STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN ELECTRICAL & ELECTRONICS ENGINEERING

Sixth Semester

						Evaluation Scheme						
Sr. No.	Subject	L	L T P Total				Internal Assessment External			al Assessment (Examination)		
						Theory	Practical	The	ory	Prac	tical	lotal
			Period	s/Week		Max. Marks	Max. Marks	Max. Marks	Hrs.	Max. Marks	Hrs.	IVIALKS
6.1	Computer Network	4	-	3	7	20	30	50	2.5	50	3.00	150
6.2	Micro Hydel and Non-conventional Energy	Hydel and Non-conventional Energy 5		3	8	20	30	50	2.5	50	3.00	150
6.3	PLC and Microcontrollers	5	-	3	8	20	30	50	2.5	50	3.00	150
6.4	Electrical Installations in Buildings	5	-	-	5	50	-	50	2.5	-	-	100
6.5	Mobile Communication	3	-	3	6	20	30	50	2.5	50	3.00	150
6.6*	Employable Skills	-	-	4	4	-	25	-	-	-	-	25
6.7	7 Project work		-	6	6	-	50	-	-	175	4.00	225
General proficiency #		-	-	4	4	-	25	-	-	-	-	25
Indrustrial Exposure (Assesment at Inst. Level)+		-	-	-	-	-	25	-	-	-	-	25
	Total	22	-	26	48	130	245	250	-	375	-	1000

* Common with other Engineering Diploma Programmes

General Proficiency will comprise of various co-curricular activities like games, hobby clubs, seminars, declamation contests, extension lectures, NCC, NSS and cultural activities etc.

+ Industrial visit compulsory to minimum 2 industries or Departments.

Note:-1. Each period will be 50 minutes.

2. Each session will be of 16 weeks.

3. Effective teaching will be at least 12.5 weeks.

6. COMPUTER NETWORKS

RATIONALE

The future of computer technology is in computer networks. Global connectivity can be achieved through computer networks. A diploma holder in computer engineering should therefore understand the function of networks. Knowledge about hardware and software requirements of networks is essential.

DETAILED CONTENTS

- 1. Networks Basics
 - Concept of network
 - Models of network computing
 - Networking models
 - Peer-to –peer Network
 - Server Client Network
 - LAN, MAN and WAN
 - Network Services
 - Topologies
 - Switching Techniques

2. OSI Model

- Standards
- OSI Reference Model
- OSI Physical layer concepts
- OSI Data-link layer concepts
- OSI Networks layer concepts
- OSI Transport layer concepts
- OSI Session layer concepts
- OSI presentation layer concepts
- OSI Application layer concepts
- 3. Introduction to TCP/IP
 - Concept of physical and logical addressing
 - Different classes of IP addressing, special IP address
 - Sub netting and super netting
 - Loop back concept
 - IPV4 and IPV6 packet Format
 - Configuring IPV4 and IPV
- 4. Network Architecture
 - ARC net specifications
 - Ethernet Specification and Standardization:

(10 Periods)

(12 Periods)

(10 Periods)

(8Periods)

L T P 4 - 3 10 Mbps (Traditional Ethernet), 10 Mbps (Fast Ethernet) and 1000 Mbps (Gigabit Ethernet), Introduction to Media Connectivity (Leased lines, ISDN, PSTN, RF, VSAT, Optical and IPLC)

- 5. Network Connectivity
 - Network connectivity Devices
 - NICs
 - Hubs
 - Repeaters
 - Multiplexers
 - Modems
 - Routers and Protocols,
 - Firewall
 - ATM
 - VOIP and Net-to-Phone Telephony,
 - Laws and Protocols
- 6. Network Trouble Shooting Techniques
 - Trouble Shooting process
 - Trouble Shooting Tools: PING, IPCONFIG, IFCONFIG, NETSTAT, TRACEROOT, Wiresharp/ Dsniffer/ Pcop
 - Hauffman codes
 - Cryptography
- 7. Wireless Networking

Basics of Wireless: Wireless MAN, Networking, Wireless LAN, Wi-Fi, Wi-Max (Broad-band Wireless) and Blue-Tooth technology.

