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 $V_k = 0.7V$.

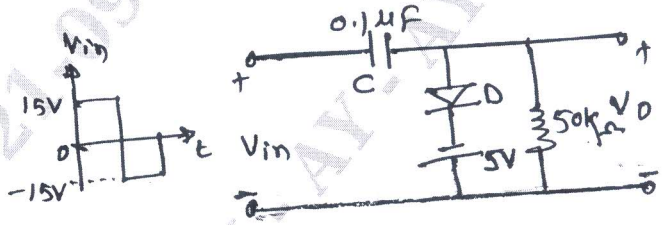


Fig Q1(c) **(05 Marks)**

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 $I_c(sat) = 12mA$, $\beta_{dc} = h_{FE} = 200$.

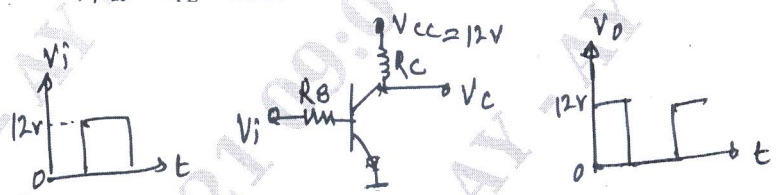


Fig Q2(c) **(05 Marks)**

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_0, A_V and A_I.

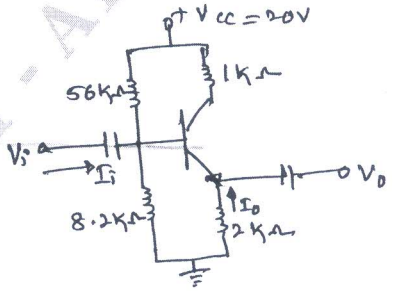


Fig Q3(b)

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

4 a. Describe Miller effect and derive an equation for miller input and output capacitances. **(10 Marks)**

b. An amplifier consists of 3identical 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 on 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 criterian? 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 = 500Ω 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)**

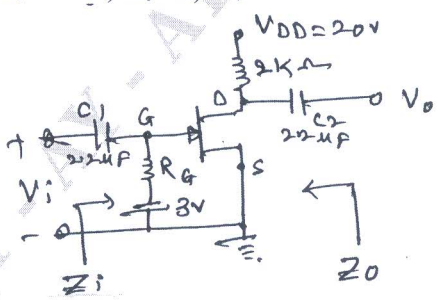
b. Discuss the differences between FET and BJT. **(05 Marks)**

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_0 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_0 v) A_v.



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

Fig Q10(c)

(05 Marks)