CURRICULAR STRUCTURE FOR PART- III (3RD YEAR) OF THE FULL TIME DIPLOMA COURSES IN ENGINEERING AND TECHNOLOGY

WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION												
TEACHING AND EXAMINATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES												
COURSE NAME: FULL TIME Diploma in Instrumentation and Control Engineering												
DURATION OF COURSE: 6 SEMESTERS												
SEMESTER: SIXTH												
BRANCH: ENGINEERING												
SR. NO.	SUBJECT	CREDITS	PERIODS			EVALUATION SCHEME						
			L	TU	PR	INTERNAL SCHEME			ESE	PR	@TW	Total Marks
						TA	CT	Total				
1.	Industrial Management	3	3	-	-	10	20	30	70	-	-	100
2.	Advanced Microprocessor and Microcontroller	3	3	1	-	10	20	30	70	-	-	100
3.	Biomedical Instrumentation	2	2	-	-	5	10	15	35	-	-	50
4.	Power Plant Instrumentation	2	2	-	-	5	10	15	35	-	-	50
5.	Elective (Any One) a)Automation Solution b)Computer Aided Instrumentation c)Computer Hardware & Networking	2	2	-	-	5	10	15	35	-	-	50
6.	Advanced Microprocessor and Microcontroller Laboratory	2	-	-	3	-	-	-	-	100	-	100
8.	Power Plant Instrumentation Laboratory	1	-	-	3	-	-	-	-	50	-	50
9.	Circuit Simulation and Control Simulation Laboratory	2	1	-	3	-	-	-	-	100	-	100
10.	Elective (Any One) a)Automation Solution Laboratory b)Computer Aided Instrumentation Laboratory c)Computer Hardware &Networking Lab	1	-	-	2	-	-	-	-	50	-	50
11.	General Viva Voce	3	-	-	2	-	-	-	-			100
12.	Industrial Project	3	-	-	3	-	-	-	-			100
11.	Professional Practice - IV	1	-	-	2	-	-	-	-		50	50
Total		25	13	1	15	45	90	135	315	300	50	900

STUDENT CONTACT HOURS PER WEEK:33 hrs, (Teaching-15 weeks + Internal Exam-2 weeks)

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

ABBREVIATIONS: L- Lecture, TU- Tutorials, PR- Practical, TA- Teachers Assessment, CT- Class Test, ESE- End Semester Exam, @TW-Term Work

TA (Teacher's assessment) = 10 marks: Attendance & surprise quizzes = 5 marks and Assignment & group discussion = 5 marks for CT= 20Marks.

TA (Teacher's assessment) = 5 marks: Attendance & surprise quizzes + Assignment & group discussion = 5 marks for CT = 10 Marks.

Total Marks : 900

Minimum passing for Sessional marks is 40%, and for theory subject 40%.

Assessment of Practical, Oral & term work to be done as per the prevailing norms of curriculum implementation & assessment

Syllabus for INDUSTRIAL MANAGEMENT

Note: This is common for all departments.

Syllabus for ADVNCED MICROPROCESSOR & MICROCONTROLLER

Name of the Course : Diploma in Instrumentation and Control Engineering	
Name of the subject : **Advanced Microprocessor & Microcontroller**	
Subject Code:	Semester: Sixth
Duration: 6 months	Maximum Marks: 100
Teaching Scheme: Theory : 3hrs/week Tutorial : 1hrs/week Practical :	Examination Scheme: Internal Scheme : Teachers Assessment : 10 Class Test : 20 End Semester Exam : 70
Credit: 3	
Aim:	
Sl No.	
1	Today microprocessors and microcontrollers have become an integral part of all automatic and semi automatic machines. Therefore there is a growing need of engineers / technicians in this field. Hence, it is necessary to study microcontroller basics, hardware and its programming.
2	The study of **Advance Microprocessor & Microcontroller** is based on the essential requirements of detail knowledge of architectural design of Intel 8086 microprocessor chip & 8051 Microcontroller
3	The technology of microprocessor has led to a single chip Microcontroller technology MCS-51 family architecture, details of 8051 Microcontroller and its programming is covered in this subject use of assembler and stimulator for programming of Microcontroller will make the students equipped for the development of embedded systems.
Objective:	
Sl No.	
1	Use data transfer techniques.
2	Describe architecture and operation of microcontroller 8051.
3	Develop assembly language programs using instruction set of 8051.
4	Design and develop microcontroller based systems.
5	Explain various applications of microcontrollers.
Pre-requisite:	
Sl No.	
1	knowledge of digital electronics
2	knowledge of 8085 microprocessor

Contents			
Group	**Module**	**Name of the topics**	**Hrs / Module**
A	1	**8086 and its Architecture:** 1.1 Intel 8086 processor, pin details for max. mode & min. mode. 1.2 8086 CPU architecture, bus interface unit & execution unit, pipelined architecture. 1.3 Register organization & different addressing mode of 8086 1.4 Basic idea of some of the advanced features- concept of multi programming, interleaved memory, cache memory, multi processing.	8
	2	**Memory Organisation 8086:** 2.1 Memory Addressing 2.2 Instruction set of 8086 2.3 Writing Assembly Language Programme	7
	3	**Microcontroller 8051 Architecture** 3.1 Difference between microcontroller & Microprocessor. 3.2 Explain the Block diagram of the Architectural of 8051. 3.3 Explain the PIN Diagram features of the 8051 core. 3.4 Explain the 8051 Programming Model. 3.5 Explain the Port Structure & Operation, Timer/Counters, serial Interface & External memory	8
B	5	**8051 Addressing Modes & Instruction Set** 5.1 Explain different addressing modes of 8051. 5.2 Explain the different types of Instruction sets of 8051. 5.2.1 Data Transfer 5.2.2 Arithmetic Operations 5.2.3 Logical Operations 5.2.4 Boolean Variable Manipulation 5.2.5 Program Branching	10
	6	**8051 Assembly Language Programming Tools** 6.1 Programs using Jump, Loop and Call Instructions, Time Delay Generation and Calculation. 6.2 I/O Port Programming, Bit manipulation 6.3 Arithmetic Programs a. Unsigned Addition and Subtraction b. Unsigned Multiplication and Division c. Signed number concept and Arithmetic operations d. Logic Programs 6.4 Programs using Logic and Compare Instructions a. Programs using Rotate and Swap Instructions b. BCD and ASCII Application Programs 6.5 Counter / Timer Programming 6.6 Programming 8051 Timers 6.7 Counter Programming 6.8 Serial Communication Programming a. Basics of Serial communication b. 8051 Connection to RS232 c. 8051 Serial Communication Programming 6.9 Interrupts Programming 8051 Interrupts a. Programming Timer Interrupts b. Programming External hardware Interrupts c. Programming the Serial Communication Interrupt d. Interrupt Priority in the 8051	12