LIST OF PRACTICALS

- 1. Recognize the physical topology and cabling (coaxial, OFC, UTP, STP) of a network.
- 2. Recognition and use of various types of connectors RJ-45, RJ-11, BNC and SCST
- 3. Recognition of network devices (Switches, Hub, Routers of access points for Wi-Fi)
- 4. Making of cross cable and straight cable
- 5. Install and configure a network interface card in a workstation.
- 6. Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation
- 7. Managing user accounts in windows or LINUX
- 8. Study and Demonstration of sub netting of IP address
- 9. Connectivity troubleshooting using PING, IPCONFIG, IFCONFIG
- 10. Installation of Network Operating System(NOS)
- 11. Visit to nearby industry for latest networking techniques

Required Software

Windows Server/Linux Server

(10 Periods)

(6 Periods)

(8 Periods)

Required Tools and Supplies

- 1) Crimping tool, crone Tool, Cable tester,
- RJ 45 connectors, RJ-11, BNC, SCST
- 3) Coaxial Cable, UTP, STP, OFC cable
- 4) Screwdriver Kit
- 5) Switch/Hub
- 6) Manageable Switch

INSTRUCTIONAL STRATEGY

This subject deals with both theory and practicals. The students should be made to practically establish LAN with various hardware and software and their integration.

RECOMMENDED BOOKS

- 1. Computer Networks by Tanenbaum, Prentice Hall of India, New Delhi
- 2. Data Communications and Networking by Forouzan, (Edition 2nd and 4th),Tata McGraw Hill Education Pvt Ltd, New Delhi
- Data and Computer Communication by William Stallings, Pearson Education, New Delhi
- 4. Local Area Networks by Peter Hudson
- 5. Understanding Local Area Network by Neil Jenkins
- 6. Area Networks by Stan Schatt, Prentice Hall of India, New Delhi
- 7. Network+ Lab manual,- BPB Publications -by Tami Evanson
- 8. Networking Essentials BPB Publications New Delhi
- 9. Computer Network and Communications By V.K. Jain and Narija Bajaj, Cyber Tech Publications, New Delhi.
- Linux Install and Configuration Black Book by Dee Annleblanc and Issac Yates, IDG Books India Private Limited, Delhi.
- 11. Unleashed Linux by TechMedia Publishers, New Delhi
- 12. Computer Network by J.S. Katre, Tech-Max Publication, Pune

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1.	08	12
2.	10	16
3.	12	20
4.	10	15
5.	08	12
6.	10	15
7.	06	10
Total	64	100

6.2 MICRO HYDEL AND NON CONVENTIONAL ENERGY SOURCES

L T P Periods 5 - 3

RATIONALE

Energy is a crucial input in the process of economic, social and industrial development. High energy consumption has traditionally been associated with higher quality of life, which in turn is related to Gross National Project (GNP). Since the conventional energy resources are under depletion, it is high time to tape the non conventional energy sources like solar and bio- energy. Uttarakhand is rich in hydro energy and lot of potential for self employment exists in setting up Micro Hydro plant. This subject is included to take care of special need of the state.

DETAILED CONTENTS

1. Micro Hydel Plants

(20 Periods)

- Small and Micro Hydro Electric Power Plants: An Overview
- Advantages and Disadvantages of Small and Micro Hydro Schemes
- Layout of a Micro Hydro Scheme
- Main Elements of a Micro Hydro Plant
- Water turbines
- Turbine Classifications, Characteristics and Selection
- Generators
- Specifications of Turbine, Generator and Governor System used in Small and Micro Hydro Electric Power Plants
- 2. Micro Hydro Electric Power Plants: Automation, Control and Case Studies (8 Periods)
 - Power Generation in Micro Hydro Electric Power Plants
 - Automation, Control and Monitoring of Micro Hydro Electric Power Plants
 - Efficiency and Limitations
 - Case Studies
- 3. Micro Hydro Electric Power Plants: Erection and Commissioning, Operation and Maintenance (8 Periods)
 - Erection
 - Commissioning

- Operation
- Maintenance
- 4. Non-Conventional Sources of Energy

Importance of Non conventional sources of energy, Present Scenario, Future Prospects, Economic Criteria

5. Solar Energy

Physical Principal of the conversion of Solar radiation into heat, Photo-voltaic cell, Electricity generation, Solar water heaters, Solar Furnaces, Solar cookers, Solar Stills solar pumping.

6. Bio-energy

Bio-mass Conversion Technologies- wet and dry processes. Methods for obtaining energy from Biomass. Power Generation by using gassifiers

7. Wind Energy

Wind Energy Conversion, Wind mills, Electricity generation from wind- Types of wind mills, local control, energy storage

8. Geo-thermal and Tidal Energy

Geo-thermal sources, Ocean thermal electric conversion, open and closed cycles, hybrid cycles. Prime movers for geo-thermal energy conversion. Steam Generation and electricity generation.

9. Chemical Energy Sources

Design and operating principles of a fuel cell, conversion efficiency, work output and emf of fuel cells, applications storage battery characteristics, types, applications, maintenance of batteries.

