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Book no 31

31/01

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CURRICULUM
FOR
ADVANCED DIPLOMA
IN
INDUSTRIAL ELECTRONICS
(FIRST TO EIGHTH SEMESTERS)



CURRICULUM DEVELOPMENT CENTRE
M.P. BOARD OF TECHNICAL EDUCATION,
OFFICE COMPLEX, BLOCK A-4, GAUTAM NAGAR,
BHOPAL-462023.

CURRICULUM

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FOR

ADVANCED DIPLOMA

IN

INDUSTRIAL ELECTRONICS

(FIRST TO EIGHTH SEMESTERS)



CURRICULUM DEVELOPMENT CENTRE
M.P. BOARD OF TECHNICAL EDUCATION,
OFFICE COMPLEX, BLOCK A-4, GAUTAM NAGAR,
BHOPAL.-462023.

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CURRICULUM

ADVANCED DIPLOMA

IN

INDUSTRIAL ELECTRONICS

(FIRST SEMESTER)



CURRICULUM DEVELOPMENT CENTRE

TECHNICAL TEACHERS' TRAINING INSTITUTE,
SHAMLA HILLS, BHOPAL-462 002

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

I Semester

S. No.	Course Title	Theory	Practical	Total
1.	Communication skills	5	0	5
2.	Maths - I.	5	0	5
3.	Engineering Physics	5	2	7
4.	Engineering Chemistry	3	2	5
5.	Engineering Drawing	0	8	8
6.	Workshop practice (Mech.) - I	0	6	6
		18	18	36

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL

**Scheme of Studies and Examination
Advanced Diploma in Industrial Electronics**

FIRST SEMESTER

Sl. NO.	COURSE TITLE	HOURS/WEEK		SESSIONAL MARKS		PROGRESSIVE ASSESSMENT		BOARD EXAMINATION		THEORY MARKS	PRACTICAL/VIVA		PRACTICAL MARKS
		TH.	FR.	TERM WORK	LAB. WORK	I	II	PAPER	DURATION Hrs.		PRACT. DURATION Hrs.		
1.	Communication Skills	5	-	15	-	10	10	1	3	100	-	-	-
2.	Mathematics - I	5	-	15	-	10	10	1	3	100	-	-	-
3.	Engineering Physics	5	2	15	25	10	10	1	3	100	1	3	50
4.	Engineering Chemistry	3	2	15	25	10	10	1	3	100	1	3	50
5.	Engineering Drawing	0	8	40	-	10	10	1	4	100	1	3	50
6.	Workshop Practice - I	0	6	-	50	-	-	-	-	-	1	4	50
		18	18	100	100	50	50			500			200

(a) Total Theory Marks = 500

(b) Total (Sessional, Progressive Assessment + Practical) Marks = 500

(c) Ratio of Theory Marks to (Sessional + Progressive Assessment + Practical Marks) = 1 : 1

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

First Semester

COMMUNICATION SKILLS

Theory per week: 5 Hrs.

Practical per week: Nil

Topic No.	Title	Theory Hrs.	Practical Hrs.
1.	Passages for comprehension	22	-
2.	Applied grammar	22	-
3.	Rapid Reading (short stories)	12	-
4.	Unseen passages for comprehension	08	-
5.	Precis writing	08	-
6.	Paragraph writing	08	-
Total		80	-

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

First Semester

COMMUNICATION SKILLS

Theory per week : 5 Hrs.

Practical per week : Nil

COURSE CONTENT

1. Passages for comprehension
A course in Technical English: Book I, prepared at Curriculum Development Centre, Technical Teachers' Training Institute, (Western Region), Bhopal, (Section I, prescribed units: 1 to 10)
2. Applied Grammar
(Text book as above; section II) (Prescribed Units: 1 to 10)
3. Rapid Reading (short stories)
(Text book as above)
 - (i) The selfish Giant - Oscar Wilde
 - (ii) A letter to God - Gregorio Lapex Y. Fuentes
 - (iii) An Astrologer's Day - R.K.Narayan
 - (iv) The Malefactor - Anton Cheknov
 - (v) The last leaf - O.Henry
4. Unseen passage for comprehension
Passages of general interest will be given.
5. Precis Writing
Passages of general interest will be given.
6. Paragraph writing
Topics of general interest will be given.

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REFERENCES

1. Living English Structures - A practice Book for Foreign students by W.S.Allen
2. English Grammar & Composition by Wren & Martin (latest revised edition)
3. Structure of Technical English by A.J.Helbert; ELBS
4. Advanced Learners Dictionary & Current English by A.S.Hornby; Oxford
5. Scientific & Technical Dictionary by Flood & West; ELBS

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

First Semester

MATHEMATICS - I

Theory per week: 5 Hrs.

Practical per week: Nil

Topic No.	Title	Theory Hrs.
1.	Algebra	32
2.	Trigonometry	24
3.	Vector Algebra	14
4.	Statistics	10
Total		80

ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

First Semester

MATHEMATICS - I

Theory per week: 5 Hrs.

Practical per week: Nil

COURSE CONTENTS

1. Algebra

Quadratic Equation - General solution, nature of roots, relation between the roots & coefficients of the equation, formation of an equation from given roots.

Indices

Logarithms

Sequences & series - Arithmetic and Geometric progressions.

Permutations & Combinations - Factorial notation, symbols nPr, nCr, Simple problems.

Binomial theorems - Statement of theorem to any index, General term middle term/terms, greatest term.

Determinants

Partial Fractions

2. Trigonometry

System of measurement of angles, trigonometric ratios & identities, T.R. of standard angles & angle of any magnitude, use of T.tables, graphs of T.functions, inverse T.functions, solution of T.equations, T. ratios of compound angles, multiple & submultiple angle, C-D formula, A-B formula, properties of triangle & solution of triangle, height and distance.

3. Vector Algebra

Vectors & scalors, i, j, k. vectors.

Addition of vectors, multiplication by a scalar, dot product, cross product, cross product with geometrical and physical applications.

4. Statistics

Definition of Descriptive statistics, scales, frequency distribution, measures of central tendency, mean, mode, measures of dispersion, variance, standard deviation, concept of normal distribution.

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REFERENCES

1. Mathematics for polytechnics - Vol. I & II; T.T.T.I., Bhopal
2. Plane trigonometry - Part I & II by S.L.Loney:
3. Algebra by K.P.Basu
4. Mathematical Statistics by M.Ray & Sharma
5. Mathematics for polytechnics by S.P.Deshpande
6. Vector Algebra by Shanti Narain
7. Higher Engineering Mathematics by G.S.Grewal

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

First SemesterENGINEERING PHYSICS

Theory per week : 5 Hrs.

Practical per week : 2 Hrs.

Topic No.	Title	Theory Hrs.	Practical Hrs.
1.	S.I.Units	4	6
2.	General properties of matter	15	6
3.	Heat Transfer	10	3
4.	Thermodynamics	10	0
5.	Electricity	10	6
6.	Cells, batteries and their maintenance	6	3
7.	Electromagnetism	10	6
8.	Basic Electronics	10	2
9.	Optics	5	-
Total		80	32

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

First Semester

ENGINEERING PHYSICS

Theory per week : 5 Hrs.

Practical per week : 2 Hrs.

COURSE CONTENTS

1. S.I.Units

Significance of S.I. Units, Fundamental Units, Base Units, Derived units in terms of base units and notations.

2. General Properties of Matter

* Molecular kinetic theory of matter, kinetic and potential energy of molecules, concept of internal energy and heat energy, gas laws and their derivations by kinetic theory.

* Cohesive and adhesive forces, surface tension, surface energy, rise in capillary tube.

* Fluid viscosity, streamline and turbulent flows, Stoke's law, kinematic viscosity, Coefficient of viscosity by Poiseuille's method.

* Elasticity, Hook's law, elastic limit, Young's Modulus, Bulk modulus.

3. Heat Transfer

Distinction between heat and temperature, modes of heat transfer, variable and steady state coefficient of thermal conductivity for good and bad conductors, convection, natural and forced heat transfer during heat convection, radiation, emissive and absorptive power, black body radiation, Stefan Boltzman law, Newton's law of cooling.

4. Thermodynamics

First law of thermodynamics, second law of thermodynamics, thermodynamic process-reversible and irreversible process, carnot cycle.

5. Electricity

Electric current, free electron, theory of metallic conduction, current voltage relation, work and power in electrical circuits.

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6. Cells, Batteries and their Maintenance

Comparative study of the chart specifying the primary and secondary cells electrodes, electrolyte, depolariser, principle of potentiometer, EMF, internal resistance of different types of cells. Maintenance of primary and secondary cells (when in use or when they are stored).

7. Electro Magnetism

- * Magnetic induction, magnetic induction of a current element, straight conductor, circular coil, magnetic flux.
- * Motion of a charged particle in a magnetic field, current carrying conductor in a magnetic field, moving coil galvanometer, conversion of galvanometer into ammeter and voltmeter.
- * Magnetic properties of materials, permeability, susceptibility.,
- * Elementary idea of transformer.

8. Basic Electronics

- * Thermoionic emission, photoelectric emission, photocell, photovoltaic cells.
- * Semiconductors, intrinsic and extrinsic semiconductor, P-type, N-type, P-N junction as a rectifier.

9. Optics

Dual nature of light, wave theory, Huygen's principle, concept of wave front, wave as rap, principle of superimposition, interference of light, conditions of interference, speed of light in different media, optical density, refractive index, diffraction of light.

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LIST OF EXPERIMENTS

1. Precise measurement of length by
 - (a) Vernier calliper
 - (b) Micrometer Screw
 - (c) Screw gauge
2. To determine surface tension of liquid by capillary rise method.
3. To determine coefficient of viscosity of liquid by Poiseuille's method.
4. To determine coefficient of thermal conductivity of a good conductor (Searle's method)
5. To determine Young's modulus.
6. To verify Ohm's law.
7. To measure resistance by ammeter and voltmeter and verification of series and parallel combination of resistance.
8. To convert a galvanometer into a voltmeter of a given range.
9. To convert a galvanometer into an ammeter of a given range.
10. To investigate the relation between current flowing through the resistance and heat generated.
11. To observe the variation of magnetic field by varying the current in coil.
12. To determine the internal resistance of cell by potentiometer.
13. To investigate the uni-directional property of P-N junctions.

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

First SemesterENGINEERING CHEMISTRY

Theory per week : 3 Hrs.

Practical per week : 2 Hrs.

Topic No.	Title	Theory Hrs.	Practical Hrs.
1.	Metals and Alloys	6	14
2.	Fuels and Combustion	5	2
3.	Lubrication and Lubricants	6	2
4.	Bonding	4	-
5.	Catalysis	2	-
6.	Corrosion and protection	6	2
7.	Protective coating	4	-
8.	Dielectrics	3	-
9.	Pollution - Water, Air and Industrial	6	8
10.	Oxidation and Reduction	5	4
11.	Industrial detergents	1	-
Total		48	32

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REFERENCES :

1. Principles of Physics - TTTI, Bhopal
2. Principles of Physics - Brijlal and Subramanian
3. Modern college Physics - H.E.White
4. College Physics - Sears and Zee Manskey
5. A level physics - Roger Mumcaster

ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

First Semester

ENGINEERING CHEMISTRY

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Theory per week: 3 Hrs.

Practical per week: 2 Hrs.

COURSE CONTENTS

1. Metals and Alloys

General properties of metals, some important ferrous and non-ferrous alloys and their properties, Chemical analysis of metals and alloys.

2. Fuels & Combustion

Classifications of fuels, Calorific value, properties and applications of different fuels, Handling & storage of Fuel, Fire - protection.

3. Lubrication & Lubricants

Friction and wear, Lubricants, Mechanism, Classification and properties of Lubricants, Selection of Lubricants. Systems of lubrication, gravity forced, static and hydrodynamic, addition of agents, for motor oil.

4. Bonding

Nature of Chemical Bond, Ionic and Covalent bonding, Physical bonding.

5. Catalysis

Types, characteristics of catalytic reactions, Autocatalysts.

6. Corrosion & Protection

Corrosion, types of corrosion, factors affecting corrosion, Protection against corrosion.

7. Protective Coatings

Introduction, cleaning and preparation of metal surfaces, types of coatings - metallic coatings and metal cladding, chemical conversion coatings, paints, varnishes, enamels, liqueurs, ceramic protective coatings, sealents.

8. Dielectrics

Introduction, Dielectric properties, classification of dielectrics, Gaseous Insulators, Liquid insulating materials, Solid insulating materials.

9. Pollution

Water Pollution - BOD, MPN, Purification of Water.

Air pollution - Major air pollutants, Air pollution and measures for its control.

Industrial pollution - Industrial wastes (effluents, garbage fumes etc.), measures for its control.

10. Oxidation & Reduction

Oxidation and Reduction, Electronic concept of oxidation and reduction, Oxidation number and Valency, Acid, Base, pH, determination of pH.

11. Industrial Detergents

Brief idea about industrial detergents.

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LIST OF EXPERIMENTS

1. To measure the pH of different solutions by -
 - (a) pH meter
 - (b) colorimetric method
2. To determine the percentage of copper in a sample of Brass by volumetric method.
3. To determine the percentage of Iron in Ferrous Salt.
4. Quantitative estimation of two metals in an alloy (Solder/Brass).
5. To find out the flash point, fire point of dry/non-drying oils.
6. To determine the viscosity of lubricants by viscometer.
7. To determine the rate of corrosion on simple and galvanised nail by nail and acid method.
8. To analyse the Cations and Anions in a given salt by macro analysis.
9. To determine total dissolved solids (TDS)
10. To determine dissolved oxygen (DO)
11. To determine most probable number (MPN)
12. To identify the concentration of NH_3 , CO_2 , and SO_2 .

REFERENCES

1. Advance Inorganic Chemistry by Behl & Tuli
2. Advance Inorganic Chemistry by Mitra
3. Applied Chemistry by Shrivastava & Singhal; PBS Publication, Bhopal
4. Objective Chemistry by Shrivastava & Shrivastava; Chandra Publication, Bhopal
5. Engineering Chemistry by P.C.Jain & Monica Jain; Dhanpat Rai & Sons Publication
6. Experiments in Applied Chemistry by M.Prasad; Chandra Publication, Bhopal
7. A text book of Engineering Chemistry by P.C.Jain

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

First SemesterENGINEERING DRAWING

Theory per week - NIL

Practical per week - 8 Hrs.

Topic No.	Title	Theory Hrs.	Practical Hrs.
1.	Introduction to drawing & drawing instruments	-	2
2.	Engineering Scales, Lines and Curves	-	12
3.	Lettering and Dimensions	-	8
4.	Projections of points, lines and planes	-	18
5.	Orthographic projections	-	16
6.	Projection of solids and section of solids.	-	18
7.	Projection of machine components by free hand sketching	-	18
8.	Development of surfaces	-	10
9.	Isometric Projections	-	12
10.	Standard conventions & symbols	-	4
11.	Element of Machine Drawing	-	10
Total		-	128

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

First Semester

ENGINEERING DRAWING

Theory per week - NIL.

Practical per week - 8 Hrs.

COURSE CONTENTS

1. Introduction to Drawing and Drawing Instruments

Define engineering drawing, Display and explain the use of various drawing instruments.

2. Engineering Scales, Lines and Curves

Calculation of representative fraction and length of scale, construction of plain scale, diagonal and vernier scale, alphabets of lines - thick, medium, and thin lines. Conventional representation of centre line, full line, hidden line, cutting line, section line, dimension line, extension line etc., practice on sketch book. Engineering curves, method of construction of curves like ellipse, parabola, hyperbola, cycloid, involute, helix, and spiral of archemedian. Uses of these curves.

3. Lettering and Dimensioning

Single stroke letters, gothic letters. Principles of dimensioning systems - Aligned and unidirectional. Arrangement of dimensions - chain, parallel and combined. Size and location dimensioning - superfluous dimensions. (IS 696 - 1972), Arrow heads & Extension lines, Practice problems on dimensioning techniques, Rules for dimensioning the isometric drawings.

4. Projection of Points lines and Planes

Introduction, elements of projections. Projection of points in different planes. Projection of line - True length. Projection of planes, practice problems.

5. Orthographic Projections

Meaning of orthographic projection, Planes of projections, Terms associated with orthographic projections front, side and top view. Differentiate between first angle and third angle projections on the basis of -

- (a) Position of the object corresponding to the reference plane.
- (b) Position of projection plane in relation to that of observer's eye and that of object.

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- (c) Relative position of front view and top view.
- (d) Relative position of side view.

6. Projection of solids and section of solids

Types of solids-terminology; position of solids with respect to reference planes. Practice problem to draw the projection of solids placed in various position with respect to the reference planes, (Cone, Cylinder, Cube, Prism & Pyramid), Define sectioning, need of sectioning, differentiate between full section, half section and Partial section. Simple problems.

7. Projection of simple machine components by free hand sketching

Techniques of free hand sketching, free hand sketching of simple machine components such as bearing cap, simple journal bearing, simple brackets, orthographic views of Hexagonal and square nut and bolts, simple practice problems.

8. Development of surface

Concept and importance of development in engineering applications. Development of cube, prism, pyramid, cylinder and cone. Practical problems of development of chimney, ducts and hoppers etc.

9. Isometric Projections

Need and use of isometric scale. procedure for preparing isometric drawing of rectangular, pentagonal and hexagonal blocks and sphere.

10. Standard Conventions and Symbols

Sign conventions and symbols used in CME engineering as per IS code 696-1972. Symbols of building material such as Brick work, stones, concrete, wood, glass and foundation Bolts. Conventional representation of features like, external and internal threads; compression, tension and leaf springs, knurling, bearings and gears. Elementary electrical symbols like DC, AC, bulb fuse, earthing, plug, resistance, capacitance, inductance, bell, buzzer, loudspeaker.

11. Elements of Machine Drawing

Rivets and Riveted joints, forms of screw threads, conventional representation of pipe joints and valves.

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REFERENCES

1. IS Code 696-1972
2. Elementary engineering drawing by N.D.Bhatt; Charotar Book Stall, Anand
3. Engineering Drawing by Gujaral and Shende; Khanna Publishers
4. Machine Drawing by N.D.Bhatt; Charotar Book Stall, Anand
5. Engineering Drawing by R.B.Gupta; Satya Prakashan, New Delhi
6. Graphics for engineers by W.J.Luzzadar; Prentice Hall India Ltd., New Delhi
7. Fundamentals of engineering drawing by W.J.Luzzadar; Prentice Hall India Ltd., New Delhi

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

First Semester

WORKSHOP PRACTICE - I

Theory per week - Nil

Practical per week - 6 Hrs.

Topic No.	Title	Theory Hrs.	Practical Hrs.
1.	Introduction to Workshop	-	2
2.	Carpentry shop	-	22
3.	Fitting Shop	-	24
4.	Sheet metal shop	-	24
5.	Smithy Shop and forging	-	24
Total		-	96

NOTE: Theoretical inputs will be provided on shop floor during workshop practice.

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

First Semester

WORKSHOP PRACTICE - I

Theory per week - Nil

Practical per week - 6 Hrs.

COURSE CONTENTS

1. Introduction to Workshop

Familiarisation of different sections of a general engineering workshop. Safety precautions and good housekeeping in the workshop. Layout of different sections of workshop, general safety rules of workshop.

2. Carpentry shop

General layout of carpentry shop, Types of job produced in carpentry, Basic information required by carpenter. Raw materials, carpentry hand tools like saws, planer, chisels, hammers, pallet, marking gauge, vice, try square, engineering rule etc., use of carpentry tools for making simple joint.