	7	**Application** 7.1 Stepper motor control 7.2 Speed/position control of ac/dc motor 7.3 Control of physical parameter like temp, pressure, flow etc	5

Books:

Title	Author	Publisher
Microprocessor architecture, programming & applications	R.S.Gaonkar	Wiely
Microprocessor& Microcontroller	N Senthil	Oxford University press
Microprocessor and Microcontroller	Kumar, Saravanan, Jeevananthan	Oxford University Press
Microcontroller: Principle & Application	Pal	PHI
The 8051 Microcontroller & Embeded Systems	Mazidi, Mazidi	PHI
The 8051 Microcontroller Architecture, Programming and Application	K J Ayla	Penram International
Introduction to Microprocessor	A.P. Mathur	TMH
Digital Circuits & Microprocessors	Herbert taub	TMH Pub.
Computer system Architecture	Morris Mano	PHI India
Computer organization & Design	P.Pal Choudhuri	PHI
Design with PIC Microcontroller	J B Peatman	Pearson
Embedded Systems Engineering	C.R Sharma	University Press
Advanced Microprocessor & Microcontroller	Prof. S K Venkata Ram	University Science Press (Laxmi Publications Pvt. Ltd)
8086 programming & advanced processor architecture	Savaliya	Wiley India
Advanced microprocessor & peripheral	A k Ray & K M Burchandi	TMH
Advanced Microprocessor	B Ram	TMH

End Semester Examination Scheme

Maximum Marks: 70						Time: 3 Hrs			
		Objective Questions				**Subjective Questions**			
Group	**Module**	To be set	To be answered	Marks per question	Total Marks	To be set	To be answered	Marks per question	Total Marks
A	1	12	Any 20	1	1 x 20 =20	4	Any 5 taking at least 2 from each group	10	10 x 5 =50
	2								
	3								
	4								
B	5	13				4			
	6								
	7								

Syllabus for BIOMEDICAL INSTRUMENTATION

Name of the Course : Diploma in Instrumentation and Control Engineering	
Name of the Subject : **Biomedical Instrumentation**	
Subject Code:	Semester: Sixth
Duration: 6 months	Maximum Marks: 50

Teaching Scheme:	Examination Scheme:
Theory : 2hrs/week Tutorial : Practical :	Internal Scheme : Teachers Assessment : 05 Class Test : 10 End Semester Exam : 35

Credit: 2

Aim:

Sl No.	
1	The study of Biomedical Instrumentation is a vital subject for the students at the present age, to know about Biomedical Electronic Instruments used for getting biological information of the human being correctly for investigation.

Objective:

Sl No.	The Student will able to
1	Know the application of the biosensors and detectors
2	Know application of different biomedical Instrument

Pre-requisite:

Sl No.	
1	Fundamental idea of Instrumentation system
2	Basics of electronics
3	Basics of physics

Contents

Group	Module	Name of the topics	Hrs / Module
A	1	**Physiological System and Bio-signals** 1.1 Physiological system of the body 1.2 Function structure of the cell 1.3 Resting and Action potentials 1.4 Function of heart 1.5 Physiological signal amplifier	5
	2	**Electrodes, sensors &Transducers for Biomedical Application** 2.1 Electrodes for biophysical sensing 2.2 Resistive transducers – Muscle force and Stress (Strain guage, Spirometry (Potentiont), humidity, (Gamestrers), Respiration (Thermistor) 2.3 Inductive Transducers – Flow measurements, muscle movement (LVDT) 2.4 Capacitive Transducers – Heart sound measurement, Pulse pick up 2.5 Photoelectric Transducers – Pulse transducers, Blood pressure, oxygen Analyses 2.6 Piezoelectric Transducers – Pulse pickup, ultrasonic blood flowmeter 2.7 Chemical Transducer – Ag-Agfallas (Electrodes, pH electrode)	7
B	3	**Measurement of Biological & Physiological parameter** 3.1 Measurement of blood pressure, blood volume, respiration rate, temperature, ECG, EEG, EMG, PCG 3.2 Safety measures implemented in Biomedical Instrumentation	8
	4	**Patient Monitoring System and ICU assisting device** 4.1 Intensive cardiac care unit and central monitoring system 4.2 Patient monitoring through biotelemetry 4.3 Pacemaker 4.4 Defibrillators 4.5 Ventilators & Respirators	7
	5	**Medical Imaging System** 5.1 X Ray machine 5.2 CT Scanning System 5.3 MR imaging	3

