



## SEMESTER -1

Subject Code	Subject	Hrs. /Week			Exam Hrs.	Maximum Marks				
		L	T	P		MS1	MS2	IA	Th.	Total
<b>Personality Development Programme for First 15<sup>th</sup> Days</b>										
<b>THEORY</b>										
1D01	English & Communication Skills	2	0	0	3	10	10	20	60	100
1D02	Applied Chemistry-I	3	1	0	3	10	10	20	60	100
1D03	Applied Physics-I	3	1	0	3	10	10	20	60	100
1D04	Applied Mathematics-I	4	1	0	3	10	10	20	60	100
1D05	Computer Fundamental & Information Technology	3	1	0	3	10	10	20	60	100
Code	Subject	Hrs. /Week			Exam Hrs.	IA (60%)		EA (40%)	Total	
		L	T	P		MP1 (30%)	MP2 (30%)			
1D06	Applied Chemistry Lab-I	0	0	2	2	30	30	40	100	
1D07	Applied Physics Lab-I	0	0	2	2	30	30	40	100	
1D08	Computer Fundamental & IT Lab I	0	0	2	2	30	30	40	100	
1D09	Engineering Drawing	0	0	3	3	30	30	40	100	
1D10	Workshop Practice – I	0	0	3	3	30	30	40	100	
<b>TOTAL</b>		<b>15</b>	<b>04</b>	<b>12</b>					<b>1000</b>	

## SEMESTER -2

Subject Code	Subject	Hrs. /Week			Exam Hrs.	Maximum Marks				
		L	T	P		MS1	MS2	IA	Th.	Total
<b>THEORY</b>										
2D01	Applied Chemistry-II	3	1	0	3	10	10	20	60	100
2D02	Applied Physics-II	3	1	0	3	10	10	20	60	100
2D03	Applied Mathematics-II	4	1	0	3	10	10	20	60	100
2D04	Electrical & Electronics Technology	3	1	0	3	10	10	20	60	100
2D05	Applied Mechanics	3	1	0	3	10	10	20	60	100
Code	Subject	Hrs. /Week			Exam Hrs.	IA (60%)		EA (40%)	Total	
		L	T	P		MP1 (30%)	MP2 (30%)			
2D06	Applied Chemistry Lab-II	0	0	2	2	30	30	40	100	
2D07	Applied Physics Lab-II	0	0	2	2	30	30	40	100	
2D08	Electrical & Electronics Workshop	0	0	2	2	30	30	40	100	
2D09	Workshop Practices-II	0	0	2	3	30	30	40	100	
2D10	Computer Fundamental & IT Lab-II	0	0	2	2	30	30	40	100	
	<b>TOTAL</b>	<b>16</b>	<b>05</b>	<b>10</b>					<b>1000</b>	

**SEMESTER III**

Code	Subject	Hrs. /Week			Exam Hrs.	Maximum Marks				
		L	T	P		MS1	MS2	IA	Th.	Total
<b>THEORY</b>										
3DEE01	Basic Electronics	3	1	0	3	10	10	20	60	100
3DEE02	Basic electrical Engineering	3	1	0	3	10	10	20	60	100
3DEE03	Electrical design & drawing	3	1	0	3	10	10	20	60	100
3DEE04	Estimating ,costing & design of electrical installations	3	1	0	3	10	10	20	60	100
3DEE05	Power system-1	3	1	0	3	10	10	20	60	100
Code	Subject	Hrs. /Week			Exam Hrs.	IA(60%)		EA(60%)	Total	
		L	T	P		MP1 (30%)	MP2 (30%)			
3DEE06	Basic Electronic Lab	0	0	2	3	30	30	40	100	
3DEE07	Basic Electrical Engineering lab	0	0	2	3	30	30	40	100	
3DEE08	Electrical design & drawing lab	0	0	2	3	30	30	40	100	
3DEE09	Estimating ,costing & design of electrical installations lab	0	0	2	3	30	30	40	100	
3DEE10	Power system design lab	0	0	2	3	30	30	40	100	
<b>GRAND TOTAL</b>		<b>15</b>	<b>05</b>	<b>10</b>					<b>1000</b>	

**SEMESTER IV**

Code	Subject	Hrs. /Week			Exam Hrs.	Maximum Marks				
		L	T	P		MS1	MS2	IA	Th.	Total
<b>THEORY</b>										
4DEE01	Electrical Machine -1	3	1	0	3	10	10	20	60	100
4DEE02	Electrical circuit theory	3	1	0	3	10	10	20	60	100
4DEE03	Electrical workshop	3	1	0	3	10	10	20	60	100
4DEE04	Basic mechanical engineering	3	1	0	3	10	10	20	60	100
4DEE05	Microprocessor & C-Programming	3	1	0	3	10	10	20	60	100
Code	Subject	Hrs. /Week			Exam Hrs.	IA(60%)		EA(40%)	Total	
		L	T	P		MP1 (30%)	MP2 (30%)			
4DEE06	Electrical Machine –I lab	0	0	2	3	30	30	40	100	
4DEE07	Mechanical engineering lab	0	0	2	3	30	30	40	100	
4DEE08	Electrical workshop lab	0	0	2	3	30	30	40	100	
4DEE09	Microprocessor & C-programming lab	0	0	2	3	30	30	40	100	
4DEE10	Technical Seminar	0	0	0	3				100	
	<b>GRAND TOTAL</b>	<b>15</b>	<b>5</b>	<b>8</b>					<b>1000</b>	

**Industrial Training** - After examination of 4<sup>th</sup> Semester, the students shall go for training in a relevant industry/field organization for a minimum period of 6 weeks and shall prepare a diary. It shall be evaluated during 5<sup>th</sup> semester by his/her teacher. The students shall also prepare a report at the end of training and shall present it in a seminar, which will be evaluated. This evaluation will be done by HOD and lecturer in charge – training in the presence of one representative from training organizations

**SEMESTER V**

Code	Subject	Hrs. /Week			Exam Hrs.	Maximum Marks				
		L	T	P		MS1	MS2	IA	Th.	Total
<b>THEORY</b>										
5DEE01	Electrical Machine-II	3	1	0	3	10	10	20	60	100
5DEE02	Power Electronics & drives	3	1	0	3	10	10	20	60	100
5DEE03	Power system-II	3	1	0	3	10	10	20	60	100
5DEE04	Electrical Measurement & instrumentation	3	1	0	3	10	10	20	60	100
5DEE05	Management	3	1	0	3	10	10	20	60	100
Code	Subject	Hrs. /Week			Exam Hrs.	IA (60%)		EA(40%)	Total	
		L	T	P		MP1 (30%)	MP2 (30%)			
5DEE06	Electrical Machine –II lab	0	0	2	3	30	30	40	100	
5DEE07	Power Electronics & drives Lab	0	0	2	3	30	30	40	100	
5DEE08	Power Ssystem Lab - (SIMUALATION BASED)	0	0	2	3	30	30	40	100	
5DEE09	Electrical Measurement & instrumentation LAB	0	0	2	3	30	30	40	100	
5DEE10	Practical Training	0	0	2	3				100	
<b>GRAND TOTAL</b>		<b>15</b>	<b>5</b>	<b>10</b>					<b>1000</b>	

**SEMESTER VI**

Code	Subject	Hrs. /Week			Exam Hrs.	Maximum Marks				
		L	T	P		MS1	MS2	IA	Th.	Total
<b>THEORY</b>										
6DEE01	Power Systems-III	3	1	0	3	10	10	20	60	100
6DEE02	Utilization of electrical power & traction	3	1	0	3	10	10	20	60	100
6DEE03	Fundamentals of control system	3	1	0	3	10	10	20	60	100
6DEE04	Switchgear & protection	3	1	0	3	10	10	20	60	100
6DEE05	Energy Management	3	1	0	3	10	10	20	60	100
Code	Subject	Hrs. /Week			Exam Hrs.	IA (60%)		EA(40%)	Total	
		L	T	P		MP1 (30%)	MP2 (30%)			
6DEE06	Switch Gear & Protection Lab	0	0	2	3	30	30	40	100	
6DEE07	Analog Electronics Lab.	0	0	2	3	30	30	40	100	
6DEE08	Control System Lab	0	0	2	3	30	30	40	100	
6DEE09	Project								200	
	<b>GRAND TOTAL</b>	<b>15</b>	<b>5</b>	<b>6</b>					<b>1000</b>	

# Semester-I

## 1D01: English Communication & Skills-I

**Objective:** English communication encompasses written, oral, visual and digital communication within a workplace context. This discipline blends together pedagogical principles of [rhetoric](#), technology, and software to improve communication in a variety of settings ranging from technical writing to [usability](#) and digital media design.

Unit	Topic	35hrs
Unit – I	Narration, Voice, Basic Sentence Patterns. (Nine basic sentence patterns) Tenses, Common errors (Noun, Pronoun, Articles, Adverb, Punctuation, Preposition etc.) Transformation of Sentences, Determiners, Preposition	<u>5</u>
Unit – II	Modals in Conversational Usage, Prefix, Suffix, Idioms & Phrasal verbs : <b>Modals</b> Can, Could, Should, Will, Would, May, Might, Must, Need not, Dare not, Ought to, Used to. <b>Phrases</b> At all; Instead of; In Spite of; As well as; Set up; Upset; Look up; Call off; Call out; Come across; Set right; Look other. <b>Idioms</b> Work up (excite); Break down; Stand up for; Turn down; Pass away; Pass on; Back up; Back out; Carry out; Done for (ruined); Bring about; Go through; Ran over; Look up (improve); Pick out (selected).	<u>8</u>
Unit – III	Composition - . Unseen Passage, Précis Writing Letter Writing : Letter to the editor of a magazine, newspaper, business letters, letters to relatives, friends, government officers. Report Writing Paragraph Writing, Essay Writing - Essays on general and local topics related to environmental problems	<u>6</u>
Unit – IV	<b>Listening:</b> For improving listening skills the following steps are recommended, Listen to Pre-recorded Tapes, Reproduce Vocally what has been heard, Reproduce in Written form. Summarize the text heard, Suggest Substitution of Words and Sentences, Answer Questions related to the taped text, Summaries in Writing <b>Vocabulary:</b> Synonyms. Homonyms. Antonyms and Homophones, Words often confused, as for example, I-me; your-yours; its-it's; comprehensible-comprehensive; complement-compliment] Context-based meanings of the words, for example, man[N] man[vb]; step[[N], step[vb] conflict _____ Israel Palestinian conflict Emotional conflict, Ideas conflict learn _____ learn at this school I learnt from the morning news <b>Group Discussion :</b>	<u>8</u>

	Developing skill to initiate a discussion [How to open] Snatching initiative from others [Watch for weak points, etc.]	
<b>Unit – V</b>	<p><b>Speaking:</b> Introducing English consonant-sounds and vowel-sounds., Remedial exercises where necessary, Knowing Word stress, Shifting word stress in poly-syllabic words [ For pronunciation practice read aloud a Para or page regularly while others monitor]</p> <p><b>Delivering Short Discourses:</b> About one self Describing a Place, Person, Object Describing a Picture, Photo.</p> <p><b>Expand a topic-sentence into 4-5 sentence narrative.</b></p> <p><b>Note :</b></p> <ol style="list-style-type: none"> <li>1. The Medium of teaching and examination will be English.</li> <li>2. The Question on Essay Writing (Unit-7) will be compulsory. The student will have to attempt one essay out of two, touching the given points on general/ local topic related to environmental problems.</li> <li>3. At least on question will be set from each unit.</li> <li>4. No theory question will be set from syllabus of practicals.</li> </ol>	<u>8</u>
	<p><b>Text Books :</b></p> <ol style="list-style-type: none"> <li>1. Intermediate English Grammar Raymond Murphy, Pub: Foundation Books, New Delhi</li> <li>2. Eng. Grammar, usage &amp; Composition Tickoo &amp; Subramanian Pub: S.Chand and Co.</li> <li>3. Living Eng. Structure Stannard Alien. Pub: Longman</li> <li>4. A Practical Eng. Grammar Thomson and Martinet. (and its Exercise Books) Pub : ELBS</li> <li>5. High School English Grammar Wren &amp; Martin. and Composition</li> </ol> <p><b>Reference Book :</b></p> <ol style="list-style-type: none"> <li>1. Communicative Skills for Engineers and Scientists by Sangita Sharma and Binod Sharma, New Delhi : Pearson.</li> <li>2. English for Engineers by Abidi &amp; Ritu, New Delhi : Cengage Learning.</li> </ol>	

### 1D02: Applied Chemistry-I

<b>Objective</b>	<b>Chemistry</b> is the <u>science</u> of <u>matter</u> , especially its <u>chemical reactions</u> , but also its composition, structure and properties. Chemistry is concerned with atoms and their interactions with other atoms, and particularly with the properties of <u>chemical bonds</u> .	
	<b>Topic</b>	<b>38 Hours</b>
<b>Unit – I</b>	<p><b>Atomic Structure:</b> Constituents of the Atom, Bohr's Model of the Atom, Quantum Number and Electronic Energy Levels , Aufbau's Principle, Pauli's Exclusion Principle, Hund's Rule, <math>n + l</math> Rule ,Electronic Configuration of Elements ( s,p,d Block Elements)</p> <p><b>Development of Periodic Table:</b> Modern Periodic Law, Long form of Periodic Table. Study of Periodicity in Physical and Chemical Properties with, special reference to Atomic and Ionic Radii, Ionisation, Potential. Electron Affinity. Electro negativity. Variation of Effective Nuclear Charge in a Period. Metallic Character.</p>	<u>8</u>



<b>Unit – II</b>	<b>Electro Chemistry:</b> Ionization, Degree of Ionization, Factors which Influence Degree of Ionization . Hydrolysis – Degree of Hydrolysis, Hydrolysis Constant., pH Value, Buffer Solution Electrolysis, Faraday's Laws of Electrolysis	<b>8</b>
<b>Unit – III</b>	<b>Kinetic Theory of Gases:</b> Postulates of kinetic Theory, Ideal Gas Equation, Pressure and Volume Corrections, Vender. Walls Equations, Liquefaction of Gases, Critical Pressure and Critical Temperature, for Liquefaction., Liquefaction of Gases by Joule – Thomson Effect, Claude's Method and Linde's Method <b>Carbon Chemistry:</b> Definition of Organic Chemistry. Difference between Organic and Inorganic Compounds. Classification and Nomenclature - Open Chain and Closed Chain Compounds, IUPAC System of Nomenclature. (upto C5).	<b>8</b>
<b>Unit – IV</b>	<b>Metals and Alloys:</b> General Principles and Terms listed in Metallurgy, Metallurgy of Iron and Steel, Different forms of Iron, Effect of Impurities on Iron and Steel 6.5 Effect of Alloying Elements in Steel <b>Pollution:</b> Water Pollution, Causes and Effects, Treatment of Industrial Water Discharges - Screening, Skimming and Sedimentation Tanks, Coagulation, Reductions, Chlorination, Biological Methods. Air Pollution Causes and Effects Control Methods – Electrostatic Precipitator, Scrubbers, Gravitational Setting Methods, by Plants. Awareness on	<b>8</b>
<b>Unit – V</b>	<b>Water:</b> Sources of Water, Hardness of Water., Degree of Hardness, Estimation of Hardness by EDTA method, Problems on Calculation of Hardness, Disadvantages of Hardness, Softening Methods, Lime-Soda Method, Permutite Method, Ion -Exchange Method Problems on Softening of Water, Drinking Water, its Requisites, Purification and Sterilization of Water.	<b>6</b>
	<b>Text Books:</b> 1.Engineering Chemistry II (Hindi) Mathur and Agarwal 2. Chemistry of Engineering Materials C.V. Agarwal 3. Engineering Chemistry P.C. Jain and Monika 4. Chemistry M.M. Uppal 5.Applied Chemistry (Hndi) V.P.Mehta Jain Bros. Jodhpur  <b>Reference Books:</b> 1 Instrumental methods of Chemical analysis, MERITT & WILLARD ( EAST – WEST press) 2 Physical Chemistry , P.W Atkin ( ELBS, OXFORD Press) 3 Physical Chemistry W.J.Moore ( Orient Longman )	

### 1D03: Applied Physics-I

**Objective:** [physics](#) employs [mathematical models](#) and [abstractions](#) of physics to rationalize, explain and predict natural [phenomena](#). This is in contrast to [experimental physics](#), which uses experimental tools to probe these phenomena.

