PIPM 7003	POWER TRANSMISSION &DISTRIBUTION	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Engineering/Science Graduates				
Co-requisites	Good Command in MS Word and PowerPoint				

Course Objectives

1. To understand a solid introduction to Power Transmission & Distribution scenario in India and world.
2. To study problems faced in Power Transmission & Distribution development in India by private and government agencies including delay in feasibility report etc.
3. To know Safety and disposal of construction material wastages and their disposal and effect on the environment, habitants and on another ecosystem.
4. To learn Policies/Acts/Tariff related with Power Transmission &Distribution projects will be discussed and taught region wise in India.
5. To make students aware of R&R Policies, upgradation and modernization of Electricity Sub Stations in India.

Course Outcomes

On completion of this course, the students will be able to

CO1	To Conceptualize Students the Basics of existing power Transmission & Distribution System networks in Utilities in Public and Private sectors along with their Rating methods. Future integrated approach of Reduction of line losses and reduction of Transformer Failures projects will be understood
CO2	To apply the systematic approach to the policies and other DPR related methodologies for arranging funds from government schemes will be learned by the students.
CO3	To analyze delays caused in the progress of implementing of projects for improvements will be learned and their remedial measures will be understood by the student
CO4	To integrate All regulatory matters/Acts/policies/guidelines/rules will be understood by the students in details particularly Electricity Act 2003 and its Amendments..
CO5	To apply Transmission and Distribution Sub Station upgradation/ modernization work in practical by the students and time over runs/cost over runs with quality standards will be learned

Catalog Description

The main objective of this course is to give broad insight into the different aspects of power Transmission and Distribution, while providing a solid introduction to power, development and cost analyses. As part of the core in the MBA Power Management program, the course will focus on difficulties in development of Transmission and Distribution and their environmental issues stressing demand and economic aspects. It also covers the key principles of regulatory aspects, Safety issues, Planning, Investment, Operations and Maintenance related Issues. Topics covered includes the economic theories of the firms, Markets, Latest Technologies, Cost Models and Production functions. The focus is given on the Power Development potential, power Policies, feasibility studies, R & R Policies, Waste Disposals, Policies and Acts etc.

Course Content

Unit 1: **3 lecture hours**

Basics of T&D Systems And Transmission Scenario In India

Unit 2: **3 lecture hours**

Legal and Regulatory Framework relevant to Transmission

Unit 3: **3 lecture hours**

Overview of power system structure

Unit 4: **3 lecture hours**

Sub Station Design &Automation.

Unit 5: **3 lecture hours**

IT Applications

Unit 6: **3 lecture hours**

Transmission Pricing

Unit 7: **3 lecture hours**

Distribution Systems

Unit 8: **3 lecture hours**

Government Schemes

Unit 9: **3 lecture hours**

Case Study

Unit 10: **4.5 lecture hours**

Busbar Systems

Unit 11: **4.5 lecture hours**

Meter to cash cycles

Text Books and Reports

1. Electricity Act 2003
2. CERC Regulations
3. Ministry of Power Website
4. Websites of various SEBs
5. Websites of Ministry of power, MNRE
6. Power Plant Engineering Book by A.K. Raja
7. Power Distribution Books/Manuals
8. Power Transmissions Books/Manuals

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Presentation/Assignment/Projects etc	ESE
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Programme Outcomes**
CO1	To Conceptualize Students the Basics of existing power Transmission & Distribution System networks in Utilities in Public and Private sectors along with their Rating methods. Future integrated approach of Reduction of line losses and reduction of Transformer Failures projects will be understood	**PO: 1,2,6,8,9,12,7**
CO2	To apply the systematic approach to the policies and other DPR related methodologies for arranging funds from government schemes will be learned by the students.	**PO: 3,2,5,10,13,12**
CO3	To analyze delays caused in the progress of implementing of projects for improvements will be learned and their remedial measures will be understood by the student	**PO:5,8,9,13,11,3**
CO4	To integrate All regulatory matters/Acts/policies/guidelines/rules will be understood by the students in details particularly Electricity Act 2003 and its Amendments..	**PO: 2,6.9,11,3,2**
CO5	To apply Transmission and Distribution Sub Station upgradation/ modernization work in practical by the students and time over runs/cost over runs with quality standards will be learned	**PO: 1,4,8,7,10,12,13**

Course Outcomes	CO1	CO2	CO3	CO4	CO5
PO1	3	3	2	3	1
PO2	2	2	3	2	3
PO3	3	2	3	2	3
PO4	2	3	3	2	2
PO5	2	1	3	2	3
PO6	3	2	3	3	2
PO7	3	2	3	2	3
PO8	2	3	3	3	3
PSO 9	1	2	3	2	2
PSO 10	3	3	3	3	2
PSO 11	2	2	2	3	3
PSO 12	3	3	3	2	3
PSO 13	3	2	3	3	2

