Code No: RR-10205.

Set No:1

I-B.Tech. Regular Examinations, May/June-2004

ELECTRONICS DEVICES AND CIRCUITS
(Common to Electrical and Electronics Engineering, Electronics and Communication Engineering, Computer Science and Engineering, Electronics and Instrumentation Engineering , Bio medical Engineering, Information Technology, Electronics and Control Engineering, Computer Science and Systems Engineering, Electronics and Telematics, Electronics and Computer Engineering, Instrumentation and Control Engineering)

Time: 3 Hours **Max. Marks: 80**

Answer any FIVE questions
All questions carry equal marks

1.a) An Electron is moving perpendicular to magnetic field 'B'. Derive the expression for radius 'R' of the trajectory and period of rotation T.
b) Derive the expression for the electro magnetic deflection sensitivity in the case of the CRT.

2.a) Draw the band diagram of PN junction under open circuit conditions and explain.
b) Sketch charge density, Electric field intensity and potential energy balance for electrons and holes.

3. a) Draw the circuit diagram of a rectifier. Explain the operation of the circuit with relevant waveform.
b) A bridge rectifier uses four identical diodes having forward resistance of 5Ω each. Transformer secondary resistance is 5 ohms and the secondary voltage is 30 V (rms). Determine the dc output voltage for I_{dc} = 200 ma and value of the output ripple voltage.

4. a) Why transistor is considered as current control device. Explain.
b) In a transistor if Emitter junction is forward biased and collector is reverse biased, explain its operation.
c) Explain why $\alpha < 1$ and $\beta > 1$ for a given transistor.

5.a) Give the UJT symbol and simplified equivalent circuit with external resisters included.
b) Draw UJT emitter characteristics and mention various regions.

Code No: RR-10205.

Set No:1

c) If $V_E < V_{Paba}$ and $V_E > V_P$, explain how UJT works for these conditions.
d) If $\eta=0.8$ $V_{BB}=15v$ and $V_D=0.7v$ find the value of Vp.

6.a) What is meant by thermal runaway? Briefly explain.
b) What is the condition for thermal stability.
c) An npn transistor $\beta = 50$ is used in common emitter circuit with $V_{CC} = 10V$ and $R_C = 2K$. The bias is obtained by connecting 100 k with resistance from collector to base. Find the quiescent point and stability factor S.

7.a) Draw the circuit diagram of a voltage shunt feed back using BJT and derive expression for voltage gain with feedback.
b) What are the advantages and disadvantages of negative feed back.
c) Calculate the gain input impedance, output impedance of voltage series feed back amplifier having A = -300 R_i = 1.5 k R_0 = 50 k and $\beta = -\frac{1}{20}$

8.a) Classify various oscillators based on O/P waveforms circuit components, operating frequencies and feedback used.
b) A phase shift oscillator is to be designed with FET having $g_m=5000\mu s$, $rd=4k\Omega$ while the resistance in the feedback circuit is $9.7k\Omega$. Select the proper value of C and R_D to have the frequency of oscillations as 5KHZ.

Code No: RR-10205.

Set No:2

I-B.Tech. Regular Examinations, May/June-2004

ELECTRONICS DEVICES AND CIRCUITS
(Common to Electrical and Electronics Engineering, Electronics and Communication Engineering, Computer Science Engineering, Electronics and Instrumentation Engineering , Bio medical Engineering, Information Technology, Electronics and Control Engineering, Computer Science and Systems Engineering, Electronics And Telematics, Electronics and Computer Engineering, Instrumentation and Control Engineering)

Time: 3 Hours **Max. Marks: 80**

Answer any FIVE questions
All questions carry equal marks

1.a) Derive the expression for the electro static deflection sensitivity in the case of CRT.
b) Compare electro static and electro magnetic deflection sensitivity in all respects.

2.a) Define law of junction? Explain about the term cut in voltage associated with p-n junction diode? How do you obtain cut in voltage from forward V – I characteristics?
b) Briefly discuss about avalanche breakdown and zener breakdown.

3. a) What is the cause of surge rectifier circuits using capacitor filter? How is the current limited.
b) In a full wave rectifier the required dc voltage is 9V and the diode drop is 0.8V calculate ac rms input voltage required in case of bridge rectifier circuit and centre tapped full wave rectifier circuit.
c) Derive the expression for the ripple factor of half wave rectifier and full wave rectifier.

4. a) Give the biasing circuit for P-N-P transistor in CE configuration and explain its operation with the help of input and output characteristics.
b) Briefly explain about:
i) Diffusion Current. ii) Drift Current.

Code No: RR-10205.

Set No:2

5.a) For a small signal JFET
$i_D = f(V_{GS}, V_{DS})$
obtain expressions for i_D and hence define g_m, r_d and μ..
b) From the definition of gm obtain expression for gm.
c) For an N-Channel silicon FET with a = 3 x 10^{-4}cm and $N_D = 10^{15}$ electrons /cm^3 find the pinch off voltage.

6.a) Draw the circuit diagram of a collector to base bias circuit of CE amplifier and derive explain for S.
b) Determine the quiescent currents and the collector to emitter voltage for a germanium transister with $\beta = 50$ in self biasing arrangement. Draw the circuit with a given component value with $V_{CC} = 20V$, $R_C = 2K$, $R_e = 100\Omega$, $R_1 = 100K$ and R_2=5K. Also find out stability factor.

7.a) State and explain Barkhausen Criterion. What are the four topologies of feed back amplifier? Explain by taking sampling and mixing signals to each topology.
b) State the transfer gain of each configuration and define feed back factor.

