STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR 6th Semester (Applied Electronics & Instrumentation)(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 CONTROL SYSTEM	5		-	20	80	3	100
Th.2		INDUSTRIAL CONTROL DEVICES & DATA AQUISATION SYSTEM	5		-	20	80	3	100
Th.3		DIGITAL SIGNAL PROCESSING (Common to ETC/AEI)	4		-	20	80	3	100
Th.4	ELECTIVE	(1) POWER PLANT INSTRUMENTATION (2) FUZZY LOGIC AND NEURALNETWORK (3) ARTIFICIAL INTELLIGENCE & ROBOTICS	4			20	80	3	100
		Total	*18*			*80*	*320*	-	*400*
		Practical							
Pr.1		CONTROL SYSTEM AND SIMULATION LAB	-	-	4	25	25	3	50
Pr.2		COMPUTER HARDWARE – LAB (Common to ETC/AEI)	-	-	3	25	25	3	50
Pr.3		PLC & AUTOMATION- LAB	-	-	4	25	50	3	75
Pr.4		PROJECT Phase-II			6	50	100	3	150
Pr.5.		Life Skill			2	25	-	-	25
		Student Centred Activities(SCA)		-	2	-	-	-	-
		Total	-	-	*21*	*150*	*200*	-	*350*
		Grand Total	**18**		**21**	**255**	**495**	**-**	**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 Tinkering 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

TH1. ADVANCE CONTROL SYSTEM

Name of the Course: Diploma in Applied Electronics & Instrumentation 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:

Control system is related to stability, combination of devices and components related to command of a system another system. This subject as wide application is industry for stability various control system like speed temperature, Pressure, level etc.(mechanical system, electrical system ,position control system and other single loop And multi loop system).In the subject information on above context has been included so that the updated knowledge can be given to the students.

B. OBJECTIVE:

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

1. Basic model of control system for analysis.
2. Effect feedback on a control system.
3. Both the transient frequency response of analysis of control system.
4. State variable approach.
5. Adaptive Ratio and other non-linear control system.

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	Fundamental of control system	12
2	Properties of control system	08
3	Control system components and mathematically modeling.	05
4	Block diagram and S.F.G approach	12
5	Time domain analysis of control system	12
6	Frequency characteristics of control system	12
7	Feedback characteristics approach	07
8	State variable Approach	07
	Total:	**75**

D. COURSE CONTENTS:

1. Fundamental of control system

1.1 Definition of control system.
1.2 Classification of control system.(open loop and closed loop control system, cascaded and ratio control system).
1.3 Block diagram of automatic closed loop control system.
1.4 Distinguish between open loop and closed and its comparison.
1.5 Effect of feedback on control system.
1.6 Standard input signal of control system.
1.7 Examples-of electrical negative feedback control system (voltage regulator).
1.8 Principle of servo Mechanism (Non-contact type control system).

2. Properties of control system

2.1Transfer Function (T.F) (Open loop and closed system).

2.2Response of control system (impulse, step and Ramp).

2.3 study state Response A. under damp Response, B. Over- Damp Response, Critically damp Response.

2.4 Advantage and Disadvantage T.F.

2.5 identification poles and zeros of T.F.

2.7 sample of T.F Electrical system using Laplace Transform

3. Control system components and Mathematically modeling

3.1 Components of control system with definition.

3.2 Potentiometer, DC Motor, Servo motor AC Motor (Synchronous and Asynchronous).

3.3 Modeling of Electrical system (R, L and C).

4. Block diagram and S.F.G approach

4.1. Deformation of basic elements of Block diagram.

4.2. Characteristics of equation of control system.

4.3. General Block diagram of feedback with Disturbance.

4.4. Conical form of closed loop control system in ‘S’ Domain.

4.5. Rule for Block Reduction.

4.6. Procedure for Reduction of Block diagram.

4.7. Sample problems for determine equivalent T.F of a Multi-loop control system.

4.8. Basic definition of S.F.G and properties.

4.9. Mason’s gain Formula.

4.10. Reduction S.F.G to determine overall T.F.

4.11 Comparison between block diagram and S.F.G Approach.

4.12 sample problems for S.F.G for electrical N/W.

