



Scheme of Teaching and Examination

Diploma in Electrical Engineering/Computer Science & Engineering (Group-I)

Semester – I

S. No.	Course Code	Course Titles	Scheme of Studies			
			L	P	T	Credit (L + T + P/2)
1	DE00101	Communication Skills – I	2	-	1	3
2	DE00102	Applied Maths – I	2	-	1	3
3	DE00103	Environmental Engineering & Sustainable Development	2	-	1	3
4	DE00104	Applied Physics	2	-	1	3
5	DE00105	Basic Non-Conventional Energy Sources	1	-	1	2
6	DE00106	Computer Fundamentals & Applications	2	-	-	2
7	DE00107	Applied Physics (Lab)	-	2	-	1
8	DE00108	Basic Non-Conventional Energy Sources (Lab)	-	2	-	1
9	DE00109	Computer Fundamentals & Applications (Lab)	-	4	-	2
10	DE0010	Seminar & Technical Presentation (Listening, Reading & Speaking) Skills	-	2	-	1
11	-	Library	-	2	-	-
12	-	Co-curricular & Academic Activity Societies	-	2	-	-
Total			11	14	05	21

L - Lecture

P – Practical

T - Tutorial



Scheme of Teaching and Examination

Diploma in Electrical Engineering/Computer Science & Engineering (Group-II)

Semester-I, Session - 2021-22

S. No.	Course Code	Course Titles	Scheme of Examination					
			Theory			Practical		Total Marks
			ESE	CT	TA	ESE	TA	
1	DE00101	Communication Skills – I	70	10	20	-	-	100
2	DE00102	Applied Maths – I	70	10	20	-	-	100
3	DE00103	Environmental Engineering & Sustainable Development	70	10	20	-	-	100
4	DE00104	Applied Physics	70	10	20	-	-	100
5	DE00105	Basic Non-Conventional Energy Sources	70	10	20	-	-	100
6	DE00106	Computer Fundamentals & Applications	-	-	50	-	-	50
7	DE00107	Applied Physics (Lab)	-	-	-	35	15	50
8	DE00108	Basic Non-Conventional Energy Sources (Lab)	-	-	-	35	15	50
9	DE00109	Computer Fundamentals & Applications (Lab)	-	-	-	35	15	50
10	DE00110	Seminar & Technical Presentation (Listening, Reading & Speaking) Skills	-	-	-	-	50	50
Total			350	50	150	105	95	750

ESE: End of Semester Exam,

CT: Class Test,

TA: Teachers Assessment.



BHARTI VISHWAVIDYALAYA, DURG

Course Code :	DE00101
Course Title :	Communication Skills – I
Pre-requisite Course Title :	
Credit :	3
Max. ESE Marks : 70	Min. Marks : 28

Unit – 1

English Grammar Sentence–Parts types transformation (Affirmative, Negative and interrogative), Determiners, Tenses, Active and Passive Voice, Prepositions, Subject-Verb Agreement.

Unit – 2

Effective Communication objectives of communication. Elements of communication process, Seven Cs of Communication, Different Communication Skills, Listening Speaking Reading Writing, Effective use of listening, listening versus hearing, Process and Purpose of listening. Techniques of effective listening.

Unit – 3

Short Stories, Selfish Giant-Oscar Wilde A Letter to God-Gregario Lapex Y-Fuentes, An astrologer’s Day –R.K. Narayan.

Unit – 4

Suggestive passages for Comprehension, Language of Science, Non-conventional sources of Energy, Our Environment and Entrepreneurship.

Books:

1. English Grammar in Use Murphy Raymond Cambridge Publications 4th Edition.
2. Living English Structure Allen Cambridge Publications Fifth edition (2009).
3. Effective English with CD Kumar, E. Suresh; Sreehari, P.; Savithri, J. Pearson Education, Noida, New Delhi 2009 ISBN: 978-81-317-3100-0.
4. English Grammar at Glance Gnanamurali, M. S. Chand and Co. New Delhi, 2011
5. Communication Skill for Technical Students Somaiya Publication.
6. Elementary English Agarwal N. K. Goyal Brothers Latest Edition.
7. Grammar and Composition A Study Guide on Communication Skills for Technical



BHARTI VISHWAVIDYALAYA, DURG

Students Dr. Sumi Guha Dr. Shameena Bano Prakashan Vaibhav Prakashan 1st
Edition, 2020 ISBN - 978-93-89989-25-0.

Open source software and website address:

1. <https://www.englishgrammar.org/>
2. <http://www.englishgrammarsecrets.com/>
3. <https://www.usingenglish.com/handouts/>
4. <http://learnenglish.britishcouncil.org/en/english-grammar>
5. <https://www.englishclub.com/grammar/>
6. <http://www.perfect-english-grammar.com/>
7. <http://www.englishteachermelanie.com/category/grammar/>
8. <https://www.grammarly.com/blog/category/handbook>
9. <https://www.britishcouncil.in/english/learn-online>
10. <http://learnenglish.britishcouncil.org/en/content>
11. <http://www.talkenglish.com/>
12. [language-labs.com](http://www.language-labs.com/)
13. www.wordsworthelt.com



Course Code :	DE00102
Course Title :	Applied Maths – I
Pre-requisite Course Title :	
Credit :	3
Max. ESE Marks : 70	Min. Marks : 28

Unit – 1

Algebra

Concept and principles of determinants. Properties of determinants Computation of Mean and R.M.S. Value General equation of second degree, Nature of roots, Quadratic Equation, Formation of Equation Class- I, II, III, IV.

Unit – 2

Differential Calculus

Basic Trigonometry, Multiple and sub multiple angles, Functions and Limits, Independent and dependent variables, Different types of functions, Concept of Limit and its evaluation, Differentiation of elementary functions, Differentiation of Algebraic, Trigonometric, Exponential and Logarithmic functions, Differentiation of sum, product, quotient of two functions.

Unit – 3

Applications of Differential Calculus

Second order derivatives–Second order derivatives (without examples), Equation of Tangent and Normal, Equation of Tangent and Normal for functions of one variable only Maxima and minima, Maxima and minima for functions of one variable only.

Unit – 4

Co-ordinate Geometry

Various forms of straight lines, Co-ordinate systems, slope point form, two point form, Distance between two points, division of a line segment, Two points intercepts form, general form, Perpendicular distance from a point on the line, perpendicular distance between two parallel lines, *Components of Vector.*

Conic sections: Definition, standard forms, General equation, Center and radius of a



circle, Focus, axis, directory, latusrectum and vertex of parabola and ellipse.

Unit – 5

Fundamentals of Statistics

Frequency distribution and central tendency, Introduction, graphical representation of frequency distribution, Central tendency, mean, median, frequency distribution and mode, Dispersion and deviation, Measure of dispersion, Range, quartile deviation, Standard deviation, root mean square deviation, Variance and coefficient of variance, Variance and coefficient of variance.

Books:

1. Advanced Engineering Mathematics Krezig, Ervin Wiley Publ., New Delhi 2014, ISBN: 978-0-470-45836-5.
2. Advanced Engineering Mathematics H. K. Das S. Chand & Co, New Delhi ISBN: 9788121903455.
3. Higher Engineering Mathematics B. S. Grewal Khanna Publ., New Delhi 2015, ISBN: 8174091955
4. Engineering Mathematics, Volume 1 S. S. Sastry PHI Learning, New Delhi 2009, ISBN: 978-81- 203-3616-2
5. Fundamentals of Mathematical Statistics S. C. Gupta S. Chand & Sons 2014

Open source software and website address:

1. www.scilab.org/ -SCI Lab
2. www.dplot.com/ -DPlot
3. www.allmathcad.com/ -MathCAD
4. www.wolfram.com/mathematica/ - MATHEMATICA
5. www.easycalculation.com



Course Code :	DE00103
Course Title :	Environmental Engineering and Sustainable Development
Pre-requisite Course Title :	
Credit :	3
Max. ESE Marks : 70	Min. Marks : 28

Unit – 1

Water pollution and Air pollution

Introduction to environment and environment pollution, Water pollution Introduction, sources of water pollution, *Hydrosphere, Natural water* classification of water pollutants and adverse effect of water pollution, control of water pollution, Physical and chemical standard of domestic water as per Indian standard. Air pollution Introduction, *Atmospheric composition, Energy balance* Sources of air Pollutants, classification of air Pollutants, Effect of air pollution on human, plant, and animal, Air monitoring system and air pollution control.

Unit – 2

Soil, Noise, Thermal and Nuclear pollution

Soil and soil profile, soil pollution introduction, *Lithosphere*, sources of soil pollution, adverse effect of soil pollution, control measures of soil pollution, Noise pollution introduction, measurement of noise and acceptable noise level, sources of noise pollution, effect of noise pollution, control of noise pollution. *Difference between sound and noise* Thermal pollution introduction, effects of thermal pollution causes and control. Radioactive pollution introduction, sources of radioactive pollution, adverse effects of radioactive pollution, control of radioactive pollution.

Unit – 3

Sustainable Development and Clean technologies

Sustainable Development: Concept of sustainable development, *Elements of sustainable development* Natural resources, a-biotic and biotic resources, Principles of conservation of energy and management, Need of Renewable energy, Growth of renewable energy in India. Clean Technologies Introduction: Clean technology, Types of Energy, Conventional Energy



Sources, Non-conventional Sources of Energy, Recycling pollution control.

Solar Power: Features of solar thermal and PV systems, Types of solar cookers and solar water heaters, Hydel Energy and its advantages, Wind energy –advantages. Biomass energy, Types of Biomass Energy Sources, Energy content in biomass of different types of Biomass conversion processes.

Unit – 4

Environment Impact Assessment (EIA)

Public Participation in EIA, *Object of EIA*, *Component of EIA*, EIA documentation, Case studies on EIA, EIA scope & steps, EIA process, EIA report *and documentation*, EIA Gazette notification, EIA action plan, EIA implementation, EIA directives follow-ups.

Unit – 5

Social Issues and the Environment

Water conservation, *Objective of water conservation*, *Methods*, Rain water harvesting, Watershed management, Acid rain *Causes and sources* and its effect, Climate change, Greenhouse effect, Depletion of Ozon layer, and effect of Ozon layer depletion, Global warming and measures against global warming.

Solid waste management: causes, effects and control measures of urban and industrial waste, importance of 3R's in waste management. *Pyrolysis* Environment protection Act 1986: importance and objective

Books :

1. Environmental studies, Dr. Suresh K. Dhameja, S. K. Kataria and sons, 2012.
2. Energy, Environment Ecology & Society, Dr. Surinder Deswal, Dhanpat Rai & sons, 2014.
3. Environment & Ecology, Dr. PIyush Kant Pandey, Sun India Publication, 2009.
4. Energy and sustainable development, P. S. Ramakrishnan, National Book Trust, 2014.
5. Our Environment (Hindi Textbook), M. K. Goyal, Agrawal publications, Agra, 2013.

Open source software and website address:

1. www.nptel.ac.in
2. <https://swayam.gov.in>



Course Code :	DE00104
Course Title :	Applied Physics
Pre-requisite Course Title :	
Credit :	3
Max. ESE Marks : 70	Min. Marks : 28

Unit – 1

Units, Measurement and Error analysis

Unit of physical quantity, Fundamental and derived unit, Unit system, CGS, MKS and SI, Advantages/ disadvantages of SI unit system, Seven basic and Supplementary units. Dimensional Analysis, Dimensional formula and equations. Applications of Dimensional equations. Numerical problems on Dimensional analysis. Measurement, Accuracy, Precision and Errors, Absolute, Relative and percentage Error. Significant figures and rounding off.

Unit – 2

Motion, Force and General Properties of matter

Motion, Newton's Law of Motion, Equation of Motion, Force, Types of Forces, Conservative and non-conservative forces, Frictional Forces, Limiting static and dynamic friction. Centripetal and centrifugal force and Their illustration. Gravitational Force 'G' and 'g' and their interrelation, Factors affecting 'g', Elasticity, Hooke's law, Elastic limit and elastic fatigue, Moduli of elasticity's, Young's modulus, Bulk Modulus, Shear modulus of rigidity, Surface Tension, Molecular force, Surface energy, effect of temperature, Cohesive and adhesive force Excess pressure and its illustration, rise of liquid in capillary tube, Viscosity Coefficient of viscosity, Newton's law of viscosity Streamline and turbulent flow, Reynolds number, Poiseuille's equation (no derivation of formula), Stoke's law and their applications.

Unit – 3

Optics, optical instruments and optical fibers

Reflection, Reflection of Light, Types of Reflection, Refraction Laws of, Refraction Lenses and combination of lenses, Absolute and relative, refractive index, Refraction



through prism, Angle of minimum deviation and its relation, Total internal reflection of light, Critical angle. Applications of TIR, Optical fiber, NA of Optical fiber, Optical instruments, Simple and Compound microscope, Spectrometer, Electromagnetic Spectrum, Pure and Impure spectrum, Visible Range.

Unit – 4

Electrostatics, Magnetism and Current Electricity

Electrostatics: - Electric Charge, Coulomb's Law, Electric Field, Potential, Potential Difference between Two Points, Equip- potential Surfaces, Types of dielectrics and dielectric Strength Capacity, Units, Principle of Capacitor, Factors Affecting Capacity, type of capacitors,

Magnetism: - Magnetic lines of force, lines of induction.

Current Electricity, Resistance, Specific resistance, Series and parallel combination of resistance, Internal resistance of a cell, Potential difference and emf of a cell, Combination of cells in series and in parallel. Simple applications of Wheatstone bridge, Meter Bridge and Potentiometer, Electrical power.

Unit – 5

Modern Physics

Photoelectric effect, Laws of photoelectric emission, Photoelectric equation and threshold frequency, Photo cell, X-rays Production of X rays, properties & uses, Laser, Spontaneous and stimulated emission, population inversion, pumping scheme and active system Ruby Laser and semiconductor laser, Ultra-sonics, Frequency range, Methods of production Magnetostriction & Piezo electric method, Properties of ultra- sonics, Applications of ultra- sonics.

Books:

1. Fundamentals of Physics Halliday, David; Resnik, Robert and Walker, Jearl John Wiley and sons Tenth edition 2013.
2. The Feynman Lectures on Physics Feynman P. Richar, B. Leighton Robert Sands Matthew Pearson Education India First edition 2012.
3. University physics Young Hugh, Freedman Roger Pearson Education India Thirteenth Edition 2013



Open source software and website address:

1. Some relevant Experiments: <http://cdac.olabs.edu.in>
2. VernierCalipers: <http://www.tutorvista.com/physics/animations/vernier-callipers-animation>
3. Screw gauge: www.notesandsketches.co.uk/Measuring_Tools_Small.swf
4. <http://www.stefanelli.eng.br/en/virtual-vernier-caliper-simulator-05-millimeter>.
5. Photoelectric effect: <http://vlab.amrita.edu/?sub=1&brch=195&sim=840&cnt=1>.
6. Deflection magneto meter: http://emvau.vlabs.ac.in/Deflection_Magnetometer/.
7. Laser: <https://spaceplace.nasa.gov/laser/en/>



Course Code :	DE00105
Course Title :	Basic Non-Conventional Energy Sources
Pre-requisite Course Title :	
Credit :	2
Max. ESE Marks : 70	Min. Marks : 28

Unit-1

Energy sources

Conventional and non- Conventional energy sources. Energy consumption as a measure of Nation's development; strategy for meeting the future energy requirements Global and National scenarios. Non-conventional energy- Seasonal variations and availability. Renewable energy – sources and features. Hybrid energy systems, Distributed energy systems and dispersed generation (DG). Prospects and Achievements of renewable energy sources in India in general and Chhattisgarh state in particular. Issues related to power generation through renewable energy sources.

Unit-2

Solar energy

Solar radiation: Beam and diffuse radiation, Solar constant, earth sun angles, attenuation and measurement of Solar radiation, local Solar time, derived Solar angles. Flat plate collectors, concentrating collectors, elements, working and maintenance. Solar air heaters-types, Solar driers, elements, working and maintenance. Storage of Solar energy- thermal storage, Electrical storage, Chemical storage. Solar water heaters, Solar distillation, Solar still, Solar cooker, elements, working and maintenance. Photo voltaics - Solar cells & its applications, Solar panels, Solar PV pump, Solar Home lighting systems, Solar street lights, elements, working and maintenance.

Unit-3

Wind energy

Principle of Wind energy conversion; Basic components of Wind energy conversion systems. Wind mill components, various types and their constructional features. Maintenance of Wind mills and turbines.



Unit-4

Energy from Biomass

Biomass conversion, technologies, Biogas generation plants, classification, advantages and disadvantages. Constructional details, site selection, filling a digester for starting, maintaining Biogas production, Fuel properties of Bio gas, and applications of Biogas. Maintenance of Biogas plants.

Unit-5

Geothermal, Micro Hydel, Ocean Thermal Energy Conversion and Tidal Energy

Geothermal plant. Micro Hydel plant. Ocean Thermal Electric Conversion (OTEC) systems like open cycle, closed cycle. Energy from tides, basic principle of tidal power, single basin and double basin tidal power plants, advantages, limitation.

Books:

1. Non-conventional Energy Sources G D RAI Khanna Publishers New Delhi
2. Non-conventional Sources of Energy (Hindi) S.S.L. PATEL Standard Publishers and Distributors
3. Non-conventional Energy Sources BH KHAN Tata McGraw Hill Publications
4. Renewable and Conventional energy S Rao Khanna Publishers New Delhi



Course Code :	DE00106
Course Title :	Computer Fundamentals and Applications
Pre-requisite Course Title :	
Credit :	2
Max. ESE Marks : 50	Min. Marks : 20

Unit – 1

Basics of Computer System

Basic building block of Computer. Central Processing Unit (CPU), Control Unit, Arithmetic logic Unit (ALU), Memory Unit, Input Output Units, Word, ASCII, BCD, EBCDIC, UNICODE Concept of Hardware and Software, System software & Application Software, Operating system Concepts, Purpose and its Functions Operations of Windows OS, Operations of Windows OS, *Operation on* file and folders, Copy file, Rename and Delete of files and folders, Search files and folders, Install Application, Create shortcut of application on the desktop Windows OS Utilities Windows accessories Utilities Control Panel, Taskbar.

Unit – 2

Word Processing

Overview of Word processor, Basics of Font, Casechanging options, working with Text, *Opening and closing documents*, Formatting Paragraphs Lists Setting, Line spacing Page settings, Margins Setting, Header and Footer Spelling and Grammatical checks, Table and its options, Merging and Splitting cells, Inserting Pictures from Files.

Unit – 3

Spread sheet/Data Analysis & Chart Presentation

Introduction to data, cell address, Excel, Data Types, Concept of hyperlink Introduction to Formatting Number, Text, Formatting Date & Time, Formatting Concept of Workbook, *Forward and functions*, Common Excel Functions, Math & Trig Functions such as Sum, Round, Sqrt, Powered. Statistical Function such as Average, Min, Max, etc. Date & Time. Logical Functions such as IN, AND, OR etc. Text Function such as Upper, Lower Types of Graphics, Word Art, Auto Shapes, Images, Introduction to charts,



Overview of different types of Charts. Printing in spreadsheet, Print Area, Header & Footer, Page Setup options.

Unit – 4

Multimedia Graphic Presentation

Introduction to Multimedia *and* Graphics. Starting a New Presentation Files, Saving work, Creating new Slides Work with textboxes, Adjusting line spacing, Formatting text boxes, Create new Slides, Introduction to Formatting, Change a slides Layout, Applying a theme, Changing the background, Formatting bulleted and numbered list, Styles Work with Fonts, Change the font, font size, font color, Creating and managing custom font theme & Color, Slides Master, Slide Sorter, Word Arts, Selecting, deleting, moving, copying, resizing and arranging objects, working with drawing tools, Find and replace text, Correcting your spelling, Use Tables Creating a new Table, Work with Video, Link to a video, Size a video, Use Animation, Sound & Effects, Creating hyperlinks, using action buttons.

Unit – 5

Basics of Internet & Cloud Computing

Types of Networks LAN, MAN, WAN Intranet, *Concept of Internet, application of Internet, www, Web browser software, VPN, Wi-Fi, Bluetooth, switches* Brief of Internet Connectivity Devices and Services Dial up, Leased line, DSL Broadband, Modem, Chat, Video conferencing, File Transfer Protocol, Web Browsers URL, Web Site, Search Engines Introduction to Virus& Antivirus Virus & its type, Antivirus Firewall Overview of Cloud Computing and *troubleshooting*.

Books:

1. Computer Fundamentals Goal, Anita, Pearson Education, New Delhi, 2014, ISBN-13: 978-8131733097.
2. Computer Course, Ravi Kant Taxali, Tata McGraw Hills. New Delhi. Year 2014 or latest.
3. Fundamentals of computers, V. Raja Raman, Neeharika Adabala, PHI 6th Edition 2014 or latest.
4. Computer Basics Absolute Beginner's Guide, Windows 10 Miller, Michael, QUE



Publishing; 8th edition August 2015, ISBN: 978-0789754516 or latest.

