RATIONALE

The objective of teaching this subject is to give students an in depth knowledge of various electronic audio and video devices and systems. Further this subject will introduce the students with working principles, block diagram, main features of consumer electronics gadgets/goods/devices like audio-systems, CD systems. TV, VCR and other items like digital clocks, calculators microwave ovens, photostat machines etc. Which in-turn will develop in them capabilities of assembling, fault diagnosis and rectification in a systematic way.

DETAILED CONTENTS

1. Audio Systems:

- 1.1. Microphones and Loudspeakers
 - a) Carbon, moving coil, cordless microphone
 - b) Direct radiating and horn loudspeaker
 - c) Multi-speaker system
- 1.2 Sound Recording
 - a) Magnetic Recording
 - b) Digital Recording
 - c) Optical Recording (CD system and DVD)
- 2. Television
- 2.1. Monochrome TV
 - a) Elements of TV communication system
 - b) Scanning and its need
 - c) Need of synchronizing and blanking pulses, VSB
 - d) Composite Video Signal
 - e) Picture Tube
 - f) Camera Tube : Vidicon and Plumbicon
 - g) TV Receiver: Block diagram, function of each block, waveform at input and output of each block.
- 2.2. Colour Television:
 - a) Primary, secondary colours
 - b) Concept of Mixing, Colour Triangle
 - c) Camera tube
 - d) PAL TV Receiver
 - e) Concept of Compatibility with Monochrome Receiver

L T P 4 - 3

(20 hrs)

(18 hrs)

(10 hrs)

	f)	NTSC, PAL, SECAM (brief comparison)	
3.	LCD	and LED Television: Basic principle and working of LCD & LED TV	(04 hrs)
4.	Cable	e Television: Working of Cable TV, DTH	(06 hrs)
5	Cons	umer Appliances(Principle and Working):	(06 hrs)
	a) b) c) d)	Microwave Oven Automatic Washing Machine Photostat Machine Digital Camera	

LIST OF PRACTICALS

- 1. To plot the frequency response of a Microphone
- 2. To plot the frequency response of a Loud Speaker
- 3. Trouble shooting of CD/DVD Player
- 4. To observe the wave forms and voltage of B/W TV Receiver.
- 5. To observe the waveforms and voltages of colour TV Receiver
- 6. Fault finding of colour T.V
- 7. Demonstration of Microwave Oven
- 8. Demonstration and study of DTH System
- 9. Demonstration of Photostat Machine
- 10. Demonstration of Automatic Washing Machine

INSTRUCTION STRATEGY

This subject gives the knowledge of the various day-to-day life electronic products. So, the teacher is required to show and demonstrate the gadgets and impart practical knowledge to the students. For that one should give home assignment and frequent industrial visit should be there. Visit to TV studio and TV transmitter station should be arranged to give a practical exposure to the students

LIST OF RECOMMENDED BOOKS

- 1. Audio and Video Systems by RG Gupta, Tata McGraw Hill Education Pvt Ltd, New Delhi
- 2. Colour Television-Principles & Practice by RR Gulati , Wiley Eastern Limited, New Delhi
- 3. Complete Satellite & cable Television R.R Gulati New age International Publisher, New Delhi

- 4. Colour Television Servicing by RC Vijay BPB Publication, New Delhi
- 5. Colour Television & Video Technology by A.K. Maini CSB Publishers
- 6. Colour TV by A.Dhake
- 7. Service Manuals, BPB Publication, New Delhi

Sr	Торіс	Time Allotted	Marks Allocation%
No		(hrs)	
1	Audio System	10	20
2 a	Monochrome TV	20	30
2 b	Colour TV	18	20
3	LCD and LED TV	04	10
5	Cable Television	06	10
6	Consumer Appliances	06	10
	Total 64 100		

5.2 PERSONAL COMPUTER ORGANIZATION (PCO)

L T P 3 - 3

RATIONALE

Persona; Computers have become a necessity in Industry, offices and becoming popular in homes too. This course gives organization structure and principles of working of various other components like visual display, keyboard drives and printers etc. Diploma holders will find employment in computer industry, Repair and maintenance field.