5. Time domain analysis of control system.

5.1. Basic concept of Time domain Analysis.

5.2 Distinguish between Linear Time variant and Non-Linear Time Variant.

5.3. Definition steady state Response Accuracy, Transient Response, Stability in-sensitivity and Robustness.

5.4. System Time Response.

5.5. Analysis of state steady error and Definition of various error Co-efficient.

5.6 Types of input and Steady state error (Step, Ramp and Parabolic).

5.7 Parameter of Zeros order, 1^{st} order and 2^{nd} order system and its T.F.

5.8 Derivation of Various time and Response Specification (Terms such as Delay Time , Rise Time , Settling Time ,Over shoot ,peak over shoot ,Harmonics ,Steady state error.).

6. Frequency characteristics of control system.

6.1 Concept of Frequency Response Analysis and its necessary in control system.

6.2. Relationship between Time Response and Frequency Response.

6.3 Various Method frequency Response Analysis.

6.4 stability through pole and zero diagram.

6.5 Polar plot and various steps of polar plot to determine for stability.

6.6 Bode plot and various steps to determine for stability.

6.7 Stability in frequency domain analysis .Determination of G.C.F, P.C.F, G.M and P.M using Bode plot.

6.8 Nyquist Plot and Nyquist Stability Criteria.

6.9 Stability Concept and Root Locus Method.

6.10. Routh Array Criteria determination stability of control system.

6.11. Sample Problems determination stability of the system using various frequency Method.

7. Feedback characteristics approach.

7.1 Effect of various parameter on an open -Loop and Closed Loop control system.

7.2 Basic Modern of Feed - back using properties, derivation and Integral.

7.3 Effect of overall gain and Stability.

7.4 Concept of Feed forward and cascaded and Ratio types control system only through Block Diagram.

8. State variable approach.

8.1. Concept state variable Approach.

8.2 Various state variable.

8.3 state model.

8.4 State models for linear continuous time function.

8.5 Advantage of state variable Analysis.

Syllabus coverage up to Internal assessment

Chapters: 1, 2, 3 and 4.

Learning Resources:

Text books:

1. Control Systems -By Samarajit Ghosh—Publisher- Pearson Pub.
2. Control Systems Principle & design- By –Gopal. M-– Publisher-.Tata Mc.Graw
3. Automatic Control System. By Kuo, B.C. –publisher-Prentice Hall.
4. Modern Control Engineering –By-Ogata,K- Publisher-Prentice Hall

Reference Books:

1. Modern Control Engineering-By-Nagrath& Gopal- Publisher- New Age International, New Delhi.
2. Control System Engg.- By- P. Ramesh Babu& R. Anandanatarajan-Publisher- SCITECH.
3. Control System Engg.- By- S. K. Bhattacharaya- Publisher- Pearson.
4. Automatic Control System- By- S. Hasan Saeed- Publisher- Katson.

TH-2. INDUSTRIAL CONTROL DEVICES &DATA AQUISATION SYSTEM

Name of the Course: Diploma in Applied Electronics & Instrumentation 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 study of industrial control devices will give the students detail idea about power electronics devices such as Thyristor, GTD, PUT, and other industrial systems like relays, synchros, servomechanism, and UPS. The students will also acquire adequate knowledge about principle of the devices and mechanism. The subject will also give the idea of control of D.C. and A.C. motors, besides, the students will gain knowledge about drives system. ICS technologies include, but are not limited to, supervisory control and data acquisition (SCADA) and distributed control systems (DCS), industrial automation and control systems (IACS), programmable logic controllers (PLCs), programmable automation controllers (PACs), remote terminal units (RTUs), control servers,

B. OBJECTIVE:

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

1. Know the principle of operation, Characteristics and applications of power semiconductor devices
2. Study working principle of MOSFET, IGBT
3. Understand the concept of turn-on and commutation methods in SCR
4. Study the methods of triggering
5. Learn about the working of controlled rectifier
6. Learn about the working of chopper & types
7. Learn about the working of inverter & types
8. Learn about the Cyclo converters and its types.
9. Understand ratings, specifications, protection, selection and reliability of SCR.
10. Learn about the working of power supplies, UPS, stabilizers and generator voltage regulator.
11. Learn about the temperature control circuit and various applications

