

PART — III
6th Semester
FINAL DRAFT FOR
CURRICULAR STRUCTURE
AND SYLLABI OF
FULL-TIME DIPLOMA COURSES IN
ENGINEERING & TECHNOLOGY

Further suggestion may be submitted to the syllabus committee. List of the coordinators for the branch of Diploma in Electrical &

Electronics Engineering are:

- **Sri Ashim Kumar Manna Mobile:8902701784**
- **Sri Swarup Kar Mobile:9433689007**
- **Sri Pinaki Ranjan Paul Mobile:9433130215**
- **Sri Anup Sarkar Mobile:9433521132**
- **Sri Swarup Kayal Mobile:9433164470**

WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION												
TEACHING AND EXAMINATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES												
COURSE NAME: FULL TIME DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING												
DURATION OF COURSE: 6 SEMESTERS												
SEMESTER: SIXTH												
BRANCH: ELECTRICAL & ELECTRONICS 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	Instrumentation & Control	4	3	1	-	10	20	30	70	-	-	100
3	Industrial Electronics-II	3	2	1	-	10	20	30	70	-	-	100
4	<u>Elective-II (Select any one)</u> i) Industrial Automation ii) Process Control & Instrumentation iii) Control of Electrical Machine iv) Computer Networking	3	3	-	-	10	20	30	70	-	-	100
5	Computer aided Electrical Drawing	2	-	-	3	-	-	-	-	50	-	50
6	Instrumentation & Control Laboratory	1	-	-	2	-	-	-	-	50	-	50
7	Industrial Electronics Laboratory-II	2	-	-	3	-	-	-	-	50	-	50
8	Elective- II Laboratory	2	-	-	3	-	-	-	-	50	-	50
9	Industrial Project	2	-	-	4	-	-	-	-	50	-	50
10	Professional Practice – IV	2	-	-	4	-	-	-	-	-	50	50
11	General Viva voce	2	-	-	-	-	-	-	-	-	100	100
	Total	26	11	2	19	40	80	120	280	250	150	800

STUDENT CONTACT HOURS PER WEEK:32 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: Attendance & surprise quizzes = 6 marks, Assignment & group discussion = 4 marks.

Total Marks : 800

Minimum passing for Sessional marks is 50%, and for theory subject 50%.

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

Name of the course: Industrial Management			
Course Code: EEE/ IM /S6		Semester: Sixth	
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)		Maximum Marks: 100 Marks	
Teaching Scheme:		Examination Scheme	
Theory: 3 contact hrs./ week		Class Test (Internal Examination): 20 Marks	
Tutorial: Nil		Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks	
Practical: 3 contact hours/ week		End Semester Examination: 70 Marks	
Credit: 3 (Three)		Practical: NIL Marks	
Rationale:			
To study the techniques for improvement in productivity of the people and equipment. to plan the production schedule accordingly organize material supply for the manufacturing activities. To minimize the direct and indirect cost by optimizing the use of resources available. To learn accounting process, inventory control and process planning. Modern manufacturing system employ techniques such as JIT, TPM , FMS, 5'S', kaizen which should be known to the technician.			
Objectives:			
The student will be able to:			
<ol style="list-style-type: none"> 1. Familiarize environment in the world of work. 2. Explain the importance of management process in Business. 3. Identify various components of management. 4. Describe Role & Responsibilities of a Technician in an Organizational Structure. 5. Apply various rules and regulations concerned with Business & Social Responsibilities of the Technician 			
Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	Overview Of Business	04	
	1.1 Types of Business – Service – Manufacturing – Trade. 1.2 Industrial sectors: Introduction to – Engineering industry– Process industry – Textile industry – Chemical industry – Agro industry. 1.3 Globalization: Introduction- Advantages & disadvantages w.r.t. India 1.4 Intellectual Property Rights (I.P.R.)		
Unit 2	Management Process	05	
	2.1 What is Management? Evolution – Various definitions – Concept of management – Levels of management– Administration & management– Scientific management by F.W.Taylor. 2.2 Principles of Management (14 principles of Henry Fayol) 2.3 Functions of Management – Planning – Organizing – Directing – Controlling. 2.4 Social responsibility and Environmental dimension of management.		
Group – B			
Unit 3	ORGANIZATIONAL MANAGEMENT	06	
	3.1 Organization :- Definition – Steps in organization		

	<p>3.2 Types of organization: – Line– Line & staff – Functional– Project.</p> <p>3.3 Departmentation:–centralized & Decentralized–Authority & Responsibility– Span of Control.</p> <p>3.4 Forms of ownership: – Proprietorship – Partnership – Joint stock– Co-operative Society – Govt. Sector.</p>		
Unit 4	Human Resource Management	10	
	<p>4.1 Personnel Management: – Introduction – Definition – Objectives – Functions.</p> <p>4.2 Staffing: – Introduction to HR Planning – Recruitment Procedure.</p> <p>4.3 Personnel:– Training & Development– Types of training– Induction – Skill Enhancement.</p> <p>4.4 Grievance handling.</p> <p>4.5 Leadership & Motivation: – Maslow's Theory of Motivation.</p> <p>4.6 Safety Management: – Causes of accident – Safety precautions.</p> <p>4.7 Introduction to :-Factory Act– ESI Act–Industrial Dispute Act– Workmen Compensation Act–Industrial Dispute Act.</p>		
GROUP:C			
Unit 5	Financial Management	09	
	<p>5.1 Financial Management- Objectives & Functions.</p> <p>5.2 Capital Generation & Management – Types of Capitals – Sources of raising Capital.</p> <p>5.3 Budgets and accounts: Types of Budgets – Production Budget (including Variance Report) – Labour Budget – Introduction to Profit & Loss Account (only concepts) – Balance Sheet.</p> <p>5.4 Introduction to – Excise Tax – Service Tax – Income Tax – VAT – Different Custom Duty – financial ratios.</p>		
Unit 6	Materials Management	09	
	<p>6.1 Inventory Management (No Numerical) –Meaning & Objectives</p> <p>6.2 ABC Analysis</p> <p>6.3 Economic Order Quantity(EOQ)</p> <p>6.4 Stores function:– Stores system–BIN card – Materials issue request (MIR), Pricing of materials – Introduction & Graphical Representation .</p> <p>6.5 Purchase Procedure: – Objects of Purchasing – Functions of Purchase Dept – Steps in Purchasing.</p> <p>6.6 Modern Techniques of Material Management–Introductory treatment to JIT / SAP / ERP</p>		
Unit 7	Safety Engineering	05	
	<p>7.1 Accidents-causes of accidents, Welfare measures.</p> <p>7.2 Need for safety</p> <p>7.3 Organization for safety</p> <p>7.4 Safety committee</p> <p>7.5 Safety programmes</p> <p>7.6 Safety measures</p>		

	TOTAL		48
Suggested List of Assignments/Tutorial			
Sl. No.	Assignments/Tutorial		
1	Preparation of financial budget of any organization		
2	Preparation of financial budget of any organization.		
3	Preparation of chart for fire safety		
4	Preparation of chart for personal, Tools & Equipments and products safety.		
5	Preparation of chart to avoid accident.		
6	Preparation of chart to show the different financial ratios		
7	Preparation of chart to show the different types of organization		
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Group	Unit	Objective questions			Total Marks
		To be set Objective questions	To be answered	Marks per question	
A	1,2	7	Any twenty	1	20 X 1 = 20
B	3,4	7			
C	5,6,7	11			

