

SCHOOL OF DIPLOMA STUDIES	PROGRAM: DIPLOMA – ELECTRICAL ENGINEERING	
ACADEMIC YEAR - 2018-19	SEMESTER – IV	BATCH YEAR: 2017-20
DEFINITION OF ONE CREDIT: <b>1. Lecture(L):</b> 1 hour / week / semester, <b>2. Practical(P):</b> 2 hour / week / semester <b>3. Tutorial(T):</b> 2 hour / week / semester		

Course Code	Course Name	Teaching Hours			Credits	Audit course	CIE	PSEE
		Theory	Tutorial	Practical				
DEE408	ELECTRICAL MACHINE-II	3	0	2	4	N	Y	Y
DEE409	COMPUTER AIDED ELECTRICAL DRAWING, DRAFTING & SIMULATION	0	0	4	2	N	Y	Y
DEE411	ENERGY CONSERVATION TECHNIQUES	3	0	2	4	N	Y	Y
DEE412	UTILIZATION OF ELECTRICAL POWER	3	0	2	4	N	Y	Y
DEC418	DIGITAL ELECTRONICS AND MICROCONTROLLER	4	0	2	5	N	Y	Y
	<b>Mentoring</b>	2	0	0	0	N	N	N
	<b>ELECTIVE: III</b>	3	0	0	3	N	Y	N
CD401	Campus to Corporate Training							
NEN002	Orientation Program in Entrepreneurship							
BBC308	Creating and Managing New Ventures							
BBC208	Essentials of Economics							
BBC108	Basics of Business Management							
	<b>Total</b>	<b>18</b>			<b>0</b>	<b>12</b>	<b>22</b>	
		<b>Total Hours</b>			<b>30</b>			

# Students are required to undergo 15 hours training / field visit/ workshop in relevant field during semester.

N- No	CIE – Continuous internal evaluation
Y – Yes	PSEE – Practical semester end examination including ITD, Dissertation, Industrial project, Industrial training etc...

<b>Course Title</b>	<b>UTILIZATION OF ELECTRICAL POWER</b>
<b>Course Code</b>	DEE412
<b>Course Credit</b>	Lecture : 3
	Practical : 1
	Tutorial : 0
	Total : 4
<b>Course Learning Outcomes</b>	
<p>At the end of course, students will be able to:</p> <ul style="list-style-type: none"> <li>• <b>Describe</b> the working of resistance oven</li> <li>• <b>Explain</b> the principle of induction heating and their applications</li> <li>• <b>Solve</b> numerical problem of heating element</li> <li>• <b>State</b> the significance of good welds</li> <li>• <b>State</b> the factors governing selection of electric motors in a electric drive</li> </ul>	
<b>Detailed Syllabus</b>	

<b>SECTION I</b>		
<b>Module No.</b>	<b>Topics</b>	<b>No. of Sessions</b>
<b>1</b>	<b>Electric Heating</b> Introduction of heating, Modes of transfer of heat, Classification of Electric heating methods, Advantage and methods of electric heating: Various types of resistance and arc furnaces, Power supplies and heat control for above furnaces, Comparison of various furnaces; high frequency eddy current heating and high frequency power supply sources; Induction heating various types of core and core less, Induction of furnaces choice of frequency and application of induction heating, High frequency generation, Dielectric heating, Choice of voltage and frequency, Calculation of heating power, Depth of penetration and losses, Application and uses of dielectric heating.	<b>10</b>
<b>2</b>	<b>Electric Welding</b> Welding and its classification, Various types of welding and power supply, Electron beam welding, modern welding techniques, Electronic welding control, Need of A.C contactors, Heat control unit A.C timer units, comparison between resistance and arc welding.	<b>4</b>

<b>3</b>	<p><b>Electric Drives</b>            Introduction concept of electric drives, Classification of electric drives, Nature of load, Factors effecting selection of drive, Methods of electric braking of D.C motor, examples. Braking of 3-phase induction motor, Mechanical features of electric drive, Load equalization, Flywheel calculations, examples. Temperatures rise of electric drives beating and cooling curves, Energy efficient drives.</p>	<b>7</b>

