STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR 6th Semester (Electronics & TeleCommunication)(wef 2020-21)

Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th.1		ADVANCE COMMUNICATION ENGINEERING	5		-	20	80	3	100
Th.2		CONTROL SYSTEMS & COMPONENT	4		-	20	80	3	100
Th.3		DIGITAL SIGNAL PROCESSING (Common to ETC /AEI)	4		-	20	80	3	100
Th.4		**ELECTIVE(Any one to be opted)** (1) RENEWABLE ENERGY SOURCES (2) Internet Of Things(IoT) (3) ARTIFICIAL INTELLIGENCE & ROBOTICS	4		-	20	80	3	100
		Total	*17*		-	*80*	*320*	-	*400*
		Practical							
Pr.1		ADVANCE COMMUNICATION ENGINEERING LAB.	-	-	3	25	25	3	50
Pr.2		COMPUTER HARDWARE LAB (Common to ETC/AEI)	-	-	3	25	25	3	50
Pr.3		MATLAB & PROCESSING SIMULATION LAB	-	-	3	25	25	3	50
Pr.4		PLC & Automation LAB	-	-	4	25	25		50
Pr.5		PROJECT Phase-II			5	25	100	3	125
Pr.6		Life Skill	-	-	2	25			25
		Student Centred Activities(SCA)	-	-	2	-	-	-	-
		Total	-	-	*22*	*150*	*200*	-	*350*
		Grand Total	**17**		**22**	**230**	**520**	**-**	**750**

Abbreviations: L-Lecturer, T-Tutorial, P-Practical . Each class is of minimum 55 minutes duration

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM/Idea Thinking and innovation Lab Practice etc ,Seminar and SCA shall be conducted in a section.

There shall be 1 Internal Assessment done for each of the Theory Subject.

Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester

Th.1- ADVANCE COMMUNICATION ENGINEERING

Name of the Course: Diploma in **Electronics & Communication** Engineering			
Course code:		Semester	6th
Total Period:	75	Examination	3 hrs
Theory periods:	5P / week	Class Test:	20
Tutorial:		End Semester Examination:	80
Maximum marks:	100		

A. RATIONALE:

The Communication has a wide long history, of application in different technology. This subject deals with different advanced techniques of Communication Engineering. The Microwave Engineering, Radar and Navigation aids an example of Communication system. The Satellite, Mobile and Optical Fiber Communication has today permeated almost every field of modern society. This has been incorporated in this subject.

B. OBJECTIVE:

After completion of this subject the student will be able to know:

1. Discuss the principles of RADAR system & types
2. State the various uses of radar in field of navigation system and aircraft Landing system.
3. Define & Describe Satellite Orbital patterns and categories(LEO,MEO& GEO)
4. Describe geostationary satellite, satellite earth station & Link Station.
5. Explain the working of direct broadcast system (DBS) & VSAT system.
6. Compare the advantage and disadvantage of optical fiber metallic cables
7. Describe how light wave propagate to optical fiber& .Know source & detector
8. Define the modes of propagation and index profile of optical fiber
9. Discuss the operation of Basic Telephone System & Electronic Telephone System.
10. Describe the working of a PBX.
11. Concept of wireless communication

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1.	RADAR & NAVIGATION AIDS	10
2.	SATELLITE COMMUNICATION	15
3.	OPTICAL FIBER COMMUNICATION	15
4.	TELECOMMUNICATION SYSTEM	10
5.	Data Communication	10
6.	WIRELESS COMMUNICATION	15
	Total:	**75**

D. COURSE CONTENTS:

1. RADAR & NAVIGATION AIDS.

1.1 Basic Radar, advantages & applications
1.2 Working principle of Simple Radar system , its types
1.3 Radar range equation &Performance factor of radar.
1.4 Working principle of Pulsed Radar system.
1.5 Function of radar indication and Working principle of moving target indicator.
1.6 Define Doppler effect&Working principle of C.W Radar.
1.7 Radar aids to Navigation
1.8 MTI Radar- working principle
1.8 Aircraft landing system.

1.9 Navigation Satellite System.(NAVSAT) & GPS System

2. SATELLITE COMMUNICATION

2.1 Basic Satellite Transponder & Kepler's Laws
2.2 Satellite Orbital patterns and elevation(LEO,MEO & GEO) categories
2.3 Concept of Geostationary Satellite, calculate its height, velocity & round trip time delay & their advantage & disadvantage
2.4 Working of the Satellite sub system
2.5 Satellite frequency allocation and frequency bands.
2.6 General structure of satellite Link system (Uplink, Down link, Transponder, Crosslink)
2.7 Working principle of direct broadcast system (DBS)
2.8 Working principle of VSAT system.
2.9 Define multiple accessing & name various types.
2.10 Time Division Multiple Accessing(TDMA) & Code Division Multiple Accessing (CDMA) – block diagram, its advantages & dis-advantages.
2.11 Satellite Application- Communication Satellite(MSAT), Digital Satellite Radio.
2.12 Working principle of GPS Receiver & Transmitter& applications.
2.13 Optical Satellite Link transmitter & Receiver

3. OPTICAL FIBER COMMUNICATION.

3.1 Basic principle of Optical communication.
3.2 Compare the advantage and disadvantage of optical fibres&metallic cables
3.3 Electromagnetic Frequency and wave line spectrum
3.4 Types of optical fibres&principles of propogation in a fibre using Ray Theory
3.5 Optical fiber construction
3.6 Define terms: Velocity of propagation, Critical angle, Acceptance angle numericalaperture
3.7 Optical fibre communication system- block diagram & working principle
3.8 Modes of propagation and index profile of optical fiber
3.9 Types optical fiber configuration: Single-mode step index, Multi-mode step index, Multi-mode Graded index
3.10 Attenuation in optical fibers – Absorption losses, scattering, losses, bending losses, core and cladding losses- Dispersion – material Dispersion, waveguide dispersion, Intermodal dispersion
3.11 Optical sources(Transmitter) & types – LED- semiconductor laser diodes
3.12 LASER -its working principles, block diagram using laser feedback control circuit
3.13 Optical detectors – PIN and APD diodes &Block diagram using APDConnectors and splices –Optical cables - Couplers
3.14 Optical repeater & Single Channel system
3.15 Applications of optical fibres – civil, Industry and Military application
3.16 Concept of Wave Length Division Multiplexing (WDM) principles.

