EEM205N: DC MACHINES & TRANSFORMER

Teaching Scheme : 02 L + 00 T; **Total:** 02 hours/week **Credits** : 02
Evaluation Scheme : 10 ISA + 30 MSE + 60 ESE **Total Marks** : 100
ESE Duration :**0** 3 Hrs.

COURSE DESCRIPTION

The aim of introducing this course is to impart knowledge of basic energy conversion in DC machines and transformer. Through the study of this course the students will get adequate knowledge of construction, working, classification and performance of electrical machines

DESIRABLE AWARENESS / SKILLS

EE101N: Basic Electrical Engineering

COURSE OUTCOMES

On the successful completion of this course, the students shall be able to

1. analyze different types of DC generators their characteristics, industrial applications,
2. compute the performance parameters of dc machines and select proper DC machine for industrial applications.
3. compute the various performance parameters of single phase transformer using equivalent circuits.
4. compare the autotransformer with two winding transformer.
5. explain various types of connections of three phase transformers and Identify proper transformers for various applications

RELEVANCE OF COURSE OUTCOMES (COs) WITH POs AND PSOs (WITH STRENGTH OF CO-RELATION)

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2										1			
2	3	2	1					1	1	2		1	1	1	1
3	3	2						1	1	1		1	1	1	1
4	2	2						1		1		1	1	1	
5	2	1						1	1				1		1

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

DC Generators: **[06 Hrs.]**

Working principle, construction. armature winding: simplex lap and wave windings. EMF equation, methods of excitation – separately and self-excited, shunt, series, compound. Voltage build-up, critical resistance, no load characteristics, load characteristics, applications of DC generators. Losses , power flow diagram and efficiency.

DC Motors: **[06 Hrs.]**

Principle of operation, construction, back EMF, classification, torque equation, losses in dc machine, power flow diagram, and efficiency. Performance characteristics of shunt, series and compound motors, starting of DC motors, necessity and types of starters, methods of speed control,

Single Phase Transformer: **[06 Hrs.]**

Principle of operation, construction and types of single phase transformers. Equivalent circuit, voltage regulation, losses and efficiency, all day efficiency. Testing- Direct loading, open and short circuit tests, measurement of various parameters from open and short circuit tests.

Single Phase Autotransformers: **[02Hrs.]**

Principle of operation, construction types of single phase autotransformers, comparison with two winding transformer efficiency and applications.

Three Phase Transformer: **[05 Hrs.]**

Construction, various types of connections and their comparative features, vector groups. Scott connection and open delta connection. Applications.

Text Books:

1. Electrical Machines, D. P. Kothari and I. J. Nagrath, 5th Edition,Tata McGraw Hill, New Delhi, 2017.
2.Electrical Machines A. Chakrabarti and S. Debnath, McGraw Hill, 2015
3. Electrical Machines, S. K. Bhattacharya, Third edition, McGraw Hill, 2009.
4. Theory and Performance of Electrical Machines, J.B.Gupta, Kataria and sons, ,14th edition Delhi.
5. Electric Machinery,P. S. Bimbhra, Khanna Publishers, 2nd Edition, 2021.

Reference Books:

1 Electric Machinery A. E. Fitzgerald, C. Kingsley and S. D. Umans,6thedition Tata McGraw Hill, New Delhi.
2. Electrical Machines, P. Purkait and I. Bandopadhyay, Oxford University Press, 1st edition, 2017.
3. M. G. Say, “Alternating Current Machines”,5th revised edition, Pitman Publishing,1984

ASSESMENT:

MSE: Mid Semester Exam will be based on 50% of the syllabus

ISA: ISA will be based on any **two** of following components-

1) Declared test
2) Surprise test
3) MCQ Test
4) Assignments
5) PPT presentation
6) Quiz
7) Fabrication of working model

However, apart from above components, the course coordinator can choose any other component and shall declare method of evaluation at beginning of course.