5. The Internet Book, Douglas Comer Prentice Hall, Year 2007 or latest.
6. Microsoft Office 2010: On Demand Johnson, Steve Pearson Education, New Delhi India, -2010. ISBN: 9788131770641 or latest.
7. OpenOffice.org for Dummies Leets, Gurdy, Finkelstein Ellen, Mary Leets Wiley Publishing, New Delhi, 2003 ISBN: 9780764542220 or latest.

Open source software and website address:

1. Fundamentals of computers- V. Raja Raman,
Neeharika Adabala https://books.google.co.in/books?id=rGjkBQAAQBAJ&dq=Fundamentals+of++computer&source=gbs_navlinks_s
2. Computer course, Ravi Kant Taxali-
https://books.google.co.in/books/about/COMPUTER_COURSE.html?id=PfHftDSmNBkC&redir_esc=y
3. Computer Fundamentals Tutorials-
https://www.arstecb.com/book_argument/com_fun.pdf
4. Computer fundamentals, P. K. Sinha <http://www.edutechlearners.com/computer-fundamentals-p-k-sinha-free-pdf/>
5. Microsoft office set by step Joan Lambert and Curtis Frye
<https://ptgmedia.pearsoncmg.com/images/9780735699236/samplepages/9780735699236.pdf>
6. Open Office Suit- <http://www.openoffice.us.com/download-openoffice-free.php>
7. MS Office: <https://www.microsoft.com/en-in/learning/office-training.aspx>
8. Open Office Training: <http://www.tutorialsforopenoffice.org/>
9. Star Office- https://s3-ap-southeast-1.amazonaws.com/r4ltue295xy0d/Special_Edition_Using_StarOffice_6_0.pdf
10. Typing Master 10 in English for Windows: <http://www.typingmaster.com/typing-tutor/free-download.html>
11. Hindi Typing Tutor and Master <http://www.hinditypingtutor.com/>



Course Code :	DE00107
Course Title :	Applied Physics Lab
Pre-requisite Course Title :	
Credit :	1
Max. ESE Marks : 35	Min. Marks : 14

List of Practical:-

1. Vernier calipers: Stainless steel body, Range: 0-150 mm, Resolution: 0.1 mm
2. Screw gauge: Stainless steel spindle and ratchet top brass body with satin chrome finish. Graduated to read up to 25 mm in 0.01 mm divisions with screw pitch of 0.5 mm, ratchet lock nut
3. Speedometer: Brass double disc superior quality, stainless steel legs and screw 1/100 mm pitch each.
4. Pendulum apparatus for determination of 'g': 200 mm diameter metal wheel mounted with fixed stand and a meter scale, stop watch to measure time. steel case fly back action least count 1/10th or 1/5th of second
5. Stoke's Law apparatus: Glass tube (~1-inch diameter and length ~ 1 m) with stand, timer, steel sphere, glass beads
6. Surface tension set up: Travelling microscope with horizontal and vertical movement (LC 0.001 cm), capillary tube, beaker, pin fixed on adjustable stand
7. Glass slab: Rectangular, all sides polished, made from slightly greenish glass free from bubbles, 75*50*18 mm
8. Glass Prism: Equilateral or right angled, from bubble free boro crown glass 38 x 38
9. Ohm's law apparatus: Box type with D.C meter to verify ohm's law with fitted ammeter & voltmeter
10. Post Office Box: Complete set in polished wooden box, Split brass contact blocks holding precision cut, interchangeable plug having molded black fluted tops. Coils of constantan wire with 4 pair of ratio
11. Arms.
12. Meter Bridge (Wheatstone Bridge): Sun mica top, two gap type having lock type terminals with pencil jockey.
13. Deflection magnetometer: Wooden base length~ 1 m, magnetic compass, meter scale



and magnets

14. Bar magnet: Alnico size 3"- 4"
15. Potentiometer: 10K Ohm 500mW Linear Slide Potentiometer. About 10 m wire of Manganin and constantan with high resistivity and low temperature coefficient stretched on a wooden board attached with a meter scale and pencil jockey.
16. Photoelectric apparatus: Includes photo cell, light sources, voltmeter, ammeter
17. Diode laser: Power 5 mW, randomly polarized



Course Code :	DE00108
Course Title :	Basic Non-Conventional Energy Sources (Lab)
Pre-requisite Course Title :	
Credit :	1
Max. ESE Marks : 35	Min. Marks : 14

List of Practical:

1. Study of Solar Radiation by using Pyranometer
2. Study of Solar Distillation or Solar Still.
3. Study the photovoltaic cells available in the lab.
4. Demonstration/ study of solar water heater.
5. Demonstration/ study of solar cooker.
6. Study of solar water heating system of 120 liter/day capacity for the institute's hostel
7. Study of working of Solar pump and calculate its discharge.
8. Demonstration/ study of the working of a windmill.
9. Visit to biogas plants, domestic community/institution for study and demonstration of biogas plant .
10. Working principle of geothermal power plant.
11. Scope of Mini and Micro-hydro power plants in your state.



BHARTI VISHWAVIDYALAYA, DURG

Course Code :	DE00109
Course Title :	Computer Fundamental and Application (Lab)
Pre-requisite Course Title :	
Credit :	2
Max. ESE Marks : 35	Min. Marks : 14

List of Practical:

1. Computer Network, LAN Cable, Router, Switch 30*2/Hub
2. Printer, Scanner, Plotter, Modem, Laser Printer, Scanner, Plotter, Modem
3. MS Back Office 2016 or latest, Office suit
4. Typing Master in English for Windows(Free download) Hindi Typing Tutor and Master(Free download), <http://www.typingmaster.com/typing-tutor/free-download.html> <http://www.hinditypingtutor.com/>
5. Open Office Suit Latest, Office suit
6. Internet Connectivity, Broad band/Leased Line
7. Anti-Virus Software & Firewall, Antivirus software And Firewall



Course Code :	DE00110
Course Title :	Seminar & Technical Presentation (Listening, Reading & Speaking) Skills
Pre-requisite Course Title :	
Credit :	1
Max. ESE Marks : 50	Min. Marks : 20

Unit – 1

Need of Learning to learn skills (Listening, Reading and Speaking), Methods of good study habits, Practice Loud reading, Practice Active Listening, Practice Speaking in Class(Group Discussion, Extempore, Debate, Role Play etc.

Unit – 2

Characteristics of good oral Presentation Ways of oral presentation Gestures Mannerism during oral Presentation Preparing Successful Presentations Making Effective Use of Visual Aids.

Books :

1. English Grammar in Use, Murphy Raymond, Cambridge Publications, 4th Edition
2. Living English Structure, Allen, Cambridge Publications, Fifth edition (2009).
3. Effective English with CD, Kumar, E. Suresh; Sreehari P.; Savithri J., Pearson Education, Noida, New Delhi, 2009 ISBN: 978-81-317-3100-0.
4. English Grammar at Glance, Gnanamurali, M., S. Chand and Co. New Delhi, 2011, ISBN: 9788121929042.
5. Elementary English Grammar and Composition Agarwal N. K., Goyal Brothers Prakashan, Latest Edition.

Open source software and website address:

1. <https://www.englishgrammar.org/>
2. <http://www.englishgrammarsecrets.com/>
3. <https://www.usingenglish.com/handouts/>
4. <http://learnenglish.britishcouncil.org/en/english-grammar>
5. <https://www.englishclub.com/grammar/>



6. <http://www.perfect-english-grammar.com/>
7. <http://www.englishteachermelanie.com/category/grammar/>
8. <https://www.grammarly.com/blog/category/handbook>
9. <https://www.britishcouncil.in/english/learn-online>
10. <http://learnenglish.britishcouncil.org/en/content>
11. <http://www.talkenglish.com/>
12. [languagelabsystem.com](http://www.languagelabsystem.com)
13. www.wordsworthelt.com

Scheme of Teaching and Examination

Diploma in Electrical Engineering/Computer Science & Engineering (Group – I)

Semester – II, Session – 2021-22

S. No.	Course Code	Course Titles	Scheme of Studies			
			L	P	T	Credit (L + T + P/2)
1	DE00201	Communication Skills-II	2	-	1	3
2	DE00202	Applied Maths-II	2	-	1	3
3	DE00203	Applied Mechanics	2	-	1	3
4	DE00204	Applied Chemistry	2	-	1	3
5	DE00205	Engineering Drawing	2	-	1	3
6	DE00206	Workshop Practice (Theory)	1	-	-	1
	DE00207	Applied Mechanics (Lab)	-	2	-	1
7	DE00208	Applied Chemistry (Lab)	-	2	-	1
	DE00209	Engineering Drawing (Practical)	-	2	-	1
8	DE00210	Work Shop Practice (Lab)	-	4	-	2
9	DE00211	Seminar & Technical Presentation (Personality Development & Leadership) Skills	-	2	-	1
10	-	Library	-	2	-	-
11	-	Co-curricular & Academic Activity Societies	-	2	-	-
Total			11	16	05	22

L - Lecture,

T - Tutorial,

P – Practical

Scheme of Teaching and Examination

Diploma in Electrical Engineering/Computer Science & Engineering (Group – II)

Semester-I, Session – 2021-22

S. No.	Course Code	Course Titles	Scheme of Examination					
			Theory			Practical		Total Marks
			ESE	CT	TA	ESE	TA	
1	DE00201	Communication Skills-II	70	10	20	-	-	100
2	DE00202	Applied Maths -II	70	10	20	-	-	100
3	DE00203	Applied Mechanics	70	10	20	-	-	100
4	DE00204	Applied Chemistry	70	10	20	-	-	100
5	DE00205	Engineering Drawing	70	10	20	-	-	100
6	DE00206	Workshop Practice (Theory)			50	-	-	50
7	DE00207	Applied Mechanics (Lab)	-	-	-	35	15	50
	DE00208	Applied Chemistry (Lab)	-	-	-	35	15	50
	DE00209	Engineering Drawing (Practical)	-	-	-	35	15	50
	DE00210	Work Shop Practice (Lab)	-	-	-	35	15	50
8	DE00211	Seminar & Technical Presentation (Personality Development & Leadership) Skills	-	-	-	-	50	50
Total			350	50	150	140	110	800

ESE: End of Semester Exam,

CT: Class Test,

TA: Teachers Assessment



BHARTI VISHWAVIDYALAYA, DURG

Course Code :	DE00201
Course Title :	Communication Skills – II
Pre-requisite Course Title :	
Credit :	3
Max. ESE Marks : 70	Min. Marks : 28

Unit – 1

English Grammar, Auxiliary Verbs, Modifiers & Adverbial Phrases, Degree, Narration.

Unit – 2

Non-Verbal Communication Static features of Non Verbal Communication – Distance, Posture, Physical contact etc. Dynamic features of Non-Verbal Communication – Mannerism, Head & Hand movement, Eye to Eye contact, Facial expressions, Gestures.

Unit – 3

Paragraph & Letter Writing Paragraph writing. Letter writing Purposes of Letters Characteristics of a Letter Types of Business Letters -Applications for Job & Resume Writing-Letter of Enquiry-Letter for Order Placement-Letter of Complaints.

Unit – 4

Technical Report Writing: Report Writing, Characteristics of a Good Report, Types of Technical Report, General outline of Project Report, Progress Report of any assumed work, **Notice:** Purposes of Notices, Qualities of Notices, Format of Notice, Mail, Purposes of Mail and Format of Mail.

Books:

1. English Grammar in Use, Murphy Raymond, Cambridge Publications, 4th Edition
2. Living English Structure, Allen, Cambridge Publications, Fifth edition(2009)
3. Effective English with CD, Kumar, E. Suresh; Sreehari P.; Savithri, J., Pearson Education, Noida, New Delhi, 2009 ISBN: 978-81-317-3100-0
4. English Grammar at Glance, Gnanamurali M., S. Chand and Co. New Delhi, 2011 ISBN:9788121929042
5. A Course in Technical English, TTTI Bhopal



6. Elementary English Grammar and Composition, Agarwal N. K., Goyal Brothers Prakashan Latest Edition.
7. A Study Guide on Communication Skills for Technical Students, Dr. Sumi Guha, Dr. Shameena Bano, Vaibhav Prakashan, 1st Edition, 2020 ISBN-978-93-89989- 25-0

Open source software and website address:

1. <https://www.englishgrammar.org/>
2. <http://www.englishgrammarsecrets.com/>
3. <https://www.usingenglish.com/handouts/>
4. <http://learnenglish.britishcouncil.org/en/english-grammar>
5. <https://www.englishclub.com/grammar/>
6. <http://www.perfect-english-grammar.com/>
7. <http://www.englishteachermelanie.com/category/grammar/>
8. <https://www.grammarly.com/blog/category/handbook>
9. <https://www.britishcouncil.in/english/learn-online>
10. <http://learnenglish.britishcouncil.org/en/content>
11. <http://www.talkenglish.com/>
12. [language-labs.com](http://www.language-labs.com/)
13. www.wordsworthelt.com



Course Code :	DE00202
Course Title :	Applied Maths – II
Pre-requisite Course Title :	
Credit :	3
Max. ESE Marks : 70	Min. Marks : 28

Unit – 1

Matrices

Introduction, Definition, Special Matrices, Addition and Subtraction of Matrices, Multiplication of Matrices, Transpose of a Matrix, Symmetric & Skew Symmetric Matrix, Ad-joint of a Square Matrix, Inverse of Matrix, Solution of simultaneous Linear equations, Rank of Matrix, Consistency of Linear System of Equations

Unit – 2

Integral Calculus

Simple Integration: Rules of integration and integration of standard functions, Methods of Integration: Integration by substitution, Integration by parts and Integration by partial fractions.

Unit – 3

Applications of Integral Calculus

Definite Integration, Simple examples, Properties of definite integral (without proof) and simple examples, Applications of integration: Area under the curve, Area between two curves.

Unit – 4

Differential equations

Differential equations of first order and first degree, Concept of differential equation, Order, degree and formation of differential equation, Solution of differential equation, Variable separable form, Homogeneous Differential Equations, Linear differential equation.



Unit – 5

Numerical Solutions of Equations

Introduction of algebraic and transcendental equations, Bisection method, Regular Falsie method, Newton Rapson's method, Introduction to Numerical integration, Trapezoidal rule, Simpson's one third rule, Simpson's three eighth rules.

Books :

1. Advanced Engineering Mathematics, Krezig, Ervin Wiley Publ., New Delhi, 2014, ISBN: 978-0-470-45836-5.
2. Advanced Engineering Mathematics, H. K. Das, S. Chand & Co, New Delhi, ISBN: 9788121903455.
3. Higher Engineering Mathematics, B. S. Grewal, Khanna Publ., New Delhi, 2015, ISBN: 8174091955.
4. Engineering Mathematics, Volume – 1, S. S. Sastry, PHI Learning, New Delhi, 2009, ISBN: 978-81-203-3616-2.
5. A text book of Engineering Mathematics, Dutta, D, New age International publications, New Delhi, 2006, ISBN: 978-81-24-1689-3.
6. GettingStarted with MATLAB-7, Pratap Rudra, Oxford University Press, New Delhi, 2009, ISBN: 0199731241.

Open source software and website address-

1. www.scilab.org/ -SCI Lab
2. www.dplot.com/ -DPlot
3. www.allmathcad.com/ -MathCAD
4. www.wolfram.com/mathematica/ - MATHEMATICA
5. www.easycalculation.com



Course Code :	DE00203
Course Title :	Applied Mechanics
Pre-requisite Course Title :	
Credit :	3
Max. ESE Marks : 70	Min. Marks : 28

Unit – 1

Fundamentals and Resolution of Forces

Definition of Mechanics, Statics, Dynamics- Kinetics, Kinematics. Concept of space, mass, particle, body, rigid body, scalar, vector, fundamental units, derived units. Force- concept, definition, unit, graphical representation. Concept of system of forces- non-coplanar, coplanar, concurrent, non-concurrent and parallel forces. Composition and Resolution of forces. Free body diagrams, law of parallelogram, Varignon's theorem. Equilibrium of Coplanar concurrent forces, parallel forces and non-concurrent forces, Lami's Theorem. Moment of a force and Couple, properties of couple, conditions of equilibrium, applications.

Unit – 2

Centroid and Moment of Inertia

Location of Centroid and Center of Gravity. Centroid of regular plane and compound areas. Center of Gravity of simple solids. Moment of Inertia of plane areas. Perpendicular and Parallel Axis theorems.

Unit – 3

Friction

Rough and Smooth surfaces, concept of friction. Types of friction, Coulomb's laws of friction Co-efficient of friction, angle of friction, angle of repose. Friction on horizontal and inclined plane, Method of reducing friction.

Unit – 4

Kinematics and Kinetics

Kinematics in Cartesian and polar coordinates. Concept of speed, velocity, acceleration, radial and transverse velocity, Particle under uniform and non-uniform acceleration,



tangential and normal acceleration. Angular displacement, Angular Velocity, Angular Acceleration. Motion under gravity. Kinetics of particle, motion under constant force, Newton's Laws of Motion. Momentum and energy principles, Impulses and angular momentum.

Unit – 5

Work, Power and Energy

Definition and unit of Work done, Power and Energy, Forms of Energy- Kinetic and Potential Energy, Principle of Conservation of power and energy, Power of engine and pumps, mean effective pressure, power measurement, Relation between Heat & Mechanical work, relation between Electrical & Mechanical energy.

Books:

1. Applied Mechanics Khurmi, R.S. S.Chand & Co. New Delhi 2014
ISBN:9788121916431
2. Applied Mechanics S.S.L Patel Dhanpat Rai & Company
3. Foundations and Applications of Applied Mechanics Ram, H. D.; Chauhan, A. K.
Cambridge University Press, Thomson Press India Ltd., New Delhi, 2015, ISBN:
9781107499836
4. Engineering Mechanics- Statics, Vol. I Meriam, J. L.; Kraige, L.G. Wiley
Publication, New Delhi, ISBN: 978-81-265-4396
5. Engineering Mechanics Ramamrutham, S. S Chand & Co. New Delhi 2008
ISBN:9788187433514



Course Code :	DE00204
Course Title :	Applied Chemistry
Pre-requisite Course Title :	
Credit :	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Atomic Structure and Chemical Bonding

Atomic Structure Electronic structure of atoms, Discovery of electrons, protons and neutrons. Rutherford model and Bohr's – Burry scheme of distributions of electrons. Heisenberg's uncertainty principle, Quantum numbers, subs energy level Distribution of electrons in sub- shells and concept of Electronic configuration of atoms, Auffbaus's rule, Pauli's exclusion principle. Hund's rule of maximum multiplicity. Chemical Bonding, *Types of Chemical Bonding, and it's Application*, Hydrogen bonding.

Unit – 2

Water Treatment

Hardness: Types of Hardness, Determination of hardness using EDTA method, Hard water Boiler Problems, Boiler corrosion, caustic embrittlement, priming and foaming, scales and sludge's. Water softening: lime soda process, Hot lime soda process, Cold lime soda process, Zeolite process, I-ion exchange process, Caution exchange An-ion exchange, *Advance Techniques of Softening*, Municipal Water, Treatment, Sedimentation Coagulation Filtration Sterilization BOD & COD. Polymer: Classification of polymer, Types of rubber, Natural and, synthetic, Processing of natural rubber. *Types of Synthetic rubber*, Properties and applications of Buna-N, Neoprene.

Unit – 3

Electrochemistry and Batteries

Conductance: Nature of solute, Nature of solvent, Temperature, Concentration or dilution, Electrical conductance in metals and electrolytes, specific conductance, equivalent conductance, cell constant. Electrodes: Hydrogen electrode, calomel electrode glass electrode.



Batteries: Type of batteries with examples Primary battery, Secondary battery, *Their Uses*, Electrical Insulator and thermocouple alloy, Electrical insulators: Classification and example Thermocouple alloy: Composition and characteristics platinum /rhodium *and its application*.

Unit – 4

Metallurgy

Metallurgy: Mineral, Ore, Gangue, Flux, Slag. *Metallurgical processor iron and Uses*.

Metal Alloys: Properties of metals, aluminum, tungsten, platinum nickel. *Uses of Metal Alloys*, Ferrous alloys: Low carbon Medium carbon High carbon steels. Non-ferrous alloy: Brass, Bronze, *Application of Steel*, Tin man Solder Woods metal.

Cement: Portland cement, Constituent Setting and Hardening, *Protection of Cement from Corrosion*.

Unit – 5

Fuels and Combustion

Fuel: Calorific value and ignition temperature, classification. Solid fuels: Coal, Classification and composition, proximate analysis, Ultimate analysis, Bomb Calorimeter. Carbonization of coke by Otto Hofmann's oven. Liquid fuels: Fractional distillation of crude petroleum, Boiling range, Composition and properties. Knocking, Cracking, Octane number and Cetane number. Gaseous fuels: Biogas, LPG, and CNG, *Application of Fuel*. Lubricants, Paints and Varnishes: Lubricant-Types, Liquid, Solid, Semisolid Theory of lubrication, Properties of a good lubricant Flash and Fire Point, Pour point and cloud point. *Application of Lubricant, Paints and Varnish*, Constituents, Properties and uses.