4. TELECOMMUNICATION SYSTEM

4.1 Working of Electronic Telephone System. (Telephone Set)
4.2 Function of switching system.& Call procedures
4.3 Space and time switching.
4.4 Numbering plan of telephone networks (National Schemes & International Numbering)
4.5 Working principle of a PBX & Digital EPABX.
4.6 Units of Power Measurement.
4.7 Working principle of Internet Protocol Telephone
4.8 Working principle of Internet Telephone

5. Data Communication

5.1 Basic concept of Data Communication
5.2 Architecture, Protocols and Standards
5.3 Data Communication Circuits
5.4 Types of Transmission & Transmission Modes
5.5 Data Communication codes
5.6 Basic idea of Error control & Error Detection
5.7 MODEM & its basic block diagram& common features Voice Band Modem

6. WIRELESS COMMUNICATION

6.1 Basic concept of Cell Phone,frequency reuse channel assignment strategic handoff co-channel Interference and system capacity of a Cellular Radio systems.
6.2 Concept of improving coverage and capacity in cellular system (Cell Splitting, Sectoring)
6.3 Wireless Systems and its Standards.
6.4 Discuss the GSM (Global System for Mobile) service and features.
6.5 Architecture of GSM system & GSM mobile station &channel types of GSM system.
6.6 working of forward and reveres CDMA channel,the frequency and channel specifications
6.7 Architecture and features of GPRS.
6.8 Discuss the mobile TCP, IP protocol.
6.9 Working of Wireless Application Protocol (WAP).
6.10 Features of SMS, MMS, 1G,2G, 3G, 4G& 5G Wireless network.
6.11 Smart Phone and discuss its features indicate through Block diagram.

Syllabus coverage up to Internal assessment

Chapters: 1, 2, 3 and 4.

Learning Resources:

1. Optical Fiber comm. Principles and practice John M.Senior.
2. Communication Systems by V. Chandra Sekhar-OXFORD
3. Microwave Engineering- M. Kulkarni – UMESH Pub
4. Telecommunication and the computer – James Martine
5. Advance Electronics Communication System-Wayne Tomasi
6. Principle of Electronics Telecommunication system – CoulsE.frenzel.
7. Satellite Comm.- Rebort M.Gagriardi
8. Optical Fiber Communication Essentials by Greb Keiser-TMH
9. Rader& Microwave engineering- G.S.N Raju
10. Optical Fibre communication system by SK Sarkar-Schand

Th.2- CONTROL SYSTEMS & COMPONENT

Name of the Course: Diploma in **Electronics & Communication** Engineering			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4P / week	Class Test:	20
Tutorial:		End Semester Examination:	80
Maximum marks:	100		

A. RATIONALE:

Control System is a combination of devices and components connected or related so as to command, direct or regulate itself or another system. This subject has wide range of applications of control of DC motor, Temperature, Pressure, Liquid, Electrical Systems, position, Velocity, Flow, Pressure, acceleration etc. Automatic control system will play important role in advancement and improvement in engineering skills now a days. This is widely used in working of satellite, power plant, guided missiles, defence, automobiles, robotics etc.

B. OBJECTIVE:

After completion of this subject the student will be able to know:

1. Know about control problems.
2. Study of Feedback Control Systems.
3. Analysis of Frequency Response.
4. Know about State variables.
5. To discuss Optimal control &Nonlinear control.

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	FUNDAMENTAL OF CONTROL SYSTEM	05
2	TRANSFER FUNCTIONS	08
3	CONTROL SYSTEM COMPONENTS & MATHEMATICAL MODELLING OF PHYSICAL SYSTEM	05
4	BLOCK DIAGRAM & SIGNAL FLOW GRAPHS(SFG)	08
5	TIME DOMAIN ANALYSIS OF CONTROL SYSTEMS	08
6	FEEDBACKCHARACTERISTICS OF CONTROL SYSTEMS	06
7	STABILITY CONCEPT, & ROOT LOCUS METHOD	08
8	FREQUENCY-RESPONSE ANALYSIS&BODE PLOT	07
9	STATE VARIABLE ANALYSIS	05
	Total:	**60**

D. COURSE CONTENTS:

1. Fundamental of Control System

- 1.1 Classification of Control system
- 1.2 Open loop system & Closed loop system and its comparison
- 1.3 Effects of Feed back
- 1.4 Standard test Signals(Step, Ramp, Parabolic, Impulse Functions)
- 1.5 Servomechanism
- 1.6 Regulators (Regulating systems)

2. Transfer Functions

2.1 Transfer Function of a system & Impulse response,
2.2 Properties,Advantages& Disadvantages of Transfer Function
2.3 Poles & Zeroes of transfer Function
2.4 Representation of poles & Zero on the s-plane
2.5 Simple problems of transfer function of network

3. Control system Components & mathematical modelling of physical System

3.1 Components of Control System
3.2 Potentiometer, Synchros, Diode modulator & demodulator ,
3.3 DC motors, AC Servomotors
3.4 Modelling of Electrical Systems(R, L, C, Analogous systems)

4. Block Diagram & Signal Flow Graphs(SFG)

4.1 Definition of Basic Elements of a Block Diagram
4.2 Canonical Form of Closed loop Systems
4.3 Rules for Block diagram Reduction
4.4 Procedure for of Reduction of Block Diagram
4.5 Simple Problem for equivalent transfer function
4.6 Basic Definition in SFG & properties
4.7 Mason's Gain formula
4.8 Steps foe solving Signal flow Graph
4.9 Simple problems in Signal flow graph for network

5. Time Domain Analysis of Control Systems

5.1 Definition of Time, Stability, steady-state response, accuracy, transient accuracy, In-sensitivity and robustness.
5.2 System Time Response
5.3 Analysis of Steady State Error
5.4 Types of Input & Steady state Error(Step ,Ramp, Parabolic)
5.5 Parameters of first order system & second-order systems
5.6 Derivation of time response Specification (Delay time, Rise time, Peak time,Setting time,Peak over shoot)

6. FeedbackCharacteristics of Control Systems

6.1 Effect of parameter variation in Open loop System & Closed loop Systems
6.2 Introduction to Basic control Action& Basic modes of feedback control: proportional, integral and derivative
6.3 Effect of feedback on overall gain, Stability
6.4 Realisation of Controllers(P, PI,PD,PID) with OPAMP

7. Stability concept& Root locus Method

7.1 Effect of location of poles on stability
7.2 RouthHurwitz stability criterion.
7.3 Steps for Root locus method
7.4 Root locus method of design(Simple problem)

8. Frequency-response analysis&Bode Plot

8.1 Frequencyresponse,Relationship between time & frequency response
8.2 Methods of Frequency response
8.3 Polar plots & steps for polar plot
8.4 Bodes plot & steps for Bode plots
8.5 Stability in frequency domain, Gain Margin& Phase margin
8.6 Nyquist plots. Nyquiststability criterion.
8.7 Simple problems as above

9. State variable Analysis-

9.1 Concepts of state, state variable, state model,
9.2 state modelsfor linear continuous time functions(Simple)

Syllabus coverage up to Internal assessment

Chapters: 1, 2, 3 , 4 & 5

Learning Resources:

1. Conrtol Systems by Samarajit Ghosh-Pearson
2. Control Systems by Principles and Design by Gopal. M,-Tata McGraw-Hill

3. Automatic Control System by Kuo, B.C,-Prentice Hall
4. Modern Control Engineering byOgata, K -Prentice Hall
5. Modern Control Engineering by Nagrath& Gopal-New Age International, New Delhi
6. Control System Engg by P Ramesh Babu& R. Anandanatarajan -SCITECH

Th.3- DIGITAL SIGNAL PROCESSING

(Common to ETC/AEI)

Name of the Course: Diploma in **Electronics & Communication** Engineering			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4P / week	Class Test:	20
Tutorial:		End Semester Examination:	80
Maximum marks:	100		

A. RATIONALE:

DSP, or Digital Signal Processing, as the term suggests, is the processing of discrete-time signals bydigital means. A signal in this context can mean a number of different things. Historically theorigins of signal processing are in electrical engineering, and a signal here means anelectrical signal carried by a wire or telephone line, or perhaps by a radio wave. Moregenerally, however, a signal is a stream of information representing anything from stockprices to data from a remote-sensing satellite. A digital signal consists of a stream of numbers,usually (but not necessarily) in binary form. The processing of a digital signal is done byperforming numerical calculationsDigital signal processing is a technology driven field which dates its growth where Computers and Digital Circuitry became fast enough to process large amount of data efficiently.

