

**VI Semester**

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory hours	Drawing hours	Practical hours	Total hours
4030610	Distribution and Utilization	6	-	-	6
4030630	Energy Conservation and Audit	4	-	-	4
<b>Elective II Theory</b>					
4030621	Power Electronics	5	-	-	5
4030622	Bio-Medical Instrumentation	5	-	-	
4030623	Computer Hardware and Networks	5	-	-	
4030640	Electrical Estimation and Costing Practical	-	-	5	5
<b>Elective II Practical</b>					
4030624	Power Electronics Practical	-	-	6	6
4030625	Bio-Medical Instrumentation Practical	-	-	6	
4030626	Computer Hardware and Networks Practical	-	-	6	
4020660	Project Work and Internship	-	-	6	6
		15	-	17	32
Extra / Co-Curricular activities					
Library		-	-	-	1
Physical Education		-	-	-	2
<b>TOTAL</b>					<b>35</b>

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory hours	Drawing hours	Practical hours	Total hours
4030610	Distribution and Utilization	6	-	-	6
4030630	Energy Conservation and Audit	4	-	-	4
<b>Elective II Theory</b>					
4030621	Power Electronics	5	-	-	5
4030622	Bio-Medical Instrumentation	5	-	-	
4030623	Computer Hardware and Networks	5	-	-	
4030640	Electrical Estimation and Costing Practical	-	-	5	5
<b>Elective II Practical</b>					
4030624	Power Electronics Practical	-	-	6	6
4030625	Bio-Medical Instrumentation Practical	-	-	6	
4030626	Computer Hardware and Networks Practical	-	-	6	
4020660	Project Work and Internship	-	-	6	6
		15	-	17	32
Extra / Co-Curricular activities					
Library		-	-	-	1
Physical Education		-	-	-	2
<b>TOTAL</b>					<b>35</b>

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS**  
**N-SCHEME**

(Implemented from the Academic year 2020 - 2021 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 4030610

Semester : VI

Subject Title : Distribution and Utilization

**TEACHING AND SCHEME OF EXAMINATION**

No of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
<b>DISTRIBUTION AND UTILIZATION</b>	6	96	25	100*	100	3 Hrs.

\* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

**Topics and Allocation of Hours**

Unit	Topic	Hours
I	Distribution	20
II	Industrial Drives	18
III	Electric Traction	17
IV	Illumination	17
V	Electric Heating and Welding	17
Test & Model Exam		7
<b>Total</b>		<b>96</b>

## **RATIONALE**

Electrical Energy requirement is the major crisis and hence any saving in Electrical energy is equivalent to production of Electrical Energy. Saving can be achieved by the utilization of Renewable Energy Sources.

## **OBJECTIVES**

At the end of the Semester, Students will be able to understand the concepts of :

- Substation arrangements.
- Distribution of Power.
- Industrial Drives - Suitability for different applications.
- Track Electrification-Traction Mechanics – Traction Motor Controls
- Illumination – Design of Lighting Schemes – Sources of Light.
- Electric Heating – Methods – Electric Furnace – Temperature Control.
- Electric Welding and Welding Equipments.

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### DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	<p><b>DISTRIBUTION</b></p> <p><b>1.1. Substation:</b> Introduction-Sub Stations-Classification of Sub Stations-Indoor and Outdoor S.S — Gas Insulated S.S- Comparisons-Layout 110/11KV Substation and 11KV/400V Distribution Substation-Substation Equipments-Bus Bar- Types of Bus Bar Arrangement -Advantages and Disadvantages.</p> <p><b>1.2 Distribution:</b> Distribution System-Requirements of a Distribution System-Part of Distribution System- Classification of Distribution Systems-Comparison of Different Distribution Systems (A.C And D.C) -A.C Distribution -Types-Connection Schemes of Distribution System-A. C Distribution Calculations- Calculation of Voltage At Load Points on Single Phase Distribution Systems (With Concentrated Load Only)- Distribution Fed At One End, Both Ends and Ring Mains-Problems- Three Phase, Four Wire, Star Connected Unbalanced Load Circuit- Problems- Consequence of Disconnection of Neutral in Three Phase Four Wire System (Illustration with an Example)</p>	<p>8</p> <p>12</p>
II	<p><b>INDUSTRIAL DRIVES</b></p> <p>Introduction to Electric Drive – Advantages of Electric Drives – Transmission of Power-Types of Electric Drives-Individual, Group and Multi Motor Drives — Advantages and Disadvantages of Individual And Group Drive -Factors Governing The Selection of Motors-Nature and Classification of Load Torque-Matching of Speed Torque Characteristics of Load and Motor-Standard Ratings of Motor- Classes of Load Duty Cycles -Selection of Motors for Different Duty Cycles-Selection of Motors for Specific Application-Braking- Features of Good Braking System- Types of Braking - Advantages of Electric Braking - Plugging, Dynamic</p>	18

	and Regenerative Braking - As Applied to Various Motors.	
III	<p><b>ELECTRIC TRACTION</b></p> <p>Introduction To Traction Systems - Advantages and Disadvantages of Electric Traction. System of Track Electrification - Methods of Supplying Power-Rail Connected System and Over Head System-O.H. Equipments-Contact Wire, Centenary and Droppers — Current Collection Gear for OHE —Bow and Pantograph Collector-Different Systems of Track Electrification-Advantages of Single Phase Low Frequency A. C. System- Booster Transformer-Necessity- Methods of Connecting B.T-Neutral Sectioning.</p> <p><b>Traction Mechanics:</b> Units and Notations used in Traction Mechanics-Speed Time Curve for Different Services - Simplified Speed Time Curve-Derivation of Maximum Speed-Crest Speed, Average Speed, Schedule Speed (Definitions Only)-Tractive Effort and Power Requirement- Specific Energy Output- Specific Energy Consumption - Traction Motors and Control: Desirable Characteristics of Traction Motors-Motors used for Traction Purpose-Methods of Starting and Speed Control of D.C Traction Motors- Rheostatic Control-Energy Saving with Plain Rheostatic Control Series- Parallel Control- Energy Saving with Series Parallel Starting - Shunt Transition -Bridge- Transition- Multiple Unit Control –Regenerative Braking. Recent Trends in Electric Traction-Magnetic Levitation (MEGLEV) — Suspension Systems.</p>	<p>8</p> <p>9</p>

