

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
NATAKKAR RAM GANESH GADKARI MARG
VILE PARLE (WEST), MUMBAI-400056

CURRICULUM
DIPLOMA COURSE IN INDUSTRIAL ELECTRONICS (PART TIME)

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC started 3 years' diploma courses and was affiliated to the Board of Technical Examinations, Maharashtra State, in 1963. Since 1969, academic freedom was granted to the Polytechnic, which enabled it to evolve curriculum and examination scheme and to introduce inplant training, which involved industry-institute interaction. Thus 4 years' semester sandwich pattern came into existence. Since 1978-79, academic freedom was extended to all the full time diploma courses. In 1989-90 full autonomy was granted to all 7 full-time diploma courses.

As a further development to the above, the multi point entry and credit system (MPECS) was initiated in 1981 on progressive basis. In this scheme students can regulate their pace of studies within the rules prescribed.

From 1993-94, full academic autonomy was extended to all the 19 courses, which includes full-time diploma, part-time diploma and post-diploma courses. The students have to qualify for appearing in the final examinations as per details given in the MPECS rules. The examinations are conducted by the institute and the final diploma is awarded by the institute at the convocation function.

The focus of Industrial Electronics course is to acquaint the students to the electronic circuits used in industry, especially the instrumentation and control aspect. Basis of electronics are covered under four C's i.e. Components and devices, Control, Communication and Computers. A sizeable coverage of these is made in various subjects. A special mention is due for subjects like Servicing techniques and Microcontroller and its applications at V & VII semester level respectively. Industrial Electronics as a subject is introduced at VII semester level. To make the students knowledgeable about recent advancements in industry, three subjects are introduced at VII & VIII semester (Final year level). They are Advanced Instrumentation, Robotics and Power Electronics. To cover the emerging areas, course on Advanced Communication Engineering and Embedded System Design are introduced as elective at VIII semester level. At the end of the diploma course the students of Industrial Electronics will have sound knowledge and skill in the field of Instrumentation and Industrial Power Control applications.

Shri Vileparle Kelvani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
Vile Parle (W) Mumbai-400056

Diploma course in Industrial Electronics (Part-Time)
With Effect From 2008-09

Sr. No.	Name of the subject	Scheme of instructions and hours per week							Scheme of Examination							
		Sub code	Lect . Hrs	Pr. Hrs	Drg. Hrs	Tut. Hrs	Credit	Gr.	NP	Hrs	Mks	TH	SSL	PR/OR	TWK	Total
Semester-I																
1	Communication skill	SS-23	03	-	-	-	03	B*	1	3	100	80	20	-	-	100
2	Mathematics-I	MA-15	03	-	-	01	04	B*	1	3	100	80	20	-	-	100
3	Chemistry	SC-27	04	04	-	-	08	B*	1	3	100	80	20	50	25	175
4	Engineering Drawing-I	ME-16	02	-	06	-	08	C*	1	3	100	80	20	50(oral)	50	200
Total 23 Hrs per week																
Semester-II																
1	Development of Generic Skills	DGI	02	-	-	01	03	B*	1	3	100	80	20	-	-	100
2	Mathematics-II	MA-25	03	-	-	01	04	B*	1	3	100	80	20	-	-	100
3	Physics	SC-17	04	04	-	-	08	B*	1	3	100	80	20	50	25	175
4	Engineering Drawing -II	ME-36	02	-	06	-	08	C*	1	4	100	80	20	50(oral)	50	200
Total 23 Hrs per week																
Semester-III																
1	Applied Mechanics	AM-16	03	1.5	-	-	4.5	C*	1	3	100	80	20	-	25	125
2	Mathematics-III	MA-35	03	-	-	01	04	C*	1	3	100	80	20	-	-	100
3	Workshop Technology	ME-26	-	05	-	-	05	C*	-	-	-	-	-	50(oral)	50	100
4	Electrical Technology	EE-38	03	1.5	-	-	4.5	C*	1	3	100	80	20	50	25	175
Total 18 Hrs per Week																
Semester- IV																
1	Advanced Mathematics	MA-45	03	-	-	01	04	C	1	3	100	80	20	-	-	100
2	Elex. Materials, Components and Devices	IE-32	03	1.5	-	-	4.5	A	1	3	100	80	20	50(oral)	25	175
3	Elex. Devices and ckts - I	IE-39	03	1.5	-	-	4.5	C*	1	3	100	80	20	50	25	175
4	Electronic W/S Tech.	IE-31	1.5	1.5	-	-	03	C	-	-	-	-	20	50	50	120
5	Fabrication Tech.	ME-46	02	04	-	-	06	C*	1	3	100	80	20	50(oral)	25	175
Total 22 Hrs per week																

B- Basic C- Core A- Application M-Management

** Term end Paper 100 marks, converted to 80 as per theory paper marks head

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Diploma course in Industrial Electronics (Part-Time)

With Effect From 2008-09

Sr .No.	Name of the subject	Scheme of instructions and hours per week							Scheme of Examination								
		Sub code	Lect. Hrs	Pr. Hrs	Drg. Hrs	Tut. Hrs	Credit	Gr.	NP	Duration	Marks	TH	SSL	PR/OR	TWK	Total	
Semester-V																	
1	Ckts and N/Ws	IE-47	03	1.5	-	-	4.5	C	1-	3	100	80	20	50(oral)	25	175	
2	Prin. Of Analog Tech.	IE-48	03	1.5	-	-	4.5	C*	1	3	100	80	20	50	25	175	
3	Elex. Devices and Ckts -II	IE-49	03	1.5	-	-	4.5	C*	1	3	100	80	20	50	25	175	
4	Prin. Of Digital Tech.	DE-37	03	1.5	-	-	4.5	C*	1	3	100	80	20	50	25	175	
5	Servicing Tech.	IE-61	01	02	-	-	03	M	-	-	-	-	-	50	50	100	
			Total 21 Hrs per week														
Semester-VI																	
1	Prin. Of Control systems	IE-67	03	1.5	-	-	4.5	A	1	3	100	80	20	50(oral)	25	175	
2	# Elem. Of Comm. Engg.	IE-66	04	1.5	-	-	5.5	A*	1	3	100	80	20	50(oral)	25	175	
3	Measuring Tech. and Meas Instruments	IE-41	03	1.5	-	-	4.5	C*	1	3	100	80	20	50(oral)	25	175	
4	# Prin. Of Instrumentation	IE-60	03	1.5	-	-	4.5	A*	1	3	100	80	20	50(oral)	25	175	
5	Fundamentals of comp. and N/W Systems	CA-54	02	03	-	-	05	C	-	-	-	-	20	50	50	120	
6	Signals and Systems	DE-62	03	1.5	-	-	4.5	A	1	3	100	80	20	50(oral)	25	175	
			Total 28.5 Hrs per week														
Semester-VII																	
1	Industrial Management-I	ME-01	02	-	-	-	02	M*	1	3	100	80	20	-	-	100	
2	Industrial electronics	IE-42	04	1.5	-	-	5.5	A*	1	3	100	80	20	50	25	175	
3	#Microcontroller and its appls	IE-69	03	1.5	-	-	4.5	A*	1	3	100	80	20	50	25	175	
4	#Advanced Instrumentation	IE-77	03	1.5	-	-	4.5	A*	1	3	100	80	20	50(oral)	25	175	
5	C++ Programming	DE-33	03	1.5	-	-	4.5	A	1	3	100	80	20	50	25	175	
			Total 21 Hrs per week														
Semester- VIII																	
1	#Industrial Management-II	ME-02	03	-	-	-	03	M*	1	3	100	80	20	-	-	100	
2	#Project Work	IE-70	01	05	-	-	06	A*	-	-	-	-	-	50	50	100	
3	#Power Electronics	IE-78	03	1.5	-	-	4.5	A*	1	3	100	80	20	50	25	175	
4	# Robotics	IE-73	03	1.5	-	-	4.5	A*	1	3	100	80	20	50(oral)	25	175	
5	#Elective i) Embeded Sys Design	DE-79	03	1.5	-	-	4.5	A*	1	3	100	80	20	50(oral)	25	175	
	ii) Advanced Comm. Engg. (Any one)	IE-79	03	1.5	-	-	4.5	A*	1	3	100	80	20	50(oral)	25	175	
			Total 22.5 Hrs per week														

B- Basic C- Core A- Application M-Management

** Term end Paper 100 marks, converted to 80 as per theory paper marks head

Part-Time Diploma Engineering students have to complete_150 credits including compulsory and optional credits for the award of Diploma.2/2

I
SEMESTER
INDUSTRIAL ELECTRONICS

(1) SUBJECT DETAILS :

Course : Diploma in Industrial Electronics	Semester : I
1.1 Communication Skill (SS-23)	
Group : Basic (B*)	Compulsory

(2) TEACHING AND EXAMINATION SCHEME :

Scheme of Instructions and Periods per Week				No. of papers, duration and Marks			Scheme of Examination						Scheme L/Pr/Cr	
L	P	D	T	Cr	NP	Hrs	Mks	SSL	Th paper	T/W	Prac	Oral	Total	
3	-	-	-	3	1	3	100	20	80	-	-	-	100	303

(3) RATIONALE :

In take level of the students is S.S.C or is Equivalent. These students have studies English for minimum of 6 years. Expected level of heir Active Vocabulary is 2500 words from the Nagpur list of High Frequency words. However, in practice it was found that the students, particularly from the vernacular medium have only 1500 words at their command. They need to have course in English subject to offset this situation. Therefore, the first semester engineering course students need to study English.

Further, in this age of information, Communication Skill is essential to everyone. This is equally true in the case of Engineers. Engineers having sound knowledge of the technical subjects should be able to communicate the same to his superiors, peers and subordinates in their routine work environment.

Having a sound Communication Skill will enable the engineering students to learn and interprets the subject effectively. This saves time and money and enhances the effectiveness of the engineer's performance.

(4) OBJECTIVES :

(i) The student will increase his English vocabulary to a minimum of 2500 words (Nagpur List) through the prescribed text and grammar exercises by various techniques such as synonyms, Antonyms, One word substitutes, Prefixes & Suffixes and Comprehension of new words, Idioms and Prepositional Phrases. Students will be able to use principles to solve problems in Mathematics at Higher Semester level.

(ii) Students will understand the various uses of grammar items such as Voice in English sentences, Degrees of Comparison, Tenses, Direct and Indirect Speech & formation of various kinds of sentences.

(iii) Students will master the important structures of English sentences to enhance their communication skill so that they can interact (orally and in writing) with people at different levels and in different situations with confidence.

(iv) This subject will enable the engineering students to understand the following:
 Effective Oral Communication
 Better Written Communication
 How to Improve Human Relations

How to Overcome Barriers to Communication
The need for Enhancing Personality

(5) DETAILED CONTENTS :

Chapter	Content	Marks	Hours
<u>SECTION – I</u>			
01	Five lessons as five units from the prescribed English Book as described in the section ‘Reference’ Below	20	08
02	Parts of Speech 2.1 Nouns, Pronouns & Adjectives 2.2 Verbs & Adverbs 2.3 Prepositions, Conjunctions, etc.	06	03
03	Sentences 3.1 Synthesis of Sentences 3.2 Tenses 3.3 Degree of Comparison 3.4 Transformation of four kinds of sentences- Assertive, Imperative, Interrogative and Exclamatory	10	03
04	Essay/Paragraph/Report Writing 4.1 Long Essay 4.2 Short Paragraph 4.3 Report Writing-Visits, Accidents, Trouble, Maintenance, Memo	16	05
05	Letters 5.1 Formal & Informal 5.2 Letters for Inquiry, Order, Complaint, Application for Job	16	05
	Total	68	24

SECTION – II

06	Dialogue Writing	06	01
07	Technical Description 7.1 Theory and Practice (Language)	08	02
08	Business Correspondence 8.1 Importance of Business Correspondence Format of a Business Letter 8.2 Types of Layout	24	08

	8.3 Cardinal Qualities of Business Letter		
09	Notices and Instructions		
	9.1 Theory and Layout		
	9.2 Types of Notices	24	06
	9.3 Tender Notice (Theory and Specimen)		
10	Background of Industry		
	10.1 Definition of Terms-Industry, Industrialization, Etc.	10	02
	10.2 Factors of Production, Infrastructure		
	10.3 Industrial Estates Small Scale Industries, Trade Unions.		
	Total	(82)	(24)

(6) IMPLEMENTATION STRATEGY (PLANNING):

- (i) Five units from the prescribed text book (English for Technical Students-T.T.T.I. Chandigarh), Lessons in the prescribed text book are used as guidelines for explaining the techniques of essay/dialogue writing.
- (ii) Teaching Plan
- (iii) Grammar items are covered along with the units of lessons
- (iv) Home assignments and classroom participation

(7) REFERENCE BOOKS:

Sr.No.	Author	Title	Year of Publication	Publishers & Address
1.	Dr. (Mrs.) Urmila Rai Dr. S.M. Rai	Business Communication	2002	Himalaya Publishing House
2.	Edited Lessons	Communication Skill for Technical Students(National Project on Communication Skill, Chandigarh)	1998	Somaiya Publications Pvt. Ltd., Mumbai & New Delhi
3.	Wren & Martin	Grammar & Composition	2002	Chand Publications, New Delhi
4.	J.C.Nesfield	English Grammar, Composition & Usage	1994	Mc.Milan, Madras
5.	Krishna Mohan Meera Banerji	Developing Communication Skill	2004	McMilan India Ltd., New Delhi

1. SUBJECT DETAILS :

Course: Diploma in Industrial Electronics	Semester: I
Subject: 1.2 Mathematics-I (MA-15)	
Group : Basic (B*)	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Scheme of instruction and periods per week					No. of papers, duration and Marks			Scheme of Examination						Scheme L/Pr/Cr
L	P	D	T	Cr	NP	Hrs	Mks	SSL	Theory Paper	T/W	Pract	Oral	Total	
3	-	-	1	4	1	3	100	20	80	-	-	-	100	404

3. RATIONALE:

Algebra, Trigonometry and Coordinate Geometry are introduced as prerequisite for the topics to be studied later on to solve the engineering problems.

4. OBJECTIVES:

1. The students will be able to use the Mathematical Methods to solve the engineering problems.
2. Students will be able to use principles to solve problem in Mathematics at Higher Semester level

5. DETAILED CONTENTS:

Chapter	Content	Marks	Hours
	Section-I		
(01)	Trigonometry		
	1.1 Trigonometric ratio of any angle, Definition of Radian, Length of arc of sector $s = r\theta$,	08	02
	Area of Sector $A = \frac{1}{2}r^2\theta$	24	06
	1.2 Trigonometric ratios of allied, compound angles and multiple angles	12	04
	1.3 Inverse trigonometric functions	06	02
	1.4 Properties and solution of triangle		
	1.5 Solution of Trigonometric equation by graph		
(02)	Matrices		
		02	01

2.1 Definition of a matrix of order $m \times n$. type of matrices	04	01
2.2 Addition and subtraction of two matrices	04	01
2.3 Multiplication of a matrix by a scalar, multiplication of two matrices.	10	03
2.4 Singular and Non-singular matrices. Transpose of a matrix. Adjoint of matrix, Inverse of a matrix A by findings Adj. A solution of simultaneous equation by using a matrix.	---	---
	(82)	(24)

SECTION-II

(03) Algebra

3.1 Determinant	18	05
3.2 Partial fractions	16	04
	24	08
3.3 Binomial Theorem	16	04
3.4 Progression (A.P./G.P.)	08	03
3.5 Permutations and Combinations	---	---
	(82)	(24)

Total

(6) IMPLEMENTATION STRATEGY (PLANNING)

Conducting lectures as per the teaching plan and conducting tutorials.

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Year of Publication	Publishers & Address
(i)	S.P.Deshpande	Mathematics for Polytechnic Students-I & II	1998	Pune Vidyarthi Graha Prakashan Pune-30
(ii)	G.V. Kumbhojkar	Engineering Mathematics – I & II	1999	Jamnadas & Co.

1. SUBJECT DETAILS:

Course: Diploma in Industrial Electronics	Semester: I
Subject: Chemistry	Code: SC – 27
Group: Basic	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Scheme of instruction and periods per week					No. of papers, duration and marks			Scheme of examination					Scheme L/Pr/Cr	
L	P	D	T	Cr	NP	Hrs	Mks	SSL	Theory Paper	T/W	Pract	Oral	Total	
4	4	-	-	8	1	3	100	20	80	25	50	-	175	4 4 8

3. RATIONALE :

This subject is classified under the category of Basic Sciences. It intends to develop the understanding of fundamental principles of chemistry and also impart knowledge of various engineering material. This will form the base for the better understanding of the other core technology and technological subjects of different branches.

4. OBJECTIVES :

After studying the subject the student will be able to

1. Understand basic principles of chemistry.
2. Apply the principles to other subject.
3. Identify different engineering materials.
4. Compare the properties of different engineering materials and select engineering materials for various purposes.
5. Apply his knowledge on day to day basis.

5. DETAILED CONTENTS:

SECTION-I

Chapter	Content	Marks	Hours
1.	1.0 Atomic Structure: 1.1 Bohr's Theory of an atom 1.2 Quantum numbers 1.3 Orbits and orbitals, shape of s and p orbitals 1.4 Pauli's exclusion principle 1.5 Hund's rule 1.6 Aufbau principle 1.7 Electronic configuration of first twenty elements 1.8 Study of inert gases 1.9 Nuclear stability mass defect and binding energy 1.10 Bonding electrovalency and covalency.	16	07

Applications

Civil engineering

To understand the behavior of any material

Mechanical engineering

Material sciences , behavior of material for various applications

Electrical engineering

Fundamental of electricity like conductivity, resistivity, selection of materials

Electronics

To understand semiconductors, diodes, transistors

Plastic engineering

Polymerization , bonding

Chemical engineering

Reaction of different types, bonding ,unit operations, chemical process technology

Practice :

i) Volumetric analysis

ii) Qualitative analysis

- | | | | |
|----|---|----|----|
| 2. | 2.0 Electrochemistry : | 10 | 05 |
| | 2.1 Atom, ion | | |
| | 2.2 Arrhenius theory, degree of ionization | | |
| | 2.3 Mechanism of electrolysis | | |
| | 2.4 Numerical problems based on its applications industrial | | |
| | 2.5 Applications of electrolysis | | |

Applications**Civil engineering**

Corrosion control

Mechanical engineering

Electroplating of various materials, in foundry for making patterns and moulds ,material science

Electrical engineering

Electrochemical reactions , batteries, electrochemical cells

Electronics

Manufacture of PCB

Plastic engineering

Electroplating of different plastic materials

Chemical engineering

Electroplating, different electrolysis process, unit operations, chemical process technology, distillation and filtration

- | | | | |
|----|---|----|----|
| 3. | 3.0 pH – | 04 | 02 |
| | 3.1 Concept of pH | | |
| | 3.2 pH scale applications of pH in industry | | |
| | 3.3 Examples based on hydrogen ion and hydroxyl ion concentration | | |

Applications

Civil engineering

Concreting and quality of water

Mechanical engineering

Selection of water fir cooling towers, other air-conditioning and refrigeration purposes, boilers , lube oils

Electrical engineering

Transformer oils and other instruments

Electronics

Manufacture of PCB

Plastic engineering

Reactions conditions, ABS plastic and alloys

Chemical engineering

Reaction conditions instrumentation, plant utility, chemical reaction engineering and pollution.

4. **4.0 Metallurgy :** 16 07

4.1 Types of metals & properties

4.2 General metallurgical processes

4.3 Metallurgy of iron- extraction of iron by blast furnace 4.4

Classification of steel – Based on its carbon content and its applications. Properties of cast iron, wrought iron and steel. Effects of elements on properties of steel

4.5 Heat treatment of steel – Hardening tempering, annealing and normalizing

4.6 Metallurgy of aluminum by Hall’s process.

Applications**Civil engineering**

Engineering material

Mechanical engineering

Manufacturing of engineering tools and machine parts

Electrical engineering

Electrical engineering materials

Electronics

PCB and parts of machines

Plastic engineering

Machines and reinforced plastics

Chemical engineering

Metals for construction of plant utilities

5. **5.0 Alloys :** 09 02

5.1 Definition and purposes of alloying

5.2 Methods of preparation of alloys

5.3 Properties, composition and application of certain non ferrous alloys.

(i) Duralumin (ii) Magnalium (iii) Monel metal

(iv) Alnico (v) Babbit metal (vi) Gun metal

(vii) Brass (viii) Bronze

Applications

Civil engineering

Engineering material

Mechanical engineering

Material sciences

Electrical engineering

Soldering and welding

Electronics

Thermocouple and soldering

Plastic engineering

Alloys and moulds

Chemical engineering

Petrochemicals , material of construction, chemical process technology

6. **6.0 Corrosion :** 18 07
- 6.1 Definition and types of Corrosion
- 6.2 Mechanism of corrosion
- 6.3 Factors affecting corrosion
- 6.4 Methods of prevention of corrosion.
- (i) Applying protective coatings on the surface of metal by hot dipping – galvanizing and tinning.
 - (ii) Metal cladding.
 - (iii) Electroplating.
 - (iv) Spraying.
 - (v) Sherardizing.

Applications

Civil engineering

Building repair and maintenance, concreting

Mechanical engineering

Selection of materials and prevention against corrosion

Electrical engineering

Dam conditions, maintenance of appliances, transmission of cables

Electronics

Machine parts and machine frames

Plastic engineering

Fiber reinforced plastics, bridges

Chemical engineering

Chemical process technology, pollution, material of construction

7. **7.0 Protective Coatings :** 09 02
- 7.1 Paints
- 7.2 Characteristics of good paint
- 7.3 Constituents of paints and their applications
- 7.4 Varnishes

7.5 Types & characteristics of varnishes

7.6 Applications

Applications

Civil engineering

Engineering materials

Mechanical engineering

Material sciences

Electrical engineering

Electrical instruments & materials

Electronics

PCB making

Plastic engineering

Galvanizing , electroplating & plastics paints

Chemical engineering

Chemical process technology, pollution, material of construction

SECTION – II

8. **8.0 Water :** 22 09
- 8.1 Impurities in natural water, physical and chemical characteristics of drinking water.
- 8.2 Hard water - Expression and estimation of hardness of water
- 8.3 Examples on the removal of hardness of water
- 8.4 Disadvantages of hard water in domestic industrial applications. Boiler feed water – Disadvantages due to hard water in the boiler
- 8.5 Methods of softening hard water.
- (i) Deionization process.
 - (ii) Calgon process.
 - (iii) Soda ash process.
 - (iv) Permulite – Zeolite process disadvantages of hard water in domestic and industrial applications.
- 8.6 Sterilization of water – chlorination + ozonisation
- 8.7 Sewage – disadvantages & treatment

Applications

Civil Engineering

Concreting

Mechanical Engineering

Hydraulics, Boilers and Engines

Electrical Engineering

Maintenance of machines, Batteries and Inverters

Electronics

Water Base Indicators

Plastic Engineering

Estimation and Manufacture of Resins

Chemical Engineering

Plant Utility, Heat Transfer Operations, Pollution and Pollution Control

Practice :

- i) Determination of hardness of water
- ii) Determination of chloride content of water

9. **9.0 Fuels :** 18 08
- 9.1 Definition and classification of fuels
 - 9.2 Calorific value of fuel units and definition
 - 9.3 Coal types and analysis of coal.
 - i) proximate ii) Ultimate analysis
 - 9.4 Characteristics of a good fuel
 - 9.5 Crude petroleum – catalytic cruding fractional distillation of crude petroleum.
Knocking of petrol in internal combustion engine and octane number.
 - 9.6 Gaseous fuel – Calorific value, composition and applications of i) water gas ii) LPG iii) Coal gas iv) Producer gas v) Natural gas

Applications

Civil Engineering

Manufacturing of bricks and Preparation of Concrete mixtures

Mechanical Engineering

Thermodynamics, thermal engines, Power Engines

Electrical Engineering

Power generating stations

Electronics

Preparation of spare parts of machines

Plastic Engineering

Soldering and Welding

Chemical Engineering

Plant Utility, Petrochemicals

10. **10.0 Lubricants :** 18 08
- 10.1 Definition and types of lubricants
 - 10.2 Types of lubrication fluid film lubrication
Boundary lubrication, extreme pressure lubrication
 - 10.3 Properties of lubricants.
 - i) Degree of acidity ii) Saponification number iii) Viscosity iv) Viscosity index v) Flash and fire point vi) Pour point + Cloud point.Working of Penskey Martin’s apparatus to determine flash and fire point. Working of redwood viscometer to determine viscosity.

Applications

Civil Engineering

Selection of lubrication for civil work and small machines

Mechanical Engineering

I.C. Engines, other types of Engines, Machines

Electrical Engineering

Maintenance and working of machines

Electronics

Maintenance of machines and its parts

Plastic Engineering

Silicon release and mould release agents

Chemical Engineering

Chemical Process Technology, Plant Utility, Petrochemicals and unit operations.

