

B.E. FOOD TECHNOLOGY AND BIO-CHEMICAL ENGINEERING SECOND YEAR
SECOND SEMESTER EXAM-2019

Subject: ELEMENTARY ELECTRONICS

Time: 3hr.

FM:100

Attempt any 10 questions:

1. a) Draw the energy band diagram of a p-n junction diode under reverse and forward biased condition. Write the current voltage relationship for such diode and draw and explain I-V characteristic.
- b) The reverse saturation current at 300K of a p-n junction Ge diode is $5 \mu\text{A}$. Find the voltage to be applied across the junction to obtain a forward current of 50 mA. [7+3]
- 2.a) What do you mean by avalanche breakdown and Zener breakdown? Draw and explain a simple voltage regulator circuit using Zener diode.
- b) In a Zener voltage regulator circuit, the supply voltage is 15V. The 12 V, 0.36W Zener diode operates at a minimum diode current of 2 mA. Calculate the series resistance R and the range over which the load resistance R_L can be varied. [6+4]
3. Draw the circuit of a full wave rectifier using two diodes and explain its operation using suitable diagram. Determine the expression for ripple factor and conversion efficiency for such rectifier. [5+5]
4. Draw and explain the input and output characteristic of a BJT in CB mode mentioning cut off and saturation region. [3+7]
5. a) Show different feedback topologies. Write the effects of negative feedback in an amplifier. Write one application of positive feedback.
- b) Determine the transfer gain of an amplifier with open loop gain $A = -100$ and feedback ratio $\beta = -0.04$. Determine output voltage and feedback voltage if the input voltage is 1mV. [7+3]
6. What is hybrid model? Write the advantages of hybrid parameters. Draw h-equivalent circuit of a BJT. [3+5+2]
7. Draw the schematic diagram of n-channel depletion and enhancement mode MOSFET. Explain the principle of operation of depletion MOSFET. [5+5]
8. What is field effect transistor? Explain the static characteristics of a JFET mentioning the linear region and saturation region. What do you mean by pinch off? [2+6+2]
9. Draw the schematic diagram of n-channel depletion and enhancement mode MOSFET. Explain the Drain characteristics of an n-channel MOSFET. Compare FET and BJT. [2+5+3]
10. Draw a simple RS flip-flop and verify the truth table for the same. Draw the logic circuit for a clocked RS flip-flop. [8+2]
11. What is race around condition? How this race around condition is removed using Master-Slave JK flip-flop? [3+7]
12. Draw and explain the NAND only logic circuit of OR and AND gates. What do you mean by combinational logic and sequential logic? [6+4]