IV

V	<b>ELECTRIC HEATING AND WELDING</b>	
	<b>Electric Heating:</b> Introduction – Advantages of Electric Heating – Modes of Heat Transfer - Classification of Electric Heating - Power Frequency Electric Heating — Direct and Indirect Resistance Heating-Infrared Heating-Arc Heating –High Frequency Electric Heating – Induction Heating-Induction Stove –Eddy Current Heating and Dielectric Heating.	5
	<b>Electric Furnaces:</b> Resistance Furnace-Requirements of Heating Elements-Commonly used Heating Element Materials- Resistance Furnace for Special Purposes-Temperature Control of Resistance Furnace-Arc Furnace -Direct and Indirect Arc Furnace-Temperature Control of Arc Furnace-Reasons for Employing Low Voltage and High Current Supply - Induction Furnace-Direct and Indirect Core Type Induction Furnace- Coreless Induction Furnace-Power Supply for Coreless Induction Furnace.	6
	<b>Electric Welding:</b> Introduction-Types of Electric Welding- Requirements of Good Weld- Preparation of Work -Resistance Welding- Butt Welding, Spot Welding, Seam Welding, Projection Welding and Flash Welding-Arc Welding-Carbon Arc Welding, Metal Arc Welding, Atomic Hydrogen Arc Welding, Inert Gas Metal Arc Welding- Comparison between Resistance and Arc Welding. Radiation Welding - Ultrasonic Welding, Electron Beam Welding, Laser Beam Welding-Electric Welding Equipments (A.C. And D.C).	6



**TEXT BOOK**

S.No	Name of the Book	Author	Publisher	Edition
1	A Course in Electrical Power	Soni&Gupta	Dhanpat Rai& Sons, New Delhi	

**REFERENCE BOOKS**

S.No	Name of the Book	Author	Publisher	Edition
1	Electric Power	SL Uppal	Khanna Publishers, New Delhi	
2	Modern Electric Traction	H Partab	Dhanpat Rai & sons, New Delhi	
3	Electrical Power Distribution System	AS Pabla	Tata McGraw Hill Publishing Co, New Delhi	
4	Utilization of Electric Power	NV Suryanarayana	Tata McGraw Hill Publishing Co, New Delhi	

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS**  
**N-SCHEME**

(Implemented from the Academic year 2020 - 2021 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 4030630

Semester : VI

Subject Title : Energy Conservation and Audit

**TEACHING AND SCHEME OF EXAMINATION**

No of weeks per Semester: 16 weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
ENERGY CONSERVATION AND AUDIT	4	64	25	100*	100	3 Hrs.

\* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

**Topics and Allocation of Hours**

Unit	Topic	Hours
I	Energy Conservation and its Importance	11
II	Energy Conservation in Electrical Machines	11
III	Energy Conservation in Electrical Installation Systems	11
IV	Energy Audit and Instruments	12
V	Energy Costs and Energy Audit Report	12
Test & Model Exam		7
<b>Total</b>		<b>64</b>

## RATIONALE

Energy conservation is the effort made to reduce the consumption of energy by using less of an energy service. Energy can be conserved by reducing wastage and losses, improving efficiency through technological upgrades and improved operation and maintenance. Energy Audit is the key to a systematic approach for decision-making in the area of energy management. The effective use of energy to maximize profits (minimize costs) and enhance competitive positions, it is necessary to conserve energy. Hence it is necessary to study energy auditing methods and energy saving opportunities in electrical system.

## OBJECTIVES

At the end of the Semester, Students will be able to:

- ✓ Explain necessity and importance of Energy Conservation
- ✓ Explain the goal with energy conservation techniques is to reducedemand, protect supplies, develop and use Alternative Energy Sources.
- ✓ Explain the energy efficient technologies in Electrical System
- ✓ Explain the Periodic maintenance of Electrical Systems.
- ✓ Explain Technical losses and commercial losses in installation Systems.
- ✓ Explain How to product output or to lower operating costs.
- ✓ Discuss about Energy Conservation Equipment
- ✓ Explain Energy Conservation in Lighting System
- ✓ Identify where and how energy and factors affecting consumptionconsumed.
- ✓ Explain Energy Costs.
- ✓ Explain how to Detect and improving energy Efficiency.
- ✓ Explain the concept and types of Energy of Energy Audit.
- ✓ Explain the importance of Energy Audit.
- ✓ List the Instruments for Audit and Monitoring Energy and Energy Savings
- ✓ Explain Energy cost in Indian Scenario.
- ✓ Draw the Energy Audit Report Format

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**DETAILED SYLLABUS**

Contents: Theory

Unit	Name of the Topics	Hours
I	<b>ENERGY CONSERVATION AND ITS IMPORTANCE</b> Definition - Need for and importance of Energy Conservation - Primary and Secondary Energy - Energy Demand and Supply - Energy Conservation in Household, Industries and Community Level - Energy for sustainable Development - Energy Conservation in India - Energy Conservation Approaches – Safe working of Electrical Equipments and Electrical Safety.	5
	Energy Conservation Techniques - Principles of Energy Conservation Methods - Difference between Energy conservation and Energy audit - Relevant clauses of Energy Conservation - BEE and its Roles - MEDA and its Roles - Energy Audit in Energy Conservation Star Labelling: Need and its benefits – Role of Tamilnadu Energy Development Agency (TEDA) – Introduction to ISO 50001 – Energy Audit Certificate.	6
II	<b>ENERGY CONSERVATION IN ELECTRICAL MACHINES</b> Need for Energy Conservation in Induction Motor and Transformer - Methods of Energy Conservation in Induction Motor - Energy Saving Opportunities with Energy Efficient Motors - Energy Conservation Techniques in Induction Motor By: Improving Power Quality -Variation in Efficiency and Power Factor with Loading Motor Survey Matching Motor Rating with Load - Minimizing the Idle and Redundant Running of Motor Operating in Star Mode -Rewinding of Motor - Replacement by Energy Efficient Motor Periodic Maintenance	6
	Energy Conservation Techniques in Transformer. Loading Sharing Parallel Operation Isolating Techniques. Replacement by Energy Efficient Transformers - Periodic Maintenance - Energy Conservation Equipment: Soft Starters, Automatic Star Delta Convertor, Variable Frequency Drives, Automatic P. F. Controller (APFC), Intelligent P. F. Controller (IPFC)Energy Efficient Motor; Significant Features, Advantages, Applications and Limitations.	5

## ENERGY CONSERVATION IN ELECTRICAL INSTALLATIONS

6

5

## ENERGY AUDIT AND INSTRUMENTS

6

6

**V**

**TEXT BOOKS:**

1. "M A Chaudhari, S M Chaudhari & S A Asarkar ", "Energy Conservation & Audit ", "Nirali Prakashan" Publication.
2. "Y. B. Mandake", "Pankaj Mohan", "Dr. D.B. Talange" Energy Conservation and Audit, "Tech – Neo" Publications.

## REFERENCE BOOKS

1. "Er. Udit Mamodiya" "Electrical Energy Conservation & Auditing", Ashirwad Publication.
2. O.P. Gupta, "Energy Technology", Khanna Publishing House, New Delhi

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS**  
**N-SCHEME**

(Implemented from the Academic year 2020 - 2021 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 4030621

Semester : VI

Subject Title : Elective Theory – II - POWER ELECTRONICS

**TEACHING AND SCHEME OF EXAMINATION**

No of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
POWER ELECTRONICS	5	80	25	100*	100	3 Hrs.

\* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

**Topics and Allocation of Hours**

Unit	Topic	Hours
I	Thyristor Family, Trigger and Commutation Circuits	13
II	Phase Controlled Rectifiers	15
III	Choppers and Inverters	15
IV	Control of DC Drives	15
V	Control of AC Drives	15
Test & Model Exam		7
<b>Total</b>		<b>80</b>

## **RATIONALE**

Developments in Electronics have their own impact in other fields of Engineering. Today all the Controls and Drives for the Electrical Machines are formed by Electronic Components and there are many Electronic Devices available to handle Eclectic Power in terms Kilo-Amps and Kilo-Volts. This subject gives a comprehensive knowledge base about the devices and circuits used in Electrical Power Control.

## **OBJECTIVES**

On completion of these units, the student should be able to:

- Explain the scope and application of Power Electronics
- Explain the operating region and working of Thyristor family devices.
- Explain and state the application for Commutation Circuits and Trigger Circuits of SCR.
- Familiarize the Phase Controlled Rectifier for different kinds of Loads.
- Study the complete protection of Converter Circuits.
- Understand the working and applications of different types of Choppers and Inverters.
- Understand the application of Power Electronics devices as UPS, SMPS.
- Understand the control of DC Drives.
- Know the various methods of Speed Control of DC Drives.
- Familiarize the Control of AC Drives.
- Study the Speed Control of Three Phase Induction Motor using PWM and Slip Power Recovery Scheme.
- Understand the Closed Loop Control of DC Drive and AC Drive.
- Know the operation of Single Phase and Three Phase Cyclo Converter.
- Study the need of Microcomputer Based Motor Control.



**DETAILED SYLLABUS**

Contents: Theory

Unit	Name of the Topics	Hours
I	<b>THYRISTOR FAMILY, TRIGGER AND COMMUTATION CIRCUITS</b> Thyristor Family (Review) –SCS, SUS, SBS, LASCR and GTO. Symbol, Circuit, Working, Characteristics and Applications - UJT, SCR, DIAC, TRIAC, IGBT, GTO and MOSFET. Gate Triggering Circuits — Requirements, Types. Circuit, working of — R, RC, Synchronized UJT Triggering Circuits. Pulse Transformer in Trigger Circuits — IC based Advance Triggering Circuits for SCR & TRIAC (Using IC TCA 785) - Driver and Power circuits for Thyristor.	7
	Commutation Circuits – SCR Turn Off Methods – Natural Commutation –Forced Commutation – Class A, Class B, Class C, Class D, Class E and Class F. SCR rating and their importance.	6
II	<b>PHASE CONTROLLED RECTIFIERS</b> Introduction — Phase Controlled Rectifiers. Circuit Diagram, Working and Waveform - Half Wave, Full Wave Controlled Rectifier with Resistive, Inductive Loads and Free Wheeling Diode - Single Phase Fully Controlled Bridge, Single Phase Dual Converter with R Load, RL Load - Single Phase Semi Converter with Continuous and Discontinuous Load Current. AC – AC Converter.	8
	Three Phase Half Controlled Bridge, Fully Controlled Bridge with RL Load - Complete Protection of Thyristors against Surge Current, Surge Voltage, $dV/dt$ , $dI/dt$ Protection.	7

III	<b>CHOPPERS AND INVERTERS</b> <b>Choppers</b> — Introduction, Principle of Chopper Operation. Control Strategies — Constant Frequency System and Variable Frequency System. Chopper Circuit Classification — Step Up Chopper, Step Down Chopper, Voltage, Current, Load Commutated Chopper, First Quadrant, Second Quadrant, Two Quadrant and Four Quadrant Choppers. Circuit Diagram, Working and Waveform – Step Up Chopper, Morgan Chopper, Jones Chopper. Applications of Choppers — SMPS	8
	<b>Inverters</b> — Introduction, Classification of Inverter. Circuit Diagram, Working and Waveform Parallel Inverter, Half Bridge Inverter, Full Bridge Inverter, Modified MC Murray Full Bridge Inverter, MC Murray Bedford Full Bridge Inverter. Three Phase Bridge Inverter Under 180° Mode, 120° Mode Operations - Pulse Width Modulated Inverters, (Single Pulse, Multiple Pulse, Sinusoidal Pulse) Applications of Inverters — UPS - Online, Offline.	3
		4
IV	<b>CONTROL OF DC DRIVES</b> Introduction — DC Drive. Basic DC Motor Speed Equation — Operating Region, Armature Voltage Control, Field Current Control, Constant Torque and Constant HP Regions - Circuit Diagram, Output Waveforms and Output Equation of — Separately Excited DC Motor in — A) Single Phase Full Converter Drives B) Single Phase Dual Converter Drives C) Three Phase Semi Converter Drives.	7
	DC Chopper for Series Motor Drive – Four Quadrant Control of DC Motor — DC to DC Converter using MOSFET and IGBT - Block Diagram, Explanations of Closed Loop Control of DC Drives, Phase Locked Loop Control of DC Drives - Microprocessor Based Closed Loop Control of DC Drives.	8

V	<b>CONTROL OF AC DRIVES</b> Introduction AC Drive - Torque Speed Characteristics of Three Phase Induction Motor, Speed Control of Induction Motor, Stator Voltage Control, Variable Frequency Control, Necessity of Maintaining V/F Ratio. Rotor Resistance Control Inverters for Variable Voltage and Variable Frequency Control -Static VAR Compensation.	8
	Speed Control by Rotor Resistance for Slip Ring Induction Motors — Static Scherbius Drive (Slip Power Recovery Scheme) - Closed Loop Control of AC Drive Block Diagram — Micro Computer based PWM Control of Induction Motor – Introduction to Cyclo Converter with Simple Circuit – Single Phase and Three Phase.	7

### TEXT BOOKS

S. No.	Author	Title	Publication	Edition
1	MD Singh, KB Khanchandani	Power Electronics	McGraw Hill Publishing Company New Delhi	Third reprint 2008

### REFERENCE BOOKS

S. No.	Author	Title	Publication	Edition
1.	Mohammed H.Rashid	Power Electronics	New Age Publication.	Third Edition, 2004
2.	Mohan, Undeland, Robbins.	Power Electronics	Wiley India Edition.	Media Enhanced Third Edition
3.	Dr.P.S.Bimbhra	Power Electronics	Khanna Publishers.	Fourth Edition, 2011.
4.	M.S.Jamil Asghar	Power Electronics	PHI Learning Private Limited	Eastern Economy Edition, 2010

**Course Name** : Diploma in Electrical and Electronics Engineering  
**Subject Code** : 4030622  
**Semester** : VI  
**Subject Title** : ELECTIVE THEORY - II: BIO MEDICAL INSTRUMENTATION

**TEACHING AND SCHEME OF EXAMINATION**

Number of Weeks per Semester: 16 weeks

Subject	Instruction		Examination			Duration
	Hours / Week	Hours/ Semester	Marks			
			Internal Assessment	Board Examination	Total	
BIO MEDICAL INSTRUMENTATION	5	80	25	100*	100	3 Hrs

\* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

**TOPICS AND ALLOCATION**

Unit	Topic	Hours
I	Bio - Electric Signals, Electrodes and Clinical Measurement	13
II	Bio - Medical Recorders	15
III	Therapeutic Instruments	15
IV	Biotelemetry and Patient Safety	15
V	Modern Imaging Techniques	15
VI	Revision & Test	07
	TOTAL	80

## RATIONALE

Bio Medical Engineering Education is in the growing stage. But every year, there is a tremendous increase in the use of Modern Medical Equipment in the Hospital and Health Care Industry therefore it is necessary for every Student to understand the functioning of various Medical Equipments. This Subject to enable the students to learn the basic principles of different Biomedical Instruments viz Clinical Measurement, Bio - Medical Recorders, Therapeutic Instruments, Biotelemetry and Modern Imaging Techniques Instruments.