B. OBJECTIVE:

After completion of this subject the student will be able to know:

1. To provide background and fundamental materials in discrete time system, digital signal processing technique, design procedures of digital filters and discrete Fourier transform.
2. Understand signal system & signal processing.
3. Differentiate continuous time & discrete time signals.
4. Explain the concepts of frequency in continuous time, discrete time signals and harmonically related complex exponential.
5. Classify the signals like multi-channel, multidimensional, continuous time vs. discrete time signals and continuous valued vs. discrete valued signals.
6. Convert analog signal to digital & vice-versa.
7. State and explain sampling theorem &quantization of continuous-amplitude signals, sinusoidal signals., Analyze digital signal & system verses discrete time signals & systems.
8. Explain discrete time signals & classify discrete-time signals.
9. Describe discrete time systems will block diagrams, classification & interconnections.
10. Analyze liner invariant systems using different techniques.
11. Describe discrete time system using different equations.
12. Apply Z-transform on LTI systems.
13. Know discrete Fourier transform, its properties & state its application.
14. Study of Fast Fourier Transform algorithms & Digital Filters

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1.	Introduction of Signals, Systems & Signal processing	10
2.	DISCRETE TIME SIGNALS & SYSTEMS	14
3.	THE Z-TRANSFORM & ITS APPLICATION TO THE ANALYSIS OF LTI SYSTEM.	14
4.	DISCUSS FOURIER TRANSFORM: ITS APPLICATIONS PROPERTIES.	12
5.	FAST FOURIER TRANSFORM ALGORITHM & DIGITAL FILTERS	10
	TOTAL	**60**

D. COURSE CONTENTS:

1 **Introduction of Signals, Systems & Signal processing**

1.1 Basics of Signals, Systems & Signal processing- basic element of a digital signal processing system -Compare the advantages of digital signal processing over analog signal processing.

1.2 Classify signals - Multi channel& Multi-dimensional signals- Continuous time verses Discrete -times Signal. -Continuous valued verses Discrete -valued signals.

1.3 Concept of frequency in continuous time & discrete time signals- Continuous-time sinusoidal signals-Discrete-time sinusoidal signals-Harmonically related complex exponential.

1.4 Analog to Digital & Digital to Analog conversion & explain the following.

a. Sampling of Analog signal,
b. The sampling theorem.
c. Quantization of continuous amplitude signals,
d. Coding of quantized sample.
e. Digital to analog conversion.
f. Analysis of digital systems signals vs. discrete time signals systems.

2 **DISCRETE TIME SIGNALS & SYSTEMS.**

2.1 Concept of Discrete time signals.
- 2.1.1 Elementary Discrete time signals.
- 2.1.2 Classification Discrete time signal.
- 2.1.3 Simple manipulation of discrete time signal.

2.2 Discrete time system.
- 2.2.1 Input-output of system.
- 2.2.2 Block diagram of discrete- time systems
- 2.2.3 Classify discrete time system.
- 2.2.4 Inter connection of discrete -time system.

2.3 Discrete time time-invariant system.
- 2.3.1 Different techniques for the Analysis of linear system.
- 2.3.2 Resolution of a discrete time signal in to impulse.
- 2.3.3 Response of LTI system to arbitrary inputs using convolution sum.
- 2.3.4 Convolution & interconnection of LTI system - properties.
- 2.3.5 Study systems with finite duration and infinite duration impulse response.

2.4 Discrete time system described by difference equation.
- 2.4.1 Recursive & non-recursive discrete time system.
- 2.4.2 Determine the impulse response of linear time invariant recursive system.
- 2.4.3 Correlation of Discrete Time signals

3 **THE Z-TRANSFORM & ITS APPLICATION TO THE ANALYSIS OF LTI SYSTEM.**

3.1 Z-transform & its application to LTI system.
- 3.1.1 Direct Z-transform.
- 3.1.2 Inverse Z-transform.

3.2 Various properties of Z-transform.

3.3 Rational Z-transform.
- 3.3.1 Poles & zeros.
- 3.3.2 Pole location time domain behaviour for casual signals.
- 3.3.3 System function of a linear time invariant system.

3.4 Discuss inverse Z-transform.
3.4.1 Inverse Z-transform by partial fraction expansion.
3.4.2 Inverse Z-transform by contour Integration

4 **: DISCUSS FOURIER TRANSFORM: ITS APPLICATIONS PROPERTIES.**

4.1 Concept of discrete Fourier transform.
4.2 Frequency domain sampling and reconstruction of discrete time signals.
4.3 Discrete Time Fourier transformation(DTFT)
4.4 Discrete Fourier transformation (DFT).
4.5 Compute DFT as a linear transformation.
4.6 Relate DFT to other transforms.
4.7 Property of the DFT.
4.8 Multiplication of two DFT & circular convolution

5 **FAST FOURIER TRANSFORM ALGORITHM & DIGITAL FILTERS.**

5.1 Compute DFT & FFT algorithm.
5.2 Direct computation of DFT.
5.3 Divide and Conquer Approach to computation of DFT
5.4 Radix-2 algorithm. (Small Problems)
5.5 Application of FFT algorithms
5.6 Introduction to digital filters.(FIR Filters)& General considerations
5.7 Introduction to DSP architecture, familiarisation of different types of processor

Syllabus coverage up to Internal assessment

Chapters: 1, 2, 3 and 4.

Learning Resources:

1. Digital signal processing principles algorithms & applications by J.G.Proakis& Dimities G. Manolakis, Peason.
2. Digital Signal Processing by Ramesh Babu
3. Digital signal processing By A.V.Oppenleim&W.Schafer.
4. Digital Signal Processing by S Salivahanan, AVallavaraj, C Gnanapriya Tata McGHill.

Th.4(i)- RENEWABLE ENERGY SOURCES

(Elective)

Name of the Course: Diploma in **Electronics & Communication** Engineering			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4P / week	Class Test:	20
Tutorial:		End Semester Examination:	80
Maximum marks:	100		

A. RATIONALE:

Renewable energy technologies enable us to create electricity, heat and fuel fromrenewable sources. Solar, wind, hydro, wave, heat-exchange, tidal, wave and bioenergy technologies are all powered by the sun, directly or indirectly. The movement of wind and water, the heat and light of the sun, the carbohydrates in plants, and the warmth in the Earth—all are energy sources that can supply our needs in a sustainable way. A variety of methods are used to convert these renewable resources into electricity. Each comes with its own unique set of technologies, benefits, and challenges. Solar energy—power from the sun—is a vast and inexhaustible resource that can supply a significant portion of our electricity needs. A range of technologies is used to convert the sun's energy into electricity, including solar collectors and photovoltaic panels.