Books:		
Title	**Author**	**Publisher**
Medical Instrumentation : Application & Design	Webster	Wiley India
Introduction to Biomedical Equipment Technology	Carr, Brown	Pearson Education
Biomedical Instrumentation & Measurement	Cromwell, Weibell, Pfeiffer	PHI
A Hand Book of Bio Medical Instrumentation	R.S. khandpur	TMH
Principle of Medical Imaging	Shung, Tsui, Smith	Academic Press Inc
Biomedical Instrumentation	O N Pandey	S. K. Khataria
Principle of Applied Biomedical Instrumentation	Goddes & Baker	Wiley
Handbook of Medical Instrumentation	Sanjay Guha	University Publication
Medical Electronics & Instrumentation	Sanjay Guha	University Publication
Medical Electronics	G.S Sawhney	Dhanpat Rai & Co.
Biomedical Instrumentation & Measurements	R Ananda Natarajan	PHI
Principles of Medical Electronics & Biomedical Instrumentation	C Raja Rao	University Press

End Semester Examination Scheme

Maximum Marks: 35						Time: 2 Hrs			
Group	**Module**	**Objective Questions**				**Subjective Questions**			
		To be set	To be answered	Marks per question	Total Marks	To be set	To be answered	Marks per question	Total Marks
A	1	6	Any 13	1	1 x 10 =10	3	Any 5 taking at least 2 from each group	5	5 x 5 =25
	2								
B	3	7				5			
	4								
	5								

Syllabus for POWER PLANT INSTRUMENTATION

Name of the Course : Diploma in Instrumentation and Control Engineering	
Name of the Subject : **Power Plant Instrumentation**	
Course Code:	Semester: Sixth
Duration: 6 months	Maximum Marks: 50
Teaching Scheme: Theory : 2hrs/week Tutorial : Practical :	Examination Scheme: Internal Scheme : Teachers Assessment: 05 Class Test : 10 End Semester Exam : 35
Credit: 2	
Aim:	
Sl No.	
1	Power plant is the most important part in different industries as well as power generation unit. Instrumentation & control is the first criteria for that.

Objective:	
Sl No.	The Student will able to
1	Measure different parameter like temperature, level, flow, vibration etc.
2	Know the different control system like air/ fuel ratio, superheated steam temperature, turbine vibration etc.
Pre-requisite:	
Sl No.	
1	Idea on basic control logic and terminology
2	Idea on basic electronics

Contents

Group	Module	Name of the topic	Hrs/ Module
A	1	**Overview of Power Generation** • Brief survey of methods of power generation- hydro, thermal, nuclear, solar and wind power • Importance of Instrumentation in power generation • Thermal power plant –building blocks, details of boiler	5
	2	**Measurement** Measurement of temperature, pressure, flow vibration etc (in brief.)	3
	3	**Control Loops in Boiler** Combustion Control Air/Fuel ratio Control Furnace draft control Drum level control Main steam & reheat steam temperature control Superheater control Deaerator control DCS in power plant Interlocking in boilers	10
B	4	**Turbine - Monitoring & Control** Speed, vibration, shell temperature monitoring & control Steam pressure control Lubricant oil temperature control Cooling system	6
	5	**Data handling-processing** logging, acquisition, accounting, display and storage Instrumentation for Generator and Busbar coupling Introduction to power plant modeling/simulation	6

Books:

Title	Author	Publisher
Principles of Industrial Instrumentation,	D. Patranabis,	TMH
Instrument Engineers Handbook Vol & II	Liptak,	Butterworth
Power Plant Instrumentation	Krisnaswami, M P Bala	PHI
Power Plant Control & Instrumentation	David Lindsley	Institute of Electrical Engineers
The Control of Boilers	S G Dukelow	ISA
Modern Power Station Practice-Instrumentation, Controls		Pergamon Press, Oxford

Standard Boiler Operation	S. M. Elonka, A. L. Kohal	TMH
Boiler Control Systems Engineering	G.F. Gilman	ISA Publication.
Power Plant Engineering	P.K.Nag	. McGraw Hill.
Power Plant Instrumentation & Control	Philip Kiameh	

End Semester Examination

Maximum Marks: 35						Time: 2 Hrs			
Group	**Module**	**Objective Questions**				**Subjective Questions**			
		To be set	**To be answered**	**Marks per question**	**Total Marks**	**To be set**	**To be answered**	**Marks per question**	**Total Marks**
A	1	7	Any 10	1	1 x 10 = 10	4	Any 5 taking at least 2 from each group	5	5 x 5 = 25
	2								
	3								
B	4	6				4			
	5								

Syllabus for AUTOMATION SOLUTION

Name of the Course : Diploma in Instrumentation and Control Engineering		
Name of the Subject : **Automation Solution**		
Course Code:	Semester: Sixth	
Duration: 6 months	Maximum Marks: 50	
Teaching Scheme: Theory : 2 hrs/week Tutorial : Practical :	Examination Scheme: Internal Scheme : Teachers Assessment: 05 Class Test : 10 End Semester Exam : 35	
Credit: 2		
Aim:		
Sl No.		
1	This subject will develop a student to make worthy for any industry	
Objective:		
Sl No.	The Student will able to	
1	Program PLC	
2	Know about the function of DCS	
3	Operate CNC	
4	Know about the Robots and its programing	
Pre-requisite:		
Sl No.		
1	Idea on basic control system	
2	Idea on basic electronics	

