

# STATE BOARD OF TECHNICAL EDUCATION, BIHAR

## Scheme of Teaching and Examinations for IV SEMESTER DIPLOMA IN ELECTRICAL ENGINEERING/ ELECTRICAL & ELECTRONIC ENGINEERING. ( Effective from Session 2016-17 Batch )

### THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam.(ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Transmission & Distribution of Electric Power	1620401	04	03	10	20	70	100	28	40	03
2.	D.C. Machines & Transformers	1620402	03	03	10	20	70	100	28	40	03
3.	Network Theory	1620403	03	03	10	20	70	100	28	40	03
4.	Electrical Estimation & Costing	1620404	03	03	10	20	70	100	28	40	02
5.	Applied Electronics	1620405	03	03	10	20	70	100	28	40	03
<b>Total :-</b>			<b>16</b>				<b>350</b>	<b>500</b>			

### PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	D.C. Machines & Transformers Lab	1620406	02	03	15	35	50	20	01
7.	Electronic Construction and Repair Lab	1620407	02	03	15	35	50	20	01
8.	Applied Electronics Lab	1620408	02	03	15	35	50	20	01
<b>Total :-</b>			<b>04</b>				<b>150</b>		

### TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits	
9.	Electrical Estimation & Costing (TW)	1620409	02	07	18	25	10	01	
10.	Electrical Drawing (TW)	1620410	03	07	18	25	10	02	
11.	Development of Life Skills-II	1620411	03	07	18	25	10	02	
12.	Professional Practices-IV	1620412	03	07	18	25	10	02	
<b>Total :-</b>			<b>13</b>			<b>100</b>			
<b>Total Periods per week Each of duration One Hour</b>				<b>33</b>	<b>Total Marks = 750</b>				<b>24</b>

**TRANSMISSION & DISTRIBUTION OF ELECTRIC POWER**  
**(ELECTRICAL ENGINEERING GROUP)**

<b>Subject Code 1620401</b>	<b>Theory</b>					<b>Credits 03</b>	
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>		<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>		<b>70</b>
	<b>04</b>	<b>—</b>	<b>—</b>	<b>TA</b>	<b>:</b>		<b>10</b>
	<b>—</b>	<b>—</b>	<b>—</b>	<b>CT</b>	<b>:</b>		<b>20</b>

**CONTENTS: THEORY**

<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
<b>Unit-01</b>	<b>Basics Of Transmission.</b> 1.1 Introduction to transmission. 1.2 Necessity of transmission of electricity. 1.3 Classification & comparison of different transmission systems.	<b>03</b>	<b>03</b>
<b>Unit-02</b>	<b>Transmission Line Components.</b> 2.1 Introduction to line components. 2.2 types of conductors-Copper, Aluminum & state their trade names. 2.3 Solid, Stranded & bundled conductors. 2.4 Line supports – requirements, types, and field of applications. 2.5 Line insulators – requirements, types, and field of applications. 2.6 Failure of insulator & reasons of Failure. 2.7 Distribution of potential over a string of suspension insulators. 2.8 Concept of string efficiency, Methods of improving string efficiency. 2.9 Corona – corona formation, advantages & disadvantages, factors affecting corona, important terms related to corona. 2.10 Spacing between Conductors. 2.11 Calculation of Span length & sag Calculation ( Numerical based on 2.7 , 2.8 & 2.11)	<b>10</b>	<b>12</b>
<b>Unit-03</b>	<b>Transmission Line Parameters</b> 3.1 R,L & C of 1-ph & 3-ph transmission line & their effects on line. 3.2 Skin effect, proximity effect & Ferranti effect. 3.3 Concept of transposition of conductors & necessity.	<b>03</b>	<b>04</b>
<b>Unit-04</b>	<b>Performance Of Transmission Line.</b> 4.1 Classification of transmission lines. 4.2 Losses, Efficiency & Regulation of line. 4.3 Performance of single phase short transmission line(Numerical based on it ) 4.4 Effect of load power factor on performance. 4.6 Medium transmission lines-End condenser, Nominal T & Nominal $iZ$ Network with vector diagram. 4.7 General circuit & Generalised Circuit Constants ( A, B, C, D )	<b>10</b>	<b>13</b>
<b>Unit-05</b>	<b>Extra High Voltage Transmission.</b> 5.1 Introduction & Requirement. 5.2 EHVAC Transmission, Reasons for adoption & limitations. 5.3 HVDC Transmission – Advantages, Limitations.	<b>03</b>	<b>06</b>
<b>Unit-06</b>	<b>Components Of Distribution System.</b> 6.1 Introduction. 6.2 Classification of distribution system. 6.3 A.C distribution. 6.4 Connection schemes of distribution system. 6.5 Requirements of Distribution systems. 6.6 Design consideration. 6.7 A.C. distribution calculations. 6.8 Methods of solving A.C.-1 phase & 3 $\emptyset$ -phase connected (balanced) distribution system. ( Numerical based on 1-ph & 3-ph balanced distribution system)	<b>10</b>	<b>16</b>

