2005-ANDHRA UNIVERSITY

II B.TECH I SEMESTER DEGREE EXAMINATION

ELECTRONICS

(INFORMATION TECHNOLOGY)

TIME-3HOUR
MARKS-70

First Question Is Compulsory
Answer Any Four From The Remaining Questions
All Questions Carry Equal Marks
Answer All Parts Of Any Question At One Place

PART A [5*2=10 MARKS]

(a) Distinguish between "transistion capacitance" and "diffusion capacitance" of a PN junction diode.

(b) Sketch the symbol and V-I characteristics of a varactor diode. List its applications.

(c) What is early effect in a BJT?

(d) A BJT has I8 = 10 µA, ß° =99 and IB=20 µA What is its IC and IE ?

(e) Name the parameters that are responsible for the shift in the operating point of a BJT amplifier with temperature. Give the variation of these parameters with temperature.

PART B [4*15=60 MARKS]

2. (a) Differentiate between drift current and diffusion currents. Discuss in details the various current components in
a i) forward biased PN junction in diode and

ii) reverse biased PN junction diode.

(b) Sketch the V-I characteristics of a PN junction diode and explain how they vary with temperature.

(c) An ideal Ge PN junction diode has a reverse saturation current of 10 µA at 300° K. Find the static and dynamic resistance of the diode at a forward bias of 0.2 V and at 360° K.

3. (a) What is tunneling in a tunnel diode? Explain the V-I characteristics of a Tunnel diode with the help of its energy band diagrams. List its applications.

(b) Show the two transistor analogous circuit of a SCR and explain its operation. Sketch its V-I characteristics. Discuss its turn-ON and turn-OFF mechanisms.

4. (a) Sketch the profiles of the currents entering (or leaving) the base region in an NPN transistor in active biased condition and hence explain the operation of the transistor.

(b) For the circuit shown in below, determine, IC and VCE. Assume for BJT ß°=99 and VBE0 V.

DIAGRAM

5. (a) Explain the reasons for shift in the operating point of a BJT amplifier with temperature. Describe briefly the bias stabilization circuits used.

(b) Design a shelf bias (emitter bias) circuit for an CE amplifier using a BIT having ßo = 99 and VBE=0V. The desired operating point is VCE=4V and IC=2mA. Assume VCC =10 V and Rc =2KO and S=8. Show the circuit with

all the component values.

6. (a) Explain why a IFET is called a umpolar device. Describe its operation with a neat sketch and its input and transfer characteristics. What is punch off voltage and mark it on the characteristics?

(b) Deduce the small signal equivalent circuit for a IFET and prove that gm = 2/l VP l vIDSS.IDS

(c) AJFET has Vp = -4V, IDSS =12 mA and IDS =3 mA. What is its 'Vas' and 'gm'?

7. (a) Draw the circuit diagram of a bridge rectifier with a capacitor input filter and explain its operation with waveforms. Derive the expressions for its output d.c. voltage and ripple voltage.

(b) A 50 Hz., bridge rectifier power supply is required to provide a d.c. voltage of 100 volts to a load of 5 kilo ohms. The minimum r.m.s. ripple voltage is to be 500 mV. Find the minimum value of the capacitance C required and the r.m.s. value of the secondary voltage of the secondary voltage of the transformer.

8. (a) Explain with a neat circuit diagram how a zener diode can be used as a voltage regulator.

(b) For the CE amplifier circuit shown in below, determine:

(i) the mid-band voltage gain Vo/Vs and (ii) the lower 3-dB cut off frequency 'fz'. Assume for BJT hre =0 and hoe =25 μ A/V as parameters.

DIAGRAM