Code No: R05010204 **R05** **Set No. 2**

I B.Tech Examinations,June 2011
ELECTRONIC DEVICES AND CIRCUITS
Common to BME, IT, ICE, E.COMP.E, ETM, E.CONT.E, EIE, CSE, ECE, CSSE, EEE

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Draw the circuit for darlington pair and derive the expressions for A_I, A_V, R_I and R_0.
   (b) The figure 4b shows a CE amplifier with collector to base bias. Calculate A_I, A_V, R_I. The transistor parameters are h_{ie}=1.1K, h_{fe}=50, h_{oe}=25$\times 10^{-6}$A/V, h_{re}=2.5 $\times 10^{-4}$. [8+8]

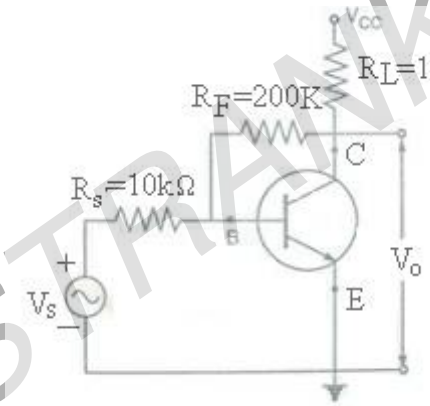

Figure 4b

2. (a) Draw the circuit diagram of half wave rectifier with capacitor input filter. Explain the operation with waveforms.
   (b) A HWR circuit fed a resistive load of 10KΩ through a power transformer having a step-down turns ratio of 8:1 and operated from 230V, 50Hz A.C. Assume the forward resistance of diode to be 40Ω and transformer secondary winding resistance as 12Ω.
   Calculate the maximum, RMS and average values of current, DC O/P voltage and power, efficiency of rectification and ripple factor. [16]

3. (a) When an electron is placed in a magnetic field with a period of rotation T = $\frac{35.5}{B} \times 10^{-12}$ sec. Show that the trajectory of an electron is a circle.
   (b) What is the radius described by an electron placed in a magnetic field, perpendicular to its motion, when the accelerating potential is 900v, and $B = 0.01wb/m^2$. What is the time period of rotation? [8+8]

4. (a) What do you understand by Q point? Explain its significance.
   (b) For the circuit shown (figure3b), calculate the value of stability factor S to make the circuit thermally stable. Assume I_{CO}=1nA and θ=4.1 $\times 10^8$ ^0C/W. [8+8]

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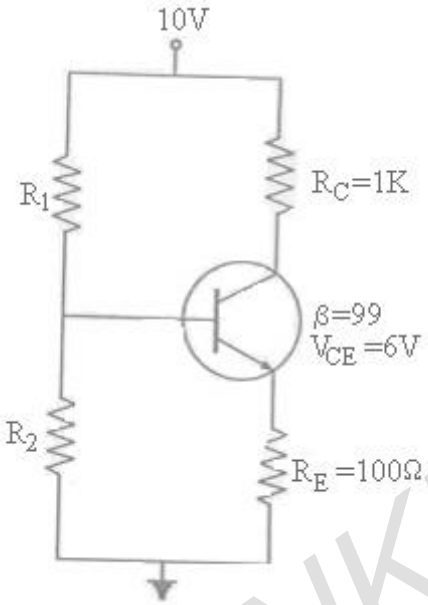

Figure 3b

5. (a) Classify various oscillators based on O/P waveforms, circuit components, operating frequencies and feedback used.

   (b) A phase shift oscillator is to be designed with FET having $g_m = 5000\mu s$, rd=4kΩ while the resistance in the feedback circuit is 9.7kΩ. Select the proper value of C and R_D to have the frequency of oscillations as 5KHZ. [10+6]

6. (a) Draw the drain characteristics of depletion type MOSFET. Explain clearly different operating regions in characteristics with proper reasoning.

   (b) Describe the construction of a light-emitting diode and explain its operational mechanism. [10+6]

7. (a) i. What is a zener diode? How does it differ from an ordinary pn-junction rectifier diode?

      ii. Give the V-I characteristics of zener diode and explain its salient features in relation to that of pn diode.

      iii. Give the equivalent model of zener diode under the reverse biased condition.

   (b) Using analytical expression for diode current calculate the dynamic slope resistance of a Ge diode at 290^0k when forward biased at current of 10 μA. [10+6]

8. (a) Define Desensitivity.

   (b) For large values of D, what is A_f? What is the significance of this result?

   (c) An Amplifier has a mid-frequency gain of 100 and a bandwidth of 200KHz.

      i. What will be the new bandwidth and gain if 5% negative feedback is introduced?

ii. What should be the amount of negative feedback if the bandwidth is to be restricted to 1MHz? [16]

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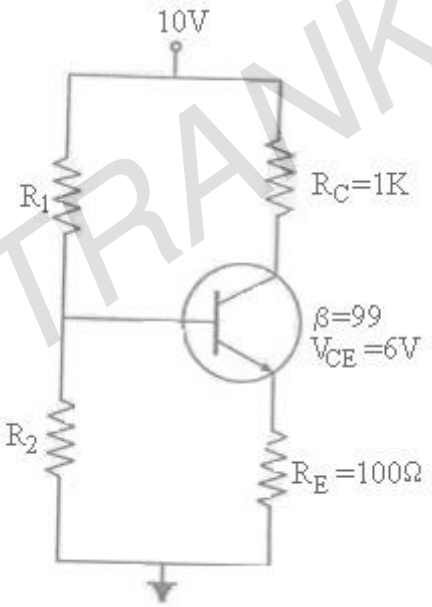