B. OBJECTIVE:

After completion of this subject the student will be able to know:

1 Know abut Energy Situation and Renewable Energy Sources
2 DefineRenewable and Non-renewable Energy Sources
3 Know about Solar Radiation & Collectors
4 Explain Flat Plate Collectors
5 What are the Applications of Solar Energy.
6 Explain Solar Drying & Solar Pond
7 Know Passive Space Conditioning & Collectors
8 Know Energy losses
9 Define Solar Thermal Power Plants
10 Define Solar Photovoltaics
11 Explain Wind Energy & Wind Direction ,Measurements & Wind Direction Indicators
12 Explain Wind Energy Converters & Components of a Wind Power Plant
13 Explain Biomass system

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	Energy Situation and Renewable Energy Sources	05
2	Solar Radiation & Collectors	06
3	Low-Temperature Applications of Solar Energy.	06
4	Passive Space Conditioning & Collectors	07
5	Solar Thermal Power Plants	08
6	Solar Photovoltaics	08
7	Wind Energy	05
8	Wind Energy Converters	08
9	Energy economics	07
	Total:	**60**

D. COURSE CONTENTS:

1. Energy Situation and Renewable Energy Sources

1.1 Renewable and Non-renewable Energy Sources
1.2 Energy and Environment
1.3 Origin of Renewable Energy Sources
1.4 Potential of Renewable Energy Sources

1.5 Direct-use Technology

2. Solar Radiation & Collectors

2.1 Solar Radiation Through Atmosphere
2.2 Terrestrial Solar Radiation
2.3 Measurement of Solar Radiation
2.4 Classification of Solar Radiation Instruments
2.5 Flat Plate Collectors
2.6 Optical Characteristics

3. Low-Temperature Applications of Solar Energy.

3.1 Swimming Pool Heating
3.2 Solar water Heating Systems
3.3 Natural Convection water Heating Systems
3.4 Solar Drying
3.5 Solar Pond

4. Passive Space Conditioning & Collectors

4.1 Principle Space conditioning
4.2 Passive building concepts- Heating, Direct gain, Indirect Gain, Passive Cooling, Shading,Paints, Collings
4.3 Construction of Concentrator
4.4 Energy losses

5. Solar Thermal Power Plants

5.1 Introduction
5.2 Solar Collection System
5.3 Thermal Storage for Solar Power Plants
5.4 Capacity Factor and Solar Multiple
5.5 Energy Conversion

6. Solar Photovoltaics

6.1 Band Theory of Solids, Physical Processes in a Solar Cell ,
6.2 Solar Cell Characteristics
6.3 Equivalent Circuit Diagram of Solar Cells
6.4 Cell Types - Crystalline Silicon Solar Cell , Solar Cells for Concentrating Photovoltaic Systems , Dye –sensitized Solar Cell (DSC)
6.5 Solar Module
6.6 Further System Components -Solar inverters ,Mounting Systems,Storage Batteries ,Other System Components
6.7 Grid-independent Systems -System Configuration
6.8 Grid-connected Systems -Small Roof Top Systems ,Medium-scale PV Generator ,Centralized System

7. Wind Energy

7.1 Wind Flow and Wind Direction
7.2 Wind Measurements
7.3 Measurement of Pressure Head
7.4 Hot wire Anemometer
7.5 Cup Anemometer (Robinson's Anemometer)
7.6 Wind Direction Indicators

8. Wind Energy Converters

8.1 Historical Development
8.2 Aerodynamic of Rotor Blade -Wind Stream Profile -Buoyancy Coefficient and the Drag Coefficient
8.3 Components of a Wind Power Plant -Wind Turbine -Tower -Electric Generators – Foundation
8.4 Power Control -Slow Rotors; Poor Control Mechanism -Control of Fast Rotors

9. Energy economics:

9.1 Present worth, Life cycle costing (LCC), Annual Life cycle costing(ALCC), Annual savings. calculations for Solar thermal system
9.2 Solar PV system,

9.3 Wind system,
9.4 Biomass system

Syllabus coverage up to Internal assessment

Chapters: 1, 2, 3 and 4.

Learning Resources:

1. Non-Conventional Energy Sources and Utilisation by R.K. Rajput, , S. Chand
2. Solar energy: Principles of Thermal Storage by S P Sukhatme, , Tata Mc Graw Hill
3. Non Conventional Energy Sources by N. K. Bansal
4. Non Conventional Energy Sources by B. H. Khan Tata Mc Graw Hill
5. Solar energy Utilization ByG.D.Rai: Khanna Publisher

Th.4(ii)- INTERNET Of THINGS
(Elective)

Name of the Course: Diploma in **Electronics & Communication** Engineering			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4P / week	Class Test:	20
Tutorial:		End Semester Examination:	80
Maximum marks:	100		

A. RATIONALE:

Internet of Things and develop skills required to build real-life IoT based projects. The Internet of things describes the network of physical objects—"things"—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet. The goal behind the Internet of things is to have devices that self report in real-time, improving **efficiency** and bringing important information to the surface more quickly than a system depending on human intervention..Smart surveillance, automated transportation, smarter energy management systems, water distribution, urban security and environmental monitoring all are examples of **internet of things** applications for smart cities

B. OBJECTIVE:

After completion of this subject the student will be able to know:

1. Understand internet of Things and its hardware and software components
2. Interface I/O devices, sensors & communication modules
3. Remotely monitor data and control devices
4. Develop real life IoT based projects

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	Introduction to IoT	08
2	Elements of IoT	10
3	IoT Application Development	14
4	Smart Technology	10
5	Smart TVs: Viewing in a Connected World	08
6	IoT Case Studies	10
	Total:	**60**

D. COURSE CONTENTS:

1. Introduction to IoT

- 1.1 What is IoT..
- 1.2 Architectural Overview,
- 1.3 Design principles and needed capabilities,
- 1.4 IoT Applications, Sensing, Actuation,
- 1.5 Basics of Networking, M2M and IoT Technology
- 1.6 Fundamentals- Devices and gateways,
- 1.7 Data management, Business processes in IoT,
- 1.8 Everything as a Service(XaaS),
- 1.9 Role of Cloud in IoT, Security aspects in IoT.

2. Elements of IoT

- 2.1 Hardware Components- Computing (Arduino, Raspberry Pi),
- 2.2 Communication, Sensing, Actuation, I/O interfaces.
- 2.3 Software Components- Programming API's (using Python/Node.js/Arduino) for Communication
- 2.4 Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.

