



## SRI VENKATESWARA COLLEGE OF ENGINEERING

## COURSE DELIVERY PLAN - THEORY

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Department of Electrical and Electronics Engineering	LP: EE18351 Rev. No: 00 Date:01/07/2019
B.E/B.Tech/M.E/M.Tech : Marine Engineering Regulation : 2018 PG Specialisation : NA Sub. Code / Sub. Name : EE18351/ Marine Electrical Machines- I Unit : I	

**Unit I Syllabus: UNIT I PRINCIPLES OF D.C. MACHINES AND GENERATORS** 8+3

Principles of DC machines – construction – winding and e.m.f equations – armature reaction – commutation – brush shift – compensating winding – D.C. generator – their characteristics- Methods of excitation – parallel operation – performance equations- Applications.

**Objective:** To familiarize the constructional details, the principle of operation, methods of testing of DC machines

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Principles of DC machines – Construction	T2	PPT
2.	D.C. generator - Methods of excitation- - winding and e.m.f equations.	T2	PPT
3.	Generator characteristics and Application.	T2	PPT
4.	Armature reaction and its effects.	R3	PPT
5.	Commutation – brush shift.	R3	PPT
6.	Need and Condition, Procedure for parallel operation.	T2	PPT
7.	Parallel Operation of Shunt Generators, Advantages, and performance equation.	T2	PPT
8.	Parallel Operation of series Generators and its requirements.	T2	PPT
9.	Problems based on emf equation of Generators and Armature reaction.	R3	BB
10.	Problems based on commutation.	R3	BB
11.	Problems in Parallel Operation of Generators.	T2	BB

Content beyond syllabus covered (if any):

**Importance of parallel operation of D.C shunt Generators in Electrical Power Plants and Ship Boards.**

\* Session duration: 50 minutes



Sub Code / Sub Name: EE18351/Marine Electrical Machines I  
UNIT: II

**UNIT II D.C.MOTORS**

8+3

D.C. Motor –their characteristics – starting and reversing – speed – torque equations – starters– speed control - Ward-Leonard control - electronic method of control (using Diode and SCR) – braking of D.C. motor-Testing of D.C. machines for finding out the losses and efficiency.

**Objective:** To understand the concept of D.C motor

Session No *	Topics to be covered	Ref	Teaching Aids
12.	D.C. Motor –their characteristics	T1	PPT
13.	Speed – torque equations	T1	PPT
14.	Speed control - Ward-Leonard control	T1	PPT
15.	Electronic method of control (using Diode and SCR)	T1	PPT
16.	Starters-Starting and Reversing	R3	PPT
17.	Braking of D.C Motor.	R3	PPT
18.	Testing of DC Machine- Direct Test .	R3	PPT
19.	Indirect type of testing of D.C Machine.	R3	PPT
20.	Problems based on Torque Equation	T2	BB
21.	Problems based on losses and efficiency of D.C Machine.	T2	BB
22.	Problems based on voltage equation, Speed, Power.	T2	BB

**Content beyond syllabus covered (if any):**

**D.C motor speed control using chopper circuit.**

\* Session duration: 50 mins



Sub Code / Sub Name: EE18351/Marine Electrical Machines I  
 UNIT: III

**UNIT III TRANSFORMERS**

**10+3**

Transformers – types and applications – operating principle – e.m.f. Equations – phase diagrams under no load and load conditions – leakage resistance – equivalent circuits – voltage regulation – losses and efficiency – open circuit and short circuit tests – parallel operation – three phase transformers – core and shell type – Instrument transformers – auto-transformers (single phase and three phase) Welding transformers- Transformer standards and specifications.

**Objectives:** To develop the knowledge of students on single and three phase transformer connections, types and testing.

Session No *	Topics to be covered	Ref	Teaching Aids
23.	Transformers – types and applications – operating principle and construction.	T1	PPT
24.	E.m.f. Equations – phase diagrams under no load and load conditions.	T1	PPT/BB
25.	Losses and efficiency – open circuit and short circuit tests.	T1	PPT/BB
26.	Concept of Voltage Regulation- Derivation of Equivalent Circuit for single phase transformer.	T1	PPT/BB
27.	Problems based on voltage equation, Calculation of losses and efficiency using O.C & S.C test results.	T1	PPT/BB
28.	Parallel Operation of single Phase Transformers.	T1	PPT
29.	Three Phase Transformers Connection , types , Advantages, Applications.	T1	PPT
30.	Principle of operation and volume of copper saving in Auto transformers.	T1	PPT
31.	Working and application of Instrument Transformers.	T1	PPT
32.	Working of Welding Transformers.	T1	PPT
33.	Problems in voltage regulation.	T1	PPT/BB
34.	Problems based on turns ratio , Losses and Efficiency of single phase Transformers.	T1	PPT/BB
35.	General Standards and Specifications of Single and Three phase transformers.	T1	PPT

**Content beyond syllabus covered (if any):**  
 Discussion of Different types of transformers and protective devices used in it.