**SECTION II**

<b>4</b>	<p><b>Electrolytic Processes</b>            Basic Principle of Electrolysis, Terms regarding electrolysis process, faraday's laws of electro-deposition, Examples, Electro forming, Electroplating, Anodizing and Electro-polishing, power supply for electrolysis process, application.</p>	<b>7</b>
<b>5</b>	<p><b>Illumination</b>            Introduction of illumination, Nature of light, Measurement of candle power and MSCP, Photometer bench, photometers, radial photometers, Principle of production of light, Sources of light, requirements of good lighting, Lamp fitting, basic principles of control, Factors affecting the design of indoor lighting installation, Special precautions, street lighting, flood lighting and its design, Various types of lamps, CFL, Mercury vapor lamp, Na-vapor lamp, Metal Halide Lamp</p>	<b>7</b>
<b>6</b>	<p><b>air conditioning system</b>            Introduction, factor affecting air conditioning system, types of air conditioning system, Ventilating and Air Conditioning of residential and commercial buildings. Heating of building, factor affecting in heating system, types of heating equipment used for space heating.</p>	<b>7</b>

**Reference Books:**

1. J. B. Gupta, Utilization of Electric Power & Electric Traction, S. K. Kataria & Sons, New Delhi, Latest edition
2. G. C. Garg, Utilization of Electric Power & Electric Traction, Khanna Publishers, New Delhi, Latest edition
3. V.K.Mehta, Electrical Power system, S.Chand, New Delhi, Latest edition
4. N.V.Suryanarayana, electric power including electric drives and electric traction , new age international publishers, latest edition.

**List of Experiments:**

1. Prepare a detailed report on illumination required and available at different places in college by luxmeter.
2. Prepare a technical report after visiting an industry, manufacturing electrical heating furnaces. (Otherwise from internet).
3. Prepare a technical report after visiting an industry, manufacturing electrical welding furnaces. (Otherwise from internet).
4. Prepare a report after visiting nearby electric-traction substation. (Otherwise from Internet).
5. Prepare test reports & bills for servicing of electrical domestic appliances.
6. Distinguish different lighting schemes.
7. Select the appropriate motors and justify selection for given different load situations (at least 5)
8. Describe the working of air conditioning and demonstrate its parts with neat sketch.

<b>Course Title</b>	<b>ELECTRICAL MACHINE-II</b>
<b>Course Code</b>	DEE408
<b>Course Credit</b>	Lecture : 3
	Practical : 1
	Tutorial : 0
	Total : 4

**Course Learning Outcomes**

At the end of course, students will be able to:

- **Differentiate** between squirrel cage and wound rotor induction motor with their salient features
- **Determine** the voltage regulation of an alternator by synchronous impedance method
- **Connect** and operate synchronous motor using proper starting method
- **Applying** special machine in electrical field.
- **Calculate** induction machine slip.

**Detailed Syllabus**

**SECTION I**

<b>Module No.</b>	<b>Topics</b>	<b>No. of Sessions</b>
1	<p><b>POLY – PHASE INDUCTION MOTOR</b></p> <ul style="list-style-type: none"> <li>• Principle of operation and construction of squirrel cage, wound rotor ,Slip, effect of slip on the rotor circuit, measurement of slip and related examples ,Torque of induction motor, starting, running torque &amp; condition for maximum torques related Example ,Torque-speed characteristic and Torque-slip characteristic ,Losses and Power stages of induction motor ,Necessity and types of starters – DOL, star-delta, autotransformer type and rotor resistance starter ,Vector diagram and equivalent circuit of 3 phase induction motor.</li> </ul>	14
2	<p><b>SINGLE PHASE INDUCTION MOTOR</b></p> <ul style="list-style-type: none"> <li>• Principle of working &amp; double field revolving theory ,Why single phase motor is not self starting? Making single phase IM self starting, Types of 1 phase IM, construction, operation and characteristics of 1 phase IM               <ul style="list-style-type: none"> <li>○ Split phase IM,</li> </ul> </li> </ul>	7