Group	Unit	Subjective Questions			Total Marks
		To be set (Ten questions)	To be answered	Marks per question	
A	1,2	3	Any five (Taking at least one from each group)	10	10 X 5 = 50
B	3,4	3			
C	5,6,7	4			

Sl. No.	Name of the Author	Title of the Book	Name of the Publisher
1.	Dr. O.P. Khanna	Industrial Engg & Management	Dhanpat Rai & sons New Delhi
2.	V.Arun Viswanath, Anoop. S. Nair, S.L.Sabu	Industrial Engineering and Management	SCITECh Publication(s) Pvt. Ltd
3.	A. Bhat & A. Kumar	Management Principles, Processes & Practices	Oxford University Press
4.	Dr. S.C. Saksena	Business Administration & Management	Sahitya Bhavan Agra

5.	W.H. Newman E.Kirby Warren Andrew R. McGill	The process of Management	Prentice- Hall
6.	Rustom S. Davar	Industrial Management	Khanna Publication
7.	Banga & Sharma	Industrial Organisation & Management	Khanna Publication
8.	Jhamb & Bokil	Industrial Management	Everest Publication , Pune

Name of the course: Industrial Electronics -II				
Course Code: EEE/ IEII /S6		Semester: Sixth		
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)		Maximum Marks: 100 Marks+50 Marks		
Teaching Scheme:		Examination Scheme		
Theory: 2 contact hrs./ week		Class Test (Internal Examination): 20 Marks		
Tutorial: 1 contact hr./ week		Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks		
Practical: 3 contact hours/ week		End Semester Examination: 70 Marks		
Credit: 3 (Four)+2(Two)		Practical: 50 Marks		
Rationale:				
This subject is important link between basic electricity and advanced electronic applications. Industrial electronics shall play very important role for shop floor engineers in the field of industrial applications like conversion, inversion, and stabilization of ac & dc power control etc. Also it will help engineer in the field of power generation, transformation and distribution in ac power. At the same time in the field of dc power requirement in industries, laboratories. This subject is heart of many industrial processes like battery charging, UPS, welding, time controlled processes, temperature controller operation etc.				
Objectives:				
The student will be able to:				
<ol style="list-style-type: none"> 1. Choose a device for a specific application. 2. Describe the operation of various converters, invertors, choppers, regulator. 3. List applications of converters, invertors, choppers, regulator. 4. Select proper device for a given application. 5. Understand the PLC and their application in industry. 				
Content (Name of topic)			Periods	Marks
Group-A				
Unit 1	CHOPPERS		5	
	1.1 Principle of operation of chopper and its application. 1.2 Functional operation of forced, commutated and Jone's chopper and their areas of applications. 1.3 Principle of operation of 4-quadrant chopper. 1.4 Principle of operation of Cycloconverter and its applications.			
Unit 2	SPEED CONTROL OF DC MOTOR		4	

	2.1 TYPES OF SPEED CONTROL OF DC MOTOR: Armature Volt – Field Current Control. 2.2 DRIVE SYSTEM: Controlled Rectifier Drive – Reversible Drive – Quadrant Drive – 2.3 Dual Converter		
Unit 3	AC POWER REGULATOR	6	
	3.1 Concept of Automatic AC Regulator and phase control 3.2 Principle of operation of: Step Regulator – Solid State Changer – Servo Regulator. 3.3 Principle of operation of Phase Control AC Regulator. 3.4 Principle of operation of CVT and Solid State Regulator.		
	GROUP- B		
Unit 4	SPEED CONTROL OF AC MOTOR	4	
	4.1 Types of speed variation – Frequency variation – Stator volt variation – Closed loop control – Types of feedback. 4.2 TYPES OF BREAKING: Regenerative breaking – Plugging.		
Unit 5	INVERTERS	4	
	5.1 Principle of operation of self-oscillating and driving inverter 5.2 Principle of operation of voltage driver, current driver, half bridge and full bridge 5.3 inverter. Inverter loads. 5.4 Three phase inverter. 5.5 Applications of inverter		
Unit 6	UPS AND SOLAR CELL	8	
	6.1 Principle of operation of ON line UPS, standby UPS, cold and warm, utility of 6.2 static switch. 6.3 Use of storage devices and working principle of battery charger 6.4 Concept of Solar Cell and its application 6.5 Idea of solar battery charger and inverter		
	GROUP- C		
Unit 7	STEPPER MOTOR	6	
	7.1 Types and principle of operation of stepper motor. 7.2 STEPPER MOTOR CONTROL: Stepper Drive – Dual Voltage Drive – Chopper Drive.		
Unit 8	PLC BASICS	8	
	8.1 Evolution and Role of PLC in Automation 8.2 Block Diagram & Principle of Working 8.3 PLC Characteristics and hardware configuration – CPU, Racks, Power Supply, 8.4 Memory, Input & Output Modules, Application Specific Modules, Speed of Execution, Communication, Redundancy. 8.5 Introduction to PLC Programming Languages –Ladder, Instruction List, 8.6 Structured Text, Grafcet		
	TOTAL	45	

Contents Practical	
Skills to be developed: On satisfactory completion of the course, the students should be in a position to design few fundamental networks.	
Intellectual Skills:	
1) Able to select proper instruments	
2) Compare the characteristics under various conditions	
Motor Skill:	
1) Make accurate measurements	
2) Adjust the meters to read zero at start	
3) Draw graphs	
List of Practical: Any EIGHT(including MINI PROJECT)	
Suggested List of Laboratory Experiments	
Sl. No.	
1.	To study a phase control AC regulator
2.	To study a Jones chopper
3.	To study a servo regulator
4.	To study an Online UPS system.
5.	To study a single-phase bridge inverter with resistive load.
6.	To study speed control of induction motor by voltage and frequency variation.
7.	To study stepper motor control system.
8.	Use of simulation package for different function of PLC.
9.	Verify function of logic gates by using PLC.
10.	Write and verify ladder program for motor ON-OFF Control with two push button
Mini Project	
Ac voltage controller	
Battery charging regulator , emergency light using solar cell , panel and solar inverter	
Temperature controller	

Examination scheme (Theoretical):

A). Internal Examination: Marks- 10

C) **Teacher's Assessment: Marks- 5**

B). End Semester Examination: Marks-35

(i) Marks on Attendance

(ii) Assignments & Interaction

Group	Unit	Objective questions			Total Marks
		Note: 6 multiple choice and 4 short answer type questions			
		To be set short answer type (Eight questions)	To be answered	Marks per question	
A	1,2,3	8	Any twenty	1	20x1= 20
B	4,5,6	9			
C	7,8	8			

Group	Unit	Subjective Questions			Total Marks
		To be set (Ten questions)	To be answered	Marks per question	
A	1,2,3	3	Any five (Taking at least one from each group)	10	10 X 5 = 50
B	4,5,6	4			
C	7,8	3			

Note 1 : Teacher's assessment will be based on performance on given assignments & quizzes.

Note 2 : Assignments may be given on all the topics covered on the syllabus.