3. IoT Application Development

- 3.1 Solution framework for IoT applications-
- 3.2 Implementation of Device integration,
- 3.3 Data acquisition and integration,
- 3.4 Device data storage- Unstructured data storage on cloud/local server,

3.5 Authentication, authorization of devices.

4. Smart Technology

4.1 Understanding the IoT Big Picture
4.2 Building the Internet of Things
4.3 Understanding Smart Devices,Building Blocks
4.4 Understanding Network Conections
4.5 Understanding IP Adresses
4.6 Understanding cellular Network & Mesh Network

5. Smart TVs: Viewing in a Connected World

5.1 What is Smart TV & its use
5.2 What is inside Smart TV
5.3 What a Smart TV does
5.4 Smart TV Operating Systems
5.5 What is Smart TV Set-TopDevices
5.6 Intergrating Smart TV in to IOT

6. IoT Case Studies

6.1 IoT case studies (any one)
a. Smart Home
b. Smart car
c. Smart Cities
d. Smart Drones

6.2 Industrial automation,

Syllabus coverage up to Internal assessment

Chapters: 1, 2, 3 and 4.

Learning Resources:

1. Vijay Madisetti, Arshdeep Bahga, IoT Case Studies, "A Hands on Approach", University Press
2. Michael Miller, Internet of Things,Pearson
3. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: Apractical Approach", ETI Labs
4. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
5. Jeeva Jose, "Internet of Things", Khanna Publishing House, Delhi
6. Adrian McEwen, "Designing the Internet of Things", Wiley
7. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill
8. Cuno Pfister, "Getting Started with the Internet of Things", O Reilly Media

Th.4(iii)-ARTIFICIAL INTELLIGENCE & ROBOTICS

(Elective)

Name of the Course: Diploma in **Electronics & Communication** Engineering			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4P / week	Class Test:	20
Tutorial:		End Semester Examination:	80
Maximum marks:	100		

A. RATIONALE:

Artificial intelligence (AI) is the intelligence exhibited by machines or software, and the branch of computer science that develops machines and software with human-like intelligence. Major AI researchers and textbooks define the field as "the study and design of intelligent agents", where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success. John McCarthy, who coined the term in 1955,defines it as "the science and engineering of making intelligent machines". Robotics is the branch of technology that deals with the design, construction, working, and application of robots, well as computer systems for their control, sensory feedback, and information processing. These technologies deal with automated machines that can take the place of humans in dangerous environments or manufacturing processes, or resemble humans in appearance, behavior, and/or cognition. Many of today's robots are inspired by nature contributing to the field of bio-inspired roboticsand will play a important role in industrial sector now a days.

B. OBJECTIVE:

After completion of this subject the student will be able to know:

1. Know Basic configuration of Robotics &its working.
2. Know Robot Control & Motion Analysis
3. Know about programming.
4. Perform kinematic and dynamic analyses with simulation.
5. Design control laws for a robot.
6. Integrate mechanical and electrical hardware for a real prototype of robotic device.
7. Select a robotic system for given application.
8. Perform kinematic and dynamic analyses with simulation.
9. Design control laws for a robot.
10. Integrate mechanical and electrical hardware for a real prototype of robotic device.
11. Select a robotic system for given application.

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	Artificial Intelligence	10
2	Introduction to Robotics	08
3	Coordinate Frames, Mapping, and Transforms	08
4	Robot Kinematics and Dynamics	10
5	Sensors and Vision System	10
6	Robot Control & Robot Actuation Systems	08
7	Control Hardware and Interfacing	06
	Total:	**60**

D. COURSE CONTENTS:

1. Artificial Intelligence

1.1 Definition of AI ,Scope of AI -Games, theorem proving, natural language processing, Visionand speech processing, robotics, expert systems

1.2 AI techniques- search knowledge, abstraction.

1.3 Problem solving - State space search; Production systems, search space control: depth-first, breadth-first search, heuristic search - Hill climbing,

best-first search, branch and bound.

1.4 Knowledge Representation- Predicate Logic: Unification, modus pones, resolution,

1.5 Structured Knowledge Representation: Semantic Nets: slots, exceptions and default frames, conceptual dependency, scripts.

1.6 Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.

2. Introduction to Robotics

2.1 Types and components of a robot, Classification of robots, Closed-loop and open-loop control systems.

2.2 Kinematics systems; Definition of mechanisms and manipulators, Social issues andsafety.

2.3 Robot Anatomy- Links -Joints and joints Notation Scheme -Degrees Of Freedom (DOF) -Required DOF in a Manipulator -Arm Configuration - Wrist Configuration -The End- Effector

2.4 Sensors and Vision

3. Coordinate Frames, Mapping, and Transforms

3.1 Coordinate Frames –Mapping -Mapping between Rotated Frames -Mapping between Translated Frames-Mapping between Rotated and Translated Frames.

3.2 Fundamental Rotation -Principal Axe Rotation -Fixed Angel Representation -Euler Angle Representations-Equivalent Angle Axis Representation

4. Robot Kinematics and Dynamics

4.1 Kinematic Modelling: Mechanical Structure and Notations , Description of Links and Joints

4.2 Translation and Rotation Representation, Coordinatetransformation, DH parameters, Jacobian, Singularity and Statics

4.3 Dynamic Modelling: Equations of motion: Euler-Lagrange formulation

4.4 The Inverse Kinematics -Manipulation Workspace - Solvability of Inverse Kinematic Model

5. Sensors and Vision System

5.1 Sensor: Contact and Proximity, Position, Velocity, Force, Tactile etc.

5.2 Introduction to Cameras, Camera calibration, Geometry of Image formation,Euclidean/Similarity/Affine/Projective transformations

5.3 Vision applications in robotics.

5.4 Kinds of Sensors Used in Robotics -Acoustic Sensors -Optic Sensors -Pneumatic Sensors -Force /Torque Sensors

5.5 Optical Encoders

6. Robot Control & Robot Actuation Systems

6.1 Basics of control: Transfer functions, Control laws: P, PD, PID

6.2 Non-linear and advanced controls

6.3 Actuators: Electric, Hydraulic and Pneumatic; Transmission: Gears, Timing Belts and Bearings,

6.4 Parameters for selection of actuators.

7. Control Hardware and Interfacing

7.1 Embedded systems: Architecture and integration with sensors,

7.2 Programming for Robot Applications

Syllabus coverage up to Internal assessment

Chapters: 1, 2, 3 and 4.

Learning Resources:

1. Saha, S.K., "Introduction to Robotics, 2nd Edition, McGraw-Hill Higher Education, New Delhi, 2014
2. Ghosal, A., "Robotics", Oxford, New Delhi, 2006Saha, S.K., "Introduction to Robotics, 2nd Edition, McGraw-Hill Higher Education

3. Craig, J.J., “Introduction to Robotics: Mechanics and Control”, Pearson, New Delhi,2009
4. Mittal R.K. and Nagrath I.J., “Robotics and Control”, Tata McGraw Hill.
5. Steve Heath, “Embedded System Design”, 2nd Edition, Newnes, Burlington, 2003
6. Introduction to Artificial Intelligence, Shinji Araya, KYORITSU SHUPPAN

PR. 1- ADVANCE COMMUNICATION ENGINEERING LAB.