	<ul style="list-style-type: none"> <li>○ Capacitor start motor, capacitor start capacitor run motor</li> <li>○ Shaded pole motor</li> <li>○ AC series motor or universal motor</li> <li>○ Repulsion motor</li> <li>○ Reluctance motor</li> <li>● Application, advantages and disadvantages of different types of single phase motors.</li> </ul>	
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<b>SECTION II</b>		
<b>3</b>	<b>ALTERNATOR</b> <ul style="list-style-type: none"> <li>● Principle, Operation &amp; Construction of alternator ,Types of winding and related terms,EMF equation of alternator ,Armature reaction &amp; Vector diagram of alternator ,Voltage regulation ,Parallel operation of alternator ,Methods of synchronizing alternator ,Hunting phenomena and function of damper winding</li> </ul>	<b>9</b>
<b>4</b>	<b>SYNCHRONOUS MOTOR</b> <ul style="list-style-type: none"> <li>● Working principle &amp; construction of synchronous motor ,Making synchronous motor self starting ,Vector diagram and Effect of change in field excitation ,‘V’ curves for synchronous motor ,Synchronous condenser ,Applications ,Comparison of synchronous motor and induction motor</li> </ul>	<b>8</b>
<b>5</b>	<b>SPECIAL MACHINES</b> <ul style="list-style-type: none"> <li>● Stepper motor</li> <li>● Brushless DC motor</li> <li>● Schrage motor</li> <li>● Servomotor</li> </ul>	<b>4</b>

**Reference Books:**

1. V.K.Mehta& Rohit Mehta, Principles of Electrical Machines, 2<sup>nd</sup> Edition, S.Chand& co., New Delhi, 2002 Reprint 2013.
2. B.L.Theraja&A.K.Theraja, A text book of Electrical Technology, Volume II, 1<sup>st</sup> Edition S.Chand& co., New Delhi, 1959 Reprint 2009.
3. J.B.Gupta, Theory & Performance of Electrical Machines, 14<sup>th</sup> edition, S.K. Kataria& sons, New Delhi, 1967 Reprint 2011.
4. M.V.Deshpande, Electrical Machines, 1<sup>st</sup> edition, PH India Pvt. Ltd., Haryana, 2011 Reprint 2013.
5. Ashfaq Husain, Electrical Machines, 2<sup>nd</sup> Edition, Dhanpan rai & co., Delhi, 2002 Reprint 2014.

**List of Experiments:**

1. To perform single phase induction motor.
2. To perform the running and reversing of single phase induction motor.
3. To perform the no load test of a single phase induction motor.
4. To perform the block rotor test of a single phase induction motor.
5. To perform the load test of a single phase induction motor.
6. To perform the running and reversing of 3- $\phi$  induction motor.
7. To perform of no load test in 3- $\phi$  induction motor.
8. To perform of blocked rotor test of 3- $\phi$  induction motor.
9. To perform and measurement of slip in 3- $\phi$  induction motor.
10. To perform the speed-torque characteristics of 3- $\phi$  induction motor.
11. To perform connection of starters of 3 –  $\phi$  induction motor.
12. To perform direct load test on alternator.
13. To perform “v” curves of synchronous motor.

<b>Course Title</b>	<b>Digital Electronics &amp; Microcontroller</b>
<b>Course Code</b>	<b>DEC418</b>
<b>Course Credit</b>	Lecture : 4
	Practical : 1
	Tutorial : 0
	Total : 5

### Course Learning Outcomes

At end of the course, students will be able to:

- **Understand** number systems and binary codes, basics of Boolean algebra and **apply** the correlation between Boolean expressions
- **Simplify** and **demonstrate** the Boolean expressions
- **Illustrate** basic methods to **understand** digital circuits and **apply** the fundamental concepts for constructing digital systems
- **Analyze** and **demonstrate** the use of combinational circuits and sequential circuits
- **Classify** micro controllers, **identify** their features and **understand** the architectural and operational configuration of 8051 microcontroller entities.
- **Classify and understand** assembly language instructions and **translate** it to **develop** skills for assembly language programming.
- **Apply** assembly language programming to interface different peripherals with 8051 to **develop** embedded applications.