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	Power semiconductor diode & transistors	12
2	Thyristors& their characteristic	12
3	Application of an SCR	06
4	Syncharos	08
5	Servo system	06
6	AC voltage controllers	06
7	Cyclo-converters	05

8	AC & DC motor control	12
9.	Chopper & drives	08
	Total:	**75**

D. COURSE CONTENTS:

1. Power semiconductor diode & transistors:

1.1 Introduction to Power Electronics, Define Converter, Inverter, Chopper, Cylo Converter, AC Voltage Controllers
1.2 Power diode.
1.3 Power transistor.
1.4 Power MOSFET.
1.5 IGBT.
1.6 MOS Control, Thermistor & Their Comparison.
1.7 UJT.

(Basic Structure, symbol, Circuit Diagram,working principle, applications etc of all above devices)

2. Thyristors& their characteristic:

2.1 SCR. (only construction & characteristics).

2.2 TRIAC. (only construction & characteristics).

2.3 GTO. (only construction & characteristics).

2.4 SCS. (only construction & characteristics).

2.5 PUT. (only construction & characteristics).

2.6 SUS. (only construction & characteristics).

2.7 Thyristor turn ON & turn OFF , gate characteristics.

2.8 Triggering of thyristor through get current.

2.9 Firing circuit for thyristor.

2.10 Thyristor protection- Heating,Cooling,Mounting.

2.11 Series & parallel operation.

3. Application of an SCR :

3.1 Explain DC Motor using SCR (with variation in load and variation power supply).
3.2 Explain SCR drives only DC drive.

3.3 Explain SCR working of an SCR illumation.

3.4 Explain the function of SCS (SILICON CONTROLLED SWITCH).

4. SYNCHROS :

4.1 Define synchros System.

4.2 Explain the operationsynchrons generator and Motor.

4.3 Explain the Reversing Motor and stator connection.

4.4 Explain the principle of differential synchros system.

4.5 Explain the differential synchros system for addition and subtraction.

4.6 Explain some application of synchros system

5. Servo System :

5.1 Define servo Mechanism.

5.2 List the elements Servo Mechanism and explain general block diagram of Servo system and different elements of servo system.

5.3 Explain the DC and AC servo system.

5.4 Explain working Principle of stepper Motor.

5.5 Discuss some application servo mechanism and in control system.

6. AC voltage controllers:

6.1 Types of A.C. voltage controller.

6.2 Integral cycle control.

6.3 Single phase voltage controllers.

6.4 Three phase voltage Controllers.

7. Cycloconverters:

7.1 Definition of Cycloconverter& its operation.

7.2 Single phase Cycloconvers.

7.3 Bridge type Cyclocoveters.

7.4 Three phase half wave Cycloconverter.

7.5 Load commutated Cycloconverter.

8. AC and DC Motor Control :

8.1 Discuss the types speed control mechanism DC and AC motor.

8.2 Explain the function of an SCR speed control and DC Motor circuit..

8.3 Explain AC drives and Frequency converter.

8.4 Microprocessor control of stepper motor.

8.5 Stepper Motor control using I.C.

8.6 Microprocessor and PLC based speed control of DC motor.

9. Chopper & drives;

. 9.1 Basic concept of choppers.

9.2 Control strategy of chopper.

9.3 Stepper chopper.

9.4 Basic concept of single chopper drives.

Syllabus coverage up to Internal assessment

Chapters: 1, 2, 3 and 4.

Learning Resources:

1. Modern power Electronics –Author---p.csen – Publisher –S. Chand company .
2. Industrial Electronics – Author- Jabbar- Publisher –MC GrawHill Ltd.
3. Power Electronics - Author – Dr P.S. Bimbhra – Publisher – Khana Publication.
4. Industrial Electronics by G. K Mittal.(Reference Books)
5. Industrial Electronics and Control- by Bhattacharya –Publisher-Mc Graw Hill.(Reference Books)
6. Power Electronics by MD Singh & KB Khanchandhni, TMH.

