No.	Title		
1.	Subject	Physical Electronics & Fields	
2.	Subject Code	KE019	
3.	Status	Major	
4.	Credit Hours	Four (4) [(3L + 1T) × 14 weeks + 12 hours Lab]	
5.	Semester and Year	Semester 2	
6.	Pre-requisite	-	
7.	Mode of Delivery	Lectures, Assignments and Practical	
8.	Assessment	Assignments 10% Class Test 10% Lab work/ Test 20% Final Examination 60%	
9.	Objectives	This unit is designed to introduce the student to the basic electrical properties of conductors, insulators and semi-conductors, which form the basic elements of electronic devices. The fundamental operations and application of two such devices (diode and bi-polar transistors) are then described.	
10.	Learning Outcomes	Upon the completion of the unit, the students will be able to: 1. Understand the fundamental difference between conductors, insulators and semi-conductors. 2. Explain qualitatively the d.c. characteristics of silicon diodes and transistors. 3. Show the application of the diodes and that of the bi-polar transistors.	
11.	Details of subject	Contents	Hours
		Chapter 1: Electricity and Matter Electrostatic phenomena. Electric field. Charge and electrons. Uniform field between charged parallel conducting plates. Electric potential at a point in an electric field. Non-uniform electric fields, strenghts and patterns. Coulomb's Law. Electric potential due to a point charge or a charged spherical conductor.	6L 2T
		Chapter 2: Capacitance Parallel plate capacitor. Capacitors in series and parallel. Energy stored in capacitor.	3L 1T
		Chapter 3: Conductors and Resistors Properties of conductors. Potential gradient and current density. Ohm's Law at a point. Drift velocity and mobility and their effect on resistivity and conductivity of a material. Resistor band notation.	3L 1T
		Chapter 4: Insulators and Semiconductors Properties of insulators and semiconductors generation and recombination. Conduction in pure semiconductor. Doping and its effect on conductivity.	6L 2T

		Chapter 5: Electromagnetism Permanent magnets, magnetic fields, force on a current in a magnetic field, field strength (B). Motion of charged particles in a magnetic field (and in electric field). Magnetic fields due to current in straight wire, and a solenoid. Forces on currents in long stright parallel wires. Definition of the ampere. Magnetic flux linkage, induced e.m.f Laws of electromagnetic induction (Faraday's and Lenz's). Fleming's right hand rule.	9L 3T
		Chapter 6: P-N Junction Forward and reverse-bias of a p-n junction. Drift and diffusion currents.	6L 2T
		Chapter 7: Diodes Specifications of diodes. Concept of rectification.	3L 1T
		Chapter 8: Transistors Base, collector and emitter regions of a bi-polar transistor. Operation of the NPN transistor in the active mode. Relationship between emitter, collector and base currents. Current gain. Equivalent circuit of a transistor. Circuit configuration of a transistor as an amplifier.	6L 2T
		Total	L = 42 hrs T = 14 hrs P = 12 hrs 68 hours
12.	Main Reference	1. Serway, R. A., and Faughn, J. S. (2003). *College Physics* (6th ed.). Thomson Brooks Cole. 2. Brodie, D. (2001). *Further Advanced Physics*. John Murray.	
13.	Additional Reference	1. Theraja, B. L., and Theraja, A. K. (1998). *A Textbook of Electrical Technology*. S. Chand & company Ltd.	
14.	Practical/Lab Classes	The students are required to conduct the following practical laboratory experiments, each of 2 hours duration: 1. Ohm's law. 2. Verification of Kirchoff's voltage law. 3. Verification of Kirchoff's current law. 4. Investigation of the Junction diode characteristics. 5. Half wave Rectifier. 6. Full wave Rectifier.	