Name of the Course: Diploma in **Electronics & Communication** Engineering			
Course code		Semester	6th
Total period:	45	Examination	3 hours
Practical periods	3 P/week	Sessional	25
Maximum marks :	50	End Semester Exam	25

A. RATIONALE:

In this Lab. The student will know the operation & application of RADAR trainer, Satellite Trainer, Optical Fiber kit Trainer & EPABX Trainer for various communication Technology & mobile communications.

B. OBJECTIVE:

After completion of this Laboratories/Practicals the student will be able to know:

1. Setup & Know the Optical Fiber Link including analog& digital.
2. Measure the losses of Optical Fiber.
3. Know EPABX /Satellite/ISDN trainer
4. Various waveform satellite communication Trainer
5. Knowabout mobile communication Trainer Kit

C. LIST OF PRACTICALS:

1. Setting up a fiber optic analog& digital link including source & detector.

2. Study of losses in Optical Fiber:
   a. Measurement of propagation loss.
   b. Measurement of bending loss.
   c. Measurement of connector loss.
   d. How connector loss is affected by fiber and quality

3. Measurement of Numerical aperture by using Optical Fibre Kit

4. Setting of AM, FM, PWM, Modulator & Demodulator using optical fiber kit.

5. Study the following experiments using EPABX Trainer Kit.

   a). To study extension to extension call pickup, direct onward dialing, autocall back, auto attendant, dynamic looking, last extension redial, conference call , call forward, simultaneous ringing, pulsing on trunk, follow me tone and DTMF dialing, Messages on hold, extension baring, trunk baring, caller id for extension to extension & trunk lines, individual memory, clobal memory, call waiting call conference

   b) Study of speech circuit using IC and its interface to line, pulse/tone dialing
   c) Study to subscriber ringing generation circuit and interface to the line.
   d) Study of telephone instrument trainer with caller id facility

6. Study of satellite communication Trainer Kit:
   a. To setup active & passive satellite communication link.
   b. To study up linking and downlinking of satellite signals.
   c. To analyze the analog baseband (Voice & Video) Signals in satellite link.
   d. To study the digital baseband signals in a satellite link.
   e. To setup an analog FM/FDM satellite link

7. Study of Rader Trainer Kit.
   a) Study of Doppler shift in Radar.
   b) Speed detection & multiple reflections from object.
   c) To find out the Time period and frequency of a moving pendulum for different heights.
   d) To measure the size of moving objects using Radar.

e) To measure the distance traveled by moving a object.

8. Study of mobile communication Trainer Kit.

9. Study of ISDN Trainer Kit.

a) Basic Rate ISDN exchange with Protocol with Protocol Analyzer.
b) ISDN Telephone sets.
c) ISDN Terminal Adaptors.
d) Analog Telephone sets.

10 Visit to Telephone Exchange / Mobile Network / earth station / Rader Station.

Learning Resources:

1. Hand book of Experiments in Electrical and Communication Engg by s. Poornachandra Rao & B. Sasikala- VIKAS pub

PR 2- COMPUTER HARDWARE LAB

(Common to ETC/AEI)

Name of the Course: Diploma in **Electronics & Communication** Engineering			
Course code		Semester	6th
Total period:	45	Examination	3 hours
Practical periods	3 P/week	Sessional	25
Maximum marks :	50	End Semester Exam	25

A. RATIONALE:

Computer hardware lab is the collection of physical elements that constitutes a computer system. Computer hardware refers to the physical parts or components of a computer such as the monitor, mouse, keyboard, computer data storage, hard drive disk (HDD), system unit (graphic cards, sound cards, memory, motherboard and chips), etc. all of which are physical objects that can be touched.[1] In contrast, software is instructions that can be stored and run by hardware.Software is any set of machine-readable instructions that directs a computer's processor to perform specific operations. A combination of hardware and software forms a usable computing system.

B. OBJECTIVE:

After completion of this Laboratories/Practicals the student will be able to know:

1. Know Computer hardware refers to the physical parts or components of a computer such as the monitor, mouse, keyboard, computer data storage, hard drive disk (HDD), system unit (graphic cards, sound cards, memory, motherboard and chips).
2. Instal Software & antivirus

C. LIST OF PRACTICALS:

1. Switches, Indicators and connectors of PC: Identification of front panel indicators and switches in a computer system of table top/tower case model and also identification of rear side connectors.

2. PC system layout: Draw a Computer system layout and Mark the positions of SMPS, Mother Board, FDD, HDD, and CD-Drive / DVD-Drive add on cards in table top/tower models systems.

3. Mother Board Layout: Draw the layout of Pentium IV or Pentium Dual core or Pentium Core2 DUO mother board and mark Processor, chip set ICs. RAM, Chache, Xtal, cooling fan, I/O slots and I/O ports and various jumper settings.

4. CMOS Setup Program: 1. Changing the Standard settings.
2. Changing advanced settings (BIOS and Chipset features)

5. A. Installation of CD drive:
1. Install and configure an CDD in a computer system.
2. CDD drive diagnostics/servicing.

B. USB pen drives and I-pods.
1. Connect and enable a pen drive or I-pod to HDD.
2. Format the pen drive or I-pod.
3. Copy files and folders from pen drive I-pod to HDD.
4. Copy files and folders from HDD to pen drive or I-pod.

6. HDD Installation: 1. Install the given HDD.
2. Configuration in CMOS-Setup program
3. Partition the HDD using fdisk./CAT/other
4. Format the Partitions.

7. Printer Installation & Troubleshooting:

1. Installing and checking a Dot-Matrix Printer.
2. Installing and checking an Ink jet / Laser Printer.

3. Possible problems and troubleshooting.

8. Modem Installation: 1. Install and configure a Modem in a windows PC.

2. Check the working condition of modem with pc.

& DVD Multi-recorder drive installation:

1. Install a DVD Multi-recorder drive in a PC.
2. Configure using device driver.
3. Check the read / write operation using a CD / DVD.

9. Installation of Scanner:

1. Connect the given scanner with a PC.
2. Configure the scanner with driver.
3. Check the scanner by scanning a page / a portion in a page.

Also Familiarize: Scandisk, recent Anti-virus software and recent PC Diagnostic software.

10. Assembling a PC: Assemble a Pentium Advanced version System with necessary peripherals and check the working condition of the PC.

Also Install and Configure Windows NT2003 operating system in a PC.

11. Construct Network by connecting one or two computer with a Windows NT2003 Server/Advanced

Construct Network by connecting one or two computer with a LINUX Server/Advanced

Configure the network by connecting one or two computer with a LINUX Server.

.Add / Remove devices using Hardware Wizard Add and Manage User Profile, Set permission to the users both in Windows NT 2003 / LINUX/ Advanced version

12. Install and Configure operating system (LINUX /Window XP advanced version /Window 2010/ Advancedetc)in a PC.

Learning Resources:

Demo lectures with power point presentations using LCD projector should be arranged to.