<b>Unit</b>	<b>Topic</b>	<b>36 Hours</b>
<b>Unit – I</b>	<b>Units and Dimensions :</b> Idea of various systems of units, SI units Basic, Supplementary and Derived Units, Prefixes & Symbols, Dimensions and Dimensional Formulae, Principle of Homogeneity of Dimensions, Dimensional Analysis, Applications and Limitations <b>Elasticity :</b> Elasticity, Stress and Strain, Elastic Limit & Hooke's law, Young's Modulus, Bulk Modules & Modulus of Rigidity, Poisson's Ratio	<b>8</b>
<b>Unit – II</b>	<b>Properties of Liquids:</b> Surface Tension & Surface Energy, Cohesive & Adhesive Force, Angle of Contact, Capillarity & Expression for Surface Tension , Streamline & Turbulent Flow, Reynold	

	Number, Viscosity & Coefficient of Viscosity. Stoke's law & Terminal Velocity	<u>8</u>
<b>Unit – III</b>	<b>Sound Waves:</b> Velocity of Sound Waves: Newton's Formula, Laplace Correction, Factors affecting Velocity of Sound Waves Propagation of Progressive Wave, Displacement, Velocity and Acceleration of a particle during propagation of wave Superposition of Waves: Stationary Waves (without mathematical analysis) Resonance tube	<u>8</u>
<b>Unit – IV</b>	<b>Gravitation &amp; Satellites:</b> Newton's law of Gravitation, Acceleration due to Gravity Kepler's laws of Planetary Motion (statement only), Artificial Satellite (simple idea), Geo-Stationary Satellites, Escape Velocity, Velocity & Time Period of an Artificial Satellite. <b>Transfer of Heat:</b> Modes of Transmission of Heat - Idea of Conduction, Convection & Radiation, Thermal Conductivity & Coefficient of Thermal Conductivity Black Body, Kirchoff's Laws & Stefan Boltzmann Law (statement only), Newton's Law of Cooling & its Derivation from Stefan's Law	<u>6</u>
<b>Unit – V</b>	<b>Electrostatics:</b> Coulomb's Law, Intensity of Electric Field, Intensity due to a Point Charge, Electric Lines of Forces & Electric Flux, Electric Potential, Electric Potential due to a Point Charge <b>D.C. Circuits :</b> Resistivity, Effect of Temperature on Resistance, Ohm's Law, Resistance in Series and Parallel and their Combination Kirchoff's Law Wheatstone Bridge Meter Bridge Principle of Potentiometer	<u>6</u>
	<b>Suggested Text Books:</b> 1. Engineering Physics Gaur & Gupta (hindi) 2. Applied Physics Vol.-I Hari Harlal, NITTTR 3. Applied Physics Vol.-II Hari Harlal, NITTTR 4. Modern Engineering Physics – A.S. Vasudeva (S. Chand) 5. Solid State Physics : Kittel <b>Suggested Reference Book:</b> 1 Solid State Physics: S. O. Pillai, Wiley Eastern Ltd. 2. Physics Vol-I & II – Resnick & Halliday (Wiley Eastern) 3. A Text Book of Optics – Brij Lal & Subramanyam	

### 1D04: Applied Mathematics-I

**Objective:** We can use of [abstraction](#) and [logical reasoning](#), mathematics developed from [counting](#), [calculation](#), [measurement](#), and the systematic study of the [shapes](#) and [motions](#) of physical objects. Practical mathematics has been a human activity for as far back as [written records](#) exist.

Unit	Topic	35 Hours
Unit – I	<b>Matrices and Determinants:</b> Definition and Properties of Determinants, Definition and Types of Matrix, Transpose of a Matrix, Symmetric, Skew Symmetric Matrices, Orthogonal matrices, Hermitian and Skew Hermitian, Minors and Cofactors, Adjoint and Inverse of a Matrix, Cramer's Rule, Solution of Simultaneous Linear Equations by Inverse Matrix Method, Characteristic Matrix, Characteristic Equation, Eigen Values & Vectors, Cayley Hamilton Theorem ( verification only )	6
Unit – II	<b>Trigonometry:</b> Allied Angle( $\sin(180 \pm A)$ , $\sin(90 \pm A)$ etc., Sum and Difference Formula (without proof) and their	6

	Application, Product Formula and C-D Formula, T-Ratios of Multiple and Sub-Multiple Angles (2A, 3A, A/2), Solution of Trigonometric Equations : $\sin X = 0$ , $\tan X = 0$ , $\cos X = 0$ , $\sin X=A$ , $\cos X =A$ & $\tan x = A$	
Unit – III	<b>Introduction to Different Types of Expansion:</b> Factorial Notation, Meaning of C(n, r), P(n, r), Binomial Theorem for Positive Index, any Index, Exponential Theorem, Logarithm Theorem <b>Complex Number:</b> Definition of Complex Number, Operations on Complex Number ( Add., Sub ,Multiplication, Division), Conjugate Complex Number, Modulus and Amplitude of a Complex Number, Polar form of a Complex Number	8
Unit – IV	<b>Two Dimensional Coordinate Geometry:</b> General Introduction, Distance Formula and Ratio Formula ,Co-ordinate of Centroid, In-Centre, Ortho-Centre and Ex-Centre of a Triangle, Area of Triangle, Straight Line, Slope form, Intercept form, Perpendicular form, One Point Slope form, Two Point form & General form, Angle between Two Lines Perpendicular Distance of a Line from a Point	7
Unit-V	<b>Conic: Circle :</b> Definition and Standard Equations, Equations of Tangent and Normal at a Point (simple problems ) <b>Parabola :</b> Definition and Standard Equations, Equations of Tangent and Normal at a Point (Simple problems ) <b>Ellipse and Hyperbola :</b> Definition and Standard Equations, Equations of Tangent and Normal at a Point(simple problems )	8
	<b>Text Books:</b> 1. Mathematics XI & XII NCERT, New Delhi 2. Mathematics XI & XII Rajasthan Board, Ajmer(Hindi) 3. Polytechnic Mathematics H. K. Dass 4. Text Book on Differential Calculus Chandrika Prasad  <b>Reference Books:</b> 1:Advanced Engineering Mathematics, Erwin Kreyszig, Wiley 9th Edition. 2:Higher Engineering Mathematics, B.V.Ramana, Tata McGraw Hill. 3: Thomas Calculus, Maurice D. Weir, Joel Hass and others, Pearson, 11th Edition.	

### 1D05: Computer Fundamental & Information Technology

**Objective:** Computer programming (often shortened to programming or coding) is the process of [designing](#), writing, [testing](#), [debugging](#), and maintaining the [source code](#) of [computer programs](#). This source code is written in one or more [programming languages](#).

Unit	Topic	40 Hours
Unit – I	<b>Introduction:</b> Computer: An Introduction, Generation of Computers & Types : PC, PC/XT, PC/AT, Main Frame, Super, LapTop, Pam Top, Central Processing Unit (CPU) Memory Unit, Input/ Out Devices : Keyboard, Mouse (Optical), Digitizer, Scanner, Web Camera, Monitor (CRT, TFT) , Printers, Plotters, Bar Code Reader, Secondary Storage Devices : Floppy, Hard Disk, CD, DVD, Flash, Drive, Block Diagram Showing Interconnection of Computer Parts, <b>Data Representation:</b> Bit, Nibble, Byte, Word, <b>Number System :</b> Decimal, Binary, Hexadecimal & their Conversions, Arithmetic Operations (Addition, Subtraction using Binary Number System) 1s , 2s Compliment, Coding Technique : BCD, EBCDIC, ASCII ,Idea of: Hardware ,Software,	8

	Firmware, Free ware, Human ware, Computer Languages and Translators Machine, Assembly, High Level Language, Scripting Language, Object Oriented Language, Platform Independent Language, Translators: Assembler, Interpreter, Compiler	
<b>Unit – II</b>	<b>Operating System :</b> Definition of Operating System (OS), Types of OS, Single user, Multi user, Multi Programming, Time Sharing, Multi Processing, <b>Introduction to Windows XP:</b> Introduction to Windows Environment, Parts of Windows Screen, Icon, Menu, Start Menu, Minimizing , Maximizing , Closing Windows, Windows Explorer, Recycle Bin, Clipboard, My Computer, My Network Places Control Panel : Adding New Hardware and Software, Display, Font, Multimedia, Mouse, International System Accessories: Paint, Media Player, Scan disk, System Information.	<b>8</b>
<b>Unit – III</b>	<b>Information Concepts and Processing:</b> Definition of Data, Information, Need of Information, Quality of Information, Concepts of Data Security, Privacy, Protection, Computer Virus and their types, Scanning & Removing Virus <b>Computer and Communication:</b> Need of Data Transmission, Data Transmission Media, Baud rate and Bandwidth, Digital and Analog Transmission Serial and Parallel Data Transfer, Protocols, MODEM. Networking of Computers : LAN, WAN, MAN, Blue tooth 6.6 LAN Topologies: Bus, Star, Ring, Hybrid Introduction to Ports : RS232, IEEE 488, PS2, USB, UTP	<b>8</b>
<b>Unit – IV</b>	<b>Information Processing:</b> Word processor, Introduction to MS-Word, Starting MS-Word Special Features of MS-Word, Using Help, Opening Document, Typing and Editing, Copying, Inserting, Moving, Deleting, Copying from One Document to Others , Undo, Redo, Spell Check, Find and Replace, Formatting, Characters and Fonts ,Spacing Removing Characters Formatting, Inserting Symbols, Paragraphs, Page Setting, Header and Footer, Page Breaks, Borders and Shading, Print Preview and Printing, Tables and Columns, Mail Merge. Auto Text and Auto correct, Introduction to Macro, Electronic Spread Sheet, Introduction to MS-Excel, Working with Spread Sheet, Editing the Worksheet, Worksheet Formatting, Formula Entering, Function Wizard, Saving and Printing Work Book, Analysis Tools <b>Data Tools</b> Charts Linking Work Sheets, Report Wizard, Data Base Application, Data Base Components, Working with Database, Creating Excel Database, Adding Records using Data Form, Deleting Records using Menu Command, Deleting Records using Data Form, Editing Records, Finding Records based on Criteria	<b>8</b>
<b>Unit – V</b>	<b>Internet:</b> Introduction to Internet, Bridges, Routers, Switch, Gate way, www, Web Site, URL, e-mail, e-Commerce, Web browsing, Web page, Introduction to Hyper text & HTML, Introduction to http & ftp Protocol. <b>Power Point:</b> Introduction to Power Point, Creating a Presentation/Slide, Adding Animation in Slide, Running a Slide Show	<b>8</b>
	<b>Suggested Text Books:</b> 1. Computer Fundamental V.K. Jain, Standard Pub.& Distributors 2. PC Software for Windows made simple R.K. Taxali, TMH 3. Mastering Windows XP TMH 4. BPB Computer Course BPB Editorial Board, 5.1. Computer Fundamental V.K. Jain, (hindi Edition) <b>Suggested Reference Books:</b> 1. Introduction to Networking NANCE, PHI 2. First Course in Computer Science Sanjeev Saxena, Vikas Publishing House First Look Microsoft Office 2003 Murray, Phi 3. Web Based Application Development Ivan Beyross, TMHusing HTML, DHTML, Java script Perl/ CGI	
<b>1D06: Applied Chemistry Lab-I</b>		
<b>Objective:</b> Develop the ability of students to carry out experiments, collect and interpret data, and critically report results through		

"hands-on" laboratory experiences.	
	<b>List of Experiments</b>
	<ol style="list-style-type: none"> <li>1. Identification of Acid and Basic Radicals in a Salt (Total Numbers = 5)</li> <li>2. Analysis of a Mixture Containing Two Salts (Not Containing Interfacing Radicals). (Total Numbers = 5)</li> <li>3. Determination of Percentage Purity of an Acid by Titration With Standard Acid.</li> <li>4. Determination of Percentage Purity of a Base by Titration With Standard Alkali Solution.</li> <li>5. Determination of the Strength of Ferrous Sulphate using Standard Ferrous Ammonium Sulphate and Potassium Dichromate as Intermediate Solution</li> <li>6. Determination of the Strength of Farrous Sulfate Solution using Standard</li> <li>7. Solution of Thiosulphate. To determine the strength of NaOH and Na<sub>2</sub>CO<sub>3</sub> in a given alkali mixture</li> <li>8. Estimation of percentage of iron in plain carbon steel.</li> <li>9. To find the eutectic point for a two component system by using method of cooling curve.</li> <li>10. Determine the reaction rate constant for the 1st order reaction</li> </ol>
<b>Text Books:</b>	
<ol style="list-style-type: none"> <li>1. Engineering Chemistry , Mathur and Aggarwal</li> <li>2. A text Book of Engineering Chemistry , S.K. Jain &amp; K.D. Gupta</li> </ol>	
<b>Reference Books:</b>	
1. Practical Chemistry For Engineers , Dr. Renu Gupta & Dr. Sapna Dubey	
<b>1D07: Applied Physics Lab-I</b>	
<b>Objective:</b> : An experiment or test can be carried out using the <a href="#">scientific method</a> to answer a question or investigate a problem. he results are analyzed, a <a href="#">conclusion</a> is drawn, sometimes a theory is formed, and results are communicated through <a href="#">research papers</a> .	
	<b>List of Experiments</b>
	<ol style="list-style-type: none"> <li>1. To Measure Internal Dia, External Dia and Depth of a Calorimeter using Vernier Callipers.</li> <li>2. To Measure Density of a Wire using Screwgauge</li> <li>3. To Measure Radius of Curvature of a Lens, Mirror using Spherometer.</li> <li>4. To Determine Refractive Index of Glass using Prism.</li> <li>5. To Determine the Refractive Index of Glass using Travelling Microscope</li> <li>6. To Determine Focal Length of a Convex Lens by Displacement Method.</li> <li>7. To Determine the Velocity of Sound at 0oc using Resonance Tube.</li> <li>8. To Determine Young's Modulus of Elasticity using Searle's Apparatus.</li> <li>9. To Determine Acceleration due to Gravity using simple pendulum.</li> <li>10. To verify Newton's law of cooling.</li> </ol>
<b>Text Book:</b>	
<ol style="list-style-type: none"> <li>1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH)</li> <li>2. Practical Physics – S.L. Gupta &amp; V. Kumar (PragatiPrakashan).</li> </ol>	
<b>Reference Books:</b>	
1.. Advanced Practical Physics Vol.I& II – Chauhan & Singh (PragatiPrakashan)	
<b>1D08: Computer Fundamental &amp; IT Lab- I</b>	
<b>Objective:</b> The choice of language used is subject to many considerations, such as company policy, suitability to task, availability of third-party packages, or individual preference. Ideally, the programming language best suited for the task at	

hand will be selected.

	<b>List of Experiments</b>	
	<ol style="list-style-type: none"><li>1. Study of Computer Components</li><li>2. Practice of Computer Booting Process in XP</li><li>3. Demonstration of Windows Environment</li><li>4. Practice of using My Computer, Windows Explorer</li><li>5. Practice of using Control Panel</li><li>6. Practice of My Network Places</li><li>7. Practice of CD and DVD Writing</li><li>8. Practice of Paint</li><li>9. Installation of Windows XP by using NTFS File System.</li><li>10. Demonstration of Network</li></ol>	
	<p><b>Suggested Text Books:</b></p> <ol style="list-style-type: none"><li>1. Yadav DS, Foundations of IT, New Age, Delhi.</li><li>2. Curtin, Information Technology: Breaking News, Tata Mo Grew Hill.</li></ol> <p><b>Suggested Reference Books:</b></p> <ol style="list-style-type: none"><li>1. Nelson, Data Compression, BPB.</li></ol>	

## 1D09: Engineering Drawing

**Objective:** In order to produce a good product, a neat drawing is a must. Therefore students must be well acquainted with the knowledge of Engineering drawing. Engineering drawing is the universal language of engineers and student must be made familiar with all the relevant aspect topics of machine drawing.

<b>List of Experiments</b>	
	<p><b>1. Preparation of following on Imperial Size Drawing Sheet :-</b></p> <p>1.1 Lines, Letters and Scales  1.2 Geometrical Constructions and Engineering Curves.  1.3 Projection of Lines  1.4 Projection of Planes  1.5 Projection of Solids  1.6 Orthographic Projections of Simple objects  1.7 Section and Development of Surfaces of Solids  i.e. Cone, Cylinder, Sphere etc.  1.8 Section and Development of Surfaces of Prism and Pyramids  1.9 Isometric Projections  1.10 Riveted Joints.  1.11 Screw Threads and Fasteners  1.12 Pulleys  1.13 Couplings  1.14 Bearing  1.15 Building Drawing</p> <p><b>2. Preparation of following Drawings in Sketch Book (Home Assignment)</b></p> <p>2.1 Lettering (On Graph Sheet)  2.2 Projection of Points In Different Quadrants  2.3 Isometric Projection of Various Planes  2.4 Various Types of Rivet Heads  2.5 Section and Conventions  2.6 Set Screws  2.7 Machine Screws  2.8 Foundation Bolts, Keys</p>
	<p><b>Text Books:</b></p> <p>1. Engineering Drawing N D Bhatt  2. Machine Drawing N D Bhatt  3. Engineering Graphics V. Laxmi Narayan  4. Machine Drawing V. Laxmi Narayan  5. Engineering Drawing P S Gill  6. Machine Drawing M L Mathur</p> <p><b>Reference Books:</b></p> <p>1. A Text Book of Machine Drawing Laxmi Narayana and Mathur, M/s. Jain Brothers, New Delhi.</p>

**2D10: Workshop Practice – I**

**Objective:** This subject is designed to give basic knowledge of carpentry shop , fitting shop , welding shop & sheet metal shop with practical experer

**List of Experiments****Carpentry Shop**

1. Preparation of Cross-Half Lap Joint.
2. Preparation of Dovetail Joint
3. Preparation of Bridle Joint
4. Preparation of Mortise and Tenon Joint
5. Preparation of Mitre Joint
6. Demonstration of Job on Wooden Polishing Work

**Welding**

7. Preparation of a Butt Joint by Gas Welding.
8. Preparation of Lap Joint by Electric arc Welding.
9. Preparation of T-Joint by Electric arc Welding.
10. Demonstration on Brazing by the Instructor.
11. Demonstration on Soldering.
12. Demonstration on Gas Cutting.