Practical: Students should be taken to site of Micro Hydro Plant and Non Conventional Energy Sources units. They may be asked to prepare report of the visits and make presentation in the class.

(8 Periods)

(7 Periods)

(7 Periods)

(8 Periods)

(8 Periods)

(6 Periods)

RECOMMENDED BOOKS

- 1. Solar Energy Principles of thermal collection and Storage SP Sukhatme, Tata McGraw Hill Publication, New Delhi.
- 2. Solar Energy Utilization; GD Rai; Khanna Publishers, New Delhi.
- 3. Reviews of Renewable Energy Sources, Vol. 3, Edited by MS. Sodha, S.S. Mathur, MAS Malik, TC Kandpal ; Wiley Eastern Limited, New Delhi.
- 4. Renewable Energy Sources and Conversion Technology by NK Bansal, Manfred Kleemann, Michael Meliss, Tata McGraw Hill Publishing Co. Ltd New Delhi.
- 5. Energy Today and Tomorrow; Maheshwar Dayal; Publications Division, Ministry of Information and Broadcasting, Govt. of India, New Delhi.
- 6. Energy Technology (non-conventional, renewable and conventional) by S Rao and BB Parulekar, Khanna Publishers, New Delhi
- 7. Non Conventional Energy Sources by B.H Khan, A tata McGraw Hill Publication New Delhi
- 8. Micro Hydel Design Manual by Adam Harvey, Intermediate technology Publications

Торіс	Time Allotted (Periods)	Marks Allocation (%)		
1.	20	25		
2.	08	10		
3.	08	10		
4.	06	07		
5.	08	08		
6.	07	10		
7.	07	10		
8.	08	10		
9.	08	10		
Total	80	100		

SUGGESTED DISTRIBUTION OF MARKS

6.3 PLC & MICROCONTROLLERS

L P Period 5 3

RATIONALE

A diploma holder when employed in automated industrial process controls or in automated power station will be required to know the basics of Programmable Logic Controllers, their working and their programming. In industry, many manufacturing processes demand a sequence of operation, which are to be performed repetitively. Early automation systems were mechanical in design, timing and sequencing being effected by gears and cams. Slowly these design concepts were replaced by electrical drives which were controlled by relays and now by programmable logic controllers (PLCs). A PLC is a solid state device, designed to operate in noisy industrial environments and can perform all logic functions. PLCs are widely used in all industries for efficient control operations. A diploma holder in industry is called upon to design , modify and troubleshoot such control circuits. Looking at the industrial applications of PLCs in the modern industry, this subject finds its usefulness in the present curriculum.

Microcontrollers have also assumed great significance in the field of electronics and common goods industry, and thus considered to be an important field of engineering. This subject aims to expose the students to both of these and give them adequate knowledge of these topics.

DETAILED CONTENTS

1. Introduction to PLC

What is PLC, concept of PLC, Building blocks of PLC, Functions of various blocks, limitations of relays. Advantages of PLCs over electromagnetic relays. Different programming languages, PLC manufacturer etc.

.2. Working of PLC

- Basic operation and principles of PLC
- Architectural details processor
- Memory structures, I/O structure
- Programming terminal, power supply

3. Instruction Set

- Basic instructions like latch, master control self holding relays.
- Timer instruction like retentive timers, resetting of timers.
- Counter instructions like up counter, down counter, resetting of counters.

(07 Periods)

(09 Periods)

(09 Periods)

- Arithmetic Instructions (ADD, SUB, DIV, MUL etc.) .
- MOV instruction
- RTC(Real Time Clock Function) .
- · Comparison instructions like equal, not equal, greater, greater than equal, less than, less than equal

4. Ladder Diagram Programming

Programming based on basic instructions, timer, counter, sequencer, and comparison instructions using ladder program.

5. Applications of PLCs

- Assembly
- Packaging
- Process controls
- Car parking .
- Doorbell operation .
- Traffic light control
- Microwave Oven
- Washing machine
- Motor in forward and reverse direction .
- Star-Delta, DOL Starters .
- Paint Industry .
- Filling of Bottles .
- **Room Automation** .

6. Micro Controller Series (MCS)-51 Over View

- Pin details
- I/o Port structure
- Memory Organisation
- Special function registers •

(11 Periods)

(05 Periods)

(07 Periods)

	Timer operation	
	Serial Port operation	
	• Interrupts	
8.	Assembly language programmingAssemblers and Compilers	(07 Periods)
	Assembler Directives	
	Assembler Directives	
9.	Design and Interface	(05 Periods)
	Examples like: keypad interface, 7- segment interface, LCD, stepper mo	otor. A/D, D/A,
	RTC interface	

- 10. Introduction of PIC Micro controllers
- Application of Micro controllers like in relays, buzzer working machine, oven 11.