<b>Unit-07</b>	<b>Underground Cables.</b> 7.1 Introduction & requirements. 7.2 Classification of cables. 7.3 Cable conductors. 7.4 Cable construction. 7.5 Cable insulation, Metallic sheathing & mechanical protection. a. Comparison with overhead lines 7.6 Cable laying	<b>03</b>	<b>04</b>
<b>Unit-08</b>	<b>Substations.</b> 8.1 Introduction. 8.2 Classification of indoor & outdoor sub-stations. 8.3 Advantages & Disadvantages. 8.4 Selection & location of site. 8.5 Main connection schemes. 8.6 Equipment's circuit element of substations. 8.6.1 In coming & outgoing lines, Transformers, CT&PT, Relays, CB's, fuses, Isolators, batteries, lightning arresters. Insulators. 8.6.2 Bus bar's material, types in detail. Connection diagram and layout of sub-stations.	<b>06</b>	<b>12</b>
<b>TOTAL</b>		<b>48</b>	<b>70</b>

**Text /Reference Books:**

<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
A Course in electrical power	Soni-Gupta- Bhatnagar	Dhanpat Rai
Principals of power system	V. K. Mehta	S. Chand & Company
A Course in electrical power	S. L. Uppal.	S. K. Khanna
Transmission & distribution of electrical energy	J. B. Gupta	S. K. Khanna
Generation & transmission of electrical energy	A. T. Star	Pitman
Transmission & Distribution of Electric Power	Savinder Singh	Foundation Publishing

**D.C. MACHINES & TRANSFORMERS (ELECTRICAL ENGINEERING GROUP)**

<b>Subject Code 1620402</b>	<b>Theory</b>					<b>Credits 03</b>	
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>		<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>		<b>70</b>
	<b>03</b>	<b>—</b>	<b>—</b>	<b>TA</b>	<b>:</b>		<b>10</b>
	<b>—</b>	<b>—</b>	<b>—</b>	<b>CT</b>	<b>:</b>		<b>20</b>

**CONTENTS: THEORY**

<b>Chapter</b>	<b>Name of Topics</b>	<b>Hours</b>	<b>Marks</b>
<b>Unit-01</b>	<b>DC Machine General</b> 1.1 definition 1.2 construction & types of DC machines 1.3 armature winding types : lap & wave. 1.4 emf equation 1.5 armature reaction 1.6 commutation – concept of reactance voltage 1.7 methods of improving commutation – emf commutation Numericals on e.m.f. equation	<b>08</b>	<b>12</b>
<b>Unit-02</b>	<b>DC Motors</b> 2.1 working, principle, back emf, torque equation 2.2 characteristics & application of series, shunt & compound motors 2.3 speed control of dc motor & numerical based on 2.1 to 2.3 2.4 starting of dc motor – 3 point starter 2.5 applications of above motors	<b>08</b>	<b>10</b>
<b>Unit-03</b>	<b>Single phase transformer</b> 3.1 introduction 3.2 principle of operation 3.3 emf equation, transformation ratio, KVA rating 3.4 types & construction of transformer 3.5 concept of ideal transformer 3.6 transformer on no load – vector diagram & numerical 3.7 transformer on load – phasor diagram of loaded transformer 3.8 equivalent circuit 3.9 direct method of finding performance of transformer, 3.10 finding the performance of 1 phase transformer by indirect method using OC& SC Test. 3.11 all day efficiency- numerical based on 3.10 & 3.11 3.12 polarity of transformer & polarity test 3.13 application 3.14 1 phase auto transformer – principle , advantages & disadvantages 3.15 comparison with 2 winding transformer & potential divider 3.16 Design of Transformer: Main Dimensions, No. of turns for Primary and secondary, Conductor cross section	<b>20</b>	<b>10</b>
<b>Unit-04</b>	<b>Three phase Transformer</b> 4.1 construction 4.2 connections 4.3 voltage & current ratio 4.4 vector groups 4.5 3 phase auto transformer 4.6 application of 3 phase auto transformer	<b>08</b>	<b>10</b>
<b>Unit-05</b>	<b>Special purpose transformer</b> 5.1 current transformer 5.2 potential transformer 5.3 isolation transformer 5.4 welding transformer	<b>04</b>	<b>08</b>
	<b>Total</b>	<b>48</b>	<b>70</b>

<b>Text /Reference Books:</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Electrical Technology	E. Hughes	Logmans, London
Electrical Technology	H. Cotton	C. B. S. Publisher New Delhi
Electrical Technology Vol. II	B. L. Theraja	S. Chand & CO Delhi
Electrical Machine Design	A. K. Sohawney	Dhanpatrai & Sons, New Delhi
Pradeep Sinha	D.C. Machines & Transformers	Foundation Publishing

**NETWORK THEORY (ELECTRICAL ENGINEERING GROUP)**

<b>Subject Code 1620403</b>	<b>Theory</b>						<b>Credits</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>	<b>03</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>70</b>	
	<b>03</b>	<b>—</b>	<b>—</b>	<b>TA</b>	<b>:</b>	<b>10</b>	
<b>—</b>	<b>—</b>	<b>—</b>	<b>CT</b>	<b>:</b>	<b>20</b>		