**Suggested Text Books :**

1. Workshop Technology Gupta & Malani
2. Workshop Technology Kumar & Mittal
3. Workshop Technology Hajra, Chaudhary

**Suggested Reference Books:**

- 1 Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.



## Semester-II

**2D01:** Applied Chemistry-II

(Cr, L:T:P:-3,3:1:0)

**Objective:** The reactions & synthesis procedures of materials like water analysis, chemical kinetics, corrosion and basic chemistry (IUPAC) behind them will makes interesting the topic & improve the research ability with their wide ideas.

Unit	Topic	40Hours
Unit – I	<b>Fuels:</b> Definition, Classification, Calorific Value (HCV and LCV) and Numerical Problems on Calorific Value, Combustion of Fuels, Numerical Problems on Combustion <b>Solid Fuels:</b> Coal and Coke <b>Liquid Fuels:</b> Petroleum and its Distillation Cracking, Octane and Cetane Values of Liquid Fuels Synthetic Petrol, Power Alcohol Bio-Gas, Nuclear Fuels – Introduction to Fission and Fusion Reactions.	<u>8</u>
Unit – II	<b>Corrosion:</b> Definition <b>Theories of Corrosion:</b> Acid Theory (Rusting) , Direct Chemical Corrosion or Dry Corrosion, Wet Corrosion or Electro-Chemical Corrosion(Galvanic and Concentration Cell Corrosion) Various Methods for Protection from Corrosion	<u>8</u>
Unit – III	<b>Polymers:</b> Definition <b>Plastics:</b> Classification, Constituents, Preparation, Properties and Uses of Polythene, Bakelite Terylene and Nylon. <b>Rubber:</b> Natural Rubber, Vulcanisation ,Synthetic Rubbers - Buna - N, Buna-S, Butyl and Neoprene	<u>8</u>
Unit – IV	<b>Cement and Glass:</b> Manufacturing of Portland Cement, Chemistry of Setting and Hardening of Cement, Glass : Preparation, Varieties and Uses. <b>Lubricants:</b> Definition, Classification Properties of Lubricants : Viscosity, Oiliness, Flash Point, Fire Point, Acid Value, Saponification, Emulsification, Cloud and Pour Point.,Artificial Lubricants	<u>8</u>
Unit-V	<b>Miscellaneous Materials:</b> Refractories : Definition, Classification and Properties Abrasives : Natural and Synthetic Abrasives, Paint and Varnish : Definition and Function of Constituents, Soap and Detergents : Definition, Properties and Uses <b>15. New Engineering Materials: (Brief Idea of Following )</b> Superconductors, Organic Electronic Materials Fullerenes Optical Fibres	<u>8</u>

**Text Books** 1. Practical Chemistry for Engineers Virendra Singh (Hindi)

2. Hand book of Technical Analysis Bannerji Jain Bros.Jodhpur

3. Engineering Chemistry-I(Hindi) Mathur & Agrawal.

4.. Inorganic Chemistry Shivhare & Lavania

**Suggested Reference Books:**

1 Engineering Chemistry, Jain & Jain, Dhanpat Rai

**2D02: Applied Physics-II**

**Objective:** [physics](#) is combined with problem solving and engineering skills, which then has broad applications. Career paths for Engineering physics is usually (broadly) "engineering, applied science or applied physics through research, teaching or entrepreneurial engineering".

Unit	Topics	38 Hours
Unit – I	<b>A.C. Circuits:</b> Faraday's Laws of Electro Magnetic Induction, Lenz's Law Self and Mutual Inductance Alternating Current, Phase & Phase Difference, Instantaneous, Average and rms value of AC, Behaviour of Resistance, Capacitance and Inductance in an AC Circuit, AC Circuits Containing, R-L, R-C and LCR in Series, Power in AC Circuit and Power Factor, Choke Coil	<u>8</u>
Unit – II	<b>Semi Conductor Physics:</b> Energy Bands in Conductor, Semi Conductor & Insulator, Chemical Bonds in Semiconductor, Intrinsic and Extrinsic Semiconductors, PN-Junction Diode, Working, Biasing and Characteristics Curves, Zener Diode and Voltage Regulation using it, Half Wave & Full Wave Rectifiers (only working, no derivations), Junction Transistors, Working, Biasing and Characteristic Curves, Brief Idea of Using Transistors as an Amplifier (without mathematical analysis)	<u>10</u>
Unit – III	<b>Modern Physics:</b> Photo Electric Effect, Einstein's Equation, Photo Cells, <b>Lasers:</b> Stimulated Emission and Population Inversion, Types of Laser - Helium Neon and Ruby Laser, Application of Lasers (brief idea only), Material Processing, Lasers in Communication Medical Applications	<u>8</u>
Unit – IV	<b>Nuclear Physics:</b> Idea of Nuclear Force, Mass - Defect and Binding Energy, Nuclear Reactions, Natural and Artificial Radioactivity, Law of Radioactive Disintegration Half Life & Mean Life, Idea of Nuclear Fission and Fusion. Chain Reaction, Nuclear Reactor	<u>8</u>
Unit -V	<b>Pollution and its control:</b> Introduction to Pollution – Water, Air, Soil, Noise, Nuclear and mental pollution, Types of Pollution, Brief idea about Noise Pollution and its Control, Nuclear Hazards, Nuclear Waste Management	<u>4</u>

**Suggested Text :**

1. A Text Book of Applied Physics N.S. Kumar (Hindi)
2. Principles of Physics Brijlal, Subhramanyam
3. Applied Physics Vol.-II Hari Harlal, NITTTR

**Reference Books:**

- 1 A Text Book of Applied Physics N.S. Kumar
- 2 Principles of Physics Brijlal, Subhramanyam

**2D03: Applied Mathematics-II**

**Objective:** Engineering mathematics is a branch of [mathematics](#) that concerns itself with [mathematical methods](#) that are typically used in science, engineering, business, and industry. Thus, "applied mathematics" is a [mathematical science](#) with specialized knowledge.

Unit	Topics	40 Hours
Unit – I	<b>Limits:</b> Concept of Limit, L.H.L., R.H.L., Limit of Standard Functions , Concept of Continuity and Differentiability at a Point (simple Problems) <b>Function:</b> Definition of Function, Range and Domain of Function, Types of Function, Absolute Value Function, Exponential value Function, Identity Function, Reciprocal Function, Rational and Irrational Function, Increasing and decreasing Function	<u>8</u>
Unit – II	<b>Differential Calculus :</b> Standard Formulae (Except Hyperbolic Function), Derivative of Sum, difference, Multiplication and Division of two Functions, Differentiation of Function of a Function, Logarithmic Differentiation, Differentiation of Implicit Functions, Differentiation of Parametric Functions, Differentiation by Trigonometric Transformations, Differentiation of a Function w.r.t. Another Function, Second Order Derivative <b>Applications of Differential Calculus:</b> Geometrical meaning of $dy / dx$ . Tangents and Normals , Angle of Intersection between two Curves, Derivative as a Rate Measurer, Errors and Approximations, Maxima and Minima of Function with one Variable	<u>10</u>
Unit – III	<b>Integral Calculus:</b> General Introduction of Integral Calculus, Integration of Sum and difference of Functions, Integration by Simplification, Integration by Substitution Integration by Parts, Integration of Rational and Irrational Functions, Additional standard Cformulae, Integration of Trigonometric Functions, Definite Integral and its Properties.	<u>10</u>
Unit – IV	<b>COORDINATE GEOMETRY</b> <b>Straight Lines:</b> Definition of differential Equation. Order, Degree and Solution of a differential Equation. Solution of a differential Equation of First Order and First Degree using, Variable Separable Method, Homogenous Form, Reducible to Homogenous Form, Linear differential Equation Bernoulli's Equation, Exact differential Equation, Substitution Method, Solution of Linear Differential Equation of Higher order with Constant Coefficients Applications of Differential Equations to L-R, L-C, L-C-R ,Circuits of Standard Forms	<u>8</u>
Unit-V	<b>Vector Algebra:</b> Definition, Addition and Subtraction of Vectors Scalar and Vector Product of two Vectors Scalar Triple Product and Vector Triple Product , Applications of Vectors in Engineering Problems <b>Numerical Integration :</b> Trapezoidal Rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule, Newton - Raphson Rule	<u>4</u>

### Suggested Text

1. Text Book on Differential Calculus Chandrika Prasad (Hindi)
2. Text Book on Integral Calculus Chandrika Prasad
3. Differential Calculus M. Ray, S. S. Seth, & G. C. Sharma
4. Integral Calculus M. Ray, S. S. Seth, & G. C. Sharma

### Reference Books:

1. Integral Calculus, M.Ray, S.S.Seth&G.C.sharma.
2. Vector Calculus, R.Kumar.

## 2D04: Electrical & Electronics Technology

**Objective:** At the end of the course the student will be able to gauge various fundamentals aspects of Basic Electrical and Electronics engineering covering networks theory, single and three phase circuits, transformers and dc machines. Also it will impart knowledge about transistors and thyristor.

Unit	Topic	36 Hours
Unit – I	<b>DC Networks :</b> Resistance, inductance, capacitance, current, voltage, power, Ohms law,	

	Kirchhoff's Laws, Node Voltage and Mesh Current Analysis; Delta-Star and Star-Delta Transformation, Source Conversion. Classification of Network Elements, Superposition Theorem, Thevenin's Theorem.	<u>10</u>
<b>Unit – II</b>	<b>Single Phase AC Circuits :</b> Generation of Single Phase AC Voltage, EMF Equation, Average, RMS and Effective Values. RLC Series, Parallel and Series- Parallel Circuits, Complex Representation of Impedances. Phasor Diagram, Power and Power Factor. <b>Three Phase A.C. Circuits :</b> Generation of Three-Phase AC Voltage, Delta and Star-Connection, Line & Phase Quantities, 3-Phase Balanced Circuits, Measurement of Power in Three Phase Balanced Circuits.	<u>10</u>
<b>Unit – III</b>	<b>Transformer :</b> Faraday's Law of Electromagnetic Induction, Construction and Operation of Single Phase Transformer, EMF Equation, Voltage & Current Relationship and Phasor Diagram of Ideal Transformer.	<u>8</u>
<b>Unit – IV</b>	<b>Transistor:</b> Bipolar Junction Transistor, Transistor Current Components, Characteristics of CE, CB and CC Transistor Amplifiers. <b>Thyristors:</b> Diode and VI characteristic, four layer diode, Bi-directional thyristors.	<u>8</u>

**Suggested Text /:**

1. Sahdev – Basic Electrical and Electronics Engg.  
J.B.Gupta – Basic Electrical and Electronics Engg.(Hindi)
- 2.
3. B.L. Thareja- Electrical Technology-Vol I

**Reference Readings**

- 1.H.P. Tiwari – Electrical and Electronics Engg.
2. Basic Electrical and Electronics Engg, Tata Mcgraw Hill

**2D05: Applied Mechanics**

**Objective:** This subject is design to give the basic knowledge of equilibrium of forces, center of gravity, centroid, moment of inertia and concept and application of work power energy.

<b>Unit</b>	<b>TopicS</b>	<b>40 Hours</b>
<b>Unit – I</b>	<b>Force:</b> Definition, Units, Different Types of Forces. <b>Coplanar Forces:</b> Resolution of Forces, Law of Parallelogram of Forces, Resultant of two or more Forces, Basic Conditions of Equilibrium, Lami's Theorem (No Proof), Jib Crane, Law of Polygon of Forces (Only Statement) <b>Moment:</b> Definition, Units & Sign Convention., Principle of Moments, Application of Equilibrium Conditions for non-concurrent Forces	<u>8</u>
<b>Unit – II</b>	<b>Application of Principles of Forces &amp; Moments:</b> Levers & their Types., Reactions of Simply Supported Beams (Graphical & Analytical Method), Steel Yard ,Lever Safety Valve Foundry Crane <b>Centre of Gravity:</b> Concept, Centroid, Calculation of C.G. of Regular Bodies, Calculation of C.G. of Plain Geometrical Figures <b>Friction:</b> Types of Friction, Laws of Friction, Angle of Friction, Angle of Repose, Friction on Horizontal and Inclined Plains, Application of.	<u>10</u>
<b>Unit – III</b>	<b>Simple Machines:</b> Basic Concepts, Loss in Friction, Inclined Plane, Simple & Differential Wheel	

	and Axle (Neglecting Rope thickness) Screw Jack Lifting Crabs Systems of Pulleys, Worm and Worm Wheel <b>Rectilinear Motion:</b> Concept, Motion under Constant Velocity, Motion under Constant Acceleration, Velocity-time graph and its uses <b>Motion under Gravity:</b> Concept, Vertical Motion, Smooth Inclined Plane <b>Projectiles:</b> Concept	<u>10</u>
<b>Unit – IV</b>	<b>Simple Machines:</b> Basic Concepts, Loss in Friction, Inclined Plane, Simple & Differential Wheel and Axle (Neglecting Rope thickness), Screw Jack, Lifting Crabs Systems of Pulleys, Worm and Worm Wheel <b>Rectilinear Motion:</b> Concept, Motion under Constant Velocity, Motion under Constant Acceleration, Velocity-time graph and its uses	<u>8</u>
<b>Unit-V</b>	<b>Motion under Gravity:</b> Concept, Vertical Motion, Smooth Inclined Plane <b>Projectiles:</b> Concept, Range, Maximum Height and Time of Flight, Equation of Trajectory Calculation of Velocity of Projectile at Certain Height, And at Certain instant <b>Newton's Laws of Motion:</b> Definitions, Momentum and it's Unit, Application of Second Law of Motion	<u>4</u>

### Suggested Text Books

1. Engineering Mechanics by, RK Rajpoot (Hindi)
2. Engineering Mechanics by, RS Khurmi
3. Engineering Mechanics By Chitranjan Aggarwal

### Suggested Reference Books

1. **Engineering Mechanics by Nelson , Tata Mcgraw Hill**
2. **Engineering Mechanics by Shailesh Kumar**

## 2D06:Applied Chemistry Lab-II

**Objective:** Develop the ability of students to carry out experiments, collect and interpret data, and critically report results through "hands-on" laboratory experiences.