10.4 Functions and Engineering applications of lubricants

Practice :

Demonstration of following experiments :

- i) Abel flashmeter
- ii) Redwood viscometer
- iii) Penskey Martens apparatus

11. **11.0 Polymer Chemistry :** 10 04

11.1 Plastics – Definition – types of plastics

11.2 Properties of plastics

11.3 engineering application of plastics

11.4 Rubber – natural and synthetic rubber properties – elasticity, abrasion resistance Tack industrial

11.5 Applications of rubber.

Applications

Civil Engineering

Preparation of Plumbing machines parts, taps, washers etc.

Mechanical Engineering

Manufacturing Processes

Electrical Engineering

Preparations of Electric wires and cables

Electronics

Preparations of PCB and wires of machines.

Plastic Engineering

Plastic Technology, Packaging, Co-polymer of Plastics and Additives.

Chemical Engineering

Chemical Process Technology, Petrochemicals

12. **12.0 Environmental Chemistry :** 14 03

12.1 Causes of pollution – air pollution types of air pollutants.

Gases – sulphur dioxide, sulphur trioxide carbon monoxide, nitrogen dioxide, carbon dioxide, control of air pollution.

12.2 Water pollution :

Sources of water pollution, methods of preventing water pollution.

12.3 Radioactive pollution

- 12.4 Noise pollution
- 12.5 Disadvantages of pollution
- 12.6 Control of Pollution

Applications

Civil Engineering

Drainage and Water Supply, Sewage Treatment

Mechanical Engineering

Thermodynamics and I.C. Engines

Electrical Engineering

Recycling of Electrical Goods

Electronics

Recycling of Electronic Goods

Plastic Engineering

Recycling of Plastics, Pollution control, Chlorofluoro Carbons and Decrease of carbons in Atmosphere

Chemical Engineering

Pollution Control and Waste Disposal, Plant Utility And Petrochemicals.

Total Number of Marks=82; Theory Hours= 64; Practical Hours= 64

6. IMPLEMENTATION STRATEGY (PLANNING):

1. **Theory topics and practice experiments should be done simultaneously. This will help the students to understand the topics.**
2. Question papers for the periodical test should cover the topics which have been taught. To test the understanding.

7. REFERENCE :

Sr.No.	Author	Title	Publishers & Address
1.	Jain and Jain	Chemistry of Engineering Materials	Dhanpat Rai Publishing Co. New Delhi
2.	Narkhede & Thatte	Engineering Chemistry	-
3.	Mahadeokar & Dr. U.P. Kodgire	Chemistry for Engineering students	Everest Publishing House, Pune
4.	B.S. Godbole	Applied Chemistry	Satya Prakashan, New Delhi

1. SUBJECT DETAILS:

Course: Diploma in Industrial Electronics	Semester : I
Subject: Engineering Drawing – I	Code : ME-16
Group : Core	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs Per Week	Practical Hrs per Week		Paper			TH	Sessional	T/W	Oral	Total
			Hrs	NP	Mks					
02	06	08	3	01	100	80	20	50	50	200

3. RATIONALE:

Engineering drawing is a language of engineers. It is classified as engineering science subject. It describes scientific facts, principles and technique of drawing in order to visualize and express the ideas and to convey the instructions through drawings without ambiguity. In engineering drawing – I, student will study concept of orthographic projections, isometric projection, isometric view, ideas of two dimensional and three dimensional objects, oblique, projections, curves etc.

4. OBJECTIVES:

Engineering drawing helps in understanding design of parts, assembly, structure etc. used in engineering field. It supports technology and technical subjects. By achieving visualization and drawing skills, the student will successfully discharge his role on shop floor, design department and inspection department etc.

5. DETAILED CONTENTS:

Chapter	Content	Marks	Hours
<u>SECTION-I</u>			
01	1.0 Introduction :		02
	1.1 Importance of Engineering Drawing for the study of technical courses		
	1.2 Drawing instruments, types of lines and dimensioning (lettering and numbering for term work or assignment)		03
	Practice :		09
	1. A2 size sheet to be drawn containing four problems on letter lines and dimensioning techniques.		
	2. Home Assignments: One sheet containing four problems		
02	2.0 Principle, Planes and Quadrants:	-	02
	2.1 Concept of principle planes and quadrants		
	2.2 I and III angle method of projections		
03	3.0 Orthographic Views :	-	02
	3.1 Projections of various objects having flat and curved surfaces		

	using 1 st and 3 rd angle projection method.		
	Practice:	-	12
	1. One sheet on orthographic projection for objects with linear features		
	2. Home Assignments: One sheet containing four problems		
04	4.0 Conversion of Pictorial View :	20	05
	4.1 Conversion of pictorial views in to non-sectional orthographic views. The objects may have slots, holes cavities etc.		
	Practice:	-	12
	1. One sheet with non sectional orthographic views for the objects with curvilinear features.		
	2. Home Assignments: One sheet containing four problems		
05	5.0 Oblique Projections :	30	04
	5.1 Oblique projections of curvilinear feature on non oblique plane only.		
	Practice:	-	12
	1. One sheet having four problems of oblique projection for the curvilinear features on non oblique plane.		
	2. Home Assignments: One sheet containing four problems		
06	6.0 Engineering curves :	30	04
	6.1 Cycloidal curves: Cycloid, epicycloids, hypocycloid (Simple cases)		
	6.2 Involute of circle and polygon (simple cases)		
	6.3 Helix on cylinder (not on cone)		
	Practice:	-	12
	1. One sheet with four Problems containing cycloid, epicycloids, hypocycloid , Involute and Helix.		
	2. Home Assignments: One sheet containing four problems		
SECTION-II			
07	7.0 Conversion of Pictorial View in Sectional Orthographic:	20	04
	7.1 Conversion of pictorial views with cutting plane into sectional orthographic projection (full section only)		
	Practice:		
	1. Four problems on sheet(full section plane)		
	2. Home Assignments: One sheet containing four problems		12
08	8.0 Isometric Views and Projections:	40	05
	8.1 Isometric Views and Projections of linear and curvilinear features.		
	Practice:		12
	1. One sheet with four problems on Isometric view having linear and curvilinear features.		
	2. On sheet with four problems on Isometric projection having linear and curvilinear features.		
	3. Home Assignments: One sheet containing four problems		
09	9.0 Engineering Curves:	20	04

9.1 Ellipse: Oblong, arcs of circle and concentric circle method.

9.2 Parabola: Eccentricity and rectangular methods.

9.3 Hyperbola : Eccentricity and rectangular methods.

Practice:

1. Four problems on Ellipse Parabola and Hyperbola

12

2. Home Assignments: One sheet containing four problems

Total

164

32

6. IMPLEMENTATION STRATEGY (PLANNING):

In depth study and understanding of the subject will be implemented by adoption of the following strategy:

1. Theory Teaching Plan
2. Term Work Plan for practical giving problems to draw in the class.
3. Home assignment to practice at home
4. Conduct of three periodical test
5. Use of OHP models and charts during theory class and practical periods

7. REFERENCE BOOKS:

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	N.D.Bhatt and Panchal	Geometrical and Machine drawing	14 th	2000	Rupalee Pub.Opp. Amul Dairy, Court Rd, Anand
2.	R.K. Dhawan	Engineering drawing	2 nd	2001	S.Chand & Co.Ltd., Ram Nagar New Delhi-110 055
3.	R.K. Dhawan	Machine drawing	2 nd	2001	S.Chand & Co. Ltd ,Ram Nagar New Delhi-110 055
4.	M.L. Dabhade	Engineering Graphics	4 th	1995	Mrs.VA.Velhankar 1030, Model Colony, B-12,Akash Ganga Pune-411 016

Information to the paper setter/examiner

regarding the distribution of topics section wise :

SECTION – I

Sr.No. Topics

Periods Marks

1	Sectional Views :	-
	<ul style="list-style-type: none"> • Full section, half sectioned offset section concept. 	
2	Missing Views :	25
	<ul style="list-style-type: none"> • Given two views (f.v.- t.v. or f.v.s.v.) deriving the third view non sectional or sectional. 	
3.	Projection of straight lines :	10
	<ul style="list-style-type: none"> • Projections of lines inclined to both the reference planes (no traces) 	
4.	Projection of planes :	15
	Projection of plane – regular polygons and circle. inclined to both the reference planes.	

SECTION – II

5.	Projections of solids :	15
	Projection of solids like prisms, pyramids, cylinders and cones with axis inclined to both the reference planes	
6.	Thread profiles and screw fasteners :	15
	<ul style="list-style-type: none"> • Different profiles of threads • Conventional representations of left hand – right hand threads, single and multistart square threads, external and internal threads • Different types of nuts • Different types of bolts • Lock nuts (Castle, slotted nut simond's nut etc. use of plane and spring washers.) 	
7.	Keys and couplings :	20
	<ul style="list-style-type: none"> • Detail and assembly drawing of different keys and couplings i.e. flange, oldhalm, flexible, universal etc. 	

II
SEMESTER
INDUSTRIAL ELECTRONICS

1. Subject Details

Course: Diploma in Industrial Electronics	Semester: II
Subject: Development of Generic Skills	Code :DG-1
Group: Basic	Compulsory

2. Teaching and Examination Scheme

Subject	Scheme of Instructions & Periods per Week			No of Papers , Duration & Marks	Scheme of Examination					Detailed Syllabus Ref. No.	Scheme L.Pr./Cr.
	Lecture	Prac. Or Drg.	Tutorial		Sessional Work	Paper	Term Work	P r a c t i c e E x a m	Total		
Development of Generic Skill	2		1	1,3 Hrs, 100 Mars	20	80			100		303

3. RATIONALE

The skills of Project Management have become important in all types of business and at all levels of work hierarchy purpose of development of Generic Skills is to develop the necessary skills, which will make students confident and competent in managing and executing engineering projects.

4. GENERAL OBJECTIVES

Over a period of time it has been observed that effectively of polytechnic students, their utility at work place can be enhanced by imparting generic skills right from entry in the polytechnic. The generic skills are life skills, they are lifelong skills, whose edge needs to be sharpened every moment.

The content is divided into 4 logical units:

1. Information

2. Communication Skills
3. Self Development
4. Task Management

It is designed by keeping self in focus with a clear objective of developing Generic Skills, to enhance the capabilities in the field of searching, assimilating and using information on job. Developing self and managing given tasks, finally to present himself as a techno manager.

It is an effort to develop student that enables him to be successful in finding a practical and reaction solution to any problem he comes across. It covers more or less all aspects of life skills. The development of subject is progressively ascending parallel to development of study in polytechnic.

5. Theory Contents:

1. Information Sources (Periods:2hrs; Mks-10)

Introduction, Types of Information sources, Print Media, Documentary Sources, Non-Documentary Sources, Non-Print Media, Electronic Media, Conclusion.

2. Information Centre (Periods:2hrs; Mks-10)

Introduction, Classification, Services, Conclusion.

3. Procedure for Information Search (Periods:4hrs; Mks-20)

Introduction, Need of Approach, Types of Approach, Steps for Information Search, Preparation of Biographic Card, Preparation of Index Card, Conclusion.

4. Learning (Periods: 4hrs; Mks-20)

Introduction, Concept of Learning, Basic Model of Learning, Principles of Learning, Conclusion.

5. Memory & Cognition (Periods: 4hrs; Mks-20)

Introduction, Basic Concepts, Dual Store Model of Memory, Sensor register Characteristics, Attention, Factors affecting attention, Figure Ground Rule, Working memory(WM); Characteristics of WM, Control Processes in WM, Long Term Memory in LTM: Characteristics of LTM, Control Processes in LTM, Organization of knowledge, Conclusion.

6. Meta Cognition & Study Strategies (Periods:4hrs; Mks-20)

Introduction, Meta Cognitive Knowledge, Self Regulated Learning, Effective Learning and Study Strategies(Covert): Selective attention, Maintain Rehearsal, Meaning learning Reflection, Internal Organization, Elaboration----** Visualization, Effective learning strategies: Effective reading, Effective listening, Notes Taking, Conclusion.

7. Learning on Job (Periods: 4hrs; Mks-20)

Introduction, Definition, Identify General and Specific Skills, Workplace as a System, Types of System, Conclusion.

8. Learning Practical Skills (Periods: 2hrs; Mks-10)

Introduction, Process of Performing the job, Domains of Learning Job, Conclusion.

9. Testing of Acquired Skills (Periods:2hrs; Mks-10)

Introduction, Objectives, Process for Skill Analysis, Conclusion.

UNIT II COMMUNICATION SKILLS

10. Basis of Communication (Periods:2hrs; Mks-10)

Definition, Concept of Communication, Communication Cycle, Communication, Conclusion.

11. Techniques of Communication (Periods: 2hrs; Mks-10)

Introduction, Oral Communication, Written Communication, Body Language, Conclusion.

S. No.	Main Topics	No of Contact Hrs	Marks	Weightage %	#M/E/D
1	Information sources	2	10	7	E
2	Information Centre	2	10	7	E
3	Process For Information Search	4	20	11	M
4	Learning	4	20	11	M
5	Memory and Cognition	4	20	12	M
6	Meta Cognition & Study Strategies	4	20	12	D
7	Learning on Job	4	20	12	E
8	Learning Practical Skills	2	10	7	E
9	Testing of Acquired Skills	2	10	7	D
10	Basic of Communication	2	10	7	E
11	Techniques of Communication	2	14	7	E

Total **32** **164** **100%** **#**

Section I

1. Information Sources
2. Information Centre

3. Procedure for Information Search
4. Learning
5. Memory & Cognition

Section II

6. Meta Cognition and Study Stratifies
7. Learning on Job
8. Learning Practical Skills
9. Testing of Acquired Skills
10. Basic of Communication
11. Techniques of Communications

Total Theory Hours : 32 Hrs.

Reference Books:

Learning to learn by Kenneth A. Kiewra

Independent Study techniques by P.D. Kulkarni & B.B. Sharma

Additional References:

101 ways to better communication by Elizabeth Hienny.

**Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC**

1. SUBJECT DETAILS:

Course: Diploma in Industrial Electronics

Semester: II

Subject: Mathematics – II (MA-25)

2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instruction and Periods per week					No of papers, duration and Marks			Scheme of Examination						Scheme L/Pr.Cr.
L	P	D	T	Cr	Np	Hrs	Mks	SSL	Theory Paper	T/W	Pract	Oral	Total	
3	-	-	1	4	1	3	100	20	80	-	-	-	100	404

3. RATIONALE:

1. Creating aptitude for Mathematics of Higher Semesters
2. Focusing attention of problem solving in liberal sense. This aspect should take care of
 - (a) Intelligent combination of techniques.
 - (b) Mathematization or mathematical modeling of problems involved in various branches of knowledge.
3. Nurturing the higher order mental process of logical reasoning with rigor and precision.

4. OBJECTIVES:

These topics are introduced as

1. Prerequisite for many topics such as integral calculus, differential equations, Fourier series etc. to be studied later.
2. To introduce the applications commonly required.

5. DETAILED CONTENTS:

Chapter	Content	Marks	Hours
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SECTION – I

01	Co-ordinate Geometry		
	1.1 Straight line: Slope of a line; X and Y intercepts of a line, point of Intersection of two straight lines, Acute angle between intersecting lines, Perpendicular distance of a point from the line, distance between two parallel lines.	12	40
	1.2 Circle: Centre-Radius form of an equation of a circle, General equation of a circle.	10	32
	1.3 Equation of a chord, tangent and normal to any circle.	02	10
		(24)	(82)

SECTION – II

02.	Complex Number		
	2.1 Definition of a complex number	02	06
	2.2 Elementary Operations	02	06
	2.3 Polar form of a complex number, exponential form of a complex number	04	14
	2.4 Argand diagram	02	06
3.	Vector Algebra		
	3.1 Scalars and Vectors	01	04
	3.2 Addition of Vectors.	01	04
	3.3 Dot product and cross product	01	04
	3.4 Scalar triple product	01	04
	3.5 Application: work done by a force, moment of a force about a point. Area of a parallelogram Area of a triangle .Volume of the parallelepiped	04	08
04.	Function		
	4.1 Values of a function, type of functions	02	10
	4.2 Limits	04	16
		<hr/>	<hr/>
		(24)	(82)

6. IMPLEMENTATION STRATEGY (PLANNING):

Conducting lectures as per the teaching plan and conduction tutorial

7. REFERENCE BOOKS:

Sr. No.	Author	Title	Year of Publication	Publishers & Address
1.	S. P. Deshpande	Mathematics for Polytechnic Students – I & II	1998	Pune Vidyarthi Graha Prakashan, Pune-30
2.	G. V. Kumbhojkar	Engineering Mathematics-I & II	1999	Jamnadas & Co

1.SUBJECT DETAILS :

Course : Diploma in Industrial Electronics	Semester : II
Subject : PHYSICS	Code : SC – 17
Group : Basic	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							Scheme	
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	SSL	T/W	Pract		Total
		Hrs	Np	Mks							
04	04	08	03	01	100	80	20	25	50	175	448

3. RATIONALE: The student has to attain a remarkable knowledge level regarding properties of materials and laws of Physics. This foundation is required at the First Year Diploma Level of various branches of Engineering and is laid by incorporating a Theory and Practical approach with due stress on practical application aspect of the subject. This is emphasized by widening scope for laboratory work, selecting such text and specialized reference books.

4. OBJECTIVES: After acquiring knowledge of Laws of Physics and co-relation of its Principles, the Student will:

- (i) Be able to understand Application (of theoretical principles) to work
- (ii) Appreciate the importance of precision involved in measurements.

5. DETAILED CONTENTS:

A. THEORY CONTENTS :

	Marks	Period
Unit: Introductory talk	-	02

To appreciate : Assertion of the statement which specifies relation between Engineering and Applied Physics.

To understand Importance of implementing precision measurements.

Chapter: (i) Subject introduction with review of past work – `Science`, Physics`, Matter and its structure, forms; `Physics` as science of measurement; unit; systems- CGS, MKS etc. multiples and submultiples

- (ii) SI units and Standards- meter(m), kilogram (kg), second (s), degree Kelvin (K), candela (cd), ampere (A), mole

SECTION-I

Marks	Hours
26	08

Unit- I General Physics

Chapter 1 : Elasticity

- 1.1 Elasticity, perfectly elastic, plastic, rigid body.
- 1.2 Stress, Strain, Hooke's law; Modulus of elasticity.
- 1.3 Young's modulus, Bulk modulus, Rigidity modulus; Poisson's ratio.
- 1.4 Young's modulus by Searle's apparatus, constant of elasticity. by Searle's method.
- 1.5 Elastic behavior of wire
- 1.6 Engineering applications.
- 1.7 Numerical problems.

Chapter 2: Viscosity

- 2.1 Viscosity, Streamline flow; critical Velocity.
- 2.2 Newton's Formula; Coefficient of viscosity; 'poise'.
- 2.3 Poiseuille's equation, Poiseuille's Method
- 2.4 Stokes' law; Stokes; formula; Stokes method.
- 2.5 Reynold's number.
- 2.6 Applications.
- 2.7 Numerical problems

28

08

Unit-II Heat and Thermodynamics

Chapter 3: Thermometry :

- 3.1 Zeroth law of thermodynamics.
- 3.2 Platinum resistance thermometer, Standard gas thermometer,
Optical pyrometer

Chapter 4 Specific heats of gases – Cp and Cv

4.1 Specific heat at constant pressure and at constant volume-

Molar, In terms of enthalpy

- 4.2 Relation between Cp and Cv
- 4.3 Numerical problems

Chapter 5 Concepts of Thermodynamics

- 5.1 Heat and energy; Joule's law; Mechanical equivalent of heat.
- 5.2 First law of thermodynamics
- 5.3 Isothermal and Adiabatic Processes
- 5.4 Thermodynamics processes- Reversible; Irreversible.
- 5.5 Cycle P-V diagram
- 5.6 Elementary ideas of heat engine
- 5.7 Concept of entropy

Chapter 6: Heat Transfer – Conduction

6.1 Heat conduction- idea of steady states; temperature gradient ; coefficient of thermal conductivity.

6.2 Thermal conductivity of a good conductor- Searle's method

6.3 Thermal conductivity of an insulator- Lee's method.

6.4 Thermal conductivity of rubber tube by calorimetric

6.5 Temperature of interface

6.6 Numerical problems

Unit III Sound

28

08

Chapter 7 Simple Harmonic Motion (S.H.M.)

7.1 General equations of S.H.M.; Graphical representations; Characteristics of S.H.M.

7.2 Numerical problems

Chapter 8: Waves and Oscillations

8.1 Progressive waves(transverse and longitudinal)-equation.

8.2 Principle of superposition; Stationary waves.

8.3 Free oscillation and forced oscillations, resonance.

8.4 Vibrations of air column-velocity of sound by resonance tube closed at one end.

8.5 Vibrations in strings- frequency of A.C Supply by Sonometer

8.6 Numerical problems.

Chapter 9: Intensity of Sound

9.1 Loudness and phon, intensity, decibel, Logarithmic formula

9.2 Data for various sources of sound and their intensity in decibel.

Chapter 10 Acoustics and reverberation:

10.1 Reverberation, Sabine's formula Conditions for good acoustics, Noise reduction and sound insulation Numerical problems

10.2 Ultrasonic-production and Application; Sonic, Subsonic, Supersonic.

Total

82

24

SECTION-II

Unit IV Optics

24

06

Chapter 11 Photoelectricity:

11.1 Photoelectric effect- Planck's hypothesis Einstein's equation; Characteristics

11.2 Photocell- photo emissive; photo conductive; photovoltaic Applications Numerical problems

Chapter 12 Elementary ideas of Interference, Diffraction and Polarization

12.1 Interference Conditions for steady interference pattern, Thin films, Newton's rings, optical flatness, Applications

12.2 Diffraction, Grating, Applications

12.3 Polarization, Polarimeter; Photoelasticity, Applications

Unit V Electricity and Magnetism

30

10

Chapter 13 Static electricity

13.1 Coulomb's law; Electric field; Intensity, Electric line of force
Flux density, Numerical problems, Potential;

13.2 Capacitance; farad; Principle of capacitor, Capacitor; Parallel plate capacitor; Combinations: Capacitors "In Series", "In Parallel; Energy of capacity; Numerical problems.

Chapter 14 Current Electricity

14.1 Specific resistance; Ohm's law as applied to complete circuit-e.m.f. and p.d.

14.2 Wheatstone's network and Wheatstone's bridge (W.B.) (metre bridge) Post Office Box (P.O.B.)

14.3 Potentiometer

14.4 Application

14.5 Numerical Problems.

Chapter 15 Electromagnetism

15.1 Current carrying conductor in the magnetic field, 'ampere' the SI Unit of current.

15.2 Rectangular coil carrying current placed in uniform magnetic field, Galvanometer-Moving coil' 'Mirror', Current Sensitivity.

15.3 Principle of Shunt, Ammeter, Voltmeter.

Chapter 16 Magnetism

16.1 Magnetic materials; Dia, Para and Ferromagnetism; Modern concept of magnetism.

16.2 Susceptibility, Magnetic hysteresis; Magnetic shielding.

16.3 Applications.

Chapter 17 Thermoelectricity

17.1 Thermocouple, Seebeck and Peltier effect; thermo e.m.f vs temperature relation.

17.2 Thermocouple as thermometer

Unit VI: Modern Physics:

28

10

Chapter 18 Bohr's Theory for hydrogen atom

18.1 Bohr's postulates

18.2 Radii of orbits and energies; Rydberg constant; Bohr model-Energy level diagram for hydrogen atom and spectral series.

Chapter 19 Crystal Structure

19.1 Crystalline and Amorphous solids, , Unit cell space-lattice cubic crystal structures- simple cubic(S.C), Body centred cubic (B.C.C), Face centred cubic (F.C.C),Atomic radius Co-ordination number, Number of atoms per unit cell; Atomic radius, Packing density..

19.2 Atomic planes and spacing, Miller indices.

Chapter 20 Elementary ideas of Lasers and Masers

20.1 Introduction related to acronym Spontaneous and stimulated (Induced) emission, Essential requirements of laser- Active medium, Resonant cavity, Pumping.

20.2 Ammonia maser, Ruby Laser; Helium –Neon Laser.

20.3 Energy and momentum of laser photon, Properties and applications.

20.4 Holography .

Chapter 21 Band theory of solids ; Semiconductors

21.1 Energy bands in solids and classification of materials in to conductorsm semiconductors and insulators.

21.2, semiconductors Intrinsic ; Extrinsic – P Type and N Type; P-N junction.

Chapter 22 Elementary ideas of Fibre optics and Superconductivity

22.1Total internal reflection ; wave guide for light, Optical fibre- Step index, Graded index ; Applications.