Contents

Group	**Module**	**Name of the topic**	**Hrs/ Module**

	1	**Overview of Automation** • Idea on PID • Idea on a close loop system with real example of different instrument needed	1
A	2	**Programmable Logic Controller** • Introduction to PLCs, Areas of applications • Architecture of a typical PLC, operation of PLC • Difference between PLC and Hardware system, Relay logic and Ladder Logic • Programming of PLCs, systematic solution finding • Programming languages, PLC Programmers, PC interface • Function block diagram, ladder diagram, instruction list, structured text • Sequential function chart, logic control systems, timers, counters • Commissioning and operational safety of a PLC, data transmission interface and communication in the field area • Guidelines and standards	8
	3	**Distributed Control System**: • Features of DCS • PLC and DCS – a comparative study • Architecture of a Typical DCS system • Advantage & Disadvantage of DCS • Hardware arrangement of DCS for a complete close loop system for analog as well as digital control • Concept of graphic panel, control panel, tuning panel, alarm panel etc	7
	4	**Concept of Robotics:** • Definition of Robot and Robotics, functional components of Robot • Different types of robot joints, workplace, work volume, work envelop, degree of freedom of robot • Common types of configuration used in major linkage or arm • Description of Cartesian coordinate robot • Robot Sensors: internal (joint position, speed sensor, acceleration, force, torque), external tactile, proximity, long range) • Robot application- loading unloading, material handling etc	7

B	5	**Concept of Computer Numerical Control:** • Introduction to NC, CNC, DNC , Advantages and disadvantages of CNC over conventional machine tool • Block Diagram of a CNC system, Physical components of CNC (MCU, Monitor, Machine TOOL) • Type of CNC machine (CNC lathe, CNC milling , Machining Centre) • CNC machine Classification • Feed back system (open loop / close loop_) • Control system (Point to point , Straight cut, contour system) • CNC machine co ordinate system ,x,y,z axis directions-absolute co ordinate system, Incremental co ordinate system) • Part programming (Manual & computer aided) • Manual part programming Word & Block Various functions(Words) (N word, Gword, X,Y,Z word, F word, S word, M words)used in manual part programming simple program in CNC lathe for facing , straight turning, taper turning, circular inter polation Coordinate system setting—Strarting point , Fixed zero, floating Zero Steps involved in CNC operation	7

Books:

Title	Author	Publisher
Programmable Logic Controllers	Thomas E. Kissel	
Programmable Logic Controllers	Weib & Reis	PHI
Instrument Engineers Handbook Vol & II	Liptak,	Butterworth
Process control Instrumentation Technology	Johnson	Prentice Hall of India
Programmable Logic Controller	Job Dan Otter	P.H. International Inc, USA
Process Control Principle and Application	Bhanot	Oxford university press
Robot Dynamics & Control	Spong, Vidyasagar	Wiley
Computer Numerical Control Machine	P Radhakrisnan	New Central Book Agency
Computer Numerical Control- Operation &	Stenerson & Curren	PHI
Robotics Engineering	Klafter, Chmielewski, Negin	PHI
Industrial Robotics	Groover, Wises, Nagel, Odrey	Mcgraw Hill
Industrial Robotics	B. Hodges	JAYCO
Robotic Technology and Flexible Automation	S. Rajan	TMH
CNC Programming Made Easy	B K Jha	Vikas
Robotics: Introduction, Programming and Projects	Maxwell	Macmillan
Programmable Logic Controller	T. E. Kissel	
Programmable Logic Controller	J. D Otter	P. H. International

End Semester Examination

Maximum Marks: 35 | Time: 2 Hrs

Group	Module	Objective Questions				Subjective Questions			
		To be set	To be answered	Marks per question	Total Marks	To be set	To be answered	Marks per question	Total Marks
A	1	7	Any 10	1	1 x 10 = 10	4	Any 5 taking at least 2 from each group	5	5 x 5 = 25
	2								
B	3	6				4			
	4								

Syllabus for COMPUTER AIDED INSTRUMENTATION

Name of the Course : Diploma in Instrumentation and Control Engineering	
Name of the subject : **Computer Aided Instrumentation**	
Subject Code:	Semester: Sixth
Duration: 6 months	Maximum Marks: 50
Teaching Scheme: Theory : 2hrs/week Tutorial : Practical :	Examination Scheme: Internal Scheme : Teachers Assessment: 05 Class Test : 10 End Semester Exam : 35
Credit: 2	
Aim:	
Sl No.	
1	The study of **Computer Aided Instrumentation** is based on the essential requirements of detail knowledge of architectural design of computer & interfacing to field system using different
2	This subject will develop a student to access computer for industrial application
Objective:	
Sl No.	The Student will able to
1	Know Bus standard, virtual instrumentation etc
2	Use serial, parallel, USB port
Sl No.	
1	Basic Electronic Engineering
2	Operation of Computer

Contents

Group	Module	Name of the topic	Hrs/ Module
A	1	**Introduction:** General structure of PC based instrumentation Advantages and disadvantages of computer based instrumentation Comparison with other control systems Introduction to various instrumentation packages like lab view, flex pro etc	2
	2	**Buses & Standards:** Introduction, Bus type, The I/O bus ISA bus, EISA bus, PCI bus, GPIB, RS-232 USB	2
	3	**Virtual Instrumentation:** • Basics concepts of virtual instrumentation , Need.	2
	4	**Computers in Process Control:** Programmable controller, Data logging , Supervisory control, Computer based controller	3

	5	**Linear Circuit and Signal Conditioning:** Op-amps, Instrumentation amplifiers and signal conditioning , Multiplexer and demultiplexer, ADC and DAC .	3
B	6	**Parallel Port (PP) Interfacing Technique** Introduction to parallel port , Parallel port as output port , Programming of Parallel port as input / output port.	4
	7	**Serial Port (SP) Interfacing Technique:** Introduction to serial port, Serial port as output port , Programming of Serial port as input / output port.	4
	8	**USB Port Interfacing Technique:** Introduction to USB port, USB port as output port	4
	9	**Use of Instrumentation Package:** Like Lab VIEW / DAISY LAB / GENIE GRAPHICAL PROGRAMMING	3
	10	**Case Study:** CNC motion controller ,Power plant controller ,Cement plant control Sugar plant control, Textile plant control	3

