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06CS32

Third Semester B.E. Degree Examination, June/July 2011
Electronic Circuits

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Illustrate the working of a double ended biased clipper with the help of circuit diagram, transfer characteristics and input output waveform. **(08 Marks)**

b. Explain the working principle of VARACTOR. **(06 Marks)**

c. Design a lossless capacitor based ac power line LED indicator operating on 120V – 230V, 50Hz variable ac mains. Determine the average LED current, assuming that the LED indicator is connected on the primary side of the transformer and peak LED current not exceeding 15 mA. Assume nominal value of $V_D = 2V$. **(06 Marks)**

2 a. In the Fig.Q2(a), what is the lowest frequency at which good by pass exists? If the lowest frequency is 1 KHz and the highest frequency is 10 KHz, what value of C is required for effective bypass? **(04 Marks)**

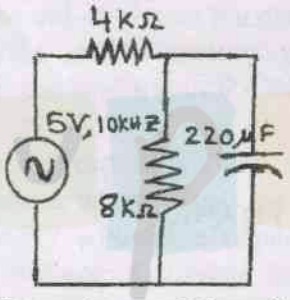

Fig.Q2(a)

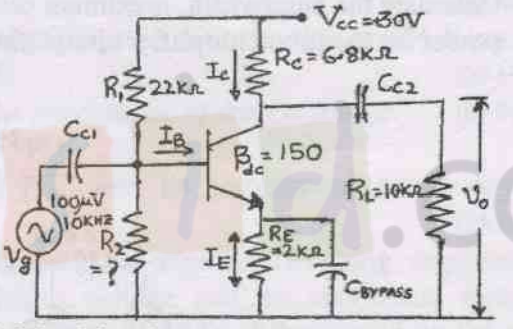

Fig.Q2(b)

b. Using the condition for stiff voltage divider bias for the BJT amplifier circuit shown in Fig.Q2(b), determine the terminal currents I_B, I_C and I_E, the terminal voltage V_{CE}, the saturation current $I_{C(SAT)}$ and the cut-off voltage $V_{CE(cut\ off)}$. Draw the DC load line and mark the Q point on the I_C versus V_{CE} characteristics plot. **(10 Marks)**

c. Write a brief note on distortion in small signal operation of a transistor (BJT) based amplifier and how it can be reduced. **(06 Marks)**

3 a. Calculate the output voltage v_{01} and v_{02} of a two stage BJT amplifier circuit shown in Fig.Q3(a), if the bypass capacitor $C_{bypass1}$ for the first stage has snapped (open). Given $\beta = 150$, $V_g = 4$ mV p-p, 20 KHz, draw the equivalent π-model for the two stage amplifier.

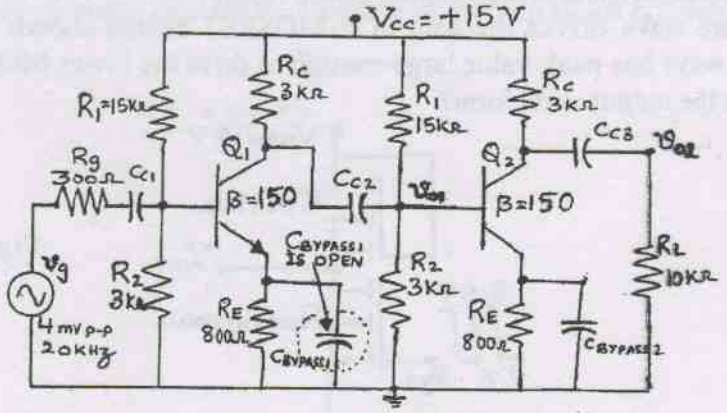

Fig.Q3(a) **(10 Marks)**

3 b. Prove that the voltage gain for a common collector amplifier is approximately unity. **(04 Marks)**

c. What is the output voltage V_{OUT}, the load current I_L, the emitter current I_{E2}, collector to emitter voltage V_{CE2} and the currents I_{R1} and I_{R2} in the circuit shown in Fig.Q3(c)? **(06 Marks)**

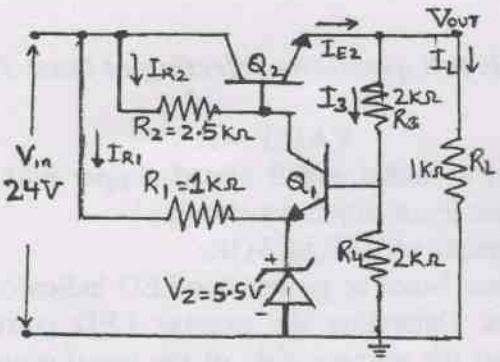

Fig.Q3(c)