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 Power Plant Instrumentation

(Elective)

Name of the Course: Diploma in Applied Electronics & Instrumentation 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:

1. To give idea to the student about instrumentation scheme of thermal, hydro & nuclear power station.
2. To know about different process of energy used for generation of power.

B. OBJECTIVE:

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

1. Students will give an idea about Power plant.
2. Subject gives a brief idea about energy requirement & energy storage.
3. Students will know about different types of power plant.
4. Students will give an idea about instrumentation used in power plant.

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	Introduction	12
2	Steam power plant	12
3	Hydroelectric power plant	10
4	Nuclear power plant	10
5	Power plant instrumentation	06
6	Instrumentation for transmission for power	10
	Total:	**60**

D. COURSE CONTENTS:

1. Introduction:

1.1 Importance of electric power plant.
1.2 Definition of power plant.
1.3 Types of power plants.
1.4 Sources of energy.
1.5 Recent development in power generation.
1.6 Direct energy conversion system.
1.7 Alternative energy system.
1.8 Energy scores in India.
1.9 Development of electric power in India.

2. Steam power plant:

2.1 Operation of condensing & non condensing power plants.

2.2 Choice of steam, temperature & pressure.

2.3 Important features of a modern coal fire steam power plant.

2.4 Basic working principle of a thermal power plant.

2.5 Different units of a stem power plants.

A. Boiler unit.

B. Steam nozzles & turbine.

C. Condensing unit & function of condenser.

D. Cooling unit.

E. Cooling ponds & cooling towers.

3. Hydroelectric Power plant:

3.1 Definition of Hydroelectric power plant.

3.2 Essential features of a water power plant.

3.3 Classification of a hydro power plant.

3.4 Hydraulic turbines & its operating characteristics.

3.5 Selection of water turbine.

3.6 Carbine hydro &steam power plant.

3.7 Comparison of hydropower station with thermal power station.

4. Nuclear Power plant:

4.1 General introduction of nuclear physics.

4.2 description of nuclear reactor.

4.3 Classification of nuclear reactor.

4.4 safety uranium.

4.5 Methods of enriching uranium.

4.6 Nuclear power plant in India.

4.7 Features of nuclear power.

5. Power plant instrumentation

5.1 General classification of instrument.

5.2 Pressure measuring instrument.

5.3 Temperature measuring instrument.

5.4 Flow measuring instrument.

5.5 Analysis of combustion of gases.

6. Instrumentation for transmission for power:

6.1 Instrumentation schemed used for HVDC. & EHVAC transmission system.

6.2 Energy management.

i. Electronic instrumentation system adopted for energy conservation

ii. Electronic instrumentation scheme used for energy audit

6.3 Economics of power plant.

Syllabus coverage up to Internal assessment

Chapters: 1, 2, 3 and 4.

Learning Resources:

Text books:-

1. Power plant engineering by P.C. SHARMA—Publisher- S.K. KATARIA &SONS.
2. Operation & control of inter connected system - Author –L. K. KIRCAHMEYAR—Publisher- JOHN WILEY.
3. Power system stability & control -Author –ANDERSON & FOUAD–publisher-GALGOTIA PUBLICATION.

Reference Books:

1. Instrumentation Engineering hand book by BELA. G. LIPTAK-publisher- BUTTERWORTH HEINEMENI publication.
2. Morten power practices by Vol.F control & instrumentation- PUBLISHER- BRITISH ELECTRICITY INTERNATIONAL PROGRAM.

TH-4 :- Fuzzy Logic and Neural Network.

(ELECTIVE)

Name of the Course: Diploma in Applied Electronics & Instrumentation 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:

1. To specify know about concept of fuzzy logic & its application to control system by using membership function.
2. To know about artificial neural network technique & its application in medical&indusrial control.