**CONTENTS: THEORY**

	<b>Name of Topics</b>	<b>Hours</b>	<b>Marks</b>
<b>Unit-01</b>	<b><u>BASIC CIRCUIT ELEMENTS &amp; WAVEFORMS:</u></b>	[07]	
	01.01 Circuit Components		
	01.02 Standard Input Signals		
	01.03 Sinusoidal Signals		
<b>Unit-02</b>	<b><u>MESH AND NODE ANALYSIS:</u></b>	[09]	
	02.01 Kirchoff's Laws.		
	02.02 Source Transformation.		
	02.03 Mesh & Node analysis.		
	02.04 Magnetic coupling.		
<b>Unit-03</b>	<b><u>FOURIER SIERIES:</u></b>	[06]	
	03.01 All forms of Fourier Series including trigonometry, Exponential etc.		
	03.02 Fourier Transform.		
<b>Unit-04</b>	<b><u>LAPLACE TRANSFORM &amp; THEIR APPLICATION:</u></b>	[07]	
	04.01 Introduction.		
	04.02 Laplace Transformation.		
	04.03 Application of Laplace Transform in the solution of Linear Differential Equation.		
	04.04 Inverse Laplace Transform.		
<b>Unit-05</b>	<b><u>RESONANCE:</u></b>	[03]	
	05.01 Series Resonance.		
	05.02 Parallel Resonance		
<b>Unit-06</b>	<b><u>TWO-PORT NETWORK:</u></b>	[12]	
	06.01 Introduction.		
	06.02 Open Circuit Impedance Parameters.		
	06.03 Short Circuit Admittance.		
	06.04 Two Port Symmetry.		
<b>Unit-07</b>	<b><u>PASSIVE NETWORK SYNTHESIS:</u></b>	[10]	
	07.01 Introduction.		
	07.02 Positive real function.		
	07.03 Two Terminal R-L Network.		
	07.04 Two Terminal R-C Network.		
<b>Unit-08</b>	<b><u>INTRODUCTION OF FIRST ORDER &amp; SECOND ORDER SYSTEMS WITH EXAMPLES:</u></b>	[06]	
<b>Total</b>		<b>60</b>	

**Books Recommended:-**

1.	Network & system	-	D. Roy Choudhury
2.	Network & system	-	G.K. Mittal
3.	Network & system	-	Vulkenberg
4.	Network & system	-	Dacsur & Kuo
5.	Network Theory	-	R.N. Pathak

**ELECTRICAL ESTIMATION & COSTING (ELECTRICAL ENGINEERING GROUP)**

<b>Subject Code 1620404</b>	<b>Theory</b>					<b>Credits 02</b>	
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>		<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>		<b>70</b>
	<b>03</b>	<b>—</b>	<b>—</b>	<b>TA</b>	<b>:</b>		<b>10</b>
	<b>—</b>	<b>—</b>	<b>—</b>	<b>CT</b>	<b>:</b>		<b>20</b>

**CONTENTS: THEORY**

	<b>Name of Topics</b>	<b>Hours</b>	<b>Marks</b>
<b>Unit-01</b>	<p><b>Drawing and IE rules</b></p> <p>1.1 Classification of Electrical Installation.                      1.2 General requirement of Electrical Installation.                      1.3 Reading and Interpretation of Electrical Engineering Drawings.                      1.3.1. Various diagrams, plans and layout                      1.3.2. Important definitions related to Installation                      1.4 IE rules related to Electrical Installation &amp; Testing.</p>	<b>02</b>	<b>04</b>
<b>Unit-02</b>	<p><b>Service Connection</b></p> <p>2.1 Concept of service connection.                      2.2 Types of service connection &amp; their features.                      2.3 Methods of Installation of service connection.                      2.4 Estimates of under ground &amp; overhead service connections.</p>	<b>02</b>	<b>06</b>
<b>Unit-03</b>	<p><b>Residential Building Electrification</b></p> <p>3.1 General rules guidelines for wiring of Residential Installation and positioning of equipments.                      3.2 Principles of circuit design in lighting and power circuits.                      3.3 Procedures for designing the circuits and deciding the number of circuits.                      3.4 Method of drawing single line diagram.                      3.5 Selection of type of wiring and rating of wires &amp; cables.                      3.6 Load calculations and selection of size of conductor.                      3.7 Selection of rating of main switch, distributions board, protective switchgear ELCB and MCB and wiring accessories.                      3.8 Earthing of Residential Installation.                      3.9 Sequence to be followed for preparing Estimate                      3.10 Preparation of detailed estimates and costing of Residential Installation.</p>	<b>08</b>	<b>18</b>
<b>Unit-04</b>	<p><b>Electrification of commercial Installation</b></p> <p>4.1 Concept of commercial Installation.                      4.2 Differentiate between electrification of Residential and commercial Installation.                      4.3 Fundamental considerations for planning of an electrical Installation system for commercial building.                      4.4 Design considerations of electrical Installation system for commercial building.                      4.4.1 Load calculations &amp; selection of size of service connection and nature of supply.                      4.4.2 Deciding the size of cables, busbar and busbar chambers.                      4.4.3 Mounting arrangements and positioning of switchboards, distribution boards main switch etc.                      4.4.4 Earthing of the electrical Installation                      4.5 Selection of type wire, wiring system &amp; layout.                      4.6 Sequence to be followed to prepare estimate.                      4.7 Preparation of detailed estimate and costing of commercial Installation.</p>	<b>08</b>	<b>14</b>