Books:

1. Engineering Chemistry, Agarwal, Shikha, Cambridge university press; New Delhi, 2015.
2. Engineering Chemistry Dara, S. S. and Dr. S. S. Umare S. Chand Publication, New Delhi, 2015.
3. Engineering Chemistry, Jain & Jain, Dhanpat Rai and sons; New Delhi, 2015.
4. Engineering Chemistry Dr. Vairam, S. Wiley, India Pvt. Ltd., New Delhi, 2013.



5. Chemistry for Engineers, Agnihotri Rajesh, Wiley India Pvt.Ltd. 2014.

Open source software and website address :

1. www.chemguide.co.uk/atommenu.html (Atomic structure and chemical bonding)
2. www.visionlearning.com (Atomic structure and chemical bonding)
3. www.chem1.com (Atomic structure and chemical bonding)
4. <https://www.wastewaterelearning.com/elearning/> (Water Treatment)
5. www.chem1.com/acad/webtext/elchem/ec6.html (Electrochemistry and batteries)
6. www.em-ea.org/guide%20books/book_2/2.1%20fuels%20and%20combustion.pdf
(Fuel and Combustion)
7. www.chemcollective.org (Metals, Alloys)
8. www.wqa.org(Water Treatment)



Course Code :	DE00205
Course Title :	Engineering Drawing
Pre-requisite Course Title :	
Credit :	3
Max. ESE Marks : 70	Min. Marks : 28

Unit – 1

Basics of Engineering Drawing

Introduction to Engineering Drawing, importance and uses, drawing equipments, instruments and their uses, Indian standard practices of laying out and folding of drawing Lettering and numbering as per BIS 9609, Lines- Different types of lines Dimensioning systems as per BIS and Methods of dimensioning and their rules. Scales - Full scale, reduced scale and enlarged scale.

Unit – 2

Constructions of conic curves

Conic Sections- Definition of locus, focus, directrix, axis, Vertex and eccentricity. Definition: ellipse, parabola and hyperbola. Ellipse: Construction of ellipse by concentric circle method, Oblong method, Arc of circle method and Eccentricity method. Parabola: Construction of parabola by rectangle method, parallelogram method Tangent method and eccentricity method or General Method. Hyperbola: Construction of hyperbola by rectangular method and eccentricity method.

Unit – 3

Projections of points, lines and planes

Projection of points: Concept of quadrant, first angle and third angle projection. Projection of points – points on different quadrants and on the reference planes. Projection of straight lines: Projection of straight lines – Line in the first quadrant and on the reference Planes, perpendicular to one plane and parallel to other plane, inclined to one plane and parallel to the other plane, parallel to both the planes and inclined to both the planes. Projection of Planes: Concept of planes, Projection of planes parallel to one of the reference plane. Projection of plane inclined to one



reference plane and perpendicular to another. Projection of plane inclined to both the reference planes.

Unit – 4

Orthographic projection and Section of solids

Introduction, First angle projection, Third angle projection, Symbols and comparison of first and third angle projections. Projection of simple objects – front view/ top view/ right/ left side view. Concept of sectioning planes, Auxiliary planes, types of sections and true shape of section. Projections of Solids -Types of solids, projections of solids in simple position, projections of solids with axes inclined to one of the reference planes and parallel to the other, projections of solids with axes inclined to both H.P. and the V.P. Section of solids - Practice problems for drawing projections and section of solids.

Unit – 5

Isometric Projection

Isometric axis, lines, and planes, isometric scale, isometric projection, isometric drawing. Isometric projection of objects containing rectangular, circular, cylindrical shapes and slots on sloping and plane Surfaces.

Books :

1. Engineering Drawing N.D. Bhatt Charotar Publisher
2. Engineering Drawing R.B. Gupta Satya Prakashan
3. Engineering Drawing Gujral & Shende Khanna Publisher
4. Engineering Drawing R.K.Dhawan S.Chand
5. Engineering Drawing P.J.Shah S.Chand
6. Engineering Drawing M.B.Shah, B.C.Rana Pearsons
7. Engineering Graphics with AutoCAD A.K.Sarkar, A.P.Rastogi, D.M. Kulkarni
PHI
8. Engineering Drawing and Graphics using AutoCAD T. Jeyapoovan Vikas



Course Code :	DE00206
Course Title :	Workshop Practice (Theory)
Pre-requisite Course Title :	
Credit :	1
Max. ESE Marks : 50	Min. Marks : 20

Unit – 1

Measurement, Hand tools and workshop safety.

Engineering Measurement: definition, importance and Types of measurements. Measuring instruments: linear measurement and angular measurement instruments. Measuring devices: Linear measurement and angular measurement devices. Workshop hand tools: List the various hand tools used in workshops. Workshop Safety –Safety Practices, Causes of accidents, General safety rules, Safety signs and symbols. Firefighting equipment, fire extinguishers, and their types and First Aid

Unit – 2

Wood Working Shop

Types of woods and artificial woods and their applications. wood working tools – bench vice, hammers, chisel, files, hacksaw, wood saw, surface planer, punch, v block, try square , steel rule , twist drill, marking block, reamers, tap set, mallet and their specification. Wood working operations – Marking ,Cutting , reaming , filing, drilling, joining, Types of wood working joint – Butt joint , lap joint, Bridle joint, Dowel joint, Mitre joint , finger joint , dovetail joint , Dado joint, Groove joint, Cross lap, splice joint. Applications of various joints.

Unit – 3

Joining Methods :

Joining methods- Various types of Joining Methods and their field application and types of welding joint. Arc welding Arc welding process, equipment with necessary accessories, Welding electrode, tools and consumables Personal protective equipment like safety glasses, welding gloves etc and safe practices in welding shop. Gas welding Gas welding process, Equipment with necessary accessories, Types like Carburizing,



oxidizing and neutral flame. Soldering and brazing: specification, filler material, flux, heating methods, temperature range, advantages, and comparison.

Unit – 4

Fitting and Sheet metal Shop.

Fitting tools – Hand tools used in fitting shop, holding tools, Marking and measuring tools, cutting tools. Fitting Operation – Sawing, Chipping, Filing, Taping, Reaming and Drilling. Sheet metal tools-list of sheet metal tools used. Sheet metal operation- Shearing, Bending, Drawing, Squeezing, Snipping, riveting, Grooving.

Unit – 5

Lathe Machine

Concept, Working principle, constructional details and major components of lathe machine with their functions. Job and tool holding devices and lathe attachments – head stock, tail stock, tool post, Lathe tools, chucks (3 and 4 Jaw), name and advantages of lathe attachment. Lathe operations – Plain turning, Facing, taper turning, Knurling, Threading etc.

Books :

1. Workshop Practice Bawa, H.S. McGraw Hill Education, Noida; ISBN: 978-0070671195
2. A Textbook of Manufacturing Process (Workshop Tech.) Gupta, J.K.; Khurmi, R.S. S.Chand and Co. New Delhi ISBN:81-219-3092-8
3. Introduction to Basic Manufacturing Process & Workshop Technology Singh, Rajender New Age International, New Delhi; 2014, ISBN:978-81-224-3070-7
4. Elements of Workshop Technology Hajra; Choudhary; Media Promoters and Publishers Mumbai, 2009, ISBN: 10-8185099146



Course Code :	DE00207
Course Title :	Applied Mechanics(Lab)
Pre-requisite Course Title :	
Credit :	1
Max. ESE Marks : 35	Min. Marks : 14

List of practical:

1. Measure resultant force using law of Triangle of forces setup.
2. Measure resultant force using law of Parallelogram of forces setup.
3. Measure resultant force using law of Polygon of forces setup.
4. Measure resultant force using Lami's Theorem using Jib crane setup.
5. Use Funicular diagram to demonstrate Non-concurrent, Non-Parallel forces.
6. Measure resultant moment using Law of Moments setup.
7. Determine C.G. of a given lamina of any shape using any computer aided drafting software.
8. Determine M.I of a given lamina any shape using any computer aided drafting software.
9. Determine coefficient of friction for surfaces of different materials on a Horizontal Plane with given setup.
10. Determine coefficient of friction for surfaces of different materials with Inclined Plane apparatus.
11. Plot Velocity -Time diagrams for different combinations of Uniform and non-uniform velocities.
12. Use dynamometer to calculate power in any rotating shaft/drum/pulley/wheel.
13. Use tachometer to calculate speed of any rotating shaft/drum/pulley/wheel.



Course Code :	DE00208
Course Title :	Applied Chemistry Lab
Pre-requisite Course Title :	
Credit :	1
Max. ESE Marks : 35	Min. Marks : 14

List of practical:

1. Electronic balance, Scale range of 0.001g to 500g. pan size 100 mm; Response time 3-5 sec.; power requirement 90- 250 V, 10 watt.
2. Nephelometer, Auto-ranging from 20-200 NTU, +/- 2% of reading plus 0.1 NTU, power 220 Volts +/- 10% AC 50 Hz.
3. Conduct meter, Range 0-199.9ms; resolution 0.1ms/0.01ms/0.001ms/0.1 μ s/0.01 μ s; accuracy $\pm 0.5\%$ ± 2 digits.
4. pH meter, Working range 0-14; resolution 0.1/0.01 pH; temperature compensation 0-1000 C.
5. Electric oven, inner size 18''x18''x18''; temperature range 100 to 2500 C. with the capacity of 40lt.
6. Muffle furnace, Temperature up to 9000C, digital temperature controller with an accuracy of +/- 30C.
7. Bomb calorimeter, Measurement unit J/kg, cal/gm, BTU/lb; temp. resolution 0.00010C or better; combustion bomb- halogen and acid resistant stabilized stainless steel; resolution 0.001kcal/gm; measurement range up to 40,000 J/gm.
8. Redwood viscometer-1, Suitable to operate at 220 volts AC mains with tap; stainless steel jet; cup cover; thermometer; electronic digital indicator ; controller etc.
9. Cleveland open cup, apparatus, Energy regulator-to regulate the rate of rise in, temperature; 220V; 50 Hz; single phase; AC supply.
10. Cloud and pore point apparatus, Energy regulator ,to regulate the rate of rise in, temperature,200V,50Hz, single phase, AC supply etc.
11. Fractional distillation assembly, Capacity 1.5 lt.



Course Code :	DE00209
Course Title :	Engineering Drawing (Practical)
Pre-requisite Course Title :	
Credit :	1
Max. ESE Marks : 35	Min. Marks : 14

List of practical:

1. Draw Lettering, types of lines, methods of dimensioning and one problem from Plain scale & Diagonal scale each on a single drawing sheet.
2. Draw Parabola, Ellipse and Hyperbola by general and Special methods on a drawing sheet.
3. Draw the problems on projection of points and lines on a drawing sheet.
4. Draw the projection of given Planes on a drawing sheet.
5. Draw the Orthographic projections of a given object with and without section on a drawing sheet.
6. Draw the projections of a solids and section of given solids on a drawing sheet.
7. Draw isometric views of simple machine elements.
8. Draw minimum two drawings using AutoCAD software.



Course Code :	DE002010
Course Title :	Workshop Practice (Practical)
Pre-requisite Course Title :	
Credit :	2
Max. ESE Marks : 35	Min. Marks : 14

List of practical:

1. Measuring tools available in workshop.
2. Marking and hand tools in a given situation.
3. Mock drill session for extinguishing fire.
4. Preparation of simple wooden job.
5. Preparation of two wooden joints.
6. Operate gas welding apparatus.
7. Preparation of lap joint using gas welding.
8. Preparation of butt joint using arc welding.
9. Mounting of electronic components on PCB.
10. Joining of aluminum sheet by using brazing.
11. Preparation of simple fitting job.
12. Preparation of simple male –female type fitting job.
13. Preparation of sheet metal job.
14. Preparation of simple turning job.
15. Preparation of simple drilling/ knurling /threading using lathe.



Course Code :	DE00211
Course Title :	Seminar & Technical Presentation (Personality Development & Leadership) Skills
Pre-requisite Course Title :	
Credit :	1
Max. ESE Marks: 50	Min. Marks : 20

Unit – 1

Concept and meaning of personality, Characteristics/Qualities, Factors influencing personality, Need for desirable personality, Posture and Health, Good Health diet, Exercise, Personal Cleanliness, Sleep and Rest, Use of Cosmetics, Dress Code, Eye-Contact.

Unit – 2

Skills for a good Leader, Different Leadership Styles: Autocratic, Democratic, Ethical, Transformational, Team Leadership, Necessity of Team Work, Personally, Socially, Professionally and Educationally.

Unit – 3

Weighing Positives & Negatives in Group Discussion, Do's and Don'ts of Group Discussion, Initiating, continuing and concluding a Group Discussion, Principles of Time Management, Criteria governing Time Management, Prioritizing work.

Books :

1. How to achieve success and happiness, Beau Norton, Create Space Independent, Publishing Platform, Latest edition.
2. Living English Structure, Allen, Cambridge Publications, Fifth edition(2009).
3. The Quick and Easy Way to Effective Speaking, Dale Carnegie, Amazing Reads, 23 January 2018.
4. English Grammar at Glance, Gnanamurali, M., S. Chand and Co. New Delhi, 2011 ISBN: 9788121929042.
5. Elementary English Grammar and Composition, Agarwal N. K., Goyal Brothers Prakashan, Latest Edition



6. Covey Sean, Seven Habits of Highly Effective Teens, Covey Sean, Fireside Publishers, 1998.
7. How to win Friends and Influence People, Carnegie Dale, Simon & Schuster, New York 1998.
8. Thomas A Harris, I am ok, You are ok, Thomas A Harris, New York-Harper and Row, 1972
9. Emotional Intelligence, Bantam Book, 2006, Daniel Coleman, Bantam Book, 2006
10. Chanakya's 7 Secrets of Leadership, Pillai Radhakrishnan, Jaico Publishing House, ISBN: 9788184954012, 8184954018

Open source software and website address:

1. <https://www.englishgrammar.org/>
2. <http://www.englishgrammarsecrets.com/>
3. <https://www.usingenglish.com/handouts/>
4. <http://learnenglish.britishcouncil.org/en/english-grammar>
5. <https://www.englishclub.com/grammar/>
6. <http://www.perfect-english-grammar.com/>
7. <http://www.englishteachermelanie.com/category/grammar/>
8. <https://www.grammarly.com/blog/category/handbook>
9. <https://www.britishcouncil.in/english/learn-online>
10. <http://learnenglish.britishcouncil.org/en/content>
11. <http://www.talkenglish.com/>
12. languagelabsystem.com
13. www.wordsworthelt.com

Scheme of Teaching and Examination

Diploma in Electrical Engineering Semester – III

S. No.	Course Code	Course Titles	Scheme of Studies (Hours/Week)			
			L	P	T	Credit (L+T+P/2)
1	DE03301	Electrical Circuits	2	-	1	3
2	DE03302	Electrical and Electronic Measurements	2	-	1	3
3	DE03303	DC Machines and Transformers	2	-	1	3
4	DE03304	Electrical Drawing and CAD	3	-	-	3
5	DE03305	Basic Electronics	2	-	1	3
6	DE03306	Electrical Circuits (Lab)	-	2	-	1
7	DE03307	Electrical and Electronic Measurements (Lab)	-	2	-	1
8	DE03308	DC Machines and Transformers (Lab)	-	2	-	1
9	DE03309	Basic Electronics (Lab)	-	2	-	1
10	DE03310	Electrical Workshop Practice-I (Lab)	-	2	-	1
11		Health, Hygiene and Yoga (Non-Credit Subject)	-	2	-	-
12		Library	-	2	-	-
Total			11	14	04	20

L - Lecture

P – Practical

T - Tutorial

Scheme of Teaching and Examination

Diploma in Electrical Engineering Semester – III

S. No.	Course Code	Course Titles	Scheme of Examination					
			Theory			Practical		Total Marks
			ESE	CT	TA	ESE	TA	
1	DE03301	Electrical Circuits	70	10	20	-	-	100
2	DE03302	Electrical and Electronic Measurements	70	10	20	-	-	100
3	DE03303	DC Machines and Transformers	70	10	20	-	-	100
4	DE03304	Electrical Drawing and CAD	70	10	20	-	-	100
5	DE03305	Basic Electronics	70	10	20	-	-	100
6	DE03306	Electrical Circuits (Lab)	-	-	-	35	15	50
7	DE03307	Electrical and Electronic Measurements (Lab)	-	-	-	35	15	50
8	DE03308	DC Machines and Transformers (Lab)	-	-	-	35	15	50
9	DE03309	Basic Electronics (Lab)	-	-	-	35	15	50
10	DE03310	Electrical Workshop Practice-I (Lab)	-	-	-	35	15	50
11		Health, Hygiene and Yoga (Non-Credit Subject)	-	-	-	-	50	50
Total			350	50	100	175	125	800

ESE: End of Semester Exam,

CT: Class Test,

TA: Teachers Assessment



Course Code:	DE03301
Course Title:	Electrical Circuits
Pre-requisite Course Title:	Applied Physics
Credit (L + T + P/2) :	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Principles of Electric Circuit

Study of different electrical parameters, Active and passive, Unilateral and bilateral, Independent and dependent source Passive Elements/Components (R, L and C): Steady state behavior in DC circuit Simple Series and parallel resistive circuits. Ohm's law, Kirchhoff's voltage and Kirchhoff's current law. Application of above laws to simple circuits Source transformation Mesh and nodal analysis (limited upto two loop/node problems).

Unit – 2

Circuit analysis and network theorems Note: (No Proofs)

Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Maximum power transfer theorem, Star/Delta transformation of passive network Application of theorems to solve DC networks (only for simple Independent source network).

Unit – 3

Single Phase AC circuits

Generation of alternating EMF AC circuit quantities: Peak value, RMS and Average value of a Sinusoidal voltage waveform AC Series and parallel circuits, Phasor diagrams and impedance triangle, definition of Active, reactive, apparent power and power factor in RLC circuit. *Study of Vector quantity.*

Unit – 4

Series and parallel resonance:

Definition of resonance and its importance in electrical circuit, Series resonance: Derivation of Resonance frequency and its numerical Definition: Quality factor, band



width and selectivity in series RLC circuit.(No derivations) *Effect on current and power factor in series resonance circuit.*

Unit – 5

Three phase AC circuits

Generation of three phase voltage Three phase three wire source and three phase four wire source, Phase sequence and phasor diagram *Connection of three phase winding in Star/Delta Line and phase electrical quantity.* relationship: Star/Delta Three phase load: Balanced/Unbalanced. Measurement of power in three phase circuits.

Books:

1. Fundamental of Electric Circuits Charles K. Alexander , Matthew N.O. Sadiku McGraw-Hill Education ISBN: 978-1259098598
2. Electronic Devices and Circuit Boylestad , Robert L. ; Nashelsky, Louis Pearson Education India; ISBN: 978-9332542600
3. Engineering Circuit Analysis William H. Hayt; Jack Kemmerly; Steven M. Durbin McGraw Hill Education; ISBN-13: 978-125909863
4. Circuits and Networks: Analysis and Synthesis Sudhakar , A.; Palli , Shyammohan S. McGraw Hill Education; ISBN: 978-9339219604
5. Circuit Theory: Analysis and Synthesis Chakrabarti, Abhijit Dhanpat Rai & Co ISBN: 978-8177000009
6. A Text book of Electrical Technology ,Vol-I Theraja, B.L. S.Chand and Co. New Delhi
7. Schaum's Outline of Electric Circuits (Schaum's Outline Series) Nahvi, M; Edminister, Joseph Tata McGraw Hill Education Private Ltd. ISBN: 978-1260011968
8. Electric Circuits and Network Suresh Kumar, K S Pearson Education ISBN: 978-8131713907
9. Network analysis Van Valkenburg, M. E. PHI Learning ISBN: 978-8131701584
10. Experiments in Basic Electrical Engineering S. K. Bhattacharya and K. M. Rastogi New Age International



Course Code:	DE00302
Course Title :	Electrical and Electronic Measurements
Pre-requisite Course Title:	Applied Physics
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Basics of Measurements and Measuring Instruments

Block Diagram of measuring systems, *Different torques (deflecting, controlling and damping torques) in measuring instatements.* Accuracy, precision, Error, Resolution, Sensitivity and tolerance: Only Definition Indicating, Recording and Integrating Instruments, Typical uses Electromechanical measuring instruments: PMMC, Moving iron, Induction, Dynamo meters type instruments.