B. OBJECTIVE:

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

1. To give an idea Modern Logic Fuzzy Logic which is powerful Mathematical tool and for modeling on uncertain system. Nature and humanity

2. To give an idea common sense reasoning and decision making in the absence complete information.

3. To find a good approximation solution any comparison to other traditional mathematical method.

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	Concept of Fuzzy logic and application	10
2	Basic concept of Fuzzy set	15
3	Operation of Fuzzy set	15
4	Fuzzy logic in Instrumentation	10
5	Artificial Neural Network	10
	Total:	**60**

D. COURSE CONTENTS:

1. Concept of Fuzzy logic and application:

1.1 Concept of Fuzzy logic and its application
1.2 Classical sets (Set-1,Set-2,General Symbol of Set-A,Crisp-2)
1.3 Universal Set.
1.4 Empty set.
1.5 Presentation of Sets.
1.6 Single tone set.
1.7 Index set.
1.8 Family Of sets.
1.9 Equal set.
1.10 Power set.
1.11 Cardinality of set .

1.12 Different of set
1.13 Complement & intersection of set
1.14 Cardinality of set .
1.15 Different of set
1.16 Complement & intersection of set

2. Basic concept of Fuzzy set

2.1 Introduction of Fuzzy set.

2.2 Representation method of Fuzzy logic.

2.3 Representation of fuzzy sets.

2.4 Expansion of fuzzy sets (α-cut set of fuzzy sets properties of α-cut) .

2.5 Strong α-cuts of fuzzy sets.

2.6 Properties of fuzzy sets.

2.7 The support of fuzzy sets.

2.8 Core of fuzzy sets.

2.9 Height of fuzzy sets.

2.10 Normal and Subnormal Fuzzy set.

2.11 Normalization of fuzzy set.

2.12 Fuzzy number.

2.13 Stranded operation of fuzzy set.

3. Operation of Fuzzy set

3.1 Introduction.

3.2 Meaning of fuzzy complement.

3.3 Threshold type complement.

3.4 Sugeno complement.

3.5 Equilibrium Fuzzy of fuzzy complement.

3.6 Disjunctive sum.

3.7 Difference of fuzzy sets.

3.8 Distance of Fuzzy sets.

3.9 Power of Fuzzy sets.

3.10 Algebraic product.

4. Fuzzy logic in Instrumentation

4.1 Comparison Of fuzzy logic with digital logic.

4.2 Fuzzy sets Theory.

4.3 Fuzzification Process.

4.4 Dfuzzification process.

4.5 Fuzzy logic controller.

4.6 Some application Fuzzy logic in engineering field.

5. Artificial Neural Network

5.1 Characteristics of Artificial Neural network

5.2 Characteristics of ANN experts system.

5.3 Artificial Neural.

5.4 Biological neural network (Basic concept).

5.5 Biological neural network structure of human brain.

5.6 Some application of ANN in the field of engineering.

Syllabus coverage up to Internal assessment (IA)

Chapters: 1, 2, 3 and 4.

Learning Resources:

1. Fuzzy set theory, fuzzy logic and application by Dr. A.K Bhargave—Publisher- S. Chand company
2. Neural networks and Fuzzy system- Author –V. Koska-– Publisher-.PHI publication
3. Introduction to Artificial neural network system. By Jacey And Jurada –publisher-Jaico publishing Mumbai.
4. Introduction to artificial intelligence and Expert System by D.W Patterson –publisher—PHI publication

Th.4 -ARTIFICIAL INTELLIGENCE & ROBOTICS

(Elective)

Name of the Course: Diploma in Applied **Electronics & Instrumentation** 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 CONTROL SYSTEM AND SIMULATION Lab

Name of the Course: Diploma in Applied Electronics & Instrumentation 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:

Control System is a combination of devices and components or related so as to command, direct of 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.

B. OBJECTIVE:

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

1. Programmable Logic Controller (PLC) makes life easier for manufacturing by Automatic certain process

2. It helps responsible helping to design this system to increase manufacturing efficiency and safety.

3. It is essentially the creation and to perform specific tasks and highly motivated and intelligent programmer problem solving skills to do the students.

4. SCADA System to monitor to control chemical or range part process, to control electric power generation, Gas and oil pipelines and other distribution process.

C. LIST OF PRACTICALS:

1. Using MATLAB Software -: Introduction to MATLAB, Some basic problem based on Matrix mathematically such as (Addition, Subtraction, Multiplication, Division, Transpose using array and with -out array.

2. To Generation of different types of signal (Sinewave , Cosine wave ,Triangular ,Square ,unit Impulse ,Unit Step and Unit Ramp ,Exponential using Continuous and Discrete).