3. Fitting shop

Introduction of tools and equipments used in fitting shop - files, vice, chisels, punch, scriber, hammers, try square, callipers, surface plate etc.
Fitting processes - filing, chipping, scraping, sawing etc.
Preparation of Male-Female joints.

4. Sheet-Metal shop

Metals used in sheet metal work - Black Iron, Galvanised Iron, Stainless steel, Copper, Aluminium, Tinned plate.
Tools - stakes, hammers, scissors etc., sheet metal processes - folding, hemming.

5. Black-smithy and forging

Layout of shop, types of jobs produced in black-smithy and forging shop, Basic information required for jobs to be made in these shops, Forging operations, furnace operations and type of heating systems used in forging shop.

LIST OF EXERCISES

1. Study and sketch of various tools used in different shops such as - carpentry, fitting, sheet metal and smithy shop.
 2. One job in carpentry shop with the use of different carpentry tools.
 3. One job on different types of carpentry joints.
 4. One job on fitting joints containing different operations such as hacksaw cutting, filing, slotting, fitting, drilling etc.
 5. Filing and fitting of mating parts, checking gap with gauge.
 - *6. One job on forging operations such as bending, upsetting, drawing down, and setting down etc.
 - *7. One job on sheet metal work containing surface development of jobs and marking joints.
 8. Filing to make a perfect square, marking and centre - punching.
 9. Chipping and bending a copper sheet to make a cylinder.
 10. Filing a L-channel sawing straight and slant slots on it.
 11. Filing, marking number and letter - punching on a M.S. sheet in different ways.
 12. Filing and forming a radius by flat hitting on a sheet metal.
 13. Making boxes and cases for various equipments and other sheetmetal works.
- * These experiences could be industry based to achieve the required performance skill.

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REFERENCES

1. Workshop tech. Vol. I & II by Hazra Choudhary
2. Workshop Technology Vol. I & II by Chapman
3. Workshop Technology Vol. I & II by Gupta and Kaushik
4. * Manufacturing Processes by Young

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ADVANCED DIPLOMA
IN
INDUSTRIAL ELECTRONICS
(SECOND SEMESTER)



CURRICULUM DEVELOPMENT CENTRE

TECHNICAL TEACHERS' TRAINING INSTITUTE,
SHAMLA HILLS, BHOPAL - 462 002

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL

**Scheme of Studies and Examination
Advanced Diploma in Industrial Electronics**

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SECOND SEMESTER

SL. NO.	COURSE TITLE	HOURS/WEEK		SESSIONAL MARKS		PROGRESSIVE ASSESSMENT		BOARD EXAMINATION PAPER	THEORY MARKS	PRACTICAL/VIVA PRACT. DURATION Hrs.	PRACTICAL MARKS	Total Mark		
		TH.	PR.	TERM WORK	LAB. WORK	I	II							
1.	Mathematics - II	5	-	15	-	10	10	1	3	100	-	-	135	
2.	Basic Mechanical Engineering	4	2	15	25	10	10	1	3	100	1	3	50	210
3.	Electronic Engineering - I	6	2	15	25	10	10	1	3	100	1	3	50	210
4.	Basic Electrical Engineering	6	2	15	25	10	10	1	3	100	1	3	50	210
5.	Electrical & Electronics Materials	4	-	15	-	10	10	1	3	100	-	-	-	135
6.	Electrical & Electronics Workshop	1	4	-	100	-	-	-	-	-	1	3	100	200
Total		26	10	75	175	50	50	(5)	-	500	(4)	-	250	1100

(a) Total Theory Marks = 500

(b) Total (Sessional + Progressive Assessment + Practical) Mark = 600

(c) Ratio of Theory Marks to (Sessional + Progressive Assessment + Practical Marks) = 1 : 1.2

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

II SEMESTER

S.No.	Course Title	Theory	Practical	Total
1.	Mathematics - II	5	-	5
2.	Basic Mechanical Engineering	4	2	6
3.	Electronics Engineering -I	6	2	8
4.	Basic Electrical Engineering	6	2	8
5.	Electrical and Electronics Materials	4	-	4
6.	Electrical and Electronics Workshop	1	4	5
Total		26	10	36

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

MATHEMATICS - II

Theory per week: 5 Hrs.

Practical per week: Nil

Topic No.	Title	Theory Hrs.	Practical Hrs.
1.	Coordinate Geometry	24	-
2.	Complex Variables	12	-
3.	Differential calculus	22	-
4.	Integral Calculus	22	-
Total		80	-

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

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MATHEMATICS - II

Theory per week: 5 Hrs.

Practical per week: Nil

COURSE CONTENTS

1. **Coordinate Geometry**

Cartesian & polar co-ordinates, point, locus.

Straight line - Equation of a straight line, Angle between two straight lines, Conditions for perpendicular & parallel lines, Length of perpendicular, Bisector of an angle between two straight lines.

Circle - Equation of a circle, Equations of tangent, normal & chord

Parabola - Equation of a parabola, its tangent & normal.

Ellipse - Equation of an ellipse, its tangent & normal.

2. **Complex Variables**

Complex Numbers : Basic definition, operation and geometric representation of complex number, complex number as vector, complex conjugates, absolute values, polar forms, product powers.

Definition of Function of Complex Variable : Definition and Quotients.

3. **Differential Calculus**

Functions and limits, differentiation of all types of functions, partial differentiation, higher derivatives (upto second order).

4. **Integral Calculus**

Integration as reverse process of differentiation, standard formula, integration by substitution, integration by parts, integration by partial fractions, definite integral.

ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second SemesterMATHEMATICS - IIREFERENCES

1. Mathematics for Polytechnics - TTTI, Bhopal
Vol. I & Vol.II
2. Coordinate Geometry - by S.L. Loney
McMillan Co. of
India Ltd.
3. Text book on Differential Calculus - by Gorakh Prasad
Pothi Shala Pvt.L
4. Text book on Integral Calculus - by Gorakh Prasad
Pothi Shala Pvt.L
5. Higher Engineering Mathematics - by G.S.Grewal
6. Complex Variables and Applications - by Churchill Ago
Mc Grawhill Co.

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second SemesterBASIC MECHANICAL ENGINEERING

Theory per week: 4 Hrs.

Practical per week: 2 Hrs.

Topic No.	Title/Topic	Theory Hrs.	Practical Hrs.
1.	Basic Thermodynamics	08	-
2.	Properties of Steam	06	-
3.	Boilers	06	08
4.	Steam Turbine	06	04
5.	I.C. Engine	08	04
6.	Fundamental of Fluid Flow	10	08
7.	Pumps	08	04
8.	Compressors and Fans	06	-
9.	Heat Exchanger and Cooling Towers	06	04
Total		64	32

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

BASIC MECHANICAL ENGINEERING

Theory per week: 4 Hrs.

Practical per week: 2 Hrs.

COURSE CONTENTS

1. Basic Thermodynamics

- Difference between gases and vapours
- Boyle's Law
- Charle's Law
- Universal gas constant - R
- Gas equation
- Internal energy
- Specific heat
- Applications of law of thermodynamics
- Thermodynamic process
- P-V diagram of thermodynamic process
- Working of following cycle by P-V diagram Auto & Diesel cycle

2. Properties of Steam

- Steam formation & process of vapourisation
- Definition of various terms connected with steam
- Introduction to steam table and its uses

3. Boilers

- Principle and working of boilers
- Classification of boilers
- Mounting and Accessories of steam boilers

4. Steam Turbine

- Principle of working of steam turbine
- Classification of turbine
- Steam and hydraulic turbine

5. I.C. Engine

- Construction and working of I.C. Engine
- Classifications of I.C. Engine
- Two stroke and four stroke engine
- Detail of four stroke engine

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6. Fundamentals of Fluid Flow

- Fluid and their properties, fluid pressure, pressure Head viscosity
- Pressure measurement - Piezometer, 'U' tube manometer, inverted 'U' tube manometer, micro-manometer
- Types of flow-steady, streamline and turbulent flow
- Bernoullis theorem and its application to venturimeter and pilot tube
- Flow measurement - study and measurement of orifices and flow over notches 'V' and rectangular

7. Pumps

- Type of pumps
- Working of centrifugal and reciprocating pumps
- Comparison of centrifugal and reciprocating pumps
- Applications

8. Compressor and Fans

- Working principle of rotary and reciprocating compressors
- FANS - types, application & specifications

9. Heat Exchanger and Cooling Towers

- Introduction, LMTD, parallel and counterflow heat exchanger, condenser
- Cooling towers - types, applications and specifications of heat exchangers and cooling towers

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

BASIC MECHANICAL ENGINEERING

LIST OF EXPERIMENTS

1. Study by models, charts and actual units of the following :-
 - (a) Common types of fire-tube and water tube boilers
 - (b) Boiler Mountings and Accessories
 - (c) Steam Turbine
 - (d) Surface Condenser
 - (e) Cooling Tower
2. To study different types & trial run of water turbine
3. To study Centrifugal pump
4. To study reciprocating pump
5. To study two stroke and four stroke petrol engine
6. To study two stroke and four stroke diesel engine
7. Measurement of pressure by U tube manometer
8. Measurement of pressure by micro manometer
9. Determine the coefficient of discharge for 'V' and Rectangular notches, orifices

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

BASIC MECHANICAL ENGINEERING

REFERENCES

1. General Mechanical Engineering - by Hazra Choudhary
2. Thermal Engineering - by P.L. Ballaney, Khanna Pub.
3. Thermodynamics and Heat Engine - by S. Domkundwar Dhanpat Rai & Son's
4. Fluid Mechanics and Hydraulic Machines - by K.D. Saxena J.K. Jain & Co.
5. Hydraulic and Hydraulic Machines - by Jagdish Lal Sahu and Co.
6. Heat Engine and Thermodynamics - by Pandya and Shah Charotar Book Stall
7. Mechanical Engineering - by Mathur & Mehta Jain Pub.
8. Fluid Mechanics - by Dr. P.N. Modi and Dr. N.S. Seth Standard Book House, Delhi

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

ELECTRONICS ENGINEERING - I

Theory per week: 6 Hrs.

Practical per week: 2 Hrs.

Topic No.	Title/Topic	Theory Hrs.	Practical Hrs.
1.	Semiconductor Theory	12	-
2.	Junction Diodes	12	02
3.	Rectifiers and Power Supplies	28	12
4.	Transistors	20	06
5.	Transistor Amplifiers	18	06
6.	Introduction to Electronic Measuring Instruments	06	06
Total		96	32

ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

ELECTRONICS ENGINEERING - I

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Theory per week : 6 Hrs.

Practical per week : 2 Hrs.

COURSE CONTENTS

1. Semiconductor Theory

* Semiconductor Materials

- Classification of conductors, semi-conductors and insulator.
- Crystalline structure of semiconductor.
- Doping of P-type and N-type materials.
- Effect of temperature on semi-conductor material.
- Minority and majority carriers.

2. Junction Diode

- * Characteristics of junction diode (Si/Ge).
- * Biasing of junction diode.
- * Diode Resistances (Forward and Reverse).
- * Capacitive effect of a P-N junction.
- * Characteristics of Zener diode.
- * Characteristics of avalanche diode.

3. Rectifiers and Power Supplies

* Half Wave Rectifier

- Voltage regulation, ripple factor, efficiency ratio of rectification.

* Full wave Rectifier

- Centre tapped FW rectifier.
- FW Bridge Rectifier.
- PN in different configuration and comparison of different rectifier circuits.

* Filter Circuits

- Capacitor filter.
- LC filter (.. and L type).
- Comparison of different filter ckts.

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- * Voltage Multiplier
 - Doubler, Tripler circuits
 - * Zener Regulator
 - * Clipper and Clamper
 - Positive and Negative Clipper.
 - Positive and Negative Clamper.
 - * Regulated Power Supply using 7805 and 7905 Transistor

4. Transistors

- * Basic Structure
 - Types of Transistor
 - Parameter
 - Two diode analogy
 - h - parameters
- * Transistor Configuration
 - Biasing of transistor
 - CE, CB and CC configuration, Region of transistor (cutoff, active and saturation)
 - Current gain (.. and ..)
 - Voltage gain, power gain
- * Transistor Characteristics
 - Input and output characteristics in CB, CE and CC
 - Comparison of different configuration

5. Transistor Amplifier

- * Transistor Biasing
 - Base biasing
 - Emitter biasing
 - Emitter feedback biasing
 - Collector feedback biasing
 - Voltage divider biasing
- * Common Emitter Amplifier
 - Amplifier action
 - AC and DC load line analysis

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7. Introduction to Electronics Measuring Instruments

- * A.C. and D.C. Power Supply
- * Digital and Analog Multimeter
- * CRO
- * Function generator
- * LCR Meter
(Front panel layout and functions of switches and knobs
and application of above instruments)

ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

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ELECTRONICS ENGINEERING- I

LIST OF EXPERIMENTS

1. Experiment with P-N junction diode & verify the nature of its characteristic curve
2. Experiment with Zener-diode and verify the nature of its characteristic curve and draw inferences on its application
3. Construct a Half-Wave Rectifier circuit on bread-board and observe its rectified and unrectified waveform on CRO. Calculate the following for the same :-
 - (a) Ripple Factor
 - (b) Efficiency of Rectifier
 - (c) PIV
4. Construct a Centre-Tapped FW Rectifier on bread-board, observe rectified and unrectified waveform on CRO and calculate the following :-
 - (a) Ripple Factor
 - (b) Efficiency of Rectifier
 - (c) PIV
5. Construct a Bridge FW Rectifier on bread-board, observe rectified and unrectified waveform on CRO, and calculate the following :-
 - (a) Ripple Factor
 - (b) Efficiency of Rectifier
 - (c) PIV
6. Construct HW and FW Rectifier using C-Filter and LC-Filter, observe the rectified output waveform without filter and with filter. And compare both outputs
7. Construct "Voltage-Doubler" and "Voltage-Tripler" on bread-board using diode-capacitor combinations and observe the outputs on CRO, measure and calculate its value
8. (a) Construct Zener-Voltage Regulator on bread board and verify its voltage regulation observing output waveform on CRO and infer it

(b) Construct Voltage Regulator circuit using 7805/7812/7905/7912 on bread board and verify its voltage regulation observing output on CRO and infer

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9. (a) Construct positive and negative clipper circuit using diode on bread board. Observe the output waveform on CRO and verify it
- (b) Construct positive and negative clamper circuit using diode on bread board. observe the output waveform on CRO and verify it
10. Using a board having a fixed transistor with three terminals brought out connect them in CE, CB, CC configuration and compare their voltage gains and draw input and output characteristics
11. Construction of CE amplifier using voltage divider biasing and draw its AC and DC load line find Q point
12. Observe the waveform at input and output of a transistor :-
 - (a) Without any biasing
 - (b) With various biasing
13. Using function generator observe the output waveforms on CRO and find out the amplitude and frequency
14. Test the component and measure the value using :-
 - (a) LCR Meter
 - (b) Multimeter
 - (c) CRO

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

ELECTRONICS ENGINEERING - I

REFERENCE BOOKS

1. Electronics Principles - by Albert Paul Malvino
TMH Pub.
2. Electronic Devices and Circuits - by Allen Mottershed
Prentice Hall Pub.
3. Integrated Electronics - by Millman & Halkias
TMH Pub.
4. Basic Electronic Principles - by V.K. Mehta
Khanna Pub.
5. Design of Electronics Circuit and Computer Aided Design - by M.M. Shah
Wiley Eastern Pub.
6. Electrical and Electronics Measurements - by A.K. Sawhney
Dhanpat Rai & Sons Pub.
7. Electronic Instrumentation and Measurement - by W.D. Cooper
A.D. Helfrick
PHI Pub.
8. Laboratory Mannual for Introductory Electronics - by L.K. Maheshwari
M.M.S. Anand

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

BASIC ELECTRICAL ENGINEERING

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Theory per week: 6 Hrs.

Practical per week: 2 Hrs.

Topic No.	Title/Topic	Theory Hrs.	Practical Hrs.
1.	DC Circuit and Network Theorem	14	08
2.	Magnetic Circuit	12	02
3.	Electromagnetic Induction	12	02
4.	Electrostatics	12	04
5.	AC Fundamental	18	12
6.	Polyphase Circuits	14	04
7.	Power System	14	-
8.	Materials	-	02
Total		96	32

ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

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BASIC ELECTRICAL ENGINEERING

Theory per week: 6 Hrs.

Practical per week: 2 Hrs.

COURSE CONTENTS

1. D.C. Circuits & Network Theorems

- Resistance
- Series & Parallel combination of Resistances
- Temperature coefficient of Resistances
- Kirchoff's laws and their application for D.C. circuits
- Star-Delta Transformation
- Superposition Theorem
- Thevenin's Theorem
- Nortons Theorem
- Maximum Power Transfer Theorem
- Reciprocity Theorem and their applications through simple problems

2. Magnetic Circuits

- Concept of Magnetic field
- Magnetic flux
- Flux Density
- Intensity of magnetisation or magnetic force
- Magneto Motive force
- Permeability
- Analogy of electrical and magnetic circuits
- Series & parallel magnetic circuits and numerical based on them
- B-H curve and hysteresis loop, Hysteresis
- Force exerted between two parallel conductors carrying current
 - (a) In the same direction
 - (b) In opposite direction

3. Electromagnetic Induction

- Faraday's Law's of electromagnetic induction
- Fleming's Left Hand and Right Hand rule
- Lenz's Law
- Statically and Dynamically induced emf
- Self and mutually induced emf
- Coefficient of self and mutual inductance
- Energy stored in a magnetic field
- Eddy current

Electrostatics

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- Electric charge
- Coulomb's Inverse square law
- Permittivity
- Electric Intensity
- Concept of Electric field
- Condensers
- Types of condensers and their practical applications
- Capacitance of parallel plate capacitor
- Capacitor's in series and parallel
- Energy stored in Electrostatic field
- Rise and decay of current in R-C & L-C series circuits

A.C. Fundamentals

- Concepts of sinusoidal and unidirectional waveforms
- Definitions of -
 - * Cycle
 - * Frequency
 - * Time period
 - * Instantaneous value
 - * Phase & Phase difference
 - * R.M.S. value
 - * Average value
 - * Maximum value
 - * Form factor & peak factor
- Mathematical expression of single phase voltages and currents i.e. $E = E_m \sin \dots$, $I = I_m \sin \dots$
- Generation of sinusoidal waveforms
- Current, voltage and power relations in pure resistive, inductive and capacitive circuits
- Graphical representation of phasors, mathematical representation of phasors in complex, polar and trigonometric forms
- Representation of alternating quantities in 'j' notation and numericals based on it. (Addition, Subtraction, Multiplication, Division)
- Simple A.C. series & parallel circuits consisting
 - * R-L
 - * R-C
 - * R-L-C
- Resonance in series circuit
- Active and reactive power in simple A.C. circuit
- Power factor

Polyphase Circuits

- Concept of polyphase
- Advantage of polyphase system over single phase system
- Generation of three phase voltages with waveforms
- Meaning of phase sequence
- Star and Delta connection of three phase circuits
- Current, voltage and power relations for three phase star and delta connection (No Derivation)

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- Simple problem on the above relationships
- Meaning of balanced and unbalanced three phase a.c. system

Power System

- Generation of electrical power
 - * Conventional methods
 - * Non conventional methods
- Transmission and distribution of electric power
- Single line diagram of power system
- Standard voltages of generation, transmission & distribution
- Power system protection with the help of circuit-Breakers and Relays
- Concept of earthing
- Earthing of power system and equipments
- Electric shock and treatment
- Safety rules and regulations

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

BASIC ELECTRICAL ENGINEERING

LIST OF EXPERIMENTS

1. Given an electric circuit having series & parallel branches, measure the current & voltage drops in each branch. Confirm the same using kirchoff's Laws
2. Verification of thevenins theorem
3. Verification of Maximum Power Transfer Theorem
4. Verify Faraday's Law & Lenz's Law by using appropriate model
5. Determine the value of unknown resistance by loss of charge method
6. Performance of R-L series circuit -
 - (a) Calculate the impedance & p.f
 - (b) Measurement of current, power and voltage
 - (c) Draw vector diagram
7. Performance of R-C series circuit -
 - (a) Calculate the impedance & p. f
 - (b) Measurement of current, power and voltage
 - (c) Draw vector diagram
8. Performance of R-L-C series circuit :-
 - (a) Calculate the impedance & p. f
 - (b) Measurement of current, power and voltage
 - (c) Draw vector diagram
9. Determination of voltages (line & phase) and current (line & phase) in case of star connection. Establish the relationships
10. Identification and selection of appropriate materials for different applications
11. Determination of voltage (line & phase) and currents (line & phase) in case of delta connection. Establish the relevant relationships
12. To plot the charging curve of a capacitor

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

BASIC ELECTRICAL ENGINEERING

REFERENCES

1. Electrical Technology - by B.L. Theraja
Nirja C & D Co. Pvt. Ltd.
2. Electrical Technology - by H. Cotton
English Language Books
Society
3. Electrical Engineering - by S.L. Uppal
Khanna Pub.
4. A Text Book of Electrical
Engineering - by J.B. Gupta
Dhanpat Rai Pub.
5. Principles of Power system - by V.K. Mehta
Khanna Pub.
6. Electrical Power - by J.B. Gupta
Dhanpat Rai Pub.
7. Switch Gear & Protection - by Sunil S. Rao
8. Electrical Power System - by William D. Stevenson
Mc Grawhill International
Editions

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second SemesterELECTRICAL AND ELECTRONICS MATERIALS

Theory per week: 4 Hrs.

