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06CS32

Third Semester B.E. Degree Examination, May/June 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. Explain positive clipper and negative clipper, with necessary diagrams. **(08 Marks)**

b. For the circuit shown in, Fig. Q1(b) :
i) Sketch the output voltage waveform ii) What is the maximum positive output voltage?
iii) What is the maximum negative output voltage? **(06 Marks)**

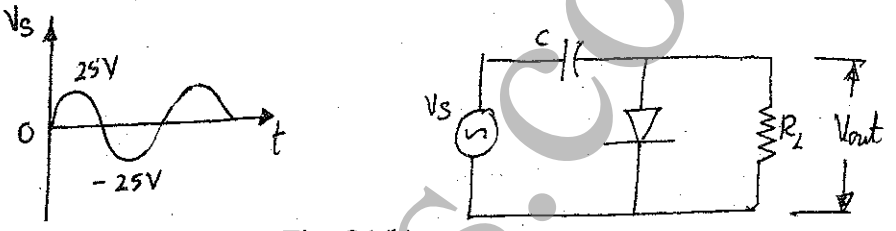

Fig. Q1(b)

c. Explain SCHOTTKY DIODE construction and its application. **(06 Marks)**

2 a. Explain with a neat circuit diagram, voltage divider bias amplifier by mentioning the importance of bypass capacitor. **(06 Marks)**

b. Obtain the graphical determination of AC emitter resistance of diode. **(06 Marks)**

c. Draw the DC and AC equivalent circuits of voltage divider bias amplifier shown in Fig. Q2(c). **(08 Marks)**

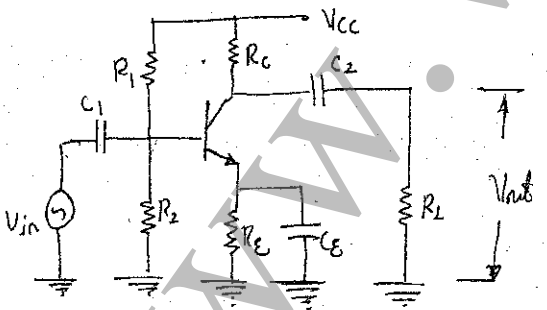

Fig. Q2(c)

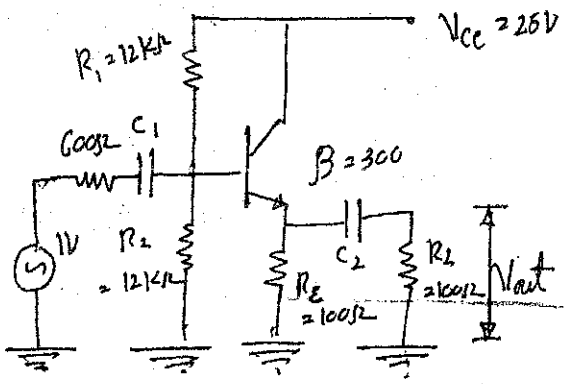

Fig. Q3(c)

3 a. Obtain the expression for voltage gain of single stage CE voltage-divider bias amplifier using π-model. **(08 Marks)**

b. Discuss trouble shooting of DC and AC circuits in voltage amplifier. **(06 Marks)**

c. For the circuit shown in, Fig. Q3(c), calculate the voltage of output impedance. **(06 Marks)**

4 a. Explain power gain interms of voltage and current gain in power amplifier. **(06 Marks)**

b. Show that the maximum efficiency of transformer coupled class A power amplifier is 50%. **(08 Marks)**

c. In a class C power amplifier V_{CC} = 30 V; R_L = 10 k Ω current drain I_{dc} = 0.4 mA peak–to–peak output voltage $V_{out(p-p)}$ = 30 V. Calculate i) DC input power ii) AC input power iii) Efficiency. **(06 Marks)**

PART – B

5 a. Explain the principle of operation and structure of n-channel depletion mode MOSFET, with a neat sketch. **(06 Marks)**

b. Discuss CMOS inverter with a neat circuit diagram, along with the transfer characteristics. **(06 Marks)**

c. Obtain the equation for voltage gain of common-source D-MOSFET amplifier. **(08 Marks)**

6 a. Explain the frequency response of a typical AC amplifier, mentioning the importance of cut-off frequency. **(08 Marks)**

b. Obtain the formula for decibel power gain and decibel voltage gain. **(04 Marks)**

c. For the circuit shown in Fig. Q6(c). Calculate :
i) The feedback fraction ii) The ideal cloud leep voltage gain iii) The exact-cloud leep voltage gain iv) The percentage error between ideal and exact valves of the closed leep voltage gain. Assume the open leep voltage gain of op. amp as 10^5. **(08 Marks)**

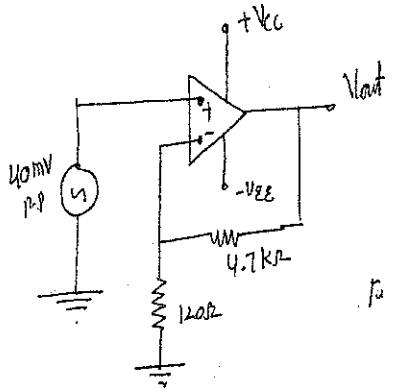

Fig. Q6(c)