Unit – 2

Electromechanical measuring Instruments

Principle of current and voltage measurement Galvanometer, Ammeter, Voltmeter Range Extension of ammeter and voltmeter using Shunts and Multipliers Current Transformer (CT) and Potential Transformer (PT). Principle of Power and energy Measurement, effect of power factor, Measurement of single and three phase power using wattmeter Measurement of single phase energy using watt-hour meter Calibration of ammeters, voltmeters, wattmeter's and energy meters Working. *Block diagram of Digital energy meter.*

Unit-3

Measurements using Bridges/meters

Classification of resistances-Low, Medium, High Concept of bridge, balancing Low resistance Measurement-Kelvin double bridge Medium resistance measurement-Wheatstone bridge High resistance measurement using Megger. Earth resistance measurement using earth tester Inductance Measurement using Maxwell's *Bridge Capacitance Measurement: Schering Bridge.*



Unit – 4

Electronic instruments

Essentials and advantages of electronic instruments True RMS reading voltmeter .Digital Voltmeters (DVM) and its types Digital millimeters Digital LCR meter-Block diagram, *Working principle Analog/Digital recorders*, Graphic recorder, Strip Chart recorder, XY recorder

UNIT – 5

Cathode Ray Oscilloscope and Digital Storage Oscilloscope

CRO-basic block diagram, Cathode Ray Tube, Electrostatic and magnetic deflection, X&Y Amplifiers, Controls on CRO and their functions, *Lissajous pattern Digital Storage Oscilloscope*.

Books:

1. A course in electrical & electronic measurements and instrumentation Sawhney, A. K. Dhanpat rai & sons, Delhi:
2. Electronic Instrumentation Kalsi H.S Tata McGraw-Hill Education ISBN-13:978-0-07-070206-6
3. Electronic instrumentation & measurement techniques Cooper, W.D. & Helfrick, A.D., New Delhi: PrenticeHall of India ISBN-13:9780132507219
4. Electrical measurements & measuring instruments Suryanarayana New Delhi, Tata McGraw Hill
5. Instrumentation for Engineering Measurements Dally, J.W. et al; John Wiley & Sons, New York
6. Electronic Instrumentation Fundamentals Albert Paul Malvino Tata McGraw Hill, New Delhi Instruments Devices and System Rangan C.S Tata McGraw Hill Publications
7. Digital Instrumentation Bouwens A. J Tata McGraw Hill Publications
8. Electrical and Electronics Measurement and Measuring Instruments (Hindi) S. K. Gupta Deepak Prakashan



Course Code:	DE03303
Course Title :	DC Machines and Transformers
Pre-requisite Course Title:	Applied Physics
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Basics of DC Machines

Law of conservation of energy Electromagnetic Induction, Faraday's laws of electromagnetic induction, Lenz's Law –concept and applications Fleming's right and left hand rule, *Back EMF, magnetic material and its properties, Losses: hysteresis and eddy current loss.*

Unit – 2

DC Generators

Construction of DC generator and its parts, Different types of DC generator (series, shunt & compound), EMF equation ,Performance of DC generators—Efficiency ,losses Condition for building up EMF in self-excited generate or Internal and external characteristics Concept of Armature reaction and its effects ,Concept of Commutation

Unit – 3

DC Motor

Construction of DC motor and its parts, Working and applications of different types of DC Motors (DC series and DC shunt motor) EMF equation, Back EMF, Torque, speed, Output power, Losses and efficiency Need of starters and types (two and three point only) Compare the performance of Series and Shunt Speed control methods of DC shunt and series motor

Unit – 4

Single Phase Transformer

Working Principle, construction, Types - Shell and Core EMF equation, Voltage and Current Transformation ratio, Equivalent circuit parameters, Phasor diagram of practical transformer under no load and lagging load conditions in brief.



Losses: Iron loss- Hysteresis and eddy current , Copper loss Efficiency, Condition for maximum efficiency and voltage regulation, OC & SC Test, Concept of All Day Efficiency and its significance Parallel operation of two single phase transformers, *Autotransformer: Construction and Application.*

Unit – 5

Poly phase Transformer

Formulation of three phase transformer by three single phase transformers 3 phase Star-delta connection Constructional details: Accessories of 3 phase transformer Parallel operation of two three phase transformers cooling methods of Power transformers.

Books:

1. Electrical Technology, Volume – II (AC & DC Machines) Theraja B.L.S. Chand and Co. Ltd., New Delhi ISBN:9788121924375
2. Electrical Machinery Dr. P.S. Bhimbra Khanna Publications ISBN: 8174091734
3. Electrical Machines Bhattacharya S. K. Tata McGraw Hill Education Pvt. Ltd., New Delhi ISBN:9789332902855
4. Electrical Machines (AC & DC) Gupta J. B. S. K. Kataria & Sons, New Delhi, ISBN:9788188458141
5. Basic Electrical Engineering (Hindi) Mehta & Gupta Dhanpat Rai Publishing Company(P) Ltd., ISBN: 978938437826
6. Electrical Machines Kothari, D.P. & Nagrath, I.J. Tata McGraw Hill Education Pvt. Ltd. New Delhi ISBN:9780070699670
7. Electric Machines Ashfaq Husain Dhanpat Rai & Company, ISBN: 6700000000432
8. Basic Electrical Engineering Mittle V.N. and Mittal Arvind Tata McGraw Hill Education Pvt. Ltd. New Delhi ISBN:9780070593572
9. Electric Machinery Arthur Eugene Fitzgerald and Charles Kingsley Tata McGraw Hill Education Publications ISBN13: 9780070530393
10. Electrical Machines-I Ravikant Saini Neelkanth Publisher Private Ltd



Course Code:	DE03304
Course Title :	Electrical Drawing and CAD
Pre-requisite Course Title:	
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Symbols and Codes

ISI Symbols in electrical engineering Conventions for circuit and schematic representation of electrical and electronic components, instruments and equipment.

Unit – 2

Installation, mounting and layout of power and safety equipment

Different types of mountings for static(transformers): pole and ground mounted Mountings for dynamic equipment (electrical rotating machines) Substation layout with circuit breaker, on-load and off-load isolators, Buchholz's relay and other protective devices of transformers up to 2MVA Plate and Pipe earthing Extension of range using shunt, multiplier, CT, PT ,*Transmission line structure , Pole mounted Transformer.*

Unit – 3

Constructional Features of Electrical Machines

Parts of a transformer up to 2 MVA DC Machines: pole, pole shoe, simplex lap and wave winding Alternators: salient and cylindrical rotor Induction motors: squirrel cage and slip ring AC Machine winding: full pitch winding and short pitch winding.

Unit – 4

Domestic and Commercial wiring for LVEquipment

Illumination fixtures: types and Internal circuit diagram Control wiring of go down, staircase, street light and for houses Wiring of energy meters for domestic and commercial loads. Internal Wiring of Refrigerators and Air conditioners Starter, 3 Point Starter, 4-point starter. Wiring diagram of submersible and centrifugal pumps, *Panel wiring with CB , Isolator, Synchroscope, regulator etc.*



Unit – 5

Computer Aided Electrical Drawing (CAD) and Cables

Computer Aided Drawing: Draw command, edit command, Coordinate entry, Osnap, Layers, Dimensioning, Text in a drawing, Ortho command, Zoom command and plot command General electrical and electronic symbols, Layouts of domestic, commercial and industrial wiring (2D only).

Cables: Types of cable, Cross section of cable and Selection of cables.

Books:

1. Electrical Engineering Drawing Bhattacharya, S.K. New Age International Publisher 978-8122408553
2. Electrical Engineering Drawing, Part-1 Singh, Surjit SK Kataria and Sons, New Delhi, ISBN:978-9350143056
3. Electrical Engineering Drawing Narang, K. L. Satyaprakashan, New Delhi, ISBN:9788176841504
4. Basic engineering Drawing Anwani, M.L. &Anwani, I. Dhanpat Rai & Sons ISBN:978-8177000191
5. Computer Aided Electrical Drawing Yogesh, M., Nagaraja, B. S., Nandan, N. PHI Learning Pvt. Ltd., Delhi ISBN:978-812034953
6. AutoCAD Electrical 2018 Black book Verma, Gaurav Cadcamcae Works 978-1988722085
7. AutoCAD Electrical 2018 for Electrical Control Designers Tickoo, Sham BPB Publications 978-9386551627
8. Electrical Drawing and Estimating and Costing Dr. M. F. Qureshi Deepak Publication 978-81-7776-169-2



Course Code:	DE00305
Course Title :	Basic Electronics
Pre-requisite Course Title:	Applied Physics
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Semiconductor Diode

pn- Junction diode: working, formation of depletion layer, construction, symbol and equivalent circuits of pn- Junction diode Barrier potential voltage, forward and reverse biasing, V-I characteristics of diode Diode current equation, Static and Dynamic resistance, Diode capacitance Symbol, *Diffusion capacitance transition capacitance*. working and characteristic of other diodes like: LED, Photodiode, Varactor diode, *Diode equation and ebullient circuits*.

Unit – 2

Rectifiers and Filters

Need for rectification, rectifier Parameters, PIV, Ripple factor, Efficiency, Peak Inverse Voltage(PIV), Transformer utilization factor(TUF) of rectifiers Types of rectifier: Half Wave Rectifier, Full Wave rectifier, Center taped and Bridge type full wave rectifier Filter Circuits: L –filter, C–filter, LC- filter, CLC- filter, *ripple factor with filter comparison of all rectifier, DC power supply*.

Unit – 3

Diode Circuits

Zener diode: working, construction and equivalent circuits of Zener diode Zener and avalanche breakdown phenomenon, Zener diode as voltage regulator Clipper: Function of clipper circuit, types of clipper :positive and negative clipper circuits, *series and shunt clipper*

Clamper: Function of clamper, types of clamper, positive and negative clamper circuits, *Application of clipper and clamper circuit*.



Unit – 4

Bipolar Junction Transistor (BJT) and Field effect transistor (FET)

BJT: Working, types of BJT ; NPN and PNP, construction and operation of NPN and PNP transistor. Modes of operation : active, saturation and cutoff, current amplification factor β and α Relation among α β and γ Transistor biasing: need for biasing, types of biasing, thermal runaway Transistor configurations: Common Emitter(CE), Common Base(CB) and Common collector configuration circuit , working and input and output characteristics. Field Effect Transistor(FET): Working, construction, input and output characteristics, drain current, pinch-off voltage, *FET as VDR comparison between BJT and FET.*

Unit – 5

Introduction to Operational Amplifier(Op-Amp)

Basics of differential amplifier, Working principle, input and output characteristics. Basics of Op-Amp: OP-AMP IC-741, functional block diagram, virtual ground, configurations of working : inverting and non-inverting, parameters : I/O resistance, gain, slew rate, bandwidth, power. Applications op-amp : Summing, multiplier, and divider amplifier, integrator and differentiator, Log and Anti-Log amplifier. *Typical values of parameters for IC μ A741.*

Books:

1. Basic Electronics & Linear Circuits Bhargava N.N.; Kulshreshtha D.C.; Gupta S. C. Tata McGrawHill; New Delhi
2. Integrated Electronics Millman Jacob; Halkias Christo; Parikh Chetan D McGraw Hill Education, India
3. Op-amps and linear Integrated circuits Gayakwad Ramakant A. PRENTICE HALL, India
4. Linear Integrated circuits and Applications Bakhshi U.A.; Godse A.P. and Bakshi A. V. Technical Publications, Pune, India
5. Electronic Devices and Circuit Theory Boylestead Robert; Neshelsky Louis Pearson Education, New Delhi
6. Basic Electrical & Electronics (Hindi) Dr. M F Qureshi Deepak Prakashan



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7. Principles of Electronics Mehta, V.K.; Mehta, Rohit S. Chand and Company, Ram Nagar, New Delhi-110 055,504
8. Basic Electronic Engineering Baru V.; Kaduskar R.; Gaikwad S.T. Dream tech Press, New Delhi,



Course Code:	DE03306
Course Title :	Electrical Circuits (Lab)
Pre-requisite Course Title:	Applied Physics
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:-

1. Identify the commonly used components and materials in an electrical circuit.
2. Observe the voltage current relation in an incandescent lamp.
3. Measure voltage and current in a given linear electric circuit.
4. Measure current and voltage in a particular branch of the given electrical circuit using Kirchhoff's Current Law.
5. Measure voltage drop in closed loop of the given electrical circuit using Kirchhoff's Voltage Law.
6. Determine the current and voltage in a given electrical circuit.
7. Connect star connected resistances to its equivalent delta connection and determine the equivalent resistance.
8. Connect delta connected resistances to its equivalent Star connection and determine the equivalent resistance.
9. Measure current through and voltage across a circuit element of a given electric circuit and verify applying mesh and nodal analysis.
10. Measure current in a branch of the given electrical circuit having two or more input sources using Super position theorem.
11. Measure load current in the load resistance using Thevenin's theorem in a given circuit.
12. Measure load current in the load resistance using Norton's theorem in a given circuit.
13. Determine the maximum power and load resistance for which circuit has maximum power using maximum power transfer theorem.
14. Measure peak value, RMS value, Period and frequency of a sinusoidal voltage using CRO.



15. Observe the behavior of current and voltage wave form in CRO for resistive load and comment on it.
16. Observe the behavior of current and voltage wave form in CRO for R-L Load and comment on it.
17. Measure voltage, current, power and power factor in a series RLC circuit and draw phasor diagram.
18. Measure voltage, current, power and power factor in a RLC parallel circuit and draw phasor diagram.
19. Determine the power and power factor in AC circuit using three ammeter method.
20. Determine the current at series resonance.
21. Observe the variation of power factor for varying inductance for a series RLC circuit.
22. Determine the current at parallel resonance.
23. Determine the impedance of a circuit during parallel resonance.
24. Measure the line /phase current, line voltage/phase voltage for the given three phase load connected to a three phase source.
25. Measure neutral displacement voltage of the given three phase unbalanced load connected to a three phase source.
26. Measure three phase power for a given star /delta connected load.



Course Code:	DE03307
Course Title :	Electrical and Electronic Measurements (Lab)
Pre-requisite Course Title:	Applied Physics
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:-

1. Selection of indicating, Recording and Integrating Instruments the laboratory and writing their specifications.
2. Demonstration of construction and working principle of moving iron and moving coil type instruments.
3. Demonstration of construction and working principle of Induction type and dynamometer type instruments.
4. Measurement of DC, AC voltage and current using analogue meter.
5. Conversion of a given galvanometer to DC/AC current- meter.
6. Conversion of a given galvanometer to DC/AC Voltmeter.
7. Measurement of high value of current and voltages using shunt resistance and multiplier.
8. Measurement of high value of current and voltages using Current and Potential Transformer.
9. Measurement of single and three phase power using wattmeter
10. Measurement of three phase power using two and three wattmeter method
11. Calibration of ammeter, voltmeter with a standard meter.
12. Calibration of wattmeter with a standard wattmeter.
13. Demonstration of working of a digital energy meter
14. Measurement of low Resistance using Kelvin's double bridge
15. Measurement of medium Resistance using wheat stone bridge.
16. Measurement of insulation resistance using Megger
17. Measurement of earth resistance using Earth tester
18. Measurement of inductance using Maxwell's Bridge



19. Measurement of capacitance using Schering's Bridge
20. Measurement of voltage, current, resistance using Digital Multi meter
21. Continuity test using digital Multi meter
22. Measurement of resistance Inductance and Capacitance using LCR meters.
23. Measurement of Quality factor of a given Inductor and Capacitor using LCR Meter
24. Demonstration of various analog/digital recorders.
25. Measurement of amplitude, Frequency, time period and Phase difference of different signals generated by function generator using CRO.
26. Measurement of Unknown frequency, phase angle using Lissajous patterns.
27. Demonstration of Digital Storage Oscilloscope



Course Code:	DE03308
Course Title :	DC Machines and Transformers (Lab)
Pre-requisite Course Title:	Applied Physics
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:-

1. Illustration of principle Electro-mechanical conversion using BLV method.
2. Identification of parts of a DC machine by dismantling the cut section model.
3. Measurement of resistance of a series, shunt field and armature winding of a DC compound machine and comment on their relative resistances.
4. Performance of Load test on a DC Shunt generator.
5. Performance of a test to analyze the effect of speed and field flux on generated voltage of DC shunt generator.
6. Performance of load test on a DC series generator.
7. Starting of a D. C shunt motor using DC 3 /4 point starter and reverse its direction of rotation.
8. Controlling the speed of a DC shunt motor by flux and armature control method.
9. Performance of load test on DC shunts motor.
10. Performance of Load test on DC series motor.
11. Performance of Brake test of DC shunts motor.
12. Performance of a test to Determine of Voltage and current ratio of a single phase transformer.
13. Performance of polarity test on a single phase transformer.
14. Performance of Open Circuit and Short Circuit test on a single phase transformer and determine the equivalent circuit parameters.
15. Performance of direct load test on a single phase transformer.
16. Performance of Parallel operation of two single phase transformers having equal and unequal kVA rating.
17. Verification of single phase auto transformer as a step up and step down transformer.



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18. Test the Performance of an auto transformer and 1- phase two winding transformer of same rating.
19. Perform parallel operation of two three phase transformers.



Course Code:	DE03309
Course Title :	Basic Electronics (Lab)
Pre-requisite Course Title:	Applied Physics
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:-

1. Test the performance of pn-Junction diode in the forward and reverse biased condition.
2. Test the performance of the given LED Diode.
3. Test the performance of the given Photo Diode.
4. Test the input and output waveform of Half Wave Rectifier
 - a) without filter
 - b) with filter
5. Test the input and output waveform of full Wave center tapped rectifier
 - a) without filter
 - b) with filter
6. Test the input and output waveform of full Wave Bridge Rectifier
 - a) without filter
 - b) with filter
7. Test the performance of Zener diode.
8. Test the output of the given Zener voltage regulator.
9. Test the output waveform of
 - a) Positive Clipper
 - b) Negative Clipper
10. Test the output waveform of
 - a) Positive Clamper
 - b) Negative Clamper
11. Determine the current gain of CE configuration with the help of input output characteristics of CE configuration.
12. Determine the current gain of CB configuration with the help of input output



characteristics.

13. Determine the current gain of CC configuration with the help of input output characteristics.
14. Build and test the operation of BJT as a switch.
15. Bias the given NPN transistor in the active region by voltage divider biasing method.
16. Test the performance of the given FET.
17. Test the performance of the given Op-Amp IC in inverting mode.
18. Build and test Op-Amp based summing amplifier.
19. Test the output of non-inverting amplifier.
20. Test the performance of Op-Amp based integrator and differentiator circuit.
21. Build and test the performance of Instrumentation amplifier.



Course Code:	DE03310
Course Title :	Electrical Workshop Practice-I (Lab)
Pre-requisite Course Title:	Workshop Practice (Mechanical)
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:-

1. Identify different type of measuring tools.
2. Use hand tools.
3. Measure the wire gauge size.
4. Identify different type of meters used for measurement.
5. Identify cables of different current and voltage ratings.
6. Identify the accessories /materials used for house wiring.
7. Identify the different types of illumination sources.
8. Identify the different types of switches and circuit breakers.
9. Perform wiring connection on a switch board.
10. PVC conduit wiring.
11. Prepare switch board.
12. Connect a given load from the main supply using Circuit breakers.
13. Prepare series testing board.
14. Control of one lamp, one fan and one socket from one switch board.
15. control of two Lamps by Series - Parallel connection using one 1-way switch & 2-way switches.
16. Control and practice of a given lighting load.
17. Control using sub circuits for a given heating and illumination load.
18. Using multi meter and clip on meter.
19. Continuity and polarity test of given electrical wiring component.
20. Test wiring installation using megger.
21. Identify Safety Signs and symbols.
22. Artificial respiration and first aid kit.
23. Mock drill session for extinguishing fire.



