

## BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

<b>II Semester: ME III Semester: AE</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AEEB04	Foundation	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
<b>Contact Classes: 45</b>		<b>Tutorial Classes: 15</b>		<b>Practical Classes: Nil</b>			<b>Total Classes: 60</b>	
<p><b>COURSE OBJECTIVES:</b>  <b>The course should enable the students to:</b></p> <ol style="list-style-type: none"> <li>I. Understand Kirchoff laws and their application in series and parallel electric circuits.</li> <li>II. Discuss principle and operation of measuring instruments.</li> <li>III. Analyze the characteristics of alternating quantities, DC machines and AC machines.</li> <li>IV. Illustrate the V-I characteristics of various diodes and bi-polar junction transistor.</li> </ol> <p><b>COURSE OUTCOMES (COs):</b></p> <p>CO 1: Understand the basic concepts of electricity, application's of Kirchoff laws and source transformation technique to complex circuits. Basic principles of indicating instruments.</p> <p>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.</p> <p>CO 3: Summarize various alternating quantities and explain working principle of induction motor, alternators and transformers.</p> <p>CO 4: Discuss the basic theory of semi-conductor diode, rectifier, zener diode and their characteristics.</p> <p>CO 5: Explain the concept of transistor in various configurations and give its applications.</p> <p><b>COURSE LEARNING OUTCOMES (CLOs):</b></p> <ol style="list-style-type: none"> <li>1. Analyze the circuits using Kirchoff's current and Kirchoff's voltage law.</li> <li>2. Use of series-parallel concepts for simplifying circuits.</li> <li>3. Use star delta transformation for simplifying complex circuits.</li> <li>4. Generalize operation and principle of measuring instruments.</li> <li>5. Demonstrate the working principle of DC motor, DC generator.</li> <li>6. Describe the construction of DC motor and DC generator.</li> <li>7. Classify the types of DC motor and generator with characteristics and voltage, current and power equations.</li> <li>8. Derive the EMF equation of DC generator, and various problems on EMF equation.</li> <li>9. Torque equation of DC motor and understand the purpose of three point starter.</li> <li>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.</li> <li>11. Discuss the principle of operation of induction motor.</li> <li>12. Explain the construction and characteristics of alternator.</li> <li>13. Explain the construction and characteristics of 3-phase induction motor.</li> <li>14. Explain the principle and construction of Transformer.</li> <li>15. Understand the working of semi-conductor diode and its V-I characteristics.</li> <li>16. Discuss the operation of half wave, full wave and bridge rectifiers.</li> <li>17. Summarize various alternating quantities of half wave, full wave and bridge rectifiers.</li> </ol>								

<p>18. Apply the concept of diodes in converting AC to DC rectification process.</p> <p>19. Compare the operation of half wave, full wave and bridge rectifiers.</p> <p>20. Distinguish the different configurations of transistor.</p> <p>21. Differentiate the operation of Diodes and transistors.</p> <p>22. Understand the concept of biasing and load line of transistor</p>		
<b>MODULE-I</b>	<b>ELECTRIC CIRCUITS, ELECTROMAGNETISM AND INSTRUMENTS</b>	<b>Classes: 09</b>
<p>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.</p>		
<b>MODULE -II</b>	<b>DC MACHINES</b>	<b>Classes: 09</b>
<p>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.</p>		
<b>MODULE-III</b>	<b>ALTERNATING QUANTITIES AND AC MACHINES</b>	<b>Classes: 09</b>
<p>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.</p> <p>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.</p>		
<b>MODULE-IV</b>	<b>SEMICONDUCTOR DIODE AND APPLICATIONS</b>	<b>Classes: 09</b>
<p>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.</p>		
<b>MODULE-V</b>	<b>BIPOLAR JUNCTION TRANSISTOR AND APPLICATIONS</b>	<b>Classes: 09</b>
<p>Bipolar junction transistor: Working principle of transistors, DC characteristics, CE, CB, CC configurations, biasing, load line, applications.</p>		
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. A Chakrabarti, "Circuit Theory", Dhanpat Rai Publications, 6<sup>th</sup> Edition, 2004.</li> <li>2. K S Suresh Kumar, "Electric Circuit Analysis", Pearson Education, 1<sup>st</sup> Edition, 2013.</li> <li>3. Williamm Hayt, Jack E Kemmerly S M Durbin, "Engineering Circuit Analysis", Tata McGraw Hill, 7<sup>th</sup> Edition, 2010.</li> <li>4. J P J Millman, C C Halkias, Satyabrata Jit, "Millman"s Electronic Devices and Circuits", Tata McGraw Hill, 2<sup>nd</sup> Edition, 1998. 5 R L Boylestad, Louis Nashelsky, "Electronic Devices and Circuits", PEI / PHI, 9th Edition, 2006.</li> <li>5. R L Boylestad, Louis Nashelsky, "Electronic Devices and Circuits", PEI / PHI, 9<sup>th</sup> Edition, 2006.</li> <li>6. V K Mehta, Rohit Mehta, "Principles of electrical engineering", S CHAND, 1<sup>st</sup> Edition, 2003.</li> </ol>		

**Reference Books:**

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

**Web References:**

1. <https://www.kuet.ac.bd/webportal/ppmv2/uploads/1364120248DC%20Machines2.pdf>  
[textofvideo.nptel.iitm.ac.in](http://textofvideo.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-1-thferaja.pdf>
3. [https://www.geosci.uchicago.edu/~moyer/GEOS24705/Readings/Klempner\\_Ch1.pdf](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](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.pdf>  
[www.bookboon.com](http://www.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](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>