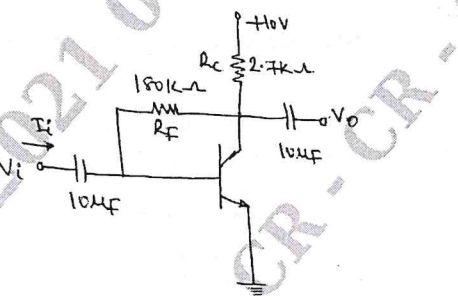

Fig.Q4(b) **(10 Marks)**

5 a. Draw the cascade configuration and list the advantages of this circuit. **(05 Marks)**

b. Derive expression for Z_i, A_I and A_V for a Darlington emitter follower circuit. **(10 Marks)**

c. With the help of block diagram explain the concept of feedback amplifier. **(05 Marks)**

6 a. Explain with the help of circuit what is cascade connection. Mention its advantages. **(07 Marks)**

b. Prove that how band width of an amplifier increases with negative feedback. **(06 Marks)**

c. Derive an expression for input resistance for voltage series feedback amplifier. **(07 Marks)**

7 a. Discuss the different types of power amplifiers. **(04 Marks)**

b. Draw the circuit diagram of a class-B push pull amplifier and explain the operation with relevant waveforms. **(08 Marks)**

c. With basic circuit, derive the expression for the frequency of oscillations of a Wien bridge oscillator. **(08 Marks)**

8 a. With circuit diagram explain the operation of transistor Hartley oscillator. Write the expression for the frequency of oscillation. **(08 Marks)**

b. In a Colpitt's oscillator $C_1 = C_2 = C$ and $L = 100\mu H$. The frequency of oscillations is 500KHz. Determine the value of C. **(06 Marks)**

c. Calculate the power dissipated in the individual transmitter of a class B push-pull power amplifier if $V_{CC} = 20V$ and $R_L = 4\Omega$. **(06 Marks)**

9 a. With sketches, describe the constructional details of JFET. **(08 Marks)**

b. Explain drain and transfer characteristics of a n-channel JFET. **(08 Marks)**

c. A JFET has $g_m = 5mV$ at $V_{GS} = -1V$. Find I_{DSS} if pinch–off voltage $V_P = -2.0V$. **(04 Marks)**

10 a. Explain the basic operation and characteristics of n-channel depletion type MOSFET. **(08 Marks)**

b. Derive the expression for Z_i, Z_0 and A_V for common source JFET amplifier with fixed bias. **(08 Marks)**

c. Give the difference between JFET and MOSFET. **(04 Marks)**

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