<b>Unit-05</b>	<b>Electrification of factory unit Installation</b> 5.1 Concept of Industrial load. 5.2 Concept of Motor wiring circuit and single line diagram. 5.3 Important guidelines about power wiring and Motor wiring. 5.4 Design consideration of Electrical Installation in small Industry/Factory/workshop. 5.4.1. Motor current calculations. 5.4.2. Selection and rating of wire, cable size & conduct. 5.4.3 Deciding fuse rating, starter, distribution boards main switch etc. 5.4.4. Deciding the cable route, determination of length of wire, cable, conduit, earth wire, and earthing. 5.5 Sequence to be followed to prepare estimate. <b>5.6</b> Preparations of detailed estimate and costing of small factory unit/ workshop.	<b>08</b>	<b>18</b>
<b>Unit-06</b>	<b>Testing of Installation</b> Testing of wiring Installation for verification of current; earthing, insulation resistance and continuity as per IS	<b>02</b>	<b>04</b>
<b>Unit-07</b>	<b>Contracts, Tenders and Execution</b> 7.1 Concept of contracts and Tenders 7.1.1 Contracts, types of contracts, contractors. 7.1.2 Valid Contracts, Contract documents. 7.1.3 Tender and tender notices. 7.1.4 Procedure for submission and opening tenders. 7.1.5 Comparative statements, criteria for selecting contractors, General conditions in order form. 7.2 Principles of Execution of works 7.3.1 Administrative approval, Technical sanctions. 7.3.2. Billing of executed work.	<b>02</b>	<b>06</b>
	<b>Total</b>	<b>32</b>	<b>70</b>

**Text /Reference Books:**

<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Electrical Design; Estimating and costing	K.B. Raina S.K.Bhattacharya	New Age International (p) Limited, New Delhi
Electrical Estimating and costing	Surjit Singh	Dhanpat Rai and company, New Delhi
Electrical Estimating and costing	N. Alagappan S. Ekambaram	Tata Mc Graw Hill Publication, New Delhi
Electrical wiring Estimating and costing	S.L. Uappal	Khanna Publication.
Electrical wiring, Estimating and costing	B.D.Arora	R.B. Publication, New Delhi
Electrical Estimation & Costing	Savinder Singh	Foundation Publishing



**APPLIED ELECTRONICS (ELECTRICAL ENGINEERING GROUP)**

<b>Subject Code 1620405</b>	<b>Theory</b>						<b>Credits</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>	<b>03</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>70</b>	
	<b>03</b>	<b>—</b>	<b>—</b>	<b>TA</b>	<b>:</b>	<b>10</b>	
<b>—</b>	<b>—</b>	<b>—</b>	<b>CT</b>	<b>:</b>	<b>20</b>		

**CONTENTS: THEORY**

<b>Chapter</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
<b>Unit-01</b>	<p><b>AMPLIFIERS</b></p> <p><b>1.1) Power Amplifiers</b></p> <p>1.1.1 Introduction, Classification – Class A, Class B, Class AB &amp; Class C, efficiency of each.</p> <p>1.1.2 Single stage class A power amplifier: Circuit operation, input &amp; output waveforms , graphical Analysis and efficiency of</p> <p>1.1.2.i] Transformer couple resistive load single stage power amplifier</p> <p>1.1.2. ii] Class A push pull amplifier</p> <p>1.1.2.iii] Class B push pull amplifier</p> <p>1.1.2.iv] Class AB push pull amplifier</p> <p>1.1.3 Concept of cross over distortion</p> <p>1.1.4. Advantages of push pull amplifier , collector power dissipation requirement &amp; specifications of power transistor, need of heat sink.</p> <p><b>1.2 FET Amplifier</b></p> <p>1.2.1 Biasing of FET: Source Self Bias, Drain to source Bias Application of FET as V V R</p> <p>1.2.2 Common Source Amplifier: Working &amp; Applications</p> <p>1.2.3 Introduction to MOSFET:Types, Construction, Working &amp; Applications</p> <p><b>1.3 Tuned Amplifiers</b></p> <p>1.3.1 Introduction &amp; necessity of tuned amplifier. Basic tuned circuits, series &amp; parallel resonance in tuned circuits.</p> <p>1.3.2 Operating principle, circuit working, resonance frequency of single tuned, double tuned amplifiers.</p>	<b>16</b>	<b>24</b>
<b>Unit-02</b>	<p><b>2.1 Feedback Amplifiers &amp; oscillators</b></p> <p>2.1.1 General theory of feedback: Types of feedback – negative &amp; positive feedback.</p> <p>2.1.2 Types of negative feedback – voltage shunt, voltage series, current shunt &amp; current series.</p> <p>2.1.3 Advantages of negative feedback on voltage gain , bandwidth , input impedance output impedance, stability , noise , distortion in amplifiers.</p> <p>2.2 Introduction to oscillator , block diagram of sine wave oscillator , requirement of oscillation –</p> <p>2.2.1 Barkhausen criterion , operating principles of RC &amp; LC oscillators</p> <p>2.2.2 RC oscillators – RC phase shift , Wien bridge</p> <p>2.2.3 LC oscillators – Colpitts , Hartley , Crystal oscillators Circuit diagram, equation for frequency of oscillation &amp; frequency stability.</p>	<b>10</b>	<b>14</b>
<b>Unit-03</b>	<p><b>3.1 Wave shaping circuits</b></p> <p>3.1.1 Necessity of wave shaping circuits.</p> <p>3.1.2 Linear circuits – RC integrator &amp; differentiator – input / output waveforms - &amp; frequency response.</p> <p>3.1.3 Non-linear circuits - Clipper , diode series &amp; shunt ,positive &amp; negative biased &amp; unbiased &amp; combinational clipper.</p> <p>3.1.4 Clampers – positive &amp; negative clampers</p>	<b>06</b>	<b>10</b>