DETAILED CONTENTS

1.	Mother Board	(8 hrs)
	Introduction to different type of mother boards, Single Board Based System, Block diagram of motherboard. Installation of Computer System.	
2.	Buses and Ports	(8 hrs)
3.	Different type of Buses PCI, SCSI and Serial and Parallel ports (COM ports) Ports COM 1, LPTI, USB. RS 232 C, use of computer for instrumentation. Memory	(8 hrs)
	Principle and Construction of Floppy Disk Drive and Hard Disk Drive (HDD). Floppy Disk Controller & Hard Disk Controller. Pen Drives, common faults with hard disk drive and floppy disk drive, RAM Module.	
4.	Keyboard and Mouse	(8 hrs)
	Block Diagram of keyboard Controller, keyboard switches, keyboard faults, mouse, common faults with mouse. Introduction to scanner, digitizer.	
5.	CRT Display Devices	(8 hrs)
	Block Diagram, Principle of operation of Computer Monitor, Difference between TV & Computer Monitor. Video display Adaptors (monochrome and Colour), introduction to solid state displays	
6.	Printers	(8 hrs)
	Printing Mechanism, Construction and working principles of Dot Matrix Printer, Inkjet Printer, Laser Printer, Printer Controller, Centronics Interface, Signals from PC to Printer and Printer to PC.	

LIST OF PRACTICALS

Operation, Maintenance, Installation and Testing of the following devices:

- 1 Keyboard
- 2 Mouse
- 3 Monitors
- 4 FDD
- 5 HDD, Partitioning and Formatting
- 6 DOT Matrix Printer
- 7 Laser Printer
- 8 Mother board (Pentium and Celeron), CMOS Set up.
- 9 CD-ROM and DVD-ROM
- 10 Connectors and Cables
- 11 MODEM
- 12 Installation of any operating system.
- 13 SMPS
- 14 Specifications, maintenance and repair of CVTs and UPS

INSTRUCTIONAL STRATEGY

This subject gives complete knowledge regarding the Computer Hardware. Teacher must give hands on practice related to operation, maintenance, installation etc. Teacher should encourage the students to do assembly of PC.

RECOMMENDED BOOKS

- 1. PC Organisation by S. Chowdhury, Dhanpat Rai & Sons, Delhi
- 2. IBM PC Colons by Govinda Rajalu, Tata McGraw Hill Education Pvt Ltd, New Delhi
- 3. Text Book by Mark Minasi
- 4. Computers by P.Norton

Sr	Торіс	Time Allotted	Marks Allocation%
No		(hrs)	
1	Mother Board	08	20
2	Buses and Ports	08	15
3	Memory	08	15
4	Keyboard and Mouse	08	15
5	CRT Display Devices	08	20
6	Printers	08	15
Total		48	100

5.3 TROUBLE SHOOTING OF ELECTRONIC EQUIPMENT

L P - 4

RATIONALE

The course provides the students with necessary knowledge and competency to diagnose the faults for trouble shooting and for systematic repair and maintenance of electronic equipment and testing of components.

NOTE: Students are to be given the awareness about the following topics during the Laboratory Work. There will not be any theory examination.

TOPICS TO BE DISCUSSED

1. Repair, Servicing and Maintenance Concepts

Introduction, Modern electronic equipment, Mean time between failures (MTBF), Mean time to repair (MTR), Maintenance policy, potential problems, preventive maintenance, corrective maintenance.