### Detailed Syllabus

#### Section-1

Sr. No.	Name of chapter & Details	Hours Allotted
1	<b>Binary logic and Boolean function simplification</b> Introduction to digital computers and digital systems Introduction to number systems Binary codes: Weighted codes and non-weighted codes Definition, symbols and truth tables of logic gates, NAND and NOR as a universal gate Axioms and laws of Boolean algebra Reduction of Boolean expressions Need of Boolean function simplification Min-terms, Max-terms, Sum of Products (SOP) and Product of Sums (POS) Karnaugh mapping, K-map representation of logical function for 2,3, and 4	8



	variables, Don't care conditions and simplification of Boolean equations using K-map	
2	<b>Combinational Circuits</b> Introduction to combinational circuits Adder and sub-tractor : Half adder, Full adder, Half sub-tractor and Full subtractor Code converters: Gray to Binary and Binary to Gray code convertor 4 bit Binary parallel adder and subtractor Magnitude Comparator: 2 input magnitude comparator Decoders: 2 to 4 line, 3 to 8 line Encoders: 4 to 2 line encoder, octal to binary encoder Multiplexers and de-multiplexers	10
3	<b>Sequential Circuits</b> Introduction to sequential circuits and difference between combinational and sequential circuits Difference between latch and flip-flop Concept of level triggering and edge triggering S-R latch, S-R flip-flop, D flip-flop, T flip-flop, JK flip-flop and Master-slave JK flip-flop. Serial-in Serial-out Shift register, Serial-in Parallel-out Shift register, Parallel-in Serial-out Shift register, Parallel-in Parallel-out Shift register, Bi-directional shift register and Universal shift register. Asynchronous and Synchronous counters Johnson counter and Ring counter	10
<b>Section-2</b>		
4	<b>The 8051 Microcontroller Architecture</b> Introduction and evolution of microprocessors and micro controllers Classification of Microcontrollers and their basic architectures Applications of Microcontrollers Architecture of 8051 micro controller 8051 Programming Model The 8051 oscillator clock and reset circuits 8051 DIP Pin Assignments and their functions 8051 Register organization Memory organization of 8051:- Internal RAM and Internal ROM organization, External Memory organization and its interfacing I/O Pins, Ports, and their circuits Counters and Timers :- TCON & TMOD Registers, Timer Modes of Operation Serial Data I/O :- SCON & PCON Registers, Serial Data Transmission Modes Interrupts :-Types of Interrupts , IE & IP Registers	12
5	<b>8051 Assembly Language Programming</b> Introduction to 8051 Assembly Language Programming	6

	<p>8051 Addressing modes              8051 Data types and Directives              Arithmetic, Logical, Jump, Loop, and Call Instructions              Basic programs using Arithmetic, Logical, Jump, Loop, and Call Instructions              I/O Port Programming              Timer, Serial Port and Interrupt Programming In Assembly Language</p>	
6	<p><b>Interfacing with 8051 and its applications</b>              Basic interfacing concepts              Introduction to LCD and its interfacing              Key board interfacing              Seven segment display interfacing              Introduction to DC motor and its interfacing              Introduction to Stepper Motor and its interfacing</p>	10

**LIST OF EXPERIMENTS**

1. To **demonstrate** the basic logic gates.
2. To **demonstrate** the NAND gate as a universal building block.
3. To **demonstrate** the NOR gate as a universal building block.
4. To **realize** and **perform** the Half adder and Full adder circuit
5. To **realize** and **perform** the half subtractor and Full subtractor circuit.
6. To **realize** and **perform** binary parallel adder/Subtractor circuit.
7. To **understand** and **demonstrate** different types of Flip-Flops.
8. To **understand** and **demonstrate** binary to gray and gray to binary code converter.
9. To **realize** and **demonstrate** the decoder circuits.
10. To **realize** and **demonstrate** the encoder circuits.
11. To **realize** and **demonstrate** various counters.
12. To **realize** and **demonstrate** the multiplexer & de-multiplexer circuits.
13. **Develop** and **simulate** various assembly language programs using Data transfer instructions and **demonstrate** the results on development board.
14. **Develop** and **simulate** various assembly language programs using Arithmetic instructions and demonstrate the results on development board.
15. **Develop** and **simulate** various assembly language programs using Logical instructions and **demonstrate** the results on development board.
16. **Write** a code to perform following operations on development board:  
Keep monitoring port pin P1.2 until it becomes high  
When P1.2 becomes high, write data 45H to port P0  
Send high to low pulse on pin P2.3
17. **Write** a code to generate waveforms of various duty cycles having different frequencies and display it on C.R.O
18. **Write** a code and **demonstrate** the following interrupt operations using development board:  
Generate external interrupt INT0 and INT1 by connecting push button switch  
Glow LEDs connected at port 1 one- by- one when interrupt occurs while LEDs connected with port 2 is blinking.
19. **Write** a code to display 1 to 9 on seven segment display with specific time delay and **demonstrate** the same.
20. **Write** a code to display various words on the LCD and **demonstrate** it using development board.
21. **Demonstrate** an interfacing of keyboard with 8051 micro controller.
22. **Demonstrate** an interfacing of DC motor and stepper motor with 8051 micro controller.
23. **Design** a real time applications using micro controller.