22.2Principle of Superconductivity –Zero ohmic resistance; Meissner effect; Super conducting state, materials, properties and applications

Total 82 26

Scheme for PHYSICS (SC-17)

Theory introductory talk---04 hours

UNIT NO.	TOPICS	NO.OF CONTACT HOURS	MARKS	WEIHTAGE	#M/E/D
I.	General Physics	08	26	15	M
II.	Heat and Thermodynamics	12	30	18	E
III.	Sound	10	30	17	E
IV.	Optics	06	26	15	E
V.	Electricity and Magnetism	14	30	18	M
VI.	Modern Physics	10	30	17	D

Total: 64 172 100

M: Most Essential, E: Essential, D: Desirable

LIST OF EXPERIMENTS

Experiments to be performed :

Section-I (ANY 09)

1	Use of Measuring Instruments – Vernier Callipers, Micrometer Screw Gauge,
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	Spherometer
2	Elastic Constants by Searle's Method
3	Young's Modulus by Searle's Apparatus
4	Surface Tension by Capillary Rise Method <u>OR</u> Viscosity by Poiseuille's Method <u>OR</u> Viscosity by Stokes' Method.
5	Thermal Conductivity of a Good Conductor by Searle's Apparatus
6	Ratio of Specific Heats Cp/Cv by Clement and Desorme's Apparatus
7	Thermal Conductivity of Rubber Tube by Calorimetric Method.
8	Thermal Conductivity of an Insulator by Lee's Method
9	Velocity of Sound by Resonance.
10	Velocity of Sound by C.R.O
11	Frequency of A.C. Supply by Sonometer and Verification by C.R.O.

Section – II (ANY 08)

12	Study of Spectrometer (Minimum Deviation and Refractive Index and Angle of Prism)
13	Wavelength of Laser Beam (He-Ne) by Diffraction Grating.
14	Specific Rotation by Polarimeter
15	J' by Electrical Method and Specific Heat of Oil by Electrical Heating.
16	Use of Wheatstone's Bridge and Post Office Box (Resistance, Specific Resistance and Temp.Coefficient of Resistance).
17	Use of Potentiometer (Principle, Comparison of e.m.f.s of Cells, Internal Resistance of Cell and Calibration of Voltmeter with the Principle COMPULSORY and ANY ONE of the Other Three).
18	Wavelength of Light by Diffraction Grating
19	Determination of Rydberg Constant.
20	Study of Crystal Structure.

Demonstration Experiments : (ANY 07)

(i)	e.m.f. of a Thermocouple
(ii)	Spectra of Ionised Gases
(iii)	Poisson's Ratio for Rubber Tube
(iv)	Study of Photocell
(v)	Temperature of Flame (Optical Pyrometer)
(vi)	Hysteresis by C.R.O.
(vii)	Study of Newton's Rings
(viii)	Study of Para and Diamagnetism by Electromagnet
(ix)	Study of Ultrasonics
(x)	Study of Photoelastic Bench
(xi)	Optical Principles of O.H.P
(xii)	Use of Precision Measuring Instruments (Dial Vernier, Dial Micrometer, Travelling Microscope etc.)

Term-Work :

Compulsory term-work on the list of experiments written in a journal and carrying 50 marks on timely submission basis specified at the index sheet of Physics Journal.

Scheme of Practical Examination :

1	Each candidate will be examined in one experiment from among those prescribed in the syllabus. The duration of the experiment
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	will be two hours
2	Each candidate will be asked to draw by lots any two experiments (one from section-I and the other from section-II). Out of the experiments so drawn by him/her, he/she will be asked to prefer any one experiment which he/she will be able to perform with confidence.
	Change of experiment shall be discouraged and if absolutely necessary, 05 marks will be deducted for the same after due verification of the laboratory records of the candidate.
3	The performance of the candidate in the practical examination will be assessed out of 50 Marks as shown in the following scheme

Scheme of assessment :

- (a) Connections, adjustment and Observations 20 Marks
- (b) Circuit diagram, figures and tabulation10 Marks
- (c) Formula, calculations and graphs if any10 Marks
- (d) Oral 5 Marks
- (e) Correct answer or appropriate result 5 Marks

Total : 50 Marks

4	Each candidate will be jointly examined by both external and internal examiners
5	Certain demonstration experiments are coupled with certain conventional experiments during the examination. Marks allotted for demonstration experiments are 15 and marks for conventional experiments are 35. The conventional experiment is assessed out of 50 as mentioned under 4 in the above scheme and then converted out of 35. Assessment of a demonstration experiment is judged by answers (Oral or Written) given by candidate in front of the relevant demonstration set up.
6	If any candidate is unable to draw a correct circuit diagram, the same may be given by the examiner on request so that the candidate may continue the experiment. However, five marks will be deducted for the same
7	While assessing, the overall performance and the ability of the candidate to handle the apparatus independently, will be considered.

6. IMPLEMENTATION STRATEGY (PLANNING) :

- 1. Theory- Lesson Plan
- 2. Practical – Scheme of marking for T/W; Scheme of assessment for Pract. Exam.

7. (a) TEXT BOOKS :

Sr. No.	Author	Title	Publishers & Address
1.	R.K.Gaur and S.L. Gupta	Engineering Physics	Dhanpat Rai & Sons.
2.	M.R. Shrinivasan	Physics for Engineers	New Age International
3.	P.G. Kshirsagar and M. N. Avadhunulu	A Text Book of Engineering Physics	S. Chand and Co. Ltd
4.	Gambhir, Durgapal and Banerjee	Introductory Physics, Vols. 1, 2 and 3	Wiley Eastern

(b) REFERENCE BOOKS :

Sr. No.	Author	Title	Publishers & Address
1.	Resnik and Halliday	Physics, Vols. 1 and 2	Wiley Eastern.
2.	B.L. Theraja.	Engineering Physics	S. Chand & Co. Ltd
3.	B.L. Theraja.	Modern Physics	S. Chand & Co. Ltd
4.	Manikpure	Applied Physics	S. Chand Co. Ltd., N.Delhi
5.	S.P. Paranjpe	Applied Physics	Central Techno Pub., Nagpur.

1. SUBJECT DETAILS :

Course: Diploma in Industrial Electronics	Semester: II
Subject: Engineering Drawing – II	Code: ME-36
Group: Core	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme			Examination Scheme							
Theory Hrs Per Week	Practical Hrs per Week	Credits	Hrs	NP	Mks	Th	Sess	T/W	Prac /oral	Total
02	06	08	04	01	100	80	20	50	50	200

3. RATIONALE:

Engineering drawing is a language of engineers. It is classified as engineering science subject. It describes scientific facts, principles and technique of drawing in order to visualize and express the ideas and to convey the instructions through drawings without ambiguity. In engineering drawing – II students will study interpretation of give orthographic views to find out the missing views/sectional, no-sectional or orthographic views. It also gives concept for straight lines, planes and solids in space. They are introduced to various machine drawing by screw fastness keys and couplings.

4. OBJECTIVES :

Engineering drawing helps in understanding design of parts, assembly, structure etc. used in engineering field. It supports technology and technical subjects. By achieving visualization and drawing skills, the student will successfully discharge his role on shop floor, design department and inspection department etc.

5. DETAILED CONTENTS :

Chapter	Content	Marks	Hours
	<u>SECTION-I</u>		
01	1.0: Missing Views : 1.1 Given two views (f.v. – t.v. or f.v.s.v.) deriving the third view-non sectional or sectional. 1.2 Full section 1.3 Half section 1.4 Offset section concept. Practice:	32	06
	1. Two sheets with four problems each. 2. Home Assignments: Two sheet containing four problems		24
02	2.0 Projection of Straight Lines : 2.1 Projections of lines inclined to both the reference planes	20	04

	(no traces)		
	Practice: 1. One sheet with four problems		12
	2. Home Assignments: One sheet containing four problems		
03	3.0 Projection of Planes :	30	06
	3.1 Projection of planes – regular polygons and circle. inclined to both the reference planes.		
	Practice: 1. One sheet with four problems	-	12
	2. Home Assignments: One sheet containing four problems		
	Total	82	64
SECTION – II			
04	4.0 Projections of Solids :	30	05
	4.1 Projection of solids like prisms, pyramids, cylinders and cones with axis inclined to both the reference planes.		
	Practice: 1. One sheet with four problems	-	12
	2. Home Assignments: One sheet containing four problems		
05	5.0 Thread Profiles and Screw Fasteners :	20	05
	5.1 Different profiles of threads		
	5.2 Conventional representations of left hand – right hand threads, single and multistart square threads, external and internal threads.		
	5.3 Different types of nuts.		
	5.4 Different types of bolts.		
	5.5 Lock nuts (Castle, slotted nut, simond’s nut etc) use of plane and spring washers.		
	Practice: 1. One sheet with Problems on various screw fastners to be sketched by free hand.	-	15
	2. Home Assignments: One sheet containing four problems		
06	6.0 Keys and Couplings :	30	05
	6.1 Detail and assembly drawing of different keys and couplings i.e. flange, oldhalm, flexible, universal etc.		
	Practice:		12
	1. One sheet with problems of keys and coupling to be sketched by free hand and problem on drawing of assembly of a coupling.		09
	2. A problem of a coupling to draw the details from the assembly.		
	3. Home Assignments: One sheet containing four problems		
	Total	82	64

6. IMPLEMENTATION STRATEGY (PLANNING) :

In depth study and understanding of the subject will be implemented by adoption of the following strategy :

6. Theory Teaching Plan
7. Term Work Plan for practical giving problems to draw in the class.
8. Home assignment to practice at home
9. Conduct of three periodical test
10. Use of OHP models and charge during theory class and practical periods

7. REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	N.D.Bhatt and Panchal	Geometrical and Machine drawing	14 th	2000	Rupalee Pub.Opp. Amul Dairy, Court Rd, Anand
2.	R.K. Dhawan	Engineering drawing	2 nd	2001	S.Chand & Co.Ltd., Ram Nagar New Delhi-110 055
3.	R.K. Dhawan	Machine drawing	2 nd	2001	S.Chand & Co. Ltd ,Ram Nagar New Delhi-110 055
4.	M.L. Dabhade	Engineering Graphics	4 th	1995	Mrs.VA.Velhankar 1030, Model Colony, B-12,Akash Ganga Pune-411 016

III
SEMESTER
INDUSTRIAL ELECTRONICS

1. SUBJECT DETAILS:

Course : Diploma in Industrial Electronics	Semester: III
Subject : Applied Mechanics	Code : AM-16
Group : C*	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs Per Wk.	Practical Hrs. Per Wk.		Paper			TH Reduced to	Sessional Marks	T/ W	Practical oral	Total
		Hrs.	N/P	Mks						
3	1.5	4.5	3	1	100	80	20	25	-	125

3. RATIONALE:

Applied Mechanics is the study of Forces and their effect on moving or stationary bodies. Also the concept of Mechanics will be very much useful to understand the further semester subjects like analysis and design.

4. OBJECTIVES:

Students will be able to:

- (1) Understand the force / force system and their effect on a body.
- (2) Apply the concept of mechanics to the real situation.
- (3) Build the pre-requisite of higher semester subject related to designs.

5. DETAILED CONTENTS:

Chapter	Topics	Periods	Marks
	SECTION-I		
1.	Introduction to Mechanics	02	06
	1.1 Mechanics definition, classification, Statics & Dynamics, Kinematics, Kinetics		
	1.2 Fundamental units of measurement (FPS, MKS, SI), derived Units, conversion of units, Scalar & vector with examples		
	1.3 Definition of particle, body & rigid body, mass & weight.		
2.	Resolution of Forces	04	14
	2.1 Concept of Force, definition, units, graphical representation of force.		
	2.2 Concept of system of forces, non-coplanar, coplanar, concurrent, non-concurrent, parallel, non-parallel forces.		
	2.3 Resolution of forces in to two components along any directions.		
	2.4 Resolution of force into two components at right angles to Each other by analytical method.(Applications levers, chain & links, connected bodies like trains etc.)		
3.	Composition of forces	04	14
	3.1 Composition, Resultant of force		
	3.2 Law of parallelogram of forces		
	3.3 moment of force, couples lever arm		
	3.4 Varignon's theorem		

	3.5 Resultant of non-coplanar, coplanar, concurrent, non-concurrent, parallel, non-parallel forces. (Application in shafts, crane, joints of trusses etc)		
4.	Equilibrium	06	20
	4.1 Definition of equilibrant, relation between Resultant and Equilibrant, Condition of equilibrium, Types of Equilibrium stable & unstable and Neutral equilibrium		
	4.2 Equilibrium of coplanar concurrent forces, Lami's theorem		
	4.3 Equilibrium of coplanar parallel forces & coplanar Non-concurrent forces.		
	4.4 Analytical condition of equilibrium for coplanar concurrent & non-concurrent forces (Application of crane stability, link mechanism, inclined plane, wedges, anchor blocks for water pipe lines, balance, levers, pulley & pulley blocks)		
	Practical: (a) Simple roof truss. (b) Bell crank lever. (c) Levers of different types. (d) Extension of Springs. (e) Compression of springs.		
5.	Beam Reactions	04	14
	5.1 Types of supports (constraints), simple, roller, hinged & fixed.		
	5.2 Types of beams, simply supported, hinged & roller supported, Cantilever, Over hang beams.		
	5.3 Types of loads, Point (Concentrated) load, Uniformly Distributed load (UDL), Uniformly Varying load (UVL)*		
	5.4 Problems on above combination of loads (Application like bearings of shafts, guy, rocker, roller supports of railway bridges) *no problems in UVL		
6.	Centre of gravity	04	14
	6.1 Centre of gravity of solids, centroid of plane laminas, definition		
	6.2 Concept of parallel forces applies to find c.g. and centroid centroidal / c.g. axes of a body / lamina, c.g./centroid of basic regular shapes.		
	6.3 Application like floating bodies, dams, & retaining wall sections, Beams column section (rolled steel), simple & built up sections (like floating bodies, dams, & retaining wall columns etc.)		
	Practical: (a) centroid of plane lamina		
	SECTION-I I		
7.	Friction	04	14
	7.1 Definition, Types of friction, static friction & dynamic friction		
	7.2 Fundamental laws of static friction. Coefficient of friction. Cone of friction. Angle of friction, Angle of repose, Rolling friction		
	7.3 Study of inclined plane, wedge & block system, ladder friction. (Application in clutches, Brakes, Dynamometer, journals, Belts & Rope drives, stator & rotor in electric motor, Bearings.)		
	Practical: (a) Friction between wooden surface (b) Friction between wooden surface & glass, metal surfaces.		
8.	Rectilinear Motion	04	14
	8.1 Definition of kinematics, rectilinear motion, displacement, speed, velocity, acceleration.		

	8.2 Equation of rectilinear motion with uniform acceleration.		
	8.3 Velocity- Time diagrams, motion under gravity. (Application to velocity of connecting rod, piston crank etc., V-T diagram for electric traction)		
9.	Kinetics	03	10
	9.1 Newton's law of motion, relation between force mass & acceleration		
	9.2 Application like motion of trains on slopes etc.		
	9.3 Concept of momentum & impulse, conservation of momentum. (Application centrifugal devices, motion of train on slopes etc. Power hammer, pile driving, Fly presses etc.)		
10.	Work, energy & power	04	14
	10.1 Work done by body, definition, application		
	10.2 Energy definition & types, Potential energy and Kinetic Energy, conservation of energy (Application like energy stored in fly wheel water reservoir)		
11.	Simple lifting machines (Application topics)	04	14
	11.1 Definition : Mechanical advantage, velocity ratio, Efficiency Relation between them, friction in machine in terms of load & effort		
	11.2 Law of Machine, Maximum M.A., Maximum efficiency Condition for reversibility of machine.		
	11.3 Study of Machine-Simple & Differential axel & wheel Weston differential pulley block, Simple screw jack, Worm & Worm Wheel, Single & Double purchase crab winch, system of pulleys.		
12.	Graphical Statics	05	16
	12.1 Space diagram, Bows notation		
	12.2 Law of triangle of forces, Polygon of forces, Force/vector Diagram		
	12.3 Resultant& equilibrium of concurrent forces		
	12.4 Polar diagram , Funicular polygon		
	12.5 Resultant& equilibrium of non-concurrent & non-parallel forces.		
	12.6 Application in finding reactions of beams, Stress in simple frame		
	Total	48	164

6. PRACTICALS

Term work consists of Journal containing minimum 10 experiment performed of the following in the laboratory.

- 1) Extension & compression of the spring
- 2) Bell crank Lever
- 3) Two/Three sheave pulley block
- 4) Simple screw jack
- 5) Single/Three Sheave Pulley Block
- 6) Differential axel & wheel
- 7) Centroid of plane Lamina
- 8) Sheer Leg & Derrick Crane
- 9) Resultant of Non concurrent & non parallel forces
- 10) Friction
- 11) Jib Crane

12) Graphical Statics

13) Momentum of Inertia of Fly Wheel

7. REFERENCE BOOKS:

Sr .N o.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	Dhade & Jamdar	Applied Mechanics	2 nd	2002	Centro tecno publishers Nagpur
2.	R.S.Khurmi	Applied Mechanics	19 th	2001	S.Chand & Company Ram Nagar, New Delhi-110055
3.	A.K. Tayal	Applied Mechanics	9 th	1998	Umesh Publication
4.	Sunil M. Deo	Applied Mechanics	7 th	2004	Nirali/Pragati Publication
5.	M. D.Dayal	Applied Mechanics	1 st	2000	Nandu Publishers, Chembur, Mumbai-71

1. SUBJECT DETAILS:

Course: Diploma in Industrial Electronics
 Subject: Mathematics III
 Group: C*

Semester: III
 Code:MA-35
 Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per wk	Tutorial Hrs Per Wk		Paper			TH	Sessional	T/W	Pract Oral	Total
		Hrs	NP	Mks						
03	01	04	03	01	100	80	20	-	-	100

3. RATIONALE:

- Create an aptitude for Mathematics for higher studies and creative work in Science and Technology.
- Focusing attention of problem solving in liberal sense. This aspect should take care of :
 - Intelligent combination of techniques.
 - Mathematization or mathematical modeling of problems involved in various branches of knowledge.
- Nurturing the higher order mental process of logical reasoning with rigor and precision.
- Developing conceptual clarify habit of abstracting a given concrete situation and to put it in precise language and ingredients of the problems on hand.

4. OBJECTIVES:

Differential calculus is introduced as:

- Prerequisite for many topics such as integral calculus, differential equations, fourier series etc. to be studied later.
- To introduce the applications commonly required.

5. DETAILED CONTENTS:

Chapter	Content	Marks	Hours
	Section-I		
1	1.0 Differentiation:	57	16
	1.1 Definition		
	1.2 Derivatives by first principle		
	1.3 List of derivatives of standard functions		
	1.4 Methods of differentiation		
	1.5 Derivatives of explicit and implicit functions		
	1.6 Derivatives of parametric functions		
	1.7 Derivatives of Inverse function		
	1.8 Derivative of one function with respect to another function		
	1.9 Successive Differentiation		
	1.10 n^{th} derivative of function		
	1.11 Leibnitz theorem		
	1.12 Application of derivative	25	08
	(i) Geometric meaning of derivative		
	(ii) Equations of tangent, normal to given curve		
	(iii) Derivative as a rate measure-velocity, acceleration, related rate		
	(iv) Maxima/Minima of functions		
	(v) Radius of curvature		
	Section-II		
2	2.0 Integral Calculus:	82	24
	2.1 Integration as inverse of differentiation		
	2.2 Methods of Integration; substitution by parts, partial fractions		

2.3 Definite integral and their properties reduction Formulae (No Proofs)

2.4 Application: Mean value and R.M.S value

Total 164

48

6. IMPLEMENTATION STRATEGY (PLANNING):

Lectures are conducted as per teaching plan and tutorials in the class.

7. REFERENCE BOOKS:

Sr.	Author	Title	Publishers & Address
1	S.P. Deshpande	Mathematics for Polytechnic Students-II	Pune Vidyarthi Griha Prakashan, Pune
2	Dr. B.S. Grewal	Higher Engineering Mathematics	Khanna Publishers 2B, Delhi
3	J.N. Wartikar P.N. Wartikar	Applied Mathematics	Pune Vidyarthi Griha Prakashan, Pune

1. SUBJECT DETAILS :

Course: Diploma in Industrial Electronics	Semester: III
Subject: Workshop Technology (ME-26)	
Group: Core	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instructions & Periods / Week					No. of Papers, Duration & Marks			Scheme of Examination						Scheme L/Pr/Cr
L	P	D	T	Cr	NP	Hrs	Mks	SSL	Theory Paper	T/W	Practical	Oral	Total	
-	5	-	-	5	-	-	-	-	-	50	-	50	100	055

3. RATIONALE :

Production is a value adding activity, where raw material is converted into finished goods, by using different resources like man, machine, material, method, etc. Handling of different tools & equipments is a part of production system. So student should be aware of method of handling of different tools, its applications, precautions, handling procedures, etc.

4. OBJECTIVES :

- 1) The student will be able to understand workshop activities.
- 2) They will be able to select right tools and right manufacturing processes for performing the job correctly.
- 3) They will be able to use different fitting tools like Files, hacksaw, hammers, try square, chisel (cross cut chisel), center punch, etc and carpentry tools like cross cut saw, jack plate, firemen chisel, rasp file, marking gauge, mallet, scriber etc.
- 4) They will be able to read dimensions and able to do marking required for making the job.
- 5) Practical
5 periods per week (two times)

Sr.No.	Title	Hours
01.	Demonstration of carpentry tool & one carpentry joints.	25
02.	One pattern	25
03.	Demonstration of fitting tools & one job of drilling and trapping.	15
04.	One job of keyway Sawing/filing.	15
	Total	80

5. Assignment

1. Notebook containing the procedure and diagram of above jobs.
2. Notebook containing write up from workshop practices TTTI Bhopal book on above hand tools.

6. REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	S.K. Hajra Choudhury, A.K. Hajra Choudhury	Elements of workshop technology (vol.I)	9 th	1997	Media promoters and publishers Pvt. Ltd., New Delhi
2.	B.S. Rghuwanshi	A course in workshop technology (vol.I)	9 th	1997	Dhanpatrai & sons, New Delhi
3.	W.A.J. Chapman	Workshop technology Vol-1, 2, 3	3 rd	1998	Viva books (P) Ltd.

Course: Diploma in Industrial Electronics

Semester: III

Subject: Electrical Technology

Code:EE-38

Group: C*

Compulsory

Teaching and Examination Scheme

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Per week	Practical Per week		Paper			TH	SSL	T/W	PRACT ORAL	TOTAL
			Hrs	NP	Mks					
03	1.5	4.5	03	01	100	80	20	25	50	175

Rationale:

To teach the student facts, concepts, principles and procedure of operation and control of electric M/c. and applications of electrical energy in manufacturing industry which enables him to work as supervisor in a shop and as an assistant in research and development department.

OBJECTIVE:

Students will be able to understand

The concept and principle of A.C fundamentals, which can be applied to rectify electrical faults and acquire supervisory role .

Understand the working and construction of different types of machines, which will help them to discharge role as a supervisor

in all technology areas and assist in carrying out investigation work.

To select the drive for a given application.

DETAILED CONTENTS:

Chapter	Section-I Contents	Hours	Marks	
1.	Introduction to electricity Electron Theory E.m.f. & potential 1.2 Ohm's Law, resistance in series and parallel 1.3 Kirchoff's current law and voltage law Practice Kirchoff's laws- verification	2	15	1.1.1Modern
2.	Magnetising & Electromagnetism 2.1 Magnetic flux,magnetic flux density,magnetic field strength 2.2 Right hand Gripping rule,Maxwell's Corkscrew rule 2.3 Fleming's left hand rule 2.4 Comparison between Electric and Magnetic ckt	6	24	
3.	Electromagnetic Induction 3.1 Faraday's laws of Electromagnetic Induction 3.2 Fleming's left hand rule,Lenz's law 3.3 Dynamically induced Emf ,statically induced Emf. Practice 1)Measurement of Inductance by 3 voltmeter method 2)Measurement of Inductance by 3 Ammeter method	6	20	
4.	A.C. Fundamentals 4.1 Generation of Alternating Voltage and current	10	23	

- 4.2 RMS value, Average value, Form factor, Peak factor
- 4.3 A.C. through Resistances, Inductance and Capacitance.
- 4.4 Generation of Three phase Alternating Voltage and current
- 4.5 Star and Delta connections of 3 phase A.C. current

Practice

- 1) Measurement of Inductance by 3 voltmeter method
- 2) Measurement of Inductance by 3 Ammeter method
- 3) RLC series
- 4) 3 phase balanced star connection, voltage relations
- 5) 3 phase balanced delta connection, current relations

SECTION II

Chapter	Content	Hours	Marks
5.	Electrical Instruments 5.1 Deflecting torque, controlling torque & Damping torque 5.2 Types of Instruments 5.3 Advantages & disadvantages of PMMC & MI Instruments.	6	10
6.	D.C generator & D.C motor 6.1 Working principle of D.C generator & D.C motor 6.2 Constructional Features of D.C generator 6.3 Types of D.C generator & D.C motor 6.4 Characteristics & application of D.C motor Practice 1) Speed control of D.C generator 2) Load characteristic of self & separately excited generator 3) Magnetisation curve of D.C shunt generator	6	28
7.	Transformer 7.1 Working principles of Transformer 7.2 EMF equation of Transformer 7.3 Voltage Transformation ratio 7.4 Losses in Transformer Practice 1) Regulation of Transformer by direct loading	6	24
8.	Industrial Application of Electric Motor 8.1 General principle of single & three induction motor 8.2 Industrial Application of Electric Motor 8.3 Classification of Industrial drives 8.4 Selection Motor.	6	20
Total		48	164

PRACTICE:

- 1. Kirchoff's laws- verification.
- 2. Measurement of Inductance by 3 voltmeter method.
- 3. Measurement of Inductance by 3 Ammeter method.
- 4. Measurement of Inductance by 3 voltmeter method

5. Measurement of Inductance by 3 Ammeter method.
6. RLC series
7. 3 phase balanced star connection, voltage relations
8. 3 phase balanced delta connection, current relations
9. Speed control of D.C generator
10. Load characteristic of self & separately excited generator.
11. Magnetisation curve of D.C shunt generator.
12. Regulation of Transformer by direct loading.

