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10ES32

Third Semester B.E. Degree Examination, June/July 2016

Analog Electronic Circuits

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. Explain Reverse recovery time of a semiconductor diode. (06 Marks)
- b. The Fig. Q1 (b) shows two way clipper. Determine its output wave form. Assume diode drop of 0.7V. (07 Marks)

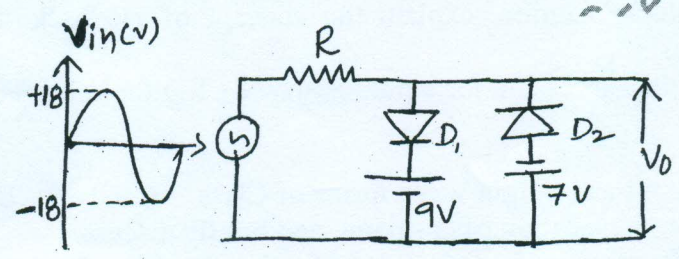


Fig. Q1(b)

- c. What is clamper circuit? Explain the operation of Positive and Negative clamper circuits and draw the wave form. [Assume Ideal Diode]. (07 Marks)
- 2 a. What is transistor biasing? Discuss the causes of bias instability in a transistor. (06 Marks)
- b. Derive the expression for I_B , V_{CE} and $S(I_{CO})$ for voltage divider bias using exact analysis. (07 Marks)
- c. For the circuit shown in Fig. Q2(c). Find I_B , I_C , V_{CE} , V_C and V_E . Assume $\beta = 100$, $V_{BE} = 0.7$. (07 Marks)

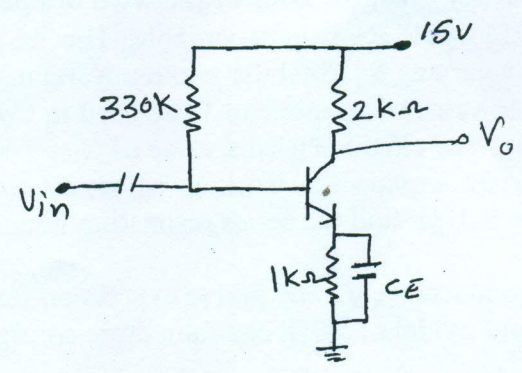


Fig. Q2(c)

- 3 a. For common base configuration shown in Fig Q3(a). Find r_e , Z_i , Z_o and A_v . (06 Marks)

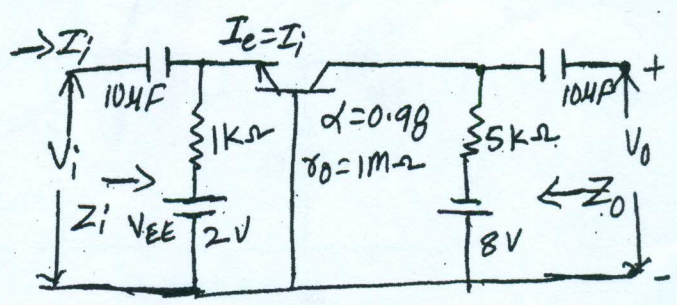


Fig. Q3(a)

Important Note : 1. On completing your answers, temporarily draw diagonal cross lines on the remaining blank spaces. 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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- b. Derive an expression for z_i , z_o , A_v and A_i of a CE fixed bias configuration using r_e model. (07 Marks)
 - c. Using h-parameter model for a transistor in C.E configuration. Derive expressions for A_i , z_i and A_v . (07 Marks)
- 4
- a. An amplifier consists of 3 identical stages in cascade; the bandwidth of overall amplifier extends from 20Hz to 20KHz. Calculate the band width of Individual stage. (06 Marks)
 - b. Describe miller effect and derive an equation for miller input and output capacitance. (07 Marks)
 - c. Draw and explain frequency response of an amplifier and briefly discuss the effect of various capacitors on frequency response. (07 Marks)

PART - B

- 5
 - a. Explain the need of cascade amplifier and list the advantage of this circuit. (06 Marks)
 - b. With block diagram, explain the concept of feedback. List the advantages of negative feedback. (07 Marks)
 - c. Derive the expression for input resistance (R_{if}) for voltage series feedback amplifier. (07 Marks)

- 6
 - a. Draw input and output wave forms of Class - A, Class - B and Class - C power amplifiers based on the location of Q - point, and briefly discuss. (06 Marks)
 - b. Draw the circuit diagram of series fed directly coupled Class - A amplifier. Give the expression for dc power input and a.c power output and show that efficiency is 25%. (07 Marks)
 - c. What is Harmonic distortion? Calculate the harmonic distortion components for an output signal having fundamental amplitude of 2.5V second harmonic amplitude of 0.25V, third harmonic amplitude of 0.1 V and fourth harmonic amplitude of 0.05V. Also calculate the total harmonic distortion. (07 Marks)

- 7
 - a. With neat circuit diagram explain the operation of BJT Hartley oscillator. (06 Marks)
 - b.
 - i) The frequency sensitive arms of the wien bridge oscillator uses $C_1 = C_2 = 0.001\mu F$ and $R_1 = 10k\Omega$ while R_2 is kept variable. The frequency is to be varied from 10KHz to 50KHz by varying R_2 . Find the minimum and maximum values of R_2 .
 - ii) Design the value of an inductor to be used in Colpitts oscillator to generate a frequency of 10MHz. The circuit is used a value of $C_1 = 100pF$ and $C_2 = 50pF$. (07 Marks)
 - c. With neat circuit explain the working of series resonant crystal oscillator. A crystal has $L = 0.1H$, $C = 0.01pF$ find the series resonating frequency. (07 Marks)

- 8
 - a. Define transconductance g_m and derive expression for g_m . (06 Marks)
 - b. With equivalent model of JFET common drain configuration. Obtain the expression for z_i , z_o and A_v . (07 Marks)
 - c. For common gate amplifier as shown in Fig Q8.(c), $g_m = 2.8ms$, $r_d = 50k\Omega$ Calculate z_i , z_o and A_v . (07 Marks)

Fig. Q8(c)

