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06CS32

Third Semester B.E. Degree Examination, December 2010
Electronic Circuits

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is a clipper? Mention the various types of clippers, with examples. With a neat circuit diagram and waveforms, explain the working of a positive clipper. The waveform should be clipped at +3V. Assume that silicon diode is used in the circuit. **(08 Marks)**

b. What is a clamper? Mention the various types of clampers, with examples. With a neat circuit diagram and waveforms, explain the working of a negative clamper. **(08 Marks)**

c. Explain the working of a voltage polarity tester and continuity tester, using LEDs. **(04 Marks)**

2 a. Identify the type of biasing, used in the following circuit shown in Fig.Q2(a). Indicate the method to obtain DC equivalent circuit and write the DC equivalent circuit. Calculate I_{CQ}, I_{BG}, I_{EQ}, V_{CQ}, V_{BQ}, V_{EQ} and r_e' in the circuit. Assume $\beta = 200$. **(08 Marks)**

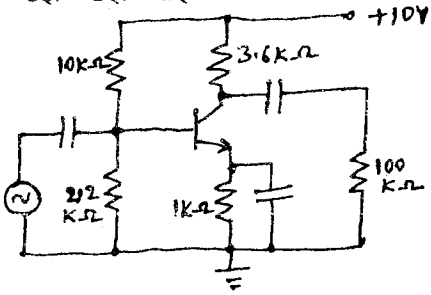


Fig.Q2(a)

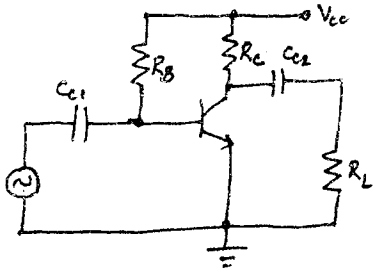


Fig.Q2(b)

b. Explain the two transistor models that are commonly use as the AC equivalent circuit of a transistor. For the circuit shown in Fig.Q2(b), write the AC equivalent circuit, using any one of the transistor models. **(08 Marks)**

c. What is meant by small signal operation of a transistor? Explain its importance. **(04 Marks)**

3 a. What is the value of v_{out} in the circuit shown in Fig.Q3(a). **(07 Marks)**

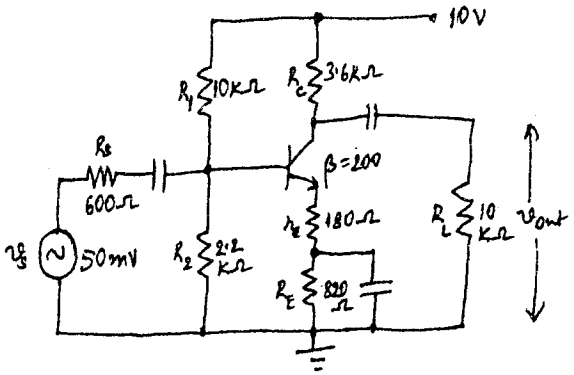


Fig.Q3(a)

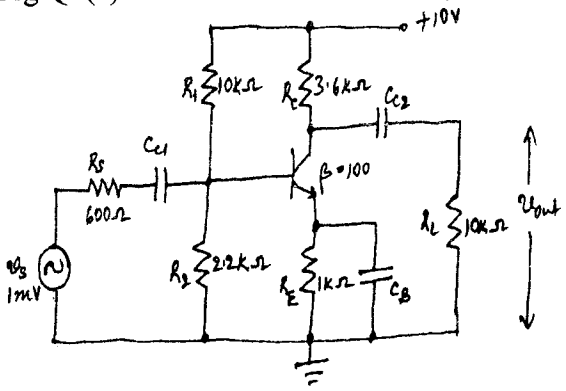


Fig.Q3(c)

b. Write a neat circuit diagram of a CC amplifier. Draw its AC equivalent circuit and derive expressions for voltage gain, input impedance and output impedance. What is the application of a CC amplifier? Indicate the other name for a CC amplifier & justify this name. **(07 Marks)**