\* Session duration: 50 mins



Sub Code / Sub Name: EE18351/Marine Electrical Machines I  
UNIT: IV

**UNIT IV INSTRUMENTS AND TESTING**

9+3

Basic requirements of measuring instrument-static and dynamic characteristics of measuring instruments – principles of indicating instruments – control and damping devices – moving coil and moving iron instruments and their use as voltmeters and ammeters –dynamometer type wattmeter – thermocouple type ammeter, voltmeters and wattmeter, extension of instrument range.Testing using digital multimeter, clamp meter.

**Objectives:** To study the construction and principle of various measuring instruments

Session No *	Topics to be covered	Ref	Teaching Aids
36.	Basic requirements of measuring instrument-Types	R3	PPT
37.	Static characteristics of measuring instruments.	R3	PPT
38.	Dynamic characteristics of measuring instruments.	R3	PPT
39.	Principle of moving coil Instruments as Ammeter and Voltmeter.	R3	PPT
40.	Principle of moving ion Instruments as Ammeter and Voltmeter.	R3	PPT
41.	Principle of dynamometer type wattmeter.	R3	PPT
42.	Thermocouple type Ammeter, Voltmeters and Wattmeter.	R3	PPT
43.	Extension of instrument range by shunt and multipliers.	R3	PPT
44.	Principle of operation of Multimeter.	R3	PPT
45.	Testing using Multimeter for Measuring Different Electrical quantities	R3	PPT
46.	Problems in Extension of range of Instruments.	R3	BB
47.	Problems in Extension of range of Instruments.	R3	BB

**Content beyond syllabus covered (if any):**

**Operation of Digital Energy meter .**

\* Session duration: 50 mins



Sub Code / Sub Name: EE18351/Marine Electrical Machines I  
UNIT: V

**UNIT V DISTRIBUTION AND TRANSMISSION SYSTEM****10+3**

Two wire and three wire D.C. distribution – A.C. Transmission – single and three phase – comparison of D.C. and A.C. transmission – use of balancer – 2-wire, 3-wire and 4- wire A.C. distribution – one end fed and ring main distributor – fuses and its materials – D.C. air circuit breaker – A.C. air circuit breakers- Types of cables (single and three core)- Electrical safety.

**Objectives:** To develop theoretical Knowledge of students on the various types of distribution system and connection patterns

Session No *	Topics to be covered	Ref	Teaching Aids
48.	Introduction to General Electrical Power System with single line diagram.	R1	PPT
49.	Introduction to Types of Transmission and Distribution System.	R1	PPT
50.	A.C. Transmission – single and three phase.	R1	PPT
51.	2-wire, 3-wire and 4- wire A.C. distribution Two wire and three wire D.C. distribution. (Volume of copper Requirement)	R1	PPT
52.	Two wire and three wire D.C. distribution. (Volume of copper Requirement)	R1	PPT
53.	Comparison of A.C & D.C Transmission and Distribution System.	R1	PPT
54.	Use of Balancer.	R1	PPT
55.	Types of Fuses, Working, and its materials.	R1	PPT
56.	Introduction to Circuit Breakers, and other protective devices in Power System.	R1	PPT
57.	Types of A.C. air circuit breakers, and its working.	R1	PPT
58.	Types of D.C. air circuit breakers, and its working.	R1	PPT
59.	Electrical safety Act.	R1	PPT
60.	Electrical safety Procedure.	R1	PPT

**Content beyond syllabus covered (if any):**

**Visit to Local power Generation Room to (College campus) explanation of the Distribution circuits and the associated protective devices.**

**TEXT BOOKS:**

1. Bhag, S. Guru, Huseyin, R. Hiziroglu, "Electric Machinery and Transformers", 3rd Ed. Oxford University Press, 2013.
2. B L Theraja & A K Theraja, 'A Textbook of Electrical Technology Volume I & II (Multicolour 23<sup>rd</sup> Edition), S.Chand Publishers, Delhi.

**REFERENCES:**

1. Uppal S.L., "Electrical Power", 13th Edition, Khanna publishers, Mumbai, 2002.
2. Berde M.S. "Electric Motor Drives", 1st Edition, Khanna Publishers, Mumbai, 1995.
3. W. Laws, "Electricity Applied To Marine Engineering", 4th edition, The Institute Of Marine Engineers, London, 1998.
4. Gorti Ramamurthi, "Handbook of Electrical Power Distribution", 2nd Ed. Universities Press, 2009.
5. Edmud GR Kraal, Stanly Buyers, Christopher Lavers, Basic electro Technology for marine engineers, 4<sup>th</sup> Ed. Reeds Vol 06.

	Prepared by	Approved by
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Date	11/7/19	11/7/19

If the same lesson is followed in the sub sequence semester/year it should be mentioned and signed by the faculty and the HOD.

\* Same lesson plan followed for the [AY 2020-21 odd]

(S. SINTHAMANI)

28/10/2020  
f HOD/EE

\* Same Lesson plan followed for the [AY 2021-22 odd]

(S. SINTHAMANI)

HOD / EEE

\* Same Lesson plan followed for the [AY 2022-23 odd]

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HOD / EEE 7.9.22