## REFERENCE BOOKS:

1. M Morris Mano, Digital Logic and Computer Design, PHI Publication.
2. R.P. Jain, Modern Digital Electronics, 3rd edition, Tata McGraw Hill.
3. A. P. Malvino, Digital Electronics Principles, Tata McGraw Hill.
4. K. J. Ayala, the 8051 Micro controller Architecture, Programming and Applications, 3rd edition, Penram, 2011.
5. Mazidi and Mazidi, the 8051 Microcontroller and Embedded Systems, 2nd edition, Pearson publication, 2013.
6. Rajkamal, Microcontroller: Architecture, Programming, Interfacing and System design, 2nd edition, McGraw-Hill Publication, 2011.
7. Sampath K. Venkatesh, 8051 Microcontroller & Embedded System, 1st edition, Katson Publication, 2012.

<b>Course Title</b>	<b>ENERGY CONSERVATION TECHNIQUES</b>
<b>Course Code</b>	DEE411
<b>Course Credit</b>	Lecture : 3
	Practical : 1
	Tutorial : 0
	Total : 4
<b>Course Learning Outcomes</b>	
<p>At the end of course, students will be able to:</p> <ul style="list-style-type: none"> <li>• <b>Identify</b> the demand supply gap of energy in Indian scenario</li> <li>• <b>Carry out</b> energy audit of an industry/Organization.</li> <li>• <b>Select</b> appropriate energy conservation method to reduce the wastage of energy</li> <li>• <b>Calculate</b> the payback period for a given energy conservation equipment</li> <li>• <b>Enlist</b> the Measurements and measuring instruments used in energy audit</li> </ul>	
<b>Detailed Syllabus</b>	

<b>SECTION I</b>		
<b>Module No.</b>	<b>Topics</b>	<b>No. of Sessions</b>
1	<b>Energy Scenario</b> <ul style="list-style-type: none"> <li>• Introduction, Primary and secondary energy ,Conventional energy and non-conventional energy ,renewable and non-renewable energy ,global primary energy resources and energy consumption ,Indian energy Scenario ,Energy needs of growing economy ,Energy conservation and its importance ,Energy strategy for the future ,Energy conservation act-2001 and its features</li> </ul>	10
2	<b>Energy management and audit</b> <ul style="list-style-type: none"> <li>• Introduction, Definition and objective of energy management ,Energy audit instrument ,Energy audit and its types ,Methodology for energy audit ,Understanding energy cost ,Maximising system efficiency</li> </ul>	6

<b>3</b>	<b>Financial management</b> <ul style="list-style-type: none"> <li>• Introduction, Investment need, appraisal criteria, Financial analysis, Financial analysis technique, Sensitivity and risk analysis, Energy performance contracting and role of ESCOS</li> </ul>	5
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**SECTION II**

<b>4</b>	<b>Electric motors</b> <ul style="list-style-type: none"> <li>• Introduction, Types of motors, Motor characteristics, Softstarter, Motor efficiency, Motor selection, Energy efficient motor, Factor affecting energy efficiency and minimizing motor losses in operation, Motor load survey</li> </ul>	7
<b>5</b>	<b>Energy efficient technologies in electrical system</b> <ul style="list-style-type: none"> <li>• Introduction, Maximum demand controllers, Automatic power factor controllers, Energy efficient lighting control</li> </ul>	7
<b>6</b>	<b>Energy conservation in power system</b> <ul style="list-style-type: none"> <li>• Introduction, Primary types of power system, Performance of exciting power plant, Combined cycle power plant (Steam and Gas) feature trend of power plant</li> </ul>	7

**Reference Books:**

1. Sivaganaraju, Electric Energy Generation, Utilisation and Conservation, S Publication Pearson, New Delhi, 2012.
2. V. K. Mehta, Electrical Power Publication Khanna and Khanna Publishers, New Dehli.
3. S. L. Uppal Electrical Power, Publication Khanna and Khanna Publishers, New Dehli.
4. www.bee-india.com by Fundamentals of electrical system Publication Bureau of Energy Efficiency.