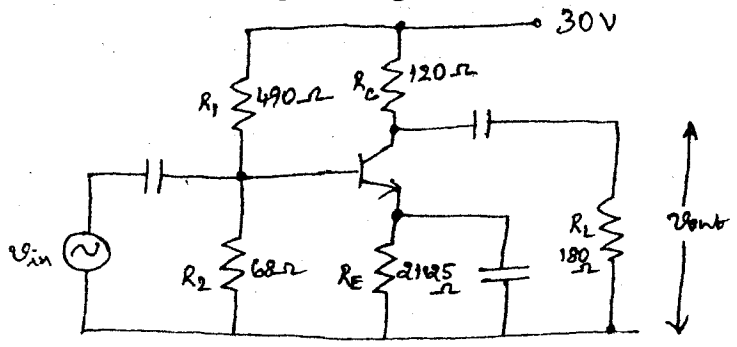
c. In the circuit shown in Fig.Q3(c), suppose $v_{out} = 0$ V, dc collector voltage is 6 V and AC collector voltage is 70 mV. With logical reasoning, identify the faulty component. **(06 Marks)**

4 a. Explain the classification of amplifiers, based on the type of coupling and frequency spectrum of operation. **(04 Marks)**

b. Briefly compare the class A, class B and class D amplifiers regarding angle of conduction and efficiency. **(06 Marks)**

c. Draw a DC load line and AC load line for the circuit shown in Fig.Q4(c) and calculate the maximum peak-to-peak undistorted output voltage. **(10 Marks)**

Fig.Q4(c)



PART – B

5 a. An n-channel D-MOSFET has $V_{GS(Off)} = -3V$ and $I_{DSS} = 6$ mA. What is I_D when $V_{GS} = -2V$ and when $V_{GS} = +2V$? Explain the terms $V_{GS(Off)}$ and I_{DSS}. **(06 Marks)**

b. Explain the need for active load switching in n-channel E-MOSFET inverter circuit. Explain how it is done using the 2-terminal curve. **(08 Marks)**

c. Explain the working of CMOS inverter, with the help of a neat circuit diagram and waveforms. Comment on its power consumption. **(06 Marks)**

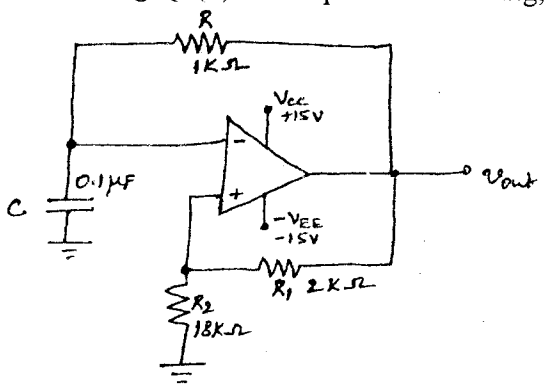
6 a. What are AC and DC amplifiers? Draw the frequency response for a typical AC amplifier and give reasons for the shape of the response curve. If mid-band gain is 200, lower and upper half power frequencies are 20 Hz and 20 kHz respectively, what is the gain at 5 Hz, 300Hz, 1 kHz and 200kHz? What is the bandwidth and mid-band region for this amplifier? **(10 Marks)**

b. Mention the different types of negative feedback amplifiers. Draw the block diagram of a VCVS amplifier. Write a neat circuit diagram of a VCVS amplifier, using an opamp and derive an expression for its voltage gain. **(10 Marks)**

7 a. With a neat diagram, explain the working of an inverting Schmitt trigger. Write the expressions for UTP and LTP and draw a graph of output versus input. **(06 Marks)**

b. Identify the circuit shown in Fig.Q7(b) and explain its working, with neat waveforms.

