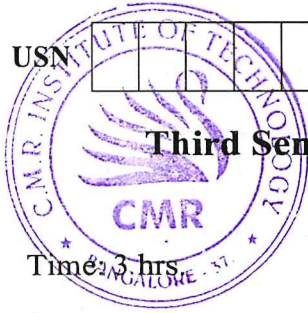


CBCS SCHEME

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15EE34



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

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions.

- 1 a. What is transistor biasing? With neat circuit diagram, explain emitter stabilized bias, write the necessary equations. (06 Marks)
- b. Explain the operation of positive clamper circuit. (05 Marks)
- c. Analyze the circuit shown in Fig Q1(c), and draw the output waveforms. Assume $V_k = 0.7V$.

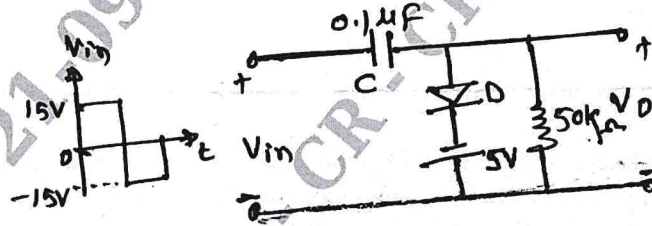


Fig Q1(c)

(05 Marks)

- 2 a. Explain the operation of two way parallel symmetrical clipper circuit, draw its transfer characteristics, input and output waveforms. (06 Marks)
- b. Explain the transistor switching circuit being used as an inverter. (05 Marks)
- c. Explain the transistor inverter shown in below Fig Q2(c), determine the values of R_B and R_C . Take $I_c(\text{sat}) = 12\text{mA}$, $\beta_{dc} = h_{FE} = 200$.

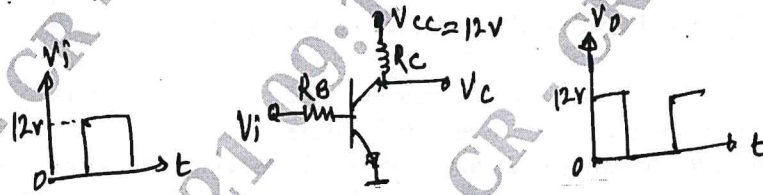


Fig Q2(c)

(05 Marks)

- 3 a. Define h- parameter. Draw the h-parameter models of CE, CB and CC transistor configurations. (06 Marks)
- b. For the emitter follower circuit shown in Fig Q3(b), calculate Z_i , Z_o , A_v and A_i .

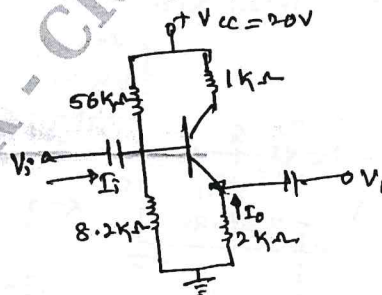


Fig Q3(b)

Take $\beta = 200$, $h_{ie} = 1.1K$, $h_{re} = 2.5 \times 10^{-4}$, $h_{fe} = 50$, $h_{oc} = 24 \mu A/V$.

(10 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. Describe Miller effect and derive an equation for miller input and output capacitances. (10 Marks)
 b. An amplifier consists of 3 identical stages in cascade the bandwidth of overall amplifier extends from 20Hz to 20KHz. Calculate the bandwidth of individual stage. (06 Marks)
- 5 a. What are the advantages and cascading amplifiers? Obtain the expression of overall voltage gain for 3-stages cascaded amplifier. (06 Marks)
 b. With block diagram, explain the concept of feedback amplifier. (06 Marks)
 c. Write the advantages of negative feedback in amplifier. (04 Marks)
- 6 a. With necessary equivalent circuit, derive an expression for Z_i , A_v and A_i for Darlington emitter follower circuit. (10 Marks)
 b. Mention the types of feedback connections. Draw their block diagram indicating input and output signals. (06 Marks)
- 7 a. Explain the operation of the transformer coupled class A power amplifier, derive its maximum efficiency. (08 Marks)
 b. What is Brakhansen criterion? Explain how oscillations start in an oscillator. (04 Marks)
 c. A power amplifier has harmonics distortions $D_2 = 0.1$, $D_3 = 0.02$, $D_4 = 0.01$, the fundamental current $I = 4A$ and $R_L = 8\Omega$. Calculate the i) Total harmonic distortion ii) fundamental power iii) Total power. (04 Marks)
- 8 a. Draw the circuit diagram and explain the operation of a class B push pull amplifier with relevant waveforms, derive its maximum conversion efficiency is 78.5%. (07 Marks)
 b. With the help of neat circuit diagram, explain the operation of transistor colpitts oscillator. Write the expression for the frequency of oscillation. (05 Marks)
 c. A quartz crystal has the following constants $L = 50mH$, $C_1 = 0.02pF$, $R = 500\Omega$ and $C_2 = 12pF$, find series and parallel resonant frequency. (04 Marks)
- 9 a. With relevant diagram and V-I characteristics, explain the operation of JFET. (07 Marks)
 b. Discuss the differences between FET and BJT. (05 Marks)
 c. Calculate the trans-conductance g_m of a JFET having values of $I_{DSS} = 12mA$ and $V_P = -4V$ at bias points i) $V_{GS} = 0V$ ii) $V_{GS} = -1.5V$. (04 Marks)
- 10 a. Explain the operation of common source JFET amplifier using fixed bias configuration. Write the equation of Z_i , Z_o and A_v . (06 Marks)
 b. Give the comparison between JFET and MOSFET. (05 Marks)
 c. For the JFET amplifier shown in below Fig Q10(c). Calculate:
 i) g_m ii) r_d iii) Z_i iv) Z_o v) A_v .

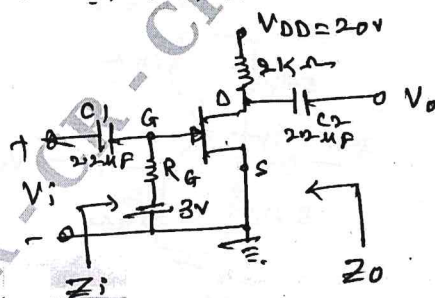


Fig Q10(c)

$$\begin{aligned}
 I_{DSS} &= 5mA \\
 V_P &= -6V \\
 Y_{DS} &= 40\mu s \\
 V_{GSQ} &= -3V \\
 R_G &= 2m\Omega
 \end{aligned}$$

(05 Marks)