### List of Experiments

1. Determination of the Strength of Copper Sulphate Solution using a Standard Solution of thio Sulphate.
2. Determination of pH Values of Given Samples.
3. Determination of Hardness of Water by EDTA Method.
4. Estimation of Free Chlorine in Water.
5. Determination of Acid Value of an Oil.
6. Preparation of Soap.
7. To determine the Viscosity & Viscosity Index of a given lubricating oil by Redwood Viscometer No. 1

### Text Books:

1. Engineering Chemistry , Mathur and Aggarwal
2. A text Book of Engineering Chemistry , S.K. Jain & K.D. Gupta

### Reference Books:

1. Practical Chemistry For Engineers , Dr. Renu Gupta & Dr. Sapna Dubey

## 2D07: Applied Physics Lab-II

**Objective:** This lab is to help the student to understand the concept of Diode, PN junctions, Half deflection

method and the concept of cells .	
	<b>List of Experiments</b>
	<ol style="list-style-type: none"> <li>1. To Determine Acceleration due to Gravity using Simple Pendulum.</li> <li>2. To Verify Newton's Law of Cooling.</li> <li>3.. To Verify Law of Resistances.</li> <li>4. To Determine Specific Resistance of Material using Meter Bridge.</li> <li>5. To Determine Internal Resistance of a Primary Cell using Potentiometer.</li> <li>6. To Compare emf of two Primary Cells using a Potentiometer.</li> <li>7. To Draw Characteristic Curves of PN Diode and Determine its Static and Dynamic Resistance.</li> <li>8. To Draw Characteristic Curves of a PNP/NPN Transistor in CB/CE Configuration.</li> <li>9.. To Measure Resistance of a Galvanometer by Half-Deflection Metho</li> </ol>
<b>Text Book:</b> 1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH) 2. Practical Physics – S.L.Gupta&V.Kumar (PragatiPrakashan).  <b>Reference Books:</b> 1.. Advanced Practical Physics Vol.I& II – Chauhan& Singh (PragatiPrakashan)	
<b>2D08: Electrical &amp; Electronics Workshop</b>	
<b>Objective:</b> this lab will help the students learn about key and basic electrical devices and apparatus used in day-to-day life. Also this will be useful in gaining knowledge about house hold electrical circuits.	
	<b>List of Experiments</b>
	<ol style="list-style-type: none"> <li>1. Study of Symbol, Specification and Approximate Cost of Common Electrical Accessories, Tools and Wires &amp; Cables Required for Domestic Installation. Study of : 2.1 Basic Electricity Rules for a Domestic Consumer 2.2 Safety Precautions &amp; use of Fire Fighting Equipments 3. Use of series of Phase Tester, Series Test Lamp, Tong Tester and Megger in Testing of Electrical Installation. 4. 4.1 Prepare a Potential Divider and Measure Resistance of a Filament Lamp Using Voltmeter and Ammeter. 4.2 Measurement of Power and Energy Consumption by an Electric Heater using Watt Meter and Energy Meter.</li> <li>5. Preparation of Wiring Diagram, Wiring, Testing, Fault Finding &amp; Costing for : 5.1 Control of one Lamp by one Switch (using Batten and Tumbler Switch) 5.2 Control of Stair Case Wiring (using Casing Capping, CFL and Flush Type Switches) 5.3 Control of one Bell Buzzer and Indicator by one Switch (using Conduit and Flush type Switch)</li> <li>6. Prepare one Switch Board as per Institutional Requirement (using Flush type Switches, Sockets, MCB, ELCB, Etc.)</li> <li>7. Study, Connecting, Testing and Fault Finding of 7.1 Fluorescent Tube and its Accessories 7.2 Ceiling Fan with resistance type and Electronic Regulator</li> <li>8. Study, Functioning, Fault Finding &amp; Repairing of following Domestic Appliances - 8.1 Automatic Electric Iron 8.2 Air Cooler 8.3 Electric Water Pump</li> <li>9. Design, Draw and Estimate the Material required for Installation For a small Residential Building/ Office/ Hall.</li> </ol> <p><b>Identification of following Resistors and finding their Values:</b></p>

	<p>1.1 Carbon and Metal Film  1.2 Variable Resistance Log and Linear  1.3 Semi Variable Preset of One Turn &amp; Multiturn  <b>2. Identification of following Capacitor and finding their Values:</b>  2.1 Mica  2.2 Ceramic  2.3 Polyesterene  2.4 Electrolytic  2.5 Tantalum  <b>3. Identification of following Switches and Study of their Working Mechanism:</b>  3.1 Toggel  3.2 Bandswiteh  3.3 Rotary  3.4 Push to on and off  3.5 Press to on and off  <b>4. Identification and Testing of following type of Connectors:</b>  4.1 Rack and Panel  4.2 Printed Circuit Edge  4.3 Coaxial  4.4 Tape &amp; Ribbon  4.5 Plate  <b>5. Study of Different Relays and their Contacts.</b>  <b>6. Study of following Tools used in Electronic Workshop:</b>  6.1 Component Lead Cutter  6.2 Wire Strippers  6.3 Soldering Iron &amp; Soldering Station  6.4 De-Solder Pump  <b>7. Measurement of Voltage, Current and Resistance using Analog &amp; Digital Millimeter.</b>  <b>8. Testing of Electronic, Component such as Capacitor, Inductor, Diode and Transistor.</b>  <b>9. Measurement of Amplitude &amp; Frequency of a Signal using CRO.</b>  <b>10. Verification of Ohm's law using Resistive Circuit and Analog Meters.</b>  <b>11. Soldering of different passive component combination on general purpose PCB.</b>  <b>12. Sketching of different Electronic Components Symbol on Drawing</b></p>	
<p><b>Text Books :</b>  Electrical Workshop M.L. Gupta  2. Domestic Devices &amp; Appliances K.B. Bhatia  3. Electrical Workshop S.L. Uppal  4. Electrical Component &amp; Shop Practice K.R. Nahar  5. Maintenance of Electrical Equipments K. S. Janwal  6. Hand Book of Philips Component</p> <p><b>Reference Books:</b>  _1.Electrical Components and Shop Practice ,K.R. Nahar</p>		
<p><b>2D09: Workshop Practice -II</b></p>		
<p><b>Objective:</b> This Lab is design to give practical exposure of engineering workshop in different shop like smithy shop, machine shop, foundry shop, and student should be able to understand different types of tool, material and measuring instrument and their application.</p>		
	<p><b>List of Experiments</b></p>	

	<p><b>Sheet Metal Shop:</b></p> <p>Preparation of following utility Jobs Involving Various Sheet Metal Joints (Single and Double Hem Joints, Wired Edge, Lap Joint Grooved Seam Joint, Single and Double Seam Joint) and Exercises (Soldering and Riveting Joints)</p> <ol style="list-style-type: none"> <li>1 Preparation of a Soap Tray &amp; Mug</li> <li>2. Preparation of Funnel</li> </ol> <p><b>Fitting and Plumbing Shop</b></p> <ol style="list-style-type: none"> <li>1. Marking Filing &amp; Hack Sawing Practice.</li> <li>2. Production of Utility Job involving Marking, Filing and Hack Sawing.</li> <li>3. Production of Utility Job involving Marking, Filing and Hack Sawing Drilling and Tapping.</li> <li>4. Cutting and Threading on G.I. Pipe</li> <li>5. Exercise on PVC Pipe Fitting.</li> <li>6. Repair of Taps and Cocks.</li> </ol>	
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**Suggested Text Books :**

- 1 Workshop Technology B.S. Raghhuwanshi
2. Workshop Technology (Hindi) Tahil Maghnani
3. Workshop Technology (Hindi) Vinay Kumar
4. Domestic Devices and Appliances K.B. Bhatia

**Suggested Reference Books:**

1. Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers

**2D10 : Computer Fundamental & IT Lab-II**

**Objective:** This lab is designed so that the better presentations and documents could be made by the students. It comprises the M.S. Excel, M.S. and powerpoint presentations.

	<b>List of Experiments</b>	
	<ol style="list-style-type: none"> <li>1. Visit to Internet Site</li> <li>2. Creating e-mail Account , Sending and Receiving e-mails.</li> <li>3. Sending e-mail with Attachment &amp; Signature</li> <li>4. Searching Web Page/ Site using Search Engine (eg. google.com, yahoo.com, altavista.com etc.)</li> <li>5. Exercise Based on MS-Word:               <ol style="list-style-type: none"> <li>5.1 Document Preparation</li> <li>5.2 Printing Document</li> <li>5.3 Mail Merge usage</li> <li>5.4 Draw Table</li> </ol> </li> <li>6. Exercise Based on Ms-Excel :               <ol style="list-style-type: none"> <li>6.1 Work Book Preparation</li> <li>6.2 Printing Workbook</li> <li>6.3 Data-base usage</li> <li>6.4 Draw Charts</li> </ol> </li> <li>7. Exercise Based on Power Point :               <ol style="list-style-type: none"> <li>7.1 Creating Slide</li> <li>7.2 Adding, Animations in Slide</li> <li>7.3 Running Slide</li> </ol> </li> <li>8. Creating Simple Web Page using HTML.</li> </ol>	

**Suggested Text Books:**

1. Yadav DS, Foundations of IT, New Age, Delhi.
2. Curtin, Information Technology: Breaking News, Tata Mo Grew Hill.

**Suggested Reference Books:**

1. Nelson, Data Compression, BPB.



**SEMESTER III**

<b>SEMSTER – 3</b>		
<b>3DEE01</b>	<b>BASIC ELECTRONICS</b>	<b>38 HRS</b>
<b>Objective:</b> The student will be able to clearly understand the concept of semiconductors, semi-conductor theory and diodes,		
Unit –I	<b>Semiconductor Diodes:-</b> Basic Introduction of P-N junction diode ,Semiconductor diode as half wave rectifier, its efficiency and ripple factor ,Semiconductor diode as full wave rectifier, its efficiency and ripple factor ,Bridge rectifier, Overall comparison between half wave and other full wave rectifiers,Peak inverse voltage (PIV) ,Use of filter circuit in rectifiers ,L filter ,C filter ,LC section filter , $\pi$ Section filter	8
Unit –II	<b>Bi-Polar Junction Transistor :</b> Concept of transistor ,Types of transistor and their working in forward and reverse bias ,Constants of transistor ( $\alpha, \beta, \gamma$ ) ,Analysis of transistor amplifier, load line ,Operating point and biasing ,Input - output characteristics in CB, CC and CE configuration ,Low frequency small signal hybrid equivalent circuit of transistor ,Derivation of voltage, current and power gain, input and output impedance of CE configuration <b>Special Devices :</b> Construction, operation, equivalent circuit and characteristics of JFET, MOSFET, CMOS Semiconductor photo devices such as LED, LDR, photo transistor Varactor diode	8
Unit –III	<b>Feed Back and Oscillators</b> Basic concept of feedback and types of feedback, Advantages and disadvantages of negative feedback for gain, stability, frequency and nonlinear distortion, Voltage series, shunt and current series and shunt feed back circuit, Barkhausen criteria, Use of positive feedback for oscillators, Principles of RC phase shift, Wein bridge oscillator. <b>Classification of Electrical Signals :</b> Analog & Digital signals and its representation, Advantages of digital techniques.	8
Unit –IV	<b>Boolean Algebra :</b> Basic laws of Boolean algebra ,Proof by perfect induction ,De’Morgen’s theorem and its applications ,Simplification of expression by Boolean algebra ,K-Map ,Realization of simplified expression by logic gates	8
Unit V	<b>Combinational Circuits :</b> Binary half and full adder ,Binary half and full subtractor ,Binary serial, parallel and BCD adder ,Parity bit generator and checker ,Binary comparator ,Basic idea of multiplexer, demultiplexer, encoder and decoder.	8
<b>TEXT BOOK:</b> 1 Analog Electronics by DR Arora, Ishan Publications, Ambala City. 2. Electronic Principles by SK Sahdev, DhanpatRai& Co., New Delhi 3 <i>Electronic Devices and circuit by MPSaxena (Hindi)</i> <b>REFERENCE BOOKS:</b> 1. Electronic Devices and Circuits by Ravi Raj Dubey 2. Analog Electronics by JC Karhara, King India Publication, New Delhi 3. Basic Electronics by JB Gupta, SKKataria and Sons, New Delhi		
<b>3DEE02</b>	<b>BASIC ELECTRICAL ENGINEERING</b>	<b>40HRS</b>
<b>Objective:</b> A Diploma holder in electrical engineering is expected to be well conversant with the basics of D.C. circuits, A.C. circuits, capacitive and inductive circuits. This subject covers the basic principles, which are required for a thorough understanding of electrical Technology.		

Unit I	<p><b>D.C. Circuits :</b> Resistance, specific resistance, Ohm's law, Resistance in series, parallel and series parallel circuits, Kirchhoff's laws Application of Kirchhoff's laws</p> <p><b>A.C. Circuits :</b> Alternating quantity and its equation, Maximum, Average and RMS values. ,Form factor ,Behaviour of R, L and C in A.C. circuits with phasor diagrams ,A.C. through R-L circuit, power factor, active and reactive component of current, power ,Q-factor of a coil ,A.C. through R-C circuit, dielectric loss and power factor of a capacitors ,Solving series R-L-C circuits.</p>	8
Unit II	<p><b>Polyphase System :</b> Need and advantage of 3-phase system ,Generation of 3-phase voltage ,Phase sequence Star-Delta connections,Phase and Line relations of voltage and current in star -delta connections (for balanced load) ,Expression of power in 3-phase circuits (for balanced load)</p> <p><b>Phasor Algebra :</b> Mathematical representation of a vector ,Symbolic notation ,Significance of operator-j ,Conjugate complex number ,Trigonometrical form of vector representation ,Exponential form of vector representation ,Polar form of vector representation ,Addition and subtraction of vector ,Multiplication and division of vector quantity.</p>	8
Unit III	<p><b>Classification of Electrical Engineering Materials :</b> General requirement of electrical engineering materials, Classification of materials into conducting, semi-conducting and insulating materials through a brief reference to atomic structure.</p> <p><b>Battery:</b> Types of storage batteries,Construction and working of Lead acid batteries, Ni-Fe batteries and Lithium ion batteries,Discharging and recharging of Lead acid batteries ,Ampere and watt-hour efficiencies</p>	8
Unit IV	<p><b>Insulating Materials :</b> Electrical properties: Volume resistivity ,Surface resistance ,Dielectric strength ,Dielectric constant ,Physical, Thermal, Chemical properties ,Classification of insulating materials on the basis of temperature limit, Properties of liquid insulating materials such as - Transformer oils, Mineral insulating oils , Properties of gaseous insulating materials such as- Hydrogen, Air, SF<sub>6</sub>.</p>	8
Unit V	<p><b>Capacitance :</b> Capacitor ,Capacitance of an isolated sphere ,Parallel plate capacitor ,Special cases of parallel plate capacitor ,Cylindrical capacitor ,Capacitor in series and parallel ,Capacitor with compound dielectric ,Energy stored in capacitor ,Charging and discharging of a capacitor, time constant ,Different types of capacitor used in various electrical applications.</p> <p><b>Magnetic Circuits :</b> Introduction ,Comparison between magnetic circuit and electric circuits ,Behavior of magnetic circuits ,Composite magnetic circuits ,Parallel magnetic circuits ,B-H curve, Rise of current in inductive circuit ,Decay of current in inductive circuit</p>	8
<b>TEXT BOOKS:</b>		
<b>3DEE03 ELECTRICAL ENGINEERING DESIGN AND DRAWING</b>		<b>40 HRS</b>
<b>Objective:</b> After completion of this course the student will be able to understand the symbol and sign convention, design of industrial installations, orthographic projections of simple electrical circuits, drawing of machine parts and contactor circuits.		
UNIT I	<p><b>Symbols and Signs Conventions:-</b>Various Electrical Symbols as per BIS.</p> <p><b>3-Phase Induction Motor Design :</b>Choice of specific magnetic and specific electric loading, Output equations, Calculation of main dimensions, Relation between D and L,Effect of length of air gap on motor performance, Calculation of no load current.</p>	8
UNIT II	<p><b>Transformer Design :</b>Single phase and three-phase core type distribution transformer, Single phase shell type transformer,Output equation, Main dimension of frame, Core design and winding design</p> <p><b>Design of Winding :</b>Definition of -Single and double layer winding, Full pitch and short pitch</p>	8

	winding, Integral and fractional winding, Developed winding diagrams of single phase and three-phase induction motors, Developed winding diagrams of alternators	
UNIT III	<b>D.C. Machine Design :</b> Choice of specific magnetic and specific electric loading, Output equation (Armature Design), Calculation of main dimensions, Output coefficients, Choice of number of poles, Design of shunt field winding	8
UNIT IV	<b>Panel Wiring Diagram :</b> Panel wiring diagram for the following with usual protective devices and showing the various equipment with suitable ranges -Synchronization and parallel operation of 3-phase alternators, 3-phase squirrel cage induction motor.3-phase slip ring induction motor.Parallel operation of three phase transformers, D.C. compound generator, Parallel operation of D.C. compound generators	8
UNIT V	<b>Contactor Control Circuits:</b> The circuit should incorporate remote control, interlocking, time delay, sequential operation, overload short circuit and no-load protection applicable to -D.O.L starter, Star-Delta starter, Rotor resistance and reversing starters, Contactor control schematic and wiring diagram for speed reversing of motors. Contactor control schematic and wiring diagram for fast and slow speeds of motors. Contactor control schematic and wiring diagram of sequential operation of motors. Control of pump motor with water level indicators.	8
	<p><b>TEXT BOOKS</b></p> <ol style="list-style-type: none"> <li>1. Electrical Engineering Design and Drawings by Surjeet Singh, Dhanpat Rai and Co, New Delhi</li> <li>2. Electrical Engineering Design and Drawings by SK Bhattacharya, SK Kataria and Sons, New Delhi</li> <li>3. Electrical Engineering Design and Drawings by Ubhi &amp; Marwaha, IPH, New Delhi</li> <li>4. Electrical Engineering Drawing (Hindi) by P.S. Gill</li> </ol> <p><b>REFERENCE BOOKS:</b></p> <ol style="list-style-type: none"> <li>5. Electrical Design and Drawing by SK Sahdev, Unique International Publications, Jalandhar</li> <li>6. Electrical Engineering Drawing by Surjit Singh, SK Kataria and Sons</li> </ol>	
<b>3DEE04</b>	<b>ESTIMATING, COSTING &amp; DESIGN OF ELECTRICAL INSTALLATIONS</b>	<b>40HRS</b>
<b>Objective:</b> This will help the students learn about purpose of estimation and costing, types of accessories, industrial installations and about transmission and distribution lines design.		
<b>UNIT I</b>	<b>Earthing:</b> Need of earthing, Pipe and plate earthing, Schedule of material and accessories, costing and estimates. <b>Service Connection:</b> General rules and regulation, Overhead and underground service connection, Schedule of material and accessories for single phase and three-phase service connection, Costing of material and work	8
<b>UNIT II</b>	<b>Wiring Materials and Accessories:</b> Different electrical symbols, Brief description, general specification and approximate cost of different types of wire and cables, switches, socket outlets, ceiling roses, lamp holders, plugs, Conduits and its accessories, distribution boards and boxes, fuses, MCB, isolators, E.L.C.B. and energy meters, Incandescent, Fluorescent and discharge lamps, D.C. and A.C. motors and starters	8
<b>UNIT III</b>	<b>General Principle of Estimating and Costing:</b> Purpose and essential of estimating and costing, Preparation of list of materials, Market survey, price list and net prices, Calculation of material and labour cost, contingencies, supervision, overhead charges, profit and total cost. Purchase process: quotations, comparative statement, purchase order, tender order, security money.	8