Practical per week: NIL

Topic No.	Title/Topic	Theory Hrs.	Practical Hrs.
1.	Conducting Materials	14	-
2.	Insulating Materials	16	-
3.	Semiconductor Materials	10	-
4.	Magnetic Materials	12	-
5.	Materials Used in Electronics Components	12	-
Total		64	-

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

ELECTRICAL AND ELECTRONICS MATERIALS

Theory per week: 4 Hrs.

Practical per week: NIL

COURSE CONTENTS

1. Conducting Materials

- * Classification of Materials
- Concept of conductivity
- Requirement of good conducting material
- Factor affecting resistivity of material
- Name of common conducting material
- Comparison of different conducting materials
- Concept of current flowing in conductor
- Mobility
- Energy level of a molecules
- Application of conductors

- * Emission of electron From Conductor Surface
- Thermonic Emission
- Photo Electric
- Field Emission
- Secondary Emission

- * Concept of Super Conductivity

- * Thermoelectric Effect and Application

2. Insulating Materials

- * Distinction between Insulator and Conductor

- * Insulation Resistance
- Definition
- Factor affecting insulation resistance

- * Dielectric Strength
- Definition
- Factor affecting dielectric strength
- Dielectric constant

- * Breakdown Voltage
- Definition
- Effect of dielectric breakdown
- Concept of air space in insulation



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- * **Effect of Frequency and Temperature on Dielectric**
 - Dielectric loss
 - Perfect dielectric
- * **Ferroelectric Properties**
 - Curie point
 - Thermal, Mechanical, Physical, Chemical properties
- * **Classification of Insulating Material**
 - Class A, B, C, H, F, Y
- * **Transformer Oil**
 - Characteristics
 - Contamination
 - Purification

3. Semiconductor Materials

- * **Classifying Material as Semiconductors**
 - Concept of conductivity
 - Name of different semiconductor material
 - Concept of forbidden energy gap and comparison with insulating and conducting materials
 - Energy band diagram
 - Fermi level
- * **Intrinsic & Extrinsic Semiconductors**
 - Energy band in extrinsic material
 - Diffusion
 - Mobility
- * **Einstein Relation**
 - Drift & diffusion current
- * **Hall Effect**
 - Definition
 - Application

4. Magnetic Material

- * **Classification**
 - Paramagnetic
 - Ferromagnetic
 - Antiferromagnetic or ferrimagnetic
 - Diamagnetic
 - Comparison
- * **Different Magnetic Material**
 - Silicon steel
 - Soft steel
 - Cast iron
 - Application & properties
 - Comparison

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- * **Curie Temperature**
 - Definition
 - Effect on magnetic material
 - * **Impurities in Ferromagnetic Material & their effect**
 - * **Magnetostriction**
 - Definition
 - Effect
 - Application
 - * **Hysteresis Effect**
 - B-H curve
 - B-H curve for soft & hard material
 - Losses
 - Steinmetz constant
 - * **Powdered Core Materials**
 - Application
5. **Material Used in Electric & Electronic Components**
- * **Resistor**
 - Carbon composition resistor
 - Insulated moulded resistor
 - Film type resistor
 - Wire wound resistor
 - Printed circuit resistor
 - * **Capacitor**
 - Paper capacitor
 - Ceramic dielectric capacitor
 - Glass dielectric capacitor
 - Plastic dielectric capacitor
 - Electrolyte capacitor
 - * **Inductor**
 - Core material
 - Laminated core
 - Powdered iron core
 - Ferrite core material
 - * **Soldering Material**
 - Flux material
 - Soft soldering material
 - Hard soldering material
 - * **Fuse**
 - Fuse material
 - Properties
 - * **Material Used in Fibre Optics (Optical Fibre)**

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

ELECTRICAL AND ELECTRONICS MATERIALS

REFERENCES

1. General & Electrical Engineering Materials - by M.L. Gupta
2. Electrical Engineering Material - by A.J. Decker
3. Electrical Engineering Material - by C.S. Indulkar
4. Electrical Engineering Material - by K.B. Raina & S.K. Bhattacharya; Ketson Pub. House

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second SemesterELECTRICAL AND ELECTRONICS WORKSHOP

Theory per week: 1 Hr.

Practical per week: 4 Hrs.

Topic No.	Title/Topic	Theory Hrs.	Practical Hrs.
1.	Symbols	04	04
2.	Data Book and Information Documents	02	04
3.	Tools	-	02
4.	Component Identification and Testing	-	06
5.	Contactors and Switches	02	08
6.	Cables and Wires	02	06
7.	Soldering Techniques	01	04
8.	P.C.B. Drafting	04	10
9.	Assembly and Testing	-	10
10.	Coil-Winding	-	06
11.	Safety and Storage	01	04
Total		16	64

ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Second Semester

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ELECTRICAL AND ELECTRONICS WORKSHOP

Theory per week: 1 Hr.

Practical per week: 4 Hrs.

COURSE CONTENTS

1. Symbols

- * Electrical Symbols
 - Component
 - Electrical Instruments and Machines
 - Wiring
- * Electronics Symbols
 - Components
 - Circuit

2. Data Book and Information Documents

- Necessity of Data-Books and Mannuals
- Data/Information reading

3. Tools

- Tools used in Electrical & Electronic Workshop
- Specification of tools
- Selection of tools

4. Component Identification and Testing

- Resistor
- Inductor
- Capacitor
- Semiconductor diodes
- Transistors
- Silicon controlled rectifier
- Integrated circuits

5. Contactor and Switches

- * Connectors
 - Various types of connectors (function and uses)
- * Switches
 - Various types of switches (function and uses)
 - Limit switches
 - Micro switches

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* **Contactors and Relays**

- Various types of contactors (function and uses)
- Setting and repairing of contactors
- Various types of relays
- Setting and repair of relays

6. **Cables and Wires**

* **Cables**

- Various types of cables and wires
- Selection of wires and cables

* **Wiring**

- Interpretation of wiring diagram (House, Industrial and control panel)
- Identification of wires/cables
- Wiring of control panel
- Cable laying (for control panel)
- Cable joints

7. **Soldering Techniques**

- Soldering materials, flux materials
- Various types of soldering irons and its selection
- Desoldering pumps
- Precautions while soldering
- Soldering and de-soldering practice

8. **P.C.B. Development**

- Various types of P.C.B.
- P.C.B. layout drafting (of any circuits)
- Printing of layout on copper clad board
- Etching
- Washing
- Inspection of prepared P.C.B. and correction
- Drilling holes on P.C.B.
- Cutting of P.C.B.
- Testing of P.C.B.
- Timing of P.C.B.

9. **Assembly and Testing**

* **List of Assembly**

- Battery eliminator for 3,6,9,12 volt
- I.C. Voltage regulators for 5V, 12V, 1 AMP
- Waveform generators using 555 IC
- Audio Amplifier
- Electronic sound generator
- Light dimmer/fan speed regulator using diac & triac
- Select static relay for 10A, 400V
- Electronic Display using LEDs/Seven segment display

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- Variable power supply
- Signal generators

10 Coil Winding

- Winding and rewinding of coils, using coil winding machine

11. Safety and Storage

- Safety precautions in workshop
- High voltage precaution and safety measures
- Storage of equipments/tools/components

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

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Second Semester

ELECTRICAL AND ELECTRONICS WORKSHOP

REFERENCE BOOKS

1. Linear IC Equivalent - by A.M. Hoebeek
BPB Pub.
2. Fundamentals of Cable Engineering - by V. Privezentsev
I. Grodnev
S. Kholodny
I. Ryazanov
Mir Pub./Moscow
3. The Master Handbook of IC Circuits - by Delton T. Horn
- TAB Book Inc.
Blue Ridge Summit, PA
4. Handbook of IC Circuit Projects - by Jim Ashe
TAB Book Inc.
Blue Ridge Summit, PA
5. International Diodes Equivalents - by A.M. Hoebeek
BPB Pub.
6. Design of Electronics Circuits
and Computer Aided Design - by M.M. Shah
Willey Eastern Pub.

CURRICULUM

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ADVANCED DIPLOMA
IN
INDUSTRIAL ELECTRONICS

(THIRD SEMESTER)



STATE CURRICULUM DEVELOPMENT CENTRE

M.F. BOARD OF TECHNICAL EDUCATION,
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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS (63) ~~475~~

THIRD SEMESTER

54-
ENE 2 ELECTRICAL & ELECTRONICS MEASUREMENTS
& MEASURING INSTRUMENTS

RATIONALE

Measurements in all branches of engineering are the prerequisite for proper perception as well as interpretation. A technician has to make various measurements and connect and install various measuring instruments. Modern developments often confront him with digital display instruments. The student is also called upon to make electronic measurements in addition to the electrical measurements. The syllabus includes the principles of measurements and construction of various types of measuring instruments commonly used in the field of electrical and electronics engineering.

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S.S.D. : 3.1 Electrical & Electronics Measurements-
and Measuring Instruments.

SCHEME OF STUDIES

S.No	TOPIC	Contact Hours			Remarks
		Theory	Practical	Total	
1	Classification of measuring instruments	08	04	12	
2	Construction, operation & other details of instruments	10	06	16	
3	Wattmeter and Energy meter	10	12	22	
4	Measurement of Resistance	10	04	14	
5	Measurement of Inductance and Capacitance	08	04	12	
6	Additional measuring instruments.	10	04	14	
7	Magnetic measurements	08	04	12	
8	Dielectric measurements	06	04	10	
9	C. R. O.	06	04	10	
10	Electronic Voltmeter	04	04	08	
11	A. F. & R. F. Measurements	05	04	09	
12	A. F. & R. F. Power measurements.	05	06	11	
13	Digital Instruments	06	04	10	
TOTAL		96	64	160	

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL

III SEMESTER / ADVANCED DIPLOMA PROGRAMME IN INDUSTRIAL ELECTRONICS

Sub. :- Electrical & Electronics Measurements & Measuring Instruments (13)

Topic[4.11] Classification of measuring instruments, errors and accuracies classification of instruments based on various effects of electric current indicating, recording & Integrating types of meters Accuracy and sensitivity, Types of errors.

Topic[4.12] Construction operation and other details of electrical instruments - Deflecting, controlling and damping forces. Supporting systems, bearing, M.C. MI dynamometer, Electro-magnetic induction, electrostatic, instruments and vibration galvanometer standard and substandard meters, calibration, shunt and Multipliers CT & PT.

Topic[4.13] Wattmeter & Energy meter :- Dynamometer and induction type wattmeter, induction type energy meter. Use of instrument transformers for extension of range advantages errors and their correction.

Topic[4.14] Measurement of resistance :- Classification of resistance effect of contact Resistance and contact thermoemfs on the measurement of low resistance, kelvin's double bridge effect of temperature and humidity on the measurement of high resistance and insulation resistance ohmmeters, Megger Earth Tester Tongtester wheatstone bridge, Multimeter.

Topic[4.15] Measurement of inductance and capacitance by Bridge Methods, Maxwell, Anderson, Desauty & Wein bridge.

Topic[4.16] Additional Measuring Instruments :- Electric resonance and Weston frequency meters, dynamometer, and Lipman p.f. meter, Weston synchroscope, Merz price Maximum demand indicator, Rotating type phase sequence indicator.

Topic[4.17] Magnetic Measurements :- Ballistic Galvanometers Measurement of flux BG, Grassot fluxmeter, Fahy simplex Permeameter, determination of hysteresis loop for ring and bar specimen, Lloyd fisher magnetic square, Measurement of Iron loss. Ballistic Galvanometer Measurement of flux by BG, Grassot fluxmeter, Fahy simplex permeameter, Determination of hysteresis loop for ring & bar specimen. Lloyd fisher magnetic square, Measurement of Iron loss

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Topic[4.18] Dielectric Measurement : - Dielectric measurement by
(1). Wattmeter method
(2). Schering bridge
(3) C.R.O.

Topic[4.19] C.R.O. :- Cathod ray tube, electrostatic deflection, magnetic deflection, time base. X and Y amplifier controls on C.R.O. Dual Beam and dual trace oscilloscope

Topic[4.110] Electronic voltmeter :- Diode TVM & FET based bridge, D.C. Amplifier, Voltage divider, Rectifier circuit. A.C. & D.C. Differential Voltages specifications. electronic voltmeter, milli and micro voltmeters.

Topic[4.111] Audio & Radio frequency measurements : A.F. and R.F. measurements, range of frequency measurements sensitivity

Topic[4.112] A.F. & R.F. Power Measurements

Topic[4.113] Digital Instruments :- Digital Instruments Advantages, digital instruments types of DVM, DMM, specific Digital Multimeters, frequency counter/Timers.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL
~~III~~ SEMESTER/ADVANCED DIPLOMA PROGRAMME IN INDUSTRIAL ELECTRO
(REVISED) (3.1)

Sub. :- Electrical & Electronics Measurements & Measuring Instruments

List of Practicals :

1. Study and use of different types of Electrical measurement.
2. Measurement of low resistance by Kelvin's double bridge.
3. Determination of medium resistance by Wheat Stone Bridge Method.
4. Finding out insulation resistance of domestic wiring and machines by Megger.
5. Measurement of Inductance by Maxwell's Bridge Method.
6. Measurement of Capacitance by Desauty-Bridge Method.
7. Calibration of a single phase Energy Meter.
8. Measurement of P.F. by Ammeter, Voltmeter and Wattmeter Method.
9. Use of Multimeter to measure resistance, voltage and current in the given circuit.
10. To find earth resistance of a given installation by earth resistance tester.
11. Measurement of R, L, and C by Universal bridge.
12. To find dielectric strength of a given transformer oil.
13. Study and operation of CRO and its controls.
14. Use of CRO for measurement of different quantities voltage, current, phase and frequency etc.
15. Study and use of digital Instrument digital Multimeter frequency meter.
16. Study and use of various other electrical instruments e.g. cathodeoscope phase sequence meter, wavemeter Maximum Demand indicator tong tester.
17. Study & use of C.T. and P.T.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION BHOPAL
THIRD SEMESTER/ADVANCED DIPLOMA PROGRAMME IN INDUSTRIAL
(REVISED)
Sub. :- Electrical & Electronics Measurements & Measuring Instruments

LIST OF REFERENCE BOOKS

1. Electrical Measurements & Measuring Instruments
by E.W. Golding - Pitman & Sons India Pub.
2. A course in Electrical & Electronic measurement & Instruments
by A.K. Sawhney - Dhanpat Rai & Sons Pub.
3. Electrical Measurement by H.V. Satyanaryan Rao Khanna Pub.
4. Electrical & Electronics measurement & Instruments
by S. Rama bhadrn - Khanna Pub.
5. Electronic Instrumentation & measurement
by Willion David Cooper - Prentice Hall of India Pub.
6. Electronic Instrumentation by Prens Ky - Prentice Hall of India Pub.

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
THIRD SEMESTER

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SUB - 3:2 ELECTRICAL MACHINES

RATIONALE

The subject of electrical machines is of great importance to a student of Industrial Electronics. It mainly deals in the theory and underlying principles of electrical machines which a student is likely to undertake in his future career by way of operation, control and maintenance.

An attempt has been made to provide all necessary information of the subject needed at the diploma level.

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SUB: ~~3.2~~ Electrical MachinesSCHEME OF STUDIES

S.No	TOPIC	Contact Hours			Remarks
		Theory	Practical	Total	
1	Energy Conversion Principles.	10	-	10	-
2	Transformers	14	08	22	-
3	Polypase Induction motor.	20	12	32	-
4	Synchronous Machine	20	12	32	-
	Total	64	32	96	-

CONTENTS

1 ENERGY CONVERSION PRINCIPLES

Principle of electro-mechanical conversion, Energy in the magnetic system, Field energy and mechanical forces, Direction of mechanical forces, Energy conversion via magnetic field, Induced voltage, Generator and motor action, Counter e.m.f. and Counter torque.

2 TRANSFORMER

Definition, Principle of operation, Constructional features, Types: Single phase and Three-phase, applications, Regulation, Losses, Efficiency, Different connections of Three-phase transformers eg. Y/Y , Y/Δ , Δ/Y , Δ/Δ , Loadability and conditions of parallel operation, Equalizer bar, Voltage ratio, Various methods of cooling eg. natural, artificial, air, water, oil, etc., Different types of safety devices used for transformer.

3 POLY PHASE INDUCTION MOTOR

Constructional details, types of rotors, squirrel cage and slip ring, Production of rotating magnetic field by three phase system, Comparison of three phase and single phase ac supply lines, Advantages of three phase supply and its utility, Double cage induction motor and its advantages, Rotor circuit, Variation of torque, Condition of maximum torque (load resistance = reactance), Torque/slip characteristics, Relation between rotor resistance and torque, Starting torque and current, Speed torque diagram, Speed control - Stator, speed control, Starting: DOL, Y/Δ , Auto-transformer, Theory and methods of selection, Importance of two speed motor.

4 SYNCHRONOUS MACHINE:

Constructional features, Revolving armature and field winding, Relation slip between speed, poles and frequency, Generator and motor action, E.m.f. equation of single/three phase alternator, Effect of distribution factor and coil span factor on e.m.f. induced.

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Synchronous impedance and its importance. Open circuit
 and Short circuit test. Alternator characteristics.
 Regulation of Alternator. Parallel operation of ~~alternators~~
 alternators. Condition of parallel operation. Effect
 of varying excitation of synchronous motor upon armature
 current and power factor when input is constant.
 Synchronous condenser. 'V' curves. Methods of
 starting synchronous motor. Hunting and its prevention.

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Reference Book.