6. IMPLEMENTATION STRATEGY (PLANNING):

The syllabus is completed by adopting the lesson plan, by charts & by demonstration of machinery in electrical technology

7. REFERENCE BOOKS:

Sr. No	Author	Title	Publisher & address
1.	V. K. Mehta	Basic Elect Engg	S. Chand &Company
2.	B. L. Thereja (volume I &II)	Electrical Technology	S. Chand &Company
3.	V. N. Mittal	Basic Elect. Engg	Tata Mcgraw- hill

IV
SEMESTER
INDUSTRIAL ELECTRONICS

1.SUBJECT DETAILS:

Course: Diploma in Industrial Electronics
 Subject: Advanced Mathematics
 Group: C

Semester: IV
 Code:MA-45
 Optional

2.TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hours per week	Tutorials Hrs. Per Wk.		Paper			TH	Sessional	T/W	Pract. Oral	Total
		Hrs	NP	Mks						
03	01	04	03	01	100	80	20	-	-	100

3.RATIONALE:

Advanced Mathematics is classified as Basic Science Subject which intends to teach students the facts concepts and principles of Mathematics those which can be applied to solve problems in Electrical.

4.OBJECTIVES:

The student will be able to evaluate integrals with the help of definition, formulae, methods and theorems.

The student will evaluate problems with the help of definitions and properties of definite integrals and reduction formulae.

The student will be able to represent complex numbers as Argand's diagram. Using algebra of vectors, student will be able to find out the work done by a force, moment of a force about a point, area of a triangle, volume of Parallelopiped.

Student will solve simultaneous equations by using matrices.

5.DETAILED CONTENTS:

SECTION-I

Chapter	Content	Marks	Hours
1.	1.0 Applications of definite integrals 1.1Length of arc 1.2Areas 1.3Volumes 1.4Centre of Gravity 1.5Moment of Inertia	42	16
2.	2.0Complex numbers 2.1De Moivre's theorem 2.2Roots of a complex number 2.3Circular and Hyperbolic functions of a complex numbers relation between them. 2.4Separation of real and imaginary part of a complex number.	40	16

SECTION-II

3.	3.0Laplace Transformations	22	12
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	3.1 Introduction, Definitions		
	3.2 Laplace Transforms of elementary functions Introduction, Definitions		
	3.3 Laplace Transforms of elementary functions $1, t^n, e^{at}, \sin(at), \cos(at)$		
	3.4 Properties of Laplace Transform		
	3.5 Inverse Laplace Transform		
	3.6 Transform of derivatives & integrals		
4.	4.0 Differential Equations	60	20
	4.1 Formation of differential equation		
	4.2 Differential equations of first order and first degree		
	4.3 Linear differential equations of higher order with constant coefficients such as $f(D)y = X$, where $X = e^{ax}, \sin(ax + b), \cos(ax + b), x^m, e^{ax}V$, where V is a function of x .		
	4.4 Applications of differential equations.		
	Total	164	64

6. IMPLEMENTATION STRATEGY (PLANNING):

Lectures are conducted as per teaching plan and tutorials in the class.

7. REFERENCE BOOKS:

Sr.No.	Author	Title	Publishers & Address
1.	S.P. Deshpande	Calculus for Polytechnics	Pune Vidyarthi Griha Prakashan, Pune
2.	Dr. B.S. Grewal	Higher Engineering Mathematics	Khanna Publishers 2B, Delhi
3.	J.N. Wartikar P.N. Wartikar	Applied Mathematics	Pune Vidyarthi Griha Prakashan, Pune

1. SUBJECT DETAILS :

Course: Diploma in Industrial Electronics
Subject: Electronic Materials, Components & Devices
Group: A

Semester: IV
Code: IE-32
Optional

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per wk	Practical Hrs Per Wk		Paper			TH	Sessional	T/W	Oral	Total
		Hrs	NP	Mks						
03	1.5	4.5	03	01	100	80	20	25	50	175

3. RATIONALE :

This course enables the students to know materials used for manufacturing of component & devices with their characteristics like resistive, capacitive and inductive material.

4. OBJECTIVES :

After studying this subject the student will be able to Understand symbol, materials and their characteristics.

2. Understand the properties of different materials.
3. Understand the fabrication technique for integrate circuits.

5. DETAILED CONTENTS :

Chapter	Content	Marks	Hours
1.	1.0 Conductor / Semiconductor : 1.1 Conductivity 1.2 Effect of temperature of conductivity 1.3 RT 1.4 Classification like low resistance and high resistance materials 1.5 Super conductivity materials, application. Practice: 1. Study of Semiconductor Devices 2. Testing of Devices	12	05
2.	2.0 Insulators : 2.1 Dielectric constant 2.2 Dielectric strength, Dielectric loss, Dielectric polarization, 2.3 Various kinds of dielectric materials and their application in electronics. Practice: Assignment on Insulator	12	05
3.	3.0 Magnetic Materials : 3.1 Electromagnetic domain theory 3.2 Ferro-magnetic materials, B.H. Curve, Hysterises loop, 3.3 Effect of air gap on hysteresis. Practice: 1. Assignment of Magnetic Material	12	05
4	4.0 Components : 4.1 Reliability and specification of Electronic passive and active components	10	02

	4.2 Stability, drift, failure.		
	Practice: 1. Testing of components		
5.	5.0 Resistors :	24	04
	5.1 Brief manufacturing process		
	5.2 Rating selection criteria		
	5.3 Types of resistors and applications variable resistors.		
	Practice: 1. Study of Resistors.		
6	6.0 Cells and batteries :	12	03
	6.1 Concept of ideal voltage and current sources.		
	6.2 Types of batteries and their capacity.		
	Practice: Assignment on Cells and batteries		
	SECTION-II		
7.	7.0 Capacitors :	24	04
	7.1 Brief manufacturing process		
	7.2 Rating		
	7.3 Different types		
	7.4 Effect of frequency on capacitance		
	7.5 Applications.		
	Practice: 1. Study of Capacitors.		
	2.To study effect of frequencies on capacitors		
8.	8.0 Inductors :	24	06
	8.1 Types of inductors, Quality factor		
	8.2 R.F. coils, saturable inductors		
	8.3 Review of basics of transformer, Leakage inductance, core and copper loss		
	8.4 Types of transformers and applications.		
	Practice: 1. To study effect of frequencies on inductor		
9	9.0 Relays ,switches and display :	10	05
	9.1 Relay characteristics, contact rating, hold, Non pick up, Drop out, Transfer time etc.		
	9.2 Classification of relays, Rating and specifications.		
	9.3 Different types of switches like thumb wheel, Lever wheel, Rotary selector types, Matrix type switches, Sensing switches, Reed relays		
	9.4 Different types of display devices		
	Practice: 1. LED Display 2. Study of Relays & Switches.		
10	10.0 IC Fabrications :	24	09
	10.1 Monolithic IC fabrication techniques		
	10.2 Hybrid IC's (thin and thick films) Environmental testing method		
	10.3 VLSI.		
	Practice: 1. TTL Characteristics 2. Assignment on IC Fabrication		
	Total	164	48

PRACTICE:

1. Study of Resistors.

2. Study of Capacitors.
3. Study of Semiconductor devices.
4. Testing of devices.
5. Study of relays and switches.
6. Study of LED display.
7. TTL characteristics.
8. Testing of components using curve tracer.
9. To study frequency response of capacitor.
10. To study frequency response of inductor.
11. Assignment on Cells and batteries.
12. Assignment on Insulator.

6. IMPLEMENTATION STRATEGY (PLANNING) :

1. Teaching Plan
2. Minimum 12 practicals / assignments.

7. REFERENCE BOOKS:

Sr.	Author	Title	Publishers & Address
1.	Madhuri Joshi.	Electronic Material & Components	A.H.Wheeler & Co.Ltd Allahabad
2.	Prof. S.D. Raut	Electronic Material & Component Devices & Technology	Technical Publications Pune

1. SUBJECT DETAILS :

Course: Diploma in Industrial Electronics
Subject: Electronic Devices & Circuits-1
Group: C*

Semester: IV
Code:IE-39
Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per wk	Practical Hrs Per Wk		Paper			TH	Sessional	T/W	Pract	Total
		Hrs	NP	Mks						
03	1.5	4.5	03	01	100	80	20	25	50	175

3. RATIONALE :

This course enables the students to know symbol, construction, working & applications of basic electronic devices like diodes & transistor.

4. OBJECTIVES :

After studying the subject the students will be able to

1. Understand the symbol, construction & characteristics of crystal diode, zener diode & BJT.
2. Understand and explain working of different rectifier & filter circuits.
3. Understand the working & application of BJT based single stage & multistage amplifiers & their frequency response curve.
4. Analyse BJT amplifier using its h-model.
5. Design unregulated power supply & R.C. coupled amplifier.

5. DETAILED CONTENTS :

Chapter	Contents	Marks	Hours
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SECTION – I

1.	1.0 Semiconductor diode characteristics : 1.1 Open circuited p.n. junction as a diode, current components in a P.N. diode 1.2 V-I characteristics and its temperature dependence, 1.2.1 Diode resistance 1.2.2 Load line concept 1.3 Piecewise linear diode model 1.4 Transition capacitance 1.5 Diode switching time 1.6 Junction diode data sheet. Practice : 1. Study of dual channel CRO. 2. Diode (Ge, Si) characteristics and effect of temperature.	12	03
2.	2.0 Breakdown diodes : 2.1 Zener diode 2.2 Schottkey diode 2.3 V.I. characteristics 2.4 Zener diode voltage regulator 2.5 Zener and schottkey diode data sheet. Practice : 1. Zener diode characteristics and effect of temperature. 2. Study of zener voltage regulator.	08	02
3.	3.0 Rectifier and Filters : 3.1 Half wave rectifier 3.2 Full wave rectifier 3.3 Ripple factor, T.U.F., Ratio of rectification. 3.4 Filters :	32	08

L-filter C-filter, L-C, C-L-C, Multiple L-C. and C-R-C filter their ripple factor with assumptions and voltage regulation.

3.5 Problems based on above topics

3.6 Design of unregulated power supply using L-C & (C-L-C) filters.

Practice :

1. Study of H.W.R./F.W.R. with / without filter.

2. Design of unregulated power supply

4. **4.0 Clipping and Clamping circuits :** 12 03

4.1 Series clipper

4.2 Shunt clipper

4.3 Biased clipper

4.4 Positive clamper

4.5 Negative clamper

Practice :

1. Diode clipping circuits.

2. Diode clamping circuits.

5. **5.0 BJT :** 18 06

5.1 The junction transistor

5.2 Transistor current components

5.3 Transistor as an amplifier

5.4 Transistor configurations and characteristics

5.5 Graphical analysis of the C.E. configuration. Analysis of cut-off and saturation regions

5.6 Typical transistor junction voltages

5.7 Transistor switching times and rating

5.8 Transistor as a switch.

Practice :

1. I/P and O/P characteristics of C.B. configuration.

2. I/P and O/P characteristics of C.E. configuration.

6. **SECTION – II** 22 07

6.0 Transistor biasing and thermal stabilization :

6.1 The operating point

6.2 Effect of temperature on operating point

6.3 Bias stability

6.4 Different biasing circuits and their thermal stability

6.5 Bias compensation techniques

6.6 Problems based on above topics.

Practice :

1. BJT operating point and load lines, effect of temperature.

2. To study different biasing circuits and compare their performance w.r.t temperature variations.

7. **7.0 Transistor at low frequencies :** 18 06

7.1 Black box theory

7.2 h-parameters

7.3 Small signal low frequency transistor hybrid model.

7.4 Analysis of C.E. configuration using accurate hybrid model

7.5 Approximate h-equivalent circuit for the three transistor configurations and their comparison

7.6 Analysis of common emitter amplifier with an emitter resistance

7.7 Analysis of R.C. coupled multistage amplifier using h-parameter

7.8 Examples based on above topics.

Practice :

1. Measurement of C.E. h-parameters.

8. **8.0 Frequency response of BJT amplifiers :** 28 08

- 8.1 Single stage C.E. amplifier and its frequency response
- 8.2 Effect of coupling and emitter bypass capacitors on low frequency response of an amplifier
- 8.3 Hybrid transistor model at high frequencies
- 8.4 C.E. short circuit current gain
- 8.5 Gain band width product
- 8.6 Examples based on above topics
- 8.7 Design of single stage R-C coupled C-E amplifier.

Practice :

- 1. To study the frequency response of single stage C.E. amplifier.
- 2. To study the frequency response of single stage C.B. amplifier.
- 3. Effect of CE and CC on low frequency response of an amplifier.
- 4. Design of BJT amplifier

9. **9.0 Multistage amplifiers :** 14 05

- 9.1 Decibel
- 9.2 Types of coupling
 - 9.2.1. Direct coupled
 - 9.2.2. R.C. coupled
 - 9.2.3 Transformer coupled amplifiers and their frequency response
- 9.3 Effect of cascading on B.W. and gain (A_v)
- 9.4 Classification of amplifiers.

Practice :

- 1. To study the frequency response of two stage R.C. coupled amplifier.

Total 164 48

PRACTICE:

- 1. Study of CRO.
- 2. P-N junction diode characteristics.
- 3. Zener diode characteristics.
- 4. Zener diode as voltage regulator.
- 5. Half wave fullwave rectifier with and without filter.
- 6. I/P and O/P characteristics of C.B. configuration.
- 7. I/P and O/P characteristics of C.E. configuration.
- 8. Clamping and clipping circuits.
- 9. C-E amplifier frequency response.
- 10. Effect of CE and CC on low frequency response of an amplifier.
- 11 Two stage R-C coupled amplifier.
- 12. Operating point and AC/DC load line.
- 13. C.B. amplifier.
- 14. To study different biasing circuits and compare their performance w.r.t temperature variations.
- 15. Measurement of C.E. h-parameters.

6. IMPLEMENTATION STRATEGY (PLANNING) :

- 1. Teaching Plan
- 2. Minimum 12 practicals or assignments

7. REFERENCE BOOKS :

Sr.No	Author	Title	Publishers & Address
1.	Millman and Halkias	Integrated electronics	McGraw Hill International Edition
2.	Millman and Halkias.	Electronic devices and circuits	McGraw Hill
3.	Robert Boylestad	Electronic devices and	PHI, New Delhi

		circuits theory	
4.	Allen Mottershead	Electronic devices and circuits	PHI, New Delhi
5.	Bhargava	Basic electronics and linear circuits	TTTI, Chandigarh TMH,New Delhi
6.	M.M. Shah	Design of electronic circuits & computer aided design	Wiley Easten Mumbai
7.	P.N. Thakkar, Sunil Shah	Design of basic electronic circuits	Jeevandeep Prakashan

1. SUBJECT DETAILS:

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per wk	Practical Hrs Per Wk		Paper			TH	Sessional	T/W	Pract Oral	Total
		Hrs	NP	Mks						
1.5	1.5	03	-	-	-	-	20	50	50	120

3. RATIONALE:

The printed circuit board has evolved as the main inter connection technology in modern electronics. The rise of surface mount technology has created a major change in most elements of design, technology and assembly of PCB. Soldering quality plays a major role in reliability of electronic circuit.

4. OBJECTIVES:

After studying the subject the student will be able to:

1. Do the reliable soldering
2. Identify and select proper connector for a circuit
3. Do the cable forming
4. Design and wind a transformer
5. Test coils and transformer
6. Draw an artwork for PCB
7. fabricate and test single sided PCB

5. DETAILED CONTENTS:

Chapter	Contents	Hours
1	1.0 Solder and soldering techniques: 1.1 Principles of solder connections 1.2 Solder alloys 1.3 Solder fluxes 1.4 Forming techniques 1.5 Soldering techniques 1.6 Solder mask 1.7 Reflow soldering techniques 1.8 Testing and quality control Practice 1. Assignment on different tools used in electronic workshop 2. Forming and soldering 3. Desoldering	08
2	2.0 Inter connection techniques: 2.1 BNC connection 2.2 D-type connection 2.3 FRC connector 2.4 Cable forming 2.5 Wire wrapping tool and wire wrapping 2.6 Crimping Practice 1. BNC or D-type connecting wiring 2. Cable forming	02
3	Wound components:	02

	3.1 Different types of cores and their characteristics	
	3.2 Testing of coils and transformers	
	3.3 Manual and automatic winding machines	
	Practice 1. transformer winding	
4	Study of software package for a PCB design	03
	Practice 1. design of single sided & double sided PCB for given circuit diagram	
5	5.0 PCB fabrication:	07
	5.1 Film master production	
	5.2 Properties of copper clad laminates	
	5.3 Board cleaning before pattern transfer	
	5.4 Photo printing	
	5.5 Screen printing	
	5.6 Plating	
	5.7 Etching	
	5.8 Testing	
	5.9 Introduction to multilayer PCB	
	Practice 1. One exercise of PCB fabrication for single sided or double sided PCB	
6	6.0 Surface mount devices and technology:	02
	6.1 Introduction to surface mount technology	
	6.2 Advantages of SMT	
	6.3 Types of SMT assemblies	
	6.4 SMD types	
	6.5 Costing of SMT equipment and assembly	
	6.6 Inspection methods and rework stations in SMT	
	Practice 1. Assignment on Surface Mount technology.	
		Total
		24

PRACTICE:

1. Soldering techniques.
2. Desoldering techniques.
3. Cable forming.
4. BNC connector soldering.
5. Transformer winding.
6. Testing of mains transformer.
7. P.C.B fabrication : single and double sided PCB
8. Assignment on different tools used in electronic workshop
9. Assignment on Surface Mount technology.
10. BNC or D-type connecting wiring.

6. IMPLEMENTATION STRATEGY (PLANNING):

1. Teaching Plan
2. Jobs on different topics

7. REFERENCE BOOKS:

Sr.	Author	Title	Publishers & Address
1	Walter C. Bosshart	Printed Circuit Board-design and Technology	TMH, New Delhi
2	NTTF Electronics Center Bangalore	PCB Design and Fabrication	NTTF Electronics Center Bangalore
3	Clyde F. Coombs Jr.	Printed circuit workbook series	McGraw Hill

1. SUBJECT DETAILS:

Course: Diploma in Industrial Electronics	Semester:IV
Subject: Fabrication Technology	
Code: ME – 46	
Group: Core (C*)	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credit	Examination Scheme and Maximum Marks						
Theory Hrs. per week	Practical Hrs. per week		Papers		TH	Sessional	T/W	Pract/Or al	Total
			Hrs	Paper No.	Marks	Marks	Marks	Marks	Marks
02	04	06	03	01	80	20	25	50	175

3. RATIONALE :

Fabrication technology is a subject of engineering which deals with sheet metal works. Practical applications of sheet metals, press tools terminology. Applications of press tools. Various fabrications process like welding, brazing, soldering and its practical application in day to day life.

4. OBJECTIVES :

It develops understanding of properties of sheet metal. This helps to understand working & maintenance of welding equipments. Knowledge of welding Brazing & Soldering processes & cold & hot working processes.

5. DETAILED CONTENTS :

SECTION – I

Chapters	Contents	Marks	Hours	
			Th	Pr
1.	Sheet Metal Works :	20	05	
	Ferrous & Non ferrous materials require for making sheets, sheet metal tools. Properties of sheet metal, sheet metal gauges. Sheet metal joints: types of Hems & seams.			
2.	Introduction to Press Tools :	40	06	
	Concept of shearing & punching. Principles & Methods of shearing. Definition of Blanking & Punching. Types of dies like progressive, compound & combine die. Terminology used in dies.			
3.	Mechanical cold working of Metals:	22	05	
	Terminology used for Bending & Rolling. Definition of rolling & bending. Different types of cold working processes like drawing, deep working, forming, pinning, extrusion, ring & core rolling &			

	bending.			
Total		82	16	

SECTION – II

4.	Mechanical Hot working of Metals:	18	03	
	Meaning of Hot working, Recrystallization temperature, Different types of Hot working processes.			
5.	Welding:	18	05	
	Principle of welding, weldability, welding Representation, various welding joints. Different types of Gas welding processes & detail of Oxy-acetylene process. Different type's arc welding processes like carbon, Twin carbon, Shielded metal, Submerged, TIG, MIG, and Plasma arc welding.			
6.	Brazing:	10	03	
	Definition. Material used for brazing, flux used in brazing, flux materials, Brazing process.			
7.	Soldering:	10	02	
	Definition. Material used for soldering, flux used in brazing, flux materials, soldering process.			
8.	Bolted Joints:	14	03	
	Thread terminology. Left hand & Right hand threads. Types of bolts, nuts locking arrangements for nuts.			
Total		82	16	

Teaching Plan	Use of Overhead Projector, charts & Chalk Board.
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TERM WORK :

Sr.No.	JOBS	Hours
01.	Job of arc welding.	10 Hrs.
02.	Demonstration of gas welding.	10 Hrs.
03.	One job of sheet metal working including bending and shearing (Involved riveting also).	20 Hrs.
04.	One simple job involving soldering/brazing.	20 Hrs.
05.	One job of preparing nut and bolts using dies and taps.	20 Hrs.

6. IMPLEMENTATION STRATEGY (PLANNING) :

1. Lesson Planning
2. Use of Transparencies (OHP)
3. Practical jobs/demonstration
4. Use of hand tools and machine tools

7. REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	S.K. Hajara Choudhury, A.K. Hajara Choudhury	Elements of workshop technology (vol.I)	9 th	1997	Media promoters and publishers Pvt. Ltd.
2.	F.J.M. Smith	Basic Fabrication and welding Engg.	3 rd	1984	Longman Craft student series Engg.
3.	Raghuvanshi	Workshop Technology Vol-1			
4.	O.P. Khanna	Welding Technology			
5.	Donaldson	Press Tool Design			

V
SEMESTER
INDUSTRIAL ELECTRONICS

1. SUBJECT DETAILS:

Course: Diploma in Industrial Electronics
 Subject: Circuits & Networks
 Group: C

Semester: V
 Code:IE-47
 Optional

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	SSL	T/W	Oral	Total
		Hrs	NP	Mks						
03	1.5	4.5	03	01	100	80	20	25	50	175

3. RATIONALE:

This first course in circuit analysis and synthesis lays down foundations for many vital concepts which will be developed in the subsequent courses.

4. OBJECTIVES:

After studying the subject the student will be able to

1. Analyze AC/DC circuits using basic analysis techniques.
2. Synthesis of circuits using parameters.
3. Find transient response of first order RC & RL ckt.
4. Understand concepts of mutual/coupled circuits.

5. DETAILED CONTENTS :

SECTION-I

Chapter	Content	Marks	Hours
1.	1.0 Network analysis and theorems : Loop and Nodal analysis of linear ckt., Superposition, Norton, Millman and Maximum power transfer theorems, Their practical & theoretical proofs. (wherever applicable). Practice: 1.Thevenin's theorem. 2.Norton's theorem. 3.Superposition theorem	30	10
2.	2.0 A.C. Circuits : 2.1 Frequency response and approximate plots (Bode's plots) of following ckt. – Compensated attenuator, R.C. low pass and high pass filters, lead and lag networks. The transfer functions of these circuits should also be derived. 2.2 Series R-L-C and parallel R-L-C ckt. Series and parallel resonance. Derivations for frequency if resonance. Selectivity, Bandwidth and Q pt. Concept. Practice: 1.Series resonance 2.Parallel resonance 3.Lead-lag circuits 4.R-C filters	18	05
		18	06

3.	3.0 Two Port Networks : Z,Y,H parameters and their conversion into each other. Practice: 1.Evaluation of Z,Y,H parameters for simple circuits	16	04
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SECTION-II

4.	4.0 Transient Response : 4.1 Periodic switching of R-L and R-C ckts., Rise and fall times, charging and discharging process 4.2 Derivation of equation for voltage across capacitor & inductor when switched on to a DC/AC supply 4.3 Differentiator and Integrator ckts. 4.4 Solutions of linear differential equations by classical method and its implication in transient response Practice: 1.Time constant of R-C circuits 2.Differentiator and Integrator	32	10
5.	5.0 Transmission Lines : 5.1 General equations of transmission lines 5.2 Expression for primary and secondary constants of a line 5.3 Open circuited line, characteristics impedance, 5.4 Loading of a line, matched conditions 5.5 Reflection & reflection co-efficient. Practice: 1.Study of attenuator 2.Study of transmission line	17	04
6.	6.0 Coupled circuit : 6.1 Mutual self and driving pt. impedance 6.2 Transfer impedance 6.3 Inductive and capacitive coupling 6.4 Transformer impedance matching equivalent circuit Practice: 1. Assignment of couple circuits	17	04
7	7.1 FILTER THEORY: LC FILTERS,Constant K & M derived type filters, half section, design of low pass, High pass, Band pass & Band reject filters using constant K & M derived filter structure (I & II type) PRACTICE: LC FILTER assignment	16	05
Total		164	48

PRACTICE:

1. Study of Thevenin's theorem.
2. Study of Norton's theorem.
3. Study of Superposition theorem.
4. Study of Maximum power transfer theorems.
5. Study of R-C high pass and low-pass filters.
6. Study of Y parameters.
7. Study of Z parameters.
8. Study of Integrating circuits.
9. Study of Differentiating circuit.
- 10.. Study of Series/Parallel R-L-C circuits.
11. LC filter assignment.
12. Assignment on coupled circuits.
13. Study of attenuator .
14. Study of transmission line.