<b>UNIT IV</b>	<p><b>Sub Station:</b> Classification of substations, Indoor and Outdoor substation, Pole mounted substation, Platform type substation, Industrial substation, Selection of site for distribution substation, Estimation of material required for distribution substation</p> <p><b>8 Description and Layout of Grid Substation 33/11 and 220/132 KV:</b> Selection of site, Equipment used in G.S.S. with specification, Single line diagram, Estimate and costing of material required, G.S.S. Earthling.</p>	8
<b>UNIT V</b>	<p><b>Plan Estimation of 1-□□ and 3-□□ Electrical load :</b> Installation plan, Single line-wiring diagram, Calculation of conductor size, Design for main switch boards and distribution board, Calculation of number of circuit, List of material required for following and preparation of estimate, calculation of material cost using PWDB.S.R., Single storey &amp; Multi storey building, Small workshop</p> <p><b>Design of Distribution Lines: Design</b> and estimate the material required for the following with specifications -L.T. Overhead distribution line, Overhead distribution line.</p>	8
	<p><b>TEXT BOOKS:</b></p> <ol style="list-style-type: none"> <li>1. Electrical Estimating and Costing by JB Gupta, Satyan Prakashan, New Delhi</li> <li>2. Estimating and Costing by SK Bhattacharya, Tata McGraw Hill, New Delhi</li> <li>3. Estimating and Costing by Surjeet Singh, Dhanpat Rai &amp; Co., New Delhi</li> </ol> <p><b>REFERENCE BOOKS:</b></p> <ol style="list-style-type: none"> <li>1. Estimating and Costing by Qurashi</li> <li>2. Estimating and Costing by SL Uppal, Khanna Publishers, New Delhi</li> </ol>	
<b>3DEE05</b>	<b>Power System-I</b>	<b>40 HRS</b>
<b>Objectives:</b> The student will be able to get an insight about the different types of electrical generation possible both conventional and non-conventional energy sources		
<b>Unit I</b>	<p><b>Introduction :</b> Electrical energy demand and electrical energy growth in India, Electrical energy growth in India, Electrical energy sources, Fossil fuels and nuclear fuels, Present status of electrical demand in Rajasthan</p> <p><b>Thermal Power Station :</b> Selection of plant location, Block diagram of plant and its working, Coal handling plant, Pulverising plant, Draft system, Boilers, Ash handling plant, Turbine, Different types of condensers, Cooling towers and ponds, Feed water heater, Economiser, Super heater and reheater, Air preheater</p>	8
<b>Unit II</b>	<p><b>Nuclear Power Station :</b> Introduction and selection of site, Block diagram of plant and its working, Main components and their function, Energy mass relationship, Energy due to fission and fusion, Nuclear chain reaction, Multiplication factor and critical size, Moderator materials, Fissile and fertile materials, Classification of Nuclear reactor, main parts and their functions, Safety measures required in nuclear plant, Disposal of nuclear waste</p> <p><b>Diesel Power Plants :</b> Main components and working of diesel power plant with the help of block diagram, Advantage and disadvantage of diesel power plant, Application of diesel power plant, Principle and operation of gas turbine plants, Comparison of different power stations, Inter connection of power stations</p>	8
<b>Unit III</b>	<p><b>Hydro Electric Power Plants:</b> Selection of site, Advantages and disadvantages of hydro power plant, Hydrology, Classification based on Water flow regulations, Load, Head. Element of hydro power plant and their functions: Dam, Storage reservoir, Fore bay, Surge tank, Pen stocks, Spill way, Head race and tailrace, Types of turbines, Specific speed, Brief idea about small and mini hydro plants, Pumped storage plant.</p>	8
<b>Unit IV</b>	<p><b>Solar Energy :</b> Application, Unit of solar power and solar energy, Historical review and future prospects, Schematic diagram of a solar thermal power plant, Solar central receiver thermal power plant, Solar pond thermal plant, Solar thermal power supply system for space station, Introduction to photo voltaic system, Merits and limitation of solar PV system, Principle of photo voltaic cell, Transparent, insulating and absorbing materials, Building heating by active and passive system, Solar still, solar dryer and solar cooker.</p>	8
<b>Unit V</b>	<p><b>Bio-Gas Energy :</b> Introduction to bio-gas energy, Properties of bio-gas, Principle of bio-gas</p>	

	production ,Chemical and microbiological processors, Factors which affects bio-gas production , Different feed stocks for bio-gas production ,Classification of bio-gas plant :Fixed dome type ,Floating type ,Comparison between fixed dome and floating type bio-gas plant ,Site selection of bio-gas plant ,Bio gas lamp and chulha,Bio gas storage and transportation. <b>Ocean Energy</b> :Introduction to ocean energy ,Types of ocean energy :Open cycle ,Closed cycle	8
	<b>TEXT BOOKS</b> 1. <b>Generation of Electrical Energy – B.R. GUPTA</b> 2. <b>Power Plant Engg - DOMKUNDWAR</b> 3. <b>Non-conventional Energy Sources - A.N. Mathur&amp;N.S.Rathore</b> <b>REFERENCE BOOKS:</b> 1. <b>Non-conventional Energy Sources - G.D.Rai</b> 2. <b>Solar Energy - Garg&amp;Prakash</b>	
<b>3DEE06</b>	<b>Basic Electronics Lab</b> <b>Objective:</b> The completion of this lab course will help the student to identify various electronic components, use of multimeter, characteristics of semiconductor PN diode, working of rectifiers and transistor.	
	<b>LIST OF PRACTICALS</b> 1. Plot V-I characteristics of P-N semiconductor diode in forward and reverse bias 2. Plot the V-I characteristics of a zener diode and design a voltage regulator using zener diode. 3. Observe the wave form for HWR and calculate ripple factor. 4. Observe the wave form for FWR and calculate ripple factor. 5. Observe the wave form for bridge rectifier and calculate ripple factor 6. Observe the wave form for capacitor filter and find the effect of value of capacitor on ripple factor. 7. Plot input output characteristics of P-N-P transistor in CB configuration. 8. Plot input output characteristics of P-N-P transistor in CE configuration. 9. Plot V-I characteristics of N-P-N transistor in CB configuration 10. Plot V-I characteristics of N-P-N transistor in CE configuration	
<b>3DEE07</b>	<b>Basic Electrical lab</b> <b>Objective:</b> This will give the required technical knowhow to understand the earthing of small house, connections of electrical motors, working of contactors, winding of fan, laying of cables and working of DOL starters.	
	1. Measurement of armature winding and series field winding resistance of a D.C. machine by ammeter-voltmeter method. 2. Measurement of shunt field winding resistance of a D.C. machine by ammeter-voltmeter method. 3. Verification of Kirchhoff's laws in D.C. circuits. 4. Verification of Kirchhoff's laws in A.C. circuits. 5. Determination of B-H curve of a D.C. machine. 6. Measurement of power and power factor of single phase R-L-C series circuit 7. Determination of R and L of a choke coil using 3-voltmeter and an ammeter. 8. Determination of R and C of a capacitor using 3-ammeter and a voltmeter 9. Measurement of phase and line voltage and current in Star and Delta connection 10. Measurement of power in 3-phase circuit (for balanced load)	
<b>3DEE08</b>	<b>ELECTRICAL DESIGN AND DRAWING LAB</b> <b>Objective:</b> The completion will help the students to draw on sheets the electrical diagram of earthing system, wiring layout, substation layout, machine drawing, winding of induction machine <b>Preparation of drawing sheets for the following.</b> 1. Electrical symbols as per I.S. 1 Sheet	

	<p>2. Preparation of sectional plan, elevation and view of transformer</p> <p>2.1 Single-phase core and shell type 1 Sheet</p> <p>2.2 Three-phase core and shell type 1 Sheet</p> <p>3. Alarm circuits. 3 Sheets</p> <p>4. Contactor circuits. 3 Sheets</p> <p>5. Developed winding diagrams. 4 Sheets</p> <p>6. Panel wiring diagram. 3 Sheets</p>	
<b>3DEE09</b>	<b>ESTIMATING,COSTING &amp; DESIGN OF ELECTRICAL INSTALLATIONS LAB</b>	
	<b>Objective:</b> This will expose the students to understand the codes and practices for electrical maintenance, use of tools and equipment used for electrical maintenance, visit and understand the substation maintenance and working of equipment	
	<p>Design and estimate the material of electrical installation for the following (by conventional method).</p> <p>1.1 Residential building up to 40 points</p> <p>1.2 Office building up to 30 points</p> <p>1.3 Community hall up to 40 points</p> <p>1.4 Small workshop up to 10 light points and 5 power points</p> <p>1.5 Motor pump set</p> <p>2. Preparation of schedule of material and estimate for the following using PWD B.S.R.</p> <p>2.1 Residential building up to 40 points</p> <p>2.2 Office building up to 30 points</p> <p>2.3 Community hall up to 40 points</p> <p>2.4 Small workshop up to 10 light points and 5 power points</p> <p>2.5 Motor pump set</p> <p>3. Design and preparation of schedule of material of estimate for service connection</p> <p>3.1 1-□□ Overhead</p> <p>3.2 3-□□ overhead</p> <p>3.3 1-□□ underground</p> <p>3.4 3-□□ underground</p>	
<b>3DEE10</b>	<b>POWER SYSTEM DESIGN LAB</b>	
	<p>Objective: The student will be able to grasp the generator system design, working of thermal power plant, type of substations, distribution system design</p> <p>1 Generating station design: Design considerations and basic schemes of hydro, thermal, nuclear and gas power plants. Electrical equipment for power stations,</p> <p>2 Auxiliary power supply scheme for thermal power plant.</p> <p>3 Distribution systems Design: Design of feeders &amp; distributors. Calculation of voltage drops in distributors. Calculation of conductor size using Kelvin's law.</p> <p>4 Methods of short term, medium term and long term load forecasting.</p> <p>5 Sending end and receiving end power circle diagrams.</p> <p>6 Instrument Transformers: Design considerations of CTs &amp; PTs for measurement and protection.</p> <p>7 Substations: Types of substations, various bus-bar arrangements. Electrical equipment for</p>	

<b>4 Semester</b>		
<b>4DEE01</b>	<b>ELECTRICAL MACHINE-I</b>	<b>40HRS</b>
	<b>Objective:</b> This will impart the students enough learning for this core subject covering laws of electromechanical conversion, dc motors and generator, transformer and its types –single and Poly phase.	
<b>Unit-I</b>	<b>Introduction to Electrical Machines</b> Definition of motor and generator Torque development due to alignment of two fields and the concept of torque angle Electro-magnetically induced emf Elementary concept of an electrical machine Comparison of generator and motor Generalized theory of electrical machines.	8
<b>Unit-II</b>	<b>D.C. Generator</b> :Construction of D.C. machine ,Lap and wave winding (Brief idea), Principle of D.C. generator ,Excitation methods and different types of D.C. Generator E.M.F. equation ,D.C. generator characteristics, Losses, Efficiency and condition for maximum efficiency, Concept of armature reaction, Effect of armature reaction on commutation and generated voltage. Parallel operation of DC generators and load sharing .	8
<b>Unit -III</b>	<b>D.C. Motor</b> : Different types of D.C. motor , Principle of D.C. motor, Concept of back emf , Torque, speed and power relations, Starters for D.C. shunt and compound motors , Characteristics of D.C. motor , Speed control of D.C. motor- Field control, Armature control, Series parallel control, Testing of D.C. machine by Direct loading, Swineburn's tes, Hopkinson's test and Calculation of efficiency as a generator and motor from above test	8
Unit-IV	<b>Transformer</b> :Construction of single phase and three phase transformer , Principle of operation, Emf equation and Turn ratio, Idea of leakage reactance, Transformer phasor diagram, At no load, At load (Lagging, Leading and UPF) ,Equivalent circuit of single phase transformer ,Losses, efficiency and regulation ,Condition for maximum efficiency, All day efficiency,	8
Unit V	<b>Transformer testing:</b> By direct loading, By open circuit and short circuit test, Determination of equivalent circuit parameters, Back to back test, Parallel operation of single-phase transformer with equal and unequal voltage ratio. Off load and on load tap changers, Auto transformer , Poly phase connection (Descriptive study) , Scott connection, Open-Delta connection, Star-Star connection, Delta - Delta connection, Parallel operation of 3-phase transformer	8
	<b>TEXT BOOKS:</b> 1. Vidyut Engg.(S.I.Units) (Hindi) by K.D.Sharma 2. Electrical Engg. part I& II(Hindi) by D.R.Nagpal 3. Electrical Machines by J.B.Gupta 4. Electrical Technology by S.L.Uppal 5. Electrical Technology Vol.-II by B.L.Theraja <b>REFERENCE BOOKS:</b> 1. A Basic Course in Electrical Engg. by Sharma & Gupta 2. Electric Machine by P.S. Bimbra 3. Electric Machine by Nagrath & Kothari.	
<b>4DEE02</b>	<b>ELECTRICAL CIRCUIT THEORY</b>	<b>40 HRS</b>
	<b>Objective:</b> A diploma holder in electrical engg.is expected to analyse electrical and electronic circuits and networks during his job. For this sound understanding of the concept and methods of analysis of electrical circuits and network is a must for him. This course will develop analytical abilities of students in solving problems.	
<b>Unit -I</b>	<b>network Parameters</b> : Active and passive, Linear and non-linear, Unilateral and bilateral, Lumped and distributed, Time varying and time invariant parameters, Voltage and current sources (ideal and practical), Dependent and Independent sources, Source conversion techniques.	6

Unit-II	<b>Network Theorems:</b> Node and mesh analysis, Star-delta transformation, Superposition theorem, <b>Reciprocity</b> theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Millman's theorem, Tellegen's theorem.	10
Unit-III	<b>Circuit Transients :</b> Introduction to Laplace transform and inverse Laplace transformations Laplace transformation of following functions-Unit impulse function ,Unit step function, Exponential function, Ramp function, Sinusoidal function, Derivative function, Integral function , Laplace transformation theorem, Shifting Theorem , Shift in 's' domain theorem 4.3.3 Complex differentiation theorem, Final value theorem, Initial value theorem, Complex integration theorem, Solution of series RL, RC and RLC circuits by Laplace transformation	8
Unit-IV	<b>Two Port network :</b> z-parameters, y-parameters, h-parameters, ABCD- parameters, Inter relation among z,y,h and ABCD parameters., Special types of network such as T, $\pi$ , Bridge - T, Parallel-T and Lattice.	8
Unit V	<b>Complex Frequency and Pole-Zero Diagram :</b> Concept of complex frequency ,Poles and zeros of simple function , Plotting of poles and zero diagram of a simple function (up to second order), Necessary conditions of pole and zero locations of driving point functions. <b>Resonance :</b> Series resonance, Parallel resonance, Q-factor, bandwidth, selectivity, half power frequencies, graphical representations , Importance of resonance	8
	<b>TEXT BOOKS:</b> 1. Electrical Circuit Theory by Arumugam & Premkumaran 2. Electrical Networks by Soni & Gupta 3. Electrical Network Analysis by Umesh Sinha 4. Electrical Network Analysis by G.K.Mithal 5. Text Book of Circuit Theory by G.S. Verma <b>REFERENCE BOOKS:</b> 1. Text Book of Circuit Theory by G.S. Verma 6. Electrical Circuit by M.E. Valvenkerberg	
<b>4DEE03 ELECTRICAL WORKSHOP</b>		<b>38 HRS</b>
<b>Objective:</b> A diploma holder in electrical engineering has to perform supervisory duty in industries and Electricity Corporation. He/ She should have adequate knowledge as well as should be able to educate his/her subordinates for electrical wiring, wiring circuits, fault investigation and repair of domestic appliances.		
<b>UNIT-I</b>	<b>4. Automobile Electrical System :</b> Dynamo ,Self starter, Voltage regulator, Ignition coil Lighting circuit-1 Four Wheeler Two Wheeler <b>Domestic Appliances :</b> Introduction, Appliances making use of thermal effects, Design of heating elements wire, Study of the followings – Table fan, Ceiling fan, Washing machine ,Emergency light, Refrigerator, Air Conditioner, Water cooler, MCB, ELCB	8
<b>UNIT-II</b>	<b>Introduction of Electrical Maintenance :</b> Fundamental of electrical maintenance and repair , Classification, scope and frequency of electrical maintenance and repair work, General structure and equipment of electrical repair shop, Repair records and maintenance schedule. <b>Maintenance and Repair of Storage Batteries :</b> Inspection and checking of storage batterie , Trouble and its shootings, Repair of storage batteries <b>Maintenance and Repairs of Circuit Breakers :</b> Maintenance and troubleshooting of Oil circuit breakers , Air blast circuit breakers , SF6 circuit breakers	8