ESE: End Semester Exam will be based on 100% of the syllabus

EEM255N: POWER SYSTEM - I

Teaching Scheme : 02 L + 00 T; **Total:** 02 hours/week **Credits** : 02
Evaluation Scheme : 10 ISA + 30 MSE + 60 ESE **Total Marks** : 100
ESE Duration : 03 Hrs.

COURSE DESCRIPTION

This course provides an introduction to generation, transmission and distribution of power system. This course also provides knowledge about various power plants. This course also provides introduction of different components of transmission system, concept and calculation of transmission line parameters.

DESIRABLE AWARENESS / SKILLS

EE101N: Basic Electrical Engineering

COURSE OUTCOMES

On the successful completion of this course, the students shall be able to -

1. demonstrate working of various power plants
2. compute various factors of generation plants.
3. compute the conductor size and transmission voltage for the transmission line
4. evaluate the transmission line constants
5. understand the basic principles of AC & DC distribution, including voltage, current, power, and resistance.

RELEVANCE OF COURSE OUTCOMES (COs) WITH POs AND PSOs (WITH STRENGTH OF CO-RELATION)

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3		2	1	2	3	1			2			1		
2	3	2	2	2	2									2	
3	3			3	2			3	3	3				2	
4	3		1	2	1	2									3
5	1		2	3		3		1							1

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

COURSE CONTENT

Power Generation: [05 Hrs.]

Study of Hydro-electric, Thermal and Nuclear power plants: Schematic block diagram, principle of working, main components and auxiliary components, site selection criteria, advantages and disadvantages. Study of solar and wind power plants.

Economic Aspects And Load Calculations: [04 Hrs.]

Structure of electric power system, load curves, important terms and factors, Units generated per annum, load duration curves, types of loads, typical demand and diversity factors. Important points in selection of generating units, base load and peak load on power stations,

Supply systems: Typical layout of an electrical power system, comparison of D. C. and A. C. transmission, advantages and disadvantages of high transmission voltage,Corona effect.

Mechanical Design of Overhead Lines: [07 Hrs.]

Overhead Line Insulators: Main components of overhead lines, conductor materials, line supports, insulators, potential distribution over suspension insulator string, methods of improving string efficiency,

Insulated Cables: Introduction, insulation, insulating materials , construction of cable, and types of cables, dielectric stress in single core cable, most economical conductor size of cable, grading of cables, insulation resistance of cable.

Transmission: [07 Hrs.]

Line constants: Line constants, resistance of a transmission line, skin effect, proximity effect, Ferranti Effect, inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing,

AC and DC Distribution: [02 Hrs.]

Classification of distribution systems, Various methods of Distribution, general, radial and ring main systems, introduction to DC Distribution, and its types, 3-Wire DC Distribution System.

Text Books:-

1. A Text Book of Power System Engineering, R.K. Rajput, First edition, Laxmi publications (P) LTD, 2007

2. Elements of Power System Analysis, William Stevenson, 6thEdition, Tata McGraw, 2006

3. Modern Power System Analysis, J. Nagrath & D. P. Kothari, 3rd Edition, Tata McGraw Hill Publishing Company, New Delhi, reprint2010

Reference Books:-

1. Power System Analysis, Hadi Saadat, McGraw Hill, 2003

2. Electrical Wiring, Estimation and Costing by S.L. Uppal, Khanna Publishers, NewDelhi, 1987
3. Power System by C.L. Wadhava, New Age International Publishers, 6th Edition, 24 April 2018

ASSESMENT:

MSE: Mid Semester Exam will be based on 50% of the syllabus

ISA: ISA will be based on any one or combination of following components-

1) Declared test
2) Surprise test
3) MCQ Test
4) Assignments
5) PPT presentation
6) Quiz
7) Fabrication of working model

However, apart from above components, the course coordinator can choose any other component and shall declare method of evaluation at beginning of course.

ESE: End Semester Exam will be based on 100% of the syllabus