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**Third Semester B.E. Degree Examination, Dec.2018/Jan.2019**  
**Analog Electronic Circuits**

Time: 3 hrs.

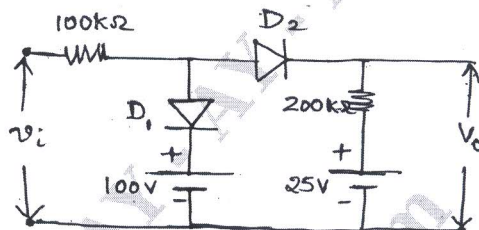
Max. Marks:100

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

**PART - A**

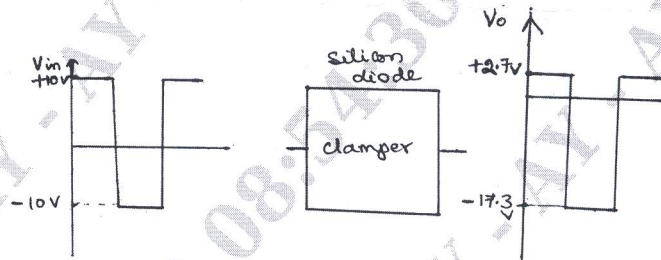
- 1 a. Derive the expression for dynamic resistance of the diode. Determine the dynamic resistance of the diode when the diode current is 2mA. (06 Marks)
- b. The input voltage to the clipper circuit shown below in Fig.Q.1(b) varies linearly from 0 to 150 volts. Draw the transfer characteristics, indicate the slope and status of diode at each level. (08 Marks)

Fig.Q.1(b)



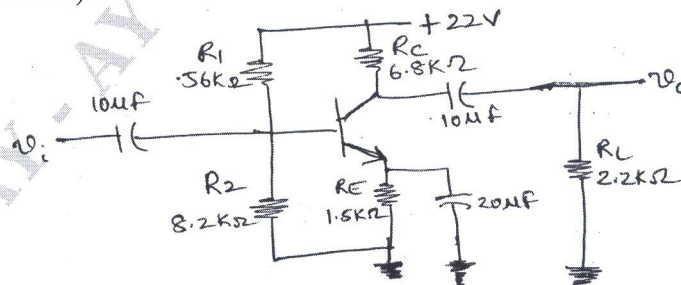
- c. Design the clamper circuit for the input-output waveform shown in Fig.Q.1(c) using silicon diode. (06 Marks)

Fig.Q.1(c)



- 2 a. Derive the expression for the stability factor of the Emitter Bias circuit with respect to  $I_{CO}$  and  $V_{BE}$ . (06 Marks)
- b. How do you find the operating point of fixed Bias circuit? (04 Marks)
- c. Design a voltage divider Bias circuit using a silicon transistor with  $B = 100$  when  $V_{CC} = 12V$ ,  $V_{CE} = 6V$ ,  $I_C = 1mA$ ,  $S = 20$  and  $V_E = 1V$ . (10 Marks)
- 3 a. Derive the expression for the current gain, input impedance, voltage gain and output impedance for CE configuration using hybrid model. (10 Marks)
- b. Find  $r_e$ ,  $A_i$ ,  $Z_i$ ,  $A_v$  and  $Z_o$  for the amplifier circuit shown in Fig.Q.3(b) with  $B = 120$  and  $r_o = 40K\Omega$  (use  $r_e$  model). (10 Marks)

Fig.Q.3(b)



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

- 4 a. Determine the lower cut off frequencies  $f_{Li}$  and  $f_{Lo}$  for the circuit diagram shown in Fig.Q.3(b) with  $R_S = 1K\Omega$ . (06 Marks)  
 b. What is miller effect? Explain. (06 Marks)  
 c. Determine the upper cut off frequencies  $f_{Hi}$  and  $f_{Ho}$  also  $f_B$  and  $f_T$  for the circuit shown in Fig.Q.3(b) given  $C_\pi (C_{be}) = 36 \text{ pF}$ ,  $C_u (C_{bc}) = 4\text{pF}$   $C_{ce} = 1\text{pF}$   $C_{wo} = 8\text{pF}$   $C_{wi} = 6\text{pF}$ . (08 Marks)

