**University of Management and Technology**

School of Engineering

Department of Electrical Engineering

**Course Outline**

Course code: EL-212 Course Title: Electrical Network Analysis Lab

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| --- | --- |
| Program | BSEE |
| Credit Hours | 1 |
| Duration | One semester |
| Prerequisites | EE-110L |
| Resource Person | Hassan Tariq1 (Section A2,C1, D2)  Jamil Ahmed2(Section A1,D1) |
| Counseling Timing  (Room# ) | See Office doors  EE Labs |
| Contact | [hassantariq@umt.edu.pk1](mailto:hassantariq@umt.edu.pk1)  [jamil.ahemd@umt.edu.pk2](mailto:jamil.ahemd@umt.edu.pk2) |

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

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

**Learning Objective:**

This lab gives the foundation on which most other courses in electrical engineering curriculum rest. Subject areas included are, AC circuit quantities, AC voltage and currents, Phase measurements, Phase Shifters, AC bridges, Capacitance Multiplier, Oscillators, Kirchhoff’s Laws, Power factor Measurement and its improvement, Three phase system, Frequency response of RC series and parallel network, Frequency Response of RL series and parallel network, Frequency response of RLC networks, Active and Passive Filters, Fourier series, Two port networks. It will teach the students the practical implementation of different circuits. We have also designed labs on software i.e. Proteus. The course directly contributes to **objectives** a, d, e and f of the HEC Electrical Engineering Curriculum.

In accordance with HEC curriculum **outcomes** a, b, d and e, the upon completion, students will be able

* To use the Laboratory equipment (Oscilloscope, Function Gen, DC Supply)
* To use Circuit Simulator Software Proteus.
* Understand how to measure the different frequencies and phases.
* To design Phase Shifters, Capacitor Multipliers and Oscillators
* To improve the Power Factor of Circuits.
* To measure the Frequency Response of RC,RL,RLC Circuits
* To design Passive and Active Filters
* To Determine the Magnitude & Phase plots of Passive Filters
* To generate any type waveform using Fourier Series
* Calculate the ‘‘Z’&’Y’ parameters of Two-Port Networks ’

**Learning Methodology:**

Practical’s, interactive, participative

**Grade Evaluation Criteria**

Following is the criteria for the distribution of marks to evaluate final grade in a semester.

**Marks Evaluation Marks in percentage**

Lab Manuals & Performance: 40%

Final Viva or Quiz + Performance: 60%

Total100%

**Recommended Text Books:**

**Text book:** Fundamentals of Electric Circuits, 5th Ed., By Alexander and Sadiku

**Reference Books:**

1) Basic Engineering Circuit Analysis, 8t h Ed., By J. David Irwin, John Wiley & Sons

2) Electric Circuits, Eighth Edition, by Nilsson & Riedel

3) Fundamental of electric circuits by Floyd

**Calendar of Course contents to be covered during semester**

Course code……EL-212…... Course title… Electrical Network Analysis…

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| --- | --- | --- |
| **Week** | **Course Contents** | **Relevance to Theory Course** |
| 1. | AC Analysis Lab Hardware and Software Familiarization | Introduction |
| 2 | Oscilloscope and Phase Measurements | Article 9.2&9.3 |
| 3 | Phase Shifters and AC Bridges | Article 9.8 |
| 4 | Capacitance Multipliers and Oscillators | Article10.9 |
| 5 | Power Factor Measurement and its Improvement | Article11.9 |
| 6 | Currents and Voltages in Balanced Three Phase Systems | Chapter 12 |
| 7 | Frequency Response of RC Series and RC Parallel Circuits | Chapter 14 |
| 8 | Frequency Response of RL Series and RL Parallel Circuits | Chapter 14 |
| 9 | Magnitude and Phase Response of Resonant RLC Series Circuits | Article 14.5 |
| 10 | Low Pass Filters and High Pass Filters | Article 14.8 |
| 11 | Band Pass Filters and Band Stop Filters | Article14.7 |
| 12 | The Fourier Series | Chapter 17 |
| 13 | Impedance and Admittance Parameters of Two Port Networks | Chapter 19 |