- (1) Elect. Engg. Book — H. Cotton.
- (2) " " — B. L. Theraja

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
THIRD SEMESTER
SUB: ELECTRICAL MACHINES

List of Practicals:

- (1) To connect three single phase transformers to form three phase transformer and determine their voltages.
 - (2) To run two single phase transformers in parallel and to find their load sharing.
 - (3) To study the constructional details of Polyphase induction motor.
 - (4) To determine slip and calculating percentage slip of a given induction motor.
 - (5) To study direct on-line, Star/Delta, and Auto-transformer starters and to run the motor with the help of ^{above} starters.
 - (6) To study a slip ring motor starter and to run the motor with its help.
 - (7) To study a synchronous machine.
 - (8) To verify the relationship $f = \frac{NP}{120}$
 - (9) To run the alternators in parallel and study their load sharing.
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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
(THIRD SEMESTER)

SUB : 3.3. Computer Application.

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RATIONALE

RATIONALE --

Computers have become indispensable tool for business and industry. Their applications are numerous and vary from maintaining of on line calendar of personal engagements to design and production of complex physical systems. Technicians find them in use in almost all types of possible places of work. Knowledge of computers, therefore, has become indispensable. A third level course, in the studies of Technical Diploma Programme, is therefore well justified.

This course aims at providing students with basic knowledge of computers-focus is what they are and some understanding of problem solving using computers. Major inputs on programming in BASIC have been included with a focus on hands on experience in programme development and execution. BASIC has been chosen because of its sheer simplicity that significantly contributes to fast learning by students as his/her very first programming language. Moreover, BASIC being a general purpose language a wide variety of application ranging from data processing engineering and engineering computations to measurement of physical parameters e.g. temperature & pressure are possible using it on a small machine like IBM-PC compatible microcomputer.

To give an idea of popular application software packages topics on WordStar, LOTUS and dBASE III+ have been included. The objective is to give the students a knowledge on how to use these packages and areas of their applications.

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S.No : 3.3. Computer ApplicationSCHEME OF STUDIES

S.No	TOPIC	Contact Hours			Remarks
		Theory	Practical	Total	
1	Introduction to computers	08	02	10	
2	Computer Softwares	08	04	12	
3	Basic Concepts of Programming	08	02	10	
4	Programming in Basic	16	16	32	
5	Introduction to - application packages	08	08	16	
	TOTAL	48	32	80	

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
THIRD SEMESTER

SUB : B.3 Computer Application.

CONTENTS.

1. Introduction to computer.

Computer hardware generations, computer block diagram, basic terms (bit, byte, and word etc) Input & Output devices, memories, classification of computers as micro, mini & mainframe.

2. Computer Software.

Basic classification of software viz. application & system software, their types and functions, purpose and function of an operating system, and elementary idea of disc operating system.

Development of programming languages and their basic difference, need of application packages & their general characteristics.

3. Basic Concepts of Programming

Problem solving, algorithms, Flow charting, Programme development process, testing and documentation.

4. Programming in Basic.

Introduction, basic character set, difference between statements and commands, constants and variables, expressions, assignment statement, library functions, output statements, control statements, array, functions, subroutine, files, fixing of programming bug, simple programming for engineering problems and file processing.

5. Introduction to application packages.

Elementary ideas of word Processing, spread sheet and database management packages, their functions, few elementary commands & field of application.

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
THIRD SEMESTER

SUB - 3.3. Computer Application.

LIST OF EXPERIMENTS.

1. Visit to computer centre, Demonstrate various I/O units and show a computer session in progress .
2. Familiarise with basic MS DOS commands.
3. Demonstration of different softwares, e.g. interpreters compilers, loaders, system libraries.
4. Demonstration of BASIC program development & editing.
5. Practicals on BASIC programming.
6. Demonstration of word processor package.
7. Familiarising with Lotus 1-2-3.
8. Familiarising with dBase III+.

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
THIRD SEMESTER

SUB : 3.3 Computer Application.

LIST OF REFERENCE BOOKS.

- Programming in Basic by Gotterfred, Scheme Series.
Programming in Basic by E. Balaguruswamy, Tata McGraw
Hill Pub. Comp., New Delhi.
Basic Hand book by David A. Lien, Compusoft Publishing,
California.
Companion book by Mehta, PBP Publications, New Delhi.
Introduction to dBASE III+ by Alan Simpsons.
1-2-3 The complete Reference by Mary Campbell,
Osborne McGraw Hill.
Introduction to Wordstar by Arthur Naimen.
Word Processing Essential concepts by Morilyn Popyk,
McGraw Hill.

ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
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THIRD SEMESTER.

COURSE: ^{B4} ELECTRICAL AND ELECTRONICS
DRAWING.

RATIONALE

Engineering drawing is the language of engineers. The knowledge of this subject is very important to the students of Industrial Electronics. The subject deals with the symbols and notations of various electrical and electronic quantities, the various circuits of electrical machines and electronics equipments, used in different fields. It is useful in understanding drawings of various circuits and equipments, conveying instructions and solving problems on sites and shop floors etc.

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SUB: 3.4 - Electrical & Electronics DrawingSCHEME OF STUDIES

S.No	TOPIC	Contact Hours			Remark.
		Theory	Practical	Total	
1	Symbols and Notations	-	16	16	
2	Wiring circuits	-	16	16	
3	Instrument circuits	-	24	24	
4	Power Wiring Diagrams	-	24	24	
5	Symbols of electronics Components	-	32	32	
6	Electronic circuits	-	32	32	
			144	144	

COURSE:

ELECTRICAL AND ELECTRONICS

DRAWING. (314)

1. Symbols and notations. Subjects

Symbols and Notations as per I.S.S. commonly used in Electrical Engineering. Symbols of principal units, their multiples and sub-multiples, type of supply methods, Indicating instruments, measuring instruments, outlets, bells and buzzers, Distribution Board, Switch gears, resistors and starters.

2. Wiring Circuits

Fluorescent tube connection diagram (Single and Twin tubes), C.V. lamp and Sodium Vapour lamp connection diagrams.

3. Instrument circuits

Connection of Ammeter, Voltmeter, wattmeter and Energy meter single phase and three phase (Two element and Three element). Connection diagram of C.T. and P.T. for measurement of Power and energy.

4. Power wiring Diagrams

Power wiring diagrams of: Shaded pole and split phase single phase induction motors, Series, shunt and Compound (Long shunt and short shunt) motors, Slip ring motor, D.C. motor starters (3 points and 4 points), D.O.L. Star-Delta, Auto-transformer starters, Slip ring motor starters.

5. Symbols of electronic elements

(a) Diodes: Basic semiconductor, Vacuum diode, Zener, Tunnel, Varactor, Photo. Light emitting.

(b) Transistors: bipolar junction (pnp & npn),

JET, JFET, MOSFET, UJT and Photo.

(c) Thyristor: diac, triac, SCR & SCS

I.C.'s: DIP & Pin & 16 & pin.

(e) Loud speaker, micro-~~phone~~, antenna, audio-receives.

6. Electronic Circuits:

Forward and Reverse biasing of a junction diode.

H.W. specific rectifier,

Full wave center ϕ

& bridge rectifier.

Battery charger.

Connections of a transistor in CB, CE, CC.

R.C. Coupled amplifier and Voltage regulator.

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List of Books!

1. I.S. 696 Latest version
2. Electrical Engg. Drawing by Bhattacharyya
3. Electrical Engg. Drawing by Nagpal
4. Electrical Drawing by Harany-
5. Electrical Engg. Drawing by Dorgan
6. Electronic Principles - by Malvino.

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

(Third Semester)

SUBJECT: DIGITAL ELECTRONICS (3.5)

CODE:-

Rationale

The digital IC's are present everywhere as the hearts of small devices like electronic watches to biggest enhancements like computers. These are present in the electronic control-devices employed in all modern automatic-plant industries, and almost ⁱⁿ every area like medical, military, agriculture, space-satellites, home appliances entertainment equipments like TV, VCR & film production & processing equipments. But what is inside in ^{an} IC? what are principles & logics used in these? IC is a device which uses these principles. The subject covers all these principle elements & logics of the field of digital electronics.

The syllabus includes logic gates and logic families, sequential & combinational circuits.

It is assumed that all institutes have training kits. The practices are aimed to utilize these kits successfully. The students will develop the software programmes on these kits.

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SUB : ~~3.5~~ - Digital Electronics

SCHEME OF STUDIES

S.No	TOPIC	Contact Hours			Remarks
		Theory	Practical	Total	
1	Number system and Binary codes	06	-	06	
2	Boolean Algebra	06	-	06	
3	Logic gates	08	08	16	
4	Logic Families	06	06	12	
5	Sequential circuits	16	06	22	
6	Arithmetic Logic unit	10	04	14	
7	Combinational Digital Circuits	06	04	10	
8	Convertors	06	04	10	
	Total	64	32	96	

COURSE:-

CONTENTS

1. NUMBER SYSTEMS AND BINARY CODES

- 1.1 Introduction to Decimal, Binary, OCTal, Hexadecimal number system.
- 1.2 Conversion of number systems.
- 1.3 Complements of numbers ; i.e. ; True's complement and radix minus one complement.
- 1.4 Binary operations (i.e. ; addition, subtraction, multiplication and division)
- 1.5 Weighted and unweighted codes ; -
Excess-3 code, Gray code, BCD code, Reflected code, Error correcting and Error detecting code, ASCII code.

2. BOOLEAN ALGEBRA

- 2.1 Basic Boolean Functions and Boolean theorems.
- 2.2 Simplification of Boolean functions.
- 2.3 K-map method for simplification of Boolean function.

3. LOGIC GATES

- 3.1 Basic Logic gates (AND, OR, NOT, NOR, NAND, EX-OR, EX NOR)
- 3.2 Universal "basic gates" & universal gates.
- 3.3 Preparation of truth table and symbols of gates.
- 3.4 Design of Basic gate with universal Gats.

4. LOGIC FAMILIES

- 4.1 Concept of Resistor diode logic, Diode Transistor Logic (DTL), Transistor Transistor Logic (TTL), Emitter Coupled Logic (ECL), Mos & Cmos; their circuit and brief description.
- 4.2 Comparison of above logic family .

5. SEQUENTIAL CIRCUIT

- 5.1 Introduction to Flip Flop.
- 5.2 R-S, JK, D and T type flip flop their analysis.
- 5.3 Advantages and Disadvantages of each Flip-Flops.
- 5.4 Explanation of clocked flip flops.
- 5.5 Positive and Negative clock function.
- 5.6 Importance of Edge triggering.
- 5.7 Counters-Circuit and Brief Description of-
 - 5.71 Synchronous/Asynchronous.
 - 5.72 Serial/Parallel/
 - 5.73 Shift register.
 - 5.74 Ripple Counter.
 - 5.75 Up-Down Counter.
 - 5.76 Decade Counter.
 - 5.77 BCD Counter.
 - 5.78 Ring Counter.

6. ARITHMETIC LOGIC UNIT (ALU)

- 6.1 Adder Circuit .
- 6.2 Half adder.
- 6.3 Full adder.
- 6.4 3 Bit binary adder.
- 6.5 Decadal adder,
- 6.6 BCD adder.
- 6.7 3 bit binary subtractor circuit.

7. COMBINATIONAL DIGITAL CIRCUITS.

- 7.1 Encoder/Decoder-Circuit and Brief Description.
- 7.2 Multiplexer/Demultiplexer circuit and Brief Description.

8. CONVERTORS OF

- 8.1 A to D Converter.
- 8.2 Ramp Converter.

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8.3 Dual Slope.

8.4 Successive approximation type.

8.5 D/A Converter.

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

THIRD SEMESTER.

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SUBJECT: DIGITAL ELECTRONICS

CODE:-

LIST OF EXPERIMENTS:

1. Set up AND/OR/NOT/NOR/NAND gates using digital Trainer/Experimenter and verify truth tables. Study the general specifications & pin configuration of TTL/C-MOS ICs
2. Verification of De-Morgan's Theorems using gate circuitry.
3. Setup Exclusive OR/XOR gates using NAND/NOR gates on trainer/experimenter and verify the truth tables.
4. Construct Full Adder using IC 7483 and subtractor using IC-7486.
5. Construct a Half adder & Full Adder using Logic gates.
6. Prepare a circuit with 7-segment display & check the operations using logic input switches, BCD code truth table using 7446.
7. Realize the minimized networks of a given function and verify the truth tables.
8. Test the function of TTL (74 series) / C-MOS (40 series ICs).
9. Prepare clocked and unclocked JK Flip-Flop circuit using NAND/NOR gates.
10. Make a Master-Slave JK F/F and verify the output with its truth table.
11. Make a T-F/F and D/F/F using J-K F/F and verify its output with its truth table.

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12. Prepare a 3-bit Ripple, up/down, decade counter using J-K F/F/D-F/F with -ve and +Ve clock input and analyse its output.
13. Prepare BCD to Decimal decoder using IC 74141 and verify its output using 7-segments, display circuits.
14. Suggest Decimal to BCD decoder using logic gates.
15. Study operation of 4 line to 1 line multiplexer.

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
THIRD SEMESTER.

SUBJECT : DIGITAL ELECTRONICS ~~AND INTEGRATED ELECTRONICS~~

CODE:-

LIST OF REFERENCE BOOKS:

1. Digital principles and applications
By Malvino and Leach
2. Digital Computer fundamentals
By Thomas G. Bartea.
3. Digital logic and computer design
By Morris mano
4. Integrated Electronics
By Jacob Millman and Cheolcos Halkias

S. No.	NAME OF SUBJECT	Scheme of Study			Scheme of Examination		BOARD EXAMINATION					TOTAL MARKS	PRACTICAL MARKS		
		CONCEPTS	WORK (SHOP WORK)	THEORY LAB. TOTAL	TERM I WORK	TERM II WORK	NO. OF SESS.	NO. OF DAYS	THEORY	PRACTICAL	DURATION				
3.1	ELECTRICAL & ELECTRONICS MEASUREMENTS & INSTRUMENTS	6 (96)	4 (64)	10 (160)	20	30	10	10	1	3	100	1	3	50	220
3.2	ELECTRICAL MACHINES	4 (64)	2 (32)	6 (96)	20	30	10	10	1	3	100	1	3	50	220
3.3	COMPUTER APPLICATION ELECTRICAL & ELECTRONICS DRAWING	- (-)	9 (144)	9 (144)	-	50	10	10	1	4	100	1	3	50	220
3.4	DIGITAL ELECTRONICS	4 (64)	2 (32)	6 (96)	20	30	10	10	1	3	100	1	3	50	220
Total :		17 (272)	19 (304)	36 (576)	80	170	50	50	5	-	500	5	-	250	1100

NOTE: (1) No. of theory paper: 05
 (2) Total theory marks: 500
 (3) No. of practicals : 05
 (4) Total Pract. Marks.: 250
 (5) Implant Training Ms: Nil
 (6) Total mks. of sessional, prog. assessment, Practic & Implant Training: 600
 (80+170+50+50+250 = 600)

(7) Ratio of theory marks 500 :: 600 and (sessional + prog. assess + practical + Implant Training) e.
 Marks: 80+170+50+50+250 = 600
 (8) Total Marks : 1500
 (9) Passing marks for - DIPLOMA IN
 COMMON WITH FOURTH SEMESTER ELECTRICAL ENGINEERING IN
 COMMON WITH FIFTH SEMESTER ELECTRONICS OF THE COMMON DIPLOMA IN
 SEMESTER DIPLOMA IN MECHANICAL ENGINEERING IN
 COMMON WITH MPEC SOFTWARE DIPLOMA IN CTM, MECH & ELECT

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

S.No.

Course Title

1ST SEMESTER

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1. Communication Skills
2. Mathematics-I
3. Engineering Physics
4. Engineering Chemistry
5. Engineering Drawing
6. Workshop Practice

2ND SEMESTER

1. Mathematics-II
2. Basic Mechanical Engineering
3. Electronics Engineering-I
4. Electrical and Electronics Materials
5. Basic Electrical Engg.
6. Electrical and Electronics Workshop.

3RD SEMESTER

1. Electrical and Electronics Measurement and Measuring Instruments.
2. Electrical Machines
3. Computer Application
4. Electrical and Electronics Drawing
5. Digital Electronics

4TH SEMESTER

1. Electrical Engg-II
2. Linear Ics and applications
3. Power Electronics-I
4. Process Control
5. Industrial Electronics-I

5TH SEMESTER

1. Industrial Training-I (16 weeks)

6TH SEMESTER

1. Microprocessors-I
2. Power Electronics-II
3. Industrial Electronics-II
4. Instrumentation
5. Business Communication
6. (Minor) Project.

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S.No.
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Course Title
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VII TH SEMESTER

1. Industrial Electronics-III
2. Microprocessors-II
3. Computers in Industry (CAM, Robotics, CNC)
4. Maintenance Engg.
5. Industrial Management
6. Major Project (Planning)

VIII SEMESTER

1. Industrial Training II + Major Project (16 Weeks)

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

Sl. No.

Course Title

1ST SEMESTER

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1. Communication Skills
2. Mathematics-I
3. Engineering Physics
4. Engineering Chemistry
5. Engineering Drawing
6. Workshop Practice

2ND SEMESTER

1. Mathematics-II
2. Basic Mechanical Engineering
3. Electronics Engineering-I
4. Electrical and Electronics Materials
5. Basic Electrical Engg.
6. Electrical and Electronics Workshop.

3RD SEMESTER

1. Electrical and Electronics Measurement and Measuring Instruments.
2. Electrical Machines
3. Computer Application
4. Electrical and Electronics Drawing
5. Digital Electronics

4TH SEMESTER

1. Electrical Engg-II
2. Linear Ics and applications
3. Power Electronics-I
4. Process Control
5. Industrial Electronics-I

5TH SEMESTER

1. Industrial Training-I (16 weeks)

6TH SEMESTER

1. Microprocessors-I
2. Power Electronics-II
3. Industrial Electronics-II
4. Instrumentation
5. Business Communication
6. (Minor) Project.

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Course Title
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VII TH SEMESTER

1. Industrial Electronics-III
2. Microprocessors-II
3. Computers in Industry (CAM, Robotics, CNC)
4. Maintenance Engg.
5. Industrial Management
6. Major Project (Planning)

VIII SEMESTER

1. Industrial Training II + Major Project (16 Weeks)

CURRICULUM

ADVANCED DIPLOMA
IN
INDUSTRIAL ELECTRONICS

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(FOURTH SEMESTER)



STATE CURRICULUM DEVELOPMENT CENTRE

M.P. BOARD OF TECHNICAL EDUCATION

AN OFFICE COMPLEX, GAUTAM NAGAR, BHOPAL - 462023

150

IV Semester of advance
 MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL.
 DIPLOMA PROGRAMME IN INDUSTRIAL ELECTRONICS

ADVANCE diploma in Industrial Electronics

(To be introduced in 199 -9)

S.No.	NAME OF SUBJECT	SCHEME OF STUDY.		SESSIONAL MARKS		PROGRESSIVE ASSESSMENT		BOARD EXAMINATION			MKS	REMARKS		
		CONTENT HRS PER WEEK (YEAR)	TOTAL	TERM WORK	LAB. WORK	I	II	THE. PAPER	DUR. HRS	MKS			PRACTICAL	DUR. HRS.
1-	Power Electronics	5 (90)	4(64)9(144)	15	15	10	10	1	3 Hrs.	100	1	3 Hrs.	50	
2-	Instrumentation	6 (96)	3(48)9(144)	15	15	10	10	1	3 Hrs.	100	1	3 Hrs.	50	
3-3	Linear IC and Appl. Circuits.	5 (90)	4(64)9(144)	15	15	10	10	1	3 Hrs.	100	1	3 Hrs.	50	
3-4	Electrical Engg.	6 (96)	3(48)9(144)	15	15	10	10	1	3 Hrs.	100	1	3 Hrs.	50	
4-														
5-														
6-														
7-														
8-														
9-														
10-	Total	22(352)	14(224)	35(576)	60	60	40	40	-	100	-	-	200	

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NOTE:- (1) No. of Theory paper: 4 ✓
 (2) Total theory marks: 400 ✓
 (3) No. of Practicals : 4 ✓
 (4) Total Pract. Marks : 200 ✓
 (5) Inplant Training Mks: NIL ✓
 (6) Total Mks. of Sessional + Prog. Assessment + Pract. 200 ✓
 (7) Ratio of theory marks : 400/400 ✓
 and (Sessional + prog. Assess + Pract. + Inplant Training) 1:1:1 ✓
 (8) Total Marks: 800 ✓

(#) Passing marks for :
 (a) Theory-33%
 (b) Practicals-40%
 (c) sessionals-60%
 (d) Inplant Trg-50%

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ADVANCE DIPLOMA IN INDUSTRIAL ELECTRONICS

FOURTH SEMESTER

SUBJECT - POWER ELECTRONICS

SCHEME OF STUDIES

S.No.	Topic	Th. Hrs.	Pr. Hrs.	Total Hrs.
1.	Introduction to modern solid state devices	16	08	26
2.	(a) Uncontrolled Rectifier	40	30	70
	(b) Controlled Rectifiers			
3.	Power Supply	12	12	24
4.	Stabilizers	10	14	24
5.	UPS			
		80	64	144

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S. K. Lawania
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1. Introduction to Silicon Controlled Rectifiers

Constructional features of SCR (Thyristor, Diac, Triac), their characteristics & working, Definition of Terms related to thyristor, series-parallel operation & compensation, Protection of thyristor, Industrial application of thyristor.

