BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

II Semester: MECH III Semester: AERO							
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**	
AEEB04	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	1	-	4	30	70	100
Contact Classes: 45	**Tutorial Classes: 15**	**Practical Classes: Nil**				**Total Classes: 60**	

COURSE OBJECTIVES:
The course should enable the students to:
I.   Understand Kirchhoff laws and their application in series and parallel electric circuits.
II. Discuss principle and operation of measuring instruments.
III. Analyze the characteristics of alternating quantities, DC machines and AC machines.
IV. Illustrate the V-I characteristics of various diodes and bi-polar junction transistor.

COURSE OUTCOMES (COs):

CO 1:   Understand the basic concepts of electricity, applications of Kirchhoff laws and source transformation technique to complex circuits. Basic principles of indicating instruments.
CO 2:   Explore to the working principle of dc machine, various types and determine the torque equation of dc motor, EMF equation of dc generator purpose of three-point starter.
CO 3:   Summarize various alternating quantities and explain working principle of induction motor, alternators and transformers.
CO 4:   Discuss the basic theory of semi-conductor diode, rectifier, zener diode and their characteristics.
CO 5:   Explain the concept of transistor in various configurations and give its applications.

COURSE LEARNING OUTCOMES (CLOs):

1. Analyze the circuits using Kirchhoff's current and Kirchhoff's voltage law.
2. Use of series-parallel concepts for simplifying circuits.
3. Use star delta transformation for simplifying complex circuits.
4. Generalize operation and principle of measuring instruments.
5. Demonstrate the working principle of DC motor, DC generator.
6. Describe the construction of DC motor and DC generator.
7. Classify the types of DC motor and generator with characteristics and voltage, current and power equations.
8. Derive the EMF equation of DC generator, and various problems on EMF equation.
9. Torque equation of DC motor and understand the purpose of three point starter.
10. List out various alternating quantities such as Sinusoidal AC voltage, average and RMS values, form and peak factor, and understand concept of three phase alternating quantity.
11. Discuss the principle of operation of induction motor.
12. Explain the construction and characteristics of alternator.
13. Explain the construction and characteristics of 3-phase induction motor.
14. Explain the principle and construction of Transformer.
15. Understand the working of semi-conductor diode and its V-I characteristics.
16. Discuss the operation of half wave, full wave and bridge rectifiers.

17. Summarize various alternating quantities of half wave, full wave and bridge rectifiers.
18. Apply the concept of diodes in converting AC to DC rectification process.
19. Compare the operation of half wave, full wave and bridge rectifiers.
20. Distinguish the different configurations of transistor.
21. Differentiate the operation of Diodes and transistors.
22. Understand the concept of biasing and load line of transistor.

MODULE-I	**ELECTRIC CIRCUITS, ELECTROMAGNETISM AND INSTRUMENTS**	**Classes: 09**

Electrical Circuits: Basic definitions, types of elements, Ohm's Law, resistive networks, inductive networks, capacitive networks, Kirchhoff's Laws, series, parallel circuits and star delta transformations, simple problems, Faradays law of electromagnetic induction; Instruments: Basic principles of indicating instruments, permanent magnet moving coil and moving iron instruments.

MODULE -II	**DC MACHINES**	**Classes: 09**

DC Machines: Principle of operation of DC generator, EMF equation, principle of operation of DC motors, torque equation, types of DC machines, applications, three point starter.

MODULE-III	**ALTERNATING QUANTITIES AND AC MACHINES**	**Classes: 09**

Alternating quantities: Sinusoidal AC voltage, average and RMS values, form and peak factor, concept of three phase alternating quantity; Transformer: Principle of operation, EMF equation, losses, efficiency and regulation.

Three phase induction motor: Principle of operation, slip, slip torque characteristics, efficiency, applications; Alternator: Principle of operation, EMF Equation, efficiency, regulation by synchronous impedance method.

MODULE-IV	**SEMICONDUCTOR DIODE AND APPLICATIONS**	**Classes: 09**

Semiconductor diode: P-N Junction diode, symbol, V-I characteristics, half wave rectifier, full wave rectifier, bridge rectifier and filters, diode as a switch, Zener diode as a voltage regulator.

MODULE-V	**BIPOLAR JUNCTION TRANSISTOR AND APPLICATIONS**	**Classes: 09**

Bipolar junction transistor: Working principle of transistors, DC characteristics, CE, CB, CC configurations, biasing, load line, applications.

Text Books:

1. A Chakrabarti, "Circuit Theory", Dhanpat Rai Publications, 6th Edition, 2004.
2. K S Suresh Kumar, "Electric Circuit Analysis", Pearson Education, 1st Edition, 2013.
3. Willianm Hayt, Jack E Kemmerly S M Durbin, "Engineering Circuit Analysis", Tata McGraw Hill, 7th Edition, 2010.
4. J P J Millman, C C Halkias, Satyabrata Jit, "Millman"s Electronic Devices and Circuits", Tata McGraw Hill, 2nd Edition, 1998. 5 R L Boylestad, Louis Nashelsky, "Electronic Devices and Circuits", PEI / PHI, 9th Edition, 2006.
5. R L Boylestad, Louis Nashelsky, "Electronic Devices and Circuits", PEI / PHI, 9th Edition, 2006.
6. V K Mehta, Rohit Mehta, "Principles of electrical engineering", S CHAND, 1st Edition, 2003.

Reference Books:

1. David A Bell, "Electric Circuits", Oxford University Press, 9th Edition, 2016.
2. M Arshad, "Network Analysis and Circuits", Infinity Science Press, 9th Edition, 2016.
3. A Bruce Carlson, "Circuits", Cengage Learning, 1st Edition, 2008.

Web References:

1. https://www.kuet.ac.bd/webportal/ppmv2/uploads/1364120248DC%20Machines2.pdftextofvideo.nptel.iitm.ac.in
2. https://www.eleccompengineering.files.wordpress.com/2014/08/a-textbook-of-electrical-technology-volume-ii-ac-and-dc-machines-b-l-thferaja.pdf
3. https://www.geosci.uchicago.edu/~moyer/GEOS24705/Readings/Klempner_Ch1.pdf
4. https://www.ibiblio.org/kuphaldt/electricCircuits/DC/DC.pdf
5. https://www.users.ece.cmu.edu/~dwg/personal/sample.pdf.
6. https://www.djm.cc/library/Principles_of_Alternating_Current_Machinery_Lawrence_edited.pdf

E-Text Books:

1. https://www.kisi.deu.edu.tr/aytac.goren/ELK2015/w10.pdfwww.bookboon.com.
2. https://www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-071j-introduction- to-electronics-signals-and-measurement-spring-2006/lecture-notes/19_bjt_1.pdf.
3. https://www.google.co.in/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=half+and+full+wave+rectifier+pdf.
4. https://www.leka.lt/sites/default/files/vaizdai/concepts-in-electric-circuits.pdf.
5. https://www.ktustudents.in