BRILLIANT INSTITUTE OF ENGINEERING AND TECHNOLOGY

Abdullapur (V), Abdullapurmet(M) R.R Dist.– 501505

COURSE FILE

For

BASIC ELECTRICAL ENGINEERING (EE103ES/EE203ES)

(AY 2019-20 I B.TECH EEE I Semester)

Prepared by

Mr. B. JEEVAN REDDY

Assistant Professor

Department of

ELECTRICAL AND ELECTRONICS ENGINEERING

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EE103ES/EE203ES: BASIC ELECTRICAL ENGINEERING

B.Tech. I Year I Sem. **L T P C 3 0 0 3**

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations

UNIT-I: D.C. Circuits Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT-II: A.C. Circuits Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III: Transformers Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV: Electrical Machines Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT-V: Electrical Installations Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Suggested Text-Books/Reference-Books:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L.S. Bobrow, Fundamentals of Electrical Engineering", Oxford University Press, 2011
4. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010
5. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE PLAN – BASIC ELECTRICAL ENGINEERING EE103ES/EE203ES (AY 2019-20)

Faculty Name : **B JEEVAN REDDY** Subject Name with code: **BASIC ELECTRICAL ENGINEERING EE103ES/EE203ES (AY 2019-20)**	Course: **B.Tech** Semester/ Branch: I **Year – I Sem. / EEE**

Course Type: ~~Mathematics~~/ ~~Science~~/ ~~Humanities~~/ ~~Computing~~/ Professional Core/ ~~Elective~~/ ~~Interdisciplinary.~~

COURSE OBJECTIVE:

- To provide comprehensive idea about AC and D C circuit analysis,
- Working principles and applications of basic machines in electrical engineering.

COURSE OUTCOMES:

After completion of this course the student is able to Known

- To understand the basic concepts of magnetic circuits, electro magnetism and electrostatics.
- To understand and analyses AC & DC circuits.
- To understand the working principle and applications of DC & AC machines.

SYLLABUS:

UNIT-I: D.C. Circuits Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT-II: A.C. Circuits Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

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components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT-V: Electrical Installations Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

PO Mapping with Course Outcomes:

CO1- 1, 2, 3, 4, 5, 8, 9, 11

CO2- 1, 2, 3, 4, 5, 8, 9, 11

CO3 – 1, 2, 3, 4, 8, 9, 10, 11

CO4 – 1, 2, 3, 4, 5, 6, 8, 11

TEXT BOOKS:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L.S. Bobrow, Fundamentals of Electrical Engineering", Oxford University Press, 2011

REFERENCE BOOKS:

1. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010
2. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989.

WEB RESOURCES:

W_1: https://nptel.ac.in/courses/108102042/
W_2: https://lecturenotes.in/subject/515/circuit-theory-ct
W_3: https://gradeup.co/study-notes-i-16b9c5e0-84da-11e7-8f7b-466c97aa8beb
W_4:https://catalogue.pearsoned.ca/assets/hip/us/hip_us_pearsonhighered/samplechapter/0133923606.pdf
W_5: http://www.engr.usask.ca/classes/EE/323/notes_2005/chapter4.pdf
Assignments: 05

Missing Topics	Teaching Methodology	Mapping to PO
	Class Lecture	
Topics Beyond the Syllabus	**Teaching Methodology**	**Mapping to PO**
	Class Lecture	

Seminar Topics:
1. A SEMINAR PRESENATION ON ELECTRICAL MACHINES AND THEIR TYPES
2. A SEMINAR ON A TRANSFORMER DEVICE

Course Assessment:

1. **25 Marks for Internal + 75 Marks for University Examination.**
2. **Student feedback on the course (Scale of 1-5).**

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE OBJECTIVES, COURSE OUTCOMES

SUBJECT: BASIC ELECTRICAL ENGINEERING EE103ES/EE203ES (AY 2019-20)

OBJECTIVES:

- To provide comprehensive idea about AC and D C circuit analysis,
- Working principles and applications of basic machines in electrical engineering.

LEARNING OUTCOMES:

After completion of this course the student is able to Known

- To understand the basic concepts of magnetic circuits, electro magnetism and electrostatics.
- To understand and analyses AC & DC circuits.
- To understand the working principle and applications of DC & AC machines.