<b>Unit-04</b>	<b>4.1 Multivibrators</b> 4.2 Transistor as switch. Definition & graphical representation of different time periods . 4.3 Multivibrator classification , circuit working & frequency with specific application . MMV , AMV,BMV & Schmitt trigger	<b>06</b>	<b>10</b>
<b>Unit-05</b>	<b>5.1 Time base generator –</b> 5.2 Voltage time base generator, exponential sweep generator UJT Relaxation Oscillator, negative resistance generator. working principle & operation . 5.3 Current time base generator , bootstrap & miller sweep generator, applications in TV & CRO	<b>06</b>	<b>08</b>
<b>Unit-06</b>	<b>Trouble shooting &amp; Testing</b> 6.1 Need for trouble shooting , Important steps for testing 6.2 Visible testing – Observing circuits for visible faults like broken component, open contacts etc. 6.3 Active testing – Voltage analysis, Resistance analysis, signal analysis. 6.4 Trouble shootings of multivibrators, phase shift oscillators, transistorised sweep generator, clipping & clamping circuits.	<b>04</b>	<b>04</b>
	<b>Total</b>	<b>48</b>	<b>70</b>

<b>Text /Reference Books:</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Electronic Principles	Paul Malvino	Tata McGraw-Hill
Applied Electronics	R.S.Sedha	S.Chand & Co.
Electronics Devices & Circuits	Allen ottershed	Prantice Hall India LTD.
Pulse Digital & Switching Waveforms	J.Millman and H.Taub	Tata McGraw-Hill
Pulse & Digital Electronics	G.K.Mittal and R.Vanvasai	Khanna Publication
Applied Electronics	R.S. Sharma	Foundation Publishing

## D.C MACHINES & TRANSFORMERS LAB (ELECTRICAL ENGINEERING GROUP)

<b>Subject Code</b> <b>1620406</b>	<b>Practical</b>			<b>Credits</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>50</b>
	—	—	<b>02</b>	<b>Internal</b>	<b>:</b>	<b>15</b>
	—	—	—	<b>External</b>	<b>:</b>	<b>35</b>

### **CONTENTS: PRACTICAL**

Skills to be developed:

#### **Intellectual Skills:**

1. Analytical Skills.
2. Identification

#### **Motor Skills:**

1. Measurement Skills.
2. Connection Skills.

#### **List of Practical's:-**

- 1) a) To identify the constructional parts of D. C. machine.  
b) To plot the O.C.C. of a given d. c. machine and to find critical resistance.
- 2) To find the performance of d. c. series & shunt motor by conducting load test
- 3) a) To control the speed of d. c. shunt motor above and below normal speed.  
b) To reverse the direction of rotation of d. c. motor.
- 4) a) To identify the constructional details of 1-phase and 3-phase transformer.  
b) Visit to maintenance and repair workshop of a transformer and prepare a report.
- 5) To measure the performance of single phase transformer by direct loading and to find transformation ratio.
- 6) To measure the performance of single phase transformer by conducting O.C. and S.C. test.
- 7) To identify terminal polarity of corresponding phases of 3-phase transformer & to calculate transformation ratio.
- 8) To compare 1-phase auto transformer with two winding transformer by collecting literature from local dealer/manufacturer & compare the data on following points.  
Weight of iron, weight of copper, turns ratio, efficiency & percentage regulation.
- 9) To observe the phase difference between primary & secondary voltage of 3-phase transformer for various vector groups.

**ELECTRONIC CONSTRUCTION AND REPAIR LAB (ELECTRICAL ENGINEERING GROUP)**

<b>Subject Code 1620407</b>	<b>Practical</b>						<b>Credits</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>	<b>01</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>50</b>	
	—	—	<b>02</b>	<b>Internal</b>	<b>:</b>	<b>15</b>	
	—	—	—	<b>External</b>	<b>:</b>	<b>35</b>	

**CONTENTS: PRACTICAL**

	<b>Name of the Topic</b>	<b>Hrs/Week</b>	<b>Marks</b>
<b>Unit-01</b>	Construction of a Battery Eliminator Box, Stabilizer Box, Radio and TV Cabinets.	[ ]	
<b>Unit-02</b>	Soldering Practice: Connecting circuit components.	[ ]	
<b>Unit-03</b>	Assembling Battery-Stabilizer, Radio Receiver, Intercoil Circuit.	[ ]	
<b>Unit-04</b>	Assembling Inverter.	[ ]	
<b>Unit-05</b>	<ul style="list-style-type: none"> <li>- Location of faults and repair of:-</li> <li>- Battery Eliminator</li> <li>- Voltage stabilizer</li> <li>- Inverter</li> <li>- Radio Receiver</li> </ul>	[ ]	
<b>Unit-06</b>	Location of faults in different types of Electronics Circuits.	[ ]	
<b>Unit-07</b>	Tracing fault in a C.H.O and its repair.	[ ]	
<b>Unit-08</b>	Handling of different types of multimeter: VTVM, Frequency meters, Calculators.	[ ]	
<b>Unit-09</b>	Fault Location and repair of instruments – Multimeter VTVM, Frequency meters, Calculators.	[ ]	
<b>Unit-10</b>	Repair of faulty study panels of your laboratory.	[ ]	
<b>Total</b>			

**NOTE:-** Three assignments for practical under SL 1 and 2. Two assignments for practical listed under SL 3 and 4, and at least one assignment for each of the practical under SL No. 5 to 10. Altogether eleven assignments to be done by the students in the workshop or laboratory.

