



University of Management & Technology

School of Science & Technology

Department of Electrical Engineering

EE-317 Power System Fundamentals

Lecture Schedule	See EE Timetable on website	Semester	Fall2012												
Pre-requisite	N/A	Credit Hours	3												
Instructor(s)	Asif Hussain ^[1] Usman Ali ^[2] Muhammad Salik ^[3] Rukhsar Ahmad ^[4]	Contacts	asif.hussain@umt.edu.pk ^[1] usman.ali@umt.edu.pk ^[2] muhammad.salik@umt.edu.pk ^[3] rukhsar.ahmad@umt.edu.pk ^[4]												
Office		Office Hours	See office windows												
Teaching Assistant	None	Contact	N/A												
Office	N/A	Office Hours	N/A												
Course Description	This introductory course will deal with the basic concepts involved in power systems, structure of modern power system, study of the conventional and nonconventional sources of electrical energy, calculation of transmission line parameters: inductance of single conductor, inductance of single and three phase lines, capacitance of single and three phase lines, basic considerations and distribution system layout, distribution substations and protection of the power system														
Expected Outcomes	<p>The course strongly supports expected outcomes a, b, d and i of the HEC Electrical Engineering Curriculum. Upon completion of this course, students will become familiar with:</p> <ul style="list-style-type: none"> ▪ Basic structure of the power generating stations including generation, transmission and distribution of electrical energy ▪ The basic concepts of single phase and three phase system ▪ Power transmission system ▪ Power distribution system ▪ Design of the distributor for the power distribution system ▪ Overview of the protection of power system equipment 														
Books	<p>Textbook:</p> <ul style="list-style-type: none"> ▪ Power System Analysis, By Hadi Saadat 4th Edition^[1] <p>Reference Books:</p> <ul style="list-style-type: none"> ▪ Power System Analysis by John J. Grainger, William D. Stevenson^[1] ▪ Electrical Power Distribution & Transmission by L.M. Faulkenberry & W. Coffey^[2] ▪ Principles of Power Systems by V.K. Mehta, Rohit Mehta^[3] 														
Grading Policy	<p>Details and timings for the assessment of this module are as follows:</p> <table border="0"> <tr> <td>Theory Part:</td> <td></td> </tr> <tr> <td>Exam (Weightage)</td> <td>Duration</td> </tr> <tr> <td>MidTerm Exam (25%)</td> <td>60 minutes</td> </tr> <tr> <td>Final Exam (50%)</td> <td>120-150 minutes</td> </tr> <tr> <td>Quiz (at least 5 per semester) (10%)</td> <td>10-15 min each</td> </tr> <tr> <td>Assignment (at least 5 per semester) (15%)</td> <td>Take home</td> </tr> </table>			Theory Part:		Exam (Weightage)	Duration	MidTerm Exam (25%)	60 minutes	Final Exam (50%)	120-150 minutes	Quiz (at least 5 per semester) (10%)	10-15 min each	Assignment (at least 5 per semester) (15%)	Take home
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Course Schedule and Lecture Plan

Lecture	Topics	Textbook (TB) / Reference Readings(RB)
02	Introduction to Power System	Lecture Slides
04	Basic Concepts of Single and Three Phase System: Power in Single and Three Phase AC Circuits, Balanced 3-phase voltages, Basic Three-Phase Circuit Connections, Power Factor Correction, Advantages of balance three-phase systems, Unbalanced Three-Phase Systems. Voltage-drop calculations for single-phase and three-phase systems, Per Unit System, Conversion of delta connected three phase to Wye Connected Three phase system.	Chap # 02 of RB ^[1]
02	Overview of Power Generating Plants: Detailed study of Steam power plant, Hydro-electric power plant and Diesel power plant	Chap # 02[2.1 – 2-12] of RB ^[3]
01	Power Flow Through Transmission Lines Skin effect, Ferranti effect and Corona loss	Lecture Slides
03	Transmission Line Parameters: Types of Transmission Lines, Inductance of a conductor due to internal flux, Flux linkages between two points external to an isolated conductor, Inductance of a single phase two wire line, Flux linkages of one conductor in a group, Inductance of composite conductor lines, Inductance of three phase lines symmetrical and unsymmetrical spacing, Inductance calculation for bundled conductors	Chap # 04[4.1-4.8] of TB ^[1]
03	Capacitance of Transmission Lines Electric field of a long straight conductor, The potential difference between two points due to a charge, Capacitance of a two wire line, Capacitance of a three phase line with symmetrical and unsymmetrical spacing, Capacitance calculation for bundled conductors	Chap # 04[4.10-4.14] of TB ^[1]
Mid Term Exam (8thWeek)		
02	Transmission Line Model and Performance: Short line model, medium line model, Long line model	Chap # 05[5.1 – 5.4] of TB ^[1]
01	Mechanical Design of Overhead Lines: Main components of overhead lines, Conductor material, Line supports, Insulators and their types	Ch#08[8.1-8.5] of RB ^[3]
02	Distribution Equipment: Circuit breakers and their types, Reclosers, sectionalizers, Fuses, Lightning protection, Protective relay introduction, Disconnect switches, Metering equipment	Lecture Slides
01	Distribution Basic Considerations and Distribution System Layout, Distribution Substations	Chap # 12 of RB ^[3]
04	DC Distribution: Types of D.C. distributors, D.C. distribution calculation, D.C. distributor fed at one end with concentrated loading, D.C. distributor fed at one end with uniform loading, D.C. distributor fed at both ends with concentrated loading, D.C. distributor fed at both ends uniform loading, Ring distributor with interconnector, Ring distributor without interconnector	Chap # 13[13.1-13.9] of RB ^[3]
03	AC Distribution: A.C. distribution calculation, Methods of solving A.C. distribution problems, 3-Phase unbalanced loads, Four-wire star connected unbalanced loads	Chap # 14[14.1-14.3] of RB ^[3]

02	Neutral Grounding: Grounding or Earthing, Equipment grounding, System Grounding, Un-grounded neutral system, Neutral grounding, Advantages of neutral grounding, Methods of neutral grounding, Grounding techniques, Voltage transformer Earthing, Grounding transformer	Chap # 26 of RB ^[3]
Final Term Exam (Comprehensive)		