

Third Semester B.E. Degree Examination, Dec.09/Jan.10
Analog 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. Describe how diffusion and transition capacitances differ. (05 Marks)
 b. A full wave bridge rectifier is supplied from the transformer secondary voltage of 100 V. Calculate the dc output voltage and peak inverse voltage of the diodes employed. (05 Marks)
 c. For the clipper circuit shown in the Fig.1(c), the input is $V_i = 50 \sin \omega t$. Calculate and plot to scale the transfer characteristic, indicating slopes and intercepts. (10 Marks)

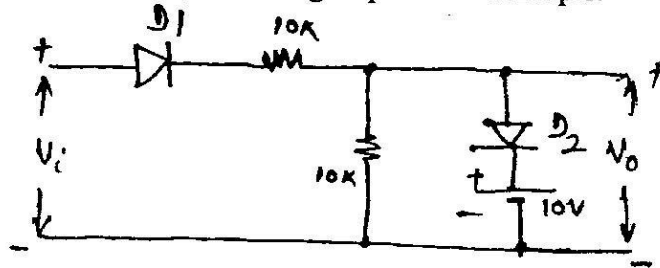


Fig.1(c).

- 2 a. Determine the voltage V_{CE} and I_C for the voltage divider configuration shown in Fig.2(a). (10 Marks)

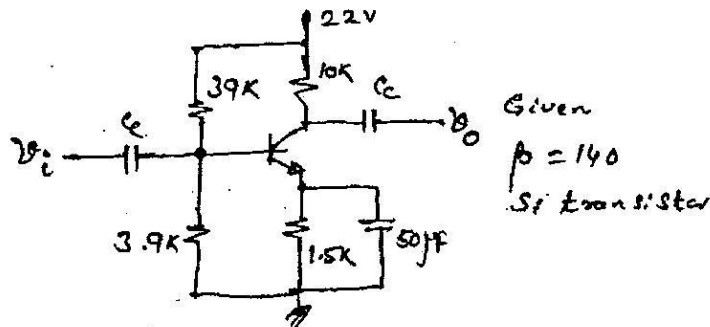


Fig.2(a).

- b. Determine R_1 and R_c for the network of Fig.2(b). Given $I_{CQ} = 2 \text{ mA}$, $V_{CEQ} = 10 \text{ V}$. Assume S_i transistor. (10 Marks)

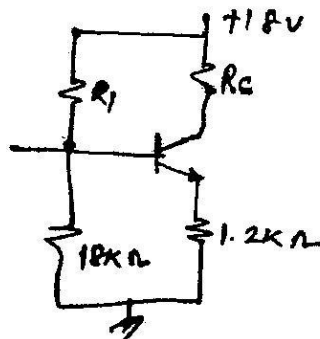
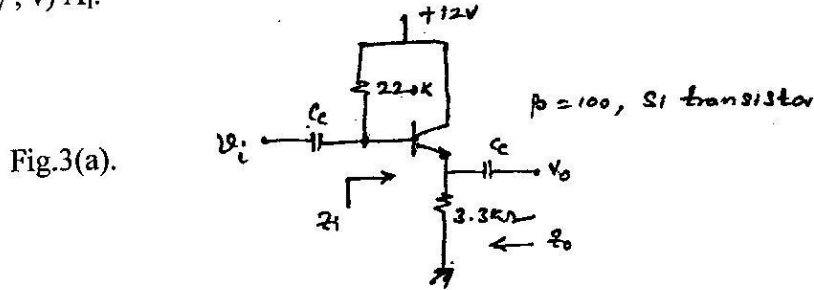


Fig. 2(b)

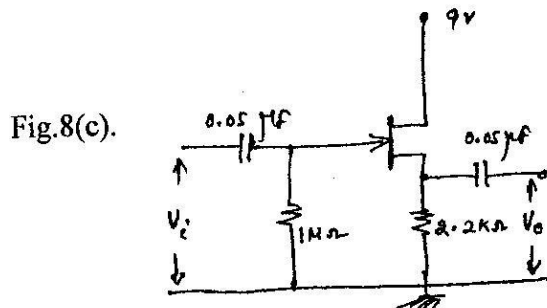
- 3 a. For the emitter – follower network of Fig.3(a), using r_e model determine: i) r_e ; ii) Z_i ; iii) Z_o ; iv) A_v ; v) A_i . (10 Marks)



- b. Using complete hybrid equivalent model for a two part system derive expressions for A_i , A_v , Z_i and Z_o . (10 Marks)
- 4 a. Prove that Miller effect capacitance $C_{Mi} = (1 - A_v) c_f$ and $C_{Mo} = (1 - 1/A_v) c_f$. (10 Marks)
- b. A four stage amplifier has a lower 3 db frequency for an individual stage of $f_1 = 40$ Hz and individual upper 3 db frequency of $f_2 = 2.5$ MHz. Calculate the overall lower 3 db and upper 3 db frequency of this full amplifier. Derive the expressions used. (10 Marks)

PART – B

- 5 a. Explain with the help of circuits what is cascade connection and cascode connection. What are the advantages of these connections? (10 Marks)
- b. Explain the important advantages of a negative feedback amplifier. (04 Marks)
- c. List the four types of feedback connections. Show one practical circuit for each feedback connection. (06 Marks)
- 6 a. Explain the working of a transformer coupled class B push pull amplifier. (10 Marks)
- b. A Class B amplifier provides a 20 V peak signal to a 16 ohm load and a power supply of $V_{cc} = 30$ V. Determine the input power, output power and circuit efficiency. (05 Marks)
- c. Calculate the harmonic distortion components for an output signal, having a fundamental amplitude of 2.5 V, second harmonic amplitude of 0.25 V, third harmonic amplitude of 0.1 V and fourth harmonic amplitude of 0.05 V. Also calculate the total harmonic distortion. (05 Marks)
- 7 a. Explain Barkhausen criterion for oscillations. (05 Marks)
- b. With the help of a neat circuit diagram, explain the working of Hartley oscillator. (07 Marks)
- c. List the advantages of a crystal oscillator. Explain the working of a series resonant crystal oscillator. (08 Marks)
- 8 a. List three advantages of PET over BJT. (03 Marks)
- b. With a neat circuit diagram, explain potential divider biasing of JFET. (07 Marks)
- c. Calculate the voltage gain and input and output impedance for the circuit of Fig.8(c). (10 Marks)



Given:
 $I_{DSS} = 16$ mA
 $V_p = -4$ V
 $r_d = 40$ K Ω
 $V_{GSQ} = -2.86$ V.