Unit-III	<p><b>Maintenance and Repair of Transformers :</b> Introduction, Transformer inspection, Periodical overhauling of transformer, Location of transformer defects, Winding and core repairs, Bushing repairs, Repair and maintenance of conservator, Dismantling and assembling of transformer ,Transformer drying out, Maintenance of Buchholz's relay, Maintenance of transformers while in services., Electrical characteristics of transformer oil, Transformer oil purification methods</p> <p><b>Fault Investigation and Testing :</b> Specification, wiring, dismantling, fault investigation, repairing, assembling and testing the following electrical appliances - Electric heater, Electric immersions heater, Room heater, Electric kettle, Electric soldering iron</p>	8
Unit-IV	<p><b>Maintenance and Repair of A.C Motors :</b> Different tests on single phase □capacitor type A.C. motor- Open capacitor ,Short capacitor, Change of value ,Test for open and short circuits faults ,Checking of centrifugal switch, Over hauling, dismantling and assembling of ceiling fan and table fan , Identification of terminals of 3-phase squirrel cage induction motor , Electrical fault location, Mechanical fault location, Drying and testing of insulation, Abnormal heating at bearing, Greasing, degreasing and impregnating Alignment and rotor balancing.</p> <p><b>Maintenance and Repair of D.C. Motors :</b> Identification of terminals of D.C. compound motors, Testing of armature and commutator, Over hauling of D.C. Machine, Repairing of field winding, Sparking at brushes and its remedies, Commutators and brush mechanism and its defect.</p>	8
Unit V	<p><b>Wire Joints :</b> Different types of joints ,Their uses</p> <p><b>Wiring :</b>Systems of wiring ,Types of wiring and their application ,Wiring Diagram of Different Lamp Control Circuits and Their Working : Bell indicator ,Fluorescent tube (single and double) , Mercury vapour lamp , Sodium vapour lamp, Neon sign lamp, Flasher</p> <p><b>Safety Measures :</b> Study of various safety devices and appliances in an electrical workshop ,Safety measures for working on low, medium and high voltage main and the study the apparatus used, Use of fire fighting, electric shock treatment, first aid, and safety posters etc.</p>	9
	<p><b>TEXT BOOKS:</b></p> <ol style="list-style-type: none"> <li>1. Study of electrical appliances and devices by K.B. Bhatia</li> <li>2. Workshop practice in electrical engineering by M.L. Gupta</li> <li>3. Electrical wiring by Arora, B.Dass</li> <li>4. Domestic Appliance by S.E. Board Rajasthan, Ajmer</li> <li>5. Basic shop practicals in electrical Engg.by Vinod kumar, &amp; K. Vajay</li> </ol> <p><b>REFERENCE BOOKS:</b></p> <ol style="list-style-type: none"> <li>1. Basic of Practicals in Electrical Engg. by Vinod kumar &amp; K. Vijay</li> <li>2. Electrical Gadgets by H. Partab</li> <li>3. Electrical Wiring by Arora, B. Das.</li> <li>4. Workshop Practices in Electric Engg. by M.L.Gupta</li> </ol>	
<b>4DEE04 BASIC MECHANICAL ENGINEERING</b>		<b>40 HRS</b>
<p><b>Objective:</b> A Diploma holder in electrical engineering absorbed in State electricity boards &amp; industries has to deal with the different types of water turbines, pumps, steam engine &amp; boilers, therefore the basic construction/working of types of steam &amp; water prime movers becomes essential. This subject fulfills the above need.</p>		
Unit-I	<p><b>Mechanical Properties of Metals :</b>Definitions –Elasticity, Plasticity, Ductility, Brittleness , Toughness, Hardness, Malleability, Fatigue, Examples of applications of above terms related to electrical engineering.</p> <p><b>Basic Concept of Thermal Engineering :</b> Energy , Internal energy , Potential energy , Kinetic energy, Heat, Work and enthalpy, Specific heat, Specific heat ratio, Characteristics gas equation, Universal gas constant , First law of thermodynamics ,Second law of thermodynamics.</p>	8
Unit-II	<p><b>3. Hydraulics :</b> Physical properties of a fluid , Density ,Specific volume, Specific weigh, Specific gravity , Viscosity, Pascal's law</p>	

	<b>Pressure Measuring Devices</b> : Manometers, Simple manometers ,Differential manometers, Inverted 'U' tube, Pressure gauges ,Continuity equation	8
Unit-III	<b>Bernaulli's Theorem</b> :Energy of a fluid ,Pressure energy , Velocity energy ,Datum energy , Venturimeter & its uses <b>Pumps</b> : Types of pumps ,Centrifugal pump ,Reciprocating pump ,Their relative advantages and performance <b>Transmission</b> : Belt drive, Rope drive, velocity ratio, Tension ratio, Effect of centrifugal tension , Application of these drives	8
Unit-IV	<b>Turbine</b> : Working principles and types of water turbines ,Selection of turbines , Brief idea of turbine ,Pelton wheel turbine, Francis turbine <b>Properties of Steam</b> : Generation of steam at constant pressure ,Enthalpy of water wet steam, Enthalpy of dry saturated stem , Dryness fraction ,Superheated steam, Latent enthalpy ,Enthalpy of steam, Specific volume, External work during evaporation, Internal content enthalpy, Internal energy of steam ,Use of steam table, Simple numerical problems	8
Unit V	<b>Boilers</b> :Classification of boilers ,Working of common boilers ,Babcox and Wilcox , Chichram boiler, Boiler mounting and their accessories, Introduction to modern high pressure boiler for thermal power station ( Lamont boiler, weffler boiler, Benson boiler and Velox boiler). <b>Steam Turbines</b> : Introduction ,Types of steam turbine, Working principle of steam turbine , Uses and advantages of steam turbine <b>I.C. Engines</b> :I.C. engine cycle ( otto, diesel) , Working principle of , Two stroke petrol and diesel , Four stroke petrol and diesel	8
	<b>TEXT BOOKS:</b> 1. Thermodynamics & Heat Power Engg. by Mathur & Mehta 2. Thermal Engg.by P.L. Ballaney 3. Hydraulics & Hyd. Machines by Khurmi 4. Strength of Materials by G.C.Singh 5. Heat Engines by Pande & Shah.	
<b>4DEE05</b>	<b>MICROPROCESSOR AND “C” PROGRAMMING</b>	<b>40 HRS</b>
<b>Unit I</b>	<b>Introduction</b> : Evolution of microprocessor, Digital computer , Organisation of computer , Definition of Instruction ,Program, Machine language ,Assembly language, High level language, Compiler and Assembler <b>Microprocessors Architecture (Intel 8085)</b> : Functional block diagram ,Pin-Out diagram with description, Buses, Address bus, Data bus, Control bus, Registers, Arithmetic and logic unit ,Timing and control unit, Types of instructions and classification into groups,Types of addressing modes, Status flags	8
<b>Unit II</b>	<b>Programming and Application of Microprocessor</b> :Some examples of assembly language programme ,Introduction to circuits (block diagram only) used in electrical application, ADC, DAC, Analog Multiplexer, Sample and Hold, Programmable peripheral interface (PPI) ,Measurement of Electrical Quantities, Frequency measurement, Phase angle and power factor measurement, Voltage and current measurement, Power and energy measurement, Measurement of Physical Quantities -Temperature measurement,Deflection measurement ,Water level indicator ,Angular speed ,Traffic Control. <b>Introduction of ‘C’ Language</b> :Scope of ‘C’ Language, Distinction and similarities with other HLLs ,Special features and Application areas	8

<b>Unit III</b>	<p><b>Elements of 'C'</b> : Character set, Key words , Data types ,Constants and Variables , Operators: unary, binary, ternary , Operator precedence</p> <p><b>Console Input-Output</b> : Types of I-O , Console I-O , Unformatted console I-O: getchar(), putchar(), gets(), puts(), getch(), getche() , Formatted I-O: scanf(), printf() •</p>	<b>8</b>
<b>Unit IV</b>	<p><b>Control Flow</b> : Statements and blocks, if ,switch ,Loops: for, while, do-while , goto and labels, break, continue, exit , Nesting control statements</p> <p><b>Arrays</b> : Basic concepts , Memory representation , One dimensional array, Two dimensional array</p> <p><b>Functions</b> :Basic concepts ,Declaration and prototypes ,Calling</p>	<b>8</b>
<b>Unit V</b>	<p><b>Pointers</b> : Basic concepts, &amp; , * operator , Pointer expression: assignment, arithmetic, comparison, Dynamic memory allocation, Pointer v/s Arrays</p> <p><b>Structure and Enumerated Data Types</b> :Basic concepts, Declaration and memory map, Elements of structures, Enumerated data types : typedef, enum, Union</p>	<b>8</b>
	<p><b>Text Books:</b></p> <ol style="list-style-type: none"> <li>1. Microprocessor &amp; Micro Computer by B. Ram</li> <li>2. Microprocessor, Architecture Programming &amp; Applications by Ramesh &amp; Gaonkar</li> <li>3. An Introduction to Microprocessors by A.P. Mathur</li> <li>1. 'C' Programming by Stephen Kochan</li> <li>2. Programming with 'C' by Schaum's Series</li> <li>3. 'C' Programming V.Balguru Swami</li> </ol> <p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1 4. 'C' Programming By Kernighan &amp; Ritchie</li> <li>5. Let us 'C' by Yashwant Kanetkar</li> </ol>	
<b>Practical IV Semester</b>		
<b>4DEE06</b>	<p style="text-align: center;"><b>ELECTRICAL MACHINE I – LAB</b></p> <ol style="list-style-type: none"> <li>1. Study of constructional features of D.C. machine and identify the terminals of D.C. shunt generator.</li> <li>2. Determination of O.C.C of D.C. shunt generator</li> <li>3. Determination of external characteristics of D.C. shunt generator.</li> <li>4. Determination of external characteristics of compound generator</li> <li>5. Study of constructional features of D.C. shunt and compound motor starter and connecting, starting and reversing the direction of D.C. shunt motor.</li> <li>6. Performing Swineburne's test on a D.C. machine</li> <li>7. Performing Hopkinson's test on a D.C. machine.</li> <li>8. Speed control of D.C. shunt motor by rheostatic control (both field and armature control)</li> <li>9. Study of constructional features of single phase and three phase transformers</li> <li>10. Determination of transformation ratio, regulation and efficiency of a single-phase transformer by direct loading.</li> <li>11. Open circuit and short circuit test of a single-phase transformer and determination of its equivalent circuit parameters, efficiency and regulation.</li> </ol>	

4DEE07	<p style="text-align: center;"><b>MECHANICAL ENGINEERING LAB</b></p> <ol style="list-style-type: none"> <li>1. Determination of coefficient of venturimeter</li> <li>2. Study of reciprocating pump and centrifugal pumps.</li> <li>3. Testing of centrifugal pump for discharge &amp; heads.</li> <li>4. Study of Pelton wheel &amp; Francis turbines.</li> <li>5. Study of boiler available, its mountings &amp; accessories.</li> <li>6. Study of steam turbine.</li> <li>7. Study of constructional features &amp; working of cooling towers, ponds.</li> <li>8. Study of two-stroke petrol engine.</li> <li>9. Study of four-stroke petrol engine.</li> <li>10. Study of four-stroke diesel engine.</li> </ol>	
<b>4DEE08 ELECTRICAL WORKSHOPLAB</b>		
	<ol style="list-style-type: none"> <li>1. To make connection of supply and consumer board</li> <li>2. Study of contactors and time delay relays</li> <li>3. Soldering practice and lugs jointing.</li> <li>4. Perform the following test on 1-phase transformer 11. Transformer oil dielectric strength test.</li> <li>5. Fire point, flash point and sludge test of transformer oil</li> <li>6. Study of choke winding.</li> <li>7. Prepare coil winding of a small transformer.</li> <li>8. Rewinding of a ceiling fan.</li> <li>9. Fault location and remedies in star-delta starter.</li> <li>10. Fault location and remedies in rotor-resistance starter.</li> <li>11. Preparation of periodical maintenance schedule for a power transformer.</li> <li>12. Study of fire fighting equipments</li> <li>13. Study of electric shock treatment, preparation of treatment chart.</li> </ol>	
<b>4DEE09 MICROPROCESSOR AND “C” PROGRAMMINGLAB</b>		
	<ol style="list-style-type: none"> <li>1. Program to add two 8-bit numbers</li> <li>2. Program to subtract two 8-bit number</li> <li>3. Program to find 1’s complement of a 8-bit numbers</li> <li>4. Program to find 2’s complement of a 8-bit numbers</li> <li>5. Program to shift an 8-bit number left by one bit</li> <li>6. Program to mask of least significant 4 bits of a 8 bit number</li> <li>7. Program to mask of most significant 4 bits of a 8 bit number</li> <li>8. Program to find square from look up table</li> <li>9. Program to find largest of two numbers</li> <li>10. Program to find smallest of two numbers</li> <li>11. Problems based on arithmetic expression, fixed mode arithmetic.</li> <li>12. Problems based on conditional statements and control structures.</li> </ol>	
4DEE10	<p><b>TECHNICAL SEMINAR</b></p> <p><b>Objective:</b> The aim of the technical seminar is to make the student present a engineering topic of interest in the form of seminar by ppt presentation which will help him/her to improve upon the presentation skills</p>	

<b>Semester 5</b>		
<b>5DEE01 ELECTRICAL MACHINES-II</b>		<b>40 HRS</b>
<b>Objective:</b> Here the student will be able to learn the concepts of working for AC machines like Induction and Synchronous, their speed control, starting and performance parameters		
Unit-I	<b>Introduction:</b> Production of rotating magnetic field by two phase and three-phase supply ,Construction of slip ring and squirrel cage motors, Principle of operation, Slip, Torque Production- Gross torque and shaft torque, Starting torque, Maximum torque, Full load torque, Relation between starting, maximum and full load torque, Torque-slip characteristics & effect of rotor resistance, Power stages and efficiency, Equivalent circuit: approximate and exact, Phasor diagram, No-load and blocked rotor tests, Circle diagram, Methods of starting, Speed control of induction motors- Rotor resistance control, Stator voltage control, Frequency control, Pole changing method, Cascade control, Cogging and crawling, Double cage induction motor, characteristic, applications, Industrial applications	<b>8</b>
Unit -II	<b>Single Phase Induction Motor :</b> Double revolving field theory and cross-filed theory, Construction, working principle and characteristics of following motors- Resistance start, Capacitor start & induction run, Capacitor start & capacitor run, Shaded pole motor, Industrial applications	<b>8</b>
Unit-III	<b>Alternators :</b> Constructional features, Principle of operation, Winding factors, EMF equation, Idea of leakage reactance (cylindrical rotor) and armature reaction, Synchronous reactance synchronous impedance, Phasor diagram at different power factors (cylindrical rotor), Voltage regulation, Open circuit and short circuit tests, Calculation of voltage regulation by synchronous impedance and m.m.f methods, Parallel operation of three phase alternators, Effect of variation in excitation and prime mover power on the performance of parallel connected alternators	<b>8</b>
Unit-IV	<b>Synchronous Motors :</b> Construction and principle of operation, Phasor diagram at no load and on load (cylindrical rotor), Power equation, Power angle characteristics, V - curves and inverted V- curves, Methods of starting, Synchronous motor operation at Constant input power and variable excitation and Constant excitation and Variable input power , Synchronous condenser, Comparison of induction motor and synchronous motor, Application of synchronous motor	<b>8</b>
Unit V	<b>Stability Analysis of Synchronous Machines:</b> Transient behavior, Reactance, Symmetrical short circuit, Swing equation, swing curve, M and H constants, Steady state stability, Transient stability, Equal area criterion of stability, Hunting phenomenon in synchronous machines <b>Special Machines :</b> Basic principles, operation, characteristics and applications of following motors - Linear induction motor, Stepper motor, A.C. Commutator Motors, Schrage motor, Repulsion motor	<b>4</b>
	<b>TEXT BOOKS:</b> 1. Electrical Machines by I.J. Nagrath 2. Electrical Technology by B.L.Theraja 3. Electrical Machines by P.S.Bhimbra <b>REFERENCE BOOKS:</b> 5. Electrical Machines by Ashfaq Husain	
<b>5DEE02 POWER ELECTRONICS &amp; DRIVES</b>		<b>40 HRS</b>
<b>Objective:</b> The student will be able to clearly understand about different types of PEC devices. Also they will learn various converters used in industry for power control and conversion like phase controlled rectifiers, inverters, choppers		
Unit-I	<b>Introduction:</b> Principle, construction ,characteristics and ratings of SCR, DIAC, TRIAC, UJT, Series connection of SCR, Parallel connection of SCR, UJT as a relaxation oscillator ,Snubber circuit, Transistor analogy of SCR, Comparison of SCR and TRIAC, Over voltage and over	

