Course Title: Electronic Principles **Credit: 3+1**
Course No: CSIT.114 **Number of period per week: 3**
Nature of the Course: Theory+Lab **Total hours: 45**
Year: First, Semester: First
Level: B.Sc.CSIT

1. Course Introduction

The course intends to enable the students to be acquainted with the basic concepts and principles of electronics. Students will be familiarized with the fundamentals of circuit analysis, semiconductors, transistors, amplifiers, oscillators, etc.

2. Objectives

At the end of this course the students should be able:

- to acquire sufficient basic knowledge in electronics.
- to apply this knowledge base for studying major courses in CSIT.
- to introduce the concepts and methods of electronics needed for application in various branch of CSIT

3. Specific Objectives and Contents

Specific Objectives	Contents
• Understand and use Kirchoff's current and voltage law • Distinguish between current source and voltage source • Learn Thevenin's and Norton's theorems and their applications	**Unit I: Circuit Analysis (6)** Kirchoff's current and voltage law, concept of current source, voltage source, application of Kirchoff's current and voltage law to simple circuits, Thevenin's and Norton's theorems and their applications
• Distinguish Intrinsic and extrinsic semiconductors and understand their working • Understand the formation of p-n junction • Explain the diode characteristics • Use diode as a rectifier • Use Zener diode as a voltage regulator • Understand the concept of photodiode and LED	**Unit II: Semiconductors (5)** Intrinsic and extrinsic semiconductors, formation of p-n junction, diode characteristics, diode as a rectifier, Zener diode, photodiode and LED
• Explain the structure and working of bipolar junction transistors • Use CB, CC, CE configurations and explain their characteristics • Derive the relation between α and β • Use of transistor as an amplifier and as a switch	**Unit III: Bipolar Junction Transistor** (8) Structure and working of bipolar junction transistor, CB, CC, CE configurations, CE mode characteristics, relation between α and β, Concept of transistor as an amplifier and transistor as a switch, DC load line and Q point

- Explain the working of JFET and MOSFET
- Understand the I-V characteristics and parameters
- Develop idea of MOS capacitor and memory devices
- Applications of FET as a Voltage Variable resistance (VVR), inverter, switch

Unit IV: Field Effect Transistor (8)
JFET and MOSFET, I-V characteristics and parameters, Idea of MOS capacitor, memory device, CMOS, Applications - FET as a Voltage Variable resistance (VVR), inverter, switch, DRAM

- Understand the classification of amplifier
- Learn frequency response and Q point
- Explain DC coupling and effect on frequency response
- Learn the concept of feedback and amplifiers
- Use of Op-amp as comparator
- Use of amplifiers

Unit V: Amplifiers (12)
General classification of amplifier based on frequency response and Q point, idea of multistage amplifier, Concept of DC coupling and effect on frequency response, concept of feedback, Concept of operational amplifier, characteristics of Op-amp, Op-amp as comparator, Virtual ground concept, Applications - Unity gain amplifier, buffer, inverting amplifier, non-inverting amplifier, Adder, subtractor, integrator and differentiator

- Understand the Barkhausen criteria
- Explain the working of Hartley, Colppits and Phase shift oscillators

Unit VI: Oscillators (5)
Barkhausen criteria, Concept of Hartley, Colppits and Phase shift oscillators

- Differenciate unregulated and regulated power supplies
- Develop the concept of regulators and current boosters

Unit VII: Regulated Power Supplies (4)
Unregulated and regulated power supply, concept of load and line regulation, Shunt and Series regulators, current boosters

Evaluation System:

Undergraduate Programs				
External Evaluation	**Marks**	**Internal Evaluation**	**Weightage**	**Marks**
End semester examination	60	Assignments	10%	40
(Details are given in the separate table at the end)		Quizzes	10%	
		Attendance	10%	
		Presentation	10%	
		Term papers	10%	
		Mid-Term exam	40%	
		Group work	10%	
Total External	60	Total Internal	100%	40
Full Marks 60+40 = 100				

External evaluation

End semester examination: It is a written examination at the end of the semester. The questions will be asked covering all the units of the course. The question model, full marks, time and others will be as per the following grid.

Full Marks: 100, Pass Marks: 50, Time: 3 Hrs

Nature of question	Total questions to be asked	Total questions to be answered	Total marks	Weightage	External exam marks
Group A: multiple choice*	20	20	20×1 = 20	20%	12
Group B: Short answer type questions	11 questions	8	8×5 = 40	40%	24
Group C: Long answer type question/case studies	6 questions	4	4×10 =40	40%	24
			100	100%	60

*Scoring scheme will not follow negative marking.