- a) Study of basic procedure of service and maintenance
- b) Circuit tracing techniques
- c) Concepts of shielding, grounding and power supply considerations in instruments.
- 2. Fundamental Trouble Shooting Procedures
 - I) Fault location
 - ii) Fault finding aids
 - Service manuals
 - Test and measuring instruments
 - Special tools
 - iii) Trouble Shooting Techniques
 - Functional Areas Approach
 - Split half method
 - Divergent, convergent and feedback path circuit analysis
 - Measurement techniques
- 3. Mobile Phones
 - Identification of various parts of mobile phones
 - Repair and maintenance of mobile phones
 - Software installation in mobile phones
 - Common faults

- 4 Trouble shooting and maintenance of testing equipment like C.R.O, function generator, power supplies and other measuring devices, detailed discussion about trouble shooting of medical, electronic equipment like, ECG, EEG, Ultra sound. Repair and maintenance and exposure of medical electronics equipment through industrial visits.
- 5. Troubleshooting Digital Systems

Typical faults in digital circuits. Use of logic clip, logic pulsar, IC tester

6 Demonstration and practicals to be performed on following groups of Electronic equipment, Choice of one equipment from each group is compulsory.

Group-I	Group-II	Group-III	Group-IV
Communication	Consumer	Audio-video	Computer
Telephone Handsets.	Inverters/UPS Emergency Lights	TV, CRT, LCD/HD	Monitor
Cordless Phones	Stabilizers	VCD, DVD Players	Printer (Laser)
Fax Machine	EPABX	CCTV	Printer (Inkjet)
Modem	Hub/Switches	Audio Systems	Scanner
Walkie / Talkie	Electronic Toys		Keyboard, Mouse
			Video Games

LIST OF PRACTICALS

- 1. Demonstration and practice of fault finding and repair of mobile telephones
- 2. Demonstration and practice of fault finding and repair of:
 - (a) C.R.O
 - (b) Function Generator
 - (c) Power supplies
 - (d) Digital multimeter
- 3. Demonstration, practice of fault finding and repair of any one equipment from group-I i.e. Communication
- 4. Demonstration, practice of fault finding and repair of any one equipment from group-II i.e. Consumer
- 5. Demonstration, practice of fault finding and repair of any one equipment from group-III i.e. Audio/Video systems

- 6. Demonstration , practice of fault finding and repair of any one equipment from group IV i.e. Computer
- 7. Testing of Integrated Circuits (ICs)
- 8. Use of digital tools for troubleshooting digital equipments

RECOMMENDED BOOKS

- 1. Repair Manuals
- 2. Specifications of Equipment supplied by the manufacturer
- 3. Introduction to Biomedical Equipment Technology Joseph J. Carr and John M Brown.
- 4. Principles of Biomedical Instrumentation and measurement Richard Aston.
- 5. Introduction to Biomedical Equipment Technology by Carr and Brown, Regents and Prentice Hall of India, New Delhi
- 6. Principles of Bio-medical Instrumentation and Measurements by Leslie Cromwell, Fred J Weibell, Erich A Pfeiffer Prentice Hall of India, New Delhi
- 7. Handbook of Biomedical Engineering- R.S. Khandpur.
- 8. Modern Electronic Equipment Trouble shooting, Repair and Maintenance by RS Khandpur, Tata McGraw Hill Education Pvt Ltd, New Delhi
- 9. Bio-medical Instrumentation by M Arumugam, Anuradha agencies Publishers, Vidayakaruppur, Kumbakonam RMS

5.4 DIGITAL SYSTEM DESIGN

LTP 4 - 2

RATIONALE

The students, already having learnt the building blocks of digital electronics, need to learn the integration of various units to develop complete digital system. Starting with the design of combinational circuits using various design approaches, students learn to design more complex sequential circuits. The again using alternate design approaches, the student gets the grasp of any digital system using various design constraints. Hence the subject.