24. Different types of fire extinguishers.



Scheme of Teaching and Examination

Diploma in Electrical Engineering Semester – IV

S. No.	Course Code	Course Titles	Scheme of Studies (Hours/Week)			
			L	P	T	Credit (L+T+P/2)
1	DE03401	Digital Electronics	2	-	1	3
2	DE03402	AC Machines	2	-	1	3
3	DE03403	Computer Programming and Basic Networking	3	-	-	3
4	DE03404	Electrical Power Generation, Transmission & Distribution	2	-	1	3
5	DE03405 /DE03406	Electrical Estimating and Costing* / Analog Electronics**	3	-	-	3
6	DE03407	Digital Electronics (Lab)	-	2	-	1
7	DE03408	AC Machines (Lab)	-	2	-	1
8	DE03409	Computer Programming and Basic Networking (Lab)	-	2	-	1
9	DE03410	Electrical Power Generation, Transmission & Distribution (Lab)	-	2	-	1
10	DE03411 /DE03412	Electrical Workshop Practice-II (Lab*) / Analog Electronics (Lab**)	-	2	-	1
11		Indian Constitution (Non Credit Subject)	-	2	-	-
Total			12	12	03	20

L - Lecture

P – Practical

T - Tutorial

Scheme of Teaching and Examination

Diploma in Electrical Engineering Semester – IV

S. No.	Course Code	Course Titles	Scheme of Examination					
			Theory			Practical		Total Marks
			ESE	CT	TA	ESE	TA	
1	DE03401	Digital Electronics	70	10	20	-	-	100
2	DE03402	AC Machines	70	10	20	-	-	100
3	DE03403	Computer Programming and Basic Networking	70	10	20	-	-	100
4	DE03404	Electrical Power Generation, Transmission & Distribution	70	10	20	-	-	100
5	DE03405 /DE03406	Electrical Estimating and Costing* / Analog Electronics**	70	10	20	-	-	100
6	DE03407	Digital Electronics (Lab)	-	-	-	35	15	50
7	DE03408	AC Machines (Lab)	-	-	-	35	15	50
8	DE03409	Computer Programming and Basic Networking (Lab)	-	-	-	35	15	50
9	DE03410	Electrical Power Generation, Transmission & Distribution (Lab)	-	-	-	35	15	50
10	DE03411 / DE03412	Electrical Workshop Practice-II(Lab*) / Analog Electronics (Lab**)	-	-	-	35	15	50
11		Indian Constitution (Non Credit Subject)	-	-	-	-	50	50
Total			350	50	100	175	125	800

ESE: End of Semester Exam,

CT: Class Test,

TA: Teachers Assessment



Course Code:	DE03401
Course Title :	Digital Electronics
Pre-requisite Course Title:	Basic Electronics Engineering and Engineering Physics
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Number System and Codes

Comparison of digital and analog systems Number Systems: Binary Decimal, Octal and Hexadecimal and their conversions Binary Addition Subtraction Multiplication and Division 1's and 2's complement of a number, Basic arithmetic operation using complement method, *One's and two's complement*. Different types of codes: 8421 BCD, Excess-3, Gray codes, ASCII *etc.*

Unit – 2

Logic Gates and Boolean Algebra

Boolean algebra: Laws of Boolean algebra and De- Morgan's theorem and *its applications*. Types of logic gates: AND, OR and NOT. Universal Gates: NAND, NOR, EX-OR and EX-NOR. Truth table, symbol, *Characteristics of gates*, implementation of basic gate using Universal gate Max - term, Min - term, Sum of product (SOP) and Product of Sum(POS) expressions, Simplification of Boolean functions using laws and theorems. Simplification of Boolean functions using K- map method (up to 4 variables)

Unit – 3

Combinational Circuits

Half Adder, Full Adder, Half subtractor, Full subtractor, parallel adder and subtractor, BCD adder' Magnitude comparator (2 and 3 bit). IC 7485 (Pin diagram and truth table) Encoders: 4- Input and 2- Output encoder, Octal to Binary and Binary to BCD Encoder , BCD to binary encoder. Multiplexer: 2x1, 4x1 and 8x1 multiplexer (IC 74151) Decoders: 3-Line to 8-Line Decoder, 8-4-2-1 BCD to Decimal Decoder. De- multiplexer: 1x2, 1x4 and 1x8 demultiplexer. *Example of MUX and DEMUX.*



Unit – 4

Sequential Circuits

Flip Flop - basic flip flop and latch, RS F/F, JK F/F, D F/F, T F/F, truth table, characteristic table and excitation table Race around condition, Master-Slave JK flip flop UP-DOWN counter (2 to 3 bit), IC7490 (Pin diagram and truth table) Universal Shift Registers, IC 74194 (Pin diagram and truth table), *IC 7490 and 74194 details, Block diagram.*

Unit – 5

Convertors and memories

Digital to analog converters: weighted resistor, R-2R Ladder network Analog to digital converters: Successive approximation, Single and Dual slope converters Different types of semiconductor memories: RAM ROM, EEPROM, UVEPROM, Static RAM, Dynamic RAM, Flash ROM and non-volatile RAM, *Comparison of different types of memories.*

Books:

1. Fundamentals of Digital Circuits Kumar, A. Anand Tata McGraw Hill Education Pvt.Ltd., ISBN: 978-8120352681
2. Digital Logic and Computer Design Mano M. Morris Prentice Hall Publication ISBN: 978-0132129374
3. Digital Electronics: Principles and Integrated Circuits Maini, A.K. Wiley India Publications ISBN: 978-0470510513
4. Modern Digital Electronics Jain ,R.P. McGraw Hill India , ISBN: 978-0070669116
5. Digital Electronics Circuits and Systems Puri, V.K. McGraw Hill , New Delhi, ISBN: 978-0074633175
6. Digital Electronics Salivahanan S. and Pravin Kumar S. Vikas Publishing House ISBN: 978-8125939368
7. Digital Principles and Applications Malvino, A.P.; Leach, D.P.; Saha G. McGraw Hill Education, New Delhi, ISBN : 97-89339203405



Course Code:	DE03402
Course Title :	A.C. Machines
Pre-requisite Course Title:	Applied Physics, DC Machines and Transformers
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Three Phase Induction Motors

Construction, types- Squirrel cage - Single, double cage, Wound rotor Working principle, Torque-Slip curve, equivalent circuit and phasor diagram Torque equation, Starting, running and condition for the maximum torque (Only expression) Necessary of starter and types of starters- DOL, Star delta, Autotransformer type and Rotor resistance starter. No load and Blocked rotor test, Losses and efficiency Speed control of squirrel cage and slip-ring induction motor.

Unit – 2

Synchronous Motor

Working principle Starting methods Equivalent circuit and phasor diagram Effect of change in excitation and pf- 'V' and inverted 'V' curves Applications of Synchronous motor - Synchronous condenser and constant speed Hunting and its prevention Maintenance of synchronous motors

Unit – 3

Single Phase Induction Motor

Construction, working and types based on starting methods: split phase- Resistance Start, Capacitor start, Capacitor start capacitor run, Shaded pole induction motor Double revolving field theory – equivalent circuit. Speed/ torque characteristics Maintenance of different types of single phase motors

Unit – 4

Alternators

Types and applications Construction- Salient and Cylindrical rotor Equivalent circuit and



phasor diagram Voltage equation Voltage regulation by synchronous impedance method, Open Circuit, Short Circuit characteristics Synchronization and conditions of synchronization of alternator with busbar/alternator: two bright and one dark lamp method Cooling system of alternator Maintenance of given alternators

Unit – 5

Special electrical machines

Construction, working Speed/ torque characteristics (where ever applicable) and applications of Special electrical machines : AC servo motor, Linear Induction Motor(LIM), Reluctance motor, Hysteresis motor, Ac series/ Universal motor.

Maintenance

Maintenance of different types of ac machine: Three Phase Induction Motors, Synchronous Motor, Single Phase Induction Motor, Alternators.

Books:

1. Electrical Technology, Volume – II (AC & DC Machines) Theraja B.L. S. Chand and Co. Ltd., New Delhi ISBN:9788121924375
2. Electrical Machinery Dr. P.S. Bhimbra Khanna Publications ISBN: 8174091734
3. Electrical Machines Bhattacharya S. K. Tata McGraw Hill Education Pvt. Ltd., New Delhi ISBN:9789332902855
4. Electrical Machines (AC & DC Machines) Gupta J. B. S. K. Kataria & Sons, New Delhi, ISBN:9788188458141
5. Basic Electrical Engineering (Hindi) Mehta & Gupta Dhanpat Rai Publishing Company(P) Ltd., ISBN: 978938437826
6. Electrical Machines Kothari, D.P. & Nagrath, I.J. Tata McGraw Hill Education Pvt. Ltd. New Delhi ISBN:9780070699670
7. Electric Machines Ashfaq Husain Dhanpat Rai & Company, ISBN: 6700000000432
8. Basic Electrical Engineering Mittle V.N. and Mittal Arvind Tata McGraw Hill Education Pvt. Ltd. New Delhi ISBN:9780070593572



Course Code:	DE03403
Course Title :	Computer Programming and Basic Networking
Pre-requisite Course Title:	Computer Fundamentals and Applications
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Introduction to ‘C’ Programming

Program logic development using Algorithm and Flowchart Algorithm-Developing and writing algorithm using pseudo Codes Flowchart- Definition and Importance of flowchart, Symbols of Flowchart, Flow lines, Terminals, Input/output, Processing, Decision, Connection off- page connectors, Limitation of flowchart Basic structure of ‘C’ Program Data Concepts- Character set, C Tokens, Keywords and Identifiers, Constants, variables and its Declaration Data Types- data type conversion Operators. Input/Output Functions- printf(), scanf(), getch(),putch(), getchar()

Unit – 2

Decision making with Branch statements and Loop statements

Introduction of decision making statements in ‘C’ Decision making with IF statement, Simple IF statement, The IF.... ELSE statement, Nesting of IF.... ELSE statement, The ELSE IF ladder The Switch statement The? : operator GOTO statement Introduction, The WHILE Statement, The DO...WHILE Statement The FOR statement, The BREAK and CONTINUE statement, *source code, object file and executable code.*

Unit – 3

User-defined Function

Concept and need of functions Library functions: Math functions, String handling functions, other miscellaneous functions. *function with arguments.*



Unit – 4

Array in 'C'

Declaring and initializing One- Dimensional Array. Array Operations-Insertion, Searching, deletion, string operation, 4.2.5Concatenation of two strings. *Introduction to pointer, call by values, call by reference.*

Unit – 5

Computer Networksand devices

Definition & history of networks, Application of Computer Networks, Standard Organizations and Protocols, Line Configuration Point to Point connection, Multipoint connection, Network Topology Bus Topology, Ring Topology, Star Topology, Hybrid Topology, Categories of network LAN, WAN, *Over view of OSI model* and its main function, feature of eachlayer. TCP/IP model. Types of Transmission Media Twisted Pair, Coaxial Cable, Optical Fiber, Introduction to Network communication devices Repeater, Hub, SwitchBridge, Router, Access Point, Gateway, RS 232, RJ 45 &RJ11, Client Server Architecture.

Books:

1. Programming in ANSI C E. Balaguruswami Tata McGraw-Hills publication
2. Programming with ANSI And Turbo C Ashok N Kamthane Pearson publication, Latest Edition
3. Let us 'C' Yashavant Kanetkar BPB publications
4. Computer Networks Andrew S Tanenbaum Prentice Hall
5. Data communication and Networking Behrouz, Forouzan, Mcgraw Hill
6. Networking Essential – Training Guide Joe Casad& Dan Newland, (MCSE, MCT) Tech Media New Delhi



Course Code:	DE03404
Course Title :	Electrical Power Generation, Transmission and Distribution Elements of Electrical Engineering,
Pre-requisite Course Title:	Electrical Circuit, DC Machines and Transformers, ACMachines
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Hydroelectric PowerPlant

Various sources of Electrical Power Generation: *MHD Power plant* Hydro, thermal, nuclear, solar, wind, bio-mass, geo thermal, OTEC, etc. Hydroelectric power station (HPS): Energy conversion process, plantlayout. Hydrograph and simple calculation of electrical power generation, choice of site and constituents of hydroelectric power plant Classification of HPS- based on; Head Storage and pondage, Plant layout, types of hydro turbines, Auxiliaries, Synchronous Generators in HPS: Selection, number of poles, rotor speed and diameter. *Closed and open MHD system with its working principle.*

Unit – 2

Thermal andNuclear Power Station

Thermal power station: Energy conversion process, plant layout , site selection Major equipment and auxiliaries of TPS : Boiler, steam turbine, Turbo Generator, super heater, economizer and electrostatic precipitator, etc) NPS: Energy conversion process, Constituents of NPS and Layout, Selection of site Reactors: Main parts, Types and its Control Nuclear Fuels. *Comparison between different power plant.*

Unit – 3

Variable Load onGenerating Stations

Structure of electrical power system. Connected load, Maximum demand, average demand, Demand factor, load factor, diversity factor, plant capacity factor and plant use factor and related numerical Load curve and Loadduration curve. Base load and peak load on generating stations. Relationship between units generated per year, maximum demand



and Load factor. Cost of electrical energy and related numerical problems. *Tariffs and its types.*

Unit – 4

Transmission Line- Parameters and performance

Transmission line parameters: Resistances, inductances and capacitances. Skin effect and effect of proximity. Stranding and transposition of conductors. Classification of transmission lines –Short, medium and long. Performance of transmission lines, voltage regulation and efficiency (Only lumped Short and Medium Transmission Line). Equivalent circuits, T and π networks, ABCD constants, Ferranti effect, line losses. Line insulators: requirements, types, Failure of insulators. String efficiency, methods of improving string efficiency (simple numerical). *Layout of component of a typical HVDC transmission system, advantage and disadvantages HVAC and HVDC system.*

Unit – 5

Distribution System

Feeders, distributors and service mains Selection of conductor size based on current for distribution systems Voltage drops in D.C. distributors Voltages drop in A.C. distributors. Types of underground power cables Construction of power cables Selection of power Cables for LT and HT connections. Laying of underground power cables. Faults in Power cables

Books:

1. Principles of Power System: including generation, transmission, distribution switchgear and protection V K Mehta Rohit Mehta S. Chand & Company Pvt. Ltd. , New Delhi ISBN : 978-8121924962
2. A course in power systems J B Gupta S.K. Kataria& Sons, ISBN: 978-9350143735
3. Power System Engineering D.P. Kothari & I.J. Nagrath McGraw-Hill; ISBN: 978-0070647916
4. Transmission and Distribution of Electrical Power J B Gupta S.K. Kataria& Sons 978-9350143629
5. Electrical Power-I Tarlok Singh S.K. Kataria& Sons A Textbook of Electrical



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Technology Vol. III

6. Theraja, B.L.; Theraja, A.K. S.Chand and Co. New Delhi ISBN : 9788121924900



Course Code:	DE03405
Course Title :	Electrical Estimating and Costing Elements of Electrical Engineering, Electrical Drawing and CAD
Pre-requisite Course Title:	Electrical Drawing and CAD
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Estimating and Costing Practices

Estimation and estimation tools. Electrical Schedule of rates, catalogues, Survey and source selection, measurement book Quantity and cost of material required. Purchase system including GeM, Purchase enquiry and selection of purchase mode, Comparative statement, Purchase orders, verification of bills Contract system. Tendering procedure and preparation of simple tender, EarnestMoney, Security Deposit

Unit – 2

Electrical Wiring

Wiring system, Types of wires, Specifications of Different types of wiring materials, Accessories. Selection of material for wiring work. Wiring tools. Wiring circuits. Point wiring system (Short, Medium and Long), Service line: single phase, three phase, Domestic and industrial panel wiring. IE Act-2003., I.E. rules for wiring. Safety rule of wiring.

Unit – 3

Estimation and Costing of residential and industrial wiring

Residential wiring Layout Load calculation Wire, switchgear, Cable and other accessories & fixture/fitting selection Earthing system Overall Estimating and costing Commercial and industrial Wiring Layout Load calculation Wire, switchgear, Cable and other accessories & fixture/fitting selection Earthing system Overall Estimating and costing

Unit – 4

Estimation and costing of Overhead and Underground Distribution System

Overhead distribution system. Materials and accessories required for the overhead



distribution system. Earthing of lines, Guarding of overhead lines, Clearances of conductor from ground, Spacing between supports conductors, I.E. rules pertaining to LV distribution lines Estimate for 440 V, 3-phase, 4 wires or 3 wires overhead distribution system. Types of service connections Method of installation of service connection (1-phase and 3-phase), I.E. rules pertaining to overhead lines and service connection Underground distribution system. Materials and accessories required for underground distribution system. Estimate for 440 V, 3-phase, 4 wires or 3 wires underground distribution system. I.E. rules pertaining to underground system and service connection.

Unit – 5

Estimation and Costing of Repair and Maintenance of Electrical Equipment and appliances

D.O.L. starter, small motor, automatic electric iron, table/ceiling fan, ICDP/ICTP Switch, etc. Operating Manuals, service manuals and drawing work of the product/equipment. Storage of consumables/spare parts of the equipment. Estimation of repairing cost and overall cost. *Validation of cost schedule*. Tools used for repairs & maintenance work Preparation of cost schedule for repair and maintenance of; Electric fan. Automatic electric iron. Single phase transformer. FHP motors Mixer grinder.

Books:

1. Electrical costing, estimating and Contracting Bhattacharya, S.K., TTTI, Chandigarh
2. I.E. rules, Bharat Manak Sangralaya, Bhopal
3. S.O.R, P.W.D., CPWD
4. Electrical wiring, estimating and costing Uppal, S.L., G.C Garg Khanna Publisher, New Delhi ISBN: 9788174092403
5. Installation, Maintenance and Repair of Electrical Machines and Equipments. Madhvi Gupta S.K Kataria and sons ISBN: 978-93-5014- 546-3
6. Electrical System Design M.K.Giridharan I K International Publishing House. ISBN: 978-93-84588-30-7
7. Electrical Design Estimation and Costing Raina K B, Bhattacharya S.K New Age International Publishers ISBN: 9788122403633
8. A Course in Electrical Installation Estimation and Costing J.B Gupta S.K. Kataria and



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Sons ISBN: 9789350142790

9. Electrical Workshop: Safety, Commissioning, Maintenance Testing of Electrical Equipment. R.P Singh I K International Publishing House ISBN: 9789381141295



Course Code:	DE03406
Course Title :	Analog Electronics
Pre-requisite Course Title:	Basic Electronics Engineering
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Introduction To Op-Amps

Basic differential amplifier, *configuration of differential amplifier*, working principle, concept of input current and virtual ground of input terminals of any OP AMP OP-AMP 741 IC pin configuration, characteristics, block diagram, specifications Electrical parameters- Ideal characteristics input offset voltage, input resistance, CMRR, slew rate, gain, and bandwidth Linear application- inverting and non- inverting amplifiers, OP-AMP as a voltage follower, adder, subtract or, integrator, differentiator. Non-linear applications- principle, features and use of OP-AMPs circuits. *Typical values of parameters IC μ A741.*

Unit – 2

Feedback In Amplifiers

Concept of feedback: Basic principles, types of feedback, merits and demerits of negative feedback Negative feedback in amplifiers, overall gain of negative feedback amplifier, effect of negative feedback on gain, stability, distortion and bandwidth (only physical explanation) *Comparator using OP-AMP, Regenerative comparator* Voltage series amplifier, voltage shunt amplifier, current series amplifier, current shunt amplifier RC coupled amplifiers with emitter by pass capacitor, Emitter follower and its application. *Comparison between RC Coupled and direct coupled amplifier.*

Unit – 3

Oscillators

Positive feedback in oscillators Barkhausen's criteria for oscillation Tank circuit: RC phase shift oscillator, Hartley's oscillator circuit, Colpitt's oscillator, Wien Bridge oscillator circuit and Crystal oscillator circuit, *clap oscillator ,crystal oscillator Working principle and application.*



Unit – 4

Power Amplifier

Voltage and power amplifier Classification of power amplifier ,Working of different types of power amplifier – Class A, B, AB, C and D Efficiency of class A and class B amplifier, Efficiency of transformer coupled power amplifier, Efficiency of class B push pull amplifier Operation of class B push-pull power amplifier Complimentary symmetry push-pull amplifier, *application of power amplifier and characteristics.*

Unit – 5

Special Application Circuits

Timers –Introduction to 555 timer, Pin diagram and functional block diagram of timer, specifications Operating modes: Mono stable, Bi-stable and Astable Timer 555 as waveform generator: Square, saw tooth and triangle, Pulse width and duty cycle of a pulse signal, Working of a wave generation circuit, *application of Multivibrator using IC555 , window detector and level detector circuits.*

Books:

1. OP-AMPS and Linear Integrated Circuits Gayakwad, R. A. Prentice Hall, ISBN: 978-8120320581
2. Linear Integrated Circuits Choudhury, D. R.; Jain , Shail B. New Age International Publishers; ISBN:978-9386070913
3. Linear Integrated Circuits Analysis, Design, and Applications Nair, B. S Wiley India Pvt. Ltd., New Delhi, ISBN:9788126518968
4. Linear Integrated Circuits Salivahanan, S.; Bhaskaran, V. S. K. McGraw-Hill Publishing Company Limited, New Delhi ISBN: 9780070648180
5. Op Amps and Linear Integrated Circuits Fiore, J. M. Cengage Delmar Thomson Learning, New Delhi ISBN: 9780766817937
6. Operational Amplifiers and Their Applications Sarkar, S.S.Chand Publishing, New Delhi ISBN:9788121917797



Course Code:	DE03407
Course Title :	Digital Electronics (Lab)
Pre-requisite Course Title:	Basic Electronics Engineering and Engineering Physics
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:

1. Perform various arithmetic operations using different number systems.
2. Verify the conversion of number systems using the kits in the lab.
3. Verify and implement the Gray code to Excess -3 code conversion and vice-versa.
4. Use various logic gates and understand their applications.
5. Verify the Boolean algebra by the kits available in the lab.
6. Develop skills to build and troubleshoot digital circuits.
7. Design and implementation of adders and subtractors.
8. Use IC 74151 and IC 74184
9. Design and build registers and counter circuits.
10. Identify different types of flip flops and corresponding ICs.
11. Identify the analog output for a 4-bit binary input using S/H circuit and D/A converter
12. Simulate a digital circuit using the virtual laboratory Software.



