

Academic Course Description

BHARATH UNIVERSITY
 Faculty of Engineering and Technology
 Department of Electrical and Electronics Engineering
 BEE601 Transmission And Distribution
 Six Semester (Even Semester)

Course (catalog) description

To learn the usage of passive elements in various Power Transmission Systems, To design a Transmission and distribution electric power system.

Compulsory/Elective course : Compulsory for EEE students

Credit hours & contact hours : 4 & 60 hours

Course Coordinator : Mr.S.Uma Mageswaran

Instructors : Mr.S.Uma Mageswaran

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@bharathuniv.ac.in)	Consultation
Mr.S.Uma Mageswaran	Third year EEE	KS 302	04422290125	u_magesh125@yahoo.co.in	12.30-1.30 PM

Relationship to other courses:

Pre –requisites : BEE304 - Electromagnetic Theory

Assumed knowledge : knowledge in power system transmission, phasor diagrams, electrical cables, etc

Following courses : BEE701 Power System Analysis

Syllabus Contents

UNIT I STRUCTURE OF ELECTRICAL POWER SYSTEMS 12

Structure of AC power system- single line diagram- EHVAC and HVDC transmission advantages and disadvantages – comparison of AC and DC transmission- Substations- various bus bar arrangement in substations– Economic choice of conductor size- Kelvin’s law

UNIT II ELECTRICAL DESIGN OF TRANSMISSION LINES 12

Resistance, inductance and capacitance calculations in single and three phase transmissions lines –stranded and bundled conductors – symmetrical and unsymmetrical spacing, transposition- self and mutual GMD – skin and proximity effect

UNIT III PERFORMANCE OF TRANSMISSION LINES 12

Equivalent circuit for short, medium and long transmission lines – analysis- efficiency and regulation – tuned power lines, attenuation and surge impedance loading – power circle diagram for receiving end and sending end –voltage control of line – shunt and series compensation

UNIT IV CABLES AND INSULATORS

Underground cables – types, construction – capacitance of the ca – insulation resistance – dielectric stresses and grading – dielectric losses – capacitance and inblester sheath grading – thermal characteristics – capacitance of three core cable – Insulators – types - advantages –voltage distribution in suspension insulators – string efficiency – method of improving string efficiency.

UNIT V MECHANICAL DESIGN OF TRANSMISSION LINES

12

Sag and Tension- Sag calculation for equal and unequal level supports – effect of wind and ice – Consideration in mechanical design of lines – stringing chart- corona characteristics.

Total: 60 HOURS

Text book(s) and/or required material

- T1. Mehta V.K, Rohit Mehta “Power system” S. Chand & Co ltd, 2005.
- T2. D. P. Kothari and I J Nagrath, ‘Modern Power System Analysis’, Tata McGraw – Hill, 2nd Edition, 2008.
- T3. Singh S N, ‘Electric Power Generation Transmission and distribution’, PHI India, 2nd Edition, 2008.

Reference Books:

- R1. C.L. Wadhwa: Electrical Power Systems, 3rd Edn, New Age International Publishing Co., 2001.
- R2. Turan Gonen, ‘Electric Power Distribution system engineering’, CRC Press INC, 2 nd Edition 2007
- R3. <http://nptel.ac.in/courses/108102047/>

Computer usage:

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area : Circuit Theory | Electrical Machines | Electronics | **Power system** | Control & Instrumentation

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February 2nd week	Session 1 to 24	2 Periods
2	Cycle Test-2	March 2 nd week	Session 25 to 45	2 Periods
3	Model Test	April 3rd week	Session 1 to 60	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

To develop a depth knowledge in the field of Power system Transmission and Distribution. The subject gives the students to understand about power system structure.	Correlates to program outcome		
	H	M	L
1.To describe transmission element in power system network	c,d	a,b,e,f,g,h,l	l,k
2.Summarize the modelling of transmission and distribution components and analyze its Performance.	a,c,d,e	b,f,g,h,j,l	l,k
3.Apply the concepts of transmission line into real time transmission networks.	a,c,d,e,f	b,g,h,j,l	l,k
4.Identify major components of power transmission and distribution systems.	c,d,e,f	a,b,g,h,j,l	l,k
5.Know and appreciate the key factors in equipment specification and network design.	a,d,e	b,c,f,g,h,j,l	l,k

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I STRUCTURE OF ELECTRICAL POWER SYSTEMS			
1.	Structure of AC power system	No	T1,T2
2.	single line diagram	No	
3.	EHVAC and HVDC transmission advantages and disadvantages	No	
4.	comparison of AC and DC transmission	No	
5.	Substations	No	
6.	various bus bar arrangement in substations	No	
7.	various bus bar arrangement in substations	No	
8.	Economic choice of conductor size		

