**University of Management and Technology**

**School of Engineering**

**Department of Electrical Engineering**

**Course Outline**

Course code……EE 340………………… Course title……Electrical Machines……………………

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| --- | --- |
| Program | BSEE |
| Credit Hours | 3 |
| Duration | One semester |
| Prerequisites | None |
| Resource Person | Muhammad Shoaib |
| Counseling Timing | Please see on the SEN-EE website and moodle |
| Contact | Muhammad.shoaib@umt.edu.pk  03338166272 (sms only) |

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

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

**Learning Objective:**

Upon Completion of the course, the students will be able to understand:-

1. Basic concepts to solve different magnetic circuit
2. Basic concepts in analyzing and solving the problems related to the equivalent circuit of a transformer
3. Basic concepts of rotating machines
4. Basic concepts in analyzing and solving the problems related to the equivalent circuit of an induction motor
5. Basic concepts in analyzing and solving the problems related to the equivalent circuit of a synchronous motor
6. Basic working principles of induction and synchronous generator and problems related to it
7. Basic concepts related to the problems solving techniques of different DC motors
8. Basic methodologies related to speed control of DC and AC motors
9. Basic concepts related to single phase motors

**Learning Methodology:**

Lecture, interactive, participative

**Grade Evaluation Criteria**

Following is the criteria for the distribution of marks to evaluate final grade in a semester (course project can also be added)

**Marks Evaluation Marks in percentage**

Sessional assessments 25

Mid Term 25

Final exam 50

Total 100

**Recommended Text Books:**

Recommended Books:

**Text book:** Electric Machinery Fundamentals by Stephen J. Chapman, 5th Edition

**Reference Books:**

1) Electric Machines, Drives and Power Systems by Theodore Wildi, 6th Edition

2) Electric Machinery by Fitzgerald, Kingsely and Umans, 6th Edition

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

**Course code………EE340 Course title…Electrical Machines……………**

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| **Lectures** | **Course Contents** | **Reference Chapter(s)** |
| 1-3 | 1.4 The magnetic field  1.5 Faraday's law  1.6 Production of induced force on a wire  1.7 Induced voltage on a conductor moving in a magnetic field | Ch-1 |
| 4-9 | 2.2 Types & construction of transformers  2.3 The ideal transformer  2.4 Theory of operation of real single phase transformer  2.5 The equivalent circuit of a transformer  2.7 Transformer voltage regulation & efficiency  2.9 The auto-transformer  2.10 The three-phase transformer | Ch-2 |
| 10-12 | 7.1 A simple rotating loop between curved pole faces  7.2 Commutation in a simple four-loop dc machine  7.3 Commutation and armature construction in real dc machines  7.4 Problems with commutation in real machines  7.5 The internal generated voltage and induced torque equations of real dc machines  7.6 The construction of dc machines  7.7 Power flow and losses in dc machines | Ch-7 |
| 13-15 | 8.1 introduction to dc motors  8.2 The equivalent circuit of a dc motor  8.3 The magnetization curve of a dc machine  8.4 Separately excited and shunt dc motors  8.5 The permanent· magnet dc motor  8.6 The series dc motor  8.7 The compounded dc motor  8.8 DC motor starters | Ch-8 |
| 16-17 | **MID TERM EXAMINATION** |  |
| 18-19 | 8.11 Introduction to dc generators  8.12 The separately excited generator  8.13 The shunt dc generator  8.14 The series dc generator  8.15 & 8.16 The compounded dc generator | Ch-8 |
| 20-23 | 6.1 Induction motor construction  6.2 Basic induction motor concepts  6.3 The equivalent circuit of an induction motor  6.4 Power and torque in induction motors  6.5 Induction motor torque-speed characteristics  6.11 Determining circuit model parameters  6.12 The induction generator | Ch-6 |

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| 24-25 | Single Phase Motors | Reference book  (Wildi) |

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| 26-28 | 4.1 Synchronous generator construction  4.2 The speed of rotation of a synchronous generator  4.3 The internal generated voltage of a synchronous generator  4.4 The equivalent circuit of a synchronous generator  4.5 The phasor diagram of a synchronous generator  4.6 Power and torque in synchronous generators  4.7 Measuring synchronous generator model parameters  4.8 The synchronous generator operating alone  4.9 Parallel operation of ac generators | Ch-4 |
| 29-30 | 5.1 Basic operation of synchronous motor  5.2 Steady state motor operation | Ch-5 |

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|  | **FINAL EXAMINATION** |  |