**APPLIED ELECTRONICS LAB (ELECTRICAL ENGINEERING GROUP)**

Subject Code 1620408	Practical			Credits		
	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	ESE	:	50
	—	—	02	Internal	:	15
	—	—	—	External	:	35

**CONTENTS: PRACTICAL**

**Intellectual Skills:**

- 1 To locate faults in circuits.
2. Interpret the waveforms.

**Motor Skill:**

1. Ability to Sketch circuit/block diagram.
2. Ability to interpret the circuit.

**List of Practical's:**

1. To Plot Frequency response of FET amplifier.
2. To Plot Frequency response & bandwidth of negative feedback amplifier.
3. To Study the Colpitt's oscillator.
4. To Study RC Phase shift oscillator.
5. To Study RC integrator and differentiator & draw i/p & o/p waveforms.
6. To Study Clipping and clamping circuits.
7. To Study function of Astable Multivibrator.
8. To Study Monostable Multivibrator.
9. To Study Bistable Multivibrator.
10. To Study UJT relaxation oscillator.

**ELECTRICAL ESTIMATION & COSTING (TW) (ELECTRICAL ENGINEERING GROUP)**

<b>Subject Code 1620409</b>	<b>Term Work</b>			<b>Credits</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>25</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Internal</b>	<b>:</b>	<b>07</b>
	<b>—</b>	<b>—</b>	<b>02</b>	<b>External</b>	<b>:</b>	<b>18</b>

**CONTENTS: TERM WORK****2. IS/International Codes : IS- 5909, 7733, 2174, 732,4648****List of Assignments / Term Work :-**

<b>S.No</b>	<b>Term Work Problems on estimation and</b>	<b>Assignments : Note: Use half imperial drawing sheets</b>
1	<p>1. Electrical Installation scheme for single flat, independent bungalow and small house. Draw wiring diagram and prepare detailed estimate and its costing</p> <p>2. Electrical Installation scheme for commercial buildings. Draw wiring diagram and prepare detailed estimate and its costing.</p> <p>3. Electrical Installation scheme for small factory unit. Draw single line layout and prepare detailed estimate and its costing</p> <p>1) Small factory unit 2) Workshop 3) Agriculture pump and floor mills etc.</p>	<p>1. Design electrical Installation scheme for a flat scheme/ Independent bungalow/House. Draw detail wiring diagrams also prepare material schedule and detailed estimate and costing. Prepare report and Drawing sheets. (Minimum 2 Drawing sheets).</p> <p>2. Design electrical Installation scheme for any one commercial complex having minimum 20KW load requirements. Draw detailed wiring diagram; prepare material schedule and detailed estimate and costing, prepare report and Drawing sheet (one Drawing sheet).</p> <p>3. Design Electrical Installation scheme for agriculture pump/floor mill. Draw wiring diagram, prepare material schedule and detailed estimate and costing. Prepare report and Drawing sheet. (One Drawing sheet).</p> <p>4. Design electrical Installation scheme for any two-factory/small unit/workshop having aggregate load of 30 KW. Draw wiring diagrams prepare material schedule &amp; detail estimate and costing. Prepare report and Drawing sheet. (Two Drawing sheet).</p>

**ELECTRICAL DRAWING (TW) (ELECTRICAL ENGINEERING GROUP) TW**

<b>Subject Code</b> <b>1620410</b>	<b>Term Work</b>			<b>Credits</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>25</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Internal</b>	<b>:</b>	<b>07</b>
	—	—	<b>03</b>	<b>External</b>	<b>:</b>	<b>18</b>

<b>Contents :Term Work</b>		<b>Hrs/week</b>
<b>Chapter</b>	<b>Name of Topics</b>	<b>Hours</b>
01	Study of symbols for representation of machines, Electrical Accessories Equipment switching and protection units as per IS 2032, 8270, 3722	2*
02	Study of various methods of representing circuits/systems through layouts, Block Diagrams, wiring diagrams.	1*
03	Study any Engineering Graphic package (preferably CAD)for preparing layout, Block Diagrams, wiring Diagrams of substations, Machine shop, Illumination systems etc.	1*
04	How to read and interpret, various types of electrical drawings based on the knowledge & Information given while studying the above 3 chapters.	4*

\* Eight Clock Hours of practical / drawing will be used for teaching theory

**Drawing Sheets: (HALF IMPERIAL)**

- (A) Draw a sheet for symbolic representation of various electrical equipment's/machines  
(B) Read the given circuits identify the components & trace the path of flow of current.
- Draw a sheet of wires & wiring accessories
- Prepare a drawing sheet showing details of domestic appliances such as Electric iron, electric Geyser, Electric Bell, Hot plate.
- Draw a sheet of electrical symbols for various electrical devices using CAD.
- Draw circuit diagrams for Staircase & Godown wiring using CAD.
- Draw (a) circuit diagram (b)vector diagram for conducting direct loading test on transformer using CAD
- Draw control and power circuit diagrams for DOL and Star/Delta Starter

**Mini Project:**

- Visit electrical Machine lab/workshop & trace the electrical installation. Draw Layout diagram & single line diagram.