**Reference Books:**

1. Sivaganaraju, Electric Energy Generation, Utilisation and Conservation, S Publication Pearson, New Delhi, 2012.
2. V. K. Mehta, Electrical Power Publication Khanna and Khanna Publishers, New Dehli.
3. S. L. Uppal Electrical Power, Publication Khanna and Khanna Publishers, New Dehli.
4. www.bee-india.com by Fundamentals of electrical system Publication Bureau of Energy Efficiency.

1. List various energy management systems prevailing in a particular industry/Organization
2. Identify the energy management skills and strategies in the energy management system
3. Organize a energy management programme in a given industry
4. List the various energy conservation methods useful in a particular industry
5. Identify the critical areas where energy conservation is required
6. Select appropriate energy conservation method for the critical area identified
7. List the various energy conservation methods useful in power generation, transmission and distribution
8. Find out the payback period for a given energy conservation equipment
9. Determine depreciation cost of a given energy conservation project/equipment
10. Draw the energy flow diagram for a industry/shop floor division
11. Identify various measuring instruments used for energy audit
12. Use various measuring instruments for carrying out energy audit
13. Prepare a sample energy audit questionnaire
14. Prepare a energy audit report
15. Prepare a technical report on energy conservation act 2001.

<b>Course Title:</b>	<b>Campus to Corporate Training</b>
<b>Course Code:</b>	<b>CD 401</b>
<b>Course Credit:</b>	Theory : 03
	Practical : 00
	Tutorial : 00
	Credits : 03

### Course Learning Outcomes:

**At the end of the course, students will be able to**

- **Formulate** the problem quantitatively and use appropriate arithmetical, and/or statistical methods to solve the problem.
- **Recall** Formulae.
- **Demonstrate** various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
- **Interpret** quantitative information (i.e., formulas, graphs, tables, models, and schematics) and draw implications from them.
- Critically **evaluate** various real life situations by resorting to analysis of key issues and factors.
- **Prepare** professional Resume.
- **Solve** different verbal and non-verbal problems and puzzles
- **Develop** their comprehensive approach on job skills & they will be ready for placements

### Detailed Syllabus:

Module	Name of Chapter & Details	Hours Allotted
<b>Quantitative Ability</b>		
1.	Numbers, H.C.F. & L.C.M., Simplification, Decimal Fractions	04
2.	Square & Cube roots, Average, Profit & Loss	04
3.	Ratio & Proportion, Problems on Age, Time and Work	04
4.	Time & Distance, Problems on Trains	05
<b>Logical Verbal Reasoning</b>		
5.	Character Puzzles, Series Completion, Venn Diagrams	03
6.	Seating Arrangement (Linear), Blood Relation Test, Direction Sense Test	03
7.	Logical Sequence of Words, Classification	03
<b>VERBAL ABILITY</b>		



8.	Verbal Ability: (Spotting errors, selecting words, ordering of words, Idioms and phrases, Verbal analogies, synonyms, spellings, Antonyms.)	06
9.	Essay Writing: Types of Essays/Paragraph writing, Structure of Essays	03
<b>INTERVIEW READINESS</b>		
10.	Resume Building: Formats of Resume, Difference between Resume and CV, Online Resume, Drafting resume	03
11.	Department Or Grooming: Components of Department, importance of grooming, Do's and Don'ts of grooming	02
12.	Interview Skills: About Interview, Types of Interviews, Frequently asked interview questions, Blunders to be avoided during Interviews	05
<b>Total Hours</b>		<b>45</b>

### Instructional Method and Pedagogy:

- Lectures will be conducted with the aid of multi-media projector, blackboard, Classroom Teaching & Learning Activities etc.
- Though the majority of the class will be lecture, certain skill building exercises will be introduced to expose the students to increasingly more difficult content.
- Assessment will be conducted every week on content delivered during week.
- Participative – Student Centric Learning Method
- Activities and Role Plays and Audio-Visual tools will be used to enhance student participation.
- Use of Online application to make classroom participation more active. Like (Kahoot, Edmodo, Etc.)