Sl. No.	Name of the Author	Title of the Book	Name of the Publisher
1.	Biswanath Paul	Industrial Electronics	PHI
2.	Moorthi	Power Electronics	OXFORD
3.	Khan & Chandani	Industrial Electronics	Tata McGraw Hill
4.	H Babu	Power Electronics	SCITECH
5.	Gupta & Singhal	Power Electronics	SK Kataria & Sons
6.	Mohan	Power Electronics Converter Application and Design	Wiley
7.	SN Biswas	Industrial Electronics	Dhanpat Rai
8.	PC Sen	Modern Power Electronics	S Chand
9.	Chatterjee & Bhattacharya (TTTI)	Industrial Electronics	TMH
10.	M.C Sharama	Practical SCR / Triac projects	
11.	F. Graf	The Encyclopedia of electronic circuit by Rudolf	

EXAMINATION SCHEME (SESSIONAL)

Name of Subject: Industrial Electronics Laboratory-II

Full Marks-50

Subject Code: EEE/ LIE2/S5

- Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the sixth Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
- External Assessment of 50 marks** shall be held at the end of the sixth Semester on the entire syllabus. One experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 15, Viva-voce – 10.**

Name of the course: Instrumentation and Control	
Course Code: EEE/ IC /S6	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks+50 Marks
Teaching Scheme:	Examination Scheme
Theory: 3 contact hrs./ week	Class Test (Internal Examination): 20 Marks
Tutorial: 1 contact hrs./ week	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 2 contact hours/ week	End Semester Examination: 70 Marks

Credit: 4 (Four) + 1 (One)		Practical: 50 Marks	
<p>Rationale: Measurement of different physical quantity can be done with the help of some instruments constructed of some electrical and electronic devices. The students will be familiar with the principle of operation of different transducer processing of signals of different instrument like LVDT, strain gauge, thermocouple, thermistors etc. The students will also be acquainted with the basics of control system after successful completion of this course.</p>			
<p>Objectives: The student will be able to:</p> <ol style="list-style-type: none"> 1. Transducer fundamentals 2. Position & displacement measurement 3. Pressure of force & vibration measurement 4. Temperature measurement 5. Signal conditioning 6. Introduction to control engineering 7. System element behaviour 8. Closed loop system 			
Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	TRANSDUCERS FUNDAMENTALS	4	
	1.1 Principle of operation of transducer and sensor. 1.2 Measurement of physical quantities with transducer, displacement, potentiometer, LVDT, strain gauge, piezoelectric crystal. 1.3 TEMPERATURE: RTD – Thermistors – Thermocouple. 1.4 FLOW: Positive displacement – Electromagnetic heat – Thermal heat. 1.5 Other applications like measurement of pH and conductivity. 1.6 Factors for choice of transducer.		
Unit 2	POSITION , DISPLACEMENT AND TEMPERATURE MEASUREMENT	6	
	2.1 Principle of Potentiometric Transducer. 2.2 Capacitance Transducer. 2.3 Linear Variable Differential Transformer. 2.4 Basic types of temperature transducer: Resistance detectors, thermistors, thermocouple — Principle of operation, specifications, features and applications. 2.5 Application of platinum thin film and sensors		
Unit 3	PRESSURE OR FORCE & VIBRATION MEASUREMENT	4	
	3.1 Representative unit of pressure or force. 3.2 Electrical transducer alignments — Electrical strain gauges: Types – Gauge Factor – Temperature Specification. 3.3 SEMICONDUCTOR STRAIN GAUGES: Properties of piezoelectric alignments,		
Group B			
Unit 4	SIGNAL CONDITIONING	6	

	<p>4.1 Signal conditioning requirements for AC and DC transducer signal.</p> <p>4.2 Transducer circuit modification.</p> <p>4.3 Specification and characteristics of instrumentation amplifier.</p> <p>4.4 Signal processing.</p> <p>4.5 Features and advantages of computerized data acquisition.</p>		
Unit 5	INTRODUCTION TO CONTROL ENGINEERING	6	
	<p>5.1 Examples of control system.</p> <p>5.2 Classification of control system.</p> <p>5.3 Representation of control system.</p> <p>5.4 Transfer function.</p> <p>5.5 Block diagram of a feedback control system.</p> <p>5.6 Simplification of a feedback control system.</p>		
Unit 6	SYSTEM ELEMENT BEHAVIOUR	7	
	<p>6.1 Standard test.</p> <p>6.2 The steady state and transient response.</p> <p>6.3 Steady State Error – Rise Time – Delay Time – Settling Time.</p> <p>6.4 DAMPING: Over damped – Under damped – Critically damped.</p> <p>6.5 Standard test inputs - step, ramp, parabolic & impulse. Need of them, significance, and corresponding Laplace representation Poles & zeros – definition.</p> <p>6.6 Analysis of first order control system for unit step input; concept of time constant</p> <p>6.7 Analysis of second order control system for unit step input; concept, definition & effect of damping; time response specifications (no derivations) ; problems on time response specifications</p>		
	GROUP- C		
Unit 7	CLOSED LOOP SYSTEM	6	
	<p>7.1 s-plane – Introduction stability - stable, unstable, critically stable & conditionally stable system; relative stability;</p> <p>7.2 Routh's stability criterion-- basic idea;</p> <p>7.3 Nyquist criteria—basic idea.</p>		
Unit 8	CONTROL ACTIONS & PROCESS CONTROLLERS	7	

C	7,8	3			
---	-----	---	--	--	--

Group	Unit	Subjective Questions			Total Marks
		To be set (Ten questions)	To be answered	Marks per question	
A	1,2,3	3	Any five (Taking at least one from each group)	10	10 X 5 = 50
B	4,5, 6	3			
C	7,8	4			

Note 1 : Teacher's assessment will be based on performance on given assignments & quizzes.

Note 2 : Assignments may be given on all the topics covered on the syllabus.

Sl. No.	Name of the Author	Title of the Book	Name of the Publisher
1.	M. Gopal	Digital Control System	Tata McGraw-Hill
2.	Patranabis	Instrumentation and Controls	PHI
3.	J.J.Nagrath & M. Gopal	Control System Engg	Wiley
4.	Rameshbabu and R Anandrajan	Modern Control System	SCITECH
5.	K. Ogata	Modern Control Engg.	--
6.	K Sridhar	Automatic Control Systems	Wiley India
7.	S N Talbar & AR Upadhyay	Electronics Instrumentation	Dhanpat Rai & Sons
8.	Kumar	Control System	Tata McGraw-Hill
9.	C. D. Johnson	Process control instrumentation Technology	--
10.	RK Rajput	Electrical & Electronics Measurement and Instrumentation	S Chand
11.	JB Gupta	Electrical & Electronics Measurement and Instrumentation	SK Kataria & Sons
12.	Kalsi	Electronic Instrumentation	Tata McGraw-Hill
13.	A.K. Sawhney	A Course in Electrical and Electronic Measurement and Instrumentation	Dhanpat Rai & Sons
14.	B.C. Kuo	Automatic Control System	PHI
15.	Natarajan	Control System Engg.	SCITECH
16.	Reddy	Instrument Control	SCITECH

EXAMINATION SCHEME (SESSIONAL)