4 a. List the important characteristics of class – A, B, AB and C amplifiers in terms of conduction angle, operating region, application and efficiency. **(08 Marks)**

b. With the aid of a circuit diagram, discuss the working of class-B push-pull power amplifier along with its advantages and disadvantages. **(06 Marks)**

c. Calculate the bandwidth, maximum dissipated power in the transistor and maximum output power for the tuned amplifier circuit shown in Fig.Q4(c). **(06 Marks)**

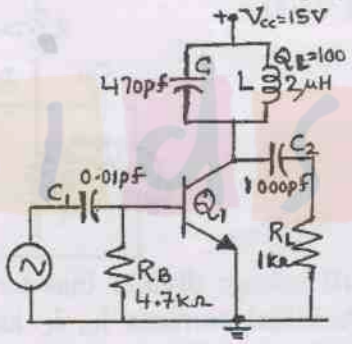

Fig.Q4(c)

PART – B

5 a. Draw and explain the working of D-MOSFET with the help of drain curve and transconductance curve. When a +ve voltage is applied to the gate of a P-channel D-MOSFET, is the current flow depleted or enhanced. **(09 Marks)**

b. What are the major differences between D-MOSFET and E-MOSFET? What type of voltage is necessary at the gate of a P-channel E-MOSFET to cause a current flow? What are the induced carriers and where do they come from? **(07 Marks)**

c. A square wave drives the gate of E-MOSFET switch shown in Fig.Q5(c). If the 10KHz square wave has peak value large enough to drive the lower MOSFET into the ohmic region, what is the output waveform? **(04 Marks)**

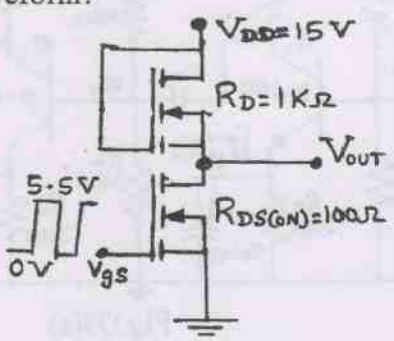

Fig.Q5(c)

6 a. Draw and explain the frequency response curve of an ac amplifier and the significance of cut-off frequency. Write the expression for voltage gain beyond mid band. **(07 Marks)**

b. Determine the output current, current gain and load power for the LM741 OPAMP circuit shown in Fig.Q6(b). Also determine the closed-loop bandwidth for $f_{2(of)}$ = 120Hz and $(1 + A_{vol} B) = 5000$. **(04 Marks)**

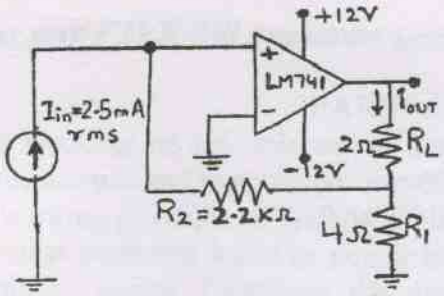

Fig.Q6(b)

c. Draw the equivalent circuit of a trans-resistance amplifier. List down its important characteristics. Derive an expression for voltage gain of OPAMP based voltage amplifier. **(09 Marks)**

7 a. With the help of a circuit diagram, waveforms, hysterisis plot and relevant formulas, explain the working of OPAMP based Schmitt trigger. **(08 Marks)**

b. With the aid of circuit pin diagram and waveforms, explain the operation of 555 timer as an ASTABLE multi vibrator to get 50% duty cycle. **(07 Marks)**

c. Explain the working of RAMP generator and the importance of current mirror. **(05 Marks)**

8 a. Define locking range and capture range in PLL and its importance. Name any two applications where PLL's are used. **(05 Marks)**

b. An LM317 adjustable regulator shown in Fig.Q8(b) is used for obtaining regulated DC output voltage. Calculate the approximate output voltage and the maximum, minimum efficiency, if the input voltage V_{in} varies between 30V and 48V. What would be the output voltage if R_2 value is doubled? Assume V_{REF} = 1.25V. **(04 Marks)**

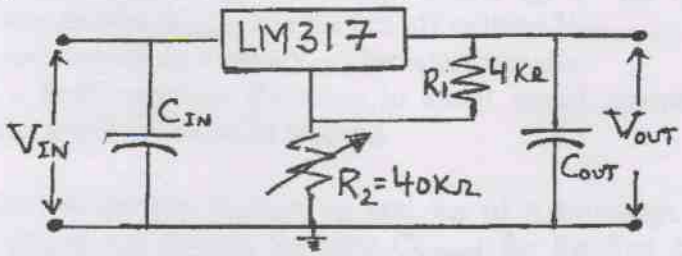

Fig.Q8(b)

c. Explain the significance of line and load regulation. **(04 Marks)**

d. With the aid of a circuit diagram, explain the working of step-up Boost regulator. **(07 Marks)**

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