## OBJECTIVES

After learning this subject, the student will be able to understand the about:

- The generation of Bio-Potential and its measurement using various Electrodes.
- The measurement of Blood Pressure.
- The measurement of Lung Volume.
- The measurement of Respiration Rate.
- The measurement of Body Temperature and Skin Temperature.
- The principles of operations of ECG Recorder.
- The principles of operations of EEG Recorder.
- The principles of operations of ENG Recorder.
- The working principles of Audio Meter.
- The principles of operations of Pacemaker.
- The basic principle of Dialysis.
- The basic principle of Short-Wave Diathermy.
- The basic principle of Ventilators.
- The working principles of Telemetry.
- The basic principle of Telemedicine.
- To learn about Patient Safety.
- The various methods of Accident Prevention.
- The basic principle of various types of Lasers.
- The basic principle of CT and MRI Scanner.
- The principle of operation of various Imaging Techniques

### DETAILED SYLLABUS

Contents: Theory

Units	Name of the topic	Hours
I	<b>BIO-ELECTRIC SIGNALS AND ELECTRODES</b>  Bio – Potential and Their Generation – Resting and Action Potential – Propagation of Action Potential.  Electrodes – Micro – Skin Surface – Needle Electrodes.	3
	<b>CLINICAL MEASUREMENT</b>  Measurement of Blood Pressure (Direct, Indirect) – Blood Flow Meter (Electro Magnetic & Ultrasonic Blood Flow Meter) – Blood Ph Measurement - Measurement Of Respiration Rate – Measurement of Lung Volume – Heart Rate Measurement – Measurement of Body and Skin Temperature - Chromatography, Photometry, Flurometry.	10
II	<b>BIO - MEDICAL RECORDERS</b>  Electro Cardiograph (ECG) – Lead System – ECG Electrodes – ECG Amplifiers – ECG Recording Units – Analysis of ECG Curves. Electroencephalograph (EEG) – 10-20 Lead System – EEG Recording Units – EEG Wave Types – Clinical use of EEG – Brain Tumor.	8
	Electro Myograph (EMG) – EMG Waves – Measurement of Conduction Velocity - EMG Recording Units – Electro Retino Graph (ERG)- ERG Recording Units, Audiometer - Principle – Types – Basics Audiometer Working.	7

III	<b>THERAPEUTIC INSTRUMENTS</b>  Cardiac Pacemaker — Classification — External Pace Makers — Implantable Pacemaker — Programmable Pacemaker — Cardiac Defibrillators — Types — AC and DC Defibrillators -Heart Lung Machine with Block Diagram. Dialysis — Hemo Dialysis — Peritoneal Dialysis. Endoscopes Endoscopic Laser Coagulator and Applications — Physiotherapy Equipment — Short Wave Diathermy — Micro Wave Diathermy — Ultrasonic Therapy Unit (Block / Circuit) — Ventilators — Types — Modern Ventilator Block Diagram.	15
IV	<b>BIOTELEMETRY AND PATIENT SAFETY</b>  Introduction to Biotelemetry — Physiological — Adaptable to Biotelemetry — Components of a Biotelemetry System — Application of Telemetry - Tele-medicine - Introduction, Working, Applications.  Patient Safety: Physiological effects of Electric Current — Micro and Macro Shock — Leakage Current — Shock Hazards from Electrical Equipment. Methods of Accident Prevention — Grounding — Double Insulation — Protection by Low Voltage — Ground Fault Circuit Interrupter — Isolation of Patient Connected Parts — Isolated Power Distribution System. Safety Aspects in Electro Surgical Units — Burns, High Frequency Current Hazards, Explosion Hazards.	8  7
V	<b>MODERN IMAGING TECHNIQUES</b>  LASER Beam Properties — Block Diagram — Operation of CO2 And Ndyag LASER — Applications of LASER in Medicine.  X Ray Apparatus —Block Diagram — Operation — Special Techniques in X-Ray Imaging —Tomogram — Computerized Axial Tomography, CT Scanner —Ultrasonic Imaging Techniques — Echo Cardiograph — Angiography — Magnetic Resonance Imaging Techniques.	5  10

**TEXT BOOK**

1. Dr.M. Arumugam – Biomedical Instrumentation, Anuradha Publications, Chennai.

**REFERENCE BOOKS**

1. Leslie Cromwell –Fred j. Wibell, Erich A.P Feither – Bio Medical Instrumentation andMeasurements, II Edition.
2. Jacobson and Webstar – Medicine and Clinical Engineering.
3. R.S .Khandpur – Hand book of Bio –Medical Instrumentation.
4. Medical Electronics - Kumara doss
5. Introduction to Medical Electronics. B.R. Klin
6. Introduction to Biomedical Instrumentation Mandeep Singh Printice Hall India2010.

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**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS**  
**N-SCHEME**

(Implemented from the Academic year 2020 - 2021 onwards)

Course Name : Diploma in Electrical and Electronics Engineering  
Subject Code : 4030623  
Semester : VI  
Subject Title : Elective: III - COMPUTER HARDWARE AND NETWORKS

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per Semester: 16 Weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examination	Total	
<b>COMPUTER HARDWARE AND NETWORKS</b>	5	80	25	100*	100	3 Hrs

\* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

**TOPICS AND ALLOCATION OF HOURS**

Unit	Topic	Hours
1	Mother Board Components and Memory Storage Devices	13
2	I/O Devices and Interface	15
3	Maintenance and Trouble Shooting of Desk top and Mobile Phones	15
4	Computer Network Devices and OSI Layers	15
5	802.X and TCP/IP Protocols	15
	Revision and Test	7
	<b>TOTAL</b>	<b>80</b>

## **RATIONALE**

Maintaining and servicing the computers, laptops and peripherals are essential requirements of the computer students. The clear understanding of computer network devices and protocols are also taught in this subject.