Name of Subject: : Instrumentation and Control

Full Marks-50

Subject Code: EEE/ LIC/S6

- Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the sixth Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
- External Assessment of 25 marks** shall be held at the end of the sixth Semester on the entire syllabus. One experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 15, Viva-voce – 10.**

• Name of the course: Computer Network	
Course Code: EEE/CN/S6	Semester: Six
Duration: One semester (Teaching-15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks +50 Marks
Teaching Scheme:	Examination Scheme :
Theory: 3 contact hrs./ week	Internal Examination : 20 Marks
Tutorial:	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 2 contact hours/ week	End Semester Examination: 70 Marks
Credit: 3 (Three) + 1 (One)	
Rationale:	
Modern age is the age of computer. Global communication can be done within few seconds with the help of computer network. Preliminaries like network structure, flow and error control, LAN, internetworking, network security etc. are included in this course so that the students know about the fundamentals of computer networking.	
Objectives:	
The student will be able to- <ul style="list-style-type: none"> ✓ Identifying the benefits of network. ✓ Distinguish between Network classifications. ✓ Describe different types of Topology. ✓ Describe different types of Network devices. ✓ Compare different transmission media. ✓ Compare OSI and TCP/IP model 	

Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	Network Basics	4	4
	1.1 Definition of computer network – Network components 1.2 Distinguish between Network classifications – Classify networks by their Geography- LAN, MAN & WAN; Classify Networks by their Network role- Peer to Peer, Server Based Networks.		
Unit 2	TRANSMISSION MEDIA AND NETWORKING DEVICES	8	8
	2.1 Classification of Transmissions Media: Guided media- UTP, STP; Coaxial Cable; Optical Fiber - Optical Fiber Structure, Light Source		

	<p>for Fiber, Propagation Mode, Advantages of optical fiber and Disadvantages of optical fiber. (brief idea)</p> <p>2.2 Unguided media: Wireless Communication – Communication Band; Microwave Communication; Satellite Communication – Access Method.</p> <p>2.3 Network Control Devices - Hubs; Switches; Routers; Bridges; Repeaters; Gateways; Modems</p>		
Unit 3	NETWORK STRUCTURES & REFERENCE MODEL	6	6
	<p>3.1 Network topology.- Bus Topology; Ring Topology; Star Topology; Mesh Topology; Tree Topology; Hybrid Topology</p> <p>3.2 SWITCHING: Circuit Switching – Message Switching – Packet Switching.</p> <p>3.3 Layered architecture of network system – Seven layer OSI model – Functions of each OSI layer – Other ISO structure – TCP / IP Layer Structure, Comparison of the OSI and TCP/IP reference models</p>		
Unit 4	FLOW CONTROL & ERROR CONTROL	8	8
	<p>4.1 FLOW CONTROL: Congestion control – Necessity of flow control – Poll / select method – Stop and wait method – Sliding window method.</p> <p>4.2 ERROR CONTROL: Error detection & correction – Types of error – Checksum – Forward error control – Automatic repeat request – Cyclic redundancy check. ALGORITHMS: Routing, Fixed and Adaptive.</p>		
Unit 5	TCP/IP Fundamentals:	4	4
	<p>1.1 TCP/IP Protocols - SLIP and PPP; ARP; IP; ICMP; TCP and UDP.</p> <p>1.2 IP Addressing - IP Address Assignments; IP Address Classes; Subnet Masking; Registered and unregistered Addresses.</p>		
Unit 6	LOCAL AREA NETWORK	6	6
	<p>2.1 Basic concepts.</p> <p>2.2 IEEE 802 family of standards.</p> <p>2.3 ETHERNET: CSMA / CD – Frame formats.</p> <p>2.4 Token Bus – Token Ring – Frame Formats.</p>		
	Group C		
Unit 7	Internet services	6	6
	<p>3.1 Structure and Objectives of Intranet & Internet.</p> <p>3.2 INTERNET SERVICES: Email – telnet – FTP – World Wide Web – Internet Telephony – Short Messaging Services (SMS)</p>		
Unit 8	NETWORK SECURITY	6	6
	<p>4.1 Different aspects of SECURITY: Privacy – Authentication – Integrity – Non-Repudiation.</p> <p>4.2 ENCRYPTION / DECRYPTION: Data Encryption System – Secret key method – Public key method.</p> <p>4.3 Digital signature.</p>		
	TOTAL	48	
Practical			

Skills to be developed			
Intellectual skills:			
1. Analytical skills.			
2. Identification skills.			
Motor skills:			
1. Handling of computers and programming abilities.			
2. Connection (of machine terminals) skills.			
List of Practical:			
1. The laboratory works will be performed on the following areas:—			
2. Draw layout of LAB Network and assess the network requirements.			
3. Use step by step procedure for File sharing & Printer sharing			
4. Compare Network directing devices. i.e. Hub, Switch, Router.			
5. Create a Network cable using RJ45 connectors			
6. Compare different Network Topologies			
7. LAN card (MB and GB range) installation and cabling, demonstration on Hub, Switches and wireless LAN card.			
8. Optical fibre based LAN- Transceiver, commissioning of optical fibre tools.			
9. To locate MAC address of computer			
10. Installation of TCP/IP Protocol i.e. NetBEUI Protocol			
11. Implementing a TCP/IP Network configuring			
Text books:			
Sl. No.	Titles of Book	Name of Author	Name of Publisher
1.	Data Communication and Networking	B.A. Forouzan	T.M.H Publishing Co. Ltd.
2.	Data Communication & Networking	DP Nagpal	S Chand
3.	Data Communication & Computer Networking	Ajit Pal	PHI
4.	Communication Network	Leon, Garcia, Widjaja	Tata McGraw-Hill
5.	Vikash Gupta	Comdex hardware and Networking Course Kit	Dreamtech press
6.	Computer Network	Tanenbaum	Prentice Hall of India
7.	Data Communications	F. Halsall	Pearson Edu.
8.	Computer Network	U. Black	Prentice Hall of India

9.	Peter Norton's Introduction to Computer	P. Norton	Tata McGraw-Hill
10.	Computer Network	Stallings	Prentice Hall of India
11.	Local Area Network	Ahuja	Tata McGraw-Hill

EXAMINATION SCHEME (THEORETICAL)

- A) Internal Examination: Marks- 20
 B) End Semester Examination: Marks-70
 C) **Teacher's Assessment: Marks- 10**
 (i) Marks on Attendance
 (ii) Assignments & Interaction

Group	Unit	Objective questions			Total Marks
		To be set short answer type (eight questions)	To be answered	Marks per question	
A	1,2,3,4	11	Any Twenty	1	20x1=20
B	5,6,7,8	12			

Group	UNIT	Subjective Questions			Total Marks
		To be set Multiple Choice (Ten questions)	To be answered	Marks per question	
A	1,2,3,4	4	Any five (Taking at least two from each group)	10	10X 5 = 50
B	5,6,7,8	5			

EXAMINATION SCHEME (SESSIONAL)**Subject: Computer Network Laboratory****Full Marks-50****Code: EEE/LCN /S6**

- Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Sixth Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
- External Assessment of 50 marks** shall be held at the end of the Sixth Semester on the entire syllabus. One Experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 15, Viva-voce – 10.**

