

Roll. No.....

1211006

B.Tech(Integrated M.Tech/MBA) 1st / 2nd Semester Examination

Jan.2014

Basics of Electronics

Subject Code: ECL-100

Time Allowed: 03 hours.

Maximum Marks: 100

Before answering the question paper the candidate should ensure that they have been supplied the correct question paper. Complaints in this regard, if any, shall not be entertained after the examination.

Note: Question No. 1 is Compulsory and attempt two questions from each section. All questions carry equal marks.

- 1(a) What is Junction Capacitance in a diode? Also write the Diode Equation and explain each terms in the expression.
- (b) Enumerate the features of a Transistor working in Common Base, Common Emitter and Common Collector.
- (c) What is the Barkhausen Criteria for Sustained Oscillations?
- (d) Show how a NOR Gate can be used as an XOR Gate.
- (e) What are Lissajous Pattern?
- (f) Derive the expression for Gain of a closed loop Op-Amp working in Non-Inverting Mode as well as Inverting Mode.

[4+5+2+3+2+4=20]

SECTION - A

- 2(a) Differentiate between Drift and Diffusion Currents? Derive the expression for Drift Current in a Semi-Conductor.
- (b) What is Doping? How can we make an N-Type Semi-Conductor from an Intrinsic Semi-Conductor? What is the net electrical charge on an N-Type Semi-Conductor?
- (c) Show the VI Characteristic of a Diode. Show in the graph the Cut-In Voltage and the Breakdown Voltage. Also explain these two terms.
- (d) Explain Avalanche and Zener breakdown phenomenon.

[8+4+4+4=20]

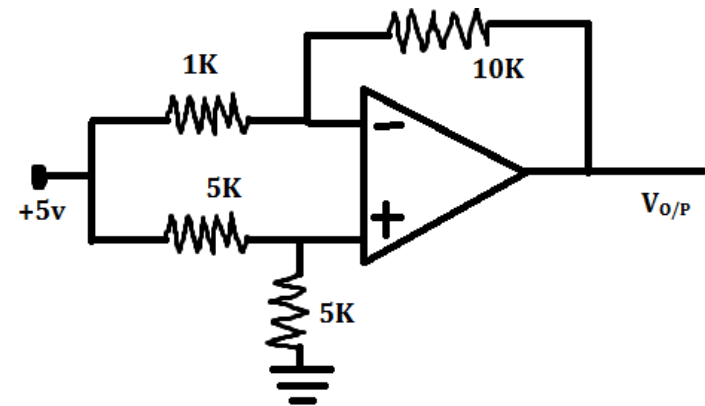
- 3(a) Draw the circuit diagram of a RC-Coupled Amplifier. Draw the Gain Bandwidth Characteristic. How the Lower and Upper Cut-Off Frequencies are obtained? Define Decibel. A 3-stage Amplifier has Voltage Gain of 10, 20 and 30 for each stage. Find the Voltage Gain and Gain in dB.
- (b) Derive the expression for Gain of an Amplifier with Negative Feedback. What is the effect of Negative Feedback on Gain, Bandwidth, Input and Output Impedance of an Amplifier?
- (c) Why transistor is known as “Transistor”? Define α , β , γ of a Transistor. Derive the relationship between α , β and γ of a transistor. **[10+6+4=20]**
- 4(a) What is Pizeo-Electric Effect? With the help of neat circuit diagram, explain the operation of Crystal oscillator. Draw its Equivalent circuit and explain it. Graphically show how does the reactance of a crystal varies with frequency.
- (b) What is the Barkhausen Criteria for Sustained Oscillation? Draw and explain Weinn Bridge Oscillator. Also find out the criteria for Sustained Oscillation of a Weinn Bridge Circuit. **[12+8=20]**

SECTION-B

- 5(a) Convert the following:-
 $(9BF)_{16} = ()_8$ $(7452)_8 = ()_{16}$ $(A2B6)_{16} = ()_8$
 $(AB3456)_{16} = ()_{10}$ $(11100110101)_2 = ()_{16}$
- (b) Why NAND and NOR Gates are called Universal Gates? How we can obtain XOR Gate from NAND Gate?
- (c) Solve the following using Boolean algebra:-
 (i) $F = A' (B' + C') + BC + AC'$
 (ii) $F = AB + A'C + BC$
- (d) Solve the following using K-Map:-
 (i) $F(A,,B,C,D) = \square m(0,1,2,5,6,7,8,9,10,14)$
 (ii) $F(A,,B,C,D) = \sum m(0,1,2,5,6,8,9,12) + d(14,15)$
[5+3+4+8=20]

- 6(a) Differentiate between Regulated Supply, Unregulated Supply and SMPS. With a diagram explain the working of a Digital Voltmeter.
- (b) Show the functional diagram of a CRT. Label and explain it. How can we obtain Intensity Control and Focusing Control? Explain how a Circular pattern can be obtained on a CRT Screen.
- (c) With the help of diagram, explain the operation of a Digital Voltmeter. **[8+8+4=20]**

- 7(a) Find the output Voltage of the following circuit:-



- (b) Define the following w.r.t. Op-Amp :-
 (i) Slew Rate, (ii) CMRR, (iii) PSRR, (iv) Unity Follower.
- (c) Draw the circuit diagram and derive the expression of Op-Amp as :-
 (i) Differentiator, (ii) Adder, (iii) Integrator. **[4+8+8=20]**