DETAILED CONTENTS

- 1. Analog Interfacing (16hrs)Signal conditioning, noise S/N ratio, spectrum analysis of analog signals, analog and digital conversion error.
- 2. Combinational Circuits (16 hrs) Review of logic variables, Boolean expressions, Minimization of Boolean expressions using map method; Tabular method of function minimization, optimal realization of Boolean expressions using gates (SSI approach), Multiplexer/Decoder (MSI approach), ROM/PLA (LSI approach)
- 3. Sequential Circuits

(22 hrs) Essential components of a sequential circuit, synchronous and asynchronous sequential circuits. Classification of sequential circuits (Mealy and Moore Machines)

Flip-flop as memory: RS, D, JK (including masterslave), T, their excitation and characteristics (Truth-Tables), conversion of JK to D and T, Generation of primitive state table / diagram, its minimization of states, state assignment, choice of memory element. Design of next state decoder (SSI, MSI approach). Worked examples for sequential system design, synchronization of asynchronous inputs, spikes in output and their removal. Design approach to asynchronous circuits, definitions of cycles, races and hazards.

4. High Frequency problems (10 hrs) High Frequency problems in digital systems, interfacing digital systems with different media the coaxial cable and fibre cable.

LIST OF PRACTICALS

- 1. Design of combinational Circuit using decoders
- 2. Design of combinational Circuit using MUX
- 3. Design of combinational Circuit using Sequential circuit
- 4. Design a 4-bit sequential generator.
- 5. Using PROM/PLA design and implement a combinational circuit.
- 6. Design and implement a module-5 synchronous counter using JK Flip-flops.

INSTRUCTIONAL STRATEGY

Emphasis is to be placed on design aspects in theory. A lot of practical work is required in designing digital systems including practical projects based on both combinational and sequential circuits. Bread Boards to be used to set up and test various circuits. Practical exercises are also required to be done on PLA, PAL and CPLD kits

REFERENCE BOOKS

- 1. Digital System Design and Microprocessors By Hayes, John Tata McGraw Hill Education Pvt Ltd , New Delhi.
- 2. Digital Systems, Hardware Organization And Design By Hill, Fedrick Willey Publication
- 3. Digital System Design Using Vhdl By Roth, Charles H Books/Thomson Learning
- 4. Digital System, Principles and Application By Tocci, Ronald PHI Publication
- 5. Engineering Approach to Digital Design By Wiiliam Fletcher PHI Publication
- 6. Digital Design By Morris Mano
- 7. Digital Logic Design Principles by Norman Balabanian & Bradley Carlson
- 8. Modern Digital Electronics By R.P. Jain
- 9. Digital Circuits & Design By S. Salivahanan & S. Arivazhagan
- 10. An Engineering Approach to Digital Design- William I. Fletcher

Sr No	Торіс	Time Allotted (hrs)	Marks Allocation%
1	Analog Interfacing	16	25
2	Combinational Circuits	16	25
3	Sequential Circuits	22	35
4	High Frequency problems	10	15
Total		64	100

5.5 ADVANCED MICROPROCESSORS

LTP 4-2

(08 hrs)

(10 hrs)

(14 hrs)

RATIONALE

The complex systems (Microprocessor) requires high through put that at times is not met with 8-bit microprocessor system. So, 16 bit Microprocessor based system become suitable. They provide better facilities to personal computers and other automatic process control systems. Micro controller based system design provides facilities for economical & less complicated small process control system.

DETAILED CONTENTS

1. The 8086 Microprocessor

- Internal Architecture of 8086.
- Concept of memory segmentation and physical address generation.
- Memory and date addressing mode
- Minimum and Maximum mode of 8086.
- 2. System Design using 8086
 - Pins and Signals.
 - CLK circuitry
 - 8086 Address and Data bus Concept
 - Memory and I/o Interface block diagram
 - Math coprocessor 8087
- 3. Programming of 8086
 - Instruction Format
 - Data transfer, Arithmetic, Bit and Logical manipulation, String, Program transfer and processor control instructions.
 - Programming using manual assembly on exercises like
 - (i) Addition & Subtraction of two 16 bit numbers.
 - (ii) Multiplication's & Division of two numbers
 - (iii) Moving a block of data (intra and inter segment)
 - (iv) To arrange a block of data in ascending/descending order.
 - Use of assembler and assembler directives.