	current protection circuit for SCR. <b>TIMER</b> : Types of timer circuits, Principles and operation, Electronic timers, D.C. operated timer, A.C. operated timer	8
<b>Unit-II</b>	<b>Power Control Rectification:</b> Phase control of SCR, Different phase controlling circuits R, RC, UJT (Pedestal and Ramp), Transformer circuit, Different methods of turn off of SCR 2.4 Single-phase and three-phase half wave and full wave rectifier using SCR, With resistive load, With inductive load With flywheel diode. <b>Inverter</b> : Basic principle of inverter, Series inverter, Parallel inverter, Single phase voltage source inverter, Three phase bridge inverter, Applications, UPS	8
Unit-III	<b>Chopper:</b> Principle of chopper operation, Control strategies-Constant frequency system, Variable frequency system, Types of chopper circuits- First quadrant or type A chopper, Second quadrant or type B chopper, Two quadrant type A chopper (type C chopper), Two quadrant type B chopper (type D chopper), Four quadrant chopper (type E chopper) <b>SMPS</b> : Types of SMPS, Protection circuits, Merits and Demerits of SMPS	8
<b>Unit-IV</b>	<b>Cycloconverter</b> : Principle of cycloconverter, Single phase to single phase circuit step up cycloconverter, Mid point cycloconverter, Bridge type cycloconverter, Single phase to single phase circuit step down cycloconverter, Mid point cycloconverter, Bridge type cycloconverter Three phase half wave cycloconverter, Three phase to single phase cycloconverter, Three phase to Three phase cycloconverter.	8
<b>Unit V</b>	<b>Speed Control of Motors:</b> Introduction, Speed control of motors using SCR for D.C. shunt motor and series motor, Single phase and three phase induction motor, Slip ring induction motor, Brush less DC motor <b>AC Stabilizer</b> : Introduction, Working and basic circuits of Resonator stabilizer, Electro-mechanical stabilizer, Electronic stabilizer	8
	<b>TEXT BOOKS:</b> 1. Power Electronics by P.C. Sen 2. Motor Control by P.S Bhimbra 3. Thyristor Engineering by M.S. Berde  <b>REFERENCE BOOKS:</b> 4. Industrial Electronics by G.K. Mithal 5. Thyristor Control Drive by G.K. Dubey	
<b>5DEE03 POWER SYSTEM-II</b>		<b>40 HRS</b>
<b>Objective:</b> Diploma holders are mostly employed in electricity boards and industries where they are supposed to erect low voltage lines, overhead and underground cables and substation and to erect HV and EHV lines and substation. For doing the above job it is expected that the student are made aware and given practice of the above aspects of lines and substations including safety practices, standardised maintenance schedule, Indian Electricity act and relevant Indian Standards.		
Unit-I	<b>Transmission and Distribution:</b> Need and basic flow diagram of power system, Relative advantages and disadvantages of A.C and D.C transmission, Selection of transmission voltage, Comparison of A.C. 1-phase, A.C. 3-phase 3 wire and A.C. 3-phase 4 wire on the basis of copper volume for overhead and underground cable, Comparison of D.C. 2-wire and D.C. 3-wire system on the basis of copper volume.	8
Unit-II	<b>Materials used in Overhead Lines</b> : Need, requirement, construction and special feature of line supports, Types of conductors : hollow, stranded and relative merits and demerits, Selection of size of conductor, general rules used in RSEB for calculation, Types of insulators, their	

	construction and application, Potential distribution over a string of insulators, String efficiency and methods of improving string efficiency <b>Mechanical Design :</b> Sag and span, Sag calculation in overhead lines with same and different level supports, Effect of wind, ice and temperature on sag, Effect of sag on overhead conductor configuration and their spacing, Effect of span on sag, Stringing chart, Transposition of conductors	8
<b>Unit-III</b>	<b>Electrical Design:</b> Overhead line constants, Classification of lines, R, L, C, of over head lines (formula without proof), Skin and Ferranti effect, Calculation of efficiency and regulation for Short transmission line, Medium transmission line (T and $\Pi$ methods), Long transmission line (Rigorous method) , Generalized circuit constants of transmission line, Determination of Generalized circuit constants of Short transmission line ,Medium transmission line (T and $\Pi$ methods), Long transmission line	8
<b>Unit-IV</b>	<b>D.C. Distribution Systems :</b> Layout of distribution system, feeders, distributors and service mains, Radial distributor, Ring main distributor and with interconnector Voltage drop calculation for D.C. distributor for uniform and concentrated loading, Radial distributor fed at one end, Radial distributor fed at both end with equal and unequal voltages, Ring main distributor <b>A. C. Distribution Systems :</b> Introduction, A. C. distributions calculation ( ring main & radial feeder), Methods of solving A. C. distributions problem, Power factor referred to receiving end voltage, Power factor to respective load voltage	8
<b>Unit V</b>	<b>Sequential Systems:</b> Latches, flip-flops, R-S, D, J-K, Master Slave flip flops. Conversions of flip-flops. Counters: Asynchronous (ripple), synchronous and synchronous decade counter, Modulus counter, skipping state counter, counter design. Ring counter. Counter applications. Registers: buffer register, shift register	8
	<b>TEXT BOOKS:</b> 1. Electrical Power by Soni, Gupta & Bhatnager 2. Electrical Power by J.B. Gupta 3. Power System V.K. Mehta 4. Transmission & Distribution of Electrical Power by Raina & Bhattacharya  <b>REFERENCE BOOKS:</b> 5. Electrical Power by S.L. Uppal	
<b>5DEE04 ELECTRICAL MEASUREMENT AND INSTRUMENTATION</b>		<b>40 hrs</b>
<b>Objective:</b> A diploma holder in electrical engineering where ever placed on job, has to select a suitable measuring instruments for measuring electrical quantities, so he/she should have adequate knowledge of construction, working, application, specification and errors of different measuring instruments. This subject covers most commonly used electrical instruments and measuring processes for above need.		
Unit –I	<b>Introduction to Measuring Instruments :</b> Classification of M.I.-Absolute & Secondary Instruments, Analog & Digital Instruments, Different Principles used in M.I., Sensitivity, Accuracy and precision, Types of errors ,Deflecting, controlling and damping torque <b>Different Measuring Instruments :</b> PMMC, moving iron and rectifier type ammeters and voltmeters ,Electrostatic voltmeter, Dynamometer type ammeter, voltmeter and wattmeter Induction type wattmeter & energy meter, Blondels theorem and measurement of power by two wattmeter method in 3-Phase circuits, Testing of single phase induction type energy meter by direct and phantom loading ,Adjustments of single phase induction type energy meter ,Brief study of static energy meter (single and 3 phase), Range extension using shunts and series multipliers	8

Unit –II	<p><b>Measurement of Resistance</b> : Classification of resistance, Measurement of low resistance by Kelvin's double bridge, Measurement of medium resistance by Ammeter and Voltmeter, Whetstone's bridge, Substitution methods, Measurement of high resistance and insulation resistance, Megger, Earth tester and Ohmmeter</p> <p><b>Potentiometers</b> : Types of A.C. and D.C. potentiometers, Construction, Standardisation, Applications</p>	8
Unit –III	<p><b>A.C. Bridges</b> : General equation for bridge balance, Maxwell's inductance bridge, Maxwell's inductance - capacitance bridge, Anderson's bridge, Schering Bridge, Wien's bridge for frequency measurements</p> <p><b>Brief study of:</b> CRO ,Electronic voltmeter</p> <p><b>Instrumentation System</b> :Introduction to measurement system, Generalised block diagram representation of instrumentation system ,Brief description of components of instrumentation system</p>	8
Unit-IV	<p><b>Transducers</b> :Classification of transducer ,Primary transducers, Secondary transducer, Active transducer, Passive transducer, Analog transducer ,Digital transducer ,Construction, principle of operation and application of the following transducers –Potentiometer, L V D T and R V D T, Resistance strain gauge, Gauge factor, Gauge materials ,Temperature compensation ,Thermocouple , Thermister, R T D, Photo cell, Piezo Electric, Capacitive</p>	8
UNIT V	<p><b>Measurement of Following Physical Parameter Using Suitable Transducers</b> :Linear displacement, Angular displacement, Strain, Stress and force, Velocity and Speed, Temperature, Pressure, pH value, Flow measurement</p> <p><b>Instrument Transformers</b> :Definition of terms related to instrument transformers ,Current Transformer (CT), Potential Transformer (PT), Difference between CT and PT, Application of CT and PT</p>	8
	<p><b>TEXT BOOKS</b></p> <ol style="list-style-type: none"> <li>1. Electrical Measurement &amp; Instruments by J.B.Gupta</li> <li>2. Electrical Measurement by E.W.Golding</li> <li>3. Electrical Measurement by D.R.Nagpal</li> </ol> <p><b>REFERENCE BOOKS:</b></p> <ol style="list-style-type: none"> <li>1. Electrical and Electronics Measurement and Instrumentation by A.K.Sawhney.</li> <li>2. Instrumentation and System by Rangan &amp; Sharma</li> </ol>	
<b>5DEE05 MANGEMENT</b>		<b>40 HRS</b>
<b>Objective:</b> The student will gain insight about energy analysis, energy audit of industrial systems, energy management, conservation techniques		
<b>UNIT I</b>	<p><b>Entrepreneurship</b> :Role of entrepreneurship and its advantage ,Classification of industries (based on scale), Classification of industries (based on type), New industrial policy, M.R.T.P. act, Product identification/ selection, Site selection , Plant layout, Institutional support needed, Pre-market survey</p> <p><b>Entrepreneurship Support System:</b> Role of District Industries Centre in setting up industry, Function of NSIC, SISI, NISIET, NRDC, SSIC, SIDO, NMTC, KVIC, RSMDC, Role of state finance corporation, state electricity board, pollution control board, RAJCON, BIS, I.S.O. etc.</p> <p><b>Setting up SSI</b> :Registration of SSI ,Allotment of land by RIICO, Preparation of project report , Structure of organization, Building construction, Establishment of machines</p>	8
<b>UNIT II</b>	<p><b>Raw Material Management</b> : Allotment of iron and steel, coke/ coal, Allotment of other indigenous raw material from NSIC, Allotment of imported raw material and parts.</p> <p><b>Marketing Facilities</b> :Supply of product to state govt, to defence, to railways, to CSPO, to CSD, Participation in international exhibition and fairs, trade centres, state emporium and departmental stores ,Quality consciousness and its effect on product sales</p> <p><b>Financial Sources for SSI</b> : Various institutions providing loans for industries ,Various types of loans, Subsidies</p>	8
<b>UNIT III</b>	<p><b>Contracts and Tenders</b> : Type of contracts ,Necessity of contract and tenders ,Type of tenders ,Tendering procedure</p> <p><b>Project Report</b> : Procedure of preparing a project report ,Format of project report ,Preparation of project report for some SSI items</p>	8



	<b>ISO : 9000 Series of Quality System</b> : Definition of few important terms related to ISO quality system ,Various models for quality assurance in ISO : 9000 series ,Various elements of ISO : 9001 model (20 points), Benefits by becoming an ISO : 9000 company, Introduction to total quality management (TQM)	
<b>UNIT IV</b>	<b>Principles of Management</b> :Management, administration and organisation, difference between them. Scientific management : Meaning, characteristics, object and advantage : Taylor's scientific management ,Fayol's principles of management, functions of management ,Types of ownership, sole trading, partnership, joint stock, co-operative and public enterprise , Types of organisation, different types and their charts, Importance of human relation professional ethics, Need for leadership, leadership qualities, Motivation <b>Human Resources Development</b> : Introduction, object and functions of human resource development department, Recruitment, sources and methods of selection, need for effective training, method of training, duties of supervisor / Foremen, role of HRD in industries. <b>Wages and Incentives</b> : Definition and requirements of a good wage system methods of wage payment ,Wage incentives - type of incentive, difference in wage incentive and bonus. incentive to supervisor.	<b>8</b>
<b>UNIT V</b>	<b>Marketing Management</b> : Concept of Marketing ,Problems of Marketing, Pricing policy, Distribution channels and methods of marketing <b>Tax System and Insurance</b> : Idea of income tax, sales tax, excise duty and custom duty , Industrial and fire insurance, procedure for industrial insurance. <b>Labour Legislation and Pollution Control Acts</b> : Industrial acts : factory act 1948 ,Workmen's compensation act 1923, Apprentices act 1961, Water pollution contract act 1974 and 1981	<b>8</b>
	<b>TEXT BOOKS</b> 1. Industrial Management by V.K. Sharma & O.P. Harkut 2. Industrial Engg. & Management by O.P. Khanana 3. Industrial Engg. & Management by T.R. Banga. <b>REFERENCE BOOKS:</b> 1. Hand Book of Small Scale Industry by P.M. Bhandari 2. Hand Book on Entrepreneurship Development by O.P. Harkut 3. Entrepreneurial Development by S.S. Khanka	
<b>Practical 5<sup>th</sup> Semester</b>		
<b>5DEE06</b>	<b>ELECTRICAL MACHINE-II LAB</b>	
	<b>Objective:</b> After completion of this course the students will be able to perform experiments on induction machines, synchronous machine	
	1. Connecting, starting and reversing the direction of rotation of 3-phase squirrel cage induction motor by using 1.1 D.O.L starter 1.2 Star-Delta starter 2. Speed control of 3-phase induction motor by rotor resistance control. 3. Speed control of 3-phase induction motor by stator voltage control 4. No-load and blocked rotor tests on 3-phase induction motor and plotting of circle diagram. 5. Study the various types of single-phase Induction motor with starting and reversing operation. 6. Starting of synchronous motor and plotting V-curves. 7. Determination of load characteristics of alternator at rated speed. 8. Determination of regulation of alternator by direct loading. 9 Determination of magnetisation curve of an alternator at rated speed	
<b>5DEE07</b>	<b>POWER ELECTRONICS DRIVES LAB</b>	
	<b>Objective:</b> The undergraduate students will learn and practically do experiments on various pec	

	devices about their characteristics, firing circuits, study and test of various bridge rectifier circuits of r and rl loads.	
	<ol style="list-style-type: none"> <li>1. Speed control of D.C. Shunt motor.</li> <li>2. Speed control of D.C series motor.</li> <li>3. Study of various SCR firing circuits.</li> <li>4. Study of various commutation circuits.</li> <li>5. Speed control of A.C 1-phase motor.</li> <li>6. Speed control of A.C 3-phase induction motor.</li> <li>7. Use of TRIAC in a dimmer circuit.</li> <li>8. Study of TRIAC in rectifier mode</li> <li>9. Study of single phase half wave rectifier using SCR with resistive load</li> <li>10. Study of (single phase) SCR with inductive load</li> <li>11. Study of (with free wheeling diode) SCR with inductive load.</li> <li>12. Study of single phase full wave rectifier using SCR with resistive load.</li> <li>13. Study of SCR with R-L load and free wheeling diode.</li> </ol>	
<b>5DEE08</b>	<p style="text-align: center;"><b>POWER SYSTEM LAB – Simulation Based</b></p> <ol style="list-style-type: none"> <li>1. Fault analysis (for 3 to 6 bus) and verify the results using MATLAB or any available software for the cases: (i) LG Fault (ii) LLG Fault (iii) LL Fault and (iv) 3-Phase Fault</li> <li>2 Study of voltage security analysis</li> <li>3 Study of overload security analysis and obtain results for the given problem using MATLAB or any software.</li> <li>4 Study of economic load dispatch problem with different methods.</li> <li>5 Study of transient stability analysis using MATLAB/ETAP Software</li> </ol>	
<b>5DEE09</b>	<p style="text-align: center;"><b>ELECTRICAL MEASUREMENT AND INSTRUMENTATION</b></p> <ol style="list-style-type: none"> <li>1. Calibration of ammeter and voltmeter.</li> <li>2. Calibration of dynamometer type wattmeter and induction type energy meter.</li> <li>3. Measurement of power in 3-phase circuits by two wattmeter method</li> <li>4. Measurement of resistance by Kelvin's double bridge</li> <li>5. Measurement of resistance by Whetstone bridge</li> <li>6. Measurement of Earth's resistance by Earth tester</li> <li>7. Calibration of ammeter and voltmeter measurement of resistance by D.C. potentiometer</li> <li>8. Measurement of inductance and capacitance with the help of a suitable A.C. Bridge</li> <li>9. Measurement of frequency using CRO</li> <li>10. Measurement of displacement using following transducers : <ol style="list-style-type: none"> <li>10.1 Potentiometer</li> <li>10.2 L.V.D.T.</li> <li>10.3 Capacitive</li> </ol> </li> </ol>	
<b>5DEE10</b>	<p><b>Practical Training</b></p> <p><b>Objective:</b> The aim of the Practical Training is to make the student present a Practical project for engineering topic which will help him/her to improve upon the practical skills</p>	
<b>Semester 6</b>		
<b>6DEE01</b>	<p style="text-align: center;"><b>POWER SYSTEM-III</b></p>	<b>40 hrs</b>
	<p><b>Objective:</b> The students will be able to learn and gain insight about per unit method, admittance and impedance model of power system, symmetrical and asymmetrical fault analysis, symmetrical components and importance of load flow analysis.</p>	
Unit-I	<p><b>Load and Load Curves :</b> Types of load, Variation in demand, chronological load curve, Load duration curve, energy load curve, Load factor, capacity factor, diversity factor, connected load, maximum demand, utilization factor</p> <p><b>Economic Aspects of Generation :</b> Factor affecting the cost of generation, Cost reduction by power station inter connection, calculation of cost per unit, Incremental rate of generation and condition for economic loading</p>	<b>8</b>
Unit-II	<p><b>Tariffs:</b> Objectives of tariff, General tariff form and types of tariff, Flat rate, Straight meter rate,</p>	