		Students will be able to develop and evaluate alternate managerial choices and identify optimal solutions.	Students will demonstrate effective application capabilities of their conceptual understanding of power generation, transmission and distribution.	Students will be able to exhibit effective decision-making skills, employing analytical and critical thinking ability.	Students will demonstrate effective oral and written communication skills in the professional context.	Students will be able to work effectively in teams and demonstrate team-working capabilities.	Students will exhibit leadership and networking skills.	Students will demonstrate sensitivity towards ethical and moral issues and have ability to address them in the context of power management.	Students will demonstrate employability traits in line with the needs of changing dynamics of the power industry.	Students will demonstrate strong conceptual knowledge in fuel management, power generation, transmission, distribution, trading, energy management, financing and regulation, and sustainable development.	Students will demonstrate effective understanding of functioning of power sector.	Students will demonstrate analytical skills in identification and resolution of issues pertaining to fuel management, power generation, transmission, distribution, trading, energy management, financing and regulation, and sustainable development.	Students will exhibit the ability to integrate technical, economic, social and regulatory frameworks for power sector planning and resource management.	Students will exhibit deployable skills pertinent to the power sector.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO8	PSO9	PSO 10	PSO11	PSO 12	PS O 13

PIPM 7003	Power Transmission and Distribution	2	3	3	2	3	1	1	2	1	1	1	1	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	UPES

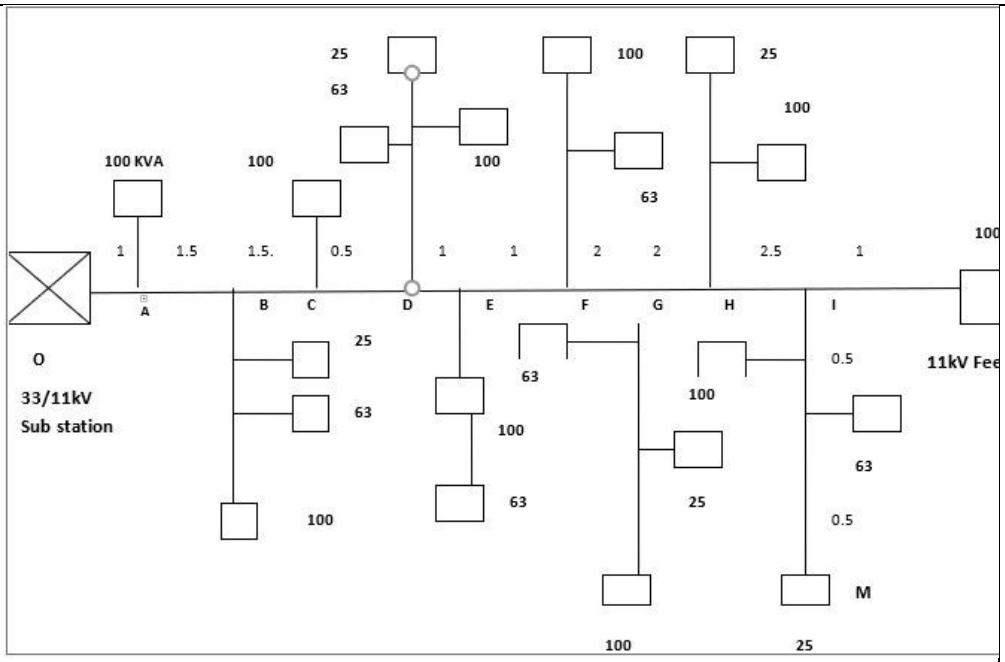
Course: PIPM7003-POWER TRANSMISSION &DISTRIBUTION
Programme: MBA Power Management **Semester: ODD**
Time: 03 hrs. **Max. Marks:100**
Course Code: PIPM 7003
Instructions:
Section A (each carrying 1 marks); Attempt 4 questions out of 5 **Section B** (each carrying 5 marks)**.** Any **Six Questions out of Seven** from **Section C** (carrying 15 marks)**.** Attempt 2 questions out of 3 **Section D (**30 Marks)