Name of the course: INDUSTRIAL AUTOMATION (Elective)	
Course Code: EEE/ IA (EL) /S6	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	Examination Scheme
Theory: 3 contact hrs./ week	Class Test (Internal Examination): 20 Marks
Tutorial:	Teacher's Assessment (Attendance, Assignment & interaction): 10

	Marks		
Practical: 2 Contact hours/ week	End Semester Examination: 70 Marks		
Credit: 3 (Three) + 1(One)	Practical: 50 Marks		
Rationale:			
<ul style="list-style-type: none"> To explain applications of control systems / Automation Design & program PLC using Ladder logic. To study working of control components 			
Objectives:			
The student will be able to:			
<ol style="list-style-type: none"> 1. Explain applications of control systems / Automation. 2. Explain the hydraulic/ pneumatic systems. 3. Describe & program PLC using Ladder logic. 4. Describe working of control components. 5. Draw power & control circuit. 			
Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	Automation	02	
	<ol style="list-style-type: none"> 1.1 Need of automation. 1.2 Advantages of automation 1.3 Requirements of automation 		
Unit 2	Control System	04	04
	<ol style="list-style-type: none"> 2.1 Use of control system in automation. 2.2 Different types of control system in automation. 2.3 Development of block diagram for simple applications like level, temperature, flow, speed control. 		
Unit 3	Control System Components	08	12
	<ol style="list-style-type: none"> 3.1 Contacts-types, current capacity & load utilization categories 3.2 Solenoids-dc, ac 3.3 I/P devices- switches-push buttons, foot switch, selector switch, pilot switch, proximity, photoelectric, temperature actuated, level control, pressure sensing, overload sensing 3.4 Relays- electromechanical, reed 3.5 O/P devices- contactors, valves, pilot lamps 3.6 Symbols in power & control circuits 3.7 Developing control circuit-basic & thumb rule 3.8 Power & control circuit for different applications like hoist,crane, conveyer belt, induction motors 		
Unit 4	Application of Electrical Actuators in control system:	08	10
	<ol style="list-style-type: none"> 4.1 Potentiometers in control system. 4.2 Servomotors-AC & DC with their working principle. 4.3 Synchros - Transmitter, Control transformer, use as error detector. 4.4 Stepper motor-PM & variable reluctance- working principle. 		

	4.5 Tacho generator – AC & DC. 4.6 Applications of above components as AC/DC control system.		
	Group-B		
Unit 5	Controllers	08	10
	5.1 Hydraulic-advantages & disadvantages, hydraulic servomotor, types of pumps used, control valves, components like accumulator, filter, seals 5.2 Pneumatic-resistance & capacitance of pressure system, pneumatic flapper-nozzle system, pneumatic relays, actuating valves, cylinders, comparison between pneumatic & hydraulic systems 5.3 Electrical & electronic controller- lead-lag networks. 5.4 Digital controllers-brief overview of microprocessor & microcontroller to be worked as controller		
Unit 6	Control actions	06	10
	6.1 On-Off, P, I, P+I, P+D,P+I+D, actions 6.2 P+I+D action using hydraulic, pneumatic electronic controller 6.3 Tuning of P+I+D controller		
Unit 7	Programmable Logic Controller	08	10
	7.1 Role of PLC in automation. 7.2 PLC Vs PC in automation. 7.3 Block diagram of PLC. 7.4 Basic blocks like CPU, I/O modules, bus system, power supplies & remote I/Os. 7.5 Different PLCs available in market.		
Unit 8	Programming of PLC	02	10
	8.1 Development of Ladder logic 8.2 Some simple programs such as I/O connections, starting of IM, stepper motor control.		
Unit 9	Introduction to special control systems	02	04
	9.1 Distributed Control System(DCS)-brief introduction to hardware & software used 9.2 SCADA- brief introduction to hardware & software used.		
	Total	48	70

Contents Practical	
Skills to be developed:	
Intellectual Skills:	
a. Logical development	
b. Programming skills	
Motor Skill:	
a. Interpretation skills	
b. Connecting properly	
List of Practical: Any EIGHT	
Suggested List of Laboratory Experiments	
Sl. No.	Write assembly language programs:
1.	a) To plot the characteristics of potentiometer. b) Use of potentiometer as error detector.
2.	To plot V-I characteristics of DC & AC servomotors. compare them with DC & AC motor characteristics.
3.	a) To plot the characteristics of synchro transmitter. b) Use of synchro transmitter- control transformer pair as error detector.
4.	To measure step angle of a stepper motor in forward & reverse direction.
5.	Observe various components /parts/symbols/connections of a PLC.
6.	To perform Forward and Reverse operation of 3 phase Induction Motor using PLC.
7.	To perform stepper motor/ temperature control using PLC.
8.	To Identify the parts of hydraulic/ pneumatic servomotor from cut-section/model.
9.	To build P, I, PI, PD & PID controller using op-amps & R-C circuits. Plot V-I characteristics.

Examination scheme (Theoretical):

A). Internal Examination: Marks- 20

C) **Teacher's Assessment: Marks- 10**

B). End Semester Examination: Marks-70

(i) Marks on Attendance:

(ii) Assignments & Interaction

Group	Unit	Objective questions			Total Marks
		To be set Multiple Choice (Ten questions)	To be answered	Marks per question	
A	1,2,3,4	11	Any twenty	1	20 X 1 = 20
B	5,6,7,8	12			
Group	Unit	Subjective Questions			Total Marks
		To be set (Ten questions)	To be answered	Marks per question	
A	1,2,3,4	4	Any five (Taking at least two from each group)	10	5 X 10 = 50
B	5,6,7,8	5			

Note 1 : Teacher's assessment will be based on performance on given assignments & quizzes.

Note 2 : Assignments may be given on all the topics covered on the syllabus.

EXAMINATION SCHEME (SESSIONAL)**Subject: INDUSTRIAL AUTOMATION LAB****Full Marks-50****Code: EEE/LIA /S6**

- 3. Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Sixth Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
- 4. External Assessment of 50 marks** shall be held at the end of the Sixth Semester on the entire syllabus. One Experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 15, Viva-voce – 10.**

Sl. No.	Name of the Author	Title of the Book	Name of the Publisher
1.	Nagrath Gopal	Control System Engg.	Wiley Eastern
2.	K.Ogata	Modern Control Engg.	Prentice Hall
3.	Jacob	Industrial Control Engg	Prentice Hall
4.	Andrew Parr	Hydraulics & Pneumatics	Jaico Publication
5.	Webb & Reis	Programmable Logic Controller: Principle applications	Wiley Eastern
6.	S.K. Bhattachrya Brijinder Singh	Control of Electrical Machines	New Age International Publishers
7.	Jon stenerson	Industrial automation and process control	Prentice Hall
8.	Richad Shell	Handbook of Industrial automation	Taylor and Francis

Name of the course: Control of Electrical Machines (Elective)	
Course Code: EEE/ CEM(EL) /S6	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks + 50 Marks
Teaching Scheme:	Examination Scheme
Theory: 3 contact hrs./ week	Class Test (Internal Examination): 20 Marks
Tutorial: nil	Teacher's Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 2 contact hours/ week	End Semester Examination: 70 Marks
Credit: 3 (Five) + 1(One)	Practical: 50 Marks
Rationale:	
<ul style="list-style-type: none"> This subject is the combination of Electrical machine and Control system. Most of the motor control circuits are based on these systems. Understanding of the subject will provide skill to the students of different motor control systems and their applications in industry. 	
Objectives:	
The student will be able to:	

