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END TERM EXAMINATION

THIRD SEMESTER [B.TECH.]– DECEMBER 2008

Paper Code:ETEC207 Paper ID:28207	Subject: Analog Electronics-I (Batch: 2004-2007)
Time : 3 Hours	Maximum Marks :75

Note: Attempt five questions in all. Q.No.1 is compulsory and attempt one question from each unit.

Q.1 (a) Define a hole in a semiconductor. Explain why a semiconductor acts as an insulator at OK and why its conductivity increases with increasing temperature. **(5)**

(b) What is meant by Q-point? What are the factors responsible for the instability of operating point? **(5)**

(c) Determine the hybrid or h-parameters for a two port network. **(5)**

(d) How MOSFET works as a resistor? **(5)**

(e) What are the advantages of negative feedback in amplifiers? Explain them. **(5)**

UNIT-I

Q.2 (a) Which of the two semiconductor materials Si or Ge has larger conductivity at room temperature and why? What happens to the conductivity of the semiconductor with the rise in temperature? **(4)**

(b) A 10 volt regulated d.c. supply of 10 mA is required from a d.c. source of 12-15V by using a pair of zener diodes. Assuming I_z (min) = 0.2 mA, design the circuit. **(4.5)**

(c) Compare centre tapped and bridge wave rectifiers. **(4)**

Q.3 (a) Derive the expression for average or D.C. values of output voltage and load current for a full wave rectifier. **(5)**

(b) Determine the concentration of holes and electrons in an N-type silicon at 300 k if the conductivity is 0.1 ohm cm^{-1}. Given that n_i at 300 k for silicon is $1.5 \times 10^{10}/cm^3$ and μ_n at 300 k for Si is 1300 $cm^2/V\text{-}S$. **(5)**

(c) Explain the principle of LED. **(2.5)**

UNIT-II

Q.4 (a) Explain the input and output characteristics of a common base amplifier. **(5)**

(b) For a fixed bias circuit using a NPN transistor, the value of β is 80. If R_B = 390 kΩ, R_C = 1.5 kΩ and V_{CC} = 30 V, find the co-ordinates of the Q-point. **(5)**

(c) What are the factors responsible for the instability of operating point? **(2.5)**

Q.5 (a) Draw a fixed bias circuit and obtain the value of d.c. voltage and currents in the circuit. **(5)**

(b) Find A_i and R_{in} for the circuit shown in Fig.1, if h_{fe} = 50, h_{ie} = 1 kΩ, h_{re} = 0 and h_{oe} = 0. **(7.5)**

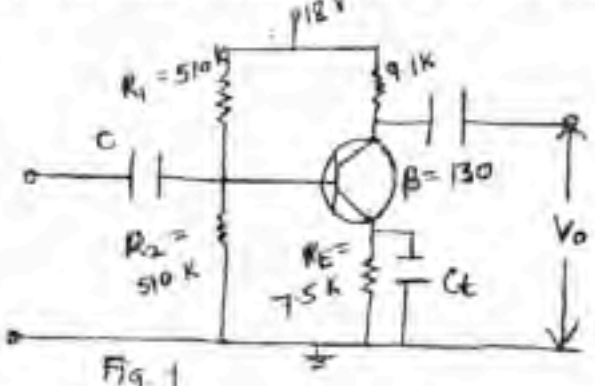

Fig. 1

P.T.O.

UNIT-III

Q.5 (a) Draw the circuit of a 2-stage R-C coupled CE amplifier and sketch its frequency response. What factors affect the gain of the amplifier at low frequencies and at high frequencies? Discuss the effect of cascading on the bandwidth. **(6.5)**

(b) An amplifier has a gain of 200 and distortion 10% with an I/P signal voltage of 200 mV. Determine (i) O/P signal voltage (ii) distortion voltage (iii) O/P voltage when I/P signal voltage is 200 mV. **(6)**

Q.6 (a) Draw the circuit diagram of voltage series feedback amplifier and derive the expression for input and O/P impedances. **(5)**

(b) Determine I/P impedance, O/P impedance and overall voltage gain for a 2-stage R-C coupled amplifier shown in Fig.2 load resistor connected across O/P terminals of the amplifier is 10 kΩ, h_{ie} = 1.1 kΩ, h_{fe} = 50, h_{re} = h_{oe} = 0. **(7.5)**

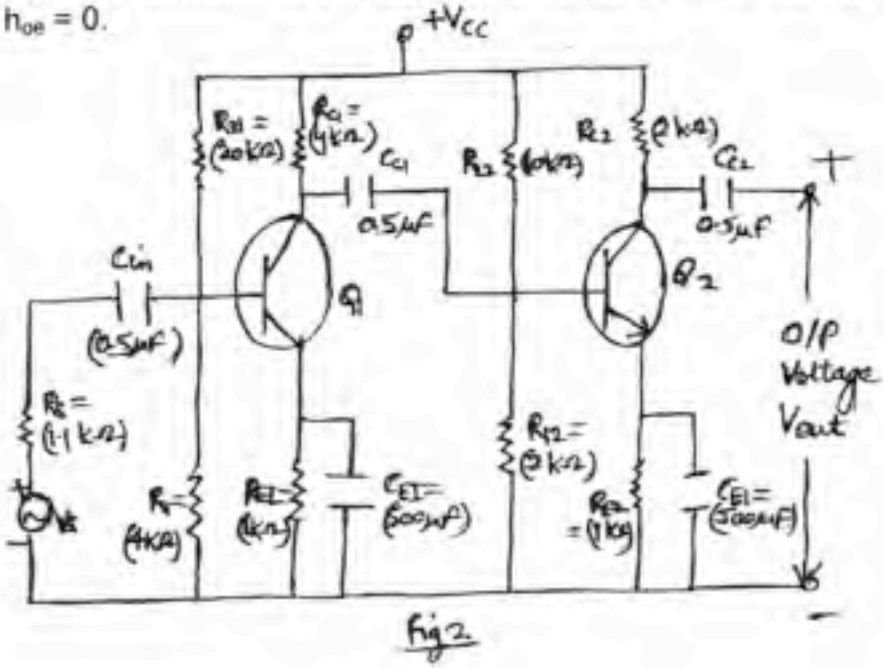

Fig 2.

UNIT-IV

Q.7 (a) Sketch the drain characteristics of a JFET and explain its behaviour before and after pinch off. **(6)**

(b) An n-channel JFET has a pinch off voltage of -4.5V and I_{DSS} = 9 mA. At what value of V_{GS} will I_{DS} be equal to 3 mA? What is its gm at this I_{DS}? **(6.5)**

Q.8 (a) Differentiate between the construction of an enhancement type MOSFET and a depletion type MOSFET. **(6.5)**

(b) Explain the firing characteristics of a thyristor. **(3)**

(c) Explain the construction of UJT. **(3)**

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