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| **University** | |
| **Course Number** | **PHYS2042** |
| **Course Title** | **Basic Electricity and Electronics** |
| **Degree Program** | **BSc. In Computer Science** |
| **Credits/Contacts** | **3/4** |
| **Prerequisite** | **No** |
| **Semester** | **2nd Semester / Year II** |
| **Status of Course** | **Supportive** |
| **Course Objectives and Competences to be acquired** | After completing this course, the student will be able to:   * Describe electrical terms including I, V, R, P; * Explain about Ohm’s and Kirchhoff’s laws; * Analyze DC and AC circuits (series, parallel, combination of both series and parallel); * Analyze series **Unity** and parallel RLC circuits; * Describe applications of different types of diodes; * Compare input and output characteristics of Bipolar transistors; |
| **Course Description** | This course is intended to acquaint students with the basic concepts of Electricity and Electronics. In part one the course deals with direct current (DC) and alternating current (AC) circuit analysis including RLC circuits. In part two the course covers applications of semi-conductors (diodes, rectifiers, and Bipolar-transistors). The lecture will be supported by Lab which uses software program “Electronic Workbench” that will help to design circuits, measure electrical quantities and analyze their main characteristics. |
| **Course Contents** | Part I: Analyzing DC circuits with R, L, C, and RLC   1. Basic concepts of Electricity    1. Structure of atom and nature of electric charge    2. Sources of Electrical quantities and units       1. Coulomb       2. Current and current carriers       3. Voltage , Resistance, Conductance and respective units       4. Electric Power and Energy    3. Source of electric voltage    4. Insulators 2. Ohm’s law    1. Current, voltage, resistance, electric power    2. Resistors (types, color codes)    3. Electric safety rules    4. Fuse and circuit breakers 3. Direct current circuits with resistances    1. Series circuits       1. Current and resistance in series circuits       2. Kirchhoff’s voltage law       3. Effects of” opens” and “shorts” in series circuits       4. Voltage-divider equation       5. Application of series circuits       6. Total power in series circuits    2. Parallel circuit       1. Voltage and resistance in parallel circuits       2. Kirchhoff’s current law       3. Effects of an open –branch in parallel circuit       4. Effects of a short circuit across parallel branches       5. Current-divider equation       6. Applications of parallel circuits       7. Conductance in parallel circuit    3. Series-parallel circuits       1. Finding the total resistance for series-parallel circuits       2. Using Kirchhoff’s Laws in series-parallel circuits       3. Opens and shorts in series-parallel circuits 4. Alternating current (AC) and voltage    1. Quantifying alternating current (Amplitude, f, T, Phase)    2. Alternating current circuits with resistances 5. Capacitance    1. Electric charge stored in dielectric of a capacitor    2. Types of capacitors    3. Charging and discharging process of a capacitor    4. Capacitor in AC circuits(including capacitive reactance)       1. Capacitors in series       2. Capacitors in parallel       3. Applications of capacitors 6. Inductance    1. Characteristics of inductance    2. Types of inductors    3. Inductors in DC circuits    4. Inductors in AC circuits (including inductive reactance)       1. Inductors in parallel       2. Inductors in series 7. R, L, and C circuits    1. Series RLC circuits; Parallel RLC circuits    2. Series and parallel resonant circuits   Part II: Applications of Diodes and Bipolar transistors   1. Diodes    1. Characteristics of diodes (ideal, I = f(v) and real)    2. Applications of diodes as rectifier (Bridge rectifier)    3. Special-purpose diodes (Zener-diode, LED, LASER-diode) 2. Bipolar transistors    1. Transistor current    2. Three ways to connect transistors   Current-versus-voltage characteristics |
| **Teaching and learning Methods** | * Lecture * Laboratory, Practical work and Demonstration |
| **Assessment/Evaluation and Grading System** | * Theoretical Tests (30%) * Assignment (20%) * Final Exam (50%) |
| **Text Books** | * + - 1. Bernard Grob; *“Basic Electronics”*; McGraw-Hill Inc. USA, 11th Edition, 2011. |
| **Reference Materials** | Hughes, Edward, Hughes; *“Electrical and Electronic Technology”*, Pearson Education Limited, USA, 2008 |