2. (a) Uncontrolled Rectifier

Review of single phase rectifier

Half wave & full wave rectifier. Bridge circuit configuration. Circuit diagrams and waveform. Definition of terms related to half wave & full wave rectifier, Filters.

Introduction to Three phase and multiphase Rectifier

Half wave & full wave bridge rectifier. Circuit diagrams & waveforms. Comparative study of single phase & Three phase rectifier, multiphase rectifiers.

(b) Controlled Rectifiers

Principle of controlled rectification, single phase & Three phase controlled rectifier, Definition of terms, semiconrolled rectifier, Circuit diagrams and waveform of single phase and three phase controlled rectifier, advantages of controlled rectifiers. Industrial application of controlled rectifiers.

3. Power Supply

(a) Block diagram of linearly regulated power supply working of each block in detail. Current limiter.

(b) Principle of working of SMPS. Block diagram of SMPS, functions of each block, advantages of SMPS, comparison of SMPS with linearly regulated power supply. Industrial application of SMPS.

4. Stabilisers

Relay controlled and servo controlled stabilisers, CVT, characteristics and comparison.

5. UPS

Principles of invertors, block diagram of UPS, function of each block. Principle of working of UPS advantages & industrial application.

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DIPLOMA IN INDUSTRIAL ELECTRONICS
IV SEMESTER

Subject - Power Electronics

SCHEME OF STUDIES

List of Practicals

1. To plot Volt-Ampere characteristics of a S.C.R.
2. To plot Volt-Ampere characteristics of a Diac
3. To plot Volt-Ampere characteristics Triac
4. Observe & Analyse waveform of controlled single phase Half wave rectifier
5. Observe & Analyse waveform of controlled single phase Full wave rectifier
6. Observe & Analyse waveform of controlled ^{THREE} ~~Three~~ phase Half wave bridge rectifier.
7. Observe & Analyse waveform of controlled Three phase Full wave bridge rectifier.
8. Study of SMPS (Switch mode power supply)
9. Study of linearly regulated power supply
10. Study of UPS (Uninterrupted power supply)
11. Study of Servo Stabilizers
12. Study of Relay Stabilizers
13. Study of CVT

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POWER ELECTRONICS

of.

IV - Sem. Advance Diploma in "Industrial Electronics."

Suggested list of References/ Books: "Power Electronics"

S.No.	Author	Title	Publisher
1.	M.H.Rashid	Power Electronics	P.H.I.
2.	Cyril.W.Lander	Power Electronics	H.G.H
3.	Z.bar	Industrial Electronics A Text Lab Manual	T.M.H
4.	Schilling Belove	Electronics circuits	Mc GRAW HILL.
5.	DEGEM Educational Electronic Systems	Course-H Electronic Sources	DEGEM Power

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MR Kaurasia
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M.N.

K. Singh

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ADVANCE DIPLOMA IN INDUSTRIAL ELECTRONICS

FOURTH SEMESTER

SUBJECT + INSTRUMENTATION

SCHEME OF STUDIES

S.No.	Topic	Th. Hrs.	Pr. Hrs.	Total Hrs.
1.	Introduction	10	04	14
2.	Sensors & Transducers	38	16	54
3.	Instrument Amplifiers & Signal Conditioners	26	14	40
4.	Display Devices & Recorders	22	14	36
		96	48	144

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DIPLOMA IN INDUSTRIAL ELECTRONICS-IV SEMESTER

Subject - Instrumentation

Instrumentation

1. Introduction -

Functional block-diagram of Instrumentation system.
Function of each block, requirement of each block.

2. Sensors & Transducers -

Definition of transducers, Principle of transduction,
Types of transducers, Application of transducer in the
measurement of Displacement, level, strain, pressure.
Temperature, voltage and current comparative study of
these methods.

Measurement of force, Introduction to load cell.

Introduction to electronic -weighing system (block
diagram & advantages)

Measurement of Torque, Method used for torque measurement

Frequency measurement, Principle of frequency. Methods
used for measurement of low medium & high frequency.

Measurement of velocity, methods used for measurement of
linear & Angular velocity, methods for the measurement of
vibrations.

TH. PY.
38 + 16

3. Instrument Amplifiers & Signal Conditioners -

Components for input modification, block diagram for
D.C. & A.C. Signal conditioning systems pre-amplifiers
input attenuators and filters instrument amplifiers.

Modulation and demodulation, Data conversion and multi-
plexing.

TH. PY.
26 + 14

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Display Devices & Recorders -


Need of display and recording in Instrumentation
Analog - instruments (types, principle of operation and their characteristics)

Digital Display Devices - Various display systems used in digital instruments. Comparison of various display systems; Block diagram of digital measuring-Instruments, Criteria for the selection of digital Instrument, Comparison of digital & Analog displaying systems.

Recorders - Types of recorders (analog, graphic, strip chart, x-y recorder, magnetic tape recorders) Their principle of operation and industrial applications.

Th. Pr
22+14

S.K. Chaurasia
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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

IV SEMESTER

SUBJECT :- INSTRUMENTATION

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LIST OF PRACTICALS :-

- (1) Study the constructional features of a load cell.
- (2) Study of different active & passive transducers available.
- (3) Measurement of following quantities, using suitable transducers.
(a) Force (b) Speed (c) Vibrations (d) Temperatures.
(e) Torque (f) Frequency (g) flow
- (4) Study of instrumentation amplifier.
- (5) Using appropriate amplifier convert a signal from
(a) Voltage to current
(b) Frequency
- (6) Study of Signal conversion
(a) A to D
(b) D to A
- (7) Study of various actuators & filters.
- (8) Study of multi plexers.
- (9) Study of various display devices
- (10) Study of recorders like
(a) stripchart recorder (b) x-y recorder
(c) Magnetic recorders
- (11) Study the performance of filters
(a) Bandpass (b) Band stop (c) Butter worth
(d) All pass .
- (12) Study of modulation process for
(1) Amplitude (2) frequency (3) Phase (4) P.W.M.

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Reference Books

1. Electronics Instrumentation & Measurement Techniques.
By - W.O.Cooper/A.D.Helfrick
Phi Publication
 2. Elect. & Elx.Measurement & Instrumentation.
By - A.K.Sawhney
 3. Instrumentation Devices & Systems.
By - C.S.Rangan/G.N.Sharma/V.S.V.Mani
Tata Mcgraw Hills Publication
 4. Instrumentation for Engineering Measurement.
By - R.H.Cerni & L.E.Foster
Publication - John Willey & Sons
 5. Electronic Measurement By Terman & Pollit.
 6. Instrumentation By Kirk & Rembrin
-

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ADVANCE DIPLOMA IN INDUSTRIAL ELECTRONICS

IV SEMESTER

SUBJECT:- LINEAR I.Cs.AND APPLICATION

SCHEME OF STUDIES

S .No.	TOPIC	TH HRS	PRACT. HRS	TOTAL HRS
1-	Differential amplifier	10	08	18
2.	Operational Amplifiers	10	08	18
3.	OPAMP Application	20	16	36
4.	Voltage Regulator	08	06	14
5-	Voltage Comparator	10	08	18
6-	Timers	12	10	22
7-	Phase Locked Loop	10	08	18
TOTAL		80	64	144

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ADVANCE DIPLOMA IN INDUSTRIAL ELECTRONICS
IV SEMESTER

SYLLABUS LINEAR ICs AND APPLICATION

1. DIFFERENTIAL AMPLIFIER -

Introduction, Differential Amplifiers, Inverting Input, Non-Inverting Input, Differential Input, Single Ended Output, Common Mode Input, Common Mode Rejection and Gain, Cascaded Diff Amps.

(10)+8

2. OPERATIONAL AMPLIFIERS -

Schematic Representation, Operational Amplifier, Opamp Generations, First Generation of OpAmps, Second Generation of OpAmps, Later Generation of Opamps, Stages of an Opamps, Input Stage of an Opamp, Intermediate Stage of Opamp, Output Stage of an Opamp, Practical Monolithic Opamp, Opamp Specifications, Open Loop Differential Characteristics, Output Signal Response, Input Error Signals, Common Mode Characteristics.

(10)+8

3. OPAMP APPLICATIONS -

Introduction, Inverting Amplifier, Non-Inverting Amplifier, Mathematical Operations Using Opamps, Opamps as Adder, Opamp as Subtractor, Opamp for Multiplication, Opamp for Division, Opamp as Integrator, Opamp as Differentiator, Electronic Analog Computation, Opamps Filters, Low Pass Filter, High Pass Filter, Opamp as Waveform Generators, Opamp as Astable Multivibrator, Opamp as Triangular Wave Generator, Opamp as Sch-mitt Trigger.

(20)+16

4. VOLTAGE REGULATOR -

Need for a Regulated Power Supply, Regulated Power Supply, Monolithic Voltage Regulator, 723 Monolithic Voltage Regulator, Basic High Voltage Regulator, Additional Applications of 723.

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5. VOLTAGE COMPARATOR -

Function of a Comparator, Comparator Vs Opamp,
Voltage Comparator 710, Inside ^{block-diagram of} the 710, 710 Applications,
Hints while using a Comparator. (10)+8

6. TIMERS -

Introduction, 555 Timer, Timer Operating Modes,
Monostable Mode, Astable Mode, Time Delay Mode,
555 as Frequency Divider, 555 as Pulse Width Modulator,
555 as Pulse Position Modulator, 555 as 50% Duty Cycle
Oscillator, General Design Consideration. (12)+ 10

7. PHASE LOCKED LOOP -

Introduction, Block Diagram of PLL, Lock and Capture,
Capture Process, PLL Transfer Characteristics, PLL Types,
565 PLL, Measurement of PLL Parameters, PLL Application,
Frequency Synthesis, FM Demodulation, AM Demodulation,
Frequency Shift Keying. (10)

List of Practicals & Ref. Books is proposed
to be same as in 'X' Scheme III Semester Electronics in the
subject. Linear I.C. & Application 17.2.97

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ADVANCE DIPLOMA IN INDUSTRIAL ELECTRONICS

FOURTH SEMESTER

SUBJECT - ELECTRICAL ENGINEERING

S.No.	Name of Topic	Th. Hrs.	Pr. Hrs.	Total Hrs.
1.	Electrical Safety	08	04	12
2.	D.C.Motor & Generator	24	10	34
3.	Single Phase Transformer	16	08	24
4.	Single Phase Motor	16	08	24
5.	Poly Phase Induction Motor	20	12	32
6.	Measuring with Ocsilloscope	12	06	18
		96	48	144

(S.K. Laxari)
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(S.K. Laxari)

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FOURTH SEMESTER, Subject - Electrical Engineering

Topic no. 1. - Electrical Safety

Effect of electricity on human body, demonstration of fault current, circuit protection in various devices, Overview of various safety rules involved in electrical working, steps to be taken on accident like switching off the source, removal of victim, artificial respiration, earth and methods of earthing.

Topic no. 2. - D.C. Motor & Generator

Constructional feature, Generation action, motor action, classification with respect to field connection, Derivation of E.M.F. equation of D.C. Generator significance of back E.M.F. in a motor, speed/torque, load torque characteristics, three point starter, various methods of speed control and application, reversal of direction of rotation of motor.

Topic no. 3. - Single Phase Transformer

Static device no rotational power loss, construction ^{cl-} core type, shell type, principle of E.M.F. production in transformer, number of turns in secondary/primary coil, transformation ratio, step up/step down transformer, E.M.F. equation ideal transformer, ^{primary} vector diagram on no load, behaviour of transformer under loaded conditions, effect of resistive inductive, capacitive load, ^{primary} vector diagram, open circuit and short circuit of transformer, leakage reactance and its effect, auto transformer and its construction, comparison of ratio of weights of auto/conventional transformer, use of auto transformer, different types of transformer and their use, concept of power transformer, impedance transformer, RF & AF transformer.

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Topic no. 4. - Single Phase Motor

Nature of field produced in single phase motor, constructional feature, schematic representation of two pole motor, principle of single phase motor, double field revolving theory, torque-slip characteristics, starting, split phase motor capacitors start motors, capacitor run motor, capacitor start and run motor, operation of shaded pole motor, application of servo motor and stepper motor.

Topic no. 5. - Poly Phase Induction Motor

Principle of operation of 3 phase induction motor, slip, torque (no derivation), starting of induction motor, different methods types of starters, D.O.L/star/delta/resistance starter (contactor with protection circuit) speed control of motors reversal of direction of motor. Name plate specifications, ratings and their applications.

Topic no. 6. - Measuring with Oscilloscope

Various controls of oscilloscope like intensity focus, vertical position, horizontal position, vertical gain, horizontal gain, vertical attenuation, horizontal sweep, synchronization select. Vertical input, horizontal input, procedure for adjusting oscilloscope controls, visual display of wave form on screen, utility in electronics servicing, measurement of voltage, frequency and phase duty cycle, other application.

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

FOURTH SEMESTER

SUBJECT - ELECTRICAL ENGINEERING

List of Practicals

1. Demonstration of circuit protection like fuse, M.C.B. etc.
2. Demonstration of artificial respiration process.
3. Identification of parts of D.C. machine.
4. Speed/Torque characteristics of D.C. motor.
5. Load/Torque characteristics of D.C. motor.
6. Demonstration of speed control of D.C. motors using various methods.
7. (a) Open circuit & short circuit test of single phase transformer.
(b) Calculation of various parameters of phasor diagram.
8. Demonstration of single phase motors starting - capacitor start, capacitor run & capacitor start & run motor.
9. Study of DOL, star/delta & resistance starters used for 3 phase induction motors.
10. Interpretation of name plate details of various motors, generators etc.
11. Measurement of voltage, frequency & phase with the help of CRO.
12. Use of various controls of CRO.

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MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL

Scheme of Evaluation
Advanced Diploma in Industrial Electronics

VIII SEMESTER

Industrial
Inplant Training (Duration 16 Weeks)

Component of Assessment		Marks Allotted
A. In Industry		
I.	Attendance and General discipline	25
II.	Daily diary maintenance	25
III.	Initiative & participative attitude during training	50
IV.	Assessment of training by Industrial Supervisor	100
B. In Institution		
V.	Training report	100
VI.	Seminar	50
VII.	Viva-Voce	50
Total		400

This programme is good for industrial training evaluation.

*Oph
(S.P. Soni)
T. P. O. Bhopal Poly.*

The proposed scheme, in my opinion is best for students of Industrial

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श्री. आई. ने अग्रवाल सदस्य पा. र. से फोन पर समझौता किया वे भी इस प्रस्ताव से सहमत हैं।

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ANNEXURE-A

Advanced Diploma in Industrial Electronics

FIFTH SEMESTER

Inplant Training (Duration 16 weeks)

<u>Component of Assessment</u>		<u>Mark: Alloted</u>
<u>A. In Industry</u>		
I	Attendance and General discipline	25
II	Daily diary Maintenance	25
III	Initiative & Participative attitude	50
IV.	Assessment of Training by Industrial Supervisor	100
<u>B. In Institution</u>		
V.	Training report	100
VI	Seminar	50
VII	Viva-Voce	50
<u>Total</u>		<u>100</u>

sd/-

(B. K. Rawat)

(B. K. Rawat)

sd/-

(K. C. Mahajan)

sd/-
(H. K. Joshi)

ADVANCED DIPLOMA
IN ^{31/118}
INDUSTRIAL ELECTRONICS

(SIXTH SEMESTER)



STATE CURRICULUM DEVELOPMENT CENTRE

M.P. BOARD OF TECHNICAL EDUCATION

A/4, OFFICE COMPLEX, GAUTAM NAGAR, BHOPAL - 462023

TEL. : (0755) 583656, 583673, 583627

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**REPORT ON CURRICULUM DEVELOPMENT WORKSHOP
FOR SUBJECTS OF VI SEMESTER FOR
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS :**

1. **VENUE :** S. V. GOVT. POLYTECHNIC, BHOPAL .
2. **DURATION:** 3 DAYS (14-1-98 TO 16-1-98)
3. **TIMINGS :** 9 HRS. TO 17 HRS.

Following members attended the workshop :

- Mr. D. M. Deshpande, Senior Research Officer, MACT, Bhopal.
- Mr. Arvind Mittal, Lecturer Electrical Engg. MACT, Bhopal
- Mr. P. K Shrivastava, Expert Teacher, P.D.U.
- Mr. A. S. Rathore, H.O.D. S. V. Govt. Polytechnic, Bhopal.
- Mr. S. D. Burman, I/C H.O.D. Govt. Women Polytechnic, Raipur.
- Mr. D. S. Tomar, Lecturer Govt. Women Polytechnic, Bhopal.
- Mr. Prateek Bajpai, Lecturer Govt. Women Polytechnic, Bhopal.
- Ms. Krishna Singh, Lecturer, S. V. Govt. Polytechnic, Bhopal.
- Ms. Vaishali Sohoni, Lecturer, S. V. Govt. Polytechnic, Bhopal.
- Mr. I. S. Arora, I/C HOD , S. V. Govt. Polytechnic, Bhopal.
- Mr. G. C. Khaira, Reasearch Officer, M.P.B.T.E. Bhopal.
- Mr. T. R. Arora, Deputy Secretary, M.P.B.T.E. Bhopal.

Apart from development of curriculum for various subjects following decisions were taken by the gorup, in respect of :

(1) Amendements in the, proposed subject-structure prepared by T.T.T.I. Bhopal, for the course and (2) Curriculum development process.

I. Curriculum for the subject of BUSINESS COMMUNICATIONS, being practiced for Advanced Diploma in Manufacturing Engg., be followed for the course of Industrial Electronics as well.

II. Being the prerequisite of subjects of VI semester (of this course of Industrial Electronics), the subject Instrumentation [earlier proposed for VI semester of the course] had been shifted to IV semester, based on the recommendations of the development team of IV semester subjects of this course. The curriculum for the

subject INSTRUMENTATION was therefore developed earlier and has been implemented by M.P.B.T.E.

III. Based on the above and to maintain sequence, the subject of PROCESS CONTROL has been shifted to VI semester in place of the subject INSTRUMENTATION.