(07 Periods)

LIST OF PRACTICALS

PLCs

- Components/sub-components of a PLC, Learning functions of different modules of a 1. PLC system
- Practical steps in programming a PLC (a) using a Hand held programmer (b) using 2. computer interface
- Introduction to step 5 programming language, ladder diagram concepts, instruction list 3. syntax
- Basic logic operations, AND, OR, NOT functions 4.
- 5. Logic control systems with time response as applied to clamping operation
- 6. Sequence control system e.g. in lifting a device for packaging and counting
- 7. Use of PLC for an application(teacher may decide)

7. Instruction Set Addressing Modes

(06 Periods)

(07 Periods)

Micro Controllers

- 1. Familiarization of Micro Controllers (8051) kit
- 2. Testing of general input/output on Micro controller board
- 3. Development of Electrical, Instrumentation applications using 8051 micro-controller
- 4. Use of Microcontroller

INSTRUCTIONAL STRATEGY

Introduce the subject and make the students familiar with applications of PLCs and Microcontrollers. The inputs shall start with theoretical inputs to architecture, instruction set, assembly language programming, Small projects may be identified, be designed and implemented. PLC ladder diagram and programming should be supplemented with visits to industry. More emphasis may be given to practical work.

RECOMMENDED BOOKS

- 1. Programmable Logic Controller by Job Dan Otter; P.H. International, Inc, USA
- 2. Introduction to PLCs by Gary Dunning. McGraw Hill
- 3. Module on PLCs and their Applications by Rajesh Kumar, NITTTR Chandigarh
- 4. Programmable Logic Controller and Microcontrollers by Gurpreet Kaur and SK Sahdev by Uneek Publications, Jalandhar
- Module on "Allen Bradlag PIC (SLC 500), Institution set-1, by Rajesh Kumar, NITTTR, Chandigarh
- Module on "PLC Applications based on SLC 5/03" By Rajesh Kumar, NITTTR Chandigarh
- 7. The 8051 Micro controller by 1 Scot Mackenzie, Prentice Hall International, London
- The 8051 Micro controllers Architecture, programming and Applications by Ayala; Penram International
- Process Control Instrumentation Technology by Johnson, Curits; EE Edition, Prentice Hall of India, New Delhi
- 10. Microcontrollers by Ayala
 - 11. Microcontrollers by Mazidi
 - 12. Microcontrollers by Neil Makanzie
 - 13. Microcontrollers by Deshmukh

Торіс	Time Allotted (Periods)	Marks Allocation (%)		
1.	07	10		
2.	09	15		
3.	09	10		
4.	07	10		
5.	05	5		
6.	11	15		
7.	07	10		
8.	07	10		
9.	05	5		
10.	06	5		
11.	07	5		
Total	80	100		

SUGGESTED DISTRIBUTION OF MARKS

6.4 ELECTRICAL INSTALLATION IN BUILDINGS

Rationale

The electrical installation plays vital role in the utilization of building, constructed for different use, e.g. residences, offices, hotels, shopping complexes, theatres, sport stadiums, auditoriums, especially multi-storied building and intelligent building.

The basic electrical installations are lighting. The other electrical installations like air conditioning, various sound systems, protection against lightning and fire, lift, diesel generating sets, computer networking are various optional installation in various buildings. Protection against lightning and fire are mandatory in buildings as per building manual. The earthing is essential in electrical installations and therefore it has to be mastered by diploma holders. Stage lighting, sound systems are essential in building used for various purpose like conference hall, auditorium, places of worship, studios and audio video broadcasting stations. Telecommunication and networking has become very useful electrical installation now-a-days. All these electrical installations have been discussed completely in this subject. The contents will help architects, and engineers associated with building projects, in their construction, maintenance, design and estimating and costing.

DETAIL CONTENTS

1. Introduction

- 2. Electrical Wiring
 - 2.1 Introduction
 - 2.2 System of Wiring
 - Selection of wiring System
 - 2.3 Wiring Network
 - 2.4 Rising Main
 - Main board & distribution board
 - Types, design with example
 - 2.5 Estimating and Costing
- 3. Lighting
 - 3.1 Consideration planning and design of lighting
 - 3.2 Design of lighting scheme
 - Residential Building
 - Non-Residential Building
 - 3.3 Factory Lighting

(08 Periods)

(02 Periods) (06 Periods)