**Text /Reference Books:**

<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Electrical Engineering Drawing	Dr. S. K. Bhattacharya	New Age International Publishers
Working with Auto CAD	Mr. Ajit Singh	Tata McGraw Hill
Electrical Drawing	Sandeep Verma	Foundation Publishing

**List of Assignments :-**

1	(A) Draw a sheet for symbolic representation of various electrical equipment's/machines (B) Read the given circuits identify the components & trace the path of flow of current.
2	Draw a sheet of wires & wiring accessories
3	Prepare a drawing sheet showing details of domestic appliances such as Electric iron, electric Geyser, Electric Bell, Hot plate
4	Draw a sheet of electrical symbols for various electrical devices using CAD.
5	Draw circuit diagrams for Staircase & Godown wiring using CAD.
6	Draw (a) circuit diagram (b)vector diagram for conducting direct loading test on transformer using CAD.

**DEVELOPMENT OF LIFE SKILLS-II (ELECTRICAL ENGINEERING GROUP) TW**

<b>Subject Code 1620411</b>	<b>Term Work</b>						<b>Credits 02</b>	
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>25</b>		
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Internal</b>	<b>:</b>	<b>07</b>		
	—	—	<b>03</b>	<b>External</b>	<b>:</b>	<b>18</b>		

**CONTENTS: TERM WORK**

	<b>Name of Topics</b>	<b>HOURS</b>	
<b>Unit-01</b>	<b>SOCIAL SKILLS</b> SOCIETIES, SOCIAL STRUCTURE, DEVELOP SYMPATHY AND EMPATHY.	<b>01</b>	
<b>Unit-02</b>	<b>SWOT Analysis</b> – Concept, How to make use of SWOT.	<b>01</b>	
<b>Unit-03</b>	<b>Inter personal Relation</b> Sources of conflict, Resolution of conflict , Ways to enhance interpersonal relations.	<b>02</b>	
<b>Unit-04</b>	<b>Problem Solving</b> <b>I) STEPS IN PROBLEM SOLVING,</b> 1) IDENTIFY AND CLARIFY THE PROBLEM, 2) INFORMATION GATHERING RELATED TO PROBLEM, 3) EVALUATE THE EVIDENCE, 4) CONSIDER ALTERNATIVE SOLUTIONS AND THEIR IMPLICATIONS, 5) CHOOSE AND IMPLEMENT THE BEST ALTERNATIVE, 6) REVIEW <b>II) Problem solving technique.</b> (any one technique may be considered) 1) Trial and error, 2) Brain storming, 3) Lateral thinking	<b>02</b>	
<b>Unit-05</b>	<b>Presentation Skills</b> Body language -- Dress like the audience Posture, Gestures, Eye contact and facial expression. PRESENTATION SKILL – STAGE FRIGHT, Voice and language – Volume, Pitch, Inflection, Speed, Pause Pronunciation, Articulation, Language, Practice of speech. Use of aids – OHP,LCD projector, white board	<b>03</b>	
<b>Unit-06</b>	<b>Group discussion and Interview technique –</b> Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making <b>INTERVIEW TECHNIQUE NECESSITY, TIPS FOR HANDLING COMMON QUESTIONS.</b>	<b>03</b>	
<b>Unit-07</b>	<b>Working In Teams</b> UNDERSTAND AND WORK WITHIN THE DYNAMICS OF A GROUPS. TIPS TO WORK EFFECTIVELY IN TEAMS, ESTABLISH GOOD RAPPORT, INTEREST WITH OTHERS AND WORK EFFECTIVELY WITH THEM TO MEET COMMON OBJECTIVES, TIPS TO PROVIDE AND ACCEPT FEEDBACK IN A CONSTRUCTIVE AND CONSIDERATE WAY , LEADERSHIP IN TEAMS, HANDLING FRUSTRATIONS IN GROUP.	<b>02</b>	



<b>Unit-08</b>	<b>Task Management</b> INTRODUCTION, TASK IDENTIFICATION, TASK PLANNING ,ORGANIZING AND EXECUTION, CLOSING THE TASK	<b>02</b>	
	<b>Total</b>	<b>16</b>	

**List of Assignment /Term Work : (Any Eight):-**

- 1) SWOT analysis: - Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT.
  - a) Your past experiences,
  - b) Achievements,
  - c) Failures,
  - d) Feedback from others etc.
- 2) Undergo a test on reading skill/memory skill administered by your teacher.
- 3) Solve the puzzles.
- 4) Form a group of 5-10 students and do a work for social cause e.g. tree Plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slump area, social activities like giving cloths to poor etc.( One activity per group)
- 5) Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.
- 6) Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the programme
- 7) Conduct an interview of a personality and write a report on it.
- 8) Discuss a topic in a group and prepare minutes of discussion. Write thorough description of the topic discussed
- 9) Arrange an exhibition, displaying flow-charts, posters, paper cutting, Photographs etc on the topic given by your teacher.

**Note:** - Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic. The **term work** will consist of any eight assignments.

**MINI PROJECT** ON TASK MANAGEMENT. DECIDE ANY TASK TO BE COMPLETED IN A STIPULATED TIME WITH THE HELP OF TEACHER. WRITE A REPORT CONSIDERING VARIOUS STEPS IN TASK MANAGEMENT.