## **OBJECTIVES**

1. On completion of the following units of syllabus contents, the students can Identify the major components that make up the system unit.
2. Understand the principle of operations of Keyboard, mouse and displays.
3. Study about the specification of I/O Ports of all I/O devices like serial, parallel, USB – Game port, Blue tooth and IP Connectors
4. Understand the technology of high-quality multiple color graphic output devices like Dotmatrix, Inkjet, Laser, Line, MFP and computer system.
5. Understand the operations to Power Supply devices. Know the use of diagnostic Software. Identify the major components of Laptop. Troubles shoot the problems in Laptop.
6. Understand the concept of data communication.
7. Discuss the advantages and disadvantages of different network topologies. Comparedifferent network classifications based on different category.
8. Know the use of different network devices.
9. Understand the different layers of OSI and their functions. Compare different LAN protocols. Identify the protocols used in TCP /IP and compare with OSI model. Understand IP address concepts and TCP/IP suite.

### DETAILED SYLLABUS

<b>UNIT I - MOTHERBOARD COMPONENTS AND MEMORY STORAGE DEVICES</b>		<b>13 HOURS</b>
1.1	<b>Introduction:</b> Parts - Mother board, sockets, expansion slots, memory, power supply, drives and front panel and rear panel connectors – Hardware, Software and Firmware.	<b>3</b>
1.2	<b>Processors:</b> Architecture and block diagram of multi core Processor (any one), Features of new processor Definition only chipsets (Concepts only)	<b>2</b>
1.3	<b>Bus Standards</b> Overview and features of PCI, AGP, USB, PCMCIA, Processor BUS – High	<b>2</b>
1.4	<b>Primary Memory:</b> Introduction-Main Memory, Cache memory –DDR2- DDR3, RAM versions – 1TB RAM – Direct RDRAM	<b>1</b>
1.5	<b>Secondary Storage:</b> Hard Disk – Construction – Working Principle – Specification of IDE, Ultra ATA, Serial ATA; HDD Partition - Formatting. Troubleshooting hard disk drives.	<b>3</b>
1.6	<b>Removable Storage:</b> CD&DVD construction – reading & writing operations; CD-R, CD-RW; DVD-ROM, DVD-RW; construction and working of DVD Reader / Writer. Blue-ray: Introduction – Disc Parameters – Recording and Playback Principles – Solid state memory devices.	<b>2</b>
<b>UNIT II I/O DEVICES AND INTERFACE</b>		<b>15 HOURS</b>
2.1	<b>Keyboard and Mouse:</b> Keyboard: Signals – operation of membrane and mechanical keyboards–troubleshooting; wireless Keyboard. Mouse- types, connectors, operation of Optical mouse and Troubleshooting.	<b>3</b>
2.2	<b>Printers:</b> Introduction – Types of printers– Dot Matrix, Laser, line printer, MFP (Multi-Function Printer), Thermal printer - Operation – Construction – Features and Troubleshooting	<b>4</b>
2.3	<b>I/O Ports:</b> Serial, Parallel, USB, Game Port, Bluetooth interface, IR connector, fire ware, Signal specification problems with interfaces.	<b>3</b>
2.4	<b>Displays and Graphic Cards:</b> Panel Displays– Principles of LED, LCD and TFT Displays. SVGA Port signals – common problems and solutions.	<b>3</b>
2.5	<b>Power Supply:</b> SMPS: Principles of Operation and Block Diagram of ATX Power Supply, connector specifications	<b>2</b>

<b>UNIT III Maintenance and Trouble Shooting of Desk top and Mobile Phones</b>		<b>15 HOURS</b>
3.1	<b>BIOS:</b> Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup.	<b>3</b>
3.2	<b>POST:</b> Definition – IPL hardware – POST Test sequence – beepcodes and error messages.	<b>2</b>
3.3	<b>Mobile phone components:</b> Basics of mobile communication. Components - battery- antenna-ear piece- microphone -speaker-buzzer-LCD- keyboard. Basic circuit board components — Names and functions of different ICs used in mobile phones.	<b>3</b>
3.4	<b>Tools &amp; Instruments used in mobile servicing:</b> Mobile servicing kit – soldering and de-soldering components using different soldering tools - Use of multi- meter and battery booster.	<b>2</b>
3.5	<b>Installation &amp; Troubleshooting:</b> Assembling and disassembling of different types of mobile phones – Installation of OS - Fault finding & troubleshooting-Jumpering techniques and solutions.	<b>2</b>
3.6	<b>Software and Antivirus:</b> Flashing- Formatting- Unlocking -Use of secret codes-Downloading- Routing; Mobile Viruses – Precautions – Antivirus Software.	<b>3</b>
<b>UNIT – IV COMPUTER NETWORK DEVICES AND OSI LAYERS</b>		<b>15 HOURS</b>
4.1	<b>Data Communication:</b> Components of a data communication – Data flow: simplex – half duplex – full duplex; Networks – Definition - Network criteria – Types of Connections: Point to point – multipoint; Topologies: Star, Bus, Ring, Mesh, Hybrid – Advantages and Disadvantages of each topology.	<b>3</b>
4.2	<b>Types of Networks:</b> LAN – MAN – WAN – CAN – HAN – Internet –Intranet –Extranet, Client-Server, Peer to Peer Networks.	<b>3</b>
4.3	<b>Transmission Media:</b> Classification of transmission media - Guided – Twisted pair, Coaxial, Fiber optics; Unguided – Radiowaves – Infrared – LOS – VSAT – cabling and standards.	<b>3</b>
4.4	<b>Network devices:</b> Features and concepts of Switches – Routers (Wired and Wireless) – Gateways.	<b>3</b>
4.5	<b>Network Models:</b> Protocol definition - standards - OSI Model – layered architecture – functions of all layers.	<b>3</b>

UNIT V 802.X AND TCP/IP PROTOCOLS		15 HOURS
5.1	<b>Overview of TCP / IP:</b> OSI & TCP/IP – Transport Layers Protocol – connection oriented and connectionless Services –Sockets – TCP & UDP.	3
5.2	<b>802.X Protocols:</b> Concepts and PDU format of CSMA/CD (802.3) – Token bus (802.4) – Token ring (802.5) – Ethernet – type of Ethernet (Fast Ethernet, gigabit Ethernet) –Comparison between 802.3, 802.4 and 802.5	3
5.3	<b>Network Layers Protocol:</b> IP –Interior Gateway Protocols (IGMP, ICMP, ARP, RARP Concept only).	3
5.4	<b>IP Addressing:</b> Dotted Decimal Notation –Subnetting & Super netting – VLSM Technique-IPv6 (concepts only)	3
5.5	<b>Application Layer Protocols:</b> FTP– Telnet – SMTP– HTTP – DNS – POP	3

#### TEXT BOOKS

S.No	Title	Author	Publisher	Year of Publishing / Edition
1.	Computer Installation and Servicing	D.Balasubramanian	Arasan Ganesan Institute of Technology	1993
2.	The complete PC upgrade and Maintenance	Mark Minasi	BPB Publication	1997
3.	Troubleshooting, Maintaining and Repairing PCs	Stephen J Bigelow	Tata MCGraw Hill Publication	2004
4.	Computer Networks	Andrew S.Tanenbaum	Prentice-Hall of India, New Delhi	2002
5.	Data Communication and networking	Behrouz A.Forouzan	Tata Mc-Graw Hill, New Delhi	2006
6.	Data and Computer Communications	William Stallings	Prentice-Hall of India	Eighth Edition 2007

#### REFERENCE BOOKS

S.No	Title	Author	Publisher	Year of Publishing / Edition
1.	Computer Networks	Achyut Godbole	Tata Mc-Graw Hill -New Delhi	
2.	Principles of Wireless Networks– A unified Approach	Kaveh Pahlavan and Prashant krishnamoorthy	Pearson Education	2002

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS**  
**N-SCHEME**

(Implemented from the Academic year 2020 - 2021 onwards)

Course Name : Diploma in Electrical and Electronics Engineering  
Subject Code : 4030640  
Semester : VI  
Subject Title : ELECTRICAL ESTIMATION AND COSTING PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION**

No of weeks per semester: 16 Weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
ELECTRICAL ESTIMATION AND COSTING PRACTICAL	5	80	25	100*	100	3 Hrs.