<ol style="list-style-type: none"> 1. Interpret the basics of the motor control systems. 2. Demonstrate the solid state control of motor. 3. Describe the implementation of PLC in control systems. 			
Content (Name of topic)		Periods	Marks
Group-A			
Unit 1	Control Systems :	08	12
	<ol style="list-style-type: none"> 1.1 Concept of Automatic control system. 1.2 Illustration of Open loop and closed loop control system. 1.3 Need for feed back system. 1.4 Basic elements of a servo mechanism. 1.5 Examples of Automatic control system. 1.6 Introduction to solid state control. 1.7 Advantages of solid state control of machines. 		
Unit 2	Magnetic Control Systems:	10	14
	<ol style="list-style-type: none"> 2.1 Operation & Applications of Contactor control circuit components – <ol style="list-style-type: none"> (i) Switches – Push button type, Selector type, Limit switch, Pressure, Float type, Proximity, Thermostat (Temperature) (ii) Fuses – Kit-kat type, Cartridge type, HRC type (iii) MCCB, MCB. (iv) Electromagnetic Contactor. (v) Overload relays – Voltage operated, Current operated, Thermal overload relay, Magnetic overload relay, (vi) Time delay relays (OFF delay, ON delay). (vii) Timer – Pneumatic type, Electronic type. (viii) Relays –Frequency response relay, Latching relay, Phase failure relay (single phase preventer), Solid state relay. (ix) Solenoid valve. 2.2 Principles of design of motor control circuits and power circuits. 		
Unit 3	MAGNETIC CONTROL OF DC MOTOR:	10	14
	<ol style="list-style-type: none"> 3.1 Operation of Control circuit & Power circuits of - <ol style="list-style-type: none"> (i) Jogging operation of DC motor in one and two directions. (ii) Starters of DC motor - Current limit acceleration starter, Series relay & Counter emf starter, Definite time acceleration starter. (iii) Braking of DC motor - Dynamic braking , Reversing & plugging. (iv) Protection of DC motor - Field failure protection circuit, Field acceleration protection circuit, Field deceleration circuit. 3.2 Solid State Control of DC Motor : <ol style="list-style-type: none"> (i) Speed control of DC motor using chopper circuit. (ii) Speed control of DC shunt motor using thyristor- Half-wave drives & Full-wave drives. 		
Unit 4	MAGNETIC CONTROL OF AC MOTOR:	10	14

	<p>4.1 Operation of Control circuit & Power circuits of -</p> <p>(i) Reversing the direction of rotation of induction motor with Interlocking systems</p> <p>(ii) Simple ON-OFF motor control circuit,</p> <p>(iii) Automatic Sequential control of motor.</p> <p>(iv) DOL starter,</p> <p>(v) Automatic Auto-transformer starter,</p> <p>(vi) Automatic Star-Delta starter.</p> <p>(vii) Starter for multispeed operation of motor.</p> <p>(viii) Plugging & Dynamic braking of AC motor.</p> <p>(ix) Protection of AC motor – Overload, Short circuit and Over temperature protection of high rating motors.</p> <p>4.2 Solid State Control of AC Motor:</p> <p>(i) Speed control of three phase induction motor using variable voltage frequency control,</p> <p>(ii) Speed control of slip-ring induction motor using variable rotor circuit resistance.</p> <p>(iii) Speed control of single phase induction motor using thyristor.</p> <p>(iv) Speed control of synchronous motor.</p> <p>(v) Speed control of universal motor.</p>		
	Use of Programmable Logic Control (PLC):	10	16
	<p>5.1 Introduction & Advantages of PLC.</p> <p>5.2 Function of each part of PLC.</p> <p>5.3 Hardware of PLC.</p> <p>5.4 Concept of Ladder diagram in PLC programming.</p> <p>5.5 Ladder logic diagram for –</p> <p>(i) DOL starter of Induction motor,</p> <p>(ii) Automatic Star-Delta starter of Induction motor,</p> <p>(iii) Sequential operation of three motors with a time gap,</p> <p>(iv) Fluid filling operation.</p> <p>5.6 Use of PLC in closed loop control, Proportional control, Integral control, Derivative control & PID control with illustration.</p> <p>5.7 DC motor speed control using PLC programming.</p>		
		48	70
<p>Contents Practical</p> <p>Skills to be developed:</p> <p>Intellectual Skills:</p> <p>To select appropriate component and equipment.</p> <p>Apply different designing skills.</p> <p>Motor Skill:</p> <p>Ability to draw the control & power circuit diagrams.</p> <p>Ability to interpret the circuits and waveforms.</p>			

1.	S.K.Bhattacharya	Industrial Electronics and Control	Tata McGraw Hill
2.	Dr. S.K.Sen	Electrical Machine	Khanna Publisher
3.	V. Subrahmanyam	Electric Drives – concepts & applications	Tata McGraw Hill
4.	Petruzella	Programmable Logic Controller	Tata McGraw Hill

E X A M I N A T I O N S C H E M E (SESSIONAL)

Name of Subject: Control of Electrical Machines Lab **Full Marks-50**

Subject Code: EEE/ LCEM/S6

- Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Sixth Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
- External Assessment of 50 marks** shall be held at the end of the Sixth Semester on the entire syllabus. One experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 15, Viva-voce – 10**

Name of the course: Process Control & Instrumentation (Elective)	
Course Code: EEE/ PC(EL) /S6	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100Marks+50 Marks
Teaching Scheme:	Examination Scheme
Theory: 3 contact hrs./ week	Class Test (Internal Examination): 20 Marks
Tutorial:	Teacher’s Assessment (Attendance, Assignment & interaction): 10 Marks
Practical: 2 contact hours/ week	End Semester Examination: 70 Marks
Credit: 3 (Three) + 1 (One)	Practical: 50 Marks
Rationale:	
<ul style="list-style-type: none"> ➤ This subject is the combination of control system and instrumentation. Most of the subjects of Electrical Engineering are based on these systems. ➤ Understanding of the subject will provide skill to the students of different process control systems and their use in industry. 	
Objectives:	
<p>The student will be able to:</p> <ul style="list-style-type: none"> ➤ Know about the basics of the process control systems. ➤ Know about the digital Data Acquisition System. ➤ Learn about the use of PLC in control systems. ➤ Know about the digital Data Transmission Systems. 	

