



**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. G. KIRAN**

**Assistant Professor**

**Department of**

**ELECTRICAL AND ELECTRONICS ENGINEERING**

## **INDEX**

1. Syllabus
2. Course Information Sheet
3. Course Objectives, Course outcomes
4. Mapping onto PEO & PO
5. Lesson Plan
6. Lecture Notes
7. University Question Paper
8. Internal Question Paper's With Key
9. Assignment Topics
10. Tutorial Sheets
11. Unit wise Question Bank
12. Gaps & Plans for Add-On Programs
13. Topic beyond the syllabus - References
14. Web References
15. Teacher Log Book/ Attendance Register

**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 impart 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>G.KIRAN</b>	Course: <b>B.Tech</b>
Subject Name with code: <b><u>BASIC ELECTRICAL ENGINEERING EE103ES/EE203ES (AY 2019-20)</u></b>	Semester/ Branch: <b>I Year – I Sem. / CSE B &amp;C</b>

**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.

**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.

**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<sub>1</sub>: <https://nptel.ac.in/courses/108102042/>

W<sub>2</sub>: <https://lecturenotes.in/subject/515/circuit-theory-ct>

W<sub>3</sub>: <https://gradeup.co/study-notes-i-16b9c5e0-84da-11e7-8f7b-466c97aa8beb>

W<sub>4</sub>:[https://catalogue.pearsoned.ca/assets/hip/us/hip\\_us\\_pearsonhighered/samplechapter/0133923606.pdf](https://catalogue.pearsoned.ca/assets/hip/us/hip_us_pearsonhighered/samplechapter/0133923606.pdf)

W<sub>5</sub>: [http://www.engr.usask.ca/classes/EE/323/notes\\_2005/chapter4.pdf](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 PRESENTATION 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).

**(G.KIRAN)**

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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**

<b>PO</b>	<b>Description</b>	<b>CO1</b>	<b>CO2</b>	<b>CO3</b>	<b>CO4</b>	<b>CO5</b>
<b>PO: 1</b>	An ability to apply knowledge of mathematics, science and engineering.	YES	YES	YES	YES	YES
<b>PO: 2</b>	An ability to design and conduct experiments, as well as to analyze and	YES	YES	YES	YES	YES



	interpret data.					
<b>PO: 3</b>	An ability to design a system, component or process to meet desired needs.	YES	YES	YES	YES	YES
<b>PO: 4</b>	An ability to function on multi- disciplinary teams.	YES	YES	YES	YES	
<b>PO: 5</b>	An ability to identify, formulate and solve engineering problems.	YES	YES		YES	YES
<b>PO: 6</b>	An understanding of professional and ethical responsibility.					
<b>PO: 7</b>	An ability to communicate effectively.					
<b>PO: 8</b>	The broad education necessary to understand the impact of engineering solutions in a global and societal context.	YES	YES	YES	YES	YES
<b>PO: 9</b>	Recognition of the need for, and an ability to engage in life-long learning.	YES	YES	YES		YES
<b>PO: 10</b>	Knowledge of contemporary issues.			YES		
<b>PO: 11</b>	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	YES	YES	YES	YES	YES



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**DEPARTMENT OF ELECTRONICS AND ELECTRICAL ENGINEERING**

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

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

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

6	Earthing	R <sub>4</sub> (509-512)	4	14	Black Board
7	Types of Batteries, Important Characteristics for Batteries.	R <sub>4</sub> (513-519)	3	17	Black Board
8	power factor improvement and battery & problems	R <sub>4</sub> (520-525)	5	22	Black Board
9	Elementary calculations for energy consumption,	R <sub>4</sub> (526-528)	1	11	Black Board
10	problems	R <sub>4</sub> (529-535)	1	12	Black Board

### **TEXT BOOKS:**

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