

## **B.Sc. Electronics Syllabus**

### **Semester III – Paper 3**

#### **EL-301T LINEAR INTEGRATED CIRCUITS AND ‘C’ PROGRAMMING**

##### **Unit 1:**

**14 hours**

##### **Integrated circuit and operational amplifier**

Integrated circuit, Advantages and disadvantages of ICs, scale of integration– classification of ICs by structure and by function (mention only), IC terminology, fabrication of monolithic IC – steps involved in the fabrication of a NPN transistor (epitaxial planar diffusion process). Operational amplifiers- block diagram, equivalent circuit, various parameters op-amp -input bias current, input offset voltage, output offset voltage, CMRR, slew rate, SVRR, Characteristics of ideal and practical op-amps. Mention 3 different op-amp ICs (Mono, dual and quad op-amp ICs(mention only). 741, OP 07, LM 308, etc. and their comparison with respect to parameters, limitations of op-amp in open loop mode.

Op - Amp with negative feedback: Inverting amplifier- derivations for  $A_v$ , concept of virtual short and virtual ground. Non- inverting amplifier – derivations for  $A_v$ . Voltage follower-circuit and features, Summing amplifier/adder and subtractor – derivation for the output voltage. Averaging amplifier, scale changer, numerical problems.

Integrator, differentiator- derivation for the output voltage, output waveforms for sine and square wave inputs, small signal half wave rectifier-circuit and working.

##### **Unit 2:**

**14 hours**

##### **Applications of operational amplifier & IC 555**

Open loop applications: comparator-circuit and characteristics, schmitt trigger-circuit and waveforms, schmitt trigger ICs (mention only)

First order active filters- low pass, high pass, band pass, band reject and all pass filters.

Circuit diagrams, derivation for cutoff frequency and numerical problems for low pass and high pass filters only. Instrumentation amplifier – circuit and working.

Phase-shift & Wein bridge oscillator using op-amp: circuit, working, expression for frequency of oscillation (no derivation), numerical problems.

Fixed and variable IC regulators– IC 78xx and IC 79xx -concepts only, IC LM317- output voltage equation (mention only) and simple numerical problems.

555 timer: functional block diagram, Multivibrator–types (mention only), Circuit diagram and Astable Multivibrator – circuit with 555 timer and working, equation for frequency of oscillations (no derivation),numerical problems. Circuit of monostable multivibrator using 555.

##### **Unit 3**

**12 hours**

##### **C Programming**

Introduction, Importance of C, Character set, Tokens, keywords, identifier, constants, basic data types, variables: declaration & assigning values. Structure of C program

Arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, conditional operators, bit wise operators, expressions and evaluation of expressions, type cast operator, implicit conversions, precedence of operators. Arrays-concepts, declaration, accessing elements, storing elements, two-dimensional and multi-dimensional arrays. Input output statement–printf(), scanf() & getch()) and library functions (math and string related functions).

**Unit 4****08 hours****Decision making, branching & looping**

Decision making, branching and looping : if, if-else, else-if, switch statement, break, for loop, while loop and do loop. Functions: Defining functions, function arguments and passing, returning values from functions, example programs.

**Unit 5****08 hours****Structures and unions**

defining and declaring a structure variables, accessing structure members, initializing a structure, copying and comparing structure variables, array of structures, arrays within structures, structures within structures, structures and functions. Unions-size of structures, bit fields, example programs.

**Text books:**

1. A Text book of Electronics, R.S.Sedha, S Chand and Co., Multicolour, 3<sup>rd</sup> edition , 2012.
2. Operational Amplifier and Linear Integrated circuits - Ramakanth Gayekwad PHI 5th edition.
3. Electronic Devices and circuit theory, Robert Boylestad and Louis Nashelsky, 9<sup>th</sup> Edition, 2013, PHI.
4. Programming in ANSI C, Balagurusamy, 2nd edition, TMH.

**Reference books:**

1. Linear Integrated circuits by Roy Choudhury, New age international, 4<sup>th</sup> edition, 2010
2. Basic electronics- B.L. Theraja - S. Chand and Co. 3<sup>rd</sup> edition -2012.
3. Electronics text lab manual, Paul B. Zbar.
4. Electronic devices, David A Bell, Reston Publishing Company/DB Tarapurwala Publ.
5. Electronic devices, applications and Integrated circuits, Mathur, Kulshreshta and Chadha, Umesh Publications.
6. Computer concepts and C Programming techniques by Padma Reddy, Nandi publications, 4<sup>th</sup> edition, 2010.

## Semester III - Practical III

### EL-301P LINEAR INTEGRATED CIRCUITS AND 'C' PROGRAMMING LAB

#### PART- A

##### Experiments on Linear Integrated circuits

1. Inverting and non inverting amplifiers.
2. Adder and subtractor.
3. Study of first order low-pass filter and high-pass filter.
4. RC phase shift oscillator/ Wein bridge oscillator Using op-amp.
5. Small signal half wave rectifier using OP-AMP.
6. Astable multivibrator / Monostable multivibrator using IC555.
7. Fixed voltage IC regulators using 78 series and 79 series.
8. Variable voltage regulator using IC LM 317.
9. Op-amp as Integrator /differentiator

**Note: Minimum of 5 experiments to be performed in PART- A**

#### PART- B

##### Experiments on 'C' Programming.

1. To generate the Fibonacci series up to the given limit N and also print the number of elements in the series.
2. To find minimum and maximum of N numbers.
3. Find the GCD of two integer numbers.
4. Write a program to calculate factorial of a given number.
5. Find all the roots of a quadratic equation  $Ax^2 + Bx + C = 0$  for non – zero coefficients A, B and C. Else report error.
6. Calculate the value of  $\sin(x)$  and  $\cos(x)$  using the series. Also print  $\sin(x)$  and  $\cos(x)$  value using library function.
7. To generate and print prime numbers up to an integer N.
8. To sort given N numbers in ascending order.
9. To find the sum & difference of two matrices of order MxN and PxQ.
10. To find the product of two matrices of order MxN and PxQ.
11. To find the transpose of given MxN matrix.
12. To find the sum of principle and secondary diagonal elements of the given M xN matrix.
13. Write a program to calculate the subject wise and student wise totals and store them as a part of the structure.

**Note: Minimum of 5 experiments to be performed in PART- B**