**PART - B**

- 5 a. Calculate  $Z_i$ ,  $A_i$ ,  $A_v$  and  $Z_o$  of the Darlington pair shown in Fig.Q.5(a). Derive the formulas used. (08 Marks)

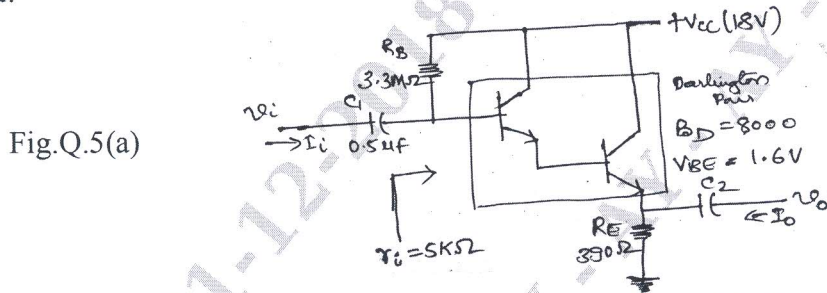
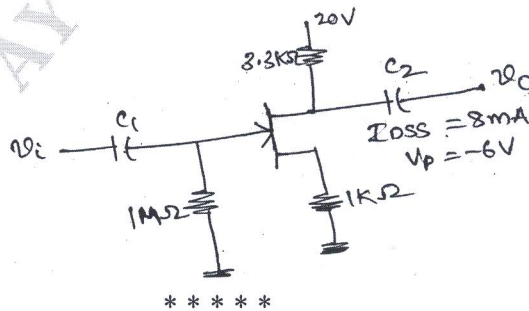


Fig.Q.5(a)

- b. What are the merits of feedback? What are different types of feedback connections? (06 Marks)  
 c. Derive the expression for  $A_f$ ,  $Z_{if}$  and  $Z_{of}$  for voltage shunt feedback circuit. (06 Marks)
- 6 a. Explain the classification of power amplifiers. (04 Marks)  
 b. Explain how the efficiency of class A amplifiers increases from 25% to 50%. When we use transformer coupling. (08 Marks)  
 c. A class B power amplifier is delivering an output voltage of 10 volts peak to a  $8\Omega$  load. If the dc power supply is 30 volts, calculate:  
 i) DC power input  
 ii) AC power delivered to the load  
 iii) Conversion efficiency  
 iv) Power dissipated in the collector of each transistor. (08 Marks)
- 7 a. Derive the expression for frequency of oscillation of transistor phase shift oscillator. What is the value of current gain required for the loop gain to be greater than unity? (10 Marks)  
 b. With a neat circuit diagram, explain the working of the Hartley oscillator. Calculate the frequency of oscillation for  $C = 250 \text{ PF}$ ,  $L_1 = 1.5 \text{ mH}$ ,  $L_2 = 1.5 \text{ mH}$  and  $M = 0.5 \text{ mH}$ . (10 Marks)
- 8 a. Write the ac equivalent model of JFET? Explain. (04 Marks)  
 b. Derive the expression for  $Z_i$ ,  $Z_o$ , and  $A_v$  for common source JFET amplifier with fixed bias. (06 Marks)  
 c. For the JFET amplifier shown in Fig.Q.8(c), the operating point is  $V_{GSQ} = -2.6\text{V}$  and  $I_{DQ} = 8\text{mA}$  with  $I_{DSS} = 8\text{mA}$  and  $V_p = -6\text{V}$ . The value of  $Y_{OS}$  is given as  $20\mu\text{S}$  determine:  
 i)  $g_m$  ii)  $r_d$  iii)  $z_i$  iv) calculate  $z_o$  with and without  $r_d$  v) calculate  $A_v$  with and without  $r_d$ . (10 Marks)

Fig.Q.8(c)



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