**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.pk03338166272 (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 law1.6 Production of induced force on a wire1.7 Induced voltage on a conductor moving in a magnetic field | Ch-1 |
| 4-9 | 2.2 Types & construction of transformers2.3 The ideal transformer2.4 Theory of operation of real single phase transformer2.5 The equivalent circuit of a transformer2.7 Transformer voltage regulation & efficiency2.9 The auto-transformer2.10 The three-phase transformer | Ch-2 |
| 10-12 | 7.1 A simple rotating loop between curved pole faces7.2 Commutation in a simple four-loop dc machine7.3 Commutation and armature construction in real dc machines7.4 Problems with commutation in real machines7.5 The internal generated voltage and induced torque equations of real dc machines7.6 The construction of dc machines7.7 Power flow and losses in dc machines | Ch-7 |
| 13-15 | 8.1 introduction to dc motors8.2 The equivalent circuit of a dc motor8.3 The magnetization curve of a dc machine8.4 Separately excited and shunt dc motors8.5 The permanent· magnet dc motor8.6 The series dc motor8.7 The compounded dc motor8.8 DC motor starters | Ch-8 |
| 16-17 | **MID TERM EXAMINATION** |  |
| 18-19 | 8.11 Introduction to dc generators8.12 The separately excited generator8.13 The shunt dc generator8.14 The series dc generator8.15 & 8.16 The compounded dc generator | Ch-8 |
| 20-23 | 6.1 Induction motor construction6.2 Basic induction motor concepts6.3 The equivalent circuit of an induction motor6.4 Power and torque in induction motors6.5 Induction motor torque-speed characteristics6.11 Determining circuit model parameters6.12 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 construction4.2 The speed of rotation of a synchronous generator4.3 The internal generated voltage of a synchronous generator4.4 The equivalent circuit of a synchronous generator4.5 The phasor diagram of a synchronous generator4.6 Power and torque in synchronous generators4.7 Measuring synchronous generator model parameters4.8 The synchronous generator operating alone4.9 Parallel operation of ac generators | Ch-4 |
|  29-30 | 5.1 Basic operation of synchronous motor5.2 Steady state motor operation  | Ch-5 |

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|  | **FINAL EXAMINATION** |  |