1. DIAGONIS SOFTEARE WILL BE USE FOR MAINTAINANCE OF COMPUTER
2. Higher configuration are preferred
3. **Download:** ProcessExplorer.zip
4. **Download:** SysinternalsSuite.zip
5. **Download:** SystemExplorerSetup.exe
6. **Download:** HWinfo.exe
7. **Download:** Speccy.exe
8. Download : CPU-Z

PR. 3- MATLAB & PROCESSING SIMULATION LAB

Name of the Course: Diploma in **Electronics & Communication** Engineering			
Course code		Semester	6th
Total period:	45	Examination	3 hours
Practical periods	3 P/week	Sessional	25
Maximum marks :	50	End Semester Exam	25

A. RATIONALE:

This Lab This lab introduces you to implementation and performance aspects of digital linear filters through simple case studies; consolidates your past knowledge on theoretical DSPconcepts by revisiting topics of quantization and filter phase. The DSP lab consists of four of hardware experiments illustrating the programming. The lab assignments contain a short introduction to the required theory.MATLAB is a software package for high-performance language for technicalcomputing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. MATLAB was originally writtento provide easy access to matrix software developed by the LINPACK and ISPACK .Today, MATLAB engines incorporate the LAPACK and BLAS libraries,embedding the state of the art in software for matrix computation.MATLAB has evolved over a period of years with input from many users. Inenvironments, it is the standard instructional tool for introductory and advancedcourses in mathematics, engineering, and science. In industry,

B. OBJECTIVE:

After completion of this Laboratories/Practicals the student will be able to know:

I, MATLAB is the tool of choiceTypical uses include the following

1. Math and computation
2. Algorithm development
3. Data acquisition
4. Modeling, simulation, and prototyping
5. Data analysis, exploration, and visualization
6. Scientific and engineering graphics

C. LIST OF PRACTICALS: (***Any 15 experiment)***

A.

1. Write a program to subtract two 16 bit numbers
2. Write a program to multiply two 16 bit numbers
3. Write a program to glow LEDs by selecting switches using digital I/O
4. Write a program to read an analog input using analog to digital converter in start stop mode
5. Write a program to read an analog input using ADC in continuous conversion mode using ADC Interrupt
6. Write a program to read four analog inputs using auto sequencer using ADC of 2407/or Higher
7. Write a program to generate a three phase fixed pwm using event manager
8. Write a program to generate a Fixed Sine PWM
9. Write a program to generate pwm and vary the frequency of PWM using Potentiometer
10. Write a program to vary the speed of DC motor by varying the duty cycle of PWM and tabulate the speed of the motor with respect to Duty cycle
11. To represent basic signals like:Unit Impulse, Ramp, Unit Step,Exponential.
12. To generate discrete sine and cosine signals with given samplingfrequency.
13. To represent complex exponential as a function of real and imaginarypart.
14. To determine impulse and step response of two vectors usingMATLAB.
15. To perform convolution between two vectors using MATLAB.
16. To perform cross correlation between two vectors using MATLAB.
17. To compute DFT and IDFT of a given sequence using MATLAB.

18. To perform linear convolution of two sequence using DFT usingMATLAB.
19. To determine z-transform from the given transfer function and its ROCusing MATLAB.
20. To determine rational z-transform from the given poles and zeros usingMATLAB.
21. To determine partial fraction expansion of rational z-transform usingMATLAB.
22. To design a Type 1 Chebyshev IIR highpass filter using MATLAB.
23. To design an IIR Elliptic low pass filter using MATLAB.
24. To design an IIR Butterworth bandpass filter using MATLAB

Learning Resources:

Develop programming concepts of students reference Websites:

Demo lectures with power point presentations using LCD projector should be arranged to.

PR. 4- PLC & AUTOMATION LAB

Name of the Course: Diploma in **Electronics & Communication** Engineering			
Course code		Semester	6th
Total period:	60	Examination	3 hours
Practical periods	4 P/week	Sessional	25
Maximum marks :	50	End Semester Exam	25

A. RATIONALE:

The PLC lab contains multiple workstations equipped with computers, PLC units and other interfacing devices to train students how to program and upload ladder logic code. Students program ladder logic code using the RS Logix software, which provides a graphical interface representing conditional computer programming functions such as if/else statements. The lab is based primarily on the Allen Bradley family of Programmable Logic Controllers, which are widely used in factories and other settingsIn this Lab. The student will know the working& application of PLC trainer,

B. OBJECTIVE:

After completion of this Laboratories/Practicals the student will be able to know:

1. Setup & Know about the PLC Trainer.
2. Know PLC programing
3. The PLC interface
4. About Networking Interface with PLC
5. Application of PLC languages(LAD)
6. Conversant industrial applications

C. LIST OF PRACTICALS:

1. A.PLC Programming:(30 periods- Any 9)

1. Introduction/Familiarization PLC Trainer & its Installation with PC
   - Learn the basics and hardware components, configuration of PLC
   - Study various building blocks of PLC
   - Determine the No. of digital I/O & Analog I/O
2. Write and implement a simple ladder logic program using digital inputs and outputs for PLC
   - Testthe AND,OR, EX-ORgateandEX-NOR gates.
3. Write the implement a simple ladder logic program using timer with branching and subroutines with PLC
   - To develop an application using On-Delay timer
   - To Develop an application using OFF Delay Timer
   - To Develop an application using Retentive and Non-Retentive Timers
   - To Develop an application using UP/DOWN counter
   - To develop an application using Relays & Latches
4. Write the implement a simple ladder logic program using counter with branching and subroutines with PLC
5. Write program on MOVE, Control statement, Math Function ,data manipulation technique on PLC
6. Write and implement a simple ladder logic program for interfacing a lift control with PLC
7. Write and implement a simple ladder logic program for interfacing a conveyor control with PLC.
8. Communication between PLC and PC
   - Single motor on / off control
   - Interlock control of two motors
   - Conveyor controller
9. Project: perform project as above for PLC programming on DC Motor/Traffic light Controller/Any Automation Industrial Ideas implementation
10. To study of PID controller instruction for a pilot plant (optional)
11. InterfaceSCADAwithPLCandassociatetagswithmemoryandI/ O and operate the PLC

inputs through the switch symbol from the computer screen and view the status of the outputs using lamp and motorgraphicssymbolsinthescreen

2. NETWORKING PROGRAMMING: (15 periods- Any Four)

1. Familiarize with computer networking Line diagrams.
2. Installation of network card&Connecting systems in a network switch.
3. Connecting systems in peer-to-peer network&Installing of internal modem and connecting to Internet.
4. Installing wireless node, Installing multiple network cards
5. Installing switch (Hub) &Preparing the UTP cable for cross and direct connections using crimping tool.
6. Installing and configuring E-mail client Microsoft Outlook Express.
7. Installing and configuring proxy server using Winproxy or Wingate.
8. Configuring Browser for Internet access using Proxy server &Installing windows 2000 or higher server as domain controller.

Learning Resources:

PLC (manual Fanuc / Alan Bradly /Simens)

Develop programming concepts of students reference Websites:

Demo lectures with power point presentations using LCD projector should be arranged to.