IV. It was discussed at length and consequently decided that in the subject "MINOR PROJECT", emphasis should be given to 'hands on experience'. And accordingly the contents for the subject were suggested in the curriculum.

V. The group opined that in place of two proposed subjects, namely - (1) Power Electronics II & (2) Industrial Electronics -II only one merged subject of the name. Industrial Electronics-I be taught, keeping in view the earlier merger of Power Electronics -I and Industrial Electronics -I into Power Electronics at level of IV semester, & restructured subject of Industrial Electronics -II at the level of VII semester.

In light of above important facts curriculum for following four subjects were developed.

- | | |
|-----------------------|-------------------------------|
| 1. MICROPROCESSOR - I | 2. Industrial Electronics - I |
| 3. Process Control | 4. Minor Project. |

The contents of each subject were developed by separate subgroups, after discussing various aspects related to curriculum development, with the members and on reaching to common final opinion. The group has tried to incorporate all possible aspects presented by AICTE in this regard.

The group has unanimously proposed following revised subject structure along with the scheme of studies & Examination for the VII semester of this course:

1. Microprocessor - II
2. Industrial Electronics - II
3. Computer Application
4. Electronics Repair, Maintenance & Testing Workshop
5. Industrial Management.
6. Major Project (Entrepreneurship)

Co-ordinator

T. R. AROFA

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परिशिष्ट-2

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आज दिनांक 21.1.98 को इंडस्ट्रीयल इलेक्ट्रॉनिक्स की बोर्ड ऑफ स्टडीज़ की बैठक शास. स.व. पोलिटेकनिक, भोपाल में 3 बजे आयोजित की गई। बैठक में निम्न सदस्य उपस्थित रहे :-

1. श्री यू.के. जैन, संयोजक, प्राचार्य शास.पोली. भोपाल.
2. श्री के.सी. महाजन, सदस्य
3. श्री आई.एस. अरोरा -तथैव-
4. श्री एस.डी. बर्मन -तथैव-
5. श्री पी.के. श्रीवास्तव विषय विशेषज्ञ पी.डी.यू. विशेष आमंत्रित
6. श्री टी.आर. अरोरा उपसचिव, तकनीकी शिक्षा मण्डल, भोपाल.

सदस्यों ने छटवें एवं सातवें सेमेस्टर की पढ़ाई एवं परीक्षा योजना एवं प्रत्येक विषय के पाठ्यक्रम का विस्तृत अध्ययन किया। समिति पाठ्यक्रम को अनुमोदित करती है साथ ही समिति इस पाठ्यक्रम को तत्काल लागू करने की अनुशंसा करती है।

४ यू.के. जैन ४
संयोजक

४ के.सी. महाजन ४
सदस्य

४ आई.एस. अरोरा ४
सदस्य

४ एस.डी. बर्मन ४
सदस्य

MADHYA PRADESH BOARD OF TECHNICAL EDUCATION, BHOPAL
 ADVANCED DIPLOMA PROGRAMME IN INDUSTRIAL ELECTRONICS

(To be introduced from 1998-99)

TOTAL TIME FOR SEMESTER = 16 WEEKS @ 36 PERIOD PER WEEK
 TOTAL HOURS = 576

SCHEME OF STUDIES AND EXAMINATION
VI SEMESTER

S. NO.	NAME OF SUBJECT	SCHEME OF STUDY			SCHEME OF EXAMINATION				BOARD EXAMINATION								
		CONTENT HRS. PER WEEK (SEMESTER)	THEORY	LAB	TOTAL	SESSIONAL MARKS	PROGRESSIVE ASSIGNMENT	THEORY PAPER	DURA -HRS	MKS	PRAC TICA L	DURA -HRS	MKS	REMARKS			
1.	MICROPROCESSOR - I	5 (80)	3 (48)	8 (128)	20	20	10	10	10	10	1	3 Hrs.	100	1	3 Hrs.	50	
2.	INDUSTRIAL ELECTRONICS - I	6 (96)	3 (48)	9 (144)	20	20	10	10	10	10	1	3 Hrs.	100	1	3 Hrs.	50	
3.	PROCESS CONTROL.	6 (96)	3 (48)	9 (144)	20	20	10	10	10	10	1	3 Hrs.	100	1	3 Hrs.	50	
4.	BUSINESS COMMUNICATION	4 (64)	-	4 (64)	20	-	10	10	10	10	1	3 Hrs.	100	1	3 Hrs.	50	
5.	MINOR PROJECT	6 (96)	6 (96)	6 (96)	20	20	10	10	10	10	1	3 Hrs.	100	1	3 Hrs.	50	
TOTAL				36 (576)	100/10	100/10	50/10	50/10	4	4	4	400	4	4	3 Hrs	200	

Corrected on 11/19/98 and made effective from 1998-99

*Sd/- K.K. Jain
 Secy, MBRE*

- No. of Theory Paper : 04
- Total Theory Marks : 400
- No. of Practicals : 04
- Total Practical Marks : 200
- Implant Training Marks : 200
- Total Marks of Sessional + Prog. Assessment + Pract & Implant Training : 500
- Ratio of Theory Marks and (Sessional+Prog. Assess+ Practical+Implant Training Marks) i.e. : 400 / 500
- Total Marks : 8
- PASSING MARKS FOR :
 - (a) Theory : 33%
 - (b) Practicals : 40%
 - (c) Sessionals : 60%
 - (d) Implant Trng : 50%

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M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI - SEMESTER

NAME OF SUBJECT : **MICROPROCESSOR - I**

Rationale

Microprocessors have already had far-reaching effects in almost every industry. New processors, New Hardware & their relevant Software intended for use with Microprocessor and new Microprocessor based commercial products are coming up in the market.

Although 32 Bits Microprocessors have become popular for increasing processing capacity requirements but study of 8 Bit Microprocessor is essential because it is easily available and its architecture is easily understandable for beginners.

The Microprocessor fabrication uses the latest logic concept which are essential components of present advanced electronics circuits and signal processing system to meet the technological advancements in the field of electronics, Computer Technology and present Industrial requirements.

So the content of the subject is prepared with above view and divided into five chapters. Some practical programs and instructions for Lab-Work being included with reference to 8 bit Microprocessor mainly.

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M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI - SEMESTER

NAME OF SUBJECT : **MICROPROCESSOR - I**

SCHEME OF STUDIES AND SPECIFICATION TABLE

S. No.	Topic	Hrs. of Study			K	C	A	Total
		Th.	Pr.	Total				
1.	Introduction	10	Nil	10	5	Nil	Nil	5
2.	Introduction to 8085 Microprocessor	20	Nil	20	10	10	Nil	20
3.	8085 Programming	20	48	68	15	10	5	30
4.	Interfacing & Memory Devices	15	Nil	15	15	10	Nil	25
5.	Basic features of other Microprocessor	15	Nil	15	10	10	Nil	20
	Total	80	48	128	55	40	5	100

Abbreviations : K KNOWLEDGE
C COMPREHENSION
A APPLICATION

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M. P. BOARD OF TECHNICAL EDUCATION
 ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
 VI - SEMESTER

NAME OF SUBJECT : **MICROPROCESSOR - I**

Content Outlines (Syllabus)

Topic No.	Topic Details	Hours of Study T+P=Total
1.	<p>Unit - 1</p> <p>Introduction</p> <p>Microprocessor, Block-Diagram of Microprocessor, Comparison of Microprocessor 8-bit, 16-bit, 32-bit.</p>	10+0=10
2.	<p>Unit - 2</p> <p>Introduction to 8085 Microprocessor</p> <p>Features of 8085 Microprocessor, Block-Diagram & Pin-Diagram of 8085, Address-bus, Data-bus, Control-bus, Various registers, Flags, Timing and control signal, ALU, Memory Mapped I/O, interrupt, Timing-diagrams.</p>	20+0=20
3.	<p>Unit - 3</p> <p>8085 Programming</p> <p>Machine level language, Assembly language & High Level Language, Instructions, Instruction formats, Addressing mode arithmetic instruction, Branching instruction. Logical instruction, Machine control Instructions, Subroutines, Development of simple Assembly Language Programs.</p>	20+48=68

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VI - SEMESTER

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NAME OF SUBJECT : MICROPROCESSOR - I

Content Outlines (Syllabus)

Topic No.	Topic Details	Hours of Study T+P=Total
4.	<p>Unit - 4</p> <p>Interfacing Memory and I/O devices</p> <p>Brief introduction to Data Transfer Schemes, Synchronous data transfer, Asynchronous data transfer, Hand-Shaking, Interrupt driven data transfer, priority interrupt, Vector-interrupt, Software Polling, Hardware Polling, Direct Memory Access (DMA) data transfer, serial data transfer.</p>	15+0=15
5.	<p>Unit - 5</p> <p>Basic features of other microprocessors</p> <p>8 Bit Microprocessor Z-80, 6800</p> <p>16 Bit Microprocessor 8086, 68000</p> <p>32 Bit Microprocessor 80286, 80386.</p> <p>Single chip micro computer (8051)</p> <p>Brief study of Semi Conductor logic technology with reference to microprocessor.</p>	15+0=15

M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI - SEMESTER

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LIST OF PRACTICALS

NAME OF SUBJECT : MICROPROCESSOR - I

Topic No	Topic Details	Hours of Study T+P=Total
1.	Study of 8085 Microprocessor Kit.	
2.	<p>Writing of small segment of Program for understanding & verification of the task of the following instruction. MOV, MVI, LXI, LDA, STA, ORA, RLC, ADI, CALL, CMA, DAD, INX, JC, CDA, LHLD, PUSH, POP etc.</p> <p>For example : To verify the operation of the instruction MOV B, C, the student may write the following segment of program.</p> <pre>MVI C, 32 H MOV B, C</pre> <p>Student will execute then above segment of program & verify that B contains the data (=32) which was loaded in register C.</p>	
3.	<p>Taking some program & anticipating the contents of various register, output port (if any), memory location.</p> <p>Example :</p> <p>Take the following programme.</p> <pre>MVI A, 8 F H MVI B, 6 8 H SUB B ANI 0F H STA 2070 H HLT</pre>	

M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI - SEMESTER

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LIST OF PRACTICALS

NAME OF SUBJECT : MICROPROCESSOR - I

Topic No	Topic Details	Hours of Study T+P=Total
4.	<p>Student should first anticipate the contents of register A, B & flag register and memory location (2070 H). Then he should actually run the program & verify then contents of register (A&B) and memory location 2070 H.</p> <p>Write 8085 assembly language program for the solution of some of the problems involving the :</p> <ul style="list-style-type: none">(1) Addition(2) Subtraction(3) Logical AND, OR, NOT(4) Branching.	

Total = 48 Hrs.

REFERENCES

1. Microprocessor Architecture, programming and application, Ramesh Gaonkar, Wiely Eastern Ltd, 2nd edition.
2. Introduction to microprocessor, Aditya P. Mathur, TATA MCGraw Hill Publishing Book Company.
3. Introduction to microprocessors : Software, Hardware Programming, Lance A Leventhal, Prentice Hall of India.

M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI - SEMESTER

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LIST OF PRACTICALS

NAME OF SUBJECT : MICROPROCESSOR - I

Topic No	Topic Details	Hours of Study T+P=Total
4.	<p>Student should first anticipate the contents of register A, B & flag register and memory location (2070 H). Then he should actually run the program & verify then contents of register (A&B) and memory location 2070 H.</p> <p>Write 8085 assembly language program for the solution of some of the problems involving the :</p> <ul style="list-style-type: none">(1) Addition(2) Subtraction(3) Logical AND, OR, NOT(4) Branching.	

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M.P. BOARD OF TECHNICAL EDUCATION, BHOPAL
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI TH SEMESTER 31/129

SUBJECT: INDUSTRIAL ELECTRONICS – I

RATIONALE

Modern Industries require various types of precise control at different stages in the process of production of Engineering and non-Engineering consumable, non-consumable and other products required in the market.

Precise control of temperature along with full control over various aspects in heating and welding is one requirement of the industry. Whereas, full control of speed, torque, output and duty cycle of ac and dc motors is another requirement in various machining operations for all types of industries.

In modern times these controls are achieved mainly by the solid state power devices as such a deep knowledge of solid state power devices and their control is of great importance in the advanced industrial electronics engineering courses.

In this syllabus main emphasis has been given to the dc applications of industrial electronics leaving the ac applications of industrial electronics to be covered in the next semester.

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M.P. BOARD OF TECHNICAL EDUCATION, BHOPAL
 ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
 VI TH SEMESTER
 SUBJECT: INDUSTRIAL ELECTRONICS – I

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SCHEME OF STUDIES AND SPECIFICATION TABLE

S. No.	TOPIC	HOURS OF STUDY			K.	C	A	TOTAL
		Th.	Pr.	Total				
1.	Review of S.C.R.	25	20	45	15	10	5	30
2.	Commutation	15	4	19	10	4	2	16
3.	Chopper	15	8	23	15	5	3	23
4.	Applications – I	25	8	33	7	8	8	23
5.	Applications - II	16	4	20	3	3	2	8
	Total	96	48	144	50	30	20	100

Abbreviations:

K : Knowledge

C : Comprehension

A : Application

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M.P. BOARD OF TECHNICAL EDUCATION, BHOPAL
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
VITH SEMESTER
SUBJECT: INDUSTRIAL ELECTRONICS - I

CONTENT OUTLINES (SYLLABUS)

TOPIC NO.	TOPIC DETAILS	HOURS OF STUDY T+P = TOTAL
1.	<p>Review Of SCR:</p> <p>Characteristics , working principle, specifications, calculation of average value, rms value, form factor, ripple factor, efficiency, TUF of single phase HW and FW controlled convertors on various loads, use of free wheeling diode, methods of turn-on, different triggering methods – R, RC, UJT, Schmitt trigger.</p>	25+24=49
2.	<p>Commutation:</p> <p>Definition, types – Natural and Forced commutation, classification – Class A, Class B, Class C, Class D, Class E, Class F.</p>	15+4 = 19
3.	<p>Chopper:</p> <p>Definition, Principle of working, chopper configurations – Type A, Type B, Type C, Type D, Type E; Jone's</p>	

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Chopper, Morgan's Chopper, Step-Up and Step-Down

Chopper, Simple applications of chopper. $15+8 = 23$

4. **Applications – I:**

D.C. Drives: Introduction, dc motor control

characteristics, 4 quadrant operation, Single phase drive

– half controlled, fully controlled, dual converter

controlled, Three phase drive – half controlled, fully

controlled, dual converter controlled, chopper

controlled dc drive. $25+8 = 33$

5. **Applications-II:**

Battery charger, temperature control, concept of use of

power electronics in heating and welding. $16+4 = 20$

TOTAL:

$96+48 = 144$

ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI TH SEMESTER

31/133

SUBJECT: INDUSTRIAL ELECTRONICS – I

LIST OF PRACTICALS

S. NO.	PRACTICAL DETAILS	HRS.
1.	Study of personal safety rules.	1
2.	Measurement of holding and latching current of a given SCR.	2
3.	Study of UJT triggering circuit and observation of waveforms at various stages.	3
4.	Study of resistance triggering circuit and observation of waveforms at various stages.	3
5.	Study of RC triggering circuit and observation of waveforms at various stages.	3
6.	Observation and analysis of waveforms on single phase half controlled converter with inductive load (with and without free wheeling diode)	3
7.	Observation and analysis of waveforms on single phase fully controlled converter with inductive load (with and without free wheeling diode)	3
8.	Study of principle of forced commutation.	3
9.	Study and observation of waveforms of Jone's Chopper.	3
10.	Study and observation of waveforms of Morgan's Chopper.	3
11.	Speed Control of dc motor using single phase converter.	3
12.	Speed Control of dc motor using Chopper.	3
13.	Study of Battery Charger.	3
	TOTAL:	48

M.P. BOARD OF TECHNICAL EDUCATION, BHOPAL
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
VI TH SEMESTER

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SUBJECT: INDUSTRIAL ELECTRONICS – I

REFERENCES (BOOKS)

S.No.	TITLE	AUTHOR/PUBLISHER
1.	Power Electronics by Dr. P.S. Bimbhra, Pub - Khanna Publications.	
2.	Power Electronics by P.C. Sen, Pub - Tata McGraw Hill.	
3.	Power Electronics by C.Y. Lander, Pub - Tata McGraw Hill.	
4.	Power Electronics Circuits, Devices and Applications by M.H. Rashid, Pub - Prentice Hall Of India.	
5.	Industrial and Power Electronics by Harish C. Rai, Pub - Umesh Publication, Delhi.	
6.	Thyristor Engineering by M.S. Berde, Pub – Khanna Publications.	

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M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI - SEMESTER

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NAME OF SUBJECT : **PROCESS CONTROL**

Rationale

Process control is one of the most vital field in almost every industry for the process line control. New controllers like PID & PLCs have come up in a big way in the industries, hence their knowledge is very essential.

For a professional in industrial electronics field, the concept and application of various controlling techniques and controllers, such as PID, PLC etc. are very essential to discharge their functions effectively and efficiently.

The contents of the subject is prepared with a view stated above and are divided into five chapter. Some practical experiences to be performed and references to be used are mainly incorporated in order to give complete guidelines. The main emphasis is put on the controller application side which will, in fact provide much more adaptability to the student in industries.

M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI - SEMESTER 31/136

NAME OF SUBJECT : **PROCESS CONTROL**

SCHEME OF STUDIES AND SPECIFICATION TABLE

S. No.	Topic	Hrs. of Study			K	C	A	Total
		Th.	Pr.	Total				
1.	Introduction to Controller system	20	-	20	10	03	-	13
2.	Laplace Transformation and Time Domain	12	-	12	10	-	-	10
3.	PID Controllers	26	20	46	08	10	10	28
4.	PLC	30	20	50	08	15	10	33
5.	Process Control System	08	08	16	06	-	10	16
		96	48	144	42	28	30	100

Abbreviations : K KNOWLEDGE
C COMPREHENSION
A APPLICATION

M. P. BOARD OF TECHNICAL EDUCATION
 ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI - SEMESTER

31/137

NAME OF SUBJECT : **PROCESS CONTROL.**

Topic No	Topic Details	Hours of Study T+P=Total
1.	<p>Introduction to Control System</p> <p>Concept of Process & Control System. Various Control System Open Loop Control System. Close Loop Control System. Block diagram, Transfer Function. Gain of Control System. Open Loop Gain & Close Loop Gain. Salient features of various Control System in process line. Concept of Analogy and Analogical Transformation Stability of a Control System. (Absolute, Relative & Marginal) Automatic Regulating System. Adaptive Control System, Distributed Control System. Devices/ Components used in Control System. Sensors, Detectors, Actuators etc.</p>	20+0=20
2.	<p>Laplace Transformation & Time Domain Response</p> <p>Laplace Transformation and its utility. Time Domain behavior in Control System. Steady state and Transient Response. Test Signals Unit STEPS, Unit RAMP, Unit IMPULSE Signal. Routh-Hurwitz stability criterion and Root-Locus concept.</p> <p><u>NOTE</u> : No mathematical treatment or derivation, only conceptual definition, figure, and final equation</p>	12+0=12

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI - SEMESTER 31/138

NAME OF SUBJECT : **PROCESS CONTROL**

Topic No	Topic Details	Hours of Study T+P=Total
3.	P.I.D Controllers Concept of Proportional, Integral, Derivative Control action PI and PID Control action. PID parameters and their significance, Input/ Output characteristics. Selection criteria for control action, in any process.	26+20=46
4.	PLC Various Electrical Control Systems. Matrix Board / Selector Switch connections in Industrial Control Sequence. Hardware Connection in Control Sequence. Concept of PLC and its features. Various Types of PLCs Compact Type / Modulator Type. Internal Block Diagram of a PLC. Components of a PLC i.e. Sensor, Timers, Counters, Actuators, Programmer etc. Specification of a Typical PLC.	30+20=50

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M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI - SEMESTER

NAME OF SUBJECT : **PROCESS CONTROL**

Topic No	Topic Details	Hours of Study T+P=Total
5.	PROCESS CONTROL SYSTEM Programming of a PLC. Ladder Programming Statement List. Control Signal Flow. Criteria for Selecting a PLC in any process.	8+8=16
	Total	96+48=144

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VI - SEMESTER

NAME OF SUBJECT : **PROCESS CONTROL**

LIST OF PRACTICALS (TOTAL 48 HRS.)