<b>Text /Reference Books:</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Adams Time management	Marshall Cooks	Viva Books
Basic Managerial Skills for All	E.H. Mc Grath , S.J.	Prentice Hall of India, Pvt Ltd
Body Language	Allen Pease	Sudha Publications Pvt. Ltd.
Creativity and problem solving	Lowe and Phil	Kogan Page (I) P Ltd
Decision making & Problem Solving	Adair, J	Orient Longman
Develop Your Assertiveness	Bishop , Sue	Kogan Page India
Make Every Minute Count	Marion E Haynes	Kogan page India
Organizational Behavior	Steven L McShane and Mary Ann Glinow	Tata McGraw Hill
Organizational Behavior	Stephen P. Robbins	Pretice Hall of India, Pvt Ltd

Presentation Skills	Michael Hatton ( Canada – India Project)	ISTE New Delhi
Stress Management Through Yoga and Meditation	--	Sterling Publisher Pvt Ltd .
Target setting and Goal Achievement	Richard Hale ,Peter Whilom	Kogan page India
Time management	Chakravarty, Ajanta	Rupa and Company
Working in Teams	Harding ham .A	Orient Longman
Development of Life Skills-II	Sudha Ranjan	Foundation Publishing

### INTERNET ASSISTANCE

1. <http://www.mindtools.com>
2. <http://www.stress.org>
3. <http://www.ethics.com>
4. <http://www.coopcomm.org/workbook.htm>
5. <http://www.mapfornonprofits.org/>
6. <http://www.learningmeditation.com> <http://bbc.co.uk/learning/courses/>
7. <http://eqi.org/>
8. <http://www.abacon.com/commstudies/interpersonal/indisclosure.html>
9. <http://www.mapnp.org/library/ethics/ethxgde.htm>
10. [http://www.mapnp.org/library/grp\\_cnfl/grp\\_cnfl.htm](http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm)
11. <http://members.aol.com/nonverbal2/diction1.htm>
12. [http://www.thomasarmstron.com/multiple\\_intelligences.htm](http://www.thomasarmstron.com/multiple_intelligences.htm)
13. <http://snow.utoronto.ca/Learn2/modules.html>

### List of Assignments :

1	SWOT analysis:- Analyze yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT. a) Your past experiences, b) Achievements, c) Failures, d) Feedback from others etc.
2	Undergo a test on reading skill/memory skill administered by your teacher.
3	Solve the puzzles.
4	Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slump area, social activities like giving cloths to poor etc.( One activity per group)
5	Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.
6	Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the program.

**PROFESSIONAL PRACTICES-IV (ELECTRICAL ENGINEERING GROUP) TW**

<b>Subject Code 1620412</b>	<b>Term Work</b>						<b>Credits</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>25</b>	<b>02</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Internal</b>	<b>:</b>	<b>07</b>	
	—	—	<b>03</b>	<b>External</b>	<b>:</b>	<b>18</b>	

**CONTENTS : TERM WORK**

	<b>Activity</b>	<b>Hours</b>
<b>Unit-01</b>	<p><b>Industrial Visits</b> Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. The industrial visits may be arranged in the following areas / industries :</p> <ol style="list-style-type: none"> <li>1) Telephone Exchange</li> <li>2) District Level National Information Center(NIC)</li> <li>3) Any other</li> </ol>	<b>08</b>
<b>Unit-02</b>	<p>Lectures by Professional / Industrial Expert to be organized from any of the following areas:</p> <ol style="list-style-type: none"> <li>x) Interview Techniques.</li> <li>xi) Cyber Laws</li> <li>xii) Nano Technology</li> <li>xiii) Ethical Hacking</li> <li>xiv) Any other suitable topic</li> </ol>	<b>10</b>
<b>Unit-03</b>	<p><b>Information Search :</b> Information search can be done through manufacturers, catalogue, internet, magazines; books etc. and submit a report. Following topics are suggested :</p> <ol style="list-style-type: none"> <li>v) Market survey of different processors.</li> <li>vi) Blue tooth Technology</li> <li>vii) Artificial Technology</li> <li>viii) Data ware-housing</li> <li>ix) Cryptography</li> <li>x) Digital signal processing</li> <li>xi) Bio-informatics</li> <li>xii) Any other suitable areas</li> </ol>	<b>10</b>
<b>Unit-4</b>	<p><b>Seminar :</b> Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes) Seminar topic</p> <ol style="list-style-type: none"> <li>i) Parallel Computing</li> <li>ii) Distributed Processing</li> <li>iii) Wireless communication</li> <li>iv) Virtual reality</li> <li>v) Embedded system</li> <li>vi) Computer security</li> <li>vii) Multimedia Techniques</li> <li>viii) Bio - Technology</li> <li>ix) Any other suitable topic</li> </ol>	<b>10</b>
<b>Unit-5</b>	<p><b>Mini Project / Activities :</b></p> <ol style="list-style-type: none"> <li>a) Web-site development</li> <li>b) Database related any topic</li> <li>c) System projects in VB like notepad, editors</li> <li>d) Animation projects using C, C++, VB etc</li> <li>e) Any other suitable topic</li> </ol>	<b>10</b>
	<b>Total</b>	<b>48</b>

**Text /Reference Books:**

<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Professional Practices-IV	Sudha Ranjan	Foundation Publishing