3. Write a program and using block diagram frequency of using the combination of R-L, R-C, and R-L-C Circuit and plot.

4. Write a program unit step response of 2nd order system.

5. (a). To Response Pole and Zero using MATLAB.

(b). Write a program open loop Transfer function of a servo system with unity feedback and determination of damping ratio.

6. To write program for closed loop Transfer Function of a System. Determine Unit step Response % Of the system.

7. To write program unity feedback control system the forward path function.

To Determine steady state error of % of the system inputs (a) 3,(b) 6t (c) 3t^2/2.

8. Sketch the polar plot and Bode plot of Transfer Function.

9. Sketch root locus as given data . G(S)=K (S+1)/(S^2(S+3.2).Sketch the T.F of Nyquist plot of the system.

10. Using system equation a system input single output system .Test for controllability.

11. Using block diagram PID Controller .To determination PID separately Response combine PI,PD ,PID Response.

Learning Resources:

Develop programming concepts of students reference Websites:

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

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 PLC AND AUTOMATION LAB

Name of the Course: Diploma in Applied Electronics & Instrumentation Engineering			
Course code		Semester	6th
Total period:	60 Periods	Examination	3 hours
Practical periods	4 P/week	Sessional	25 Marks
Maximum marks :	75 Marks	End Semester Exam	50 Marks

A. RATIONALE:

Experiment may be carried out by using PLC. For the purpose of controlling various online process parameter both electrical & nonelectrical.Basic idea about various language used for programing PLC.The PLC laboratory is setup to complement the topics studied in the automation theory course. The lab is equipped with PLC automation trainer kits and modules to enable the study of components of automation system. The students perform experiments to study the components of PLC, programming PLC, interconnection of PLC with computer, SCADA programming and fault detection in automation system.

B. OBJECTIVE:

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

1. Know about programmable logic controller.
2. Know the Control of various process parameter. Bu using PLC (programmable logic controller).
3. Know about various languages used for programming PLC.
4. Get an idea to design software multipurpose control system without changing hardware.

C. LIST OF PRACTICALS:

1. Basic Logic Gates. Using Ladder logic using PLC.

2. Latching and unlatching using Ladder logic.

3. Different application push-Button.

4. Using different types Timer .Delay operation of Lamp by using Timer.

5. Using different types of Counter.

6. Sequential operation ON/OFF set of lights.

7. Traffic light indication using Ladder logic.

8. Automatic indication of Water Tank level

9. Alarm communication using SCADA.

10. Temperature sensing using SCADA

Learning Resources:

Develop programming concepts of students reference Websites:

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

List of Equipment & Tools Required for Lab (for group of 30)

Sl No	Equipment & Tools Required for Electronics Workshop	Laboratory Size-30 Nos Table- 8 nos
	Equipment Required	Quantity Required
1.	PLC Trainer kit with all assoceries a) The cpu has to have minimum 8 MB (RAM) memory integrated b) The CPU should have multi computing facility c) The CPU should be backed up by redundant external battery. d) In built determinist communication protocol facility, e,g - profibus is required e) All the I/O module and the CPU should support 60 degree centegrate ambient during operating condition. f) The party should have supplied the same model at least two govt. college/training institute in the state. trainer	8
2.	Latching and unlatching using Ladder logic Kit	1
3.	push-Button switches sets	4
4.	Kit for different types Timer & Delay operation of Lamp by using Timer.	1
5.	Sequential operation ON/OFF set of lights Kits	1
6.	Traffic light indication using Ladder logic using above PLC trainer	1
7.	Automatic indication of Water Tank level using above PLC trainer	1
8.	Alarm communication kit using SCADA.	1
9.	Temperature sensing Kit using SCADA	1

PR. 4- PROJECT Phase –II

Name of the Course: Diploma in Applied Electronics & Instrumentation Engineering			
Course code		Semester	6th
Total period:	90	Examination	3 hours
Practical periods	6 P/week	Sessional	50
Maximum marks :	150	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(5^{th} and 6^{th} sem). The Grouping of students, selection of Project, assignment of Project Guide to the Group was done in the beginning of 5^{th} 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-5 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.