Р

Periods 5

L

3.4 Industrial Fitting

*

- 3.5 Flood Lighting
- 3.6 Street Lighting
- 3.7 Stage Lighting
- 3.8 Various Kind of Lights
 - Profile Light
 - Plano Convex Light
 - Fresnel light
 - Par Light
 - Effect Light
 - Sound Active Light
 - Cone Light
 - H.M.I light
 - Solar Light
 - F.O.H. light
- 3.9 Fitting of light
 - Wiring & Operation
 - Precaution, Estimating & Costing
- 4. Air Conditioning
 - 4.1 Introduction
 - 4.2 Refrigeration
 - Refrigerant
 - Classification of refrigerant
 - 4.3 Air Conditioning
 - Air Conditioning
 - Air Conditioning Cycle
 - Heat & moisture transfer
 - Unit of Air Conditioner or Refrigeration Plant\
 - 4.4 Mixing process in Air Conditioning

(09 Periods)

- Components of Refrigeration or Air Conditioning Unit
- Evaporator
- Compressor
- Condenser
- Refrigerant Control Valve
- Air Outlet
- Thermostatic switch/controls
- Equipment used in Air conditioning System
- 4.5 Classification of Air Conditioning
 - According to Purpose
 - According to Season of year
 - According to Arrangement of equipment
 - Unitary Air Conditioner
 - Window Air Conditioner
 - Split Air Conditioner
 - Central Air Conditioner
- 4.6 Chilling Machine
- 4.7 Design of Duct
 - Design of Air Outlet
 - VRF air conditioning
 - Design of capacity of Air Conditioner
 - Design of Heating Plant
- 4.8 Estimating & Costing

5. Sound System

5.1 Intelligibility

- Loudness & Intensity
- Ambient Noise Level (ANL)
- Requisite Loudness
- Echo & Reverberation
- Acoustic of Building

5.2 Loud Speaker System

- Conference System
- Communication System
- Recording
- Broadcasting
- Film or Video Production
- 5.3 Musical Performance

5.4 Basic Equipment

- Public Address System
- PA system for a school
- System for places of worship
- Conference system
- Musical system
- Fore Ground Musical Sound System
- Paging Background Music System
- Auditorium Sound Reinforcement System
- 5.5 Estimating & Costing

(09 Periods)

Diesel Generating Set

- 6.1 Classification
- 6.2 Brushless Alternator
 - A C Generators

6.3 Prime Movers

Control Panel .

6.4 Installation

- Selection of Site ٠
- Foundation •
- Earthing System •
- 6.5 **Exhaust Piping**
 - Fuel Piping
 - Cable Connection .
 - Change over Switch •
- 6.6 Design of D.G. Set
- 6.7 Battery
- 6.8 Commissioning of D.G. Set
- 6.9 Estimating & Costing

7. Lift

- 7.1 Terminology
 - Codes & Standard •
 - Rules & Act •

7.2 Classification

- Lift Layout
- 7.3 Components of Lift
- 7.4 Safety Features
- 7.5 Inverter or Converter
- 7.6 Programmable Logic Control (PLC)
- 7.7 Installation of Lift
- 7.8 Selection of Lift
 - Design of Lift •

(09 Periods)

(09 Periods)

6.

7.9 Estimating & Costing

- 8. Fire Protection & Protection System
 - Related Terminology
 - Fire Protection System
 - Fire Detection & Alarm System
 - Conventional Fire Alarm System
 - Sector Indicates Panel
 - Analogue and Addressable Fire Alarm
 - Design Heat Detector
 - Design of Fire Alarm
 - Fire Fighting System
 - Estimating & Costing
- 9. Computer Networking
 - 9.1 Classification
 - 9.2 Network Topology
 - 9.3 Internet work
 - 9.4 Basic Hardware Component
 - Open System
 - 9.5 Inter Connecting Modes
 - 9.6 Installation of Computer Network
 - 9.7 Design Of Computer Network
 - 9.8 Estimating & Costing
- 10. Rope & Roping System
 - 10.1 Introduction
 - Types
 - 10.2 Design
 - 10.3 Installation
 - 10.4 Estimating & Costing

(09 Periods)

(09 Periods)

(05 Periods)

11. Earthing

- Special Feature of Earthing
- Type of Earthing
- Effect of Electrocution
- Earth Leakage Protection
- Testing of Earthing
- Estimating and Costing

RECOMMENDED BOOKS

- 1. Electrical Installation in Building by Hari Mohan Johari; KW Publishers Pvt Ltd
- 2. Electrical Installation in Building Vol.1 By H.M.Johari
- 3. Basic Electrical Installation Work by Trevor-Linsely
- 4. BWK of Design of Electrical Installation by Jain
- 5. Electrical Installation and Practice by Allan Smith

SUGGESTED DISTRIBUTION OF MARKS

Торіс	Time Allotted (Periods)	Marks Allocation (%)
1	02	02
2	06	08
3	08	10
4	09	12
5	09	10
6	09	10
7	09	12
8	09	10
9	09	10
10	05	08
11	05	08
Total	80	100

6.5 MOBILE COMMUNICATION

L - P Periods/ Weeks **3** - **.3**

RATIONALE

The wireless/mobile communication technology though complex but is spreading at a very fast rate. People use more mobile phones in comparison to land line phones. It is expected that with in very short period almost everybody will be using mobile communication. Technology is also changing very fast. Therefore, the students should know the functioning of wireless/mobile system/equipment to keep themselves abreast of this latest application of communication.