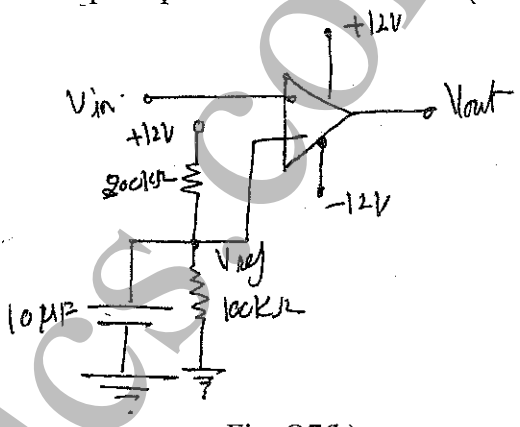

Fig. Q7(b)

7 a. Explain the functional block diagram, of 555 timers. **(08 Marks)**

b. The input voltage to the circuit shown in, Fig. Q7(b) is a sine wave of peak value 8V.
i) Calculate the trip point or threshold ii) Calculate the cut-off frequency of the bypass circuit iii) Sketch the output waveform and determine its duty circle. **(08 Marks)**

c. Explain how Schmitt trigger can be used to convert a periodic sine wave to a rectangular wave. **(04 Marks)**

8 a. Explain the various characteristics on which a power supply depends, with respect to quality and suitability : **(04 Marks)**

b. Calculate the output voltage for the circuit shown below in the Fig Q8(b) : **(08 Marks)**

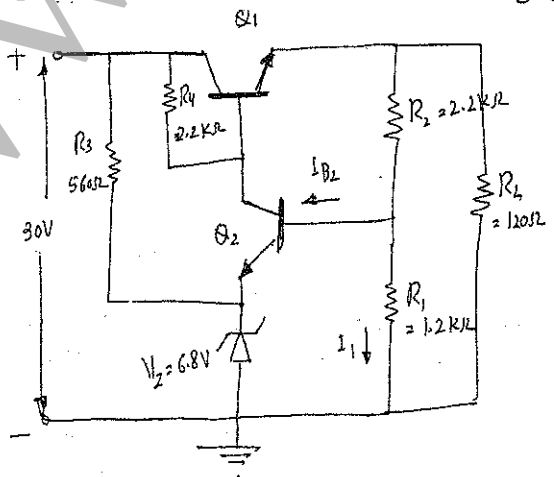

Fig. Q8(b)

c. Explain with a circuit diagram, unregulated DC to DC converter using power BJTs. **(08 Marks)**

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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)**

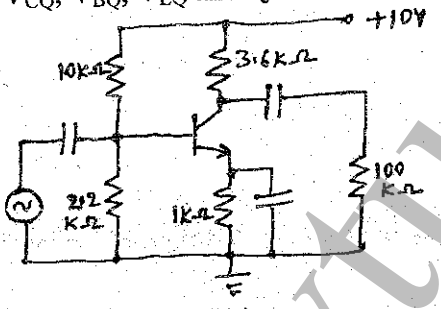


Fig.Q2(a)

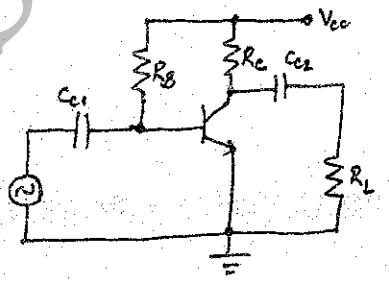


Fig.Q2(b)

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)**

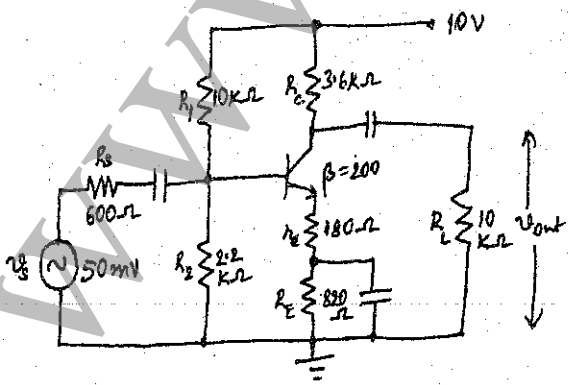


Fig.Q3(a)

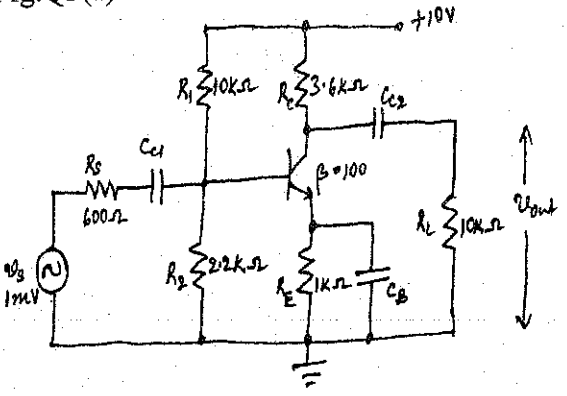


Fig.Q3(c)