Books:

Title	Author	Publisher
PC Based Instrumentation: Concept & Practice	Mathivanan	PHI
PC Based Instrumentation & Control	Mike Tooley	Elseveir Butterworth Heinemann
PC Interfacing for Data Acquisition & Process Control	S Gupta	ISA

End Semester Examination Scheme

Maximum Marks: 35						Time: 2 Hrs			
Group	**Module**	**Objective Questions**				**Subjective Questions**			
		To be set	To be answered	Marks per question	Total Marks	To be set	To be answered	Marks per question	Total Marks
A	1	6	Any 10	1	1 x 10 =10	4	Any 5 taking at least 2 from each group	5	5 x 5 =25
	2								
	3								
	4								
	5								
B	6	7				4			
	7								
	8								
	9								
	10								

Syllabus for COMPUTER HARDWARE & NETWORKING

Name of the Course : Diploma in Instrumentation and Control Engineering	
Name of the subject : **Computer Hardware & Networking**	
Subject Code:	Semester: Sixth
Duration: 6 months	Maximum Marks: 50
Teaching Scheme: Theory : 2hrs/week Tutorial : Practical :	Examination Scheme: Internal Scheme : Teachers Assessment: 05 Class Test : 10 End Semester Exam : 35
Credit: 2	

Aim:	
Sl No.	
1	The study of **Computer Hardware & Networking** is based on the essential requirements of detail knowledge of architectural design of computer hardware & networking using different software tools.
2	To Identify various components of PC
3	To study construction, working and function of different peripheral devices.
4	To Install system software, application software, drivers and detect /remove virus infections

Objective:	
Sl No.	The Student will able to
1	Identify various components of PC.
2	Describe the construction, working and function of different peripheral devices.
3	Read and interpret documentation (use manuals).
4	Assemble the PC and connect the modules.
5	Install system software, application software and drivers.
6	Check the components for proper function, correct faults.
7	Install and handle the diagnostic and test software.
8	Detect and remove virus infections.
9	State different types of networks and components used in networking

Pre-requisite:	
Sl No.	
1	Digital Electronics Engineering
2	Operation of Computer

Contents

Group	Module	Name of the topic	Hrs / Module
	1	**Personal Computer** 1.1 Evolution – IBM PC to Pentium, Laptops, Palmtops. 1.2 Personal computer system – functional block diagram, recognize major components of PC 1.3 Technical specifications. 1.4 Comparison chart – processor and memory IBM PC to Pentium IV, AMD athlon, Sempron etc. 1.5 System unit – brief description of motherboard, interface cards, expansion slots, front panel control, rear side connectors, cables and connectors, SMPS, floppy disc drive, hard disc drive, CD-ROM drive, display unit, keyboard.	2

A	2	**Inside PC** 2.1 Inside PC – functional blocks of mother board – CPU, RAM, BIOS, CacheRAM, BUS extension slots, on-board I/O and IDE connectors, ISA, PCI, AGP & PCI express. 2.2 BIOS, services, organization and interaction. 2.3 CMOS, CMOS setup utilities, CMOS setup program. 2.4 Motherboard types. 2.5 Processors – CISC and RISC. 2.6 Features of Pentium 4 processor, Pentium Celeron processor, CYRIX series processors, AMD series processors. 2.7 Chipsets – features of Intel 800, 810, 854, 915 series chipset motherboards 2.8 Bus standard and Bus architecture 2.9 Power supplies – Linear power supplies, SMPS, block diagram of SMPS, Linear vs SMPS power supply, SMPS for computers, Power requirements in PCs.	6
	3	**On board memory and I/O interface** 3.1 PC's memory organization 3.2 ROM, RAM, distinguish between static and dynamic RAM 3.3 DRAM, Synchronous DRAM, Extended Data Out DRAM, Double Data Rate SDRAM, Direct Rambus DRAM, Cache Memory, Extended/Expanded/Virtual memory. 3.4 PC memory map, Memory packaging. 3.5 I/O port – Serial port, Parallel port, Game port, USB port	3
	4	**Storage devices** 4.1 Magnetic storage fundamentals – read/write head, writing, reading. 4.2 Diskette basics – Floppy disks, Hard disks, tracks and sectors, disk types. 4.3 Disk organization in DOS 4.4 Floppy disk drives – types and capacity, drive sub assemblies, floppy disk controller – functions and functional block diagram, interfacing of FDC 4.5 Hard disk drives – drive sub assemblies, hard disk controller – functions and functional block diagram, interfacing of HDC, SATA technology.	4
		4.6 Installation and configuration of HHD – configuring, formatting, partitioning. 4.7 CD-ROM disks – types, reading and writing of CD 4.8 CD-ROM drive – principle of operation, block diagram, installation and setup. 4.9 DVD technology – DVD disks, DVD drive, block diagram, DVD formats. 4.10 Pen drives. 4.11 Installing CD and DVD media drives.	
	5	**Input Devices** 5.1 Keyboard – types, operation, and keyboard signals, interface logic, keyboard functions. 5.2 Mouse – principle of operation, mouse signals, optical mouse, mouse installation. 5.3 Scanner – principle of operation, types, installation. 5.4 Digital Camera – connection, installation.	2