DETAILED CONTENTS

1. Wireless Communication

(• 8 Periods)

- 1.1 Basics
- 1.2 Advantages of wireless communication
- 1.3 Electromagnetic waves.
- 1.4 Frequency Spectrum used.
- 1.5 Paging system.
- 1.6 Cordless Telephone System.
- 1.7 Cellular Telephone System
- 1.8 Comparison of above wireless communication systems.
- 1.9 Propagation considerations
 - a) Range
 - b) Atmospheric Effect
 - c) Geographic Effect
 - d) Signal Fading
 - e) Doppler Effect
- 2. Cellular Concept
 - 2.1 Cell area
 - 2.2 Capacity of cell
 - 2.3 Frequency Reuse
 - 2.4 Co-channel Interference
 - 2.5 Adjacent channel Interference
 - 2.6 Power Control for reducing Interference
 - 2.7 Improving coverage and capacity in cellular system
 - a) Cell Splitting.
 - b) Sectoring
 - c) Repeater for Range Extension.
- 3. Multiple Access Techniques for Wireless Communication
 - 3.1 Introduction to Multiple Access.
 - 3.2 Frequency Division Multiple Access (FDMA)
 - 3.3 Time Division Multiple Access (TDMA)

 $(1 \ge \text{Periods})$

(•) Periods)

- 3.4 Code Division Multiple Access (CDMA)
- 3.5 Spread Spectrum Multiple Access (SSMA)
- 3.6 Frequency Hopping spread Spectrum (FHSS).
- 3.7 Comparison of FDMA/TDMA/CDMA
- 3.8 Introduction to Wireless local loop (WLL) technologies.
 - (a) Satellite- Based System
 - (b) Cellular-- Based System
 - (c) Micro Cellular-- Based System
 - (d) Fixed Wireless Access Systems
- 4. Mobile Communication Systems
 - 4.1 Advanced Mobile Phone System (AMPS)
 - a) Operation of AMPS
 - b) Working of AMPS Phone System
 - 4.2 Introduction of Global Systems for Mobile Communication (GSM) and its architecture, Introduction of CDMA System, comparison of CDMA and GSM Systems
 - 4.3 Introduction of GPRS and GPS System.
- 5. Mobile computing

(06 Periods)

(12 Periods)

- 5.1 Introduction to Blue tooth and Infrared Data Association(IRDA)
- 5.2 Introduction to Wi-Fi ,Radio Frequency identification (RFID) .

LIST OF PRACTICALS

- 1. Study the features, specification and working of cellular mobile
- 2. Signal strength measurement of various points from a transmitting antenna/cordless phone
- 3. Visit of a Mobile Switching Centre (MSC) in the nearest M.S. facility provider
- 4. Demonstration of Base Trans Receiver (BTS) with nearby cellular tower
- 5. Observing call processing of GSM trainer Kit.
- 6. Observing call processing of CDMA trainer Kit.
- 7. Practical study of setting of Wi-Fi
- 8. Fault finding of a basic (GSM) and a (CDMA) mobile phones Demonstration
- 9. Study and practice of data transfer using blue tooth

INSTRUCTIONAL STRATEGY

Wireless and Mobile Communication is heaving significant impact in Electronics Market. For the proper awareness of this subject it is must to provide the students the detail functioning of wireless/mobile system/equipment. For this visits must be arranged to BTS/MSC (Mobile Switching Centre) providers. The theory classes need to be application based in addition to industrial visits in the BSNL, Vodafone, Airtel, SPICE, TATA Indicom etc

RECOMMENDED BOOK

- 1. Wireless Communications, Principles and Practice, by Thedore S. Rappaport.
- 2. Wireless Communication by Singal, Tata Mc Graw Hill Education Pvt Ltd. New Delhi.
- 3. Wireless Communication by Misra, Tata McGraw Hill Education Pvt. Ltd, New Delhi.
- 4. Introduction to Wireless and Mobile Systems, by Dharma Prakash Agarwal, Qing-Anzeng.
- 5. Wireless Communication and Networking, by William Stallings.
- Mobile and Personal Communication Systems and Services, by Raj Pandya, Prentice Hall of India, New Delhi.
- 7. Mobile Communication by John Schiller, Prentice Hall of India, New Delhi.
- 8. Wireless Communications by Pahalwan, Pearson Publishers.
- 9. Wireless and Mobile Communication VK Sangar, Ishan Publications.