4.	8086 In	terrupt System	(6 hrs)
	Concep -	t Interrupt Vector table and Interrupt type code.	
	-	Types of interrupts and interrupt priority.	
	-	Predefined Interrupts (0 to 4).	
	-	User defined software/hardware interrupts.	
5.	Micro C	controllers	(10 hrs)
	Introduc	ction of Micro Controllers.	
	-	Main features and architecture of 8051/8951 Application of Micro controllers such as washing machines, photocopier, cars etc	
6.	Applica	tion of Microprocessors	(10 hrs)
	Use of for appl	microprocessor (with block diagram, main devices used and operation) ications like:	
	(i) (ii)	Temperature measurement and control system	
	(iii)	Data Acquisition system.	
	(iv)	Speed control of DC motor.	
7.	Introduc	ction to 32 bit Microprocessors	(06 hrs)

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Main features of 80386, 80486, Pentium microprocessor.

LIST OF PRACTICALS

- 1. Familiarization of different keys of 8086-microprocessor kit and its memory map.
- 2. Steps to enter, check /modify data or program and to execute a program on 8086 microprocessor kit.
- 3. Writing and execution of ALP on 8086 for addition/subtraction of two 16 bit numbers (signed and unsigned).
- 4. Writing and execution of ALP on 8086 kit for Multiplication/Division of two signed/unsigned numbers.

- 5. Writing and execution of ALP on 8086 kit for arranging a block of data in ascending/descending order
- 6. Writing and execution of ALP on 8086 kit to generate nos of series like 1,1,2,3,5,8,13,21, - -.
- 7. Writing and execution of ALP for stepper motor control using stepper motor interfacing card.
- 8. Study and use of Logic controller Interface card.
- 9. Study and use of opto coupler interface card.
- 10. Interfacing of 8051 with seven segment display.
- 11. Interfacing of 8051 with LCD display.

INSTRUCTIONAL STRATEGY

The subject is of high importance and requires thorough knowledge of theoretical aspects of different microprocessors. The regular teaching should be supplemented by learning resources available and practical applications of microprocessors. The survey of latest available microprocessors should be made to make students abreast with the developments. Programming exercises other than the given in the list may be given to the students.

RECOMMENDED BOOKS

- 1. Microprocessor and Application by D.V. Hall.
- 2. Advanced Microprocessor and Interfacing by Badri Ram, Tata McGraw Hill Education Pvt Ltd., New Delhi
- 3. Microprocessor Architecture, Programming and Applications with 8080/8085 by Ramesh S Gaonker, Willey Eastern Ltd. New Delhi
- 4. 8051 Micro Controller by Ayala
- 5. Microprocessor 8086/88 by B.B. Brey
- 6. Microprocessor and Microcontrollers by Dr BP Singh, Galgotia Publications, New Delhi
- 7. Microprocessor by Rajiv Sapra, Ishan Publications, Ambala
- 8. Microprocessor by Naresh Grover
- 9. Microprocessors and Microcomputers and their Applications by AK Mukhopadhyay
- 10. Microprocessors and Applications by Uffenback
- 11. Introduction to Microprocessors by A. Mathur, Tata McGraw Hill Education Pvt Ltd., New Delhi
- 12. Microprocessor Architecture, Programming and Applications with 8085 by RS Gaonkar, Wiley Eastern Ltd, New Delhi
- 13. Microprocessor and Applications by Badri Ram, Tata McGraw Hill Education Pvt Ltd., New Delhi
- 14. Microprocessor by SK Goel

15. 8051 by Mcakenzie, Prentice Hall of India, New Delhi

Sr No	Торіс	Time Allotted (hrs)	Marks Allocation%
1	The 8086 Microprocessor	08	10
2	System Design using 8086	10	15
3	Programming of 8086	14	25
4	8086 Interrupt System	06	10
5	Micro Controller	10	15
6	Application of Microprocessors	10	15
7.	Introduction to 32 bit Microprocessors	06	10
	Total	64	100

5.6 INSTRUMENTATION AND PROGRAMMABLE LOGIC CONTROLLERS

L P 4 4

(02 hrs)

(4 hrs)

(08 hrs)

RATIONALE

This subject deals with the various instruments, their construction and working which control the various parameters and operations in any industry. A diploma holder in the field of Electronics employed for maintenance of electronic equipment/ gadgets is required to diagnose faults, rectify them and test the total system for good performance. Thus there is a need of introducing diploma holders to the basics of Instrumentation.