B	6	**Video and Sound** 6.1 Display 6.2 Video basics – CRT, scanning methods, colour CRT 6.3 VGA monitor – Functional block diagram 6.4 Digital display technology (thin displays) – Liquid crystal displays, LCD panel display, Plasma displays, TFT monitors. 6.5 CRT controller - functions 6.6 Graphic card – Accelerated Video Cards, components of graphic cards, 3-D video. 6.7 Basics of digital sound, sound blaster card, installation and setup, Musical Instrument Device Interface MIDI, 3D Audio, MPEG audio	2
	7	**Computer Installation** 7.1 Room preparation – location, computer room pollution, air conditioning, false flooring and ceiling, fire protection system. 7.2 Power supply – power supply problems-transients, spikes and surges, blackouts, power conditioning, surge protector, voltage regulator, isolation transformer, line conditioners, servo stabilizer, CVT, problems with CVT, Off-line and on-line UPS, UPS batteries, Inverters. 7.3 PC assembly- Installation steps, configuring motherboard, identifying the connectors and cables, adding memory modules, bios-CMOS setup, HD formatting and partitioning, installation of system and	3
	8	**Introduction to networking** 8.1 Local Area Network (LAN) and Wide Area Network (WAN) 8.2 Network components – File server, workstations, network interface cards, network cabling, bridge, router, gateways, repeater (brief description only) 8.3 Wireless networks, network security 8.4 MODEM – principle of operation, functional block diagram, installation.	3
	9	**Printers and Plotters** 9.1 Dot matrix printer – principle of operation, sub assemblies, printer mechanism, unpacking the printer, installation, testing the printer, connecting the printer to the computer, ribbon refilling. 9.2 LASER printer – principle of operation, functional block diagram, toner cartridges, printer installation, self test. 9.3 Ink-jet printer- principle of operation, installation, installing ink cartridges, printer operation check. 9.4 Plotter – types, functional block diagram, connection and installation, inkjet plotters. 9.5 Setting of configuration switches.	2

Books:

Title	Author	Publisher
Computer Installation and Servicing	D Bala Subramanian	TMH, New Delhi
Managing and troubleshooting PCs	Mike Meyers, scott Jernigan	TMH, New Delhi
Computer Fundamentals	Dr.Lariy Long	Dreamtech Press
A complete guide to Computer Fundamentals	Sudipto Das	University Science Press
Computer Network	Tanenbum	PHI / Pearson
Computer Network	Bhusan Trivedi	Oxford University Press

End Semester Examination Scheme

Maximum Marks: 35						Time: 2 Hrs			
Group	**Module**	**Objective Questions**				**Subjective Questions**			
		To be set	To be answered	Marks per question	Total Marks	To be se	To be answered	Marks per question	Total Marks

A	1	7	Any 10	1	1 x 10 =10	4	Any 5 taking at least 2 from each group	5	5 x 5 =25
	2								
	3								
	4								
	5								
B	6	6				4			
	7								
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Syllabus for ADVANCED MICROPROCESSOR & MICROCONTROLLER LAB

Name of the Course : Diploma in Instrumentation and Control Engineering	
Name of the subject :**Advanced Microprocessor &Microcontroller Lab**	
Subject Code:	Semester: Sixth
Duration: 6 months	Maximum Marks: 100
Teaching Scheme: Theory : Tutorial : Practical: 3 hrs/week	Examination Scheme: Continuous Internal Assessment Performance of job : 30 Notebook / viva : 20 External Assessment On spot Job : 30 Viva Voce : 20
Credit: 2	
Skill to be developed:	
Intellectual Skill;	
1	Use of programming language constructs in program implementation.
2	To be able to apply different logics to solve given problem.
3	To be able to write program
4	Study different types of errors as syntax semantic, fatal, linker & logical
5	Debugging of programs
6	Understanding different steps to develop program such as • Problem definition • Analysis • Design of logic • Coding • Testing • Maintenance (Modifications, error corrections, making changes etc.)
Motor Skill:	
1	Proper handling of Computer System**.**
List of Practical:	
Sl No.	**Experime**
1	Study of Architecture of 8086 microprocessor
	Programming Languaage- Assembly/C Prograamming KIT—ATMEL / PIC Simple programming on (using
2	Demonstration and study of microcontroller trainer kit

3	Demonstration and use of software simulator / assembler
4	Programming examples (any two) – Data transfer instructions
5	Programming examples (any two) – Logical Operations
6	Programming examples (any two) – Jump and Call instructions
7	Demonstration and testing of the following applications (Any four) Keyboard Interface LCD display Interface D/A or A/D converter Interface Relay Interface Stepper motor control DC motor control

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Syllabus for POWER PLANT INSTRUMENTATION LAB

Name of the Course : Diploma in Instrumentation and Control Engineering	
Name of the subject : **Power Plant Instrumentation Lab**	
Subject Code:	Semester: Sixth
Duration: 6 months	Maximum Marks: 50
Teaching Scheme: Theory : Tutorial : Practical: 3 hrs/week	Examination Scheme: Continuous Internal Assessment Performance of job : 15 Notebook / viva : 10 External Assessment On spot Job : 15 Viva Voce : 10
Credit: 1	
Skill to be developed:	
Intellectual Skill;	
1	Operation of different instruments
Motor Skill:	
1	Proper wiring
List of Practical:	
Sl No.	**Experiment**
1	Measurement of temperature by thermocouple, RTD
2	Measurement of level by D/P transmitter
3	Measurement of flow by orifice & D/P transmitter
4	Measurement of pressure by pressure transmitter
5	Control of above parameter for suitable process
6	Simulation of any power plant
7	Visit to any power plant

Syllabus for AUTOMATION SOLUTION LAB

Name of the Course : Diploma in Instrumentation and Control Engineering	
Name of the subject : **Automation Solution Lab**	
Subject Code:	Semester: Sixth
Duration: 6 months	Maximum Marks: 50
Teaching Scheme: Theory : Tutorial : Practical: 2 hrs/week	Examination Scheme: Continuous Internal Assessment Performance of job : 15 Notebook / viva : 10 External Assessment On spot Job : 15 Viva Voce : 10
Credit: 1	
Skill to be developed:	
Intellectual Skill;	
1	Understanding different steps to develop program such as • Problem definition • Analysis • Design of logic • Coding • Testing • Maintenance
Motor Skill:	
1	Proper handling of Computer System**.**
List of Practical:	