PR. 5- PROJECT Phase –II

Name of the Course: Diploma in **Electronics & Communication** Engineering			
Course code		Semester	6th
Total period:		Examination	3 hours
Practical periods	5 P/week	Sessional	25
Maximum marks :		End Semester Exam	100

RATIONALE

Students' Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course covered in many subjects and Labs, by undertaking a project. The prime emphasis of the project work is to understand and apply the basic knowledge of the principles of Electronics engineering and practices in real life situations, so as to participate and manage a large Electronics engineering projects, in future. Entire Project spreads over 5th and 6th Semester. Part of the Project covered in 5th Semester was named as *Project Phase-I* and balance portion to be covered in 6th Semester shall be named as *Project Phase-II*.

OBJECTIVES

After undergoing the Project Work, the student will be able to:

- Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real practical working environment, preferably in an industrial environment.
- Develop software packages or applications and implement these for the actual needs of the community/industry.
- Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.
- To achieve real life experience in Project design.
- To develop the skill of writing Project Report

Project Phase-I and Phase-II

The Project work duration covers 2 semesters(5th and 6th sem). The Grouping of students, selection of Project, assignment of Project Guide to the Group was done in the beginning of 5th semester under Project Phase-I. The students were allowed to study literature, any existing system and then define the Problem/objective of the Project. Preliminary work and Design of the system also have to be complete in Phase-I. Development may also begin in this phase. Project Milestones are to be set so that progress can be tracked .

In Phase-II Development, Testing, Documentation and Implementation have to be complete. Project Report have to be prepared and complete in Phase-II. All Project reports should be organized uniformly in proper order, irrespective of group. Teacher Guides can make suitable alteration in the components of Task and schedule.

At the end of Project Phase-II in 6^{th} semester there shall be one presentation by each group on whole Project work undertaken by them.

A suggestive criterion for assessing student performance by the external (preferably person from industry) and internal (teacher) examiner is given in table below:

Sl. No.	**Performance Criteria**
1.	Selection of project assignment
2.	Planning and execution of considerations
3.	Quality of performance
4.	Providing solution of the problems or production of final product
5.	Sense of responsibility
6.	Self expression/ communication/ Presentation skills
7.	Interpersonal skills/human relations
8.	Report writing skills
9	Viva voce

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 work done by the students and invite leading Industrial organisations to such an exhibition.

The Project Report need to be prepared as per standard format and following is the indicative format. The Teacher Guide may make minor alteration keeping the sense in tact.

Organization of Project Report

1. Cover page:
   It should contain the following (in order)
   (i) Title of the Project
   (ii) "Submitted in partial fulfillment of the requirements for the Diploma in <Branch Name>"
   (iii) By Name of the Student(s)
   (iv) Logo of the Institution
   (v) Branch Name/Depart Name and Institution Name with Address
   (vi) Academic Year

2. 1st Inner page
   Certificate:
   It should contain he following
   "This is to certify that the work in this Project Report entitled <Project Title> by <Name of student(s)> has been carried out under my supervision in partial fulfillment of the requirements for the Diploma in <Branch Name>" during session <session > in <Branch /Department Name> of <Institute name> and this work is the original work of the above student(s).

   Seal and signature of the Supervisor/Guide with date
3. 2nd Inner Page
   Acknowledgement by the Student(s)
4. Contents.
5. Chapter wise arrangement of Reports
6. Last Chapter: Conclusion
   It should contain
   (i) Conclusion
   (ii) Limitations
   (iii) Scope for further Improvement
7. References

Pr-6 LIFE SKILL

(Common to All Branches)

Practical	2 Periods per week	Sessional	25 Marks
Total Periods	30 Periods	Total Marks	25 Marks

Objective: After completion of this course the student will be able to**:**

- Develop team spirit i.e. concept of working in team
- Apply problem solving skills for a given situation
- Use effective presentation techniques
- Apply task management techniques for given projects
- Enhance leadership traits
- Resolve conflict by appropriate method
- Survive self in today's competitive world
- Face interview without fear

DETAIL CONTENTS:

1. SOCIAL SKILL

Society, Social Structure, Develop Sympathy and Empathy
Swot Analysis – Concept, How to make use of SWOT
Inter personal Relation**:** Sources of conflict, Resolution of conflict ,
Ways to enhance interpersonal relation

2. PROBLEM SOLVING

Steps of Problem solving**:**

- Identify and clarify the problem,
- Information gathering related to problem,
- Evaluate the evidence,
- Consider alternative solutions and their implications,
- Choose and implement the best alternative,
- Review
- Problem solving techniques:

1) Trial and error, 2) Brain storming, 3) Lateral (Out of Box) thinking

3. PRESENTATION SKILL

Body language , Dress like the audience
Posture, Gestures, Eye contact and facial expression. STAGE FRIGHT,
Voice and language – Volume, Pitch, Inflection, Speed, Pause
Pronunciation, Articulation, Language, Practice of speech.
Use of AV aids such as Laptop with LCD projector, white board etc.

4. GROUP DISCUSSION AND INTERVIEW TECHNIQUES

Group Discussion:
Introduction to group discussion, Ways to carry out group discussion,
Parameters— Contact, body language, analytical and logical thinking,
decision making
Interview Technique :
Dress, Posture, Gestures, facial expression, Approach
Tips for handling common questions.

5. WORKING IN TEAM

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.

6. TASK MANAGEMENT

Introduction, Task identification, Task planning ,
organizing and execution, Closing the task

PRACTICAL

List of Assignment: *(Any Five to be performed including Mock Interview)*

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. Solve the True life problem assigned by the Teacher.

3. Working in a Team

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 slum area, social activities like giving cloths to poor etc.(One activity per group where Team work shall be exhibited)

4. Mock Interview

5. Discuss a topic in a group and prepare minutes of discussion.

6. Deliver a seminar for 5 minutes using presentation aids on the topic given by your teacher.

7. 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 (with Break up into sub tasks and their interdependencies and Time)

Note: -1. 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.

Note: -2. The following Topics may be considered for Seminar/GD in addition to other Topics at the discretion of the Teacher.

(Comparison with developed countries, Occupational Safety, Health Hazard, Accident & Safety, First-Aid, Traffic Rules, Global Warming, Pollution, Environment, Labour Welfare Legislation, Labour Welfare Acts, Child Labour Issues, Gender Sensitisation ,Harassment of Women at Workplace)

METHODOLOGY:

The Teacher is to explain the concepts prescribed in the contents of the syllabus and then assign different Exercises under Practical to the students to perform.

Books Recommended:-

Sl.No	Name of Authors	Title of the Book	Name of the Publisher
01	E.H. Mc Grath , S.J	Basic Managerial Skills for All	PHI
02	Lowe and Phil	Creativity and problem solving	Kogan Page (I) P Ltd
03	Adair, J	Decision making & Problem Solving	Orient Longman
04	Bishop , Sue	Develop Your Assertiveness	Kogan Page India
05	Allen Pease	Body Language	Sudha Publications Pvt. Ltd.