End Term Exam./3rd Semester (Diploma)/DECE 302/ Nov. 2024

Electronic Devices & Systems

Full Marks: 100

Time: 3 hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1 a) Discuss with neat sketch the forward and reverse bias characteristics of a PN junction diode. [7]

b) Mention the differences between avalanche and zener breakdown mechanisms. What is the concept of Zener breakdown and the use of Zener diodes in voltage regulation. Describe with a neat sketch how a Zener diode regulator works? [2+6]

c) Determine I_1, I_2 and I_{D_1} in the following circuit. (Fig 1 a) [5]

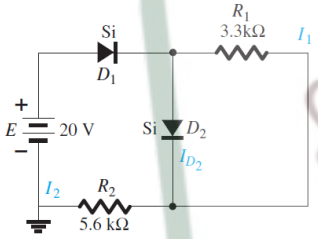


Figure 1 a

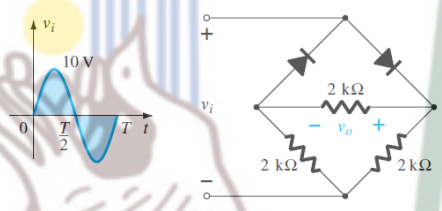


Figure 2 b

2 a) For the emitter follower network in Fig 2 b, find the values of $A_v, Z_i, r_e,$ and Z_o. [8]

b) Derive the expression for small signal voltage gain $\left(A_v = \frac{v_o}{v_i}\right)$, input impedance Z_i, output impedance Z_o for the potential divider based [12]

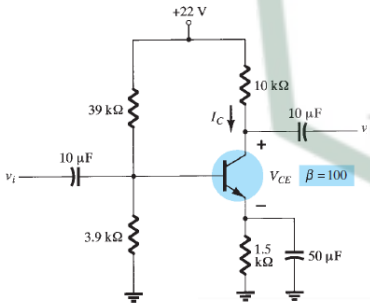


Figure 2 a

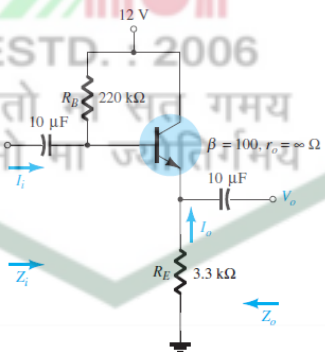


Figure 2 b

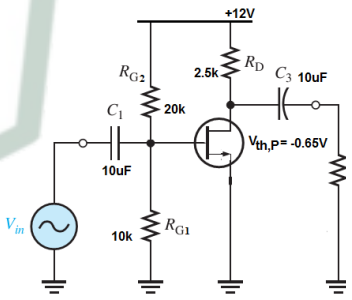


Figure 2 c

common emitter amplifier.

3. a Draw the diagram of center tap full wave rectifier and find the values of V_{dc},V_{ac}, and V_{rms}. What do you mean by peak inverse voltage [4+3+3+3]

b Determine the output waveform for the network shown in Fig 1 b and calculate the output dc level v_0 and the required PIV of each diode. An 10 volt sine is applied as the input v_i. [7]

c) Mention the non-operational quality attributes of and Embedded system and explain the product life cycle curve for an embedded System. [5+5]

4 i) Derive the expression of base current (I_b), collector current (I_c) and draw the DC load lines for Fixed base bias and voltage divider bias. [10]

ii) Determine I_c collector to emitter voltage (V_{CE}) from the circuit shown in Figure 2 a. [8]

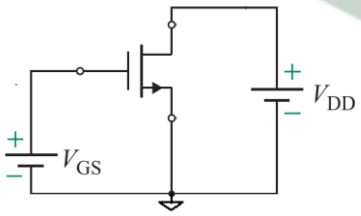
iii) What is the difference between DC load line and AC load line. [2]

5. a Find the Quiescent values of VGS, IDS, VDS for the amplifier shown in Fig 2 c. Find the value of open circuit voltage gain, if $k_n = 0.3mA/V^2$ [10]

b Explain the operation of the n channel Depletion mode MOSFET. Draw the IDS~VGS and IDS ~ VDS characteristics. Mention the informations obtained from these characteristics. [5+3+2]

6 a What do you mean by oscillation? What is Barkhausen's criteria for oscillation? Classify the sinewave oscillators and explain the operation of 2 sine wave oscillator circuit diagrams. [2+2+2+4]

b Find the values of small signal transconductance, rds for the following circuit, if $k_n = 0.3mA/V^2$, Vth,n =1.0V, VGS=2V, VDD=2.5V. [5]



c Find the mode of operation of the MOFET and the on resistance, if $k_n = 0.3mA/V^2$, Vth,n =1.0V, VGS=2V, VDD=0.5V. [5]

****