TEC-301 1175

**Odd Semester Examination 2018-19**

**B.TECH.(EEE/EN) (SEMESTER-III)**

# ELECTRONIC DEVICES AND CIRCUITS

**Time: 03:00 Hours** **Max Marks :100**

**Note:Attempt all questions. All questions carry equal marks.**

1. Attempt **any four** parts: [5x4=20]

   (a) Design an astable\multivibrator for output amplitude of 15 volts and square wave of 500Hz, use silicon transistors having $(h_{fe})_{min}$=40 for transistor=140kΩ, $(I_C)_{sat}$=6mA and $(V_{ce})_{sat}$=0.2 volt.

   (b) Explain Hall Effect and give some application of Hall Effect.

   (c) State and briefly explain Barkhausen criterion of oscillator. Draw the circuit diagram of general oscillator.

   (d) A cascaded amplifier of 2 stages has $A_1$=25 and $A_2$=10db. If $V_i$=5mv, find $V_o$ and the overall gain of the cascaded system in dB.

   (e) Draw circuit diagram of Darlington amplifier. Give its main characteristics, merits and applications.

2. Attempt **any four** parts: [5x4=20]

   (a) Explain the operation of transistor as an amplifier.

   (b) The gain of the amplifier is 100 with its bandwidth of 10 kHz. If 10% of negative feedback is applied in the basic amplifier, determine the feedback gain and new bandwidth of the amplifier.

   (c) Distinguish ferromagnetic, ferromagnetic and antiferromagnetic materials. Discuss the various uses of ferrites.

(d) The lattice constant of a face centered cubic lattice is $4.25\frac{1}{A}$. Determine the

(i) Effective number of atoms per unit cell.

(ii) Volume density of atoms.

(e) What is the function of speed up capacitor in a bistablemultivibrator.

3. Attempt **any two** parts. [10x2=20]

(a) Draw the circuit of an emitter coupled differential amplifier and explain its working.

(b) (i) State any four advantages of negative feedback in amplifiers.

(ii) In an amplifier with negative feedback, the gain of the basic amplifier is 100 and it employs a feedback factor of 0.02. If the input signal is 40mV determine

a Voltage gain with feedback and

b Value of output voltage.

(c) Explain how the timer IC555 can be operated as an astablemultivibrator, using timing diagram.

4. Attempt **any two** parts. [10x2=20]

(a) Explain the principle of working of Wein bridge oscillator circuit. Explain why negative feedback in addition to the usual positive feedback is employed in Wein bridge oscillator.

(b) Define negative Feedback and positive feedback. An amplifier with current feedback has following specifications: $h_{fe}$=100Ω, $h_{ie}$=2000 Ω, $R_1$=15000 Ω, $R_2$=5600 Ω, $R_e$=100 Ω and $R_L$=470 Ω. calculate the value of voltage gain and input resistance of the amplifier with and without feedback.

(c) Explain why the conductivity of pure semiconductor increase with temperature. When an intrinsic semiconductor does behave as an insulator? What is a hole in a semiconductor and how is it formed?

5. Attempt **any two** parts: [10x2=20]

(a) In a transistor colpitt's oscillator L=100μH,$C_1$= 01μF, $C_2$=0.001μF and $C_c$=10μF. Determine

(i) Operating frequency

(ii) Feedback fraction

(iii) Minimum gain to sustain oscillations

(iv) Emitter resistance $R_e$ if $R_L$=2.5kΩ

(b) Draw the circuit of a monostablemultivibrator using two transistors and explain its operation with reference to waveform of pertinent node voltage in the circuit. Analyze the circuit to obtain an expression for the pulse period.

(c) Draw the circuit of h parameter equivalent of a CE amplifier with unbypassed emitter resistor. Derive an expression for

(i) Its input impedance

(ii) Voltage gain, using the equivalent circuit.

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5. Attempt **any two** parts: [10x2=20]

(a) In a transistor colpitt's oscillator L=100μH,$C_1$=.01μF, $C_2$=0.001μF and $C_c$=10μF. Determine

(i) Operating frequency

(ii) Feedback fraction

(iii) Minimum gain to sustain oscillations

(iv) Emitter resistance $R_e$ if $R_c$=2.5kΩ

(b) Draw the circuit of a monostablemultivibrator using two transistors and explain its operation with reference to waveform of pertinent node voltage in the circuit. Analyze the circuit to obtain an expression for the pulse period.

(c) Draw the circuit of h parameter equivalent of a CE amplifier with unbypassed emitter resistor. Derive an expression for

(i) Its input impedance

(ii) Voltage gain, using the equivalent circuit.

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