### Reference Books & Websites:

- **Books:**

1. Dr. R.S. Aggarwal, "Quantitative Aptitude", S.Chand Publication, New Delhi.
2. Abhijit Guha, "Quantitative Aptitude for Competitive Examinations", 4th Edition.
3. Dr.R.S Aggarwal, "A Modern Approach to Verbal & Non-Verbal Reasoning", S.Chand Publication, New Delhi.
4. Arun Sharma, "How to Prepare for Logical Reasoning for the CAT"

- **Website:**

1. [www.indiabix.com](http://www.indiabix.com)
2. [www.freshersworld.com](http://www.freshersworld.com)

<b>Course Title</b>	<b>COMPUTER AIDED ELECTRICAL DRAWING, DRAFTING&amp;SIMULATION</b>
<b>Course Code</b>	DEE409
<b>Course Credit</b>	Lecture : 0
	Practical : 2
	Tutorial : 0
	Total : 2

### Course Learning Outcomes

At the end of course, students will be able to:

- **Simulate** design of electrical power system network.
- **Draw** single line diagram of power plant in Auto CAD 2010 software.
- **Draw** electrical design of DC machines in Auto CAD 2010 software.(2D and 3D) .
- **Draw electrical** design of transformers in Auto CAD 2010 software.(2D and 3D).

### Detailed Syllabus

#### SECTION I

Module No.	Topics	No. of Sessions
1	<b>Understanding of drawing and drafting with AutoCAD 2010.</b> Commands/Tools (Drawing commands, Utility commands, Modify commands, edit and inquiry commands, Display commands and Drawing aids, Control command, Drawing with geometrical commands), Layer designing and color combination, Complex object drafting / Drawing, Attributes and base link, Dimensioning of special features, Three dimensional drawings.	14
2	<b>Drawing and drafting of basic electrical components using AutoCAD 2010.</b> General electrical and electronic symbols, layouts of domestic, commercial and industrial wiring (2D only), Cross Sectional view of fuse, Different types of switches, Cross sectional view of cables (2D and 3D).	14

#### SECTION II

3	<b>Drawing and drafting of electrical machines using AutoCAD 2007.</b> Cross section view of D.C. Motor and Generator (Yoke, Commutator, poles, brush, armature, terminal box), Cross section view of single phase Transformer, Power transformer ( Including Core, Winging, bushing, conservator tank, protecting equipments and accessories ), Cross section	8
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	view of Induction Motor (rotor, stator, frame, rotor slots, stator slots and windings), 3-D view of Squirrel Cage Rotor and Slip Ring Rotor.	
<b>4</b>	<b>Drawing and drafting of Electrical power system using Auto CAD 2010.</b> Symbols used in Electrical Power system, Cross Sectional view of (i) Insulators (ii) Circuit Breakers (iii) Lightning Arresters (iv) 11 KV Pole Mounted Substation, Single line diagrams of (i) 11KV/132KV Substation (ii) 220 KV Substation, Layout of Thermal Power Station and Hydro Power Station.	8
<b>5</b>	<b>Simulations</b> Understand the applications of simulation for different electrical and electronic circuits. Works with “Mat Lab” and “Circuits maker” software. Analysis of different electrical and electronics circuits with circuit maker software.	12

### Reference Books:

1. LP Editorial Board, Electrical AUTO-CAD, 1<sup>st</sup> edition, Law point Publications, Bangalore, 2007.
2. AutoCAD Manual, Publication: Microsoft Autodesk -2010.
3. AutoCAD by A problem solving Approach, Beyond Publication, 2013.
4. Rubenstein, AutoCAD, Publication: Delmar, 2013.

### List of Experiments:

1. To draw electrical symbols in Auto CAD 2010 software.
2. To draw electronic symbols in Auto CAD 2010 software.
3. To draw electrical design of AC machines in Auto CAD 2010 software. (2D and 3D).
4. To draw electrical design of DC machines in Auto CAD 2010 software.(2D and 3D)
5. To draw electrical design of transformers in Auto CAD 2010 software.(2D and 3D)
6. To simulate electrical circuit in circuit maker software.
7. To simulate electronic circuit in circuit maker software.
8. To draw single line diagram of power plant in Auto CAD 2010 software.
9. To draw single line diagram of substation in Auto CAD 2010 software.
10. To understanding of MATLAB software.
11. To simulate design of electrical power system in MATLAB software.
12. To draw single line diagram of power transmission and distribution system in Auto CAD 2010 software.