1. Study of Proportional Control action and Input/ Output characteristics of a controller.
2. Study of Integral Control action and Input/ Output characteristics of a controller.
3. Study of Derivative Control action and Input/ Output characteristics of a controller.
4. Study of PI Control action and Input/ Output characteristics and compare the control action with P, I and D controller.
5. Study of PID Control action and Input/ Output characteristics and compare the control action with all other P, I, D and PI controller.
6. Study of control action of Pressure Controlled Flow using PID.
7. Study the control action of Liquid Controlled Flow using PI/ PID Controller.
8. Control the speed of a DC-Motor using PLC and STL Programming.
9. Control the speed of a DC Motor using PLC and Ladder Programming.
10. Write Programme for different motor control using PLC (i.e. Star-Delta Starter Operation, Speed Reversal etc.)
11. Write Programme for different Mech./ Electrical/ Chemical Processes line using PLC

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M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
VI - SEMESTER

NAME OF SUBJECT : **PROCESS CONTROL**

REFERENCE BOOKS

1. Programmable Logic Controllers "Basic Level".
Text Book - TP-301 - by Festo- Dieluetic Publication.
2. Modern Control Engineering - by K. Ogata, Prentice Hall of India Ltd.
3. Control System Engineering - by Nagrath & Gopal, Willey Eastern Ltd.
4. Automatic Control System - by B. C. Kuo,
5. Industrial Automation Circuit Design and Components (For PLC)
by- David W. Pessen, Prentice Hall of India Ltd.
6. Programmable Counters - Hardware, Software & Application.
by- George L. Bulten, Jr. M/c Graw- Hills.

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M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI - SEMESTER

SUBJECT :- BUSINESS COMMUNICATION

SCHEME OF STUDIES

S.No.	Topics	Theory Hours	Total Hours
1.	Communication	14	14
2.	External Barriers	12	12
3.	Oral Communication	08	08
4.	Professional Interviews	10	10
5.	Written Communication	20	20
Total		64	64

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M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
VI - SEMESTER

BUSINESS COMMUNICATION

TOPIC 1:- COMMUNICATION

Definition-nature-importance to Managers communication theories and process-symbolic interactionalism-Information theory-Interaction theory-transaction theory-elements of communication process Importance, feedback.

TOPIC 2:- EXTERNAL BARRIERS

Psychological barriers-linguistic barriers-Mechanical barriers-making communication effective.
Communication methods - oral media, written media, non verbal communication.

TOPIC 3:- ORAL COMMUNICATION

Speeches for different occasions-guidelines-listening value problem and guidelines-Interview-types of information.

TOPIC 4:- PROFESSIONAL INTERVIEWS

Interview process-problems-guidelines-group discussions - purpose and problem guideline. Conference responsibility of chairmen and participant, effective use of non verbal communication.

TOPIC 5:- WRITTEN COMMUNICATION

Writing techniques and guidelines - letter writing - basic principles - purpose - types of business letter - handling negative ideas effectively - report writing, types of reports - structure of report - drafting report.

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M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
VI - SEMESTER

SUBJECT :- BUSINESS COMMUNICATION

BOOKS RECOMMENDED :

1. Jerry C. Vofferred, A Gerloff & REbert C. Cumins: Organisational communication, Mcgraw Hills New York.
2. Haston, Sandberg & Mills :
Effective speaking in Business prentice Hall, New York.
3. George L Mornisey :
Effective business and technical presentations, Addission wesley Publ., Co., London.
4. Raymond Lesikar :- Busi. Commn., Theory & Practice.
5. Essential of Business Communication by Rajendra Pal, & J.S. Korlahalli.
6. Business Communication - U.S. Rai & S.N. Rai.
7. Business Communication - Nomai Pradhan, D.S. Bhende, Vijay Thakur.

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M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI - SEMESTER

NAME OF SUBJECT : **MINOR PROJECT**

Rationale

Project work leads the student to develop his original thinking, group discussion, interpersonal relation and entrepreneurship ideas and polishes his behaviour in the work environment.

The student can exhibit his creativity, knowledge and skill through the project work.

Keeping in view this fact it is aimed that the student shall make layout, construct, test and produce results for any one electronic circuit based on the curriculum.

With this view, project work may not be bound in any limit & boundary and therefore only certain guidelines have laid down for Minor Project Work.

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M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VI - SEMESTER

MINOR PROJECT

SUGGESTED AREA FOR PREPARATION OF MINOR PROJECT

Identification of project based on curriculum depending upon the availability of material component and facilities in the Institutions, keeping in mind the latest developments in new areas.

- Collection of latest information pertaining to the project.
- Design of circuit for the desired objective, through software or otherwise.
- Selection of components.
- Selection and use of Tools & Test Measuring Equipments.
- HARDWARE Design & Fabrication
- Fabrication of Cabinet / Housing and Mounting of control and display devices including drawing of wiring diagram, test points at intermediate stages.
- Testing of Project / Product.
- Making cost analysis of the project.
- Writing of project report and Presentation / Seminar.

REFERENCES

1. Electronics Magazines & Journals.
2. Industrial Visits.
3. Entrepreneurship Development Board Magazines.
4. Data Books, Data Sheet for various Electronic Components.

CURRICULUM

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ADVANCED DIPLOMA
IN
INDUSTRIAL ELECTRONICS

(SEVENTH SEMESTER)



STATE CURRICULUM DEVELOPMENT CENTRE

M.P. BOARD OF TECHNICAL EDUCATION

A/4, OFFICE COMPLEX, GAUTAM NAGAR, BHOPAL - 462023

TEL : (0755) 583656, 583673, 583627

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REPORT ON CURRICULUM DEVELOPMENT WORK-SHOP
For Subjects of VII-Semester
Of
Advanced Diploma in "INDUSTRIAL ELECTRONICS"

A curriculum development workshop has been organised by M.P. Board of Technical Education, Bhopal at the premises of S.V. Govt. Polytechnic, Bhopal from 19.01.1998 to 21.01.1998 for VII-Semester in "Advance Diploma in INDUSTRIAL ELECTRONICS", exclusively being run at Govt. Polytechnic, Dhar, M.P.

A number of various teachers / lecturers from the various institutions and various stream of Engineering have actively participated and carried the work of curriculum development in different subjects of the said course. The group consisted of following members :-

1. Mr. A.S. Rathore, HOD (Maint.), S.V. Govt. Poly., Bhopal
2. Mr. I.S. Arora, I/c. HOD (Elx.), S.V. Govt. Poly., Bhopal
3. Mr. K.C. Somaiya, Lect. (Elect.), S.V. Govt. Poly., Bhopal
4. Mrs. Shobha Upadhyay, Lect. (Mech.), S.V. Govt. Poly., Bhopal
5. Ms. Krishna Singh, Lect. (Elect.), S.V. Govt. Poly., Bhopal
6. Ms. Vaishali Sohoni, Lect. (Elect.), S.V. Govt. Poly., Bhopal
7. Mr. Sukhlal, Lect. (Comp.), S.V. Govt. Poly., Bhopal
8. Mr. Prateek Bajpai, Lect. (Comp.), Govt. Women's Poly., Bhopal
9. Mrs. Deepa Tuli, Lect. (Elx.), Govt. Women's Poly., Bhopal
10. Ms. Pushpa Vaswani, Lect. (Comp.), Govt. Women's Poly., Indore
11. Mr. G.C. Khaira, Research Officer, MPBTE, Bhopal
12. Mr. S.D. Burman, I/c. HOD (Elx.), Govt. Women's Poly., Raipur

Apart from the curriculum the group has rigourously discussed on Subjects, Topics and Scheme of studies and brought out the common theme in the print-out. The subject structure proposed for VII-Semester by the previous group of VI-Semester Workshop was accepted by this group also.

Keeping in mind the aforesaid facts and the guidelines of AICTE for the curriculum, the working group has prepared the following subjects' curriculum for the approval of "Board Of Studies".

1. Microprocessor-II
2. Industrial Electronics-II
3. Computer in Industry
4. Electronics Repair, Maintenance & Testing
5. Industrial Management
6. Major Project. [Entrepreneurship]

Dated : 21.01.1998
Bhopal.

Co-Ordinator
(T.R. ARORA)

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REPORT ON CURRICULUM DEVELOPMENT WORK-SHOP
For Subjects of VII-Semester
Of
Advanced Diploma in "INDUSTRIAL ELECTRONICS"

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3. Mr. K.C.Somaiya, Lect.(Elect.), S.V.Govt. Poly., Bhopal
4. Mrs. Shobha Upadhyay, Lect.(Mech.), S.V.Govt. Poly., Bhopal
5. Ms. Krishna Singh, Lect.(Elect.), S.V.Govt. Poly., Bhopal
6. Ms. Vaishali Sohoni, Lect.(Elect.), S.V.Govt. Poly., Bhopal
7. Mr. Sukhlal, Lect.(Comp.), S.V.Govt. Poly., Bhopal
8. Mr. Prateek Bajpai, Lect.(Comp.), Govt.Women's Poly., Bhopal
9. Mrs. Deepa Tuli, Lect.(Elx.), Govt.Women's Poly., Bhopal
10. Ms. Pushpa Vaswani, Lect.(Comp.), Govt.Women's Poly., Indore
11. Mr. G.C.Khaira, Research Officer, MPBTE, Bhopal
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3. Computer in Industry
4. Electronics Repair, Maintenance & Testing
5. Industrial Management
6. Major Project. [Entrepreneurship]

Dated : 21.01.1998
Bhopal.

Co-Ordinator
(T.R.ARORA)

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परिशिष्ट-2

४

आज दिनांक 21.1.98 को इंडस्ट्रीयल इलेक्ट्रॉनिक्स की बोर्ड
एडिज की बैठक शास. स.व. पोलिटेकनिक, भोपाल में 3 बजे
आरंभ की गई। बैठक में निम्न सदस्य उपस्थित रहे :-

श्री यू.के. जैन, संयोजक, प्राचार्य शास.पोली. भोपाल.

श्री के.सी. महाजन, सदस्य

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आमंत्रित

श्री टी.आर. अरोरा उपसचिव, तकनीकी शिक्षा मण्डल, भोपाल.

सदस्यों ने छटवें एवं सातवें सेमेस्टर की पढ़ाई एवं परीक्षा योजना
व प्रत्येक विषय के पाठ्यक्रम का विस्तृत अध्ययन किया। समिति पाठ्य-
क्रम को अनुमोदित करती है साथ ही समिति इस पाठ्यक्रम को तत्काल
अंगीकार करने की अनुशंसा करती है।

श्री यू.के. जैन
संयोजक

श्री के.सी. महाजन
सदस्य

श्री आई.एस. अरोरा
सदस्य

श्री एस.डी. बर्मन
सदस्य

VII - SEMESTER

SCHEME OF STUDIES AND EXAMINATION

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S NO	NAME OF SUBJECT	SCHEME OF STUDY				SCHEME OF EXAMINATION				BOARD EXAMINATION				REMARKS
		CONTENT HRS. PER WEEK (SEMESTER)		SESSIONAL MARKS	PROGRESSIVE ASSIGNMENT	THEORY PAPER	DUR A- HRS.	MKS	PRAC TICA L	DUR A- HRS.	MKS			
THEORY	LAB	TERM WORK	LAB WORK									I	II	
1	MICROPROCESSOR - II	3 (48)	3 (48)	20	20	10	10	1	3 Hrs	100	1	3 Hrs	50	
2	INDUSTRIAL ELECTRONICS II	4 (64)	2 (32)	20	20	10	10	1	3 Hrs	100	1	3 Hrs	50	
3	COMPUTER IN INDUSTRY	4 (64)	2 (32)	20	20	10	10	1	3 Hrs	100	1	3 Hrs	50	
4	ELECTRONICS REPAIR, MAINTENANCE & TESTING	2 (32)	3 (48)	20	20	10	10	1	3 Hrs	100	1	3 Hrs	50	
5	INDUSTRIAL MANAGEMENT	4 (64)	-	20	-	10	10	1	3 Hrs	100	-	-	-	
6	MAJOR PROJECT (ENTREPRENEURSHIP)	-	9 (144)	20	80	10	10	-	-	-	1	3 Hrs	100	
TOTAL		17 (272)	19 (304)	120	100	60	60	5	-	500	5	-	300	

180 50 50 corrected on 11/198 and made effective from 1998-99

K. K. Singh

- NOTE :-**
1. No. of Theory Paper : 05
 2. Total Theory Marks : 500
 3. No. of Practicals : 05
 4. Total Practical Marks : 300
 5. Inplant Training Marks : -
 6. Total Marks of Sessional + Prog. Assessment + Pract. & Inplant Training : 700

7. Ratio of Theory Marks and (Sessional+Prog. Assess+ Practical+Inplant Training Marks) i.e. : 500 / 700
8. Total Marks : 1200

- 9. PASSING MARKS FOR**
- (a) Theory : 33%
 - (b) Practicals : 40%
 - (c) Sessionals : 60%
 - (d) Inplant Trg. : 50%

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M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VII - SEMESTER

NAME OF SUBJECT : MICROPROCESSOR - II

RATIONALE

Electronics, Particularly Microelectronics Technology is advancing rapidly day by day. There is tremendous growth and advancement in microprocessor and computer technology too. Industries are being rather forced to tune with the Microprocessor Technological revolution and advancement.

So educational institution are required to align with this industrials and technological development. Thus it is very necessary to include the advanced microelectronics and microprocessors in the curriculum, theoretically as well as practically.

In this microprocessor-II Curriculum more emphasis is given to the study of readily available 16- bit microprocessor, interfacing devices and techniques. Introduction to advance microprocessor like Pentium is also covered .

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VII - SEMESTER

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NAME OF SUBJECT : MICROPROCESSOR-II

SCHEME OF STUDIES AND SPECIFICATION TABLE

S. No.	Topic	Hrs. of Study			K	C	A	Total
		Th.	Pr.	Total				
1.	Memory Interfacing	4	0	4	5	5	5	15
2.	Programmable Interface	10	0	10	10	5	5	20
3.	Serial I/O and Data Communication	6	0	6	5	5	5	15
4.	Introduction to 8086	10	0	10	5	5	5	15
5.	Introduction to 8086 Programming	8	24	32	5	5	5	15
6.	Application of 8085/ 8086	6	24	30	3	2	5	10
7.	Advanced Microprocessor	4	0	4	5	5	0	10
		48	48	96	38	32	30	100

Abbreviations : K- KNOWLEDGE
C- COMPREHENSION
A- APPLICATION

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 ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VII - SEMESTER

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NAME OF SUBJECT : MICROPROCESSOR - II

Topic No	Topic Details	Hours of Study T+P=Total
1.	Memory Interface - Basic concepts in memory interfacing , - Memory map and addressing decoding , - Interfacing EPROM and R/W memory	4 + 0 = 4
2.	PROGRAMMABLE interface devices - Basic concepts in programmable devices , - 8155/8156 the multipurpose programming devices , - Block diagram , - Control word , - Application of 8155: interfacing, seven segment LED display etc - 8255: programmable peripheral interface, -Block diagram , - Control word , - Different modes of operation : mode 0,1,2, - Configuring 8255 in each of the three modes , - 8254 : Programmable interval timer , - Block diagram , - control word , - study of different modes of operation , -8257: Programmable DMA Controller - Block diagram - Control Word - 8259: Programmable Interrupt Controller - Block diagram - Control Word - Programming 8259	10 + 0 = 10

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 ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VII - SEMESTER

31/154

NAME OF SUBJECT : **MICROPROCESSOR - II**

Topic No	Topic Details	Hours of Study T+P=Total
3.	- 8279: Programmable Key board/ display controller - Block diagram - Control Word - Programming 8279	6 + 0 = 6
	Serial I/ O and data communication, -Basic concepts in serial I/O , - comparison of various serial I/O standards , - Hardware controlled serial I/O using 8251: - 8251 programmable communication interface , - Block diagram , - Mode word format ,control word format , status word format	10 + 0 = 10
4.	Introduction to 8086 & its coprocessor - The internal architecture of 8086 - The BIU : the queue, segment register, instruction pointer. - The E.U. Control circuitry , instruction decoder and ALU - flag register, general purpose registers, stack pointer registers, other pointer and index register. - Memory organisation in 8086 - Accessing a byte, even addressed word or odd addressed word - Use of 8086 Max/Min mode - Various interrupt of 8086 - 8086 address and data bus concepts - clock generator for 8086 . - Segmentation of memory in 8086.	8 + 24 = 32

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 ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

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VII - SEMESTER

NAME OF SUBJECT : MICROPROCESSOR - II

Topic No	Topic Details	Hours of Study T+P=Total
5.	Introduction to 8086 Programming - Instruction set of 8086 - Data transfer instructions - Arithmetic instructions - Bit manipulation instructions - String instructions - Branch instructions - Iteration Control instructions - Interrupt instruction - Processor Control instructions	6 + 24 = 30
6.	<u>Application of 8085/ 8086 :</u> - Use of 8085/8086 for the following application - DC Motor Speed and direction control - Stepper Motor interfacing. - Traffic Controller - Temperature measurement and Control - Frequency Measurement - Interfacing LED Display	4 + 0 = 4
7.	<u>Advanced Microprocessors</u> - 80486 - Enlist various advance features of 80486 over previous microprocessors - Distinguish between 80486-SX and 80486-DX <u>Pentium :</u> - Introduction and basic features - Advancement and generations of Pentium - Difference between RISC and CISC architecture.	

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VII - SEMESTER

31/156

NAME OF SUBJECT : MICROPROCESSOR - II

Topic No	Topic Details	
<u>LIST OF EXPERIMENTS</u>		
1.	Writing simple 8086 Programmes	
2.	Prepare Hardware Interface for Numeric Keyboard/ Display for 8085/ 8086.	
3.	Configure a Microprocessor for Seven Segment LED Display, Write programme for Displaying decimal number 0-9.	
4.	Control the speed and direction of a DC motor using microprocessor and 8254.	
5.	Using 8255 interface a stepper motor with a microprocessor.	
6.	Preparing a model of Traffic Signalling System using Microprocessor.	
7.	Measure a given frequency using microprocessor interfaced with 8255 and verify the frequency.	
	Total	48 Hrs.

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VII - SEMESTER

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NAME OF SUBJECT : MICROPROCESSOR - II

REFERENCES

Sl. No	Title	Author/ Publisher/ Edition
1.	Microprocessor, Architecture and Programming and Application-	Ramesh Gaonkar, Wiley Eastern, Ltd., 2nd edition.
2.	Microprocessor and interfacing programming and hardware-	Douglas V. Hall, McGraw Hill International.
3.	Microprocessors Theory and Applications, Intel & Motorola, M.	Raffiquzzaman : Prentice Hall of India.
4.	Microprocessors and Microcontroller, B. P. Singh,	Galgotiya Publications.
5.	Fundamentals of Microprocessors and Microcomputers, B. Ram	Dhanpat Rai & Sons Publication
6.	Introduction to Microprocessors 2nd edition by Aditya P. Mathur, Tata	McGraw Hills.