Section A ( )
Define the following

1	There is no charging current and skin affect in direct current.	**[1]**	**CO1**
2	Demand factor is always less than Unity.	**[1]**	**CO5**
3	A direct current line can carry 2 times of power in comparison to alternating current line.	**[1]**	**CO2**
4	The touch voltage in earthling system is considered as 523 volts.	**[1]**	**CO2**
5	The alternating current transmission lines of length more than 250 km are classified asmedium transmission lines.	**[1]**	**CO3**
6	The scope of IT applications in power sector is more in distribution sector than transmission sector.	**[1]**	**CO1**
7	In power line carrier communication capacitor is used as open circuit point for power frequency (50 cycles) AC power.	**[1]**	**CO2**
8	The ten delta (di electric dissipation factor) of new transformer is unity (1.0).	**[1]**	**CO4**
9	The myrex index number (MIN) of new transformer oil is 1000.	**[1]**	**CO4**
10	Acetylene gas (C_2H_2) is evolved when paper insulation of transformer is overheated.	**[1]**	**CO2**

11	Thermal imaging camera is not useful for detecting actual hot spot in a transformer.	**[1]**	**CO2**
12	Power factor of an electricity bulb is 0.85.	**[1]**	**CO3**
13	AT&C losses are higher than technical losses.	**[1]**	**CO1**
14	By using high voltage distribution system, AT&C losses are reduced.	**[1]**	**CO2**
15	Bucholz relay in a transformer protects it from overloading by electricity consumers.	**[1]**	**CO2**
16	Silica gel is used to protect the transformer from atmospheric air.	**[1]**	**CO3**
17	Transformer oil is a mineral oil of good electrical conductivity.	**[1]**	**CO1**
18	The earth resistance of the earth pipe used in earthling practices is one ohm.	**[1]**	**CO2**
19	Instrument transformer is used to measure the efficiency of transformer.	**[1]**	**CO2**
20	Reactive Compensation is required in direct Current Line.	**[1]**	**CO3**
	SECTION B (Attempt 4 questions out of 5**)**		
1	Analyze the advantages and dis-advantages of high voltage direct current system.	**[5]**	**CO4**
2	Evaluate the golden rules for preventing of power transformer failures and describe all 8 number maintenance schedules for transformer	**[5]**	**CO2**
3.	Analyze why Reforms were necessary in Power Distribution Industry. Describe in details the Distribution reforms and their restructuring.	**[5]**	**CO5**
4	Analyze the merit order operation of power houses related with frequency for proper grid operation.	**[5]**	**CO1**
5	(a) Draw a single line diagram of a 220/132 kv substation. (b) Draw a layout of 400 kv substation..		
	SECTION C (Any **Six Questions out of Seven)**		
1	Analyze the new technologies in electricity power transmission	**[5]**	**CO4**
2	Evaluate all the nine new technologies in energy storage systems	**[5]**	**CO4**
3	Analyze the earthling in electricity system what are the points to be earthed in a electricity substation. Why black metal is used in electricity substation switch yards.	**[5]**	**CO5**
4	Draw the single line diagram of any three type of bus-bar system of an electricity substation.	**[5]**	**CO4**
5	Draw the block diagram of AT&C losses in a electricity distribution system and describe various methods of reduction of Technical losses	**[5]**	**CO2**
6	a) Analyze in detail Daily and Yearly Load Curves.	**[5]**	**CO5**

	b) Evaluate all the six types of transformer losses.		
7	a) Evaluate the capitalized cost of transformer with factors affecting the evaluation of the cost of different transformers. b) Analyze and Draw the Meter to Cash Cycle and also Draw and Describe Pie Chart Of AT&C Losses.	**[5]**	**CO4**
	SECTION D (Attempt 2 questions out of 3**)**		
1	a) Analyze the best practices used in metering, Billing and Revenue Collection in Power Distribution System.. b) Analyze the ten delta (di electric dissipation factor) and describe in detail the residual life assessment (RLA) methods on transformer	**[15]**	**CO3**
2	Two lamps are to be compared: (a) Cost of first lamp is Re. 1 and it takes 100 watts. (b) Cost of second lamp is Rs. 4 and it takes 60 watts. Both lamps are of equal candlepower and each has a useful life of 1000 hours. Which lamp will prove economical if the energy is charged at Rs. 70 per kW of maximum demand per year plus 5 paisa per kWh? At what load factor both the lamps will be equally advantageous?	**[15]**	**CO4**
3	Calculate the voltage drop of a 11kV line at following point i. Point J ii. Point M The 11kV line main conductor is ACSR weasel and in Tap line ACSR squirrel for which regulation constants per 100 kVA KM are 0.0840 and 0.1169 respectively, diversity factory is 2.5, power factor is 0.8, loads in kVA and distances in KM.	**[15]**	**CO2**


25
63
100
25
100
100 KVA
100
100
63
100
1
1.5
1.5.
0.5
1
1
2
2
2.5
1
A
B
C
D
E
F
G
H
I
O
33/11kV
Sub station
25
63
100
63
100
63
100
0.5
63
25
0.5
M
100
25
11kV Fee