9.	Economic choice of conductor size	Yes	
10.	Problem Solved	Yes	
11.	Kelvin's law	Yes	
12.	Kelvin's law	Yes	
UNIT II ELECTRICAL DESIGN OF TRANSMISSION LINES			
13.	Resistance	Yes	T2,R3
14.	inductance	Yes	
15.	capacitance	Yes	
16.	calculations in single and three phase transmissions lines	Yes	
17.	stranded	Yes	
18.	bundled conductors	Yes	
19.	symmetrical	Yes	
20.	unsymmetrical spacing	Yes	
21.	transposition	Yes	
22.	self and mutual GMD	Yes	
23.	skin	No	
24.	proximity effect	No	
UNIT III PERFORMANCE OF TRANSMISSION LINES			
25.	Equivalent circuit for short	Yes	T1,T3
26.	Equivalent circuit for short	Yes	
27.	medium and long transmission lines	Yes	
28.	analysis	Yes	
29.	efficiency and regulation	Yes	
30.	tuned power lines	No	
31.	attenuation	No	
32.	surge impedance loading	No	
33.	power circle diagram for receiving end	No	
34.	sending end	Yes	
35.	voltage control of line	Yes	
36.	shunt and series compensation	No	
UNIT IV CABLES AND INSULATORS			
37.	Underground cables	No	T1,R1
38.	types, construction	No	
39.	capacitance of the ca	Yes	
40.	insulation resistance	Yes	
41.	dielectric stresses and grading-dielectric losses	Yes	
42.	capacitance and inblester sheath grading-thermal characteristics	Yes	
43.	capacitance of three core cable	Yes	
44.	Insulators	Yes	
45.	types - advantages	Yes	

46.	voltage distribution in suspension insulators	Yes	
47.	string efficiency	Yes	
48.	method of improving string efficiency.	Yes	
UNIT V MECHANICAL DESIGN OF TRANSMISSION LINES			
49.	Sag and Tension	Yes	T2,R1
50.	Sag and Tension	Yes	
51.	Sag calculation for equal and unequal level supports	Yes	
52.	Sag calculation for equal and unequal level supports	Yes	
53.	Sag calculation for equal and unequal level supports	Yes	
54.	effect of wind and ice	Yes	
55.	effect of wind and ice	Yes	
56.	consideration in mechanical design of lines	Yes	
57.	consideration in mechanical design of lines	Yes	
58.	stringing chart	Yes	
59.	stringing chart	Yes	
60.	corona characteristics.	No	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	05%
Cycle Test – II	-	05%
Model Test	-	10%
Attendance	-	05%
SEMINAR&ASSIGNMENT	-	05%
Final exam	-	70%

Prepared by: Mr.S.Uma Mageswaran

Dated :

Addendum**ABET Outcomes expected of graduates of B.Tech / EEE / program by the time that they graduate:**

- a) An ability to apply knowledge of mathematics, science, and engineering fundamentals.
- b) An ability to identify, formulate, and solve engineering problems.
- c) An ability to design a system, component, or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- d) An ability to design and conduct experiments, as well as to analyze and interpret data.
- e) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- f) An ability to apply reasoning informed by the knowledge of contemporary issues.
- g) An ability to broaden the education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- h) An ability to understand professional and ethical responsibility and apply them in engineering practices.
- i) An ability to function on multidisciplinary teams.
- j) An ability to communicate effectively with the engineering community and with society at large.
- k) An ability in understanding of the engineering and management principles and apply them in project and finance management as a leader and a member in a team.
- l) An ability to recognize the need for ,and an ability to engage in life-long learning.

Program Educational Objectives**PEO1: PREPARATION**

Electrical Engineering Graduates are in position with the knowledge of Basic Sciences in general and Electrical Engineering in particular so as to impart the necessary skill to analyze and synthesize electrical circuits, algorithms and complex apparatus.

PEO2: CORE COMPETENCE

Electrical Engineering Graduates have competence to provide technical knowledge, skill and also to identify, comprehend and solve problems in industry, research and academics related to power, information and electronics hardware.

PEO3: PROFESSIONALISM

Electrical Engineering Graduates are successfully work in various Industrial and Government organizations, both at the National and International level, with professional competence and ethical administrative acumen so as to be able to handle critical situations and meet deadlines.

PEO4: SKILL

Electrical Engineering Graduates have better opportunity to become a future researchers/ scientists with good communication skills so that they may be both good team-members and leaders with innovative ideas for a sustainable development.

PEO5: ETHICS

Electrical Engineering Graduates are framed to improve their technical and intellectual capabilities through life-long learning process with ethical feeling so as to become good teachers, either in a class or to juniors in industry.

Course Teacher	Signature
Mr.S.Uma Mageswaran	

Course Coordinator

(Mr.S.Uma Mageswaran)

HOD/EEE

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