Course Code:	DE03408
Course Title :	AC Machines (Lab)
Pre-requisite Course Title:	Applied Physics, DC Machines and Transformers
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:

1. Perform direct load test on alternator to determine voltage regulation
2. Perform voltage regulation of alternator by synchronous impedance method for Unity, lagging and leading power factor
3. Synchronize a given alternator with infinity bus bar- By two bright and one dark lamp method and by Synchroscope
4. Test the performance of synchronous motor at different load conditions to see the effect of variation of excitation and pf((V & inverted V curve)
5. Assemble/Disassemble a given 3 – Φ Induction motor and identify various parts
6. Measure the slip of 3-phase Induction motor by using
7. Tachometer and by Stroboscopic method
8. Perform direct load test on three phase induction motor and draw performance curves.
9. Make connections of DOL starter / star-delta starter auto transformer / rotor rheostat starter for appropriate three phase induction motor
10. Perform speed control of squirrel cage induction motor by:
 - i) By changing the supply voltage.
 - ii) By changing the applied frequency
11. Perform speed control of slip-ring induction motor by Rotor rheostat control.
12. Perform no load and block rotor test to analyze the performance of a 3 phase induction motor
13. Test ceiling fan motor for its functioning
14. Perform no load a test on single phase induction motor to measure rotational losses.
15. Perform Load test on single phase capacitor type induction motor



16. Perform a test on AC servo motor to plot speedtorque characteristics.



Course Code:	DE03409
Course Title :	Computer Programming and Basic Networking (Lab)
Pre-requisite Course Title:	Computer Fundamentals and Applications
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:

1. Write an algorithm and draw a flowchart for addition of two numbers.
2. Write an algorithm and draw a flowchart for calculating simple interest.
3. Develop a program in 'C' to display a simple message using printf() function.
4. Develop a Program in 'C' to find ASCII value of a character using input/output function.
5. Write program for solving quadratic equation using if...else statement in 'C'.
6. Write a program in 'C' to calculate the grade of a student using nested if...else statement in 'C'
7. Write a program in 'C' to Calculate sum of first 'N' natural numbers using while and do...while and for loop.
8. Write a program in 'C' to check a given number is prime or not using loop with break statement.
9. Writes a program in 'C' to find Fibonacci series using for/while/do while loop.
10. Write a program in 'C' to calculate sum of two numbers using user-defined function.
11. Write a program in 'C' using the given Library function.
12. Develop a program in 'C' to display list of values in reverse order
13. Develop a program in 'C' to perform addition of all elements of an one dimensional array
14. Establish a network to connect computing systems by using any type of topology.
15. Demonstrate the topology used in computer network.
16. Install, configure and Test Repeaters for networking
17. Install, configure and Test Routers for networking



18. Install, configure and Test Gateway for networking



Course Code:	DE03410
Course Title :	Electrical Power Generation, Transmission and Distribution (Lab)
Pre-requisite Course Title:	Basic Electronics Engineering
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:

1. Demonstrate Hydroelectric Power Plant Using an animated model.
2. Draw the line diagram of HPS and main cycles.
3. Demonstrate the Thermal Power Plant using an animated model.
4. Draw the line diagram of Thermal Power Station and main cycles.
5. Demonstrate Nuclear Power Station using an animated model.
6. Draw the line diagram of Nuclear Power Station and main cycles.
7. Prepare a load curve for the complete calendar year of your institution electrical load and analyze it.
8. Prepare a load duration curve for the above data in
9. Determine Transmission line parameters (R, L, C) using
10. a simulated transmission line model.
11. Determine voltage regulation and power transfer capability of a transmission system using simulated transmission line model.
12. Determine ABCD parameters of a given transmission line using simulated Transmission line model.
13. Collect different samples of Overhead Conductors, Underground Cables, Line supports and Line Insulators.
14. Prepare a report based on survey of the connected loads in your institute premise and find the relevant specifications of different switches, MCBs and panels and compare it with those already installed.
15. Prepare a report on distribution system of your institute.
16. Test the continuity of power cable.



Course Code:	DE03411
Course Title :	Electrical Workshop Practice – II (Lab)
Pre-requisite Course Title:	Electrical Circuit, Basic Electronics, Electrical Workshop Practice-I
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:

1. Identify types of resistors and measure their values
2. Identify types of inductors. specifications and measure their values
3. Identify types of capacitors, specifications and measure their values
4. Identify different type of control transformers and measure their primary and secondary voltage
5. Identify different type of diodes and transistors used in consumer electronics
6. Construct and test a half wave rectifier circuit.
7. Construct and test a switching circuit using transistor
8. Identify various digital IC's and test it using digital IC tester
9. Identify the various parts and trace the control circuit of a given Electrical mixer/Grinder
10. Dismantle a home emergency light and identify its major parts
11. Identify the internal and external components of a given washing machine and operate it
12. Identify the internal and external components of a given home UPS, install and operate it
13. Diagnose and repair the fault of a given faulty Emergency lamp
14. Use tools and instrument for diagnosing the fault of a given geyser
15. Diagnose the fault of a mixer grinder, replace the faulty component and operate it
16. Diagnose the fault of a faulty water purifier and replace the faulty component
17. Identify the various components of a starter panel for a single phase submersible pump
18. Construct the DOL starter with Main Switch and indication lamps for a three-phase motor



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19. Identify and repair the faulty component of a given DOL starter panel
20. Identify the various components of a starter panel for starting a given three phase synchronous motor
21. Identify the faulty component of a given faulty synchronous motor starter panel
22. Construct the Star/Delta starter with Main Switch and indication lamps for starting a given three-phase motor
23. Identify terminals, parts and connections of a given DC machine
24. Practice maintenance of carbon brushes, brush holders, commutator and sliprings
25. Practice dismantling and assembling of a given DC machine
26. Identify parts and terminals of three phase AC motors
27. Practice dismantling and assembling of a given three phase Induction motor
28. Practice maintenance service and repair of AC single phase motor



Course Code:	DE03412
Course Title :	Analog Electronics(Lab)
Pre-requisite Course Title:	Basic Electronics Engineering
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:

1. Measure the input offset voltage, input resistance, CMRR, slew rate for a given OP-AMP.
2. Test the performance of OP-AMP inverting amplifier.
3. Test the performance of OP-AMP non - inverting amplifier.
4. Test the output of scaling amplifier.
5. Test the output of Instrumentation amplifier comprising of OP-AMP.
6. Test the output of Adder and Subtractor circuit comprising of OP-AMP for the given inputs.
7. Test the output of Integrator and differentiator circuit comprising of OP-AMP for the given inputs.
8. Measure voltage gain and 3 dB frequency of Voltage series feedback transistor amplifier by plotting the frequency response.
9. Measure voltage gain and 3 dB frequency of Voltage shunt feedback transistor amplifier by plotting the frequency response.
10. Measure voltage gain and 3 dB frequency of current series feedback transistor amplifier by plotting the frequency response.
11. Measure the frequency of oscillation of the given RC phase shift oscillator.
12. Measure the frequency of oscillation of the given Wein bridge oscillator.
13. Test the performance of Hartley's oscillator.
14. Test the performance of Colpitt's oscillator.
15. Measure the frequency of oscillation of Crystal controlled Oscillator.
16. Measure the efficiency of class A amplifier.
17. Measure the efficiency of class B amplifier.
18. Measure the efficiency of class B push pull amplifier.
19. Measure the efficiency of class C amplifier.



20. Determine the duty cycle of an output waveform in 555 timers.
21. Generate square waveform for a given time delay.
22. Generate square waveform for a given time delay using 555 IC Timer.
23. Test the performance of 555 IC in mono stable mode.
24. Test the performance of 555 IC in bi stable mode.

Scheme of Teaching and Examination
Diploma in Electrical Engineering Semester – V

S. No.	Course Code	Course Titles	Scheme of Studies			
			(Hours/Week)			
			L	P	T	Credit (L+T+P/2)
1	DE03501	Power Electronics	3	-	1	4
2	DE03502	Power System Operation and Protection	3	-	1	4
3	DE03503	Instrumentation and Process Control	2	-	1	3
4	DE03504	Installation and Maintenance of Electrical Equipment	2	-	1	3
5	DE03505	Electrical and Electronics Simulation (Lab)	-	4	-	2
6	DE03506	Power Electronics (Lab)	-	2	-	1
7	DE03507	Power System Operation and Protection (Lab)	-	2	-	1
8	DE03508	Instrumentation and Process Control (Lab)	-	2	-	1
9	DE03509	Installation and Maintenance of Electrical Equipment (Lab)	-	2	-	1
10	DE03510	Industrial Training	-	2	-	1
Total			10	14	04	21

L - Lecture

P – Practical

T - Tutorial

Scheme of Teaching and Examination

Diploma in Electrical Engineering Semester – V

S. No.	Course Code	Course Titles	Scheme of Examination					
			Theory			Practical		Total Marks
			ESE	CT	TA	ESE	TA	
1	DE03501	Power Electronics	70	10	20	-	-	100
2	DE03502	Power System Operation and Protection	70	10	20	-	-	100
3	DE03503	Instrumentation and Process Control	70	10	20	-	-	100
4	DE03504	Installation and Maintenance of Electrical Equipments	70	10	20	-	-	100
5	DE03505	Electrical and Electronics Simulation (Lab)	-	-	-	35	15	50
6	DE03506	Power Electronics (Lab)	-	-	-	35	15	50
7	DE03507	Power System Operation and Protection (Lab)	-	-	-	35	15	50
8	DE03508	Instrumentation and Process Control (Lab)	-	-	-	35	15	50
9	DE03509	Installation and Maintenance of Electrical Equipments (Lab)	-	-	-	35	15	50
10	DE03510	Industrial Training	-	-	-	35	15	50
Total			280	40	80	210	90	700

ESE: End of Semester Exam,

CT: Class Test,

TA: Teachers Assessment



Course Code:	DE03501
Course Title :	Power Electronics
Pre-requisite Course Title:	Basic Electronics, Digital Electronics & Electrical Circuit
Credit:	4
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Power electronic devices

Silicon Controlled Rectifier (SCR): Construction, principle of operation, characteristic curve, two transistor analogy, Switching characteristics and triggering methods Rating and Protection: over voltage, over current, snubber circuit Series and parallel operation of SCRs: String efficiency DIAC, TRIAC: Construction, Operation, characteristic curves and applications Power BJT, MOSFET, IGBT: Construction, Operation, characteristic curves and applications, *UJT in brief*.

Unit – 2

Commutation Techniques and DC-DC Converters

Need for commutation in SCR Principle of Natural and Forced commutations (class A, class B, class D and class E) Working principle of buck, boost and buck boost converter Simple numerical on Converters: duty ratio calculation, output voltage, current, input and output power, efficiency.

Unit – 3

Phase Controlled Rectifier

Single phase half wave controlled rectifier with R, RL , RL *with freewheeling diode*, and RLE load Single phase full wave controlled rectifier (M-2 & B-2 connection) with R, RL and RLE load Effect of free-wheel diode in single phase full converter Effect of source inductance on converter performance Three-phase half wave-controlled rectifier with R and RL load.



Unit – 4

Inverter and Cycloconverter

Inverter: Working principle, types-Voltage Source Inverter, Current Source Inverter. PWM Inverters: single phase Half bridge and full bridge with R and RL load , Single phase Cyclo- converter: working principle of Midpoint and bridge Configuration with R load Step up and step down single phase Cyclo- converter and its applications, *Three phase to single phase cycloconverter, three phase to three cycloconverter.*

Unit – 5

AC Voltage Controller, UPS AND SMPS

Single phase AC voltage controller: Working principle and its applications Significance of UPS, Block diagram of UPS, SMPS: Block diagram, principle of operation, advantages and disadvantages and applications of SMPS.

Books:

1. Power Electronics Bimbhra, P. S. Khanna Publication
2. Fundamentals of Power Electronics Bhattacharya, S. K. Vikas publishing House
3. Power Electronics Chitode, J.S. Technical Publications
4. Power Electronics Gupta, B.R. ;Singhal V. Katson Books
5. Power Electronics Singh, M.D.; Khanchandani, K.B. McGraw Hill Education
6. *Power Electronics Circuits Devices and Application Rashid, Muhammad H.* Pearson Education India



Course Code:	DE03502
Course Title :	Power System Operation and Protection
Pre-requisite Course Title:	AC rotating Machines, Electrical Power Generation Transmission and Distribution
Credit:	4
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Representation of Power System

Necessity and advantages of interconnection, Single line representation of a simple power system with standard symbols. Single Phase representation of balanced three phase networks Per unit (PU system) : Introduction, representation, change of base and simple numerical. Complex power flow, Concept of torque or Load angle (δ) and Power factor angle (θ) Simplified representation of Synchronous Machines Power angle curve of a synchronous generator

Unit – 2

Power System faults and Stability

Operator a and j, Symmetrical Faults: Definition of transients in a transmission lines, Sub-transient, transient and steady state period; reactance offered, LLL and LLLG faults Definition: Short Circuit Capacity (SCC) of a bus, Simple Numerical Unsymmetrical faults : LG, LL, LLG faults and their effects Stability: Introduction, Steady state and transients stability, Stability limit Steady State stability: static and dynamic stability Transient stability : swing curve, Introduction to equal area criteria of stability and its applications Methods of improving stability, *Reliability & factors affecting reliability*.

Unit – 3

Active and Reactive power control

Introduction to active and reactive power in power system and their sources. Requirement of reactive power in power system. Effect of DC excitation on lagging and leading operation of a synchronous machine, V curve of a synchronous machine. Voltage control in power system: shunt reactor, synchronous phase modifier, shunt capacitors, series capacitors, static VAR system and related circuit diagram.



Unit – 4

Elements of Protection and Circuit Interrupting Devices

Basic elements of a protective system. Types, causes and effects of various Faults. Protection zones : Backup protection zones CT and PT: Specifications and Connection diagram (single phase and 3 phase) Current limiting reactors. *Importance of Neutral Earthing & method of neutral earthing & its advantages*, Interrupting devices: Sequence of operation and interlocking Isolators and Fuses: types, features, testing and applications Construction, working and testing of circuit breakers: Air break, Air Blast, Sulphur Hexa Fluoride (SF₆), vacuum and oil circuit breakers Auto-reclosure, Arc phenomena and extinction Resistance switching Working principle of arc quenching in HVDC circuit breaker

Unit – 5

Protective Relays and Circuit Breaker

Concept of protective relay, Protective relay: Principle of working, construction and operation of electromagnetic induction (shaded pole, watt-hour meter and induction cup), Settings Relay Types: Thermal relay, Directional relay, Distance relay (impedance, reactance and mho), Negative phase sequence relay, Static relay, Maintenance and testing of relays Various faults and abnormal operating conditions in Alternator and its protection schemes Various faults and abnormal occurring in the Motor and its protection schemes Differential Protection of Bus bars Over current, Percentage differential and restricted earth fault protection of Transformers Inrush phenomenon and over fluxing phenomenon in Transformer Buchholz Relay, analysis of trapped gases Transmission line protection scheme Protection scheme -Overload protection, Over-current and earth fault protection, Time graded and current graded protection, Current balance differential protection Carrier aided protection, Carrier inter-tripping, acceleration and blocking scheme Distance/Impedance protection, Auto reclosing Protection of parallel feeders and Ring Mains



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Books:

1. Electrical PowerSystems Ashfaq Hussain CBS Publishers & Distributors
2. Electrical PowerSystem Wadhwa C. L. New Age Int. Pub. New Delhi
3. Power System Protection and Switchgear Ram B. and Vishwakarma D.N. TMH, New Delhi, Latest edition
4. Generation and Economic Considerations Gupta J. B. S.K. Kataria & Sons
5. Transmission and Distribution of Electrical Power Gupta J. B. S.K. Kataria & Sons
6. Electrical Power-I Tarlok Singh S.K. Kataria & Sons
7. Principles of Power System Mehta V K Rohit Mehta S.Chand Publishing



Course Code:	DE03503
Course Title :	Instrumentation and Process Control
Pre-requisite Course Title:	Electrical Circuit, Electrical and Electronic Measurements
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Basic Instrumentation System and characteristics

Need of instrumentation. Block diagram of a generalized instrumentation system and their functions– Measure, sensing, signal conditioning, data transmission, display and control aspect. Characteristics of an instrumentation system: Static characteristics - Accuracy, precision, *Types of errors in transducers*, resolution, linearity, reproducibility, repeatability, threshold, dead- zone, sensitivity, drift, distortion. Dynamic characteristics - Fidelity, bandwidth, response time, time constant, settling time, *transient response in control system*.

Unit – 2

Transducers

Concepts, importance and characteristics Sensors and transducers. Classification of transducers based on: Energy – Active and passive. Technology – Mechanical, Electrical, Electronic. Stages – Primary and secondary. *Velocity, Force, Weight, Torque, Pressure, displacement, Temperature*. Construction, fundamental working principle and applications of: Bourdon tube, LVDT, Strain Gauge, Thermocouple, Resistance Temperature Detector (RTD), Thermistor, Piezoelectric, Resistive, Inductive and Capacitive, Proximity Ultrasonic *P.H. measurement*

Unit – 3

Signal conditioning and data transmission

Signal conditioning- Purpose, Elements Operational Amplifier, instrumentation Amplifier, Applications. Sample and Hold of a signal, Shannon criteria, Quantization (discretization), Quantization error Data transmission- Advantages and disadvantages of Digital Transmission over Analog. *types of conversion A/D and D/A conversion. Types of*



channel and medium Multiplexing (TDM & FDM), Demultiplexing. Optical transmission.

Unit – 4

Measurement of Non-Electrical quantities

Measurement of Temperature- using Thermocouple, RTD, Thermistor and Pyrometer. Measurement of Pressure-using Pirani Gauge, *Bellows Pressure Gauge, Bourdon Tube Pressure Gauge, Manometer Pressure Gauge* LVDT, Strain Gauge, and Capacitive Transducer. Measurement of speed – using Tachometer, Stroboscope Measurement of Flow – *using Orifice Plate, Venturi Tube, Flow Nozzle, Pitot Tube, Elbow Tap* electromagnetic pick-up, turbine flow meter. Measurement of liquid level – using capacitive transducer. Material Analysis- Measurement of pH, Humidity, types of Hygrometer. Measurement of position, object detection using proximity transducers Measurement of distance, water level and obstacle detection using ultrasonic transducer.

Unit – 5

Basic Control System

Unit step response of a system – Introduction, response for any stable and unstable system. Open loop and closed loop control system: Block diagram representation. Terminology used in feedback control system - plant output, feedback signal, reference input signal, error signal, controller, actuator (final control element), examples of commonly used actuators. Basic control actions-Proportional (P), Integral (I) and Differential (D), PID Controller. Use of sensors and transducers in feedback control system.

Books:

1. Electrical & Electronic Measurement A.K. Sawhney Dhanpat Rai & Co.
2. Transducers and Instrumentation D.V.S.Murty Prentice Hall of India,
3. Mechanical and Industrial Measurements R.K.Jain Khanna Publishers
4. Instrumentation Devices and Systems Rangan, Sharma and Mani Tata McGraw Hill,
5. Electronic Instrumentation H.S.Kalsi Tata McGraw Hill,
6. Instrument Engineers' Handbook B.G. Liptak CRC press, Volume 1,2



Course Code:	DE03504
Course Title :	Installation and Maintenance of Electrical Equipment Elements of Electrical Engineering, DC Machines and Transformers, AC Machines
Pre-requisite Course Title:	Machines
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Installation of Electrical equipment and machines

Types of heavy electrical equipment Unloading electrical equipment at site, Inspection of electrical equipment at site. Installation procedures of small and large static equipment. *Installation of rotating type machine & pole mounted transformer.*

Unit – 2

Commissioning of Electrical equipment and Machines

Commissioning procedure to be adopted for commissioning the static equipment in respect of: Mechanical installation and alignment. Commissioning procedure to be adopted for commissioning the static equipment in respect of: Electrical tests and safety precautions to be adopted before energization Commissioning procedure to be adopted for commissioning the rotating machine in respect of: Mechanical installation and alignment. Commissioning procedure to be adopted for commissioning the rotating machine.