6. IMPLEMENTATION STRATEGY (PLANNING) :

1. Teaching Plan
2. Minimum 12 practicals/assignments in the term

7. REFERENCE BOOKS :

Sr. No.	Author	Title	Publishers & Address
1.	Philip Cutler	Electronic ckt. Analysis – Vol.1	McGraw Hill Singapore
2.	Kaur et al	Networks, Transmission lines & filters	PHI, New Delhi
3.	Sudhakar Shamsunder	Circuits & Networks	Tata McGraw Hill

1. SUBJECT DETAILS :

Course: Diploma in Industrial Electronics
Subject: Principles Of Analog Techniques
Group: C*

Semester: V
Code:IE-48
Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	Sessional marks	T/W	Pract	Total
			Hrs	N/ P	Mks					
03	1.5	4.5	03	01	100	80	20	25	50	175

3. RATIONALE :

Analog circuits play a vital role in the field of electronics. This course lays down the concepts of feedback amplifiers (Positive and Negative), timers, sweep generator etc. which are used in many electronic applications.

4. OBJECTIVES :

After studying the subject the student will be able to

1. Draw and analyze the circuits of Operational amplifier, Oscillators, Feedback amplifier, Timers.
2. Identify the need for voltage and current time base generators, blocking oscillators, voltage multipliers.
3. Measure Opamp parameters.

5. DETAILED CONTENTS :

SECTION-I

Chapter	Content	Marks	Hours
1.	1.0 Feedback Amplifier (Negative feedback) : 1.1 Feedback concept and classification 1.2 Effect of negative feedback on 1 Bandwidth 2 Voltage gain 3 Noise 4 Input/Output impedance 5 Distortion 6 Stability 1.3 Feedback circuit using transistor 1 Voltage series 2 Voltage shunt 3 Current series 4 Current shunt Practice: 1. Assignment on feed back 2. Study of Voltage shunt feedback	10	04
2.	2.0 Oscillators (Positive Feedback) : 2.1 Condition for maintaining oscillations 2.2 Derivation of frequency of oscillations for the following oscillators using transistors 1 RC phase shift oscillator 2 Wein bridge oscillator 3 Tuned collector oscillator 4 Hartley / Colpitts oscillator 5 Crystal oscillator Practice: 1. Wein bridge oscillator	30	08

	2. RC phase shift oscillator		
	3. Crystal oscillator		
3.	3.0 Operational Amplifier :	42	12
	3.1 Block diagram of Opamp, Differential amplifier, Level shifting stage, Darlington amplifier and overload protection circuit.		
	3.2 Operational amplifier parameters.		
	3.3 Characteristics of Opamp.		
	3.4 Opamp applications.		
	1 Inverting / Non-inverting amplifier		
	2 Adder / Subtractor		
	3 Voltage follower		
	4 Integrator, Schmitt trigger		
	5 Voltage limiters, Dead zone circuits		
	6 Log / Antilog amplifier		
	7 Precision rectifiers (half wave, full wave)		
	8 Active filter (first order and concept of higher order filters)		
	9 Wein bridge oscillator		
	10 Square wave generator		
	Practice:		
	1 Opamp applications		
	1. Inverting / Non-inverting amplifier using Opamp.		
	2. Integrator.		
	3. Differentiator		
	4. Precision rectifier.		
	5. Log / Antilog amplifier.		
	6. Dead zone circuit.		
	7. Comparator.		
	8. Schmitt trigger.		
	9. Filter (low pass, high pass)		
	10. Adder/Subtractor		

SECTION-II

4.	4.0 Timer 555 :	30	08
	4.1 Internal block diagram		
	4.2 Monostable, Astable, Bistable multivibrators		
	4.3 Typical applications		
	Practice: Timer circuits using 555 timer IC		
	1. Astable multivibrator		
	2. Mono stable multivibrator		
5.	5.0 Voltage and current sweep generators :	21	08
	5.1 General features of a time base signal.		
	5.2 Voltage and current sweep generator circuits.		
	1 Exponential sweep.		
	2 UJT sweep circuit.		
	3 Miller's theorem and Miller time base generator.		
	4 Bootstrap time base circuit		
	5 Transistor constant current sweep		
	Practice: 1. To study UJT Sweep circuit		
6.	6.0 Blocking Oscillator :	05	02
	6.1 Transformer blocking oscillator (Base and emitter timing).		
	6.2 Astable blocking oscillators (diode & RC controlled).		
	Practice:1. Assignment on Blocking Oscillator		
7.	7.0 Voltage Multipliers :	10	02
	Voltage doublers, triplers & quadrupler, applications.		
	Practice: 1. Voltage doubler circuit		

8.	8.0 Analog Integrated Circuits :	16	04
	8.1 Universal active filter		
	8.2 Switched capacitor butter worth filter		
	Practice:1. To study active filter IC.		
	Total	164	48

PRACTICE:

1. Inverting / non-inverting amplifier using opamp.
2. Op-amp as adder and scalar.
3. Study of op-amp parameters.
4. Op amp as differentiator.
5. Op amp as integrator.
6. Hysterisis comparator using op- amp.
7. Square wave generator using op amp.
8. Transfer characteristics of inverting amplifier.
9. Astable multivibrator using 555 timer IC.
10. Transfer characteristics of a dead zone circuit.
11. Gate crystal oscillator.
12. Schmitt gate oscillator
13. RC phase shift oscillator.
14. Voltage shunt feedback.
15. Voltage doubler.
16. Study of comparator.
17. Precision rectifier.
18. Active filter.
- 19.To study UJT sweep circuit
- 20.Weinbridge oscillator
- 21.Log/Antilog amplifier
- 22.Astable multivibrator using IC 555
23. Monostable MV using IC 555

6. IMPLEMENTATION STRATEGY (PLANNING) :

1. Teaching Plan
2. Minimum 12 practicals / Assignments.

7. REFERENCE BOOKS :

Sr.No	Author	Title	Publishers & Address
1.	Allen Mottershead	Electronic Devices & Circuits	PHI, New Delhi
2.	Jacob Millman Herbert Taub	Pulse, digital and switching waveforms	TMH, New Delhi
3.	Ramakant Gaikwad	Linear integrated circuits and Opamp	PHI, New Delhi
4.	J.Machael Jakob	Applications and Design with Analog integrated circuits	PHI, New Delhi

1. SUBJECT DETAILS:

Course: Diploma in Industrial Electronics
Subject: Electronic Devices & Circuits -II
Group: C *

Semester: V
Code:IE-40
Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks						
Th Hours per week	Tutorials Hrs. Per Wk.		Paper		TH	Sessional	T/W	Practical	Total
			Hrs	NP					
03	1.5	4.5	03	01	80	20	25	50	175

3. RATIONALE:

This course enables the students to understand symbol, construction, working & applications of devices like UJT, Thyristors, FET and Photoelectric devices. It also covers important applications of BJT like multi vibrators, Power amplifiers, and Tuned amplifiers.

4. OBJECTIVES:

After studying the subject the student will be able to

1. Understand the symbol, construction & characteristics of JFET, MOSFET, UJT, SCR, DIAC, TRIAC Photoelectric devices etc.
2. Understand and explain the applications of UJT, FET, SCR, DIAC, TRIAC Photoelectric devices etc.
3. Understand the need, working & application of power amplifiers & voltage tuned amplifier.
4. Understand & explain working of different BJT based multivibrators.
5. Design power amplifier, Schmitt trigger, Monostable multivibrator & C-S amplifier.

5. DETAILED CONTENTS:

Chapter Content Marks Hours

SECTION – I

- | | | | |
|----|--|----|----|
| 1. | 1.0 Power Amplifier :
1.1 Single ended and double ended amplifier
1.2 Class A transformer coupled amplifier
1.2.1 Conversion efficiency
1.2.2 Harmonic distortion
1.2.3 O/P power
1.3 Push pull amplifier, class A,B, AB operation
1.4 Complementary symmetry push pull amplifier
1.5 Heat sink
1.6 Problems based on above topics
1.7 Design of class A,B power amplifiers
1.8 Calculation of heat sink requirements.
Practice :
1. Frequency response of single stage Transformer coupled amplifier.
2. Study of class AB push pull amplifier. | 34 | 12 |
| 2. | 2.0 Voltage Tuned Amplifiers :
2.1 Need
2.2 Single tuned voltage amplifier
2.3 Double tuned voltage amplifiers
2.4 Frequency response, B.W., Av and selectivity. | 14 | 03 |

	Practice :		
	Frequency response of single tuned voltage amplifier.		
3.	3.0 FET :	34	12
	3.1 Construction and char. of JFET		
	3.2 Effect of temp.		
	3.3 JFET parameters		
	3.4 Configurations		
	3.5 Small signal FET model		
	3.6 FET biasing		
	3.7 Common source and common drain amplifiers		
	3.8 FET applications as V.V.R. in AGC, constant current source etc.		
	3.9 Design of single stage C-S amplifier.		
	3.10 MOSFET :		
	Construction and char. of D-MOSFET and E-MOSFET, data sheet		
	3.11 Problems based on above topics.		
	Practice :		
	1. JFET characteristics.		
	1. MOSFET characteristics.		
	2. FET biasing ckts.		
	3. Frequency response of FET amplifier.		

SECTION – II

4.	4.0 UJT :	12	03
	4.1 Construction		
	4.2 Equivalent circuit.		
	4.3 V.I. characteristics		
	4.4 Applications of UJT		
	4.4.1 UJT relaxation oscillator		
	4.5 Frequency stability		
	4.6 UJT data sheet.		
	Practice :		
	1. V.I. characteristics of UJT.		
	2. UJT relaxation oscillator.		
5.	5.0 Thyristors :	18	04
	5.1 Construction		
	5.2 Characteristics and Applications of SCR, DIAC, TRIAC		
	5.3 Analogy of SCR		
	5.4 Rating of above devices.		
	Practice :		
	1. SCR characteristics.		
	2. Diac characteristics.		
6	6.0 Multivibrators :	36	10
	6.1 Astable M.V.		
	6.2 Monostable M.V		
	6.3 Bistable M.V		
	6.4 Stable states		
	6.5 Triggering methods		
	6.6 Schmitt trigger		
	6.7 Applications of Schmitt trigger, Monostable, Astable & Bistable MVs.		
	6.8 Design of Schmitt trigger & monostable multivibrator using BJT.		
	Practice :		
	1. Study of astable/Bistable M.V.		
	2. VCO (Symmetrical A.M.V.		
	3. Schmitt trigger		
	4. Monostable multivibrator		

7.	7.0 Photoelectric Devices :	16	04
	a. Photoelectric effects		
	b. Construction and char. of photodiode, phototransistor, phototube, multiplier phototube, LED,LCD,		
	c. Optocoupler, photovoltaic cell and their applications		
	d. Burglar alarm.		
	Practice :		
	1. Phototube characteristics.		
		Total	164 48

Two assignments on following design topics.

- i. Power amplifier
- ii. Multivibrator
- iii. JFET C-S amplifier

PRACTICE:

1. Study of V.I. characteristics of UJT.
2. Study of UJT relaxation oscillator.
3. Study of SCR characteristics.
4. Study of Diac characteristics.
5. Study of Schmitt trigger.
6. Study of FET, MOSFET characteristics.
7. Study of FET amplifier.
8. Study of Astable, Bistable Multivibrator.
9. Study of Voltage Controlled Oscillator.
10. Study of Frequency response of single tuned voltage amplifier.
11. Study of Push pull amplifier.
12. Study of Phototube characteristics.

6. IMPLEMENTATION STRATEGY (PLANNING) :

1. Teaching Plan
2. Minimum 12 practicals/assignments

7. REFERENCE BOOKS:

Sr.No	Author	Title	Publishers & Address
1.	Millman and Halkias	Integrated Elex.	McGraw Hill International Edition
2.	Millman and Halkias	Electronic Devices and Circuits	McGraw Hill
3.	Robert Boylestad	Electronic Devices and Circuits	PHI, New Delhi
4.	Allen Mottershed	Electronic Devices and Circuits	PHI, New Delhi
5.	Millman & Taub	Pulse, digital and switching waveforms	TMH McGraw Hill
6.	Rammurthy	Thyristors and their application	East West New Delhi
8.	Bhargava	Basic Elex. and linear ckts.	TTTI, Chandigadh TMH, New Delhi
9.	M.M. Shah	Design of electronic circuits & computer aided design	Wiley Easten Mumbai
10.	Sunil Shah	Design of Basic Electronic Circuits	Jeevandeep Prakashan

1. SUBJECT DETAILS :

Course: Diploma in Industrial Electronics
Subject: Principles of Digital Techniques
Group: C*

Semester: V
Code: DE-37
Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per wk	Practical Hrs Per Wk		Paper			TH	Sessional	T/W	Pract	Total
		Hrs	NP	Mks						
03	1.5	4.5	03	01	100	80	20	25	50	175

3. RATIONALE :

Digital device technology plays a very important role in the modern world. Digital circuits are used in various day to day applications like toys, computers, calculators, satellites, microwave ovens, cellular phones etc. The digital systems with some kind of human interface will perform highly complex tasks with very high reliability and speed, unattainable by any other means. This course enables the students to learn the basic principles used in digital systems.

4. OBJECTIVES :

After studying the subject the student will be able to

1. Convert from one code to other.
2. Write the Boolean expression for a logic circuit.
3. Design combinational and sequential digital circuit.
4. Draw and analyse A/D and D/A conversion circuits.

5. DETAILED CONTENTS :

SECTION-I

Chapter	Content	Marks	Hours
1.	1.0 Number system and codes : 1.1 Binary 1.2 Octal 1.3 Hexadecimal 1.4 BCD 1.3 Gray Practice: 1. Assignment on code conversion	06	02
2.	2.0 Basic logic gates, Universal gates : 2.1 Boolean algebra 2.2 De Morgan's Theorems Practice: 1. Verification of DeMorgan's Theorems. 2. NAND/NOR as universal gates.	08	03
3.	3.0 Arithmetic elements : 3.1 Half adder, Full adder 3.2 Half subtractor, Full subtractor 3.3 1's complement, 2's complement subtraction 3.4 BCD adder Practice: 1. Half adder and Full adder using basic gates	08	03
4.	4.0 Design of combinational circuits : 4.1 K Map	30	08

	4.2 SOP and POS forms of equations		
	4.3 Min terms, Max terms		
	4.4 Design of circuits using universal gates		
	Practice : 1. Design of combinational circuit		
5.	5.0 Study of MSI, LSI circuits :	30	08
	5.1 Decoders, Encoders		
	5.2 Multiplexers, Demultiplexer		
	5.3 4 bit parallel adder		
	5.4 4 bit comparator		
	5.5 Parity generator, checker		
	5.6 Arithmetic and logic unit		
	5.7 PLA, PLD		
	Practice:		
	1. Study of decoder ICs.		
	2. Study of Multiplexer ICs.		
	3. Study of 4 bit parallel adder		
	4. Study of 4 bit comparator		
	5. Study of parity generator/checker.		
	6. Study of ALU		
	SECTION-II		
6.	6.0 Sequential circuits :	32	09
	6.1 Difference between combinational and sequential circuits.		
	6.2 Triggering of sequential circuits.		
	6.3 Flip flops – R-S, J-K-T, and D types.		
	6.4 Counters – Synchronous and asynchronous basic concept and design using excitation tables of flip flops e.g. Binary, BCD, Up/Down, Pre settable counters.		
	6.5 Four digit up/down counter IC 7217.		
	6.6 Shift registers – serial and parallel shift, universal shift register, and ring counter.		
	Practice:		
	1. J-K flip flop (7476), D flip flop (7474).		
	2. Design on counter using flip flop & gates.		
	3. Study of counters ICs.		
	4. Study of shift register ICs.		
7.	7.0 Semi-conductor memories :	20	06
	7.1 Random Access Memory : Static memory cell,		
	7.2 Dynamic memory cell, Internal organization, Read/Write operation.		
	7.3 Read Only Memory: Erasable Programmable ROM, EEPROM.		
	7.4 Memory Expansion – Serial and parallel expansion.		
	7.5 Study of memory ICs.		
	Practice:		
	1. Study of memory ICs.		
	2. Serial and parallel expansion of memory		
	3. Assignment on memory ICs		
8.	8.0 Logic families :	10	03
	8.1 Comparative study of different logic families like TTL, CMOS, ECL etc. considering following characteristics: Logic levels, Power dissipation, Fan in /		

Fan out, Noise immunity, Speed of operation.
8.2 Interfacings of ICs of different logic families.

Practice: 1. Interfacing of TTL & CMOS ICs

9. **9.0 Study of A/D & D/A Converters:** 20 06

9.1 Study of Analog to Digital conversion techniques successive approximation A/D converter – Dual slope A/D conversion, Flash A/D conversion, ICs based on each conversion method.

9.2 Study of Digital to Analog conversion Binary weighted resistor method, R-2R, Ladder method, ICs based on D/A conversion technique.

Practice:

1. Study of D to A conversion.
2. Study of A/D conversion.

Total 164 48

PRACTICE:

1. Study of logic gates.
2. Verification of De-morgan's theorem.
3. NAND as a universal gate.
4. NOR as a universal gate.
5. Study of half and full adders.
6. Study of decoder.
7. Study of BCD to seven segment decoder/driver.
8. Study of multiplexer.
9. Designing of combinational circuit.
10. Study of JK flipflop.
11. Study of D type flip flop
12. Study of decade counter.
13. Study of four bit parallel adder.
14. Study of DAC/ADC.

6. IMPLEMENTATION STRATEGY (PLANNING) :

1. Teaching Plan
2. Minimum 12 practicals/assignments.

7. REFERENCE BOOKS:

Sr.No	Author	Title	Publishers & Address
1.	Albert Paul Malvino & Donald P. Leach	Digital Principles & Application	Mc-Graw Hill International
2.	Morris Mano	Digital Logic & Computer Design	PHI, New Delhi
3.	James Bignell & Robert Donovan	Digital Electronics	Delmar & Thomson Learning
4.	TTL Data Sheets	-	-
5.	Intersil Data Sheets	-	-
6.	National Semi-conductor Data Sheets	-	-
7.	R.P.JAIN	Modern digital electronics	TMH

1. Subject Details:

Course: Diploma in Industrial Electronics	Semester: V
Subject: Servicing Techniques	Subject Code: IE-61
Group: M	Optional

2. Teaching and Examination Scheme:

Teaching Scheme		Credits	Examination Scheme & Maximum Marks							
Theory	Practical		Paper			Th	Sessional	T/W	Practical	Total
Hrs./week	Hrs/week		Hrs	Np	Mks					
01	02	03	-	-	-	-	-	50	50	100

3. Rationale

This subject will develop the basic skill of maintenance of equipments. It will also provide the necessary knowledge and competence in finding systematic repair of electronic test equipment. It also provides the information of maintenance management of service department/service enterprise in industry.

4. Objectives:

Student will be able:

1. To develop tracing, testing maintenance and trouble shooting knowledge.
2. To do the analysis of circuit.
3. To develop different fault finding techniques like visual inspection, tracing, voltage and signal analysis.
4. To find the equivalent components with the help of data book
5. Do effective use of internet.
6. Do effective use of computer, operation manual and service manual.

5. Contents:

Chapter	Name of the topic	Hours
01.	Reliability aspects of electronic equipments	04
	<ul style="list-style-type: none">• Traditional bath tub reliability curve• Generalized reliability curve• Mean time to fail• Failure rate• Mean time between failure• Mean time to repair• Mean time to restore time• Thermal acceleration• Practical reliability• Quality standards• Maintenance policy• Preventive maintenance	

	<ul style="list-style-type: none"> • Corrective maintenance • Qualitative maintenance 	
02.	Maintenance Management	02
	<ul style="list-style-type: none"> • Maintenance policy • Equipment service option • Types of contract • General contract provision • Maintenance organization • Training maintenance personnel • Planning of spare parts inventory • Assigning spare parts requirement • Essentials of good equipments management program • Acquisition program • Planning of utilities • Incoming inspection • Inventory control • User training • Technical training • Management of service manual and reference library • Maintenance arrangement • Calibration check • Preventive maintenance • ALERT issue • Quality assurance • Installation procedure • Environmental conditions 	
	<ul style="list-style-type: none"> • Humidity 	
	<ul style="list-style-type: none"> • Shock and vibrations Protection from electromagnetic interference • Safety • Service and Maintenance laboratories • Work bench • Lighting • Storage • Maintenance system overview • Log book • Performa for recording specification • Performa for preventive maintenance • Performa for corrective maintenance • Data analysis • Information tags • Personal safety 	
03.	Fundamental Troubleshooting Procedure	02

- Reading of block diagram
- Reading of circuit diagram
- De-assemble
- Re-assemble
- Trouble shooting process
- Fault establishment
- Fault correction
- Fault finding aids
- Service, Maintenance and Instruction manual
- Test and Measuring tools
- Pre troubleshooting techniques
- Preliminary Observation
- Function area approach
- Split half method
- Divergent path
- Convergent path
- Feedback path
- Systematic troubleshooting checks
- Check control setting
- Check associated equipments
- Visual check
- Calibration
- Isolate the troubling circuit
- Measurement
- Individual component

04. Troubleshooting Procedure 02

1. Visual inspection
2. Measure
 - Voltage levels
 - Presence of signal waveform
3. Component failure
 - Out of circuit test
 - In circuit test
4. Signal tracing
5. Functional analysis

05. Troubleshooting Aids Tools 02

- Service manual
- Circuit diagram
- Circuit board location
- Voltage analysis
- Fault finding flow check
- Diagnostic software
- List of replaceable parts

06. Data Manuals 02

Troubleshooting Technique

	1. Voltage analysis	
	2. Signal injection	
	3. Signal tracing	
07.	Computer Maintenance	02
	• Need of preventive maintenance	
	• Assembling of PC.	
	• Installation of O.S.	
	• Trouble shooting	
	• Hardware: Peripherals	
	• Software	
	TOTAL	16

Practice:

1. Testing of resistor, capacitor and inductance by using multimeter, LCR Q meter and CRO.
2. Testing of transistor by using multimeter, transistor tester and CRO.
3. Testing of IC using IC tester.
4. Testing of variable resistor, connectors, switches by using multimeter.
5. Testing of diode, zener diode, varactor diode, Photo diode, Tunnel diode, LDR, thermistor, 7 segment display, FET, MOSFET, SCR, Triac with the help of multimeter.
6. Layout of components in given power supply
 - Tracing of voltage regulation section in given power supply
 - Voltage analysis in given power supply
 - Fault finding in given power supply by voltage analysis method.
7. Layout of components for given function generator
 - Tracing of alternation section used in function generator
 - Voltage analysis in given function generator
 - Fault finding in function generator by voltage analysis method.
8. Layout of components for given CRO
Tracing a vertical section of CRO.
9. Fault finding of memory, connector and power supply in PC.

Assignment: List of different tools and materials with specifications.

6. Implementation Strategy (Planning):

1. Teaching Plan
2. Minimum 12 practical / assignments.

7. Reference Books:

S. No.	Author	Title	Publication
1.	R.G. Gupta	Electronic instruments & systems	TMH
2.	R.S. Khandpur	Trouble shooting of Electronic equipment	TMH
3.	Scott Muller	Upgrading and Repairing of PC	Pearson Education

VI
SEMESTER
INDUSTRIAL ELECTRONICS

1. SUBJECT DETAILS:

Course: Diploma in Industrial Electronics
 Subject: Principles of Control System
 Group: A

Semester: VI
 Subject Code: IE-67
 Optional

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs. per week	Practical Hrs. per week		Paper			Th	Sessional	T/W	Practical (oral)	Total
			Hrs	NP	Mks					
03	1.5	4.5	03	01	100	80	20	25	50	175

3. RATIONALE :

This subject helps to develop understanding of concept like stability of a system; and how feedback is an important technique of improving characteristics of system.

