3E2072

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B.Tech. IIIrd Semester (Main/Back) Examination, Feb. - 2011

Common for Computer Engg. & IT

Electronic Devices & Circuits

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt overall **five** questions, selecting one question from **each** unit. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.*

Unit - I

1. a) What do you understand by clamping circuit with neat diagram explain the action of

i) Positive clamming and

ii) Negative clamper

b) Describe the Hall effect? What properties of a semiconductor are determined From a Hall effect experiment? **(8+8)**

2. a) Find the output of a clipper as shown in Fig. (i). Assume that $V_f = 0$ and $r_f = 0$ for both diode

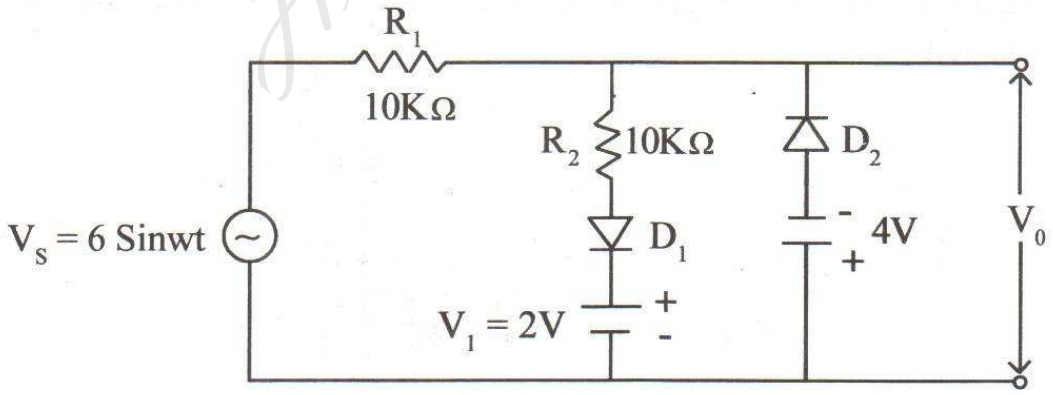


Fig. (1.)

b) Explain the significance of Fermi level in intrinsic and extrinsic semiconductor energy band distributions? **(8+8)**

Unit - II

3. a) Find out the expression of S, S′ and S″ for Potential divider biasing circuit (For C.E. configuration)

   b) Draw and explain Ebers Molls representation of BJT? Also define the voltage and current used in Ebers Molls Equation for PNP transition. **(8+8)**

4. a) Draw the circuit of transistor in common emitter configuration of BJT and sketch the output characteristics indicate the active, saturation and cutoff region. Derive the relationship between α and β for BJT?

   b) h - parameter for CE amplifier has $h_{ie} = 1100\Omega$ $h_{fe} = 50$, $h_{oe} = 25\times10^{-6}$ Mho, $h_{re} = 2.5\times10^{-4}$ if $R_L = 1K\Omega$ Determine the following parameters

   i) current gain

   ii) voltage gain

   iii) power gain

   iv) input impedance **(8+8)**

Unit - III

5. a) Draw the R-C coupled amplifier circuit? Calculate the current gain for low, middle and high frequencies region?

   b) The amplifier of Fig. (2) Utilizes an N-channel FET for which $V_p = -2V$, $g_{mo} = 1.60$ mA/V and $I_{DSS} = 1.65$mA. It is desired to bias the circuit at $I_D = 0.8$ mA using $V_{DD} = 24V$ assume $r_d >> R_d$ Determine

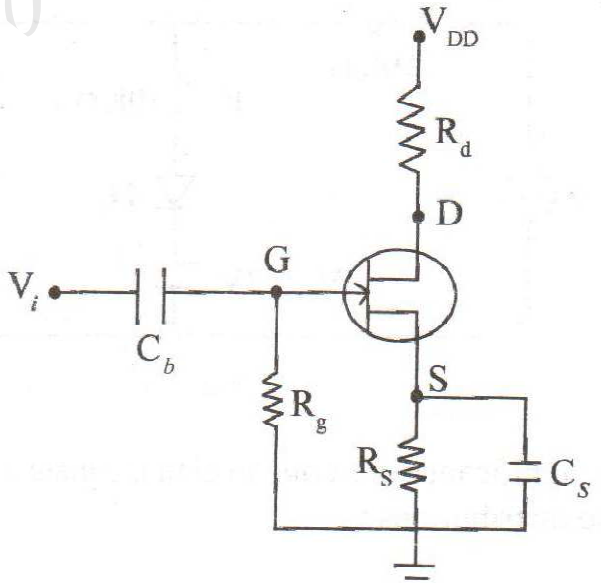
   i) V_{GS}

   ii) g_m

   iii) R_s

   iv) R_d

   such that the voltage gain is atleast 20 dB with R_s bypassed with a very large capacitance C_s **(8+8)**



6. a) Explain the working of n-channel MOSFET. What is the difference between enhancement and depletion mode of operation.

   b) Explain Miller's theorem. Define Boot strapping with its electrical equivalent circuit? **(8+8)**

Unit - IV

7. a) Explain the Brakhausen criterion for sustained oscillations.

   b) Prove that in a negative Feedback amplifier

$$\left|\frac{dA_F}{A_F}\right| = \frac{1}{|1+\beta A|}\left|\frac{dA}{A}\right|$$

   Where A_F = gain with feedback, A = transfer gain, β = feedback factor. **(8+8)**

8. a) Draw the circuit diagram of voltage shunt Feedback amplifier with its necessary effects? What are the difference between voltage shunt and voltage series Feedback amplifier?

   b) Determine the operating frequency of a Hartley oscillator if $L_1 = 100\mu H$ $L_2 = 1mH$ mutual inductance between coils $M = 10\mu H$ and $C = 10$ PF **(8+8)**

Unit - V

9. a) Draw the circuit of the wein bridge oscillator. Derive the expression for frequency of oscillation for such as oscillator

   b) The parameter of a crystal oscillator equivalent circuit are $L_S = 0.8$ H, $C_S = .08$ PF $R_S = 5\ K\Omega$ and $C_p = 1.9PF$ Determine the resonance frequencies F_S and F_P **(8+8)**

10. a) With the help of circuit diagram explain the working of "Astable multivibrator" give its waveform what are the basic difference among the three types of multivibrator circuits

    b) Draw the circuit of a Schmitt Trigger using BJT and explain its working with input voltage versus the output voltage curve. **(8+8)**
