

II B.Tech II Semester Supplementary Examinations, April/May 2005
ELECTRONIC DEVICES AND CIRCUITS
(Mechatronics)

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

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Draw the charge profile diagrams of P-type and N-type semiconductors.
(b) Draw the reverse bias characteristic of the semiconductor diode discussing the method of obtaining the curve using a circuit and how do you calculate the reverse resistance? Explain.
(c) Mention the important specifications of semiconductor diodes and discuss the significance of each of them clearly.
2. (a) With suitable sketches, discuss about the principle of operation of bridge rectifier circuit. Mention the advantages and disadvantages of the circuit when compared to other full wave rectifier circuit.
(b) Derive the expressions for ripple factor and efficiency of bridge rectifier circuit.
3. (a) Compare various features of BJT and JFET devices
(b) Draw a diagram showing the structural details of P-Channel Field Effect Transistor.
(c) Draw a circuit with biasing voltages to obtain the characteristics of a JFET
(d) Mention the relation between Drain current, Drain saturation current, V_{GS} and V_P . And explain the influence of pinch of voltage ' V_P ' on drain current using Transfer characteristic of the Junction Field Effect Transistor.
4. (a) Draw the circuit diagrams showing the three configurations of Transistor amplifiers.
(b) Draw the Transistor biasing circuit using Collector-to-base bias arrangement. Explain the concept of providing proper bias for the Transistor to act as amplifying device
(c) Mention the DC load line equation for CE Transistor Collector to base bias circuit and describe the method of drawing the DC load line on the CE Transistor output characteristics.
5. (a) Explain the concepts for arriving at the hybrid- π equivalent circuit model of Common Emitter amplifier at high frequencies.
(b) Explain the different parameters used in the above hybrid- π equivalent circuit indicating the methods of arriving at the various expressions for the parameters used in the circuit.

6. (a) Draw the FET amplifier circuit with potential divider biasing with tabilization of bias. ssume sinusoidal input to the amplifier. Explain the operation of the amplifier showing the signal waveforms on the output characteristics of the device and the load line.
(b) Discuss the concept of amplification from the small signal low frequency equivalent circuit of FET amplifier with necessary derivation for voltage amplification.
7. (a) Mention the reasons for using negative feedback in transistor amplifiers and derive an expression for voltage gain with feed back.
(b) In an R-C Coupled amplifier, the voltage gain $A_V = 1000$; $f_L = 20$ HZ; $f_H = 200$ KHz; and distortion is 6% without feedback. Calculate the values of the above parameters; if negative voltage feedback $\beta = 0.01$ is applied to the amplifier.
8. (a) Draw the weinbridge oscillator circuit and explain its working.
(b) Calculate the value of 'C' used in the weinbridge circuit that determines the oscillator frequency of 10 KHZ. Assume $R=50$ K Ω in the weinbridge circuit.
(c) Derive the expression for feedback factor in the weinbridge circuit.
