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|  | **University of Management and Technology**  **School of Science**  **Department of Physics** |

**Course Code: PH-316 Course Title: Electronics**

**Program: BS (Physics)**

**Course Outline (Spring Semester 2023)**

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| **Lecture Schedule** | Monday: 5:00-6:15 PM  Thursday: 5:00-6:15 PM | **Pre-Requisite** | N/A |
| **Course Coordinator** | Dr. Muhammad Tahir | **Contact** | muhammad.tahir@umt.edu.pk |
| **Course**  **Description** | Electronics is an important discipline that finds its use in a large number of applications. Continual advances in electronics in the areas of materials, processes, devices and circuits have been leading to rapid advances in the existing applications of electronics as well as in the emergence of new applications. To harness the full potential of developments in electronics and further advance the technologies related to electronics | | |
| **Course**  **Objectives** | The curriculum is designed to enable the students to learn, understand, and apply the fundamental and advanced concepts of electronics. This curriculum should be taught in such a manner that it produces scientists with sufficient hands-on skills and problem-solving mindset, in order to contribute effectively in the profession. In order to derive the maximum benefits from this curriculum, the students should be provided ample opportunities to polish their communication skills, exhibit ethical behavior and effective leadership, and prepare themselves to be a responsible professional of the society. | | |
| **Course Outcomes** | After the successful completion of course, the students will be able to:  **CLO-1** The paper equips the learners about basic circuit knowledge to analyze electric circuits using network theorems.  **CLO-2** Understand diode and it‘s applications in clipping and clamping circuits, Rectifiers and design regulated power supply using Zener diodes.  **CLO-3** To be able to plot the current voltage characteristics of Diode, Transistors and its different biasing conditions  **CLO-4** Usage of semiconductor devices in designing the circuits.  **CLO-5** Designing of various electronic circuits and their applications | | |
| **Text Book** | 1. Thomas L. Floyd, “Electronics Fundamentals: Circuits, Devices and Applications”, Prentice Hall, 8th ed. 2009. | | |
| **Reference Books** | 1. B. Grob, “Basic Electronics”, McGraw-Hill, Tch ed. 1997. 2. B. Streetman and S. Banerjee “Solid State Electronics Devices”, Prentice Hall, 6th ed. 2005. 3. A. Bar-lev, “Semiconductor and Electronics Devices”, Prentice Hall, 3rd ed. 1993. 4. D. H. Navon and B. Hilbert, “Semiconductor Micro-devices and Materials”, CBS College Publishing, 1986. 5. A. P. Malvino, “Electronic Principles”, McGraw-Hill, 7th ed. 2006. 6. R. T. Paynter, “Introductory Electric Circuits”, Prentice Hall, 1998. | | |
| **Assignment& Projects** | Problems will be assigned at regular intervals as an assignment. | **Quizzes** | * All quizzes will be announced well before time. * No make-ups will be offered for missed quizzes. |
| **Mid - Term**  **Examination** | A 60-minutes exam will cover all the material covered during the first 15 lectures. | **Final**  **Examination** | A 120-minutes exam will cover all the material covered during the semester. |
| **Attendance**  **Policy** | Attendance is mandatory. Every class is important. All deadlines are hard. Under normal circumstances late work will not be accepted. Students are required to take all the tests. No make-up tests will be given under normal circumstances. Students missing more than 20% of the lectures will receive an “SA” grade in the course and will not be allowed to take final exam. | | |
| **Grading**  **Policy** | Assignment and Quizzes: 30%  Mid-Term Examination: 30%  Final Examination: 40% | | |

**CLO – PLO MAPPING:**

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| **CLOs** | **PLOs** | | | | | | | | | | | |
| Scientific Knowledge | Problem Analysis | Conduct investigations of complex problems | Design / Development of Solutions | Science and Society | Environment and Sustainability | Ethics | Communication | Individual and Team Work | Lifelong Learning | Future Employability | Competency |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 1 | ✔ | ✔ | ✔ | ✔ |  |  |  |  |  | ✔ |  |  |
| 2 | ✔ | ✔ |  |  | ✔ |  |  |  | ✔ |  | ✔ |  |
| 3 | ✔ | ✔ |  | ✔ |  | ✔ | ✔ |  |  | ✔ | ✔ |  |
| 4 | ✔ |  |  | ✔ | ✔ |  |  |  |  | ✔ |  | ✔ |
| 5 | ✔ |  | ✔ |  |  |  |  | ✔ |  | ✔ |  |  |

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|  | **University of Management and Technology**  **School of Science**  **Department of Physics**  **Lecture Plan (Spring 2023)** |
| **Week** | **Topics** |
| 1st | Metals, insulators and semiconductors, Conduction in Silicon and Germanium, The forbidden energy gap, n and p type semiconductors, |
| 2nd | The junction diode, diode |
| 3rd | The ideal diode model, the half wave rectifier, the full wave rectifier, the bridge rectifier, measurement of ripple factor in the rectifier circuit, the capacitor filter |
| 4th | The voltage doubling rectifier circuit, rectifying AC voltmeters, diode wave clippers, diode clampers |
| 5th | Special Purpose Diodes (part 1) |
| 6th | Special Purpose Diodes (part 2) |
| 7th | Transistor voltage and current designations, the junction transistors, the volt-ampere curve of a transistor, the current amplification factors, the load line and Q point |
| 8th | **Mid Term** |
| 9th | the basic transistor amplifiers, the common emitter amplifier, the trans-conductance gm, performance of a CE amplifier, relation between Ai and Av, the CB amplifier, the CC amplifier, comparison of amplifier performance. |
| 10th | Choice of Q point, variation of Q point, fixed transistor bias, the four-resistor bias circuit, design of a voltage feedback bias circuit |
| 11th | Common emitter, common collector, common base biasing. |
| 12th | Field Effect Transistor |
| 13th | Operational Amplifiers |
| 14th | Power Amplifiers |
| 15th | Modulation and Demodulation |
| 16th | **Final Term** |

**Mapping of CLOs to Direct Assessments**

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| **CLOs** | Quiz1 | Quiz 2 | Quiz 3 | Quiz 4 | Assignment /Quiz 5 | Assignment/Quiz 6 | Assignment /Quiz 7 | Mid Term  Exam | Final Term Exam |
| 1 | ✔ | ✔ |  |  | ✔ |  |  | ✔ | ✔ |
| 2 |  |  | ✔ | ✔ | ✔ |  |  | ✔ | ✔ |
| 3 |  |  |  |  |  | ✔ | ✔ | ✔ | ✔ |
| 4 |  | ✔ |  | ✔ | ✔ |  |  | ✔ | ✔ |
| 5 | ✔ |  | ✔ |  | ✔ | ✔ | ✔ | ✔ | ✔ |

**Faculty Signature ……………………. …. Date……………..……………………**

**Chairman/Director signature…………… Date………….……………………….**

**Dean’s signature…………………………… Date………………………………….**