Content (Name of topic)		Periods	Marks
Unit 1	Process Control System:	10	14
	1.1 Introduction to the terminology of process control system – Balanced condition, Self-regulation, Process disturbance, Process time lag, Process reaction curve. 1.2 Block diagram of a process control system. 1.3 Realization of control actions using P, PI, PD, PID controller. 1.4 P, I, D actions with Pneumatic, Hydraulic and Electronic systems, Amplifiers. 1.5 Concept of Feedback and feed forwards control systems, Ratio control, Cascade control. 1.6 Control valves and Actuator.		
Unit2	Measurement of Non Electrical Quantity:	10	14
	2.1 Basic requirements of a transducer. 2.2 Measurement of Pressure: Manometer, Bellows, Bourdon tube, Capacitance type differential pressure transducer. 2.3 Measurement of Temperature: Resistance temperature detector, Thermocouple, Pyrometer. 2.4 Measurement of Flow: Rotameter, Electromagnetic flow meter, Hot wire anemometer. 2.5 Measurement of liquid level. 2.6 Measurement of Humidity - Hygrometer. 2.7 Measurement of Viscosity. 2.8 Gas analyser. 2.9 Measurement of pH.		
Unit 3	Data Acquisition System:	10	12
	3.1 Basic components of Data Acquisition System. 3.2 Components of a PC-based Data Acquisition System. 3.3 Analog input & output subsystem. 3.4 Digital input & output subsystem. 3.5 Single channel data acquisition system. 3.6 Multi channel data acquisition system. 3.7 Concept of Distributed Control System (DCS, DDC). 3.8 IEEE 488 Interface.		
Unit 4	Data Transmission Element / Telemetry:	06	12
	4.1 Land line telemetry 4.2 Voltage and current telemetering, two wire current transmitter. 4.3 Time division multiplexing, synchros, modem, synchronous and asynchronous communication. 4.4 RF telemetry. 4.5 Modulation methods –		

	Amplitude modulation, Frequency modulation, Pulse width modulation. 4.6 Pulse code modulation (PAM) Telemetry.		
Unit 5	Spectrum Analyzer:	06	08
	5.1 Basic principle. 5.2 Block diagram. 5.3 Low cost Spectrum Analyser. 5.4 Experiments with low cost components. 5.5 Concept of spectrum analysis software.		
Unit 6	Use of Programmable Logic Control (PLC) in process control:	06	10
	6.1 Introduction & Advantages of PLC. 6.2 Function of each part of PLC. 6.3 Hardware of PLC. 6.4 PLC operation & Program execution. 6.5 Application of PLC in process control – Pressure, Temperature, Liquid level control.		
	TOTAL	48	70
List of Practical: (At least Eight Experiments are to be performed)			
Sl. No.			
1.	To study of a bourdon tube, manometer and bimetallic transducer.		
2.	To measure fluid pressure using manometer.		
3.	To monitor and control of temperature using bimetal.		
4.	To study of different telemetering systems with the help of slide / model.		
5.	To study of AM, FM, PWM using trainer kit.		
6.	To study of a temperature controller and its application in temperature control circuit.		
7.	To study a typical pneumatic control system.		
8.	To study of Data Acquisition System using slide.		
9.	To study distributed digital control using 8085 microprocessor / microcontroller.		
10.	To make and execute circuit of any process control system using PLC programming.		
11.	To apply PID controller in a process control system and observe the output with variation of input using MATLAB software.		
12.	Visit to a nearby Process Control Industry and study the control process with its allied components.		

Examination scheme (Theoretical):

A). Internal Examination: Marks- 20

C) **Teacher's Assessment: Marks- 10**

B). End Semester Examination: Marks-70

(i) Marks on Attendance:

(ii) Assignments & Interaction

Group	Unit	Objective questions			Total Marks
		To be set short answer type (Eight questions)	To be answered	Marks per question	
A	1,2	11	Any twenty	1	20x1=20
B	3,4,5,6	12			

Group	Unit	Subjective Questions			Total Marks
		To be set (Ten questions)	To be answered	Marks per question	
A	1,2	4	Any five (Taking at least two from each group)	5	10X 5 = 50
B	3,4,5,6	5			

Note 1 : Teacher's assessment will be based on performance on given assignments & quizzes.

Note 2 : Assignments may be given on all the topics covered on the syllabus.

Sl. No.	Name of the Author	Title of the Book	Name of the Publisher
1.	Eckman	Automatic Process Control	Wiley Eastern
2.	D. Patranabis	Principle of Process Control	Tata McGraw-Hill
3.	Purkait	Electrical & Electronics Measurements & Instrumentation	Tata McGraw-Hill
4.	Curtis Johnson Ltd.	Process Control Instrumentation	Prentice Hall of India
5.	Petruzella	Programmable Logic Controller	Tata McGraw-Hill

EXAMINATION SCHEME (SESSIONAL)

Name of Subject: Process Control & Instrumentation Laboratory

Full Marks-50

Subject Code: EEE/ LPC/S6

- Continuous Internal Assessment of 25 marks** is to be carried out by the teachers throughout the Sixth Semester. **Distribution of marks: Performance of Job – 15, Notebook – 10.**
- External Assessment of 50 marks** shall be held at the end of the Sixth Semester on the entire syllabus. One experiment per student from any one of the above is to be performed. Experiment is to be set by lottery system. **Distribution of marks: On spot job – 15, Viva-voce – 10.**

Name of the course: Industrial Project	
Course Code: EEE/ IP/S6	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	Examination Scheme
Theory: nil	
Tutorial: nil	Teacher's Assessment (Attendance, Assignment & interaction):
Practical: 4 contact hours/ week	Term Work: 50 Marks
Credit: 2 (Two)	
Rationale:	
<p>Diploma holder need to be capable of doing self study throughout their life as the technology is developing with fast rate. Student will be able to find out various sources of technical information and develop self-study techniques to prepare a project and write a project report.</p> <p>This subject is intended to teach students to understand facts, concepts and techniques of electronics equipments, its repairs, fault finding and testing, estimation of cost and procurement of material, fabrication and manufacturing of various items used in electrical field. 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.</p>	
Objectives:	
<p>The student will be able to:</p> <ol style="list-style-type: none"> (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. (5) Develop basic technical Skills by hands on experience. (6) Write project report. (7) Develop skills to use latest technology in Electronics field. 	
Contents:	
<p>During fifth semester students will collect information, analyse the information and select the project. They will also prepare the List of the components required, PCB design, Testing Procedure, Design of the Cabinet or Box or Board as the case may be. They will also prepare a synopsis of the project.</p> <p>So at sixth semester they have to execute the project. A tentative Schedule is proposed below:</p>	
Proposed Schedule:	Weeks
Procuring components, component testing and circuit testing	02
PCB making and onboard testing	05
Trouble shooting and cabinet making	04
Documentation	04
<p>Project Work is intended to provide opportunity for students to develop understanding of the interrelationship between different courses learnt in the entire diploma programme and to apply the knowledge gained in a way that enables them to develop & demonstrate higher order skills. The basic objective of a project class would be to ignite the potential of students' creative ability by enabling them to develop something which has social relevance, aging, it should provide a</p>	

taste of real life problem that a diploma-holder may encounter as a professional. It will be appreciated if the polytechnics develop interaction with local industry and local developmental agencies viz. different Panchayet bodies, the municipalities etc. for choosing topics of projects and / or for case study. The course further includes preparation of a Project Report which, among other things, consists of technical description of the project. The Report should be submitted in two copies, one to be retained in the library of the institute. The Report needs to be prepared in computer using modern software wherever necessary.

GENERAL GUIDELINE

Project Work is conceived as a group work through which the spirit of team building is expected to be developed. Students will be required to carry out their Project Works in groups under supervision of a lecturer of their core discipline who will work as a Project Guide. It is expected that most of the lecturers of the core discipline will act as project guide and each should supervise the work of at least two groups. Number of students per group will vary with the number of lecturers acting as Project Guide and student strength of that particular class.

