AMITY UNIVERSITY
UTTAR PRADESH

Course Title: BASIC ELECTRONICS ENGINEERING
Course Code: ES201
Credit Units: 04
Level: UG

L	T	P/ S	SW/F W	TOTAL CREDIT UNITS
3	0	2	0	4

Course Objectives: The objective of this course is to introduce the students about the semiconductor devices. This course is to familiarize the students about the transistor, FET and operational amplifier. This course also familiarizes the students about the basics of Digital Electronics.
Prerequisites: Physics
Course Contents / Syllabus:

Module I: Semiconductor Diode and Diode Circuits	**Weightage %**
• Semiconductor devices, p-n junction, diffusion capacitance, drift capacitance. • Diode - ideal versus practical, diode resistance, diffusion current, drift current. • diode equivalent circuits, load line analysis, diode as a switch. • different types of diodes - Zener, Schottky, LED, Solar Cell. • Zener diode as voltage regulator. • Diode applications - half wave & full wave rectifiers, clipping and clamping circuits	**25**
Module II: Bipolar Junction Transistor	**Weightage %**
• Bipolar junction transistor (BJT) - Introduction, construction, transistor operations. Transistor configuration – common base, common emitter, common collector, basic features • Circuit topology, input-output characteristics, load line analysis, operating point • leakage currents, active, saturation and cut off mode of operations, • Transistor biasing, stabilization factors, thermal stability, coupling and bypass capacitors. • Distortion, frequency response of RC coupled amplifier.	**20**
Module III: Field Effect Transistors	**Weightage %**
• Junction Field effect transistor (JFET) - volt-ampere characteristics	**20**

• Merits and demerits of JFET • MOSFET - enhancement and -depletion mode • Common source amplifier • Source follower	
Module IV: Introduction to Operational Amplifiers	**Weightage %**
• Differential amplifier configuration, CMRR • Introduction to Op-Amp, schematic and block diagram, equivalent circuit • Pin configuration of 741 Op-Amp, datasheet interpretation • Characteristics of ideal Op-Amp, concept of virtual ground, slew rate. • Op-Amp configuration – open loop and closed loop Inverting and non-inverting Amplifiers	**20**
Module V: Basic Digital Electronics	**Weightage %**
• Number systems and codes • Boolean algebra, basic logic gates and their truth tables • Implementation of Boolean function using universal gates NAND and NOR, K-maps upto 4 variable • Adders and subtractor.	**15**

Course Learning Outcomes:

1. Student will be able to identify and describe the operations and applications of semiconductor devices.
2. Student will be able to analyze and design application-based circuits using Bipolar Junction Transistor.
3. Student will be able to understand basic operation of Field Effect Transistor.
4. Student will be able to understand the basics of operational amplifier and its characteristics.
5. Student will be able to apply the basic concept of digital electronics and design logic circuits.

Pedagogy for Course Delivery: The course would be covered under theory and laboratory. In addition to assigning small project–based learning, early exposure to hands-on design to enhance the motivation among the students. It incorporates designing of problems, analysis of solutions submitted by the student's groups and how learning objectives were achieved. Continuous evaluation of the students would be covered under quiz, viva etc.

List of Laboratory Experiment

1. To study and plot the characteristics of a junction diode.
1. To study Zener diode I-V characteristics.
2. To study diode-based clipping and clamping circuits.
3. To study half wave, full wave and bridge rectifier with filters.
4. To study the input and output characteristics of a transistor in its various configurations (CE and CB).
5. To study and plot the characteristics of a JFET in its various configurations.
6. To study and plot the characteristics of a MOSFET in its various configurations.

7. To study the gain and plot the frequency response of a single stage transistor amplifier.
8. To study the op amp as an inverting and non- inverting amplifier.
9. To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates.

Assessment/ Examination Scheme:

Theory L/T (%)	**Lab/Practical (%)**	**Total**
75%	25%	100%

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					**End Term Examination**
Components (Drop down)	Mid-Term Exam (CT)	Class Quiz	**HA**	Attendance(A)	
Weightage (%)	15%	10%	10%	5%	60%

CT: Class Test, HA: Home Assignment, EE: End Semester Examination; A: Attendance

Lab Assessment (P):

Continuous Assessment/Internal Assessment					**End Term Examination**
Components (Drop down)	A	**PR**	**LR**	V	
Weightage (%)	5%	15%	10%	10%	60%

A: Attendance, PR- Performance, LR – Lab Record, V – Viva. EE- External Exam

Text & References:

- Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”,8th Edition., PHI, 2002.
- Millman J. and Halkias .C., " Integrated Electronics ", 2nd Edition, Tata McGraw-Hill, 2001.
- Adel S. Sedra and K. C. Smith: Microelectronic Circuits, Fifth Edition, 2007, ISBN-10: 0195338839.
- Ramakant Gaekwad: Operational Amplifiers and Linear Integrated Circuits fourth Edition, 2000, ISBN 0132808684, 9780132808682
- Moris Mano: Digital Design, Pearson Education. FIFTH EDITIONISBN-13: 978-0-13-277420-8 , ISBN-10: 0-13-277420-8
- Principles of digital design, Prentice-Hall, Inc. Upper Saddle River, NJ, USA ©1996 ,ISBN:0-13-301144-5