Fig.Q7(b)



(06 Marks)

c. With a neat diagram, explain the internal structure of 555 timer. Explain the external connections to be made to make it work as a monostable multivibrator. Draw neat waveforms of the trigger input, monostable output and voltage across the capacitor. Write an expression for time period. **(08 Marks)**

8 a. Define the terms load regulation, output resistance and line regulation for a voltage regulator. The measured values for a voltage regulator are: V_{NL} = 9.91 V , V_{FL} = 9.81 V, V_{HL} = 9.94 V and V_{LL} = 9.79 V. Calculate load regulation, output resistance and line regulation. Assume that full load current is 1 A. **(06 Marks)**

b. What are the series and shunt voltage regulators? What are their advantages and disadvantages? For the circuit shown in Fig.Q8(b), derive the expression for output voltage. Identify the function of the circuit. Calculate the values of V_{out} , I_L, I_c, I_{R3}, I_{RS}, I_{in}, I_{R2}, P_{in}, P_{out} and efficiency. **(08 Marks)**

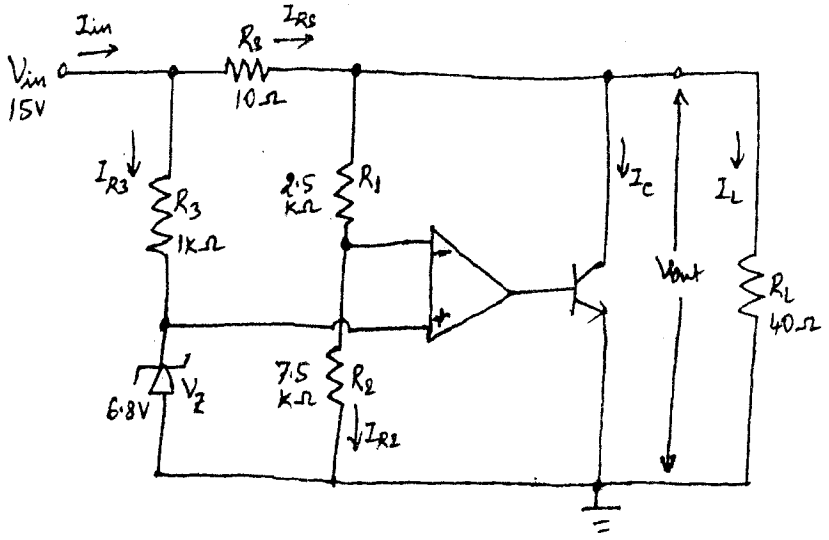


Fig.Q8(b)

c. Identify the function of the circuit shown in Fig.Q8(c). Derive the expression for V_{out} , I_L, I_E, I_{R3}, I_{in}, I_{R2}, P_{in}, P_{out} and efficiency. **(06 Marks)**

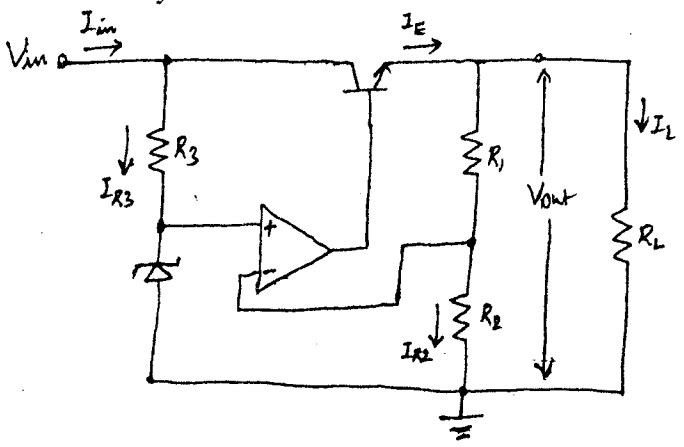


Fig.Q8(c)

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