Unit – 3

Earthing systems:

Earthing, Methods of earthing, Permissible earth resistance value for different electrical installations. Factors affecting the earth resistance, Methods for Improvement of earth resistance. Measurement of earth resistance

Unit – 4

Maintenance of Electrical Machines and Installations

Methods for drying insulation, Measurement of internal temperature of winding, Need of



vacuum impregnation Filtering process of insulating oil, Testing of insulating oil
Concepts of preventive maintenance, maintenance schedule for induction motor, DC
Motor, transformer, power Distribution line, Circuit breaker and underground cable
Tools for hot linemaintenance

Unit – 5

Trouble shooting and safety measures

Normal performance of equipment. Causes of Electrical accidents. Common faults in electrical equipment; DC Machines, AC Machines, Transformers, Power cables and electrical Installations Trouble shooting of internal and external faults; DC Machines, AC Machines, Transformers, Power cables and electrical Installations Instruments and accessories for trouble shooting. Trouble shooting charts; electrical iron, ceiling fan, wall fan, washing machine, air cooler. Treatment of shock, Different types of Fire extinguishers

Books:

1. Testing, commissioning operation and maintenance of electrical equipments Rao, S. Khanna Publication
2. Installation, commissioning and maintenance of electrical equipments Singh, Tarlok S.K. Kataria and Sons
3. Installation, maintenance and repair of electrical machines and equipments Gupta, Madhvi S.K. Kataria and Sons
4. Preventive maintenance of Electrical apparatus Sharoti, S.K. Katson Publishing House
5. Electrical workshop: Safety, commissioning, maintenance and testing of Electrical equipment Singh, R.P. I K international Publishing house Pvt. Ltd.
6. IS Standards Govt of India Bureau of Indian Standards Bharat Manak Sangralya, Bhopal



Course Code:	DE03505
Course Title :	Electrical & Electronics Simulation (Lab) Electrical Circuits, Basic Electronics, DC Machines and Transformer, Digital Electronics, Power Systems
Pre-requisite Course Title:	Machines and Transformer, Digital Electronics, Power Systems
Credit:	2
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:

1. Open the new EDA file/project and save at the given place.
2. Copy the available code/file and make the changes in the circuit by changing component values.
3. Connect one or more source and discrete components and complete the circuit in the circuit window.
4. Connect the resistors in series and parallel combination and measure the current and voltages in the circuit using simulation tool.
5. Perform node and loop analysis of the given electrical network.
6. Perform analysis of a given electrical circuit by coding a program file using operators and conditional statements
7. Simulate and test the integrator circuit.
8. Simulate and test the differentiator circuit.
9. Simulate and test the clipper and clamper circuit.
10. Simulate and test the comparator circuit for two DC input signal.
11. Simulate and test the half wave and full wave rectifier.
12. Simulate and test the astable multivibrator circuit contain the timer IC.
13. Simulate and test the bistable multivibrator circuit contain the timer IC.
14. Simulate and test voltage regulator circuit contains 7805 IC.
15. Test the functions of various logic gates.
16. Test the functions of various FF.
17. Simulate and test half adder circuit.
18. Simulate and test full adder circuit.
19. Simulate and test four-bit parallel adder circuit.



20. Develop a 4-bit parity generator circuit.
21. Simulate a Mod-10 up counter.
22. Test the functions of shift register.
23. Use program file to plot the inductance of a magnetic circuit as a function of the core permeability
24. Use program file to plot the efficiency of a given transformer as function of the load current
25. Use program file to plot the variation of speed of a given DC motor operating in constant
 - a) Torque region
 - b) Power region
26. Use program file to plot the rotor speed of a three-phase slipping induction motor with varying rotor resistance and constant load torque.
27. Use program file to plot the armature current versus field current for a synchronous motor.
28. Use program file to determine the fault current for given parameters of a three-phase power system network.
29. Develop a series R-L-C circuit and analyze the relationship of V and I waveform in under damped, critically damped and over damped condition
30. Develop a half wave controlled rectifier circuit with R load and analyze the voltage and current waveform across load.
31. Develop a half wave controlled rectifier circuit with R-L load and analyze the voltage and current waveform across load with and without freewheeling diode.
32. Develop a full wave controlled rectifier circuit with R-L load and analyze the voltage and current waveform across load.
33. Develop a type E chopper circuit and analyze output voltage and current waveform.
34. Simulate PWM circuit and observe the output for the different input modulating signals.



Books:

1. Modeling and Simulation using Matlab and Simulink Jain, Shailendra Wiley India
2. Programming in Matlab, Aproblem solving approach Mittal, Ankush Patel; R. N., Mittal Pearson EducationIndia
3. Microcontroller Experiments through Arduino Scilab & Xcos Manas Ranjan Das Shroff Publishersand Distributors
4. Electronics Devices andCircuit Theory Boylestad, Robert L. Pearson Publication, New Delhi
5. Getting Started with Arduino: The Open Source Electronics Prototyping Platform Banzi, Massimo ;Shiloh, Michael Shroff/MakerMedia



Course Code:	DE03506
Course Title :	Power Electronics (Lab)
Pre-requisite Course Title:	Basic Electronics, Digital Electronics & Electrical Circuit
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:

1. Test the performance of a given SCR and Plot the VI characteristics.
2. Test the performance of a given MOSFET and plot the output characteristics.
3. Test the performance of a given IGBT and plot the output characteristic.
4. Test the performance of TRIAC for the given AC load control.
5. Design the R and RC triggering circuit for triggering SCR.
6. Test the performance of a buck converter at different duty cycle for a given resistive load.
7. Test the performance of a buck converter at different duty cycle for a given resistive inductive load.
8. Test the performance of a boost converter at different duty cycle for a given resistive load.
9. Test the performance of a forced commutation circuit (A, B, C, D and E)
10. Build and test a triggering circuit for a single phase full wave controlled rectifier using SCR.
11. Test the performance of a half wave controlled rectifier comprising of SCR for R load.
12. Test the performance of a half wave controlled rectifier comprising of SCR for RL load.
13. Test and analyze the performance of a half wave controlled rectifier comprising of SCR for RL load with freewheeling diode.
14. Test the performance of a full wave controlled rectifier comprising of SCR for RL load and calculate the ripple factor.
15. Test the performance of a single phase half bridge VSI feeding R load.
16. Test the performance of a single phase full bridge VSI feeding RL load.



17. Measure the input to output frequency of a single phase to single phase step down cyclo-converter.
18. Measure the input to output frequency of a single phase to single phase step up cyclo-converter.
19. Measure the output load voltage of a single phase AC voltage controller using On-off control.
20. Measure the output load voltage of a single phase AC voltage controller using phase angle control for a resistive load.
21. Measure the output load voltage of a single phase AC voltage controller using phase angle control for a resistive inductive load.



Course Code:	DE03507
Course Title :	Power System Operation and Protection (Lab)
Pre-requisite Course Title:	AC rotating Machines, Electrical Power Generation Transmission and Distribution
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:

1. Determine per unit impedance of a given three phase system (Synchronous Machine) installed in your lab.
2. Prepare the Single line diagram of your institute power supply system and mention the power system parameters in p. u. values
3. Develop a simple programme to calculate the p. u. values of a given power system using MATLAB software.
4. Simulate 3 phase balanced system fault and unsymmetrical faults.
5. Demonstrate fault study with single line and double line in 3 phase system.
6. Demonstrate the LLL, LLLG and LG, LL, LLG faults.
7. Verify the theoretical calculations of power system faults and compare with practical results.
8. Simulate real and reactive power control methods using AGC of long distance transmission line (using 'Power World' simulator (open source)).
9. Simulate real and reactive power control methods using Synchronous machine Excitation Control of long distance transmission line. (Using 'Power World' simulator (open source)).
10. Determine the fusing factor of a given fusing material.
11. Identify various switchgear equipment available in the lab and write their specification and symbols.
12. Check the Polarity of Current Transformer and Potential Transformer and connect it with the relay.
13. Identify parts of various circuit breakers and their specification.
14. Dismantle a Vacuum circuit breaker.



15. Identify the various components of SF6 circuit breaker.
16. Test overload relay and plot Time-Current characteristic.
17. Use Buchholz relay for transformer protection.
18. Test thermal overload relay for protection of motor and set the relay properly.
19. Test static relay for the protection of motor.
20. Interpret the protection scheme for an alternator in power station (from Blue print and visit).
21. Interpret different protective scheme for transformer.



Course Code:	DE03508
Course Title :	Instrumentation and Process Control (Lab)
Pre-requisite Course Title:	Electrical Circuit, Electrical and Electronic Measurements
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:

1. Determine accuracy of a given measuring instrument.
2. Determine static characteristics of given instrumentation system.
3. Determine dynamic characteristics of given instrumentation system.
4. Plot the displacement versus output voltage characteristic of LVDT.
5. Measure pressure using bourdon tube.
6. Measure the strain using strain gauge.
7. Measure the temperature of a hot body using thermocouple.
8. Observe the output of an instrumentation amplifier.
9. Observe the output waveform of A/D and D/A converter.
10. Convert a given physical quantity into 4-bit digital output using ADC.
11. Measure the temperature of a water heating system using RTD.
12. Calibrate the low pressure using pirani gauge.
13. Measure the liquid level using capacitive probe.
14. Measure the frequency and observe the speed using tachometer.
15. Calibrate the humidity of an environment using hygrometer.
16. Measure the pH value of a given system using pH meter.
17. Plot time response of first order system using MATLAB/Scilab.
18. Plot the time response of second order system and determine various parameters using MATLAB/Scilab.
19. Plot unit step response of any given higher order stable system using MATLAB/Scilab.
20. Plot time response and measure various parameters for under damped, over damped and critically damped system using MATLAB/ Scilab.



Course Code:	DE03509
Course Title :	Installation and Maintenance of Electrical Equipment (Lab)
Pre-requisite Course Title:	Elements of Electrical Engineering, DC Machines and Transformers, AC Machines
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:

1. Identify the different types of Installation kits, tools, accessories and equipment.
2. Make a report for installation of static machines.
3. Make a report for installation of rotating machines.
4. Make a report for installation of pole mounted transformer.
5. Identify the different types of commissioning tools, accessories and instruments.
6. Make a report for commissioning of the given static machine.
7. Make a report for commissioning of the given rotating machine.
8. Make a report for commissioning of pole mounted transformer.
9. Prepare drawing of plate/pipe earthing.
10. Measure earth resistance of any electrical machine/ premise.
11. Measure earth resistance of an electrical substation.
12. Perform insulation test of transformer oil.
13. Prepare preventive Maintenance report of distribution transformer installed in college premise.
14. Prepare the standard operating procedure for shut down and re-energizing of a given electrical equipment to be taken up for preventive maintenance.
15. Prepare Preventive maintenance schedule of induction motors in industrial establishment.
16. Prepare maintenance schedule of 33/11 kV O.H. Lines
17. Perform preventive maintenance check for LV Air circuit
18. breaker and Vacuum circuit breaker
19. Measure insulation resistance of a given HV underground cable
20. Identify the measurement tools available for conditioning monitoring of electrical



equipment.

21. Identify the types of Firefighting equipment used for electrical fires.
22. Identify the tools and equipment used in installation and maintenance work.
23. Prepare Trouble shooting chart of the given equipment.
24. Undertake drill operation for using fire extinguishers for safety against fire.
25. Prepare a report on action to be taken when a person gets attached to a live part.



Course Code:	DE03510
Course Title :	Industrial Training
Pre-requisite Course Title:	Industrial Visit, Industrial Training and Internship
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

Major Dimensions / Aspects of Industrial Visit

- 1) Layout of different Departments, Sections of Industry, stores, entry and exit etc.
- 2) Display of Quotations in the Industry
 - a) Systems of Industry
 - b) Procedures/Rules/standards
 - c) Hierarchy at Industries
 - d) Products & Services
 - e) Targets
 - f) Safety Precautions/Norms
 - g) Flow diagrams of different process
 - h) Other Aspects
- 3) Demonstration of Specific Equipment, not available in the Institute or Department or even the Demonstration of Performance of Specific Experiment.
- 4) Demonstration of latest Engineering Tools or Techniques or Software's or Procedures

Scheme of Teaching and Examination

Diploma in Electrical Engineering Semester – VI

S. No	Course Code	Course Titles	Scheme of Studies (Hours/ Week)			
			L	P	T	Credit (L+T+P/2)
1.	DE03601	Utilization of Electrical Energy and Traction	3	-	1	4
2.	DE03602	Wind and Solar Power Technology	3	-	1	4
3.	DE03603	Entrepreneurship Development and Management	2		1	3
4.	Elective (Any One)		2	-	1	3
	DE03604	Industrial Automation				
	DE03605	Energy Conservation & Energy Audit				
5.	DE03606	Utilization of Electrical Energy and Traction (Lab)	-	2	-	1
6.	DE03607	Wind and Solar Power Technology (Lab)	-	2	-	1
7.	Elective (Any One)		-	2	-	1
	DE03608	Industrial Automation (Lab)				
	DE03609	Energy Conservation & Energy Audit (Lab)				
8.	DE03610	Major Project	-	3	-	2
Total			10	09	04	19

L - Lecture

P – Practical

T - Tutorial

Scheme of Teaching and Examination

Diploma in Electrical Engineering Semester – VI

S. No	Course Code	Course Titles	Scheme of Examination					
			Theory			Practical		Total Marks
			ESE	CT	TA	ESE	TA	
1.	DE03601	Utilization of Electrical Energy and Traction	70	10	20	-	-	100
2.	DE03602	Wind and Solar Power Technology	70	10	20	-	-	100
3.	DE03603	Entrepreneurship Development and Management	70	10	20	-	-	100
4	Elective (Any One)		70	10	20	-	-	100
	DE03604	Industrial Automation						
	DE03605	Energy Conservation & Energy Audit						
5.	DE03606	Utilization of Electrical Energy and Traction (Lab)	-	-	-	35	15	50
6.	DE03607	Wind and Solar Power Technology (Lab)	-	-	-	35	15	50
7.	Elective (Any One)		-	-	-	35	15	50
	DE03608	Industrial Automation (Lab)						
	DE03609	Energy Conservation & Energy Audit (Lab)						
8.	DE03610	Major Project	-	-	-	70	30	100
			280	40	80	175	75	650

ESE: End of Semester Exam,

CT: Class Test,

TA: Teachers Assessment



Course Code:	DE03601
Course Title :	Utilization of Electrical Energy and Traction
Pre-requisite Course Title:	Power Electronics, DC machines and Transformers, A.C. Rotating Machines
Credit:	4
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Electrical Drives

Types of electrical drive Motors used for electrical drives; DC series, shunt and separately excited motors, Induction Motor Selection of Electrical motors. Torque / speed and torque / current characteristics of DC series, shunt and separately excited motors, characteristics of three phase induction motors. Heating and Cooling of electrical motors – Heating and cooling curves, insulating materials. Size and rating of motors- standard ratings of motors, *Duty cycle*, classes of duty, ambient temperature and ratings, ambient temperature and ratings, motors used for different types of applications, temperature rise with short time ratings. Types of load: Classification of loads with respect to time, classification of loads with respect to duty cycles. Enclosures for rotating electrical machines.

Unit – 2

Electric Heating and Welding

Advantages of Electrical heating. Essential Requirements of a good heating element, materials of heating element, causes of failure of heating element, *Method of transfer of heat*, Methods of electric heating – resistance heating, arc heating, high frequency heating, induction heating, dielectric heating. Types of resistance welding, choice of welding time, electric arc welding, Types of welding electrodes, Welding transformers and rectifiers.

Unit – 3

Illumination

Introduction: Terms used in illumination, laws of illumination. Types of sources of illumination -Electric arc, incandescent, gaseous discharge, fluorescent. Arc lamps,



incandescent lamps, laser, LED, neon, Tungsten-Halogen and Sodium Vapour lamps, Fluorescent lamps. Types of lighting schemes: direct, semi direct, Semi-indirect, Indirect lighting and general lighting schemes. General ideas about street lighting, factory lighting and flood lighting.

Unit – 4

Electric Traction Drives

Overview of electrical traction system in India, Choice of traction system in India, Requirements of ideal traction system, advantages and disadvantages of electric traction System of track electrification – DC system, single phase AC system, three phase AC system, Composite system Special mechanical and electrical features of traction motors, current collectors Traction motors: DC series, Three phase induction motors Types of electric braking: Plugging, Rheostat or Dynamic braking, Regenerative braking.

Unit – 5

Other Aspects of Electric Traction

Types of service- Main line services, Urban services, suburban services. Speed-time and speed distance curves for main line service, suburban service and urban and city service. Basic definitions: Crest speed, average speed, schedule speed, *schedule time, average speed*, Factors affecting the schedule speed of a train. Factors affecting the schedule speed of a train, Simplified trapezoidal and quadrilateral speed time curves, Tractive effort. Specific energy consumption, dead weight, accelerating weight, adhesive weight, coefficient of adhesion, advantages and disadvantages of regenerative braking, *Need & type of maintenance, maintenance record.*

Books–

1. Art and Science of Utilization of Electrical Energy H. Partap Dhanpat Rai & Sons, Delhi
2. Utilization of Electrical Power and Electric Traction J. B. Gupta S.K. Kataria and Sons, 2000.
3. A Text Book. of Electrical Power S.L. Uppal Khanna Publications, Delhi
4. Modern Electric Traction H. Partap Dhanpat Rai & Sons, Delhi
5. Generation, Distribution and Utilization of Electrical Power C. L. Wadhwa New Age



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International Publications, New Delhi

6. Generation and Utilization of Electrical Energy M. Balasubba Reddy, D. Srilatha, S. Sivanagaraju Pearson Publications
7. Utilization of Electrical Power R. K. Rajput Laxmi Publication(P)Ltd. New Delhi
8. Utilisation of Electric Power: Including Electric Drives and Electric Traction. N.V, Suryanarayana New Age International Publication.



Course Code:	DE03602
Course Title :	Wind and solar Power Technology
Pre-requisite Course Title:	AC Machines, Power Electronics
Credit:	4
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Renewable Energy Sources

Various sources of Energy – Conventional and Non- conventional. Importance of Non-Conventional Energy Sources. Energy Chain – Energy Flow block diagram from primary energy source to final energy consumption via electrical and non- electrical route. Advantages and disadvantages of conventional energy sources, Green Power- Definition and advantages.

Unit – 2

Wind Energy

Wind Energy – Introduction Factors effecting the distribution of wind energy on the surface of earth, Variation of wind speed with height-existing formula and related plot Estimation of wind energy at a site – Power in wind, empirical formula, Wind speed duration curve, Power versus wind speed characteristics. Capacity Factor of a Wind power plant – Definition and formula. Selection of Site for a Wind Power Plant- Factors effecting wind power generation, important features. Important terms and definitions used in wind power plants – Blade, Chord, Wind Velocities, Angle of attack, Pitch angle (Blade setting angle), drag force, Lift force, Solidity.

Unit – 3

Wind Power Generation

Introduction- block diagram of wind energy conversion systems (WECS). Wind Turbines – Types. Horizontal Axis Wind Turbine (HAWT). Types of Rotors-single or multiple blades, Teetering of Rotor, Upwind and downwind machines. Yaw Control and Pitch control of Rotor. Vertical Axis Wind Turbine (VAWT). Rotors-types & construction in brief. HAWT versus VAWT -Advantages and disadvantages Speed Control strategies for wind turbines - Yaw and tilt control, pitch control and stall control. Power speed



characteristics in various speed region Generators Suitable for Wind Power Generation- DC, Synchronous and Induction generators, advantages and disadvantages. Fixed speed drive scheme – power output versus wind speed characteristics Variable speed drive scheme – Variable speed drive using power electronics, Scherbius Variable speed drive – block diagram, Variable speed direct drive – advantages and disadvantages. System integration – Effect of wind speed and grid condition. Wind energy storage – Major problems and remedies Environmental aspects of wind power

Unit – 4

PV cell

PV cell characteristics and its equivalent circuit. Types of material used for PV cells Data sheet of PV cell with emphasis on short circuit current, open circuit voltage, peak power, cell efficiency parameters. Effect of temperature on PV cell. Connection of Identical and non-identical PV cells in series. Connection of Identical and non-identical PV cells in parallel., Protecting series and parallel connected PV cells, Interconnection of modules in series and parallel

Unit – 5

SOLAR ENERGY

Solar energy : storage system, Application of solar energy: solar water heating, space heating and cooling, solar photovoltaic, solar cooking, solar distillation & desalination , Solar industrial process heating, Solar power generation. Solar Green Houses, Solar thermo mechanical power, solar refrigeration & air conditioning, Solar ponds.