Each student must secure at least 50% marks in internal evaluation in order to appear in the end semester examination. Failing to get such score will be given NOT QUILIFIED (NQ) and the student will not be eligible to appear in the end semester examinations.

Practical examination: Practical examination will be taken at the end of the semester. Students must demonstrate the knowledge of the subject matter.

Internal evaluation

Assignment: Each student must submit the assignment individually. The stipulated time for submission of the assignment will be seriously taken.

Quizzes: Unannounced and announced quizzes/tests will be taken by the respective subject teachers. Such quizzes/tests will be conducted twice per semester. The students will be evaluated accordingly.

Attendance in class: Students should regularly attend and participate in class discussion. Eighty percent class attendance is mandatory for the students to enable them to appear in the end semester examination. Below 80% attendance in the class will signify NOT QUALIFIED (NQ) to attend the end semester examination.

Presentation: Students will be divided into groups and each group will be provided with a topic for presentation. It will be evaluated individually as well as group-wise. Individual students have to make presentations on the given topics.

Term paper: Term paper must be prepared by using computer in a standard format of technical writing and must contain the required number of pages. It should be prepared and submitted individually. The stipulated time for submission of the paper will be seriously taken as one of the major criteria of the evaluation.

Mid-term examination: It is a written examination and the questions will be asked covering all the topics in the session of the course.

Discussion and participation: Students will be evaluated on the basis of their active participation in the classroom discussions.

Instructional Techniques: All topics are discussed with emphasis on real-world application. List of instructional techniques is as follows:

- Lecture and Discussion
- Group work and Individual work
- Self study
- Assignments
- Presentation by Students
- Term Paper writing

- Quizzes
- Guest Lecture

Students are advised to attend all the classes and complete all the assignments within the specified time period. If a student does not attend the class(es), it is his/her sole responsibility to cover the topic(s) taught during that period. If a student fails to attend a formal exam/quiz/test, there won't be any provision for re-exam. Unless and until the student clears one semester he/she will not be allowed to study in the following semesters.

Prescribed Text

- *Principles of Electronics*: A. P. Malvino, Tata Mc-Graw Hill Publication, 7th Edition

Reference

- *Basic Electronics*: B. L. Theraja, S.Chand & Company Ltd
- *Electronic Devices and Circuits:* T. F. Bogart, Universal Book Stall, New Delhi
- *Principles of Electronics*: V. K. Meheta, S.Chand & company Ltd. 5th Edition
- *Basic Electronics and Linear Circuits*: N. N. Bhargava, D. C. Kulshreshtha, S. C. Gupta, Tata McGraw Hill Publishing company
- *Electronic Devices and circuits*: Boylstead, Tata Mc-Graw Hill

Course Title: Electronic Principles PR **year: 1st**
Course No: CSIT.114 **Semester: 1**
Nature of the Course: Practical **Credit: 1**
Year: First, Semester: First
Level: Bachelor of Science in Computer Science

Objectives:
By the end of the course the student should be able to:

- measure correctly the basic physical quantities
- determine errors in measurements
- analyze raw data and make valid conclusions
- validate corresponding theoretical component
- develop proper laboratory skills
- design basic physics experiments
- interpret experimental results and draw logical conclusions
- relate theoretical concepts to practical skills

Laboratory Works:

- To draw I-V characteristics of Ohmic and non Ohmic resisters and find voltage current ration.
- To study the junction diode and LED characteristics.
- To study the temperature dependence of resistance of a given semiconductors
- To determine the impedance of a given LCR circuit.
- To study characteristics of NPN transistor.
- To determine dielectric constant by using Lissagous pattern.
- To construct CE amplifier for the determination of the voltage gain of the amplifier.
- To study the characteristic of a Zener a diode (Switches) and use it to regulate power supply.
- To construct and study the working of NOT-AND-OR, NAND and NOR gates.
- To construct and study the working of OR, NAN and NOR gates.

Note:

- Student must perform 6 Hours of lab work (2 Hours x 3 times or 3 Hours x 2 times) every week
- In every semester, at least Eight experiments are to be performed. Additional experiments may be added subject to availability of time.
- The practical exam will be graded on the basis of the following marking scheme:

In-Semester Evaluation	20 %
Final Exam Written	60 %
Final Exam Oral	20 %

Books:

1. *B.Sc. Practical Physics*: C. L. Arora, S Chand and Company Ltd.
2. *Practical Physics:* G. L. Squires, Cambridge University Press.
3. *Practical Physics*, P. K. Shukla and A. Srivastava, New Age International (P) Limited