



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. K.RAJESH

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.



BRILLIANT INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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

| | |
|---|--|
| Faculty Name : K.RAJESH | Course: B.Tech |
| Subject Name with code: <u>BASIC ELECTRICAL ENGINEERING EE103ES/EE203ES (AY 2019-20)</u> | Semester/ Branch: I Year – I Sem. / CSE A |

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:

W₁: <https://nptel.ac.in/courses/108102042/>

W₂: <https://lecturenotes.in/subject/515/circuit-theory-ct>

W₃: <https://gradeup.co/study-notes-i-16b9c5e0-84da-11e7-8f7b-466c97aa8beb>

W₄: https://catalogue.pearsoned.ca/assets/hip/us/hip_us_pearsonhighered/samplechapter/0133923606.pdf

W₅: 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 | |

| |
|--|
| <u>Seminar Topics:</u> |
| 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).

(K.RAJESH)

HOD



BRILLIANT INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

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

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 |



BRILLIANT INSTITUTE OF ENGINEERING AND TECHNOLOGY

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

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 |
|----------------|--|--------------------------|---------------|----------------------|-----------------|
| 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 | R ₄ (251-255) | 2 | 17 | PPT |

| | | | | | |
|-----------------|---|--------------------------|---|----|-------------|
| | relations in star and delta 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.
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:

W₁: <https://nptel.ac.in/courses/108102042/>

W₂: <https://lecturenotes.in/subject/515/circuit-theory-ct>

W₃: <https://gradeup.co/study-notes-i-16b9c5e0-84da-11e7-8f7b-466c97aa8beb>

W₄: https://catalogue.pearsoned.ca/assets/hip/us/hip_us_pearsonhighered/samplechapter/0133923606.pdf

W₅: http://www.engr.usask.ca/classes/EE/323/notes_2005/chapter4.pdf

(K.RAJESH)

HOD