4. OBJECTIVES :

After studying the subject the student will be able to

1. Understand concept of closed loop system.
2. Understand concept and techniques of time domain analysis.
3. Understand concepts and techniques of frequency domain analysis.
4. Understand working of servo components.

5. DETAILED CONTENTS :

SECTION-I

Chapter	Content	Marks	Hours
1.	1.0 Control System : 1.1 Open loop control system and closed loop control system. 1.2 Elementary form of control system. 1.3 Block diagram representation of system. 1.4 Transfer function of the system, effect of feedback on control system.	20	08
2.	2.1. Introductory ideas of laplace transforms and its use in solving differential equation. 2.2 Description of time domain behaviors of control system. 2.3 Steady state and transient response. Time domain specifications. Characteristics equation of the system. 2.4 Roots of the equation and system response. 2.5 Steady state error analysis problems. Test Signals .Type of the system.	44	18
3.	3.0 Stability : 3.1 Stability of the system – absolute stability, relative stability, 3.2 Routh's criteria, 3.3 Nyquist criteria – problems.	18	06

SECTION-II

4.	4.1 Description of frequency domain behavior of control system. 4.2 Frequency domain specification. Bode diagram.	18	06
5	5.0 Study of servo components : 5.1 Potentiometers, synchro elements- construction, principle of operation, applications. 5.2 Simple theory of servomechanism – A.C. position servomechanism D.C. position servomechanism. A.C. servomotor, D.C. servomotor – advantages and disadvantages.	40	14

- 5.3 Amplidyne – Ward Leonard system of speed control.
- 5.4 Servo amplifier – servo modulators and demodulators.
- 5.5 Stepper motor applications. System examples – Digital servo system, Voltage regulator system.

6..	6.1 Effect of gain on the system performance	24	04
	6.2 Effect of derivative control & integral control.		
	6.3 Compensation networks – lag lead, effect of Tachometer rate feedback control.		
	Total	164	48

PRACTICE:

1. Synchro transmitter.
2. Synchro pair as an error detector.
3. Compensatory networks – Lag .
4. Compensatory networks – Lead .
5. Linear Potentiometer characteristics.
6. Characteristics of A.C. servomotor.
7. Transistor modulator.
8. Phase sensitive detector.
9. Stepper motor.
10. D.C. positional servo system.
11. Study of A.C. positional servo system.
12. Study of D.C. positional servo system.
13. Characteristics of A.C. servomotor.
14. Potentiometer pair as an error detector.

6. IMPLEMENTATION STRATEGY (PLANNING):

1. Teaching Plan
2. Minimum 12 practical/assignments in the term.

7. REFERENCE BOOKS:

Sr.No.	Author	Title	Publishers & Address
1.	S.C.Goyal and U.A.Bakshi	Principles of Control System	Technical Publication, Pune
2.	Benjamin C. Kuo	Automatic Control System	PHI
3.	I. J. Nagrath/ M. Gopal	Control System Engineering	Wiley Eastern Ltd.(New Delhi)

1. SUBJECT DETAILS :

Course: Diploma in Industrial Electronics	Semester: VI
Subject: #Elements of Communication Engg.	Subject Code: IE-66
Group: A*	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks						
Theory Hrs. per week	Practical Hrs per week		Paper		Th	Sessional	T/W	Practical (oral)	Total
			Hrs.	Np					
04	1.5	5.5	03	01	80	20	25	50	175

3. RATIONALE :

This course enables the students to understand fundamentals of telecommunication. The knowledge of communication is essential in the world of information Technology.

4. OBJECTIVES :

After studying the subject the student will be able to

1. Explain the analog and digital modulation techniques.
2. Draw the circuits for radio and analyse the waveforms.
3. Identify the need for multiplexing communication signals.
4. Draw the radiation pattern for antenna.
5. Understand T.V. and data communication.

5. DETAILED CONTENTS :

SECTION-I			
Chapter	Content	Marks	Hours
1.	1.0 Introduction to communication system: 1.1 Block diagram of communication system 1.2 Need for modulation 1.3 Bandwidth requirements	02	01
2.	2.0 Amplitude Modulation: 2.1 Amplitude modulation theory 2.1.1 Frequency spectrum of AM Wave 2.1.2 Representation of AM Wave 2.1.3 Power relation in AM Wave 2.1.4 Problem based on AM Wave 2.2 Generation of AM Wave 2.2.1 Basic requirement 2.2.2 Grid modulation class 'C' Amplifier 2.2.3 Plate modulation class 'C' Amplifier 2.2.4 Collector modulation 2.2.5 AM transmitter block diagram	14	06
3.	3.0 Single sideband technique: 3.1 Suppression of carrier 3.1.1 Effect of non linear resistance on added signals 3.1.2 Balance modulator 3.2 Suppression of unwanted sideband 3.2.1 The filter system 3.2.2 Phase shift method	09	03
4.	4.0 Frequency modulation: 4.1 Theory of frequency and phase modulation 4.1.1 Mathematical representation of FM wave 4.1.2 Frequency spectrum of FM Wave 4.1.3 Phase Modulation 4.2 Noise and frequency modulation 4.2.1 Effect of noise on carrier noise triangle	14	06

	4.2.2 Pre emphasis and de emphasis 4.2.3 Comparison of Wide Band and Narrow Band FM 4.3 Generation of frequency modulation 4.3.1 Direct method 4.3.2 Stabilized reactance modulator-AFC 4.3.3 Indirect method		
5.	5.0 Radio receiver: 5.1 Receiver type 5.1.1 Tuned radio frequency(TRF) receiver 5.1.2 Superhetrodyne receiver 5.2 AM receiver 5.2.1 RF section and characteristics 5.2.2 Frequency changing and tracking 5.2.3 Intermediate frequency and IF amplifier 5.2.4 Detection and automatic gain control(AGC) 5.3 FM receiver 5.3.1 Amplitude limiting 5.3.2 Basic AM demodulator 5.3.3 FM detectors frequency and phase discriminators	15	05
6.	6.0 Pulse communication: 6.1 Introduction-types 6.2 Pulse width modulation-PWM 6.3 Pulse position modulation-PPM 6.4 Pulse code modulation-PCM	06	03
7.	7.0 Multiplexing Schemes: 7.1 Types-frequency division and time division	06	02
8.	8.0 Noise: 8.1 Types of noise 8.2 Noise calculation 8.3 Noise figure, noise temperature 8.4 Problem based on above topics	08	03
9.	9.0 Phase locked loop: 9.1 Block diagram 9.2 Study of PLL IC 565 9.3 Applications	08	03
	SECTION-II		
10.	10.0 Radiation and Propagation of Wave : 10.1 Electromagnetic Radiation 10.1.1 Fundamental of EM Wave 10.1.2 Effect of environment 10.2 Propagation of Wave 10.2.1 Ground Wave 10.2.2 Sky Wave Propagation-Ionosphere 10.2.3 Space Wave 10.2.4 Tropospheric Wave Scatter Propagation	16	06
11.	11.0 Antenna: 11.1 Radiation Mechanism 11.2 Wire Radiator in space 11.2.1 Current and Voltage distribution 11.2.2 Resonant antenna 11.2.3 Non-Resonant antenna 11.3 Terms and definitions 11.3.1 Antenna gain 11.3.2 Antenna resistance 11.3.3 Bandwidth, Beamwidth and Polarization 11.4 Effect of Ground antenna 11.5 Directional high frequency antenna 11.5.1 Dipole arrays 11.5.2 Folded dipole and applications 11.5.3 Non Resonant antenna-The Rhombic antenna 11.6 Microwave antenna	22	08

	11.6.1 Antenna with parabolic reflection 11.6.2 Horn antenna 11.7 Wideband and special purpose antenna 11.7.1 Helical antenna 11.7.2 Loop antenna		
12.	12.0 Monochrome Television : 12.1 Picture transmission 12.2 TV transmitter 12.3 TV receiver 12.4 Synchronization 12.5 Aspect ratio 12.6 Scanning 12.7 Picture resolution 12.8 Composite video signal 12.9 VSB(Vestigial Sideband) 12.10 Interference suffered by TV signal 12.11 TV broadcast channel 12.12 Monochrome TV receiver	20	09
13.	13.0 Colour Television: 13.1 Additive colour mixing 13.2 Luminance signal 13.3 Compatibility 13.4 Colour difference signal 13.5 Chrominance signals 13.6 PAL-Encoder 13.7 PAL-D-Colour receiver 13.7.1 Chroma Decoder	18	07
14.	14.0 Digital Television: Transmission and Reception 14.1 Digital satellite TV 14.2 Direct to home digital satellite TV	06	02
	Total	164	64

Practice:

1. Study of AM,FM,SSB Modulation/Demodulation
2. Study of Noise,distortion.
3. Audio Amplifier.
4. AM,FM receiver.
5. Pulse Width Modulation.
6. Study of PLL
7. F.S.K
8. P.S.K
9. Study of composite video signal.
10. Monochrome/Colour T.V. receiver.
11. Study of Antenna Radiation Pattern.

6. IMPLEMENTATION STRATEGY (PLANNING) :

1. Teaching Plan.
2. Minimum 12 practical/assignments in the term.

7. REFERENCE BOOKS :

Sr.No.	Author	Title	Publishers & Address
1.	George Kennedy	Electronic Communication System	TMH
2.	Taub and Schilling	Principles of Communication System	TMH, New Delhi
3.	Wayne Tomasi	Advance Electronic Communication	PHI, New York
4.	R.R. Gulati	Monochrome & Colour T.V.	Wiley Eastern Bombay

1. SUBJECT DETAILS :

Course: Diploma in Industrial Electronics
 Subject: Measurement Techniques and Measuring Instruments
 Group: C *

Semester: VI
 Code:IE-41
 Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	SSL	T/W	oral	Total
			Hrs	N/p	Mks.					
03	1.5	4.5	03	01	100	80	20	25	50	175

3. RATIONALE :

To become a good Technician in electronics, the student must understand, select, measure, and use proper testing & measuring instruments and must be aware of all errors & remedies. They should also be capable of measuring all parameters and use methods in connection with test and measuring procedure.

4. OBJECTIVES :

After studying the subject the student will be able to

6. Identify, label the PMMC instrument.
7. Draw circuits of electronic voltmeter, FET voltmeter.

Measure voltage & current and extend the range of measuring instruments.

9. Measure resistance, inductance, capacitance using DC/AC bridges and using ohmmeters.

10. Measure voltage, current, frequency & phase using CRO.

6. Draw signal generator AF/RF diagrams and use if for testing purpose.

1. Measure Q of a circuit and dissipation factor using LCR-Q meter.

5. Measure distortion in an amplifier.

6. Use D.S.O. for measuring applications.

5. DETAILED CONTENTS :

SECTION-I

Chapter	Content	Marks	Hours
1.	1.0 Measurement Terminology: 1.1 Definition of measurement & instruments, 1.2 Accuracy, error, precision, range, sensitivity 1.3 Types of errors in measurement and remedial methods 1.4 Merits & de-merits Practice: 1. Assignment on Measurement terminology	16	03
2.	2.0 Standards: 2.1 Requirements of standards 2.2 Primary, secondary, working standards 2.3 Concept of calibration & calibration check uncertainty. Practice: 1. Assignment on need of standards and Calibration	10	03
3.	3.0 Permanent magnet moving coil galvanometer: 3.1.Theory, working & construction of PMMCG 3.2 Measurement of voltage current and resistance using PMMCG 3.3 Extension of range, Ayrton shunt 3.4 PMMCG multi meter advantages and limitations Practice: 1. Extension of range of ammeter 2. Extension of range of volt meter	20	06

	3. Series ohmmeter		
	4. Shunt ohmmeter		
4.	4.0 Electronic volt/Ohmmeters :	28	08
	4.1 Principle, working of FET voltmeter		
	4.2 Transistorized voltmeter		
	4.3 AC milli volt meter		
	4.4 Chopper type electronic DC volt meter.		
	4.5 Ohmic sensitivity of volt meter		
	4.6 Loading effect, remedies, concept of high input impedance to measuring instrument		
	4.7 Principle and operation of DVM		
	4.8 DVM specifications		
	4.9 Measurement of AC/DC voltage, current and resistance		
	4.10 Advantages of DVM, types of DVM.		
	Practice: 1. FET Volt meter		
	2. Loading effect measurement		
	3. Rectifier type instrument		
5.	5.0 Time and frequency Measurement:	08	04
	5.1 Frequency and time standards		
	5.2 Measurement of frequency		
	5.3 Block schematic of frequency counter		
	5.3 Measurement of frequency and time		
	Practice: 1. Assignment on frequency counter		
	2. Assignment on voltage to time conversion		
	<u>SECTION-II</u>		
6.	6.0 Resistance and impedance bridges :	20	06
	6.1 Introduction to DC resistance bridges		
	6.2 Errors in balancing bridge		
	6.3 Kelvin double bridge		
	6.4 Concept of guard applications		
	6.5 Potentiometric measurements		
	6.6 AC bridges Types of sources and detectors		
	6.7 Maxwell's bridge		
	6.8 Hay's bridge		
	6.9 Capacitance comparison bridge and RLC bridge, applications		
	Practice : 1. Demonstration of RLC bridge		
	2. Assignment on AC bridges to calculate unknown values of L,C		
	3. Measurement of input impedance		
7.	7.0 Signal generators :	16	04
	7.1 Block schematic of A.F. and R.F. generators, explanation of each block inside		
	7.2 Specification and application of signal generators		
	7.3 Function generator		
	7.4 Block diagram		
	Practice: 1. Assignment on schematic diagram of AF signal generator along with the power supply and attenuator		
	2. Demonstration on RF Generator		
8.	8.0 Q Meter :	16	03
	8.1 Theory and explanation of the circuit		
	8.2 Measurement of Q,L,C and dissipation factor.		
	Practice: 1. Measurement of Q & dissipation factor of C		
9.	9.0 Distortion factor meter :	16	04
	9.1 Harmonic distortion		
	9.2 Theory of tuned harmonic analyzer		
	9.3 Heterodyne harmonic analyzer		
	9.4 Measurement of harmonic distortion		
	Practice: 1. Measurement of distortion		
10.	10.0 Cathode Ray oscilloscope:	14	07
	10.1 Study of block diagram and function of each block of CRO		

- 10.2 Deflection sensitivity and Deflection factor of CRT
 - 10.3 Special features of dual trace, double beam, delayed sweep and storage oscilloscopes
 - 10.4 Measurement of voltage, frequency, phase
 - 10.5 Study of Lissajous, Z-modulation, waveform analysis and comparison.
 - 10.6 Special features and application of DSO
- Practice: 1. Study of Lissajous pattern
- 2. Measurement of phase of two signals
 - 3. Frequency comparison and to find the unknown frequency
 - 4. Measurement of voltage and frequency
 - 5. Component testing.

Total 164 48

PRACTICE:

- 1. Extension of range of ammeter./ Extension of range of voltmeter.
- 2. Series ohmmeter/Shunt ohmmeter.
- 3. Demonstration of RLC bridge/RF Generator
- 4. . Measurement of distortion
- 5. FET Voltmeter.
- 6. Loading effect measurement.
- 7. Rectifier type instrument.
- 8. Measurement of input impedance.
- 9. Study of Lissajous pattern.
- 10. Measurement of phase of two signals.
- 11. Frequency comparison and to find the unknown frequency.
- 12. Measurement of voltage and frequency ,component testing using CRO.
- 13. . Measurement of Q & dissipation factor of C

6. IMPLEMENTATION STRATEGY (PLANNING) :

- 1. Teaching Plan
- 2. Minimum 12 practicals/ assignments

7. REFERENCE BOOKS :

Sr.No	Author	Title	Publishers & Address
1.	W.D.Cooper	Electronic Instrumentation & Measurement Techniques Measurement	PHI, New Delhi
2.	Golding E.W.& Widdis	Electrical Measurement & Measuring Instruments	TMH, New Delhi
3.	Chiang H.H.	Electrical & Electronics Instrumentation	Dhanpatrai & Sons New Delhi
4.	Terman & Petit	Electronic Measurement	TMH, New Delhi

1. SUBJECT DETAILS :

Course: Diploma in Industrial Electronics
Subject: #Principles of Instrumentation
Group: A*

Semester: VI
Subject Code: IE-60
Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs. per week	Practical Hrs. per week		Paper			Th	Sessional	T/W	Practical (oral)	Total
			Hrs	NP	Mks					
03	1.5	4.5	03	01	100	80	20	25	50	175

3. RATIONALE :

It is necessary to fully understand the system under investigation before suggesting suitable transducers and then utilize the electronic support. It is also necessary to know the basic principles of transducers and show how each of them can be used for the measurement of large number of variables.

4. OBJECTIVES :

After studying the subject the student will be able to

1. Select proper transducer for particular application.
2. Use proper signal conditioning circuit.

Design a complete system for the measurement of non electrical quantities.

5. DETAILED CONTENTS :

SECTION-I

Chapter	Content	Marks	Hours
1.	1.0 Instrumentation : Fundamentals, Instrumentation terminology: error, Accuracy, Precision, Sensitivity, Reliability, Sources of error in instruments.	12	02
2.	2.0 Transducers and primary sensors : 2.1 Transducers in measurements. Transducer: actuating mechanism, types of transducers voltage and current generating transducer, piezoelectric, photoelectric, thermoelectric, magnetoelectric, variable parameter analog transducers, frequency generating transducers, transducer selection factors. 2.2 Applications of the above transducers for measurement of speed, displacement, acceleration, vibration, strain, pressure, level, temperature, flow, PH and conductivity. 2.3 Transducers for Biomedical application. Instrumentation for clinical laboratory.	10 36 24	03 12 07

Practice:

1. Measurement of displacement.
2. Thermocouple characteristics.
3. Thermistor characteristics.
4. RTD characteristics.
5. Strain guage.
6. Photo transducer

SECTION-II

3.	3.0 Amplifiers and signal conditioning : 3.1 Input modification, balance bridges inputs 3.2 Instrumentation amplifiers, 3.3 chopper modulators, solid state modulators and demodulator. 3.4 Analog and digital measurements, A/D and D/A conversion 3.5 Isolation and current loop transmitters. Practice: 1 Instrumentation amplifier. 2 Diode chopper modulator. 3 Analog to digital converter. 4 Digital to analog converter 5 V to I and I to V converter. 6 Voltage to frequency converter. 7 Study of comparator	32	10
4.	4.0 Indicating and recording devices : 4.1 Analog indicators, oscillograph and graphic recorders 4.2 Numerical and digital indicators 4.3 Data acquisition system 4.4 printers Practice: 1. Digital panel meter	16	04
5.	5.0 Systems for control and measurement of displacement, speed, acceleration, pressure, level temperature etc. using above blocks. Practice: 1. Assignment on system design	16	04
6.	6.0 Interference signals : Capacitive interference, inductive interference and shielding, conductively coupled interference, ground loop interference. Practice: 1. Assignment on interference signals	12	04
7.	7.0 Signal to noise considerations : Fluctuation and noise in measurement system. Sources of noise. Practice: 1. Assignment on signal to noise considerations	06	02
	Total	164	48

PRACTICE:

1. Measurement of displacement using L.V.D.T.
2. Photosensor.
3. Strain guage.
4. Thermocouple characteristics.
5. Thermistor characteristics.
6. V to I and I to V converter.
7. Diode chopper modulator.
8. Instrumentation amplifier.
9. IC 7107/ IC 7106 .
10. Voltage to frequency converter.
11. Quad comparator IC LM 339.
12. Study of DAC 0808.
13. RTD characteristics.
14. Digital panel meter
15. study of ADC
16. Solid state temperature transducer

6. IMPLEMENTATION STRATEGY (PLANNING):

Teaching Plan.

1. Minimum 12 practicals/assignments in the term.

7. REFERENCE BOOKS:

Sr.No.	Author	Title	Publishers & Address
1.	A.K. Sawhney	A course in electrical and electronic measurement & instrumentation	Dhanpatrai & Sons, New Delhi.
2.	Curtis Johnson	Process control instrumentation technology	PHI, New Delhi.
3.	H.S. Kalsi	Electronic instrumentation	TMH, New Delhi.
4.	Joseph Carr John M.Brown	Introduction to bio-medical equipment technology	Pearson Education, (Singapore) Pte Ltd, New Delhi.
5.	StanleyWolf Richard Smith	Students reference manual	PHI, New Delhi.

1. Subject Details

Course: Diploma Industrial Electronics	Semester VI
Subject: FUNDAMENTALS OF COMPUTER AND NETWORKING SYSTEM (CA-54)	
Group: Core	Optional

2. Teaching and Examination Scheme

Teaching Scheme			Credits	Examination Scheme and Maximum Marks							
Theory Hrs Per Wk.	Pract Hrs per wk	Tut Hrs per wk		Paper			TH Reduced to	Sessional Marks	T/ W	Pract	Total
			Hrs	N/P	Mks						
2	3	-	5	-	-	-	-	20	50	50	120

3. RATIONALE:

This subject envisages to make the students know the fundamentals of computer systems and its organization. It will enable the students to comprehend the organization and working of various units of personal computer system for storing and processing information. It will also help the students to have hands on experience of operating systems and different application software used for office automation, day to day problems sharing in particular for creating business documents, data analysis graphical representations and business presentations. It also deals with basics of Internet technology available services internet connectivity and accessing information on internet. The student will also familiarize themselves with case study on Linux o.s., its design architecture, command structures, utilities and Linux.

4. OBJECTIVES:

The student will be able to:

1. Get familiarized with computerization.
2. Utilize computers in engineering /technical field.
3. Use computer concepts for Microsoft applications
4. Promote Computer Literacy and Programming Skills.
5. Made to expose towards computer area.
6. Learn networking concepts
7. Operate Internet/e-mail facility
8. Study of Linux as Operating System and Shell Programming.

5. DETAILED CONTENTS :

Chapter	Content	Marks	Hours
1	<p>1.0 Fundamentals of Computer concepts</p> <p>1.0 To acquaint with computer Hardware and Software, To get familiar with various operating system (DOS);</p> <p>1.2 To use DOS internal commands ;To familiarise with DOS external commands;</p> <p>1.3 To study of computer specifications PC,PC-XT, PC-AT, Pentium and its applications,</p> <p>1.4 General architecture of computers; Computer peripherals (I/O Device),CD player , Storage units , floppy diskette , printers and output peripherals;</p> <p>1.5 General computer terms, computer software, applications software, operating systems, utilities packages, languages, advantages of software and application packages.</p> <p>Practice: 1. Study of Computer hardware and peripherals</p>	20	06
2.	<p>2.0 Introduction to Windows:</p> <p>2.1 Structure of a Window, Basic techniques for working in Windows.</p> <p>2.2 Using Menus</p> <p>2.3 Working with A dialogue box, Type of Options</p> <p>2.4 Starting Windows , Task Bar, Start Menu</p> <p>Practice: 1. Study of DOS Internal and External Commands 2. Getting started with Windows by using different menus and working with dialogue box 3. Study of Control panel , Screen saver and Help commands using Windows</p>	10	05
3.	<p>3.0 Introduction to WORD package</p> <p>3.1 Starting Word; The Word Screen; Getting to Word Document:</p> <p>3.2 Typing and Editing : Editing text, Copying and Moving, Typing Special Characters (Symbols);</p> <p>3.3 Some common features: Changing the case of text, Moving & copying text with drag and drop, Justifying text.</p> <p>3.4 Creating bulleted & numbered lists, Arranging and moving between open documents.</p> <p>3.5 Finding and replacing, formatting.</p> <p>3.6 Using the spell checker, Checking grammar.</p> <p>Practice: 1. Creating, Editing and Saving a document , Table using Word package creating 2. Document with Table ,editing using special characters & saving. 3. Study of tool bar menus like Standard , Formatting , Tables and Borders</p>	15	02

	4. Study of spell check , find , replace , go to , page setup , print preview and print commands.		
4	<p>4.0 Concepts of POWER POINT</p> <p>4.1 What is Business graphics : Types of Business Graphics, How to make an effective presentation,</p> <p>4.2 Physical aspects of presentation; A Presentation Graphics package ;</p> <p>4.3 Creating a presentation : creating a Title slide, Creating a Graph, Creating Tables, Make Organization Chart, To Save and close presentation; Working with Tools: Create , Edit, Move, Delete , Resize , Format text object, Working with Graphics tools;</p> <p>4.4 Slide show</p> <p>Practice: 1. Creating a new presentation and getting acquainted with various menus like FILE, EDIT, VIEW, INSERT, FORMAT, TOOLS, SLIDESHOW</p> <p>2 Choosing Auto Layout and working with tools and to prepare a slide show</p> <p>3. To study special effects using one slide show demonstration</p>	15	02
5	<p>5.0 Fundamentals of EXCEL</p> <p>5.1 Starting EXCEL: What is a spreadsheet creating & editing spreadsheet, modifying the sheet.</p> <p>5.2 Study of Toolbars, Formula bar and Status bar.</p> <p>5.3 Inserting Header and footer, cells, rows, columns, worksheet.</p> <p>5.4 Formatting individual cells row, column, sheet, manipulating data by using Sort.</p> <p>5.5 Saving and Retrieving saved worksheet.</p> <p>Practice: 1.Creating Spread Sheet for various combination of computational tables.</p>	15	02
SECTION-II			
6	<p>6.0 Linux Fundamentals</p> <p>6.1 Linux Fundamentals:- Basics of Unix and Linux.</p> <p>6.2 Multi-User and Multitasking capacities of Linux, change of password, the file types, structure of file system, important directories of the file system.</p> <p>Practice: 1.Linux basic commands.</p> <p>2.Linux Advanced commands</p>	25	06
7	<p>7.0 Introduction to Shell Programming :</p> <p>7.1 What is Shell</p> <p>7.2 Tools for working with Linux and Shell programming, Function of Shell</p> <p>7.3 Access permission of file in Linux, editing files with V1, important commands related to V1 editor.</p> <p>7.4 Introduction to Bash Shell Basics, Shell Bash variables, basics scripts element (input/output).</p> <p>7.5 Simple Shell Programs.</p> <p>Practice: 1.CREATING FILE USING V1 editor, editing, saving file and quit from V1 editor.</p> <p>2. Study of different run levels.</p>	24	05

	3. Shell programming-I 4. Shell programming-II. 5. Study of KDE environment		
8	8.0 Networking and LAN commands 8.1 Network Concept and classification; 8.2 Local Area Network(LAN) : LAN Topology, LAN Software/ Operating System. 8.3 LAN commands and elementary Administrative commands like ATTACH, BROADCAST CAPTURE, LOGIN, LOGOUT, MAP, REVOKE, RIGHTS, SYSCON, SYSTIME. Practice: 1. Networking concepts and LAN commands. 2.Introduction to administrative command like Create Users, Mapping , Assigning , etc.	20	02
9	9.0 Introduction to INTERNET : 9.1 What is INTERNET, Application of INTERNET 9.2 E-mail, TELNET, WWW, Study of various search engine using LYNX, LOGIN PROCEDURE. 9.3 Study of INTERNET EXPLORER, Creating mailing account, Difference between SHELL and TCP/IP account. 9.4 Surfing using WORLD WIDE WEB information relating to employment, education, alumni. Practice: 1. Internet terms , Use of Shell account and study of mailing , Software to send & receive mail on Hard Disk. 2. To study internet explorer package & retrieve education related information from TCP/IP account and downloading procedure.	20	02
		Total	32

Note:- Minimum of twelve experiments must be performed /completed in journal for approval of term work acceptance other than the 75% requirement of attendance.