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

DETAILED CONTENTS

1. Introduction to instrumentation

Transducer

Basic Measurement System, functions of its elements namely the transducer, signal conditioner, display or read-out and power supply.

2. Transducers

c)

- a) Distinction between active and passive transducers with examples. Basic requirements of a transducer
- b) Principle of operation of the following transducers and their applications in measuring the physical quantities listed against each one of them.

Physical quantities

mansadoon	i nysiour quantities
Variable Resistance Type	
 Potentiometeric Resistance device 	Displacement and force
- Strain gauge	Torque and displacement
- Thermistor	Temperature
- Resistance hygrometer	Humidity

d)	Variable capacitance type	(04 hrs)
	- Variable capacitance	Displacement and pressure
	- Pressure gauge	
	- Dielectric gauge	Liquid Level and thickness
e)	Variable inductance type	(04 hrs)
	- LVDT	Pressure force, displacement and position
	- Burdon pressure gauge	Pressure force, displacement pressure,
	- Strain gauge	force, displacement
f)	Other Types	(06 hrs)
	- Solid State Sensor	Temperature
	- Thermocouple	Temperature
	- Piezoelectric device	Force
	- Photoelectric devices	Light
	- Proximity probes	r.p.m
	- Digital transducer	displacement
	- Bimetallic thermometer	Temperature
	- Basic principles of Magnetic and ultrasonic How meters	c Flow

3. Signal Conditioners

Characteristics of instrumentation amplifiers in aspect of input impedance, output impedance, drift, dc offset, noise, gain, common mode rejection ration, frequency response, relating to suitability of these characteristics for amplifying signals from various transducers. Need and working of a typical isolation amplifier

4. Output Devices and Displays

Basic principles of operation, constructional features and application of the following:

- a) Graphic Recorder
- b) X-Y Recorder
- 5. Introduction to PLCs

What is PLC, limitations of relays. Advantages of PLCs over electromagnetic relays, Different programming languages, PLC manufacturer etc.

145

(04 hrs)

(06 hrs)

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(06 hrs)

- 6. Working of PLC
 - Basic operation and principle of PLC,
 - Architectural details Processor
 - Memory structure, I/O Structure
 - Programming terminal, Power Supply
- 7. Instruction Set
 - Basic instructions like latch, master control self holding relays.
 - Timer instructions like on-delay timers, off-delay timers, retentive timers, resetting of timers.
 - Counter instructions like up-counter, down counter, resetting of counters.
 - Sequencers, output sequencers, input sequencers time driven and event driven sequencers masking etc.
 - Comparison instruction like equal, not equal, greater, greater than equal, less than, less than equal mask equal, limit etc.
- 8. Ladder diagram programming

Programming based on Basic instructions, timer counter, sequencer to comparison instruction using ladder diagrams.

- 9. Applications of PLCs
 - Assembly
 - CNC Machines
 - Packaging
 - Process controls
 - Car parking
 - Doorbell operation
 - Traffic light control
 - Sorting of objects etc
 - Microwave Oven
 - Washing machine

LIST OF PRACTICALS

- 1. Measurement and plot of characteristics of optical devices like photodiodes, photocells.
- 2. Characteristics of light operated switch using photo-transistor and LDR

(06 hrs)

(06 hrs)

(04 hrs)

(04 hrs)

- 3. Measurement of strain using strain gauge.
- 4. Measurement of temperature using thermistor and thermocouple.
- 5. Measurement of humidity using humidity meter
- 6. Measurement of linear and angular displacement
- 7. To assemble and test instrumentation amplifier measure its gain, input and output impedance.
- 8. Study an X-Y records and graphic recorder
- 9. Measurement of pressure using Bourdon Tube.