8.a) What are the factors that affect the frequency stability of an oscillator. How frequency stability can be improved in oscillators.
b) Derive an expression for frequency of oscillation of Hartley oscillator using transistor.

Code No: RR-10205.

Set No:3

I-B.Tech. Regular Examinations, May/June-2004

ELECTRONICS DEVICES AND CIRCUITS
(Common to Electrical and Electronics Engineering, Electronics and Communication Engineering, Computer Science Engineering, Electronics and Instrumentation Engineering , Bio medical Engineering, Information Technology, Electronics and Control Engineering, Computer Science and Systems Engineering, Electronics And Telematics, Electronics and Computer Engineering, Instrumentation and Control Engineering)

Time: 3 Hours **Max. Marks: 80**

Answer any FIVE questions
All questions carry equal marks

1.a) Derive the expression for transit time τ (tow) and final velocity V in the case of Electron traversing in uniform electric field E.

b) An electron with a velocity of $3x10^5 ms^{-1}$ enters an electric field of 910 v/m making an angle of 60^0 with the positive direction. The direction of the electric field is in the positive Y direction. Calculate the time required to reach its maximum height.

2.a) How does the reverse saturation current of diode varies with temperature. Explain.

b) Draw the energy band diagram of p-n diode for no bias, forward bias and reverse bias.

3. a) For a full wave rectifier with shunt capacitance filter derive expression for ripple factor using approximate analysis.

b) Why filter circuit in necessary with rectifiers. Give the list of different filters used in section and their merits and demerits.

4. a) Compare CB,CE,CC configurations with respect to current gain, voltage gain, input resistance and output resistance.

b) Explain what is meant by early effect in the case of transistor and what is its consequences.

Code No: RR-10205.

Set No:3

5.a) From the static characteristics how to obtain quiescent voltage and current using load line for JFET.

b) Explain how FET can be used as a switch.

6.a) Draw the circuit diagram of CE amplifiers with emitter resistance and obtain its equivalent hybrid model and derive expressions for A_I, R_I, A_V with the approximate analysis.

b) Determine A_V, A_I, R_i, R_O for a CE amplifier using npn transistor with h_{ie}= 1200Ω h_{re} = 0, h_{oe}=36 h_{oe}=2X10^{-6} mhos. R_L = 2.5 kΩ, R_S = 500 Ω (neglect the effect of biasing circuit)

7.a) Classify the amplifier based on feed back topology and give their block diagrams. How the input and output impedances are effected in each case.

b) Draw the circuit diagram of a current series feed back circuit and derive expressions for voltage gain and output resistance, and input resistance.

8.a) What is the type of feedback incorporated in the Wien bridge oscillator circuit? Explain its working.

b) A FET phase shift oscillator has g_m=5mhos and rd=50kΩ. The feedback resistance is 100kΩ and the capacitor value is 64.97PF. Calculate the frequency of the oscillations and the value of R_D.

Code No: RR-10205.

Set No:4

I-B.Tech. Regular Examinations, May/June-2004

ELECTRONICS DEVICES AND CIRCUITS
(Common to Electrical and Electronics Engineering, Electronics and Communication Engineering, Computer Science Engineering, Electronics and Instrumentation Engineering , Bio medical Engineering, Information Technology, Electronics and Control Engineering, Computer Science and Systems Engineering, Electronics And Telematics, Electronics and Computer Engineering, Instrumentation and Control Engineering)

Time: 3 Hours **Max. Marks: 80**

Answer any FIVE questions
All questions carry equal marks

1.a) With the help of necessary equations show the trajectory of an electron is cycloid when it is placed in perpendicular electric and magnetic fields.
b) Determine the velocity and kinetic energy of an electron accelerated through potential of 3kv.

2.a) What are general specifications of pn junction diode?
b) The voltage across a silicon diode at room temperature (300^0 k) is 0.7 volts when 2ma current flows through it. If the voltage increases to 0.75V, calculate the diode current (assume Y_T = 26mu)

3. a) Explain the circuit diagram of a single phase full-wave bridge rectifier and sketch the input output wave forms.
b) Define percentage regulation and prove that the regulation of both half wave and full wave rectifier is given by percentage regulation equal to

$$\frac{Rf}{RL} \text{x} 100\%$$

4. a) Explain the input and output characteristics of CE configuration of a transistor and indicate various regions.
b) Prove that for a CE transistor in active region $I_C = \beta, I_B + (1+\beta) I_{CO}$.

5.a) Compare JFET and MOSFET with respect to various features.
b) Draw the biasing circuit suitable for JFET and if the JFET is replaced by a MOSFET for what mode of operation it is valid and explain about the function of each component used in the circuit.

Code No: RR-10205.

Set No:4

6.a) Compare common collector and common emitter configuration with regards to R_i, R_o, A_I,A_V.

b) Draw the circuit diagram of CC amplifier using hybrid parameter and derive expressions for A_I, A_V, R_i,R_O.

7.a) What are the different types of feed back amplifiers. Give their equivalent circuits.

b) Draw the circuit for current shunt amplifier and justify the type of feed back. Derive the expression for A_v, β, R_i and R_o for the circuit.

8.a) Why the LC oscillators are not suitable for low frequency applications. Explain the principle of working of basic LC oscillators.

b) Find C and h_{fe} of a transistor to provide f_o of 50KHZ of a RC transistorized phase shift oscillator. Given R_1=22kΩ, R_2=68kΩ, R_c=20kΩ, R=6.8kΩ and h_{ie}=2kΩ.