Books–

1. Non-Conventional Energy Resources B H Khan Mc Graw Hill Education (India) Pvt. Ltd.
2. Non-Conventional Energy Sources G D Rai Khanna Publication
3. Non-conventional sources of Energy (Hindi) V K Jain Deepak Prakashan
4. Non-Conventional Energy Sources and Utilisation R K Rajput S.Chand and company Pvt.Ltd. ISBN:9788121939713
5. Wind Energy Siraj Ahmed PHI Learning, New Delhi



6. Wind Power Plants and Project Development Earnest, Joshua and Wizelius Tore
PHI Learning, New Delhi, 2015 ISBN: 978-8120351271
7. Wind Power Technology Earnest Joshua PHI Learning, New Delhi, 2015 ISBN:
9788120347786
8. Wind Energy Basics Gipe, Paul Chelsea Green Publishing
9. Wind and Solar Power Systems: Design, Analysis, and Operation Mukund R. Patel
CRC Press ISBN9780849315701
10. ENERGY SWARAJ: My Experiments with Solar Truth. Solanki, Chetan Singh
NOTION PRESS, 2019 ISBN: 9781646509454
11. Solar Photovoltaic Technology and Systems: A Manual for Technicians, Trainers
and Engineers Solanki, Chetan Singh PHI Learning, New Delhi, 2015 ISBN:
9788120347113
12. Solar Photovoltaic's: Fundamentals, Technologies and Applications Solanki,
Chetan Singh PHI
13. Solar Electric Handbook: Photovoltaic Fundamentals and Applications Boxwell
Michael Media Bundle, Greenstream Publishing ISBN -1256701661
14. Technology of Solar Brahmpal Bhardwaj Engineers India Research Institute ISBN:
9789380772547
15. Solar Photovoltaics: A Lab training Manual Chetan S Solanki, Brij M. Aro ra,
Juzer Vasi, Mahesh B Patil Cambridge University Press India Ltd.



Course Code:	DE03603
Course Title :	Entrepreneurship Development and Management
Pre-requisite Course Title:	
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Entrepreneurial Development

Definition of Entrepreneurship, Characteristics of Entrepreneurship, Factor influencing Entrepreneurship. Need for promotion of Entrepreneurship, Entrepreneurial Environmental, Environmental analysis, opportunity in service industries.

Unit – 2

Motivation Management

Motives, motivation and motivational cycle. Concept of Need for Achievement. Need for Achievement assessment through various tools. Ring toss game, Boat making exercise, Building block exercise, TAT stories, Who am I? Interpretation and action plan for self-development.

Unit – 3

Management of Creativity.

Creativity: Divergent thinking, creativity techniques. Innovation, types and applications Product life cycle, New product development process. Product development and innovation through creativity and innovation.

Unit – 4

Critical Resources

Forms of business organization: Proprietorship, Partnership, Cooperative, Private, Public Ltd Company, Section 8 company, LLP Institutional Support for entrepreneurship: MSMESI, CED, DTIC, CITCON, CSIDC, LUN, NSIC, KVIC, NABARD, Banks, SIDBI Entrepreneurship promotion schemes of centre and state. Marketing Mix, Market survey for project identification Inventory control, vendor development, material movement,



store management. Manpower plan, hiring process, compensation, performance appraisal.

Unit – 5

Sustainable business plan

Format of business plan/techno-economic feasibility report. Demand and annual production target based on market survey. Outline production/service process. Land, building and machinery requirement. Power, utilities and raw material requirement. Fixed capital, Working capital, Subsidy and Cost of Project. Means of finance, calculation of interest. Profitability analysis, Break-even point.

Project

Project selection and formulation, Scope of project report, Content and format of project report, Need of project appraisal, Steps of project appraisal.

Books–

1. Entrepreneurial Development Desai Vasant Himalaya Publishing House
2. Starting your own business, step by step Blue print for the First – time Entrepreneur Harper Stephen C. Mc Craw-Hill
3. The Business Planning GUIDE H.Bangs David Upstart Publishing Company in Chicago
4. Entrepreneurship Development in India Gupta Dr.C.B. Shrinivasa NP Sultan Chand & Sons
5. Entrepreneurship Development Khanka Dr.S.S. S.Chand New Delhi
6. Entrepreneurship Development and small Business Enterprises Charantimath M. Pearson Edu.Soc.INDIA
7. Entrepreneurship Development Sharma Sangita PHI, DELHI



Course Code:	DE03604
Course Title :	Industrial Automation DC Machines and Transformers, AC
Pre-requisite Course Title:	Rotating Machines, Digital Electronics and Basic Programming Skills
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Industrial Automation and Robotics

Definition of industrial automation, block diagram, working of each building block
Types of Automation: fixed, programmable, flexible, hard and soft automation. Benefits, limitations and applications of automation.

Unit – 2

Basics of PLC

Definition, Block diagram, Parts of PLC, Principles of Operation, functions of various blocks, I/O modules: analog & digital, I/O Specifications PLC scan cycle. Advantages & Applications of PLC.

Unit – 3

PLC programming

Programming basics, Program Scan, port addressing PLC Programming languages – , Instruction list, , Structured text Functional Block diagram, Ladder logic and sequential function chart Basics of ladder logic - rung, rails, Programming execution, If Closed and If Open Instructions, normally open and normally close operation Ladder logic and diagram, relay logic Arithmetic instructions: addition, subtraction, multiplication. Programming Timer –On, Off and reset Programming Counter-Up, down Develop ladder logic for various simple applications.

Unit – 4

Installation and Troubleshooting of PLC

PLC enclosures, electrical noise, Leaky inputs and outputs, grounding, voltage variations



and surges Common Preventive Maintenance procedure and troubleshooting steps of PLC Interfacing of Programmable Logic Controller *with other hardware like drives and sensor.*

Unit – 5

Supervisory Control and Data Acquisition System (SCADA)

SCADA: Introduction, need benefits and typical applications of SCADA, SCADA Architecture - Remote Terminal Units (RTUs), Master Terminal Units, Various SCADA editors, Communication protocols for SCADA Interfacing SCADA system with PLC- Typical connection diagram, Object Linking and Embedding for Process Control(OPC) architecture Creating SCADA Screen for simple object, Steps for Linking SCADA object with PLC ladder program using OPC, Configuring simple applications using SCADA.

Books–

1. Introduction to Programmable Logic controllers Gary Dunning Delmar Cengage Learning
2. Programmable Logic Controllers Frank D. Petruzella Tata Mc Graw Hill publications, New Delhi
3. PLCs & SCADA: Theory and Practice Rajesh Mehra and Vikrant Vij Laxmi Publications, New Delhi
4. Programmable Logic Controllers W. Bolton Elsevier
5. Programmable Logic Controllers Principles and applications 2. Webb John W. and Reis A. Ronald PHI ,New Delhi,
6. Programmable Logic Controllers John R Hackworth Pearson education, New Delhi
7. Programmable Logic Controllers and Industrial Automation an Introduction Mitra, Madhuchanda; Gupta, Samarjit Sen Param International Publishing (India) Pvt. Ltd., New Delhi,
8. Programmable logic controllers: principles and Applications Webb, John W.; Reis, Ronald A. PHI Learning Pvt. Ltd. New Delhi,
9. SCADA: Supervisory Control and Data Acquisition Stuart A Boyer International Society of Automation
10. PLC & SCADA: Theory and Practice Rajesh Mehta, Vikrant Vij Lakshmi Publications



Course Code:	DE03605
Course Title :	Energy Conservation & Energy Audit Electrical Circuit, DC Machines and Transformers, AC rotating Machines
Pre-requisite Course Title:	
Credit:	3
Max. ESE Marks: 70	Min. Marks : 28

Unit – 1

Energy conservation measures and Management

Current energy scenario in India: Demand supply gap, need of electrical energy conservation. Review of various sources of renewable and non-renewable sources of energy. Concept of energy management and its objectives. Difference between energy management, energy conservation, energy audit and energy efficiency. Role of Bureau of Energy Efficiency(BEE) and Government Organizations such as NPC, MNRE, BEE, MEDA in energy conservation. Functions of Energy rating: Star labeling of equipment. Features of energy conservation act 2001 Energy Units and Conservations Payback period, Internal Rate of Return, *depreciation*, Depreciation Role of ESCO Difference between ESCO and EPC

Unit – 2

Energy Conservation in Power System

Power factor, Causes and effects of low power factor, power factor improvement and its Importance, Methods of improvement(Numerical on above) Most economical power factor, Selection and location of power factor correcting equipment Assessment of Transmission and Distribution (T&D) losses in power system: Technical and commercial Demand- Side management (DSM): objectives, methodology Energy conservation equipment : Maximum Demand Controller kVAR Controller Automatic Power Factor controller. Introduction to Availability Based Tariffs (ABT), Recent Chhattisgarh State Power Distribution Company Limited (CSPDCL) tariffs for different consumers. (Simple Numerical on above topic)



Unit – 3

Energy conservation in lighting system

Fundamental illumination, nature of light, Recommended Luminance levels Procedure for assessing existing lighting system in a facility. Energy conservation techniques in lighting system. By replacing Lamp sources. Using energy efficient luminaries Using light controlled gears by using the advance technology, By installation of separate Transformer / servo stabilizer for lighting. Periodic survey and adequate maintenance programs. Lighting maintenance. Centralized Control Equipment (Microcontroller based). Occupancy sensors/Motion Detectors, Control gears: Dimmers, Regulators and Stabilizers. Principle of simple photo meter different photo metal heads.

Unit – 4

Energy conservation in electrical motors and Transformers

Need and significance of energy conservation in motors and transformers. Difference between energy efficient and standard motors. Energy conservation techniques in Induction motor, the work horse of the industry: By improving Power quality. By motor survey. By matching motor. By minimizing the idle and redundant running of motor. By operating in star mode. By rewinding of motor. By improving mechanical power and transmission efficiency Function of Energy conservation equipment related to electrical motors: Soft starter: For induction motors, Power Factor Controller, Static capacitor, Automatic star delta starter Variable Frequency Drives. Energy efficient transformer, its features amorphous transformer; epoxy Resin cast transformer/ Dry type of transformer

Unit – 5

Energy Audit

Electricity act 2003 (statement) IE rules and regulations for energy audit. Energy Flow Diagram and its significance. Energy audit instruments and their use. Questionnaires for the energy audit. ABC analysis. Internal energy audit checklist. Procedure of Energy audit (walkthrough audit and detailed energy audit) Simple payback period and return on investment Examples on small Energy conservation projects. (Numerical). Instruments for Audit - basic role and usage guidelines for instruments like digital multi-meter, tong tester, Lux meter, power analyzer , flow meters, thermal imager, temperature indicators,



digital pressure meter etc

Books–

1. Fundamentals of electrical system www.bee-india.com Bureau of Energy Efficiency
2. Guide Books no. 1 and 3 for National Certification Examination for Energy Managers and Energy Auditors (Fourth Edition 2015) (BEE) Bureau of Energy Efficiency (A Statutory body under Ministry of Power, Government of India)
3. Energy Technology O.P. Gupta Khanna Publishing House, New Delhi
4. Efficient Use and Management of Electricity in Industry Desai, B. G.; Rana, J. S.; A. Dinesh, V.; Paraman, R Devki Energy Consultancy Pvt. Ltd.
5. Principles of Power System Mehta, V. K S. Chand & Co. New Delhi
6. Energy Management Singh, Sanjeev; Rathore, Umesh S K Kataria & Sons, New Delhi
7. Energy management Paul O'Callaghan McGraw Hill, New Delhi
8. Energy Management and K. V. Sharma, P. I K International Conservation Venkateshaiah Publishing House Pvt. Ltd;
9. Energy Management, Audit and Conservation Barun Kumar Vrinda Publications P Ltd.;
10. Energy Engineering And Management Chakrabarti, Aman e-books Kindle Edition
11. India - The Energy Sector P. H. Henderson University Press, Delhi
12. Energy Management Handbook W. C. Turner Fairmount Press
13. Utilization Generation & Conservation Of Electrical Energy Sunil S. Rao Khanna Publishers (2007)



Course Code:	DE03606
Course Title :	Utilization of Electrical Energy and Traction (Lab)
Pre-requisite Course Title:	Power Electronics, DC machines and Transformers, A.C. Rotating Machines
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:-

1. Identify the different drives used in material handling system.
2. Determine Torque / speed and Torque / current characteristics of DC motor.
3. Determine Torque / speed and Torque / current characteristics of three phase induction motor.
4. Test the temperature rise and the steady state value for a given motor for under rated loading condition.
5. Compare the various types of supply required for different types of welding.
6. Investigate the various electronic circuits used in welding.
7. Draw the characteristics of a welding generator.
8. Draw the basic circuit for electric arc furnace showing the arrangements of OCBs, control panels, CTs through relays, furnace transformer and arrangement of electrode movement.
9. Draw automatic illumination control circuits using LDR's
10. Measure intensity of light with lux-meter for various types of illuminating lamps.
11. Draw the circuit diagram of a lighting of a two wheeler.
12. Draw the circuit diagram of a lighting of a four wheeler.
13. Investigate the various Electric drives used in traction system in Indian railways.
14. Draw the layout of D.C locomotive and Diesel locomotive.
15. Draw the power diagram of A.C locomotive and its equipment.
16. Determine the energy saving by series and parallel control of D.C motors.
17. Calculate tractive power and energy consumption for a basic electric traction system.
18. Calculate the energy recovered during regenerative braking.



Course Code:	DE03607
Course Title :	Wind and Solar Technology (Lab)
Pre-requisite Course Title:	AC Machines, Power Electronics
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:-

1. Make a list of various non-conventional energy sources with its specifications, available in lab and explain its working using suitable diagram.
2. Enlist applications of various non- conventional energy sources available in lab.
3. List the various parts of a small wind power training system.
4. Dismantle the given small wind turbine and write the name of different parts.
5. Assemble an already dismantled wind turbine and check its proper working.
6. Identify the power electronic devices and circuits in the small wind turbine.
7. Test functioning of the power electronic devices used in given wind turbine.
8. Perform minor repairs of given wind power plant.
9. Draw the plot of generated power versus wind speed for a small wind power trainer.
10. Measure the I-V and P-V characteristics of a given PV module.
11. Experimentally investigate short circuit current, OC voltage, fill factor, maximum power and efficiency of given PV module.
12. Measure the I-V characteristics of two PV modules connected in
 - 1) Series 2). Parallel
13. Measure the solar irradiance level of a given locality for a given time duration using pyranometer.
14. Determine the maximum power generated by a PV module placed on a horizontal flat surface.
15. Verify the healthiness of a battery for a PV application.
16. Connect a given solar module, solar battery, charge controller and inverter to a given and measure the Electrical parameters under normal solar insolation
17. Connect a given solar module, solar battery, charge controller and inverter to a given and measure the Electrical parameters under partial shading condition.



Course Code:	DE03608
Course Title :	Industrial Automation (Lab)
Pre-requisite Course Title:	DC Machines and X-mer, AC Machines, Digital Electronics and Programming
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:-

1. Identify the various building blocks of a simple given automation system and its function.
2. Identify the important components of a simple given robotic system and its function.
3. Identify the various parts and front panel status indicators of the given PLC.
4. Identify different input and output devices that can be connected to a given PLC.
5. Test the analog input and output lines of the given PLC.
6. Test the digital input and output lines of the given PLC.
7. Use PLC to test the START STOP logic for two inputs and one output system.
8. Use PLC to control the following devices: lamp, motor, push button switches, proximity sensor.
9. Develop/Execute ladder diagram for different arithmetic operations.
10. Develop/Execute ladder diagram of AND, OR, NOT, NAND, NOR, X-OR, X-NOR gate along with truth table.
11. Check the UP/DOWN COUNTER operation of the given PLC.
12. Check the on, off and reset delay timer simple operation of the given PLC.
13. Develop/test ladder program to put LED/lamp in the blinking mode.
14. Develop ladder program for traffic light control system.
15. Develop / test ladder program for rotating stepper motor in forward and reverse direction at constant speed.
16. Develop /test ladder program for tank water level control.
17. Test the ground connections of the given PLC.
18. Interface the given PLC with a PC and a Laptop
19. Test the given parameters of SCADA.



20. Set up a SCADA configuration.

Course Code:	DE03609
Course Title :	Energy Conservation & Energy Audit (Lab)
Pre-requisite Course Title:	Electrical Circuit, DC Machines and Transformers, AC rotating Machines
Credit:	1
Max. ESE Marks: 35	Min. Marks : 14

List of Practical:-

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. Visit the web site of BEE and MEDA /CREDA and collect the information on energy conservation activities.
4. Conduct an interview with the energy manager regarding energy conservation.
5. Analyze the case study of energy conservation in generation by solar, wind, bio energy, cogeneration and fuel cell technology or any recent technology of generation estimating payback period also.
6. Collect the energy bills of various electrical consumers and prepare a report on reduction of electricity bill.
7. Visit to Automatic power factor correction unit in industrial/commercial utility understand it's working.
8. Estimate electrical energy saving by improving power factor and load factor for a given case study in terms of savings in units and cost.
9. Collect information by market survey and prepare report on rating, luminous output, cost, list of manufacturers of various types of energy efficient luminaries (FTL, CFL, LED, Sodium Vapour, HPMV etc.)
10. Case study on the energy conservation measures taken in street lighting.
11. Determine the reduction in power consumption by replacement of FAN and regulators in class room/laboratory.



12. Compare the power consumption of different types of Tube-light with choke, electronic ballast and LED lamps by direct measurement.
13. Case study on the energy conservation techniques implemented in electrical motors.
14. Determine the power saving in star mode operation of Induction motor compared to delta mode.
15. Determine the ‘% loading’ along with the related efficiency for different loads of given Induction motor.
16. Control speed of a 3 phase induction motor using VFD.
17. Analyze the specifications of a energy efficient motor.
18. Prepare a sample energy audit report of your workshop/ lab, by using various energy audit instruments.
19. Prepare a sample energy audit questionnaire for a educational institute, administer it and prepare a report.
20. Visit to any one organization such as Hospitals, public library or any commercial building, prepare, administer and analyze questionnaire for implementation energy conservation program.



Course Code:	DE03610
Course Title :	Major Project
Pre-requisite Course Title:	
Credit:	1
Max. ESE Marks: 100	Min. Marks : 40

Identification of project and allocation methodology: Though the teachers and students, both are involved in identification of project titles, but the prime responsibility of identification of project titles goes to the teachers involved in implementing the course or programme. Teachers are fully aware of course/programme curriculum. They are also aware of related industrial problems. They try to explore the possibility of identification of project titles through these problems.

These small industrial problems in the form of project titles may be brought into the laboratories or workshop of institutions of a specific programme, which are equipped with all necessary facilities and resources to carry out the project work. These labs or workshop can function as miniature industry to solve the industrial problems in the form of simulated industrial projects. These projects may be integrated problem of courses or programme. The project identified may be application type, product type, Research type and review type.

Criteria for Identification and Implementation of Project Titles: Identification of project title is planned to be done based on many considerations like: Cost effectiveness, Safety considerations. Ethical issues, Environmental considerations, improvised process, Improvised equipment, simulated industry's problem, Application or utility in the world of work.

Implementation and Evaluation of Project Work: Once the identification of project titles and guide allocation process is over, quality of student's project, on different criteria including the report writing need to be continually monitored. Projects planning, design, execution and report writing is done by the students under the guidance and feedback by respective teachers for attainment of courses.



Continual Monitoring, feedback and assessment mechanism on weekly progress/updates on action taken on different criteria and sub-criteria of the project work need to be planned for individual and team of students. Path breaking teachers who think out of the box are required to guide, monitor and evaluate the project work.

For objective, valid and reliable assessment, teachers should use different tools of assessment such as checklist, rating scale, assessment rubric, observation schedule, portfolio assessment, incidental records etc. Even the students may be encouraged to adopt self-assessment techniques using the assessment rubrics.

Criteria of Evaluation of Project: The different criteria of evaluation of project under different sub heads of project work completion are given below:

Project Planning: Project planning, its action plan, steps of realizing the projects, may be specifically planned in advance based on feasibility, resources available, time allocation, finance and manpower requirement for each and every step or activity of project work.

Under project planning, many points need to be considered like - Selection of relevant industry based projects as per the requirement of curriculum, Objectives Set, Literature survey, Literature survey on the project title need to be done through abstract, journals, websites, open sources and other relevant sources available

It need to be ensured that objectives are written properly with clear specific, measurable and attainable statements. The sample size has to be delimited and decided as per the time limit allotted, feasibility and many other considerations.

Objectives formulated will decide the further course of action, depth and breadth of the project and implementation plan.

Design, Development and Execution of Project: Following important characteristic features of project are needed to be given special emphasis during the implementation of the project work- Innovativeness, Creativity, Originality, Pro-activeness, Initiativeness, Cost Effectiveness, Resourcefulness, Development of soft skills/generic skills. There may be deviation from planning, design and implementation of the project as per the



requirement.

Quality of Report Writing: Following points need to be taken care of for report writing- Report writing as per prescribed format, Clarity of Objectives, Presentation of Data, Data Analysis, Interpretation and Result, Quality of Product.

Presentation & Discussion: Quality of presentation of data need to be ensured using the following criteria - Clarity in Communication and Presentation, Voice Audibility, Use of Media and methods, Satisfying the queries of audience, Attainment of objectives set.

Project's Potential: Futuristic scope and recommendation for further studies related to project may be assessed from the following criteria - Papers published or award received, Exhibition or Display or showcase of project in competition or exhibition or Tech Fest, Evaluation of working of projects or prototype, Relevance and Applications in the world of work, Recognition in any form, Related areas/sub areas for further studies. The students need to be assessed, continuously based on the assessment rubric prepared by the implementing teachers on different stages of project work completion.