Topic	Time Allotted (Period)	Marks Allocation(%)
1.	08	15%
2.	09	20%
3.	13	25%
4.	12	25%
5.	06	15%
TOTAL	48	100%

SUGGESTED DISTRIBUTION OF MARKS

6.6 **EMPLOYABLE SKILLS**

RATIONALE

Diploma holders are required to not only possess subject related knowledge but also soft skills to get good jobs and to rise steadily at their workplace. This subject is included to develop employability skills amongst the students.

DETAILED CONTENTS

- 1. Industrial Scenario Engineering Education and expectations of competences from an engineer by employer (04 periods)
- 2. Personality types, characteristic and features for a successful engineer (04 periods)
- 3. Professional Engineer desirable values and ethics and their development. Relation between engineering profession, society and environment (04 periods)

4. Managing project

- Leadership .
- Motivation
- Time management
- Resource management
- **Computer Software**
- Interpersonal relationship .
- Engineer economics and fundamentals .
- 5. Effective Communication
 - Listening .
 - Speaking
 - Writing .
 - Presentation Technique/Seminar
 - Group discussion .
- 6. Preparing for Employment
 - Searching for job/job hunting
 - **Resume Writing** .
 - Interview technique in personal interview telephonic interview, panel interview, . group interview, video conference

(08 periods)

Periods per week -- 4

(08 periods)

(16 periods)

LTP

7.	Managing Self	(06 periods)
	 Managers body, mind, emotion and spirit Stress Management Conflict resolution 	
8.	Continuing professional development	(04 periods)
	Organising learning and knowledgeUse of computer for organising knowledge resource	
9.	Creativity, Innovation and Intellectual property right	(06 periods)
	• Concept and need in present time for an engineer	
10.	Basic rules, laws and norms to be adhered by engineers during their we	orking (04 periods)

6.7 PROJECT WORK

L P Periods - 6

Project work aims at developing skills in the students whereby they apply in totality the knowledge and skills gained through the course in the solution of a practical problem undertaken as a project work. The students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. It is also essential that the faculty of the respective departments may have a brainstorming session to identify suitable project assignments. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given to a group. The students should identify themselves or be given project assignment at least two to three months in advance. The project work identified in collaboration with industry/field organization should be preferred.

Each teacher is expected to guide the project work of 5-6 students at a time. The project assignments may consist of:

- a) Projects related with repair and maintenance of machine parts
- b) Estimating and costing projects
- c) Design of components/ parts/ jigs / fixtures
- d) Projects related to quality control
- e) Project work related to increasing productivity
- f) Project connected with work study
- g) Projects relating to erection, installation, calibration and testing
- h) Projects related to wastage reduction
- i) Projects related to energy audit

For Students of Electrical Engineering Diploma Programme the project work can be grouped under the following four groups. A number of projects have been mentioned under each section. A student should take at least two projects both of which should not be from the same group. If more than two projects are taken to make up a total of 256 hours, then more than 1 may be taken from the same group as long as at least two groups are covered. A student is read to choose one project from each section.

Report for all the four project should be prepared and will give a seminar. The same will be assessed for internal and external assessment.

NOTE: (Two, only one from one group)

SECTION A

1.1 Electrical Machines and Equipment:

- 1.1.1 Design and Construction of a small transformer (100 VA to 1 kVA)
- 1.1.2 Construction of hot air blower

- 1.1.3 Design and Fabrication of Automatic curtain operator
- 1.1.4 Fabrication of Automatic Star-Delta starter
- 1.1.5 Construction of Automatic Water level controller
- 1.1.6 Construction of Choke for fluorescent tubes
- 1.1.7 Design and construction of loading rheostats minimum 5kw
- 1.1.8 Design and construction of Geyser
- 1.1.9 Erection/installation and commissioning of rotating electrical machine
- 1.1.10 Design and assembly of contactor control circuit for various applications