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)**

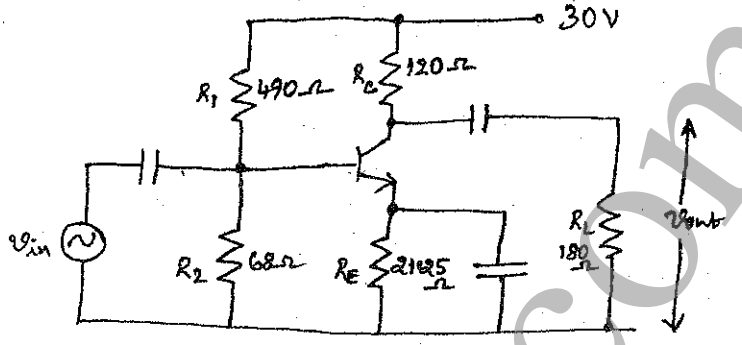
c. In the circuit shown in Fig.Q3(c), suppose $v_{out} = 0$ V, dc collector voltage is 6 V and AC collector voltage is 70 mV. With logical reasoning, identify the faulty component. **(06 Marks)**

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)**

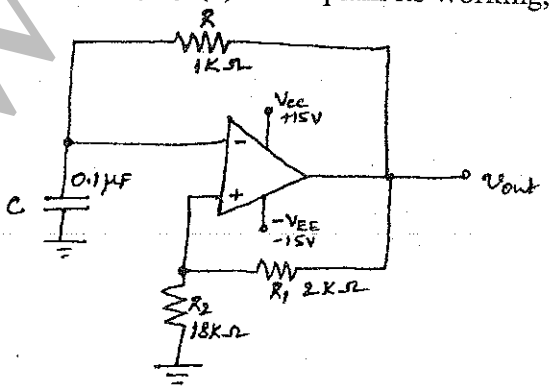
6 a. What are AC and DC amplifiers? Draw the frequency response for a typical AC amplifier and give reasons for the shape of the response curve. If mid-band gain is 200, lower and upper half power frequencies are 20 Hz and 20 kHz respectively, what is the gain at 5 Hz, 300Hz, 1 kHz and 200kHz? What is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



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. **(06 Marks)** **(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)**

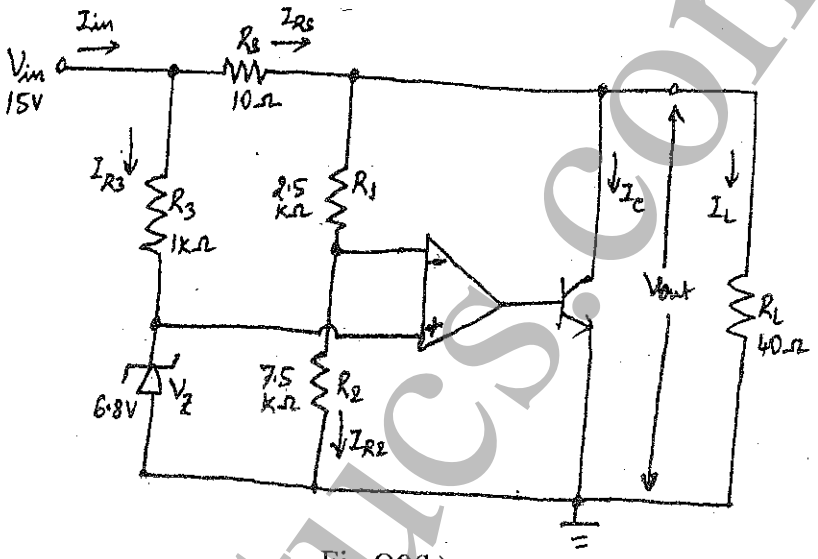


Fig.Q8(b)

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)**

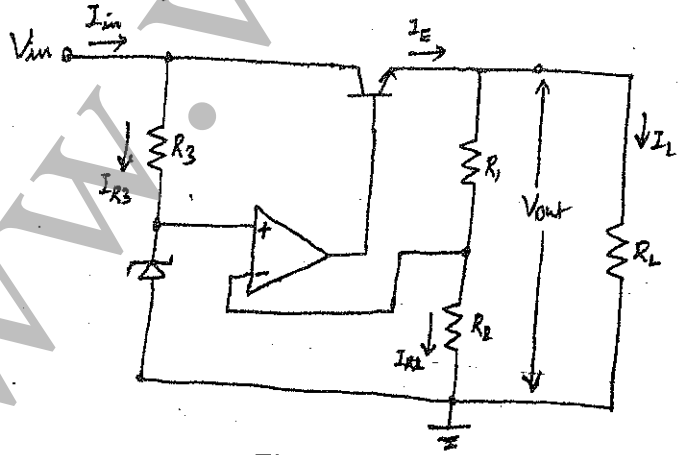


Fig.Q8(c)

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