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10ES32

Third Semester B.E. Degree Examination, June/July 2018
Analog Electronics Circuits

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Assuming an ideal diode, sketch v_i, v_d and i_d for half-wave rectifier of Fig.1(a). The input is a sinusoid with frequency 50 Hz. **(08 Marks)**

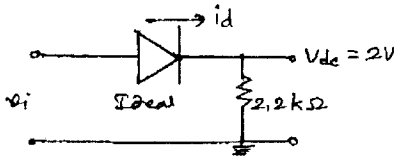

Fig.Q1(a)

b. Determine v_0 for the network shown in Fig.Q1(b). **(06 Marks)**

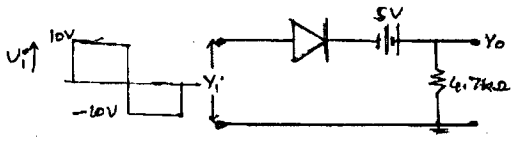

Fig.Q1(b)

c. Sketch v_0 for the network shown in Fig.Q1(c). **(06 Marks)**

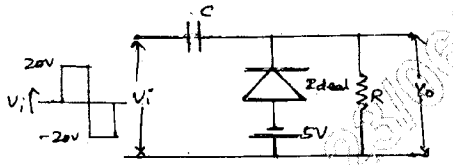

Fig.Q1(c)

2 a. Using exact analysis, obtain the Q-point values for the voltage-divider bias circuit. **(08 Marks)**

b. Obtain the expression for $S(I_{co})$ for an emitter-bias circuit and determine its value for the circuit with R_B = 470 kΩ, R_E = 2.2kΩ, R_C = 3.3kΩ, V_{CC} = 12V and β = 100. **(06 Marks)**

c. For the circuit shown in Fig.Q2(c), determine the values for R_1 and R_C. **(06 Marks)**

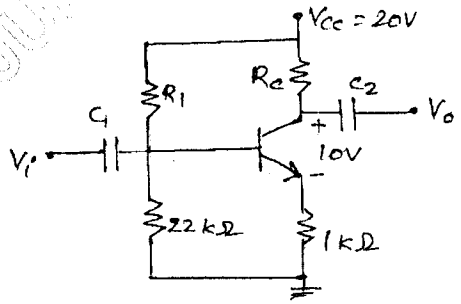

Fig.Q2(c)

3 a. Derive the equations for Z_i, Z_0 and A_V for fully by passed common emitter RC–couple amplifier. **(08 Marks)**

b. Compare Z_i, Z_0 and A_V of a RC coupled amplifier with emitter follower and explain wh emitter follower is called as impedance matching network. **(06 Marks)**

c. For the circuit shown in Fig.Q3(c), find Z_i, Z_0 and A_V. **(06 Marks)**

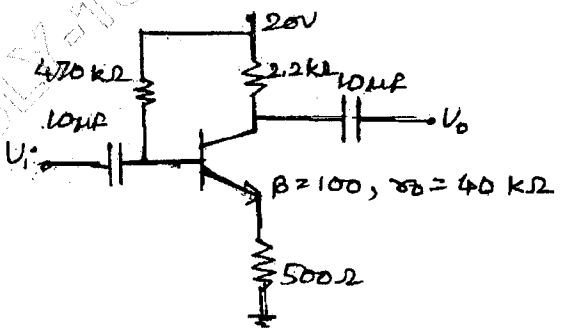

Fig.Q3(c)

4 a. Draw the frequency of RC coupled amplifier and explain high-pass action at low frequenci and low-pass action at high frequencies with relevant equations and Bode plots. **(08 Marks)**

b. Draw the high frequency equivalent circuit for RC coupled amplifier and obtain expressio for f_{Hi} and f_{H0}. **(06 Marks)**

c. Determine f_{C_S} and f_{C_C} for circuit with,

$C_S = 10\mu F$, $C_E = 20\ \mu F$, $C_C = 1\ \mu F$, $R_S = 1k\Omega$, $R_1 = 40k\Omega$, $R_2 = 10\ k\Omega$, $R_E = 2k\Omega$, $R_C = 4k\Omega$, $R_L = 2.2k\Omega$, $\beta = 100$, $r_0 = \infty$, $V_{CC} = 20V$. **(06 Marks)**

PART – B

5 a. Explain the advantages of employing negative feedback in an amplifier. **(06 Marks)**

b. Derive an equation for Z_i and A_V for a Darlington emitter follower. **(08 Marks)**

c. For cascaded stages shown in Fig.Q5(c), determine :

i) Loaded gain for each stage

ii) Total gain for the system A_V and A_{VS}. **(06 Marks)**

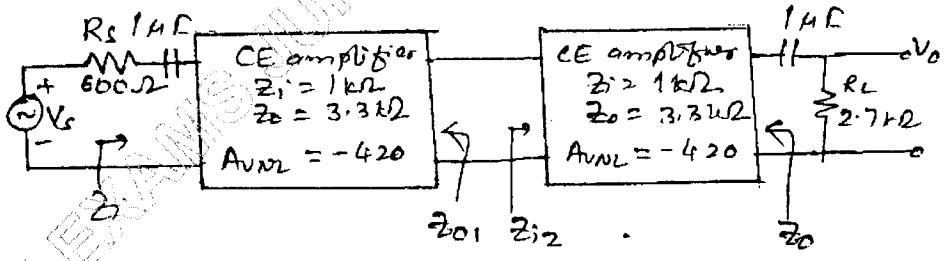

Fig.Q5(c)

6 a. Derive the expression for maximum percentage efficiency for a seriesfed class–A power amplifier. **(08 Marks)**

b. Calculate the second harmonic distortion for an output waveform with $V_{CE_Q} = 10V$, $V_{CE_{min}} = 1V$, $V_{CE_{max}} = 18V$. **(06 Marks)**

c. Draw the circuit of a class-B push-pull amplifier and explain the working. Explain why cross-over distortion occurs in class-B and how it is overcome. **(06 Marks)**

7 a. With a neat circuit diagram, explain the principle of operation of RC phase-shift oscillator with necessary equations. **(08 Marks)**

b. Explain the working of transistor crystal oscillator in series resonant mode. **(06 Marks)**

c. Design a Weinbridge oscillator for a frequency of 4KHz. **(06 Marks)**

8 a. Derive equations for Z_i, Z_0 and A_V for JFET fixed bias configuration, with source resistor bypassed. **(08 Marks)**

b. For JFET amplifier shown in Fig.Q8(b), find Z_i, Z_0 and A_V. **(08 Marks)**

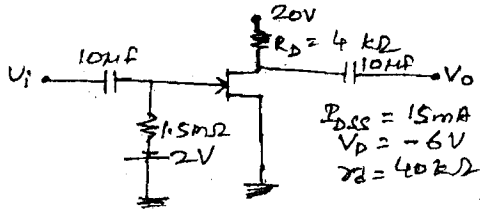

Fig.Q8(b)

c. Explain the graphical determination of g_m. **(04 Marks)**

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