PLCs

- 1. Familiarization with the working of PLC
- 2. Components/sub-components of a PLC, learning functions of different modules of a PLC system
- 3. Introduction to step 5 programming language, ladder diagram concepts, instruction list syntax
- 4. Basic logic operations, AND, OR, NOT, functions
- 5. Logic control systems with time response as applied to clamping operation
- 6. Sequence control system e.g in lifting a device for packaging and counting
- 7. Use of PLC for various mechanical outputs viz motion of a piston in a single cylinder multiple cylinders, driving machine operation etc.
- 8. Familiarization of the working of PLC
- 9. Writing, entering and testing programs using a hand-held programmer and computer for the following operations
 - Ladder Logic
 - Timers
 - Counters
 - Sequencers

INSTRUCTIONAL STRATEGY

The teacher should explain the scope of various measuring devices and their practical application in the field. The transducers and measuring devices must be shown to the students and they should be trained in the selection, operation, maintenance and calibrations. Frequent visits to nearby process industries will be of immense help to the students. The inputs shall start with theoretical inputs to architecture, instruction set, assembly language programming, Small projects may be identified, be designed and implemented. PLC ladder diagram and programming should be supplemented with visits to industry. More emphasis may be given to practical work.

RECOMMENDED BOOKS

- 1. Electrical and Electronic Instrumentation and Measurements by A.K. Sawhney, Dhanpat Rai and Co, New Delhi.
- 2. Electronic Instrumentation by HS Kalsi, Tata McGraw Hill Education Pvt Ltd, New Delhi
- 3. Electronic Instrumentation by Cooper, Prentice Hall of India, New Delhi
- 4. Transducers by Peter Norton
- 5. Mechanical and Industrial Measurements by R.K. Jain, Khanna Publishers, New Delhi
- 6. Fundamentals of Industrial Instrumentation and Process Control by Dunn, Tata McGraw Hill Education Pvt Ltd, New Delhi
- 7. Process Control Instrumentation Technology by Johnson, Curits; EE Edition, Prentice Hall of India, New Delhi
- 8. Programmable Logic Controller by Job Dan Otter; P.H. International, Inc, USA
- 9. Introduction to PLCs by Gary Dunning. McGraw Hill
- 10. Module on PLCs and their Applications by Rajesh Kumar, NITTTR Chandigarh
- 11. Module on "Allen Bradlag PIC (SLC 500), Institution set-1, by Rajesh Kumar, NITTTR, Chandigarh
- 12. Module on "PLC Applications based on SLC 5/03" By Rajesh Kumar, NITTTR Chandigarh

Sr	Торіс	Time Allotted	Marks Allocation%
No		(hrs)	
1	Introduction to instrumentation	02	5
2	Transducers	26	35
3	Signal Conditioners	06	10
4	Output Devices and Displays	04	5
5	Introduction to PLCs	06	15
6	Working of PLC	06	15
7	Instruction Set	06	5
8	Ladder diagram programming	04	5
9.	Applications	04	5
	Total	64	100

PERSONALITY DEVELOPMENT CAMP

This is to be organized at a stretch for two to three days during fifth or sixth semester. Extension Lectures by experts or teachers from the polytechnic will be delivered on the following broad topics. There will be no examination for this subject.

- 1. Communication Skills
- 2. Correspondence and job finding/applying/thanks and follow-up
- 3. Resume Writing
- 4. Interview Techniques: In-Person interviews; telephonic interviews, panel interviews; group interviews and video conferencing etc.
- 5. Presentation Techniques
- 6. Group Discussions Techniques
- 7. Aspects of Personality Development
- 8. Motivation
- 9. Leadership
- 10. Stress Management
- 11. Time Management
- 12. Interpersonal Relationship
- 13. Health and Hygiene