Sr. No.	Main Topics	No. of Contact Hrs.	Marks	Weightage %	# M / E / D
1.	Fundamentals of Computer concepts	06	20	12	E
2.	Introduction to Windows	05	10	07	E
3.	Introduction to WORD package	02	15	09	M
4.	Concepts of POWER POINT	02	15	09	M
5.	Fundamentals of EXCEL	02	15	09	M
6.	Linux Fundamentals	06	25	16	M
7.	Introduction to Shell Programming	05	24	14	M
8.	Networking and LAN commands	02	20	12	M
9.	Introduction to INTERNET	05	26	16	E
	Total	32	164	100%	#

(# M=Most Essential, E=Essential, D=Desirable)

6. IMPLEMENTATION STRATEGY (Planning)

- i) Teaching Plan
- ii) Lesson Plan
- iii) Assignments

7. REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & address
1	Hunt & Shelly.	Computer and Common sense			
2	V. Rajaraman	Computer Fundamentals			(Prentice hall)
3		PC Guide for Windows			(ITC Publication / Galgotia publication)
4	Galgotia.	Learning Word 6.0 for Windows step-by-step			
5	Preilerson	Linux: The computer reference – 5/E			
6		Unleashed Linux			
7		Mastering MS Office			BPP Publication
8	U.D. Black	Data Communications and Distributed Networks			Prentice-Hall

1. SUBJECT DETAILS:

Course: Diploma in Industrial Electronics	Semester: VI
Subject: Signals and Systems	Subject Code: DE-62
Group: A	Optional

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs. per week	Practical Hrs. per week		Paper			Th	Sessional	T/W	Practical (oral)	Total
		Hrs	NP	Mks						
03	1.5	4.5	03	01	100	80	20	25	50	175

3. RATIONALE:

The subject of Signals and Systems has assumed great importance in the recent time because of increasing practical use of signal analysis in Digital Signal Processing(DSP). This field finds practical applications in speech analysis, processing and compression. Particularly in medical field (ultra sound imaging, CT scan). Signal processing also finds extensive applications in telephony, radar, sonar and space probes.

4. OBJECTIVES:

After studying this subject the students will be able to:

1. Analyze different signals.
2. Find fourier analysis of continuous and discrete time signals.

5. DETAILED CONTENTS:

Section I

	Hrs.	Marks
1. Introduction to signals	08	16
- Discrete and continuous signals		
- Transformation of signals, the need and requirements		
- Standard test signals unit step and unit impulse in both domain.		
- Periodicity concepts.		
2. System	04	18
- Introduction and overview of a system		
- Properties of system like		
1.Memory		
2.Invertibility		
3. Causality		
4. Stability		
5. Time invariance		
6. Linearity		
3. Linear time invariant system(LTI)	20	48

- Importance of LTI system
- 1. Signals in terms of impulse of signals
- 2. Convolution sum of LTI discrete systems
- 3. Convolution integral of LTI continuous systems
- 4. Properties of LTI system
- 5. Unit step response of LTI system
- 6. Representation of LTI system using differential and difference equations
- 7. Block diagram representation of systems

Section 2

4. Continuous time signals and systems(CT) <ul style="list-style-type: none"> - Fourier analysis 1. The response CT LTI system to complex exponentials 2. Fourier series representation of CT LTI periodic signals 3. Fourier series representation of periodic signals (Fourier Transforms) convergence of Fourier transforms 4. Properties of Fourier transforms parseval's equation 5. Frequency response of systems by linear constant coefficient differential equation. Typical example of first order and second order system. 	16	40	
5. Fourier representation of discrete time LTI system <ul style="list-style-type: none"> 1. The response of discrete time LTI system to complex exponentials(discrete time Fourier transforms DTFT) 2. Representation of periodic signals using DTFT 3. Properties of DTFT 4. Duality of DTFT and Fourier series coefficient 5. Frequency response of LTI system characterized by difference equation 	16	42	
Total	48	164	

PRACTICE:

1. Study of different signals.
2. Assignments on different types of systems.
3. Problems on
 - a. LTI system.
 - b. convolution.
 - c. fourier series .
 - d. fourier transform.
 - e. DTFT

6. IMPLEMENTATION STRATEGY (PLANNING) :

3. Teaching Plan
4. Minimum 12 problems /assignments.

7. REFERENCE BOOKS:

Sr. No	Author	Title	Publishers & Address
1.	Oppenheim Wilsky and Young	Signals and Systems	PHI
2.	Gable and Roberts	Signals and Systems	Wiley Publications
3.	Simon Haykin and Barry Van Veen	Signals and Systems	John Wiley
4.	Benoit Boulet	Fundamentals of Signals and Systems	Dreamtech
5.	Smarajit Ghosh	Signals and Systems	Pearson Education

VII
SEMESTER
INDUSTRIAL ELECTRONICS

1. SUBJECT DETAILS:

Course: Diploma in Industrial Electronics
Subject: Industrial Management-I
Group: M

Semester: VII
Code: ME-01
Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	SSL	T/W	PRL	Total
			Hrs	N/p	Mks.					
02	-	02	3	1	100	80	20	-	-	100

3. RATIONALE:

Management is the process of getting work done through work force to achieve the objectives of the organization. This subject “Industrial Management-I” covers the fundamental principles, objectives, process and various activities of management.

Along with attaining the necessary technical knowledge, the technical students also require some inputs in management areas so as to enable them to carry out their work effectively and efficiently.

This subject will enable the students to understand various processes and activities in an industrial organization.

4. OBJECTIVES:

1. To understand the process of formation and promotion of Industry/Organization.
2. To understand the process of formation and promotion of industry /organization
3. To know the basic principles of supervision
4. To understand the Basics of Quality Management, Maintenance & Industrial Safety
5. To understand the principles and practices in Human Resource Management

5. DETAILED CONTENTS:

Chapter Content Marks Hours

SECTION – I

1.	1.0 Introduction to Indian Industry	15	03
	1.1 Meaning –Definition		
	1.2 Classification of Industry		
	1.3 Location of Industry		
	1.4 Importance of Industry		
	1.5 Resources for Industry		
2.	2.0 Types of Ownership of Industry	17	03
	2.1 Proprietorship		
	2.2 Partnership		
	2.3 Private Ltd Company		
	2.4 Public ltd Company		
	2.5 Co-operative Enterprises		
	2.6 Public Sector Enterprises		
3.	3.0 Supervisor & Supervision	20	04

	3.1Introduction		
	3.2Role of Supervisor in an organization		
	3.3Responsibilities of supervisor		
	3.4Qualities of Supervisor		
	3.5Skills of Supervisor		
	3.6Functions of Supervisor		
4.	4.0 Leadership	15	03
	4.1Meaning and nature		
	4.2Qualities of good leaders		
	4.3Types of Leadership		
	4.4Supervisor's role as a leader		
5.	5.0 Motivation	15	03
	5.1Meaning		
	5.2Needs and expectations: Workmen		
	5.3Types of Motives: Primary & Secondary motives		
	5.4Affiliation motive, power motive and achievement motive		
	5.5Role of supervisor in motivating the workmen		
	<u>SECTION – II</u>		
6.	6.0 Industrial Training	16	03
	6.1Need and importance of training		
	6.2Methods and techniques of training		
	6.3Training & Development of manpower		
	6.4Supervisor as a Trainer		
7.	7.0 Maintenance	16	03
	7.1Need for maintenance of industry		
	7.2Types of maintenance		
	7.3Maintenance and productivity		
	7.4Role of supervisor in shop floor maintenance		
8.	8.0 Quality Management	16	03
	8.1Meaning, purpose		
	8.2Areas of application and scope		
	8.3T.Q.M.		
	8.4ISO and its importance		
9.	9.0 Industrial Safety	16	03
	9.1Meaning and importance		
	9.2Accidents- causes of accidents		
	9.3Effects of Accidents		
	9.4Prevention of Accidents		
	9.5Safety devices and system		
10.	10.0 Industrial Relations	18	04
	10.1Meaning and importance		
	10.2Types of Industrial relations		
	10.3Industrial disputes-causes		
	10.4Methods and machinery for resolving industrial disputes		
	10.5Trade union-its role in maintaining industrial peace		
	Total	164	32

Sr.No	Author	Title	Publisher
1	T.R. Banga & S.C. Sharma	Industrial Organisation and Management	Khanna Publication
2	O.P.Khanna	Industrial Management	Ganpat Rai
3	L.R.Bittal	What every supervisor should know?	Tata Mc Graw Hill

1. SUBJECT DETAILS:

Course: Diploma in Industrial Electronics	Semester: VII
Subject: Industrial Electronics	Code:IE-42
Group: A*	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	SSL	T/W	Practical	Total
		Hrs	NP	Mks						
04	1.5	5.5	03	01	100	80	20	25	50	175

3. RATIONALE:

To become a perfect electronic technician, knowledge of power devices and trigger devices and their related circuits and applications are essential which enables them to work in related application area.

4. OBJECTIVES:

After studying the subject the student will be able to:

1. Draw equivalent circuits, characteristics and understand the working of all power devices/trigger devices like Triac, GTO, IGBT, and MOSFET.
2. Draw and analyze the waveforms of single half/full converter, 3 ϕ half/full converter with resistive and inductive loads.
3. Draw and design regulated / controlled power supply and SMPS.
4. Draw and design electronic timer.
5. Understand the principles, Merits and De-merits of Induction/ Di-electric heating.
6. Understand working and design of types of inverters, UPS and choppers.

5. DETAILED CONTENTS:

Chapter	Content	Marks	Hours
---------	---------	-------	-------

SECTION – I

- | | | | |
|----|--|----|----|
| 1. | 1.0Control Devices:
Construction, Characteristics and control of following devices:
1.1Triac, Power MOSFET, IGBT, GTO and their specification and ratings.
Practice:
1. Assignment on suitable trigger devices and the ratings , equivalent circuits
2. Study of characteristics of triac
3. Study of diac-triac phase control
4. Study of RC phase control of triac
5. Ramp and Pedestal control | 12 | 03 |
| 2. | 2.0Controlled rectifier:
Conceptual treatment with the help of diagrams and waveforms.
2.1Single phase half converters (half controlled)
2.2Single phase full converters (fully controlled).
2.3Three phase half controlled converters. | 20 | 10 |

	2.4 Three phase fully controlled converters with resistive and inductive load.		
	Practice:		
	1. Single phase half converter		
	2. Single phase full converter		
3.	3.0 Design of Series Regulator with error amplifier:	20	08
	3.1 Design of Series Regulator with error amplifier		
	3.2 Shunt regulators, Zener regulators		
	3.3 Transistor voltage regulator		
	3.4 Protection circuits, Crow bar protection.		
	3.5 Switch mode regulators.		
	3.6 Voltage regulators IC's 723, LM309, 78XX series.		
	Practice:		
	1. Study of series regulator		
	2. Demonstration on SMPS		
	3. Study of three pin regulator		
	4. Design of voltage using IC 723		
4.	4.0 Electronic time delay circuits:	15	05
	4.1 DC time delay circuit		
	4.2 Timer using 555 IC		
	4.3 AC time delay circuit		
	4.4 Sequential timers		
	4.5 Automatic exposure control timer		
	Practice:		
	1. Study of D.C. timer		
	2. Study of sequential timer		
	3. Study of precise timer		
5.	5.0 Study of SMPS:	15	06
	5.1 Concept of Switched Mode Power Supplies		
	5.2 Various schemes of SMPS		
	5.3 Design aspects of SMPS		
<u>SECTION – II</u>			
6.	6.0 High Frequency Heating:	12	06
	6.1 Induction Heating: Basic Principle		
	6.2 Factors Governing the process		
	6.3 Applications, merits & demerits over other systems		
	6.4 Di-electric heating: Basic Principle		
	6.5 Factors governing the process, applications, merits & demerits over other systems.		
	Practice:		
	1. Assignment on calculation of high frequency power		
	2. Assignment on design of high frequency source.		
7.	7.0 Ultrasonic:	10	04
	7.1 Generation & detection		
	7.2 Application like flaw detection, thickness measurement, cleaning		
	7.3 Application in medical field.		
	Practice:		
	1. Study of ultrasonic meter for distance measurement		
8.	8.0 Choppers:	16	08
	8.1 Concept of Choppers		
	8.2 Typical circuits		
	8.3 Application		
	Practice:		
	1. Study of Jone's Chopper		
9.	9.0 Inverters:	28	10
	9.1 SCR series inverter		
	9.2 Parallel Mc Murray Bedford inverters		
	9.3 3 ϕ inverters		
	Practice:		
	1. Study of class C commutation		
	2. Study of R/RC triggering of SCR		
	3. Demonstration of bridge inverter		

	4. Assignment on 3 phase inverter 120° mode waveform analysis for each phase		
10.	10.0 UPS: On line Off line Practice: 1. Assignment on UPS	16	04
		Total	164 64

PRACTICE:

1. Study of DC timer.
2. Study of Series regulator.
3. Study of 723 regulator.
4. Study of Constant voltage/constant current sweep generator.
5. SCR UJT light dimmer.
6. Single phase half/full converter
7. Phase control of triac.
8. Sequential timer.
9. Diac-triac light dimmer circuit.
10. PUT relaxation oscillator.
11. Ramp and pedestal control circuit.
12. Class C commutation.
13. Ultrasonic digital distance meter.
14. Demonstration of bridge inverter
15. 78xx Series Regulator.
16. Study of Jone's Chopper

6. IMPLEMENTATION STRATEGY (PLANNING):

3. Teaching Plan
4. Minimum 12 practical/assignments in the terms

7. REFERENCE BOOKS:

Sr.No	Author	Title	Publishers & Address
1.	Dubey,Doradla	Thyristorised power controllers	Wiley International
2.	Sen	Power electronics	TMH, New Delhi
3.	GE	GEC manual of SCR and transistor	General Electric Co.
4.	Ramamurthy	Thyristorised power controllers	East-West Publishers, New Delhi
5.	Chute & Chute	Electronics in industry	TMH, New Delhi
6.	Rasheed	Power electronics	TMH, New Delhi
7.	Dutta	Industrial electronics	PHI, New Delhi
8.	Schuler Mcname	Industrial electronics and robotics	McGraw Hill International

1. SUBJECT DETAILS :

Course: Diploma in Industrial Electronics
Subject: #Microcontroller and its Applications
Group: A*

Semester: VII
Subject Code: IE-69
Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs. per week	Practical Hrs per week		Paper			Th	Sessional	T/W	Practical	Total
			Hrs.	Np	Mks					
03	1.5	4.5	03	01	100	80	20	25	50	175

3. RATIONALE :

Microcontrollers have changed the scenario for miniaturized control applications. Microcontroller based applications are existing in almost every industry, from home appliances, toys to real time applications and distributed control system. Knowledge of microcontrollers is a must for trained technicians.

4. OBJECTIVES :

After studying the subject the student will be able to:

11. Draw & explain block diagram of 8 bit/16 microcontrollers.
12. Write application program using 8 bit microcontroller.

Design microcontroller based applications.

14. Interface different hardware(I/p & O/p) device to microcontroller.

5. DETAILED CONTENTS:

SECTION-I

Chapter	Content	Marks	Hours
1.	1.0 Introduction to microcontroller:	04	01
2.	2.0 Architecture of microcontroller 8051: 2.1 Port, program memory, data memory, serial data, interrupts. 2.2 Memory organization. 2.3 Timing diagram to access external data memory, program memory. 2.4 Reset logic: Power ON reset. 2.5 Oscillator circuit.	26	08
3.	3.0 Instruction set and programming: 3.1 Addressing mode. 3.2 Instruction sets. 3.3 Basic programs.	36	11
4.	4.0 Microcontroller Design:	16	04

- 4.1 Memory interfacing.
- 4.2 System design using microcontrollers.

SECTION-II

5.	5.0 Advanced programming:	18	05
	5.1 Time Delays.		
	5.2 Event Counting		
	5.3 Serial transmission, microprocessor communication.		
6.	6.0 Interfacing and Applications:	32	11
	6.1 Keyboard Interfacing		
	6.2 Display Interfacing.		
	6.3 Pulse width measurement.		
	6.4 A/D AND D/A interfacing.		
	6.5 Multiple interrupts.		
	6.6 Expanding the I/O pots.		
7.	7.0 Other Microcontrollers:	16	04
	7.1 Comparison of different microcontrollers		
	7.2 Introduction to 16,32 bit microcontrollers		
8.	8.0 Software Tools:	16	04
	8.1 Assemblers.		
	8.2 Simulator.		
	8.3 Cross compiler.		
	Total	164	48

PRACTICE:

1. Basic programs.
2. Program on Code Conversion.(hex to ASCII, hex to BCD).
3. Programs on counters.
4. Programs on timers/delays.
5. Programs on interrupts.
6. Program on serial port (mode 1 and mode 2)
7. Interfacing of keyboard.
8. Interfacing of display.
9. Interfacing of A/D converter.
10. Interfacing of D/A converter.
11. Study of Applications: a. Temperature controller b. Stepper motor controller.
c. Tachometer. d. Frequency Counter.

6. IMPLEMENTATION STRATEGY (PLANNING):

1. Teaching plan
2. Minimum 12 practicals/ assignments in the term.

7. REFERENCE BOOKS:

Sr.No.	Author	Title	Publishers & Address
1.	Kenneth .J. Ayala	The 8051 microcontroller architecture programming and application	Penram International Pub. house(India)
2.	Intel Data sheet for 8051		

	microcontroller & 16 bit microcontroller.	-	-
3.	Intel-Embedded applications data sheet.	-	-

**Web reference: www.intel.com
www.atmel.com**

1.SUBJECT DETAILS:

Course : Diploma in Industrial Electronics	SEMESTER : VII
Subject : #Advanced Instrumentation	Code : IE-77
Grade : A*	Compulsory

2.TEACHING AND EXAMINATION SCHEME:

Theory Hrs. per Week	Practical Hrs. Per week	credits	Paper			TH	SSL	TW	Oral	TOTAL
			Hrs	NP	Mk					
03	1.5	4.5	03	01	100	80	20	25	50	175

3.RATIONALE:

Process control knowledge is essential for the final assembly and testing of the process control loop and system as a whole.

4.OBJECTIVES:

After studying the subject student will be able to

1. Define process control characteristic such as element modes and stability along with detail knowledge of measurement technique.
2. Explain control mode implementation, final element functions .
3. Plot the response of different controllers.

5. DETAILED CONTENTS

SECTION-1

Chapter	Contents	Marks	Hours
1	1.0 Process control		
	1.1 Introduction, control system :Process control principles, servo mechanism	16	03
	1.2 Block diagram of process control :Element identification, Block diagram representation		
	1.3 Evaluation of control system : Stability, regulation, transient regulation, criteria for evaluation. Analog and Digital processing, Time Response. Practice : 1. Study of servo mechanism 2 Servo amplifier.		
2	2.0 Final Control	08	02
	Control elements, signal conversion, electrical, pneumatic, Hydraulic actuator		

Practice: 1.Study of Stepper motor.

3	3.0 Discrete state process control : System characteristics, specification of process, logic symbols., ladder diagram, examples, programmable controller functional diagrams, operation, programming. Practice: 1.To study PLC 2.PLC Programming	30	10
4	4.0 Controller principles: Process characteristic, process equations, process lag, self regulation 4.1 Control system parameters: Error, variable range, control parameter range, control lag ,dead time, cycling. 4.2 Controller modes : Discontinuous-two position, multi position, floating control. Continuous: Proportional, integral, derivative, and composite mode. Practice: 1.Error detector	28	08
SECTION- II			
5	5.0 Analog controllers: Features, single and composite control modes, design consideration. 5.1 Digital controller: Different methods, data logger, type, features, Computer based control. Practice: 1. On/Off control 2. Study of proportional controller 3. PI controller 4. PD controller 5. PID controller	26	08
6	6.0 Control loop characteristic: Configuration of control system, multivariable control system, quality of control system, definition, measure of quality. 6.1 Stability: Instability sources, criteria for stability, process loop tuning. Practice:1. Assignment on control loop characteristics .	16	05
7	7.0 Neural network, basic concepts, neurons, feed forward network, learning and application 7.1 Fuzzy control: Elements of fuzzy logic, fuzzy controller, fuzzy interference, defuzzyfication Practice:1. Assignment on fuzzy logic.	16	05
8	8.0 HMI :Local operator panels 8.1 Need for HMI 8.2 Types and characteristic of local HMI operator panels 8.2.1 Introduction to programming of HMI panels 8.2.2 Interface between HMI panels and PLC	08	03

9	9.0 HMI :SCADA	16	04
	9.1 Definition of SCADA		
	9.1.1 Functional block diagram		
	9.1.2 Function of SCADA		
	9.1.3 Communication between PLC and SCADA		
	9.2 SCADA Applications .		
	Total	164	48

PRACTICE:

1. On/Off control.
2. Derivative controller.
3. IC CA 3059.
4. Error detector.
5. Proportional controller.
6. Study of servo amplifier.
7. Integral controller.
8. PI controller.
9. PD controller.
10. PID controller.
11. Study of stepper motor.
12. Study of PLC.
13. Study of servo-mechanism.
14. Study of SCADA.
15. Assignment on fuzzy logic/SCADA
16. Temperature control using IC

6. IMPLEMENTATION STRATEGY (PLANNING):

1. Teaching Plan
2. Minimum 12 practicals /assignments.
3. Industrial Visit for students.

7.REFERENCE BOOKS:

SN.	Author	Title	Publication
1	Curtis Johnson	Process control instrumentation Technology	Pearson Education
2	B.Kosco	Neural networks and fuzzy systems	PHI
3	M.A.Mitra & S. Sengupta	Programmable logic controllers and industrial automation	Penram international
4	B.J.Liptak	Process control instrumentation Engineer's handbook	Chilton Co.

1. SUBJECT DETAILS:

Course: Diploma in Industrial Electronics	Semester: VII
Subject: C++ Programming	Code:DE-33
Group: A	Optional

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per wk	Practical Hrs Per wk		Paper			TH	Sessional	T/W	Pract (Oral)	Total
		Hrs	NP	Mks						
03	1.5	4.5	03	01	100	80	20	25	50	175

3. RATIONALE:

C++ supports the two most popular programming paradigms procedural programming and object oriented programming. It also offers a powerful way to cope up with the real world problems. Students will be able to write better programs in C++ because it offers software's reusability, testability, portability and reliability.