SECTION B

1.2 Electrical Power:

- 1.2.1 Drawing, estimating and costing of electrical installation of the institution from supplier's pole to the institution distribution board.
- 1.2.2 Drawing, estimating and costing of electrical installation of a workshop having a given number of electrically operated appliances/machines.
- 1.2.3 To study the laying of underground distribution cable for a small colony starting from main distribution pole
- 1.2.4 To study the erection erect a 5 pole span overhead line for a small distance for distribution of electrical energy. To energize it and prepare list of material and cost estimates.
- 1.2.5 Energy audit for the workshop of your institution and to suggest remedies to have low Electricity Bill
- 1.2.6 Case study of Electrical fire detection and protection system provided in a building
- 1.2.7 To survey the load of given area in a village, small colony, calculate the effective load and find out the sizes of the cables/conductors for the proposed distribution system
- 1.2.8 Designing of light and fan scheme for a institutional or commercial building
- 1.2.9 To prepare a plan for augmentation of a nearby pole mounted sub station
- 1.2.10 To prepare a proposal for substation of your institution, calculating the total load (estimating and costing)
- 1.2.11 Power factor improvement in a industry

SECTION C

1.3 Electronics Based Projects:

Fabrication of:

- 1.3.1 Voltage Stabilizer for refrigerator, air-conditioner
- 1.3.2 Emergency light using SCR
- 1.3.3 Power amplifier
- 1.3.4 Low cost intercom for home
- 1.3.5 Analog computer
- 1.3.6 Regulated power supply 30V/1Ampere
- 1.3.7 Fabrication of online UPS
- 1.3.8 Inverter circuit 500 watt/1 KVA.
- 1.3.9 Solid State Control of Traffic Lights
- 1.3.10 To develop a computer network (LAN) in building
- 1.3.11 Lighting control by small circuit
- 1.3.12 Design of safety measures in intelligent building

SECTION D

1.4 Fabrication and Testing of:

- 1.4.1 SCR operated automatic water level controller
- 1.4.2 SCR based speed controller for DC shunt motor
- 1.4.3 Three phase full wave rectifier using power diodes
- 1.4.4 Timer circuit using 555-IC
- 1.4.5 SCR controlled rectifier circuit
- 1.4.6 Inverting and non-inverting amplifiers using OP AMP(741)
- 1.4.7 Comparator circuits using OP AMP (741)
- 1.4.8 Project using PLC
- 1.4.9 Project relating to Microprocessor
- 1.4.10 Project relating to Microcontroller

Special Project: If a group of student develops a small entrepreneurial product, then other project is not to be done by them.

Note: The quality of end-product and process adopted by the students in its execution should be taken into consideration along with other parameters while evaluating the students

A	suggestive	criteria	for	assessing	student	performance	by	the	external	(personnel	from
in	dustry) and	l interna	l (te	acher) exa	miner is	given in table	bel	low:			

Sr.	Performance criteria	Max.		Ratin	1g Scale		
No		marks	Excellent	Very Good	Good	Fair	Poor
1.	Selection of project assignment	15	15	12	10	07	04
2.	Planning and execution of considerations		15	12	10	07	03
3.	Quality of performance	25	25	16	12	08	04
4.	Providing solution of the problems or production of final product	25	25	16	12	08	04
5.	Sense of responsibility	15	15	12	10	07	03
6.	Self expression/communication skills	10	10	08	06	04	02
7.	Interpersonal skills/human relations	10	10	08	06	04	02
8.	Report writing skills	15	15	12	10	07	04
9.	. Viva voce		20	16	14	08	04
Tota	ll marks	150	150	112	90	60	30

The overall grading of the practical training shall be made as per following table.

In order to qualify for the diploma, students must get "Overall Good grade" failing which the students may be given one more chance to improve and re-evaluated before being disqualified and declared "not eligible to receive diploma". It is also important to note that the students must get more than six "goods" or above "good" grade in different performance criteria items in order to get "Overall Good" grade.

	Range of maximum marks	Overall grade
i)	More than 80	Excellent
ii)	79 <> 65	Very good
iii)	$64 \Leftrightarrow 50$	Good
iv)	49 <> 40	Fair
v)	Less than 40	Poor

Important Notes

- 1. The internal and external examiner must follow these criteria and they should see the daily, weekly and monthly reports while awarding marks as per the above criteria.
- 2. The criteria for evaluation of the students have been worked out for 100 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.
- 3. The external examiner, preferably, a person from industry/organization, who has been associated with the project-oriented professional training of the students, should evaluate the student's performance as per the above criteria.
- 4. It is also proposed that two students or two projects, which are rated best, be given merit certificate at the time of annual day of the institute. It would be better if specific nearby industries are approached for instituting such awards.

The teachers are free to evolve other criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project items prepared by the students and invite leading Industrial organisations in such an exhibition. It is also proposed that two students or two projects, which are rated best, be given merit certificate at the time of annual day of the institute. It would be better if specific industries are approached for instituting such awards.