Figure 3b

2. (a) i. What is a zener diode? How does it differ from an ordinary pn-junction rectifier diode?
   ii. Give the V-I characteristics of zener diode and explain its salient features in relation to that of pn diode.
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   (b) Using analytical expression for diode current calculate the dynamic slope resistance of a Ge diode at 290^0k when forward biased at current of 10 μA. [10+6]

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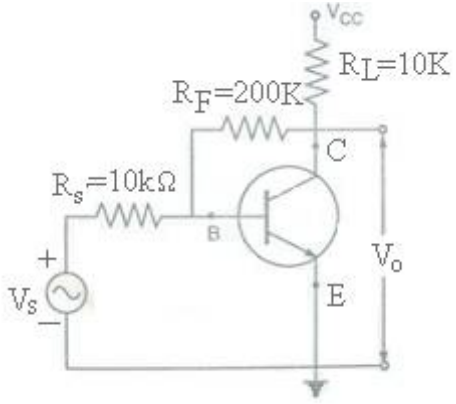

Figure 4b

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   (b) Using analytical expression for diode current calculate the dynamic slope resistance of a Ge diode at 290^0k when forward biased at current of 10 μA. [10+6]

Code No: R05010204 **R05** **Set No. 1**

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   (b) The figure 4b shows a CE amplifier with collector to base bias. Calculate A_I, A_V, R_I. The transistor parameters are h_{ie}=1.1K, h_{fe}=50, h_{oe}=25$\times$ 10^{-6}A/V, h_{re}=2.5 $\times$ 10^{-4}. [8+8]

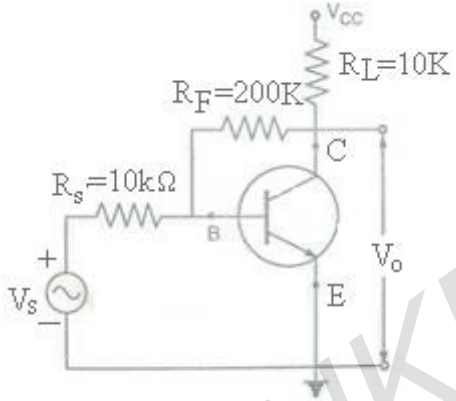

Figure 4b

7. (a) Define Desensitivity.

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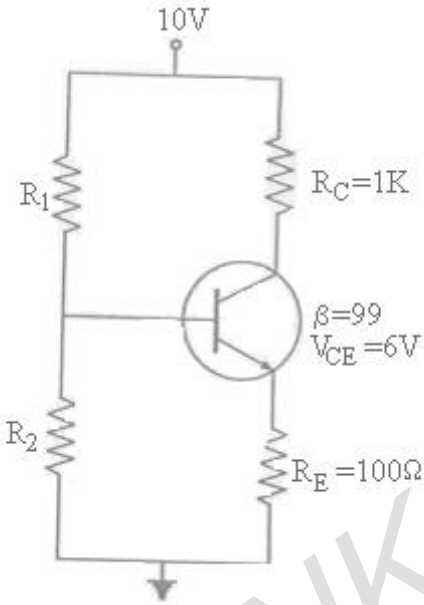

Figure 3b

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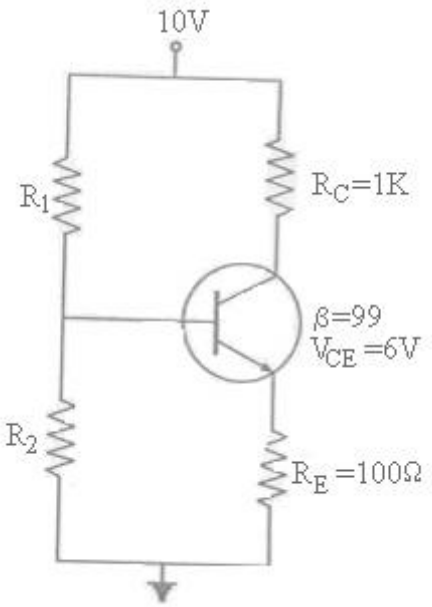

Figure 3b

Code No: R05010204 **R05** **Set No. 3**

4. (a) Draw the circuit for darlington pair and derive the expressions for A_I, A_V, R_I and R_0.

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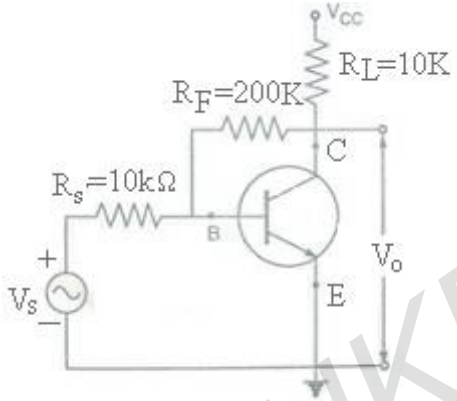

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