THE PROJECT

The students should be made aware of the factors influencing the selection of a particular product and its available design, viz. selection of components for assembling, harnessing, testing and quality control of the same. They should also be aware of the workability of the product. Each group will take at least one project in a semester.

PROJECT REPORT

Each project work should be accompanied by a 'Project Report' which should cover the following:—

- (a) General description;
- (b) Product specification;
- (c) Hardware description;
- (d) Operating instruction;
- (e) Installation requirement, if any;
- (f) Circuit diagrams;
- (g) Layout diagrams;
- (h) List of components;
- (i) Costing;
- (j) Study of marketability;
- (k) Scope for future development;
- (l) A brief outline of the maintenance procedure may also be included in the report (if possible).

SUGGESTED LIST OF PROJECT WORKS

The project works are generally selected depending upon the objective of the course and the infrastructural facilities available at a particular institution. Some of the popular items are listed below as guideline for selection:—

- (i) regulated power supply;
- (ii) AC voltage stabilizer;
- (iii) inverter;
- (iv) battery charger;
- (v) FM receiver;
- (vi) bar level indicator;
- (vii) digital thermometer;

- (viii) field strength meter;
- (ix) digital clock;
- (x) solid state relay;
- (xi) stereo amplifier;
- (xii) Solar appliances like solar lantern, solar inverter, solar mobile/battery charger etc.
- (xiii) programmable interval time;
- (xiv) analog trainer kit;
- (xv) digital trainer kit;
- (xvi) circuit theory trainer kit;
- (xvii) microprocessor trainer kit;
- (xviii) telephone line / status monitor;
- (xix) MICROPROCESSOR BASED APPLICATIONS: (a) temperature controller, (b) alarm, (c) moving display, (d) speed control of motor, (e) programmable logic controller etc.;
- (xx) one project on computer application ;
- (xxi) one project on any one of the elective subjects;
- (xxii) a report on a short visit to a local electronic industry / organization may be regarded as one of the projects;
- (xxiii) a particular project may be a part of a bigger project depending upon the complexity.
- (xxiv) Any other suitable project referred from relevant books/ journals or emerging areas of electronics and communication technology after thorough review of the literature from internet

References:**Books/Magazines:**

Sr. No.	Name of the Magazines
1.	Industrial Automation
2.	Electronics for You
3.	Electronics Projects
4.	Computer World
5.	Chip
6.	Any Journal Related to Electronics/Computer/Information Technology

Website:

Using any search engine, such as <http://www.google.co.in/> the relevant information can be searched on the Internet.

Name of the course: Professional Practice-III	
Course Code: EEE/PP-IV/S6	Semester: Sixth
Duration: 17 weeks (Teaching-15 weeks + Internal Exam-2 weeks)	Maximum Marks: 50
Teaching Scheme:	Examination Scheme :
Theory:	Internal Teachers' Assessment: 50 Marks
Tutorial:	
Practical: 3 contact hours/ week	End Semester Examination: Nil
Credit: 2	

Module 1	<p>Structured industrial visits shall be arranged and report of the same should be submitted by the individual student, to form a part of the term work.</p> <p>Following are the suggested type of Industries/ Fields –(Any three visits)</p> <ul style="list-style-type: none"> i) Satellite Earth Station. ii) Radar Establishment. iii) MTSO. iv) Large Scale Industries where Robot is used 	10
-----------------	---	-----------

Rationale:	
<p>In addition to exposure both in theoretical and practical from an academic institution, it is desired that student should be familiar with the present day industry working environment and understand the emerging technologies used in these organisation. Due to globalization and competition in the industrial and service sectors, acquiring overall knowledge will give student better opportunity for placement facility and best fit in their new working environment.</p> <p>In the process of selection, normal practice adopted is to see general confidence, positive attitude and ability to communicate, in addition to basic technological concepts.</p> <p>The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.</p>	
Objectives:	
<p>The student will be able to-</p> <p>Student will be able to:</p> <ol style="list-style-type: none"> 1. Acquire information from different sources. 2. Enhance creative skills 3. Prepare notes for given topic. 4. Present given topic in a seminar. 5. Interact with peers to share thoughts. 6. Understand Open Source Software- “LATEX” Technical Report writing writing software. 7. Understand application of technologies in industry scenario. 8. Prepare a report on industrial visit, expert lecture. 	

	<p>v) Industries where Automation is in use</p> <p>vi) Industry where solar energy related production under process.</p> <p>vii) Any other relevant area.</p>	
Module 2	<p><i>The Guest Lecture/s from field/industry experts, professionals to be arranged (2 Hrs), minimum 3 nos. (Topics at Sl No. B is compulsory and chose any 2 from the following or alike topics). Students should submit a brief report on the guest lecture as part of Term Work</i></p> <p>a. Mobile communication.</p> <p>b. Open Source Software “LaTeX”- a technical report writing software</p> <ul style="list-style-type: none"> • Introduction and Installation Of LaTeX and Compilation • Letter Writing, Report Writing in LaTeX • Maths, Equations, Tables and Figures in LaTeX documentation • References and Beamer LaTeX documentation <p>c. Digital Literacy</p> <p>d. Software debugging.</p> <p>e. EMI/EMC</p> <p>f. Fuzzy logic and neural network.</p> <p>g. Image processing</p> <p>h. PLC and its application</p> <p>i. Electronics Packaging</p> <p>j. Carrier guidance and interviewing techniques.</p> <p>k. Self-employment.</p> <p>l. Blue tooth technology.</p> <p>m. Any other relevant topic</p>	9
03	<p>Information Search ,data collection and writing a report on the topic</p> <p>a) Wireless Communication- 3G/4G</p> <p>b) GPS</p> <p>c) Cloud Computing</p> <p>d) SCADA</p> <p>e) Manufacturing process of ICs</p> <p>f) WLL Technology</p>	8
04	<p>Group Discussion:</p> <p>The students should discuss in group of six to eight students and write a brief report on the same as a part of term work. The topic of group discussions may be selected by the faculty members. Some of the suggested topics are –</p> <p>a. Advance technology Boon or Curse.</p> <p>b. Any other topic.</p>	8

05	Seminar : Seminar topic should be related to the subjects of fifth semester Each student shall submit a report of 5 to10 pages and deliver a seminar (Presentation time – 10 minutes)	10
Total		45

Name of the course: General Viva Voce	
Course Code: EEE/ GVV/ S6	Semester: Sixth
Duration: One Semester (Teaching - 15 weeks + Internal Exam-2 weeks)	Maximum Marks: 100 Marks
Teaching Scheme:	Examination Scheme
	The Final Viva-Voce Examination shall take place at the end of the Part – III Second 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 organisation and he / she should give credit out of 50 marks ; whereas, 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 lecturers will act as the Internal Examiner.
Credit: 2 (Two)	
Course Content	
The syllabi of all the theoretical and sessional subjects taught in the three years of diploma education.	
Objectives:	
The student will be able to:	
<ol style="list-style-type: none"> 1. Solve any technical problem from the knowledge acquired from the entire course. 2. Able to face any technical interviews in future for placement in various industries. 	