	Block meter rate, Hopkinson demand tariff, Doherty demand rate, Wright demand rate, Present tariff pattern in Rajasthan <b>Power Factor Improvement</b> :Meaning of power factor, Causes of low power factor, Effects of low power factor, Advantages of power factor improvement, Methods of power factor improvement, Location of shunt capacitors	8
Unit-III	<b>Control of Voltage and Reactive Power</b> : Introduction, Methods of voltage control, Tap changing transformers, Offload tap changing transformer, On load tap changing transformer, Shunt reactors , Shunt capacitors, Series compensation, Location of series capacitors, Protective schemes for series capacitors, Problems associated with series capacitors, Series capacitor versus shunt capacitor, Synchronous phase modifiers, Rating of a phase modifier ,Static VAR systems (SVS) , Advantages and applications of SVS	8
Unit-IV	<b>Combined Operation of Power Stations</b> : Types and advantage of interconnection , Base load, peak load and load allocation among different power station, Real and reactive power control of turbo alternator, Reactive power requirements during peak and off peak hours <b>Extra High Voltages Transmission:</b> Introduction, Need for EHV transmission, Use of Bundled conductors, Conductor surface gradients, Environmental aspects in EHV and UHV lines design, Radio noise from EHV lines.	8
Unit V	<b>HVDC Transmission</b> : Introduction, Types of DC links, Advantages of DC transmission, Converter station equipment, Ground return , Earth electrode, station earth, HVDC systems in India <b>Corona</b> :The Phenomenon of Corona, Disruptive critical voltage, Visual critical voltage ,Corona Loss, Factors and conditions affecting corona, Radio interference due to corona, Practical considerations, Corona in Bundled conductor	8
	<b>TEXT BOOKS:</b> 1. Generation of Electrical Energy by B.R. Gupta 2. Power System Design by M.V. Deshpande 3. Electrical Power System by Nagrath & Kothari 4. Elements of Power system by Stevenson  <b>REFERENCE BOOKS:</b> 1.Power System Analysis and Design byB.R. Gupta 2.Electrical Power Systems by Ashfaq Husain	
<b>6DEE02</b>	<b>UTILIZATION OF ELECTRICAL POWER AND TRACTION</b>	<b>40 HRS</b>
<b>Objective:</b> The subject contents are designed to meet the above requirements and an engineer after undergoing this course shall be in a position to operate and keep the equipment used in utilization of electrical power..		
<b>Unit-I</b>	<b>Industrial Utilization</b> : Advantages of electrical drives over mechanical drives, Group and individual drives, Characteristics and application of various types of electric motors, Selection of electrical motors for, Domestic uses - Fans, sewing machines, refrigerators, air conditioners, coolers, mixers and ,grinders, washing machines, hair dryer, Industrial uses - Lathes, drilling machine, elevators, cranes lift, conveyors, textile and paper mills. <b>Electric Heating</b> :Principle of electric heating, Advantages of electric heating, Methods of heating, Resistance heating, Induction heating, Dielectric heating	8
<b>Unit-II</b>	<b>Illumination:</b> Terms used in illumination, Laws of illumination, Inverse square law, Lambert's cosine law, Electrical sources of light, Design of lighting schemes for domestic, commercial and industrial premises based upon illumination level required for various works. Types of lamps ,Comparison of fluorescent tubes and filament lamps ,Requirement of good lighting ,Lighting schemes for flood light	8
<b>Unit-III</b>	<b>Traction Systems:</b> I deal traction system ,Different systems of traction ,Systems of electric traction ,Systems of track electrification ,Comparison between D.C. and A.C. systems of railway electrification form the point of view of main line and suburban line railway service.	

	<b>Electric Welding:</b> Principle of electric welding ,Classification of electric welding, Resistance welding, Spot welding ,Butt welding, Seam welding, Arc Welding, Metal arc welding, Carbon arc welding ,Comparison between resistance and arc welding	<b>8</b>
<b>Unit-IV</b>	<b>Electric Traction Motors:</b> General features of traction motor ,Characteristics of Motors ,D.C. Series motor, D.C. shunt motor ,A.C. Series motor, Rating and ventilation <b>Power Supply:</b> System of supply of power for electric traction, Current collector for overhead systems, Overhead construction for tramways trolley buses and railway, Sag and tension calculation for a trolley wire, Transmission lines to feed substations, Location of substations ,Feeding and distribution systems ,Protective device	<b>8</b>
<b>Unit V</b>	<b>Train Movement and Energy Consumption:</b> ,Speed time curves, Typical speed time curves, Definition of crest speed, average speed and schedule speed, Factors affecting schedule speed, Simplified quadrilaterals speed time curves, Tractive effort for propulsion of train, Determination of specific energy output using simplified speed time curves, Factors affecting energy consumption, Definition of dead weight, accelerating weight and adhesion weight	<b>8</b>
	<b>TEXT BOOKS:</b> 1. A Course in Electrical Power by J .B. Gupta 2. Utilization of Electric Power & Electric traction by G.C. Gay 3. Art & Science of utilization of Electrical Energy by H. Partab 4. Electrical Utilization & Traction by Yash & Basant  <b>REFERENCE BOOKS:</b> 1. Electrical Utilization & Traction by Yash & Basant 2. Electric Drives by G.K. Dubbey.	
<b>6DEE03</b>	<b>FUNDAMENTALS OF CONTROL SYSTEM</b>	<b>40 HRS</b>
<b>Objective:</b> This course aims at imparting the basic concept of control systems. Now a days automated industries are growing at a fast speed. A diploma holder must have knowledge of control procedure. After studying this course the students will be capable of implementation of these principles in process industries as well as engineering industries.		
<b>Unit I</b>	<b>Control System:</b> Basic definition ,Open loop and Closed loop systems, Transfer function, Transfer function of different R- C networks, Block diagram and its reduction technique, Signal flow graph and Mason's gain formula	<b>8</b>
<b>Unit II</b>	<b>Control System Components :</b> D.C. Servo motor, A.C. Servo motor, Synchro pair, Tachogenerator	<b>6</b>
<b>Unit III</b>	<b>Time Domain Analysis :</b> Various test signals used in control system (step, impulse, ramp, parabolic), Impulse response, First order and second order system, Time domain specifications, Step response of first order and second order system ,Stability analysis of control system, Absolute satiability, Marginal satiability, Relative satiability, Asymptotic satiability, Routh's stability criterion, Formation of Routh array, Difficulties in formation of Routh array and their remedies, Determination of gain K, Static and dynamic error coefficients	<b>4</b>
<b>Unit IV</b>	<b>Frequency Response :</b> Frequency domains analysis, Frequency domain specifications, Gain margin and phase margin ,Polar plots, Bode plot, Nyquist stability criterion,Stability analysis using Nyquist plot and Bode plot, M & N circle	<b>6</b>
<b>Unit V</b>	<b>Root Locus :</b> Introduction, Rules for constructing root loci, Root locus plots, Effect of Zeros and Poles on root locus.	<b>10</b>
	<b>TEXT BOOKS :</b> 1. Control System Engg. By Nagrath & Kothari 2. Control System by B.C. Kuo 3. Control System Engg. By Ogata	

	<b>REFERENCE BOOKS:</b> 1. Automatic Control System by Hassan Saeed	
<b>6DEE04 SWITCHGEAR AND PROTECTION</b>	<b>CR</b>	<b>LTP 3, 3:1:0</b>
<b>Objective:</b> The course is designed to develop the understanding of the principles and working of protective switchgears so that one can handle, install and maintain them and also take decisions at his level in different situations.		<b>40 HRS</b>
<b>UNIT I</b>	<b>Faults in Power System :</b> Sources of faults, Percentage reactance and base KVA, 3-phase short circuits on alternator, Calculations of short-circuit KVA current, Construction of reactors, Limitations of fault current, Location of reactor <b>Symmetrical Components :</b> Operator 'a' Determination of sequence components ,Sequence impedance and sequence network ,Types of faults at the terminals of unloaded alternator Determination of fault current	<b>8</b>
<b>UNIT II</b>	<b>Fuses :</b> Definition of different terms ,Selection of fuse materials, Types of fuses, Application of H.R.C. fuses, Drop out fuse, Advantage and disadvantage of fuses <b>Protection :</b> Principle of protection systems,Basic requirement of relays, Classification of relays according to construction, uses and operating time,Types o f relays (construction, setting and applications),Thermal relay, Electromagnetic relay, Induction type relay, Differential type relay,Distance relay, Over current, reverse power and earth leakage protection, Static relays, Basic elements, Applications	<b>8</b>
<b>UNIT III</b>	<b>Protection of Alternator :</b> Field failure, Field earth fault, Over current, Phase unbalance and insulation protection, Differential and restricted earth fault schemes, Protection against prime mover failure <b>Transformer Protection :</b> Over current, Earth fault, Differential protection, Buchholz relay, Differential scheme for the protection of generator - transformer units.	<b>8</b>
<b>UNIT IV</b>	<b>Line Protection :</b> Differential pilot wire protection systems, Time graded directional over current and earth fault protection, Elements of distance protection and power line carrier protection <b>Over Voltage Protection :</b> Causes of over voltage, Lightning surges, Protection of line against over voltage, Function of ground wire, Horn gap, Lightening arrestors, Insulation coordination.	<b>8</b>
<b>UNIT V</b>	<b>Circuit Breakers :</b> Basic construction of circuit breaker, Arc phenomenon, Arc extinction methods, Interruption of capacitive current, Current chopping, Resistance switching, Construction, working and application of, Oil circuit breaker, Bulk oil C.B.,Minimum oil C.B. Air Circuit breaker, Air blast circuit breaker, Vacuum circuit breaker, SF6 circuit breaker, Ratings of circuit breaker.	<b>8</b>
	<b>TEXT BOOKS</b> 1. Switchgear & Protection by Sunil S.Rao 2. A Course in Electrical Power by Soni, Gupta & Bhatnagar 3. Switchgear & Protection by M.Chander & Ravindranath <b>REFERENCE BOOKS</b> 1 Electrical Power System by C.L. Wadhwa.	
<b>6DEE05 ENERGY MANAGEMENT</b>		<b>40 HRS</b>
<b>Objective:</b> To achieve the target and goals in an organisation it is essential to co-ordinate the entire system. For this purpose a diploma holder should have the knowledge of principles of electrical energy management, auditing and environmental aspects.		
<b>UNIT I</b>	<b>Energy Management and Energy Planning :</b> Definitions and Significance, Energy Strategy, Energy Policy and Energy Planning, Two Sides of Energy Management, Sectors of Supply Side Energy Management, Objectives of Energy Management, Hierarchical Levels of Sup-- Side Energy Management, Trade-off between Energy and Environment, Finery- and Energy Planning, Energy and Economy, Essential Imperatives and Steps in Supply Side Energy Planning, Energy Planning Flow for Supply Side,Essential Data for Supply-side Energy Planning, Per Capita Energy Consumption, Essential Imperatives and Steps in User Side Energy Planning, Energy Management and Control Systems (EMCs or EMS) for Demand Side, Energy	<b>8</b>

	Management in End-User Plant, Seven Principles of Energy Management, Energy Policy of a Supply Organization and Demand Side Organization, Energy Policy of a Demand Side Organization (Energy Consumer), Organization for Energy Management	
<b>UNIT II</b>	<b>Energy and Power Management</b> : Overview of India's Energy and Power Sector ,National Energy Strategies of India, Primary Energy Sources for Power Generation and, Electric Power Sector Planning in India, India's Nonconventional, Renewable and Alternate Energy Planning, Rural Electrification Programs in India, Economic Reforms in Energy and Power Sector, Energy Consumption Trends in India, Integrated Estimates, Energy Conservation Measures under 9th Five Year Plan, Per Capita Availability of Commercial Energy Resources, Reserve to Production Ratio (R/P)	<b>8</b>
<b>UNIT III</b>	<b>Energy Audit</b> : Aim of Energy Audit, Energy flow diagram, Strategy of Energy Audit, Comparison with Standards, Energy Management Team, Considerations in Implementing Energy Conservation programmes, Periodic progress review, Instruments for energy audit, Energy Audit of illumination system, Energy audit of electrical system, Energy audit of Heating, ventilation and Air conditioning systems	<b>8</b>
<b>UNIT IV</b>	<b>Environmental Aspects of Energy and Pollution Control</b> : Introduction, Terms and Definitions, Pollution from use of energy, Combustion products of fossil fuels, Particulate matter Fabric filter and Baghouse, Electro-static precipitator (ESP), Carbon Dioxide, Green house effect and Global warming, Emission of Carbon Monoxide, Pollution by Sulphur dioxide (SO <sub>2</sub> ) and Hydrogen Sulphide H <sub>2</sub> S, Emission of Nitrogen Oxides, Acidic Rains, Acid Snow, Acidic Fog and Dry Acidic Deposits, Acid Fog, Dry Acidic Deposition, FGD and SCR Systems of Cleaning Flue Gases	<b>8</b>
<b>UNIT V</b>	<b>Energy Conservation</b> : Introduction, Motivation for Energy Conservation, Principles of Energy Conservation, Energy Conservation planning, Energy Conservation in following sectors, Industries, Electrical Generation, Transmission and distribution, Household and commercial sectors, Transport, Agriculture ,Energy Conservation Legislation <b>Energy and Sustainable Development</b> : Introduction, Energy problems, Energy use trends in Developing countries, Prospects of changes in Energy supply, Agenda for Sustainable development	<b>8</b>
	<b>TEXT BOOKS:</b> 1. Generation of Electrical Energy by B.R. Gupta 2. Energy Technology by S.Rao, Dr. B.B. Parulkar 3. An Overview of Environment Engineering by Kapoor.	
<b>Practical 6th semester</b>		
<b>6DEE06 SWITCHGEAR &amp; PROTECTION LAB</b>		
<b>Objective:</b> Introduce students to power system protection and switchgear, Teach students the protection systems used for electric machines, transformers, bus bars, overhead and underground feeder		
	1. Study different components of Switchgear 2. To visit thermal/nuclear power plant 3. To design and simulate hybrid wind-solar power generation system using simulating software 4. Study Different terminology used in power quality assessment 5. Study and measure certain parameters of power quality in laboratory with and	

	without power quality Improvement devices.	
<b>6DEE07</b>	<b>Analog Electronics Lab.</b>	
	<b>Objective:</b> The student will practically perform and analyse working DSO, Analog and digital multimeter. Also they will plot various curves of PN diode, Zener diode, transistor and FET	
	<ol style="list-style-type: none"> <li>1 Study the following devices: (i) Analog&amp; digital multimeter (ii) Function/ Signal generators (iii) Regulated d. c. power supplies (constant voltage and constant current operations)</li> <li>2 Study of digital storage CRO and store a transient on it.</li> <li>3 Study of analog CRO, CRO probes, measurement of time period, amplitude, frequency &amp; phase angle using Lissajous figures.</li> <li>4 Plot V-I characteristic of P-N junction diode &amp; calculate cut-in voltage, reverse Saturation current and static &amp; dynamic resistances.</li> <li>5 Plot V-I characteristic of zener diode and study zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.</li> <li>6 Plot frequency response curve for audio amplifier and to determine gain bandwidth product. Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of <math>I_{dss}</math> &amp; <math>V_p</math></li> </ol>	
<b>6DEE08</b>	<b>Control System Lab</b>	
	Objective: Implement an integral control system for the chosen system. Evaluate the performance of an integral control system with regard to accuracy, speed of response, relative stability and sensitivity to parameter changes.	
	<ol style="list-style-type: none"> <li>1. To study P, PI and PID temperature controller for an oven and compare their performance.</li> <li>2. To study and calibrate temperature using resistance temperature detector (RTD)</li> <li>3. To design Lag, Lead and Lag-Lead compensators using Bode plot.</li> <li>4. To study DC position control system</li> <li>5. To study synchro-transmitter and receiver and obtain output V/S input characteristics</li> <li>6. To determine speed-torque characteristics of an ac servomotor.</li> <li>7. To study performance of servo voltage stabilizer at various loads using load bank.</li> <li>8. To study behavior of separately excited dc motor in open loop and closed loop conditions at various loads.</li> </ol>	