\* Examinations will be conducted for 100 marks and it will be reduced to 75marks.

**RATIONALE**

To enable the students to prepare the schedule of materials with specification and estimate the cost for different types of Electrical Installations. This will empower the students with the necessary principles of Planning, Electrical Rules and Method of Installations.

## OBJECTIVES

On completion of the following units of syllabus contents, the students must be able to:

- Draw the Conventional Symbols for various Electrical Installations.
- To quote the relevant IE Rules for a given Electrical Installation, Earthing and clearance of Service Lines.
- Familiarize the types of Wiring.
- Explain the necessity and types of Earthing.
- Estimate the quantity of materials and cost required for Domestic and Industrial Wiring.

## DETAILED SYLLABUS

Contents: Practical

### Name of the Topics:

#### Exercise

1. To study the various Electrical Symbols, IE Rules 28, IE Rules 30, IE Rules 31, IE Rules 54, IE Rules 56, IE Rules 87.
2. To study the various types of Earthing.
3. To study the various types of Electrical Wiring Methods.
4. Estimate the quantity of material and cost required for Residential Building (1BHK).
5. Estimate the quantity of material and cost required for Computer Centre having 10 Computers, AC Unit, UPS, Light and Fan.
6. Estimate the quantity of material and cost required for Industrial Power Wiring having 4 Machines.
7. Estimate the quantity of material and cost required for street light service having 12 Lamps Light Fitting.
8. Estimate the quantity of material and cost required for 3 Phase Service connection to a building having 5KW Load.
9. Estimate the quantity of material and cost required for Irrigation Pump Wiring (5HP).
10. Estimate the quantity of material and cost required for School Building having 3 Class Rooms.
11. Estimate the quantity of material and cost required for erection of a 15HP Induction Motor in a Saw Mill/Flour Mill.

**REFERENCE BOOKS**

Sl.No.	Title of the book	Author	Publisher
1.	Electrical Design Estimating and Costing.	K.B.Raina&K.Battacharya.	Khanna Publications.
2.	Electrical Installation Estimating and Costing.	J.B.Gupta	S.K.Kataria and Sons
3.	Electrical Wiring, Estimating and Costing.	Dr.S.L.Uppal	New age international (p) limited
4.	Electrical Estimating and Costing.	Surjit Singh	DhanpatRai company.
5.	Electrical wiring, Estimating and costing	B.D.Arora	R.B. Publication.

**DETAILED ALLOCATION OF MARKS**

Sl.No	NAME OF ACTIVITY	MARK ALLOCATION
1.	LAYOUT / DETAILS OF FITTING	20
2.	LOAD CALCULATION	20
3.	MATERIAL CALCULATION	30
4.	MATERIAL SCHEDULE AND APPROXIMATE COST	25
6.	VIVA-VOCE	05
	<b>TOTAL</b>	<b>100</b>



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS**  
**N-SCHEME**

(Implemented from the Academic year 2020 - 2021 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 4030624

Semester : VI

Subject Title : POWER ELECTRONICS PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION**

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
POWER ELECTRONICS PRACTICAL	6	96	25	100*	100	3 Hrs.

\* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

**RATIONALE**

- The advent of Thyristors has revolutionized art of Electric Power Conversion and its Control.
- The use of the Power Electronic Devices has pervaded the Industrial Applications relating to the field of Electrical, Electronics, Instrumentation and Control Engineering.
- This Subject is introduced to impart practical skills to the students in using some important Power Electronic Devices and Circuits.

## OBJECTIVES

**At the end of the Course, Students will be able to:**

- Construct and test various Triggering Circuits for SCR.
- Construct and test different types of Phases Controlled Converters in various configurations at different load conditions.
- Construct and observe the performance of different types of Chopper and Inverters.
- Construct and test the performance of Open Loop and Closed Loop Control of DC and AC drives.
- Construct and test the performance of Single Phase Cyclo Converter.

## DETAILED SYLLABUS

Contents: Practical

**Name of the Topics: Power Electronics Practical**

### Exercise

1. Construct the Line synchronized Ramp trigger circuit using UJT with AC Load to measure Firing Angles.
2. Construct Lamp control circuit using DIAC – TRIAC to measure various output voltage for Firing Angles.
3. Construct and test the SCR Commutation Circuits (Class B & Class D)
4. Construct and test the Half Wave Controlled Rectifier with R- Load, RL Load
5. Construct and test the Single Phase Fully Controlled Bridge with RL- Load and Free Wheeling Diode.
6. Construct and test the Single-Phase Semi Controlled Bridge with R- Load
7. Construct and test the DC Chopper Control Circuit using Thyristor (any class).
8. Construct and test the Step-Up Chopper.
9. Construct PWM based Step Down DC Chopper using MOSFET/IGBT.
10. Construct and test the Single-Phase Single Pulse / Sinusoidal PWM Inverter using MOSFET/IGBT.
11. Construct and test the SMPS using MOSFET/IGBT.
12. Construct and test the Open Loop Speed Control Circuit for DC Shunt Motor and Single-Phase AC Motor.

13. Construct and test the Control Circuit using TRIAC for Universal Motor.
14. Construct and test the Closed Loop Speed Control for a DC and AC Motor.
15. Construct and test the Single-Phase Parallel Inverter using MOSFET/IGBT
16. Construct and test the Single Phase to Single Phase Cyclo Converter.

**LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)**

S.NO	NAME OF THE EQUIPMENT	NO OF QUANTITY
1.	Line Synchronized Ramp Trigger Circuit Using UJT Trainer Kit.	1
2.	Lamp Control Circuit Using DIAC – TRIAC Trainer Kit.	1
3.	SCR Commutation Circuits (Class B & Class D)	1
4.	Half Wave Controlled Rectifier with R- Load & RL Load Trainer Kit.	
5.	Single Phase Fully Controlled Bridge with RL- Load And Freewheeling Diode Trainer Kit.	1
6.	Single Phase Semi Controlled Bridge with R- Load Trainer Kit.	1
7.	Construct and Test the DC Chopper Control Circuit using Thyristor (Any Class) Trainer Kit.	1
8.	Step Up Chopper Trainer Kit.	1
9.	PWM Based Step Down DC Chopper using MOSFET/IGBT Trainer Kit.	1
10.	Single Phase Single Pulse / Sinusoidal PWM Inverter using MOSFET/IGBT Trainer Kit.	1
11.	SMPS using MOSFET/IGBT Trainer Kit.	1
12.	Open Loop Speed Control Circuit for DC Shunt Motor and Single-Phase AC Motor Trainer Kit	1
13.	Control Circuit Using TRIAC for Universal Motor Trainer Kit.	1
14.	Closed Loop Speed Control of DC and AC Motor Trainer Kit.	1
15.	Single Phase Parallel Inverter using MOSFET/IGBT Trainer Kit	1
16.	Single Phase to Single Phase Cyclo Converter Trainer Kit.	1
17.	CRO With Power Probe	4
18.	Multi Meter	5

**DETAILED ALLOCATION OF MARKS**

S.NO	NAME OF THE ACTIVITY	MARK ALLOCATION
1	Circuit Diagram	25
2	Connections	25
3	Procedure	20
4	Reading/Graph/Result	25
5	Viva Voce	05
	<b>Total</b>	100

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**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS**  
**N-SCHEME**  
**(Implemented from the Academic year 2020 - 2021 onwards)**

Course Name : Diploma in Electrical and Electronics Engineering  
Subject Code : 4030625  
Semester : VI  
Subject Title : BIO-MEDICAL INSTRUMENTATION PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per Semester: 16 Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
<b>BIO-MEDICAL INSTRUMENTATION PRACTICAL</b>	6	96	25	100*	100	3 hrs

\* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

**RATIONALE**

Recent advances in Medical Field have been fueled by the Instruments developed by the Electronics and Instrumentation Engineers. Pacemakers, Ultrasound Machine CAT, Medical Diagnostic Systems are few names which have been contributed by Engineers. Now Health Care Industry uses many Instruments which are to be looked after by Instrumentation Engineers.

## OBJECTIVES

1. Will enable the Students to learn the basic principles of different Instruments/Equipment used in the Health Care Industry.
2. The practical work done in this area will impart skill in the use, Servicing and Maintenance of this Instruments/Equipment.
3. Proficiency in this area will widen the knowledge and skill of Diploma Holders in the field of Biomedical Instrumentation.

## DETAILED SYLLABUS

### List of Experiments:

1. Construction and Testing of Differential amplifier.
2. Construction and Testing of Instrumentation amplifier.
3. Measurement of pH of given solution.
4. Measurement of Blood pressure.
5. Measurement of ECG waveform.
6. Construction and verification of pacemaker circuit.
7. Construction and testing of high gain amplifier.
8. Measurement of Body and Skin temperature.
9. Study, handle and use the following Instruments/Equipments:
  - a. Cardiac monitor.
  - b. ECG stimulator.
  - c. Muscle stimulator.
  - d. Vascular Doppler recorder.
  - e. Pressure plethysmograph.
  - f. Skin sympathetic response meter.

**DETAILED ALLOCATION OF MARKS**

S.NO	NAME OF THE ACTIVITY	MARK ALLOCATION
1	Circuit Diagram / Connection Diagram / Block Diagram	35
2	Connections and Proceeding the Experiment	35
3	Reading/Calculation/Graph/Result	25
4	Viva Voce	05
	Total	100

**LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)**

S.No	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1	pH meter and conductivity meter	1
2	Photo transducer for pulse measurement	1
3	Sphygmomanometer and Stethoscope	1
4	Blood flow measurement system	1
5	Multi parameter (ECG, EMG, EEG) Simulator	1
6	GSR measurement setup.	1
7	Function generator	8
8	DSO	8
9	Regulated Power supplies	8
10	Bread boards	8

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS**  
**N-SCHEME**  
**(Implemented from the Academic year 2020 - 2021 onwards)**

Course Name : Diploma in Electrical and Electronics Engineering  
Subject Code : 4030626  
Semester : VI  
Subject title : COMPUTER HARDWARE AND NETWORKING PRACTICAL

**TEACHING AND SCHEME OF EXAMINATION**

No. of weeks per Semester: 16 Weeks

Subject	Instructions		Examination			Duration
	Hours / week	Hours / semester	Internal Assessment	Board Examination	Total	
<b>COMPUTER HARDWARE AND NETWORK PRACTICAL</b>	6	96	25	100*	100	3Hrs

\* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

**RATIONALE**

The course aims at making the students familiar with various parts of computers and laptops and how to assemble them and the different types of peripherals desired. In addition, the course will provide the students with necessary knowledge and skills in computer and laptop software installation and maintenance and to make him diagnose the software faults. This subject also gives the knowledge and competency to diagnose the problems in computer hardware and peripherals and also gives the knowledge for trouble shooting for systematic repair and maintenance of computers and laptops.



## OBJECTIVES

On completion of the following exercises, the students must be able to

- Know the various indicators, switches and connectors used in Computers.
- Familiarize the layout of SMPS, motherboard and various Disk Drives.
- Configure Bios set up options.
- Install various secondary storage devices with memory partition and formatting.
- Know the various types of printer installation and to handle the troubleshooting
- Assemble PC system and checking the working condition.
- Installation of Dual OS in a system.
- Identify the problems in Computer systems, software installation and rectification
- Assembling and disassembling of Laptop to identify the parts and to install OS and configure it.
- Enable to perform different cabling in a network.
- Configure Internet connection and use utilities to debug the network issues.
- Configure router for any topology
- Install and configure Windows 2008 / 2013 Server
- Design Windows server Active directory Services.
- Install and configure server hardware devices.

**DETAILED SYLLABUS**

<b>PART A - COMPUTER SERVICING AND NETWORK PRACTICAL</b>	
1	Identification of system layout (Study Exercise) a) Front panel indicators & switches and front side & rear side connectors. b) Familiarize the computer system Layout: Marking positions of SMPS, Motherboard, HDD, DVD and add on cards. c) Configure bios setup program and troubleshoot the typical problems using BIOS utility.
2	HARD DISK a) Install Hard Disk. b) Configure CMOS-Setup. c) Partition and Format Hard Disk. d) Identify Master /Slave / IDE Devices. e) Practice with scan disk, disk cleanup, disk De-fragmentation, Virus Detecting and Rectifying Software.
3	a) Install and Configure a DVD Writer & Blu-ray Disc Writer. b) Recording a Blank DVD & Blu-ray Disc.
4	Assemble a system with add on cards and check the working condition of the system and install Dual OS.
5	Identification of mobile phone components (Study Exercise) a) Basic mobile phone components. b) Familiarizing the basic circuit board components: Marking position of different IC and Switches in the Network and Power sections of the PCB.
6	Flashing, Unlocking and Formatting memory cards in Mobile phones.
7	Do the following cabling works in a network a) Cable Crimping b) Standard Cabling c) Cross Cabling d) I/O Connector Crimping e) Testing the Crimped cable using a Cable tester
8	a) Configure Host IP, Subnet Mask and Default Gateway in a system in LAN(TCP/IP Configuration). b) Configure Internet connection and use IPCONFIG, PING / Tracert and Net stat utilities to Debug the Network issues.
9	Transfer files between systems in LAN using FTP Configuration. Install a printer in LAN and share it in the network.