Mapping onto PEO & PO

PO	Description	CO1	CO2	CO3	CO4	CO5
PO: 1	An ability to apply knowledge of mathematics, science and engineering.	YES	YES	YES	YES	YES
PO: 2	An ability to design and conduct experiments, as well as to analyze and interpret data.	YES	YES	YES	YES	YES
PO: 3	An ability to design a system, component or	YES	YES	YES	YES	YES

	process to meet desired needs.					
PO: 4	An ability to function on multi- disciplinary teams.	YES	YES	YES	YES	
PO: 5	An ability to identify, formulate and solve engineering problems.	YES	YES		YES	YES
PO: 6	An understanding of professional and ethical responsibility.					
PO: 7	An ability to communicate effectively.					
PO: 8	The broad education necessary to understand the impact of engineering solutions in a global and societal context.	YES	YES	YES	YES	YES
PO: 9	Recognition of the need for, and an ability to engage in life-long learning.	YES	YES	YES		YES
PO: 10	Knowledge of contemporary issues.			YES		
PO: 11	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	YES	YES	YES	YES	YES

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Lesson Plan : BASIC ELECTRICAL ENGINEERING/EE103ES/EE203ES (AY 2019-20)

Sl.No	Name of the Topic	Referernce Book	No.of Periods	Total No. of Periods	Delivery Method
UNIT I					
1	Electrical circuit elements (R, L and C)	T_1 (1-12)	1	1	Black Board
2	KCL AND KVL & Problems	T_1 (13-22)	2	3	Black Board
3	voltage and current sources	T_1 (23-38)	1	4	Black Board
4	simple circuits with dc excitation	T_1 (39-56)	2	6	Black Board
5	Superposition &problems	T_1 (57-71)	4	10	Black Board
6	Thevenin &problems	T_1 (72-81)	4	14	Black Board
7	Norton Theorems. problems	T_1 (82-91)	4	18	Black Board
8	Time-domain analysis of first-order RL and RC circuits.	T_1 (136-145)	2	20	Black Board
UNIT II					
1	A.C. Circuits	R_4 (201-206)	1	1	Black Board
2	Representation of sinusoidal waveforms,	R_4 (206-207)	2	3	Black Board
3	peak and rms values, phasor representation, real power, reactive power, apparent power, power factor	R_4 (209-221)	3	6	Black Board
4	Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel)	R_4 (222-232)	4	10	Black Board
5	resonance in series R-L-C CIRCUIT	R_4 (233-247)	3	13	PPT
6	voltage and current relations in star and delta connections.	R_4 (248-250)	2	15	PPT
7	Three-phase balanced circuits, voltage and current relations in star and delta	R_4 (251-255)	2	17	PPT

	connections.				
8	PROBLEMSPP P	R_4 (256-261)	6	23	Black Board
UNIT III					
1	Transformers	T_2 (1-15)	2	2	Black Board
2	Ideal and practical transformer	T_2 (16-25)	1	3	Black Board
3	equivalent circuit	T_2 (26-50)	2	5	Black Board
4	losses in transformers	T_2 (51-60)	2	7	Black Board
5	Auto-transformer	T_2 (61-71)	2	9	Black Board
6	three-phase transformer connections.	T_2 (72-81)	2	11	Black Board
7	EMF Equation& problems	R_1 (101-121)	4	15	Black Board
8	Regulation &problems	R_1(136-145)	2	17	Black Board
9	Efficiency &problems	R_1 (146-148)	3	20	Black Board
UNIT IV					
1	Electrical Machines	R_2 (247)	2	2	Black Board
2	Generation of rotating magnetic fields,	R_2 (248-249)	2	4	Black Board
3	Construction and working of a three-phase induction motor	R_2 (250)	2	6	Black Board
4	Significance of torque-slip characteristic	R_2 (251-252)	2	8	Black Board
5	Loss components and efficiency	R_2 (253-256)	2	10	Black Board
6	Single-phase induction motor	R_2 (257)	2	12	Black Board
7	starting and speed control of induction motor, Single-phase induction motor. Construction	R_2 (258-260)	4	16	Black Board
8	torque-speed characteristic and speed control of separately excited dc motor.	R_2 (261-265)	4	20	PPT
9	problems	R_2 (266-270)	4	24	Black Board
UNIT V					
1	Electrical Installations	R_4 (485)	2	2	Black Board
2	Components of LT Switchgear	R_4 (486-488)	1	3	Black Board
3	Switch Fuse Unit (SFU), MCB	R_4 (489-492	2	5	Black Board
4	ELCB, MCCB	R_4 (493-500)	2	7	Black Board
5	Types of Wires and Cables	R_4 (501-508)	3	10	Black Board
6	Earthing	R_4 (509-512)	4	14	Black Board

7	Types of Batteries, Important Characteristics for Batteries.	R_4 (513-519)	3	17	Black Board
8	power factor improvement and battery &problems	R_4 (520-525)	5	22	Black Board
9	Elementary calculations for energy consumption,	R_4 (526-528)	1	11	Black Board
10	problems	R_4 (529-535)	1	12	Black Board

TEXT BOOKS:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.
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WEB RESOURCES:

W_1: https://nptel.ac.in/courses/108102042/
W_2: https://lecturenotes.in/subject/515/circuit-theory-ct
W_3: https://gradeup.co/study-notes-i-16b9c5e0-84da-11e7-8f7b-466c97aa8beb
W_4:https://catalogue.pearsoned.ca/assets/hip/us/hip_us_pearsonhighered/samplechapter/0133923606.pdf
W_5: http://www.engr.usask.ca/classes/EE/323/notes_2005/chapter4.pdf

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