Sl No.	**Experiment**
1	Learning functions of different modules of a PLC system
2	Practical steps in programming a PLC (a) using a Hand held programmer (b) using computer interface
3	Introduction to programming language, ladder diagram concepts, Statement List, FBD
4	Basic logic operations, AND, OR, NOT functions
5	Logic control operations using latching properties e.g. in activating a solenoid
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 single cylinder, multiple cylinders, driving machine operation, automatic bottle filling system, level & temperature control etc.
8	Learning functions of different parts of a DCS system
9	Design of different panels in DCS
10	Programming for a close loop control system in DCS
11	Pick & place operation of Robot
12	Simple program in CNC lathe for facing , straight turning, taper turning, circular interpolation.

Syllabus for COMPUTER AIDED INSTRUMENTATION LAB

Name of the Course : Diploma in Instrumentation and Control Engineering	
Name of the subject : **Computer Aided Instrumentation Lab**	
Subject Code:	Semester: Sixth
Duration: 6 months	Maximum Marks: 50
Teaching Scheme: Theory : Tutorial : Practical: 2 hrs/week	Examination Scheme: Continuous Internal Assessment Performance of job : 15 Notebook / viva : 10 External Assessment On spot Job : 15 Viva Voce : 10
Credit: 1	
Skill to be developed:	

Intellectual Skill;	
1	Use of computer
Motor Skill:	
1	Interfacing external circuitry to the computer
List of Practical:	
Sl No.	**Experiment**
1	Controlling of relay and devices using parallel port
2	Analog to digital conversion using ADC 0804
3	Digital to analog conversion using DAC 0808
4	Generation of a square wave through parallel port
5	Implementation a data acquisition application using an 8-bit data acquisition card. (Any type of software and any type of programming language like C , Visual Basic might be used)

Syllabus for COMPUTER HARDWARE & NETWORKING LAB

Name of the Course : Diploma in Instrumentation and Control Engineering	
Name of the subject :**Computer Hardware & Networking Lab**	
Subject Code:	Semester: Sixth
Duration: 6 months	Maximum Marks: 50
Teaching Scheme: Theory : Tutorial : Practical: 2 hrs/week	Examination Scheme: Continuous Internal Assessment Performance of job : 15 Notebook / viva : 10 External Assessment On spot Job : 15 Viva Voce : 10
Credit: 1	
Skill to be developed:	
Intellectual Skill;	
1	Identify various components of Computer.
2	Able to prepare a block diagram to correlate all the components based on their functions.
3	Know the procedure for starting and checking the computer function for satisfactory working.
Motor Skill:	
1	Able to use the various tools efficiently.
2	Identify proper tools for repair work.
3	Start and operate the computer as per procedure.
List of Practical:	
Sl No.	**Experiment**
1	Open the top cover of PC unit and identify the following parts – motherboard, interface cards, expansion slots, cables and connectors, rear side connections, SMPS, floppy disk and hard disk drive, CD-ROM drive, RAM. Write the function of each component in brief.

2	Find an advertisement for a new personal computer in a current newspaper or magazine and examine it to determine the following – • Make, model and speed of CPU • RAM size • Storage capacity of HDD • Does it include a CD-ROM, CD-R/W or DVD? • Does it come with network interface card? • Is a monitor included? If so, what kind and size.
3	Assemble the PC and connect the modules. Compare layout and wiring of the module with technical documents, carryout CMOS setup, organize HDD (formatting and partitioning) install system software, necessary drivers, application software's and put the PC into operation.
4	Install graphic and sound blaster card and necessary drivers.
5	Install and handle the diagnostic test software, detect faulty components, asses the possibility of repair, repair or replace them.
6	Detect and remove virus infection.
7	Carryout systematic fault finding, check cables, plugs, connectors, power supply and other units. Select suitable spare parts and replace the defective parts and components.
8	Install printer, plotter and required drivers
9	Carryout preventive maintenance and cleaning of printer. Carryout self test and adjust the printer.
10	Install MODEM and required driver.

Syllabus for CIRCUIT SIMULATION & CONTROL SIMULATION LAB

Name of the Course : Diploma in Instrumentation and Control Engineering	
Name of the subject : **Circuit Simulation & Control Simulation Lab**	
Subject Code:	Semester: Sixth
Duration: 6 months	Maximum Marks: 100

Teaching Scheme: Theory : 1 hrs/week Tutorial : Practical: 3 hrs/week	Examination Scheme: Continuous Internal Assessment Performance of job : 30 Notebook / Viva : 20 External Assessment On spot Job : 30 Viva Voce : 20

Credit: 2	
Skill to be developed:	
Intellectual Skill	
1	Use of computer operation
Motor Skill	
1	
List of Practical	
Sl No.	**Experiments**
1	Simulate different electric circuit to prove theorems
2	Simulate different electric circuit to check resonance
3	Simulate different electronic circuit like amplifier, oscillator
4	Learning to write program in Matlab & analyze the output
5	Simulate the control system in Matlab
6	Study the operation of LabVIEW software
7	VI, sub VI, loops, structure, chart, array, cluster, graphs etc

Books:

Title	**Author**	**Publisher**
Virtual Instrumentation	J Jerome	PHI
Matlab	S Jain	Wiley
Matlab & Its Application in Engineering	Bansal, Goel, Sharma	Pearson
LabVIEW Based Advanced Instrumentation System	P Sumathi	Elsievier
LabVIEW graphical Programming	Gray Jhonson	TMH
LabVIEW for Everyone	Wells, Travis	PHI
Practical Matlab Application for Engineers	M Kalechman	Yesdee
Advanced LabVIEW Programming Techniques	Bittre, Mohiuddin, Nawrocki	
Automatic Control Systems with MATLAB Programming	Narendra Singh Beniwal & Ruby Beniwal	University Science Press (An inprint of Laxmi Publications Pvt. Ltd)
Introduction to MATLAB & SIMULINK – A Project Approach	O Bencher & M Weeks	Firewell Media (An inprint of Laxmi Publications Pvt. Ltd)
Introduction to MATLAB Programming, Toolbox & Simulink	Jaydeep Chakraborty	University Press

Syllabus for INDUSTRIAL PROJECT

Name of the Course : Diploma in Instrumentation and Control Engineering	
Name of the Subject : **Industrial Project**	
Course Code:	Semester: Sixth

Duration: 6 months	Maximum Marks: 100
Teaching Scheme: Theory : Tutorial : Practical: 3 hrs/week	Examination Scheme: Continuous Internal Assessment : 50 External Assessment : 50
Credit: 2	
Aim:	
Sl No.	
1	This subject is intended to teach students to understand facts, concepts and techniques of electrical equipments, its repairs, fault finding and testing, estimation of cost and procurement of material, fabrication and manufacturing of various items used in electrical
2	This will help the students to acquire skills and attitudes so as to discharge the function of supervisor in industry and can start his own small-scale enterprise
Objective:	
Sl No.	The Student will able to
1	Work in Groups, Plan the work, and Coordinate the work.
2	Develop leadership qualities.
3	Analyse the different types of Case studies.
4	Develop Innovative ideas.
	Develop basic technical Skills by hands on experience.
Pre-requisite:	
Sl No.	
1	Knowledge to execute student project.
Contents	
Project work actually started on the last semester. It should be finished in this semester. If students have finished one project on last semester. The will perform another project in this semester	
Seminar on this project work is a part of this syllabus. Student will prepare the PPT for seminar & that will be presented in front of external examiner. External examiner will evaluate on the basis of project work and seminar performance.	
References:	
IEEE Transactions/Journals	
Electrical India	
IEEMA Journal	
Elecrama	
Technorama	
Urja	
Industrial Automation	
Electronics for You	
Electronics Projects	
Computer World	
Chip	
Any Journal Related to Instrumentation / Electrical/Electronics/Computer/Information	
Website: http://www.google.com	

Syllabus for PROFESSIONAL PRACTICE IV

Name of the Course : Diploma in Instrumentation and Control Engineering	
Name of the Subject : **Professional Practice IV**	
Subject Code:	Semester: Sixth

Duration: 6 months	Maximum Marks: 50
Teaching Scheme: Theory : Tutorial : Practical: 2 hrs/week	Examination Scheme: Continuous Internal Assessment: 50

Credit: 1

Aim:

1	To acquire information from different sources
2	To present given topic in a seminar
3	To Prepare a report on industrial visit, expert lecture
3	To introduce FOSS

Objective:

Sl No.	The Student will able to
1	Prepare a report on industrial visit
2	Acquire information from different sources.
3	Prepare notes for given topic.
4	Present given topic in a seminar.
5	Interact with peers to share thoughts.
6	Prepare a report on industrial visit, expert lecture.

Pre-requisite:

1	Knowledge on basic electrical & electronic engineering
2	Knowledge on Instrumentation engineering
3	Knowledge of basic computer operation
4	Idea of industrial visit

Contents

Unit	Name of the activity	Hrs/Unit
1	**Field Visit** • One or two days Industrial visit in any plant	
2	**Lecture by Professional / Industrial experts / Student Seminar based on following areas (any four)** • TQM • Application of Robotics in various fields • E Nose & E Tongue • HART protocol • PLC DCS • SCADA • MEMS and Application • Chemical and biosensors • Boiler Instrumentation and control • Intelligent control • Any other suitable topic	

3	**Group Discussion** The student should discuss in a group of six to eight students. Two topics for group discussions may be selected by the faculty members. Some of the suggested topics are- • Civil servants or local politicians – who holds higher stature in India • Liberalization and economic development • Disaster management • Shortage of skilled manpower in India • Is foreign Direct Investment (FDI) in retail sector good for India? • Adult education • Trends in energy conservation • Gambling/Betting should be legalized • Any other suitable topic	
4	**CAD for Electrical/ Electronics/ Instrumentation** Drawing of electrical wiring, junction box, panel, equipments/ Instruments etc	
5	**Free & Open Source Software** • Revision of Libra Office, Writer, Calc, Impress, Latex	

Syllabus for GENERAL VIVA VOCE

Name of the Course : Diploma in Instrumentation and Control Engineering		
Name of the subject : **General Viva Voce**		
Subject Code:	Semester: Sixth	
Duration: 6 months	Maximum Marks: 100	
Credit: 3		
Aim:		
1	It is require d to revisit the contents of the departmental subjects learnt by the students up to sixth semester.	
2	As a diploma holder of Instrumentation and Control Engineering, students should be able to co relate the various ideas and concepts learnt from various subjects throughout the course duration	
3	Student should equip themselves to face various types of technical questions during various competitive examinations/ Interview Board.	
Contents		
The syllabi of all theoretical and sessional subjects taught in the three years of diploma education		
Examination Scheme:		
The Final Viva-Voce Examination shall take place at the end of Sixth Semester. It is to be taken by one External and one Internal Examiner. The External Examiner is to be from industry / engineering college / university / government organization and he / she should give credit out of 50 marks. The Internal Examiner should normally be the Head of the Department and he / she should give credit of 50 marks. In the absence of the Head of the Department, the senior most Lecturer will act as the Internal Examiner		