PART B – SYSTEM ADMINISTRATION PRACTICAL	
10	Installation of Windows 2008 / 2013 Server.
11	Installation and configuration of DHCP Server.
12	Installation and configuration of Mail Server.
13	a) Installation of Red Hat Linux using Graphical mode. b) Installation of Red Hat Linux using VMware.
14	a) Creating a user in Linux Server and assigning rights. b) Configuring and troubleshooting.
15	a) Configuring and troubleshooting of /etc/grub.conf b) Configuring and trouble shooting of /etc/passwd

**Note:**

The students must and should install software's. After the demonstration, the same is uninstalled. Each batch has to learn to install and use the tools.

**DETAILED ALLOCATION OF MARKS**

S.NO	NAME OF THE ACTIVITY	MARK ALLOCATION
1	Procedure Writing – One Question from PART – A	10
2	Procedure Writing – One Question from PART - B	15
3	Executing Exercise (PART – A)	10
4	Executing Exercise (PART – B)	20
5	Result (PART – A)	5
6	Result (PART – B)	5
7	Demonstration of mini project	5
8	VIVA – VOCE	5
	TOTAL	75

**LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)**

<b>Hardware Requirements:</b>	
Desktop Systems	30 Nos
Hard disk drive	06 Nos
DVD, Blu-ray Drive	06 Nos
Blank DVD , Blu-ray Disc	20 Nos
Head cleaning CD	
Dot matrix Printer	02 Nos
Laser Printer	02 Nos
Server	01 Nos
Mobile phones	06 Nos
<b>Network Requirements:</b>	
Crimping Tool	06 Nos
Screwdriver set	06 Nos
Network Cables	
Modem	02 Nos
Hub	01 No
Router	01 No
Switch	02 Nos
<b>Software Requirements:</b>	
Windows OS	
Windows Server 2008 / 2013 and LINUX.	
Antivirus software.	
DVD and Blu-ray Burning S/W.	
Mobile Phone Flashing S/W	

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS**  
**N-SCHEME**

(To be implemented for the students admitted from the year 2020 - 2021 onwards)

Course Name : 1040: Electronics and Communication Engineering

Subject Code : 4040660

Semester : VI

Subject Title : Project Work & Internship

**TEACHING AND SCHEME OF EXAMINATION**

No. of Weeks per Semester: 16

Subject	Instruction		Examination		
	Hours/ Week	Hours/ Semester	Assessment Marks		
			Internal	Board Exam	Total
PROJECT WORK & INTERNSHIP	6	96	25	100*	100

\* Examination will be conducted for 100 marks and it will be reduced to 75 marks.

Minimum Marks for Pass is 50 out of which minimum 50 marks should be obtained out of 100 marks in the Board Examination alone.

**OBJECTIVES:**

- The project work and internship is aimed to assemble and test a photo type model of any one item/gadget.
- Real time application problems if any may be identified from any industry and may be chosen.
- The knowledge and the skill so far acquired may be made use of.
- The team spirit may be motivated.
- The entrepreneurship ideas may be motivated by conducting a career guidance programme.
- Learn and understand the gap between the technical knowledge acquired through curriculum and the actual industrial need through internship .

**INTERNAL ASSESSMENT:**

The internal assessment should be calculated based on the review of the progress of the work done by the student periodically as follows.

Detail of assessment	Period of assessment	Max. Marks
First Review	6 <sup>th</sup> week	10
Second Review	12 <sup>th</sup> week	10
Attendance	Entire semester	5
<b>Total</b>		<b>25</b>

**EVALUATION FOR BOARD EXAMINATION:**

Details of Mark allocation	Max Marks
Demonstration/Presentation	25
Report	25
Viva Voce	30
Internship report	20
<b>Total</b>	<b>100</b>

**List of Equivalent Subjects for M - Scheme to N – Scheme**

M - SCHEME		N – SCHEME	
III SEMESTER			
Subject Code	Subject Name	Subject Code	Subject Name
34031	Electronic Devices and Circuits	4040310	Electronic Devices and Circuits
33031	Electrical Circuit Theory	4030320	Electrical Circuit Theory
33032	Electrical Machines-I	4030330	Electrical Machines -I
34034	Electronic Devices and Circuits Practical	4040340	Electronic Devices and Circuits Practical
33034	Electrical Circuits and Machines Practical	4030350	Electrical Circuits and Machines Practical
33036	Electrical Work Shop Practical	4030360	Electrical Workshop Practical
33064	Wiring and Winding Practical	4030370	Wiring & Winding Practical
IV SEMESTER			
33041	Electrical Machines – II	4030410	Electrical Machines -II
33042	Measurements and Instruments	4030420	Measurements, Instruments and Transducers
33044	Transducers and Signal Conditioners	4030320	Measurements, Instruments and Transducers
34043	Digital Electronics	4040430	Analog and Digital Electronics
		4020620	E-Vehicle Technology and Policy
33045	Electrical Machines and Instrumentation Practical	4030450	Electrical Machines and Instrumentation Practical
34046	Integrated Circuits Practical	4040460	Analog and Digital Electronics Practical
33065	Electrical Circuits Simulation Practical	4030470	Electrical Circuits and Simulation Practical

V SEMESTER			
33051	Generation Transmission and Switchgear	4030510	Generation Transmission and Switchgear
34052	Micro Controller	4040520	Micro Controller and its Applications
33055	Computer Aided Electrical Drawing Practical	4030540	Computer Aided Electrical Drawing Practical
33071	Control of Electrical Machines	4030511	Control of Electrical Machines
33072	Programmable Logic Controller	4030512	Programmable Logic Controllers
		4030513	Renewable Energy Sources
33074	Control of Electrical Machines Practical	4030514	Control of Electrical Machines Practical
33075	Programmable Logic Controller Practical	4030515	Programmable Logic Controller Practical
		4030516	Renewable Energy Sources Practical
34056	Micro Controller Practical	4040550	Microcontroller and its Applications Practical
		4040570	Entrepreneurship and Startups
VI SEMESTER			
33061	Distribution and Utilization	4030610	Distribution and Utilization
		4030630	Energy Conservation and Audit
33053	Electrical Estimation and Energy Auditing	4030640	Electrical Estimation and Costing Practical
33081	Power Electronics	4030621	Power Electronics
34082	Bio-Medical Instrumentation	4030622	Bio-Medical Instrumentation
34682	Computer Hardware and Networks	4030623	Computer Hardware and Networks
33084	Power Electronics Practical	4030624	Power Electronics Practical
33085	Bio-Medical Instrumentation Practical	4030625	Bio-Medical Instrumentation Practical
34684	Computer Hardware and Networks Practical	4030626	Computer Hardware and Networks Practical
33067	Project Work	4020660	Project Work and Internship