4. OBJECTIVES:

After studying the subject the student will be able to:

1. List of the keywords, operators of the 'C++' language
2. Draw flowchart for programs
3. Write programs in 'C++'

5. DETAILED CONTENTS:

Chapter	Contents	Marks	Hours
	Section-I		
1	1.0 Structure programming using C++	06	02
	1.1 C++ as a superset of C programming language		
	1.2 C++ Fundamentals: Character set, Identifiers and keywords, Data types constants and Variables Declarations, Operators and expressions, Library Functions, Symbolic constants, Preprocessor Directives		
2	2.0 Data Input and Output:	06	03
	2.1 getchar(), putchar(), scanf(), printf(), puts(), cin, cout, setw(), endl etc		
	2.2 Control statements: If, If-else, Switch Loop statements: for, while, Do-while Breaking Control statements: break, continue, goto		
3	3.0 Functions And Program Structures	30	05
	3.1 Introduction		
	3.2 Defining of Function		
	3.3 Return statement		
	3.4 Types of Function		
	3.5 Actual and formal Arguments		
	3.6 Local and Global Variables		
	3.7 Default Arguments		
	3.8 Multifunction Programs		
	3.9 Storage Class Specifiers: Automatic, Register, Static, External Variables		
	3.10 Recursive Functions		

4	4.0 Pointers 4.1 Declarations, Referencing and De-referencing, Passing Pointers to Functions, Pointers to Arrays 4.2 Structures and Unions: defining and Processing a structure and union	16	03
5	5.0 Arrays 5.1 Array notation 5.2 Array Declaration 5.3 Array Initialization 5.4 Processing with Array 5.5 Arrays and Functions 5.6 Multidimensional Arrays 5.7 Character Arrays	24	04
Section-II			
6	6.0 Classes and Objects 6.1 Introduction 6.2 Structures and Classes 6.3 Declaration of Class 6.4 Arrays of Class Objects 6.5 Constructors: Copy and default constructors 6.6 Destructors 6.7 Static Class members: Static data member and static member functions 6.8 Friend Functions 6.9 Dynamic memory allocations 6.10 This pointer	32	07
7	7.0 Inheritance 7.1 Single inheritance 7.2 Multiple inheritance	18	03
8	8.0 Overloading 8.1 Function overloading: With various data types, with argument, scoping rules for function overloading, special features of function overloading 8.2 Operator Overloading: Overloading Assignment, Binary operator	16	03
9	9.0 Polymorphism 9.1 Introduction, Virtual functions, Pure virtual functions	16	02
Total		164	48

PRACTICE:

1. Programs on for ,do,do-while,while loop
2. Program on switch-case
3. Program on function and recursive function
4. Program on single and two dimension arrays
5. Program on pointers
6. Program on structure
7. Program on class and object, constructor, destructor, friend function
- 8 Program on single, multiple, multilevel inheritance
9. Program on function overloading and operator overloading
- 10.Program on polymorphism

6. IMPLEMENTATION STRATEGY (PLANNING):

1. Teaching Plan
2. Minimum 15 practicals / assignments

7. REFERENCE BOOKS:

Sr.	Author	Title	Publishers & Address
1	D. Ravichandran	Programming with C++	Tata McGraw Hill
2	Balaguruswamy	Programming in C++	Tata McGraw Hill
3	Robert Lafore	Object Oriented Programming in C++	Galgotia Publications
4	Yashwant Kanetkar	Let us C++	B.P.B. Publications

VIII
SEMESTER
INDUSTRIAL ELECTRONICS

1. SUBJECT DETAILS:

Course: Diploma in Industrial Electronics	Semester: VIII
Subject:# Industrial Management – II	Code: ME-02
Group: M*	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	Sessiona l	T/W	Pract	Total
			Hrs	N/P	Mks					
03	-	03	03	01	100	80	20	-	-	100

3. RATIONALE :

Management is the process of getting work done through work force to achieve the objectives of the organization. This subject “Industrial Management-II” covers the fundamentals principles, objectives, process and various processes and activities of management. Along with attaining the necessary technical knowledge, the technical students also require some inputs in management areas so as to enable them to carry out their work effectively and efficiently. This subject will enable the students to understand various processes and activities in an industrial organization.

4. OBJECTIVES :

6. To know the process of management.
7. To understand the organizational structure and its importance.
8. To know the various functional areas of an organization.
9. To understand the Basics of costing and finance.
10. To understand various functions of marketing.
11. To enable the students applying basic principles of management in their work life.

5. DETAILED CONTENTS:

SECTION-I

Chapter	Content	Marks	Hours
1.	Management	10	06

- 1.10 Introduction to management
- 1.11 Meaning, definition and importance.
- 1.12 Relevance of management to engineers.
- 1.13 Principles of management.

Functions of management

- 2.1 Functions of management.
 - 2.2 Planning and organizing.
 - 2.3 Directing, communicating.
 - 2.4 Motivating and coordinating.
 - 2.5 Controlling
- 5 04

Organizational structures

- 3.1 Meaning, types and factors determining structure.
 - 3.2 Line organization.
 - 3.3 Functional organization.
 - 3.4 Line and staff organization.
 - 3.5 Project based organization.
- 10 04

Procurement

- 4.1 Purchase procedures.
 - 4.2 Types of purchase.
 - 4.3 Principles of purchase.
 - 4.4 Inventory and inventory control.
 - 4.5 Duties of storekeeper.
- 10 04

Human resource management

- 5.1 Importance of human resources to industry.
 - 5.2 Recruitment, selecting and placement of man-power.
 - 5.3 Employee welfare measures in industry.
 - 5.4 Training and development.
 - 5.5 Self-management.
 - 5.6 Time management.
- 15 06

SECTION – II

6.	Marketing	10	05
	6.1 Importance of marketing.		
	6.2 Sales and marketing difference.		
	6.3 Product life cycle and marketing strategies.		
	6.4 Channels of distribution.		
	6.5 Packaging and advertising.		
	6.6 Export marketing.		
7.	Finance	10	06
	7.1 Sources of finance.		
	7.2 Working capital and fixed capital.		
	7.3 Financial statements of a company.		
	7.4 Financial ratios.		
	7.5 Budgets and budgetary control.		
8.	Cost and cost calculation	15	06
	8.1 Objectives of cost calculation.		
	8.2 Classification of cost-bases.		
	8.3 Variable and fixed cost.		
	8.4 Direct and indirect cost.		
	8.5 Functional cost.		
	8.6 Cost control and cost reduction.		
	8.7 Overheads and types of overheads.		
	8.8 Cost calculation of a product.		
	8.9 Break even analysis.		
9.	Depreciation	7	03
	9.1 Meaning and importance.		
	9.2 Causes of depreciation.		
	9.3 Methods of calculation of depreciation.		
	9.4 Machine replacement factors to be considered.		
10.	Time value of money	08	04
	10.1 Equivalence.		
	10.2 Simple and compound interest.		
	10.3 Present worth method.		
	10.4 Future worth method.		
	10.5 Sinking fund method.		
	10.6 Capital recovery method.		
		Total	164 48

REFERENCE BOOKS:

Sr. No.	Author	Title	Publishers
1.	T R Banga & S C Sharma	Industrial Organization & Engineering Economics	Khanna Publications
2.	O P Khanna	Industrial Management	Dhanpatrai & Sons
3.		Production Planning Control &	Khanna Publications

K C Jain & Agarwal	Industrial Management	
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1. SUBJECT DETAILS :

Course : Diploma in Industrial Electronics Subject: # Project Work Group: A*	Semester : VIII Code: IE-70 Compulsory
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2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs/week	Practical Hrs/week		Paper			Th	SSL	T/W	Practical/ Oral	Total
			Hrs	NP	Mks					
01	05	06	-	-	-	-	-	50	50	100

3. RATIONALE :

The project developed for any electronic application gives an in depth understanding of all the concepts learnt at the lower semesters. The students are also exposed to the various stages of making a project. It will enhance the design abilities in a student and the capability to work in a team.

4. OBJECTIVES :

After developing a project the students will be able to :

1. Design an electronic circuit
2. Design PCB
3. Test and calibrate the electronic equipment
4. To write the Project Report

5. Each student/group of students will submit detailed project report with following details

1. Schematic diagram
2. Working of the project and documented program
3. PCB – artwork
4. Assembly drawing
5. Front panel drawing
6. Specification sheet
7. List of components and cost

6. Basis of Marking :

Students will be marked on the basis of

1. Understanding and completeness of the Project
2. Approach to the solution of problem
3. Planning and implementation
4. Design and testing procedure

5. Project Report
6. Student's involvement in the Project

1.SUBJECT DETAILS:

Course : Diploma in Industrial Electronics	Semester : VIII
Subject : #Power Electronics	Code: IE-78
Group : A*	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination scheme and Maximum marks							
Theory Per Week	Practical Per Week		Paper			Th	SSL	T/W	PRL	Total
			Hrs	NP	Mks					
3	1.5	4.5	03	01	100	80	20	25	50	175

3.RATIONALE:

This course enables students to know the application of control system to a.c. & d.c. drive.

4.OBJECTIVE:

After studying the subject student will be able to

1. Analyze the stability of d.c. drive
2. Analyze the stability of a.c. drive

5.Subject Details:

SECTION-1

Chapter	Name of the topic	Hours	Marks
1.	Introduction 1.1 Basic element of drive, adjustable Speed drive & its requirement. Four Quadrant operation of hoist, D.C drive & A.C drive & their comparison 1.2 Load torque speed characteristics, Stability of drive (no mathematical derivation) Factors considered for drive selection, starting & breaking of electric motors	04	15
2.	Chopper controlled D.C motor 2.1 Basic chopper circuit, D.C chopper using Power MOSFET 2.2 Single, two, four quadrant chopper drive, Multiphase chopper drive	05	15

3.	Converter controlled D.C motors 3.1 Speed torque characteristics of D.C motors, types of single phase converter drive, single phase half wave converter. Semi converter, full converter & dual converter 3.2 Types of three phase half wave converter, semi converter, full converter & dual converter drive	10	36
4.	Advanced techniques of D.C motor control 4.1 Advantage of microprocessor & microcontroller for D.C drive, microcontroller based stepper motor control 4.2 Phase locked loop control of D.C motor	05	16

SECTION-II

5.	Introduction to motor control 5.1 Star delta connection, advantages of converter Fed induction motor, speed torque characteristic Of induction motor 5.2 Different method of speed control of induction Motor, stator voltage control, rotor voltage control Frequency control, stator voltage and frequency , Frequency control inverter using power MOSFET Slip energy recovery system chopper controlled Resistance and rotor circuit	15	50
6.	Drive of specific application Block diagram, sequence of stages and drive Required at each stage for following application 6.1 Textiles mills 6.2 Steel rolling mills 6.3 Cranes and hoists 6.4 Cement mills 6.5 Paper mills 6.6 Sugar mills 6.7 Machine tools application 6.8 coal minning	09	32
Total		48	164

Practice

1. Measure the out power of chopper for resistive load by using frequency and /or duty cycle of chopper
2. Find effect on speed and torque of given DC series motor by varying armature Voltage using step up/down chopper .
3. Find effect on speed and torque of given DC separately excited by varying field Voltage
4. Find the variation in armature voltage and speed of given separately excited motor by Advancing 7 retarding the firing pulses of SCR using single phase semi converter.
5. Find the variation in armature voltage & speed of given separately excited motor By Advancing 7 retarding the firing pulses of SCR using single phase full converter.
6. Find the variation in armature voltage and speed of given separately excited motor by Advancing 7 retarding the firing pulses of SCR using three phase full converter.
7. Find the effect of change of rotor resistance of induction motor speed.

8. Measure the speed of given induction motor for various stator voltage using A.C voltage controller.
9. Develop the program using microprocessor / microcontroller to control the speed of given stepper motor.

6. IMPLEMENTATION STRATEGY (PLANNING):

1. Teaching Plan
2. Minimum 12 practicals/assignments.
3. Industrial Visit for students

7. REFERENCE BOOKS :

Sr. No	Author	Title	Publishers & Address
1.	Cyril w.Lander	Power electronics	TMH, new Delhi
2.	S. Chapman	Electrical machine fundamental	McGraw Hill singapore
3.	G.K dubey	Electrical drives	PHI New Delhi
4.	P.C SEN	Power Electronics	TATA McGraw Hill
5.	B.L Thareja A.L Thareja	Electrical Technology Volume-II A.C & D.C Machine	S. Chand & company
6.	Vedam Subrahmanyam	Thyristor control of electrical device	TATA McGraw Hill
7.	Vedam Subrahmanyam	Electric drives	TATA McGraw Hill
8.	S.K Bhattacharya & S.chaterjee	Industrial Electronic & control	TATA McGraw Hill

1. SUBJECT DETAILS:

Course: Diploma in Industrial Electronics
 Subject: #Robotics
 Group: A*

Semester: VIII
 Code: IE -73
 Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination scheme and Maximum marks							
Theory Per Week	Practical Per Week		Paper			Th	Sessional	T/w	oral	Total
			Hrs	NP	Mks					
3	1.5	4.5	03	01	100	80	20	25	50	175

3. RATIONALE:

This course enables students to know the fundamental & application of robotics & how to control industrial robot.

4. OBJECTIVES:

After studying the subject student will be able to:

1. Analyze & control industrial robot.
2. Write the specification of robotics
3. List applications of robots
4. Maintain & safely handle robots

5. DETAILED CONTENTS:

SECTION-1

Chapter	Contents :	Hours	Marks
1.	Robots parameters	05	18
	1.1 Concept of robotics		
	1.2 Roll of robots in various manufacturing industries		
	1.3 Robots specification parameters		
	1.3.1 Stationary robots: range of operation, speed, repeatability, teaching method, number of controllable axes, external interface PLC function, programming capacity, dimensions, weight		
	1.3.2 Mobile robots: physical, constructional, power, mobility, swung radius, software sensing and manipulation, onboard computing electronics		
2.	Robot motion	19	32
	2.1 Robot classification:		

	According to applications ,according to control systems		
2.2	Robot anatomy : Polar configuration ,cylindrical configuration ,Cartesian configuration , joint arm configuration		
2.3	Robot motion : Vertical transverse , radial transverse , rotational transverse , 2 ,3 & 4 degree of freedom , speed of motion ,and load carrying capacity , precision of movement : special resolution , accuracy , repeatability		
2.4	Robot drive systems : hydraulic drives , electric drive , pneumatic drive.		
3.	Robot and effectors.	09	32
3.1	Gripper mechanism : CAM actuated gripper , screw type gripper , vaccum tubes , magnetic gripper , adhesive grippers , hooks And other misc . devices .		
3.2	End effecters interface : physical support , power and signal transmission ,various consideration in gripper selection		
	SECTION-2		
4.	Sensors in robot.	12	42
4.1	Sensing of physical parameters : Types of sensors , tactile sensors , force / torque sensors , Proximity / range sensors .		
4.2	Machine vision : function of machine vision (block diagram) illumination techniques , sending digital image , major steps of image compression , segmentation –thresholding techniques , multilevel thresholding , regions splitting , region merging , feature extraction thinning object recognition noise detection and removing (near neighbour techniques) .		
5.	Application of robotics : material transfer ,loading/ unloading , welding : spot welding and arc welding – assembly , spray coating , future application.	09	28
6.	Maintenance and safety:	04	12
6.1	Maintenance : Robot preventive maintenance, robot refurbishment, robot overhaul, sub assembly recondition and rebuilt onsite Maintenance.		
6.2	Safety in robots : work place design , safety sensors , safety monitoring.		
	Total	48	164

PRACTICE / ASSIGNMENT:

List of practicals:

1. To prepare a report of following points using searching a information through internet :
 1. Manuplator
 2. End effectors
 3. Link
 4. Joint
 5. robot motion
 6. Robot applications
2. To verify angular displacement of the shaft of the stepper motor using a microprocessor.
3. To verify the number of rotation of the shaft of steeper motor using microcontroller.
4. To control forward and backword movement of the object coupled with the shaft of dc motor using limit switch
5. To prepare report on comparision and applications of the various types of grippers mentioned in the syllabus after conducting of the group discussion of the following points types of gripper mechanism , application and effects of loading
6. To perform peak and place operation using magnetic operation to determine Maximum load carrying capacity for the given magnetic gripper
7. To enlist various features available in matlab image processing tool bar and to read the digital image using matlab
8. To perform a following operation on digital image using matlab software : h detection ,segmentation
9. To determine various factors affecting on a proximity switch

6. IMPLEMENTATION STRATEGY (PLANNING):

1. Teaching Plan
2. Minimum 10 practical/assignments.
3. Industrial Visit for students

7. REFERENCE BOOKS:

Sr no.	Author	Title	Publisher
1.	Mikell P Groove	Industrial Robotics	McGraw Hill
2.	R. J. Shilling	Fundamentals of Robotics	Prentice hall of India
3.	R. D. Klafter	Robotics Engineering	Prentice Hall of India

Web references 1) www.robots.com
 2) www.robots.epson.com

1. SUBJECT DETAILS :

Course: Diploma in Industrial Electronics
Subject: #Embedded System Design (Elective)
Group: A*

Semester : VIII
Code : DE-79
Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination scheme and Maximum marks							
Theory Per Week	Practical Per Week		Paper			Th	SSL	T/W	Oral	TOTAL
			Hrs	NP	Mks					
3	1.5	4.5	03	01	100	80	20	25	50	175

3. RATIONALE:

This course enables students to know the devices, buses & also learn the embedded design of microcontroller.

It helps student to get thorough explanation of embedded hardware architecture, interfacing techniques, buses and protocols, hardware and software interrupt, embedded software programming, modeling, inter-process synchronization and real time operating system.

4. OBJECTIVES:

After studying this subject student will be able to

1. Define Embedded system
2. Embedded system design of microcontroller
3. Case studies of Smart card, Robots, Automobile control, Mobile phone, Process control

5. DETAILED CONTENTS:

SECTION-I

Chapter Content	Hrs	Marks
(1) Introduction to Embedded Systems	02	10
(2) Embedded Microcontrollers : ARM7TDMI 32-Bit microcontroller architecture and instruction set - Memory organization Memory selection for an embedded system. -Dynamic Memory Access. -Interfacing of memory and processor -Embedded mass storage and FAT file system.	15	50

Devices And Buses : I/o devices	06	22
- Timer and Counting devices.		
- USB, CAN, RS232, RS485.		
- I ² c buses.		
- I/o devices : Keypad, Display interface (LCD, Touchscreen, Graphic devices)		

SECTION-II

(4) Device Drivers and Interrupt Servicing Mechanism :	08	32
Device Drivers		
-Parallel port drivers		
-Serial port drivers,		
-Interrupt servicing		
-Multiple Interrupts		
-Deadline and Interrupt latency.		
(5) Programming And Testing	06	20
-Assembly Level Programming		
-Cross Compilers		
-IDE & Source Level Debugger.		
(6) Real time operating system	07	20
-Operating system services		
-Process management		
-Timer Functions		
-Event Functions		
-Memory management		
-Device file and I/o subsystem management		
-Interrupt routines in RTOS environment.		
(7) Case Studies: CODE C, Smart card, Robots, Automobile control, Mobile phone, Process control.	04	10
Total	48	164

**Pract
ice:
1.**

1. DMI microcontroller
2. Interfacing programs on serial port, parallel port
3. Program on interrupt
4. Study of RTOS
5. Assignment on Case Studies.

6. IMPLEMENTATION STRATEGY (PLANNING):

1. Teaching Plan
2. Minimum 12 practicals /assignments.
3. Industrial Visit for students

7. REFERENCE BOOKS :

Sr.No	Author	Title	Publishers & Address
1.	Rajkamal	Embedded Systems – Architecture Programming & Design	Tata McGraw Hill
2.	David Simon	An Embedded Software	–
3.	Technical Reference Manual of ARM7TDMI	–	–
4.	Jonathan W. Valvano	Embedded Microcontroller System- Real Time Interfacing	Thomson

Web reference:

www.intel.com

www.goembedded.com

www.arm.com

1.SUBJECT DETAILS:

Course: Diploma in Industrial Electronics	Semester: VIII
Subject: #Advanced Communication Engg. (Elective)	Code: IE-79
Group: A*	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination scheme and Maximum marks							
Theory Per Week	Practical Per Week		Paper			Th	SESSI ONAL	T/W	Oral	TOTAL
			Hrs	NP	Mks					
3	1.5	4.5	03	01	100	80	20	25	50	175

3. RATIONALE:

This course will enable students to understand different advanced communication systems.

4. OBJECTIVES:

After studying the subject student will be able to

1. Explain use of information theory and coding techniques in Digital Communication
2. Classify different types of RADAR.
3. Explain propagation of signals in satellite and microwave communication system
4. Explain the architecture of cellular mobile network and various aspects of mobile communication.

5. DETAILED CONTENTS:

SECTION-1

Contents	Marks	Hrs
1. Information Theory & Coding	20	06
1.1 Amount of information , rate of Information, entropy, channel, efficiency		
1.2 Shannon Hartley's theorem-channel capacity		
1.3 Error correcting & detecting codes- Parity code, Hamming code, CRC, Cyclic code, Linear block code		
Practice: Assignments- Problems based on above topic		
2. Radar	24	07
2.1 Fundamentals		
2.2 Radar Range Equation		
2.3 Pulse Radar		
2.4 Antennas & scanning		
2.5 Display methods		
2.6 Moving target indication (MTI)		
2.7 Radar beacons		
2.8 C W Doppler radar		
2.9 Frequency modulated CW Radar		
Practice: Study of pulse Radar Assignments- Problems based on above topic		
3. Satellite Communication	38	11
3.1 Overview of satellite communication		
3.2 Kepler's laws		
3.3 Orbital parameter		

- 3.4 Look angles
- 3.5 Types of orbit
- 3.6 Launches and Launch vehicles
- 3.7 Satellite sub-system
 - 3.7.1 Attitude and orbit control system
 - 3.7.2 Telemetry, tracking, command & monitoring
 - 3.7.3 Transponders
- 3.8 Multiple access- FDMA, TDMA
- 3.9 VSAT
- 3.10 Digital DBS TV
- 3.11 GPS
- 3.12 Dish Antenna

Practice:

Study of Dish antenna

Assignments- Problems based on above topic

SECTION-2

- 4. Fiber Optic Communication 30 09
 - 4.1 Introduction
 - 4.2 Types of optical fiber
 - 4.3 Transmission characteristics-
Attenuation, Dispersion
 - 4.4 Optical sources- LASER, LED
 - 4.5 Optical detectors-photodiode, avalanche photodiode
 - 4.6 WDM

Practice:

1) Study of fibre optic communication

2) Study of source characteristics

3) Study of detector characteristics

4) Measurement of NA; attenuation

Assignments- Problems based on above topic

- 5. Microwave Communication 30 09
 - 5.1 Microwave waveguides and components
 - 5.1.1 Rectangular waveguides
 - 5.1.2 Circular waveguides
 - 5.1.3 Cavity resonators
 - 5.1.4 Waveguide coupling, matching & attenuation
 - 5.1.5 Directional couplers, circulators & isolators
 - 5.2 Microwave tubes and devices:
Klystron, Magnetrons, TWT, Gunn diode

Practice:

Problems based on the above topics

Experiments based on microwave bench

- 6. Introduction to Mobile Communication 22 06
 - 6.1 Cellular concepts
 - 6.2 Multiple access technologies
 - 6.3 Cellular system operation
 - 6.3.1 System architecture
 - 6.3.2 Location updating & call setup
 - 6.3.3 Hand off & power control
 - 6.4 Digital cellular mobile
 - 6.4.1 GSM- N/w architecture, Service aspects,
Radio aspects & Security aspects
 - 6.4.2 CDMA- N/w architecture, Service aspects
& Security aspects

Practice:

1. Study of Microwave waveguide kit.
2. Propagation in Optical fibre.
3. TDM of Voice & data.
4. Measurement of Numerical aperture.
5. Measurement of Attenuation in fibre.
6. Measurement of dispersion in fibre.
7. Voice coding A-law & μ -law.
8. Study of different fibres
9. Study of source characteristics.
10. Study of detector characteristics.
11. Power and Attenuation measurement.
12. Wavelength measurements.
13. Standing wave measurements.
14. Measurement of impedance.
15. Study of Directional coupler.
16. Demonstration of RADAR.
17. Frequency measurements using cavity wavemeter.

6. IMPLEMENTATION STRATEGY (PLANNING):

1. Teaching Plan
2. Minimum 12 practicals/assignments in the term
3. Industrial Visit for students

7. REFERENCES:

Sr.No	Author	Title	Publishers
1.	George Kennedy	Communication System	TMH
2.	Taub Schilling	Principles of communication	TMH
3.	Raj Pandya	Mobile & Personal Communication System & Services	PHI
4.	Lee W.C.Y.	Mobile Cellular Telecommunication	McGraw Hill
5.	Timothy Pratt.	Satellite Communication	WSE
6.	J M Senior	Optical Fiber Communication (Principles & Practice)	Pearson Education