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M.P. BOARD OF TECHNICAL EDUCATION, BHOPAL
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
VII TH SEMESTER
SUBJECT: INDUSTRIAL ELECTRONICS – II

RATIONALE

Power Electronics occupies an indispensable position in the field of battery charging, uninterrupted power supply, electroplating, electrolysis, galvanisation, heating, and welding. It also plays an important role in all sorts of electric drives and lighting control. The recently developed techniques provide improved and more efficient manufacturing methods, accurate control and regulation of almost every kind of process. By means of electronic control, mechanical drives can be given almost any desired speed – torque characteristics, the control apparatus being, to all intents and purposes, inertia less and practically instantaneous in action.

Electronically generated high frequency energy offers possibilities in the wood working and plastic industries. Hardening, soldering or smelting of metals by high frequency energy increases the production of metal goods and quality also.

Of late power electronics has also assumed an extremely important role in main line electric traction and power supply for urban transport system as well as in HVDC transmission.

Keeping in view the above advancement, this syllabus has been designed in such a way so that the students will achieve the required knowledge of the subject. However more stress has been given to the ac applications of power electronics since the dc applications has already been considered in the previous Industrial Electronics– I syllabus.

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M.P. BOARD OF TECHNICAL EDUCATION, BHOPAL
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
VII TH SEMESTER
SUBJECT: INDUSTRIAL ELECTRONICS – II

SCHEME OF STUDIES AND SPECIFICATION TABLE

S. No.	TOPIC	HOURS OF STUDY			K.	C	A	TOTAL
		Th.	Pr.	Total				
1.	Inverter	9	6	15	6	6	2	10
2.	Cyclo-converter	7	3	10	6	6	2	10
3.	Electric Heating	15	8	23	9	6	6	21
4.	Welding	10	5	15	7	5	6	18
5.	Applications – I	18	4	22	8	5	8	21
6.	Applications – II	5	6	11	4	2	6	12
	Total	64	32	96	40	30	30	100

Abbreviations:

K : Knowledge

C : Comprehension

A : Application

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VII TH SEMESTER

SUBJECT: INDUSTRIAL ELECTRONICS – II

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CONTENT OUTLINES (SYLLABUS)

TOPIC NO.	TOPIC DETAILS	HOURS OF STUDY T+P = TOTAL
1.	<p>Inverter:</p> <p>Definition , Principle of inversion, Need of inversion, type of inverters (their circuit diagrams, working and waveforms) – Centre tapped dc supply type, Centre tapped load type, Single phase bridge, 3 phase bridge (120 and 180 degree conduction), series and parallel inverter, methods of output voltage control (only principle).</p>	9+6 = 15
2.	<p>Cycloconverter:</p> <p>Definition, Principle, Need, Types – Circuit diagram, waveform and explanation of single phase to single phase cycloconverter, circuit diagram and principle of working of three phase to single phase cycloconverter, comparison of cycloconverter.</p>	7+3 = 10

3.

Electric Heating:

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Advantages of electric heating over other methods, classification – Power frequency and High frequency heating, Principle and application of power frequency heating methods.

High frequency heating – classification (Induction and Dielectric), Induction heating – introduction, principle, relation of depth of penetration, power density and heat produced, merits and demerits, applications, high frequency power source for induction heating, Dielectric Heating – Introduction, principle, circuit diagram, expression for heat generated, methods of coupling of electrodes to the R . F. generator, thermal losses in dielectric heating, simple numerical problems, merits and demerits, applications.

15+8 = 23

4.

Electric Welding:

Definition, classification – plastic and fusion welding, various welding processes used in general engineering purposes, resistance welding – definition, resistance welding process, basic circuit for ac resistance welding, types of resistance welding, electronic welding controls (circuit / block diagram and explanation) – line contactor, its advantages over conventional contactor,

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	heat control circuits, synchronous and non-synchronous operations, sequence timer.	10+5 = 15
5.	Applications – I: A.C. drives – introduction, induction motor performance characteristics, different methods of speed control of Induction motors, three phase induction motor speed control by antiparallel connected SCRs, Block diagrams of closed loop speed control (stator voltage control), inverter controlled single and three phase induction motor, introduction to PWM control , cycloconverter controlled single phase induction motor, slip power recovery scheme – introduction, method , rotary and static Kramer and Scherbius drives. Microprocessor Controlled AC and DC drives – introduction, application.	18+4 = 22
6.	Applications – II : Applications of power electronics (Block / Circuit diagram and explanations) in HVDC transmission, thyristorised circuit breaker, emergency tube light. Principle of ac voltage controllers.	5+6 = 11
	TOTAL:	64+32 = 96

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
VII TH SEMESTER
SUBJECT: INDUSTRIAL ELECTRONICS – II

LIST OF PRACTICALS

S. NO.	PRACTICAL DETAILS	HRS.
1.	Study and observation of waveforms of series inverter.	3
2.	Study and observation of waveforms of parallel inverter.	3
3.	Study and observation of waveforms of single phase to single phase cycloconverter.	3
4.	Study and control of heat in induction heating.	3
5.	Study and compare rise of temperature in different dielectric materials in dielectric heating.	5
6.	Study of electronic controls used in resistance welding.	5
7.	To control the speed of single phase induction motor used in electronic method.	4
8.	Study of emergency tube light circuit.	3
9.	Study of HVDC Transmission.	3
	TOTAL:	32

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VII TH SEMESTER

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SUBJECT: INDUSTRIAL ELECTRONICS – II

REFERENCES (BOOKS)

S.No.	TITLE	AUTHOR / PUBLISHER
1.	Power Electronics by Dr. P.S. Bimbhra, Pub - Khanna Publications.	
2.	Power Electronics by P.C. Sen, Pub - Tata Mc Graw Hill.	
3.	Power Electronics by C.Y. Lander, Pub - Tata Mc Graw Hill.	
4.	Power Electronics Circuits, Devices and Applications by M.H. Rashid, Pub – Prentice Hall Of India.	
5.	Industrial and Power Electronics by Harish C. Rai, Pub - Umesh Publication, Delhi.	
6.	Thyristor Engineering by M.S. Berde, Pub – Khanna Publications.	
7.	Industrial Electronics by G.K. Mithal, Pub – Khanna Publishers.	
8.	Industrial Electronics by R.G. Kloffler.	
9.	Utilization of Electric Power and Electric Traction by J.B. Gupta, Pub – S.K. Kataria and Sons, Delhi.	
10.	Electric Drives by Vedam Subrahmanyam, Pub – TATA McGraw Hill.	

M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VII - SEMESTER

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NAME OF SUBJECT : **COMPUTER IN INDUSTRY**

RATIONALE

Computers have become an indispensable tool for business and industry. Their applications are numerous and vary from maintaining of on-line calendar of personal engagements to design and production of complex physical machines. Knowledge of computers and its computing application therefore has become essential. Hence subject **COMPUTER IN INDUSTRY**, in the studies of technical diploma programme, is well justified.

This course aims to providing students with basic knowledge of recent operating systems, Information technology and Numerical computing softwares. In fundamental unit focus is on some understanding of basic commands of Operating System and basic knowledge of recent fields of application like Multimedia and Internet. Major inputs on programming in "C" have been included with a focus on hands on experience in program development and execution. "C" has been chosen because of its most important application in the field of Scientific Computing. It is said that first Industrial Revolution was experienced in eighteenth century, when attempts were made to substitute muscle power by mechanical energy. The world is now passing through second industrial revolution with fantastic development occurring continuously in the field of electronics and Computer Science. CNC, CAD/CAM and ROBOTICS play an important role in this regard.

M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

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VII- SEMESTER

NAME OF SUBJECT : **COMPUTER IN INDUSTRY**

SCHEME OF STUDIES AND SPECIFICATION TABLE

S. No.	Topic	Hrs. of Study			K	C	A	Total
		Th.	Pr.	Total				
1.	Fundamentals	12	08	20	06	-	09	15
2.	Programming in 'C'	16	08	24	09	06	15	30
3.	CAD/CAM	08	02	10	06	04	05	15
4.	CNC	13	08	21	05	05	05	15
5.	Robotics	15	06	21	10	05	10	25
		64	32	96	36	20	44	100

Abbreviations : K KNOWLEDGE
C COMPREHENSION
A APPLICATION

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M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VII - SEMESTER

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NAME OF SUBJECT : **COMPUTER IN INDUSTRY**

Topic No	Topic Details	Hours of Study T+P=Total
1.	FUNDAMENTALS UNIX : <ul style="list-style-type: none">- Introduction- Characteristics- Structure- Basic UNIX Commands : ls, cp, mv, cat, date, cal, lp, cd, grep, kill, mail, mkdir, pwd, rm, who. WINDOWS 95 : <ul style="list-style-type: none">- Introduction- Hardware Requirements- Security Features- Parts of Window screen : Desktop, Icons.- Anatomy of a Window : The Title bar, Minimize, Maximize and Close, The Control Box, Scroll Bars, Scroll Buttons and Scroll Boxes. MULTIMEDIA : <ul style="list-style-type: none">- Introduction- Hardware Requirements - CD ROM, Video Capture Card, Sound Card, Speakers, Video Card & Monitors, Microphones.- Multimedia input and output devices- Elements of Multimedia program. COMPUTER NETWORK : <ul style="list-style-type: none">- Introduction- Goals- Applications- Network Structure	12+8=20

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 ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VII - SEMESTER

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NAME OF SUBJECT : **COMPUTER IN INDUSTRY**

Topic No	Topic Details	Hours of Study T+P=Total
	<ul style="list-style-type: none"> - OSI reference model - Network Topology - Types of Network : LAN, MAN and WAN. <p>INTERNET :</p> <ul style="list-style-type: none"> - Introductory knowledge of : <ul style="list-style-type: none"> TCP/IP Protocol, Internet Services, Ethernet, Bridges, Router, Repeaters, Internet Addressing Scheme, WWW, SLIP, PPP, FTP, E-Mail, TELNET. 	
2.	<p>PROGRAMMING IN 'C'</p> <ul style="list-style-type: none"> - Variables : <ul style="list-style-type: none"> Declaration of Variables, Assignment of Variables, Arithmetic Expressions, Data Types. - Decision Making : <ul style="list-style-type: none"> Relational Operators, Logical Operators, IF Statement, SWITCH Statement. - Iteration : <ul style="list-style-type: none"> FOR, WHILE, DO...WHILE loops. - Functions. - Arrays, Pointers and Structures. - Input/Output and Files. - Introduction to C++ - Advantages of C++ over C. 	16+8=24

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VII - SEMESTER

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NAME OF SUBJECT : **COMPUTER IN INDUSTRY**

Topic No	Topic Details	Hours of Study T+P=Total
3	Computer Aided Designing/ Computer Aided Manufacturing (CAD/CAM) : <ul style="list-style-type: none">- Introduction- Potential application area- Software and Hardware for CAD/CAM- Functioning of CAD/CAM system.- Manufacturing automation protocol.- General awareness of AUTOCAD.	8 + 2=10
4	Computerised Numerical Control (CNC) : <ul style="list-style-type: none">- Introduction- Analog and Digital Control- Programmed Automation and Numerical Control.- Different possible numerical Control used in CNC's- Tape and Tape Punching- Computer Aided Part Programming.- Elements of CNC Systems- Machine rebuilding and updating- Control retrofitting- Advantages and applications	13 + 8 = 20
5	Robotics : <ul style="list-style-type: none">- Introduction of Robot and Robotics- Reasons for using Robot- Basic elements of Robots- Type of joints- Notations for Robot manipulator	15 + 6 = 21

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VII - SEMESTER

NAME OF SUBJECT : **COMPUTER IN INDUSTRY**

Topic No	Topic Details	Hours of Study T+P=Total
	<ul style="list-style-type: none">- Configuration of Robot.- Classification of Robot- Robot arm, Hands,- End effectors- Designing of gripper- Operational unit and control- Control systems for Robot- Expected qualities in Robot : Vision, Tactile sensing and Mobility- Specification of Robot- Precautions in the use of Robot and their application.- Application and economics of Robot.- Robot Programming : Sequencing operations Teach by showing.	

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VII - SEMESTER

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NAME OF SUBJECT : **COMPUTER IN INDUSTRY**

REFERENCES

UNIX :

1. A User Guide to the UNIX : Dr. Rebecca Thomas, Jean Yates
Mc Graw Hill Publication

WINDOWS 95 & MULTIMEDIA :

1. Mastering Windows 95 : Robert Cowart
BPB Publication

COMPUTER NETWORK :

1. Computer Networks : Andrew S. Tenenbaum
Prentice Hall India Publication

INTERNET :

1. Internetworking with TCP/IP Vol.-1 : Douglas E. Comer
Prentice Hall India Publication

PROGRAMMING IN 'C'

1. The Spirit of 'C' : Mallish Cooper

CAD/CAM

1. CAD/CAM/CIM : P. Radhakrishnan, S. Subramanayan.
Wiley Eastern Limited.

CNC / ROBOTICS :

1. Production Technology : R.K. Jain, S.C. Gupta
Khanna Publications.
2. Robotics : James W. Masterson, Elmer C. Poe and Stephen W. Fardo
Prentice Hall Publications.

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M. P. BOARD OF TECHNICAL EDUCATION
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VII - SEMESTER

NAME OF SUBJECT : **COMPUTER IN INDUSTRY**

TOTAL PRACTICAL HRS : 32

PRACTICALS

1. Practice on following UNIX Commands : ls, cp, mv, cat, date, cal, lp, cd, grep, kill, mail, mkdir, pwd, rm, who.
2. Windows95 : Running Windows95, Making new folders, Moving & Copying items between folders, Deleting Items, Copying files & folders to and from Floppy Disks.
3. Writing a document using MS-WORD, Printing, Spell Checking.
4. Writing, Printing & Graph Designing using MS-Excel.
5. Playing Multimedia files with Media Player.
6. Working on any Web-Browser, E-mail.
7. Simple Programs in 'C'.
8. Work on general menu driven commands of AUTOCAD.
9. Study of CNC/DNC.
10. Job Preparation on CNC machine.
11. Study of Robotics machinery.

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M.P. BOARD OF TECHNICAL EDUCATION

ADVANCED DIPLOMA IN INDUSTRIAL-ELECTRONICS

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VII-SEMESTER

ELECTRONICS REPAIR, MAINTENANCE & TESTING

RATIONALE

In the present context it is very much required that a technician must know the various aspects of Fault-Diagnosis & Repair / Maintenance. As, most of the industries, today expect that the Supervisor / Employee, specially at the Shopfloor must be well aware and capable of performing the Preventive Maintenance, Minor-Fault Repairing / Servicing of the machineries being used at the floor. Apart from these, he must, also be having the adequate knowledge of Safety-Precautions at Shopfloor as well as about the various Safety Devices and their uses. The members present in the curriculum design strongly felt that the subject must be more practice-oriented. Therefore, in the curriculum, it is always taken care that student must learn through practice and develop his skills, namely in Fault-Finding, Identifying components / items for repairing / replacements and maintenance of Machine / Circuit with the help of Manuals, Trouble-Shooting Charts, Circuit Diagram etc. He will also be able to prepare Preventive Maint. Chart, Safety-Precaution Chart etc. for future reference. Which will definitely help the student for his confidence to work more comfortably as well as efficiently on the floor & maintain the machineries.

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M. P. BOARD OF TECHNICAL EDUCATION

ADVANCED DIPLOMA IN INDUSTRIAL-ELECTRONICS

VII - SEMESTER

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NAME OF SUBJECT : ELECTRONICS REPAIR, MAINTENANCE & TESTING

SCHEME OF STUDIES AND SPECIFICATION TABLE

S. No.	Topic	Hrs. of Study			K	C	A	Total
		Th.	Pr.	Total				
1	Introduction To Tools And Equipments	04	04	08	05	05	10	20
2	Electronic Equipments	12	24	36	15	05	15	35
3	Electrical Circuits	05	06	11	10	05	10	25
4	Electrical Machines	05	10	15	03	03	04	10
5	Safety	06	04	10	05	02	03	10
TOTAL		32	48	80	38	20	42	100

Abbreviations :-

K Knowledge

C Comprehension

A Application

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ADVANCED DIPLOMA IN INDUSTRIAL-ELECTRONICS

VII - SEMESTER

NAME OF SUBJECT : ELECTRONICS REPAIR, MAINTENANCE & TESTING

Theory per week :

Practical Per week :

Topic No	Topic Details	Hours of Study T+P=Total
1	<p><u>INTRODUCTION TO TOOLS & EQUIPMENT</u></p> <ul style="list-style-type: none"> - Concept of Repair, Maintenance & Testing - Various Tools used for Repair & Maint. Common / General Tools. Special Tools (Crimping-Tool, Cutters, IC-Pullers Bearing-Pullers). - Various Measuring & Testing Equipments and Instruments. Megger, Earth-Tester, Tong-Tester, Techo-Meter, Multi-meter, Ammeter, Voltmeter, Wattmeter, Energy-Meter, Oscilloscope, RLC Bridge etc. - IC Testers Analog IC Tester & Digital IC Tester - Accessories used in Electrical/Electronics Application. Connectors, Contactors, MCB, Fuses, Cables Ferrules, Caution Plates, Terminal Identifiers, Protecting Devices, Color-Coding. Lugs. 	04+04=8
2	<p><u>ELECTRONIC EQUIPMENTS</u></p> <p>Electrical Circuit (Power Input, Indication, Protection etc.)</p> <ul style="list-style-type: none"> - Identification of Mountings & Components. Power-Cord, Switches, Fuses, Fuse-Holders, Relays, Heat-Sinks, Light-Switches, Displays, Connectors, Sockets etc. - Specification of Mountings & Components Electrical Rating and Physical Size etc. - Testing & Replacement of above-said items <p>Simple Electronic Circuit</p> <ul style="list-style-type: none"> - Identification of Conventional Circuit & Chassis Mounting Components and Devices. 	12+24=36

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ADVANCED DIPLOMA IN INDUSTRIAL-ELECTRONICS

VII - SEMESTER

NAME OF SUBJECT : ELECTRONICS REPAIR, MAINTENANCE & TESTING

Theory per week :

Practical Per week :

Topic No	Topic Details	Hours of Study T+P=Total
	<ul style="list-style-type: none"> - Circuit Tracing - Identification of Testing-points & Testing of Components and Circuit. - Identification of Faulty Equipments and Components and Replacement. Complex Electronic Circuit - Identification of Sub-Functional Blocks / Circuits of a Complex Circuit. - Identification of Testing Points and Testing of Circuit.(Using CRO / DMMs etc.) - Identification of Interconnection of Sub functional Blocks as a whole. - Fault Diagnosis and replacement of faulty Components / Circuitry. (Use of Manuals / Maint. & Service Charts) High-Tech Electronic Equipments - Identification of various High-Tech. Eqpt. Modules / Cards. - Identification of functionability of var. Section / Modules / Cards. - Identification and Listing of faults & Faulty Modules / Cards. (Using Troubleshooting-Charts & Mannuals) Documentation - Preparation of Maintenance Chart, History-Sheet, Inventory-Chart, Spare-Invent. etc. 	
3.	<p><u>ELECTRICAL CIRCUIT</u> Power-Wiring & Circuit</p> <ul style="list-style-type: none"> - Testing / Availability of 3-Phase Supply. (Using Volt-meter, Multimeter, Test-Lamp) 	05+06=11

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VII - SEMESTER

NAME OF SUBJECT : ELECTRONICS REPAIR, MAINTENANCE & TESTING

Theory per week :

Practical Per week :

Topic No	Topic Details	Hours of Study T+P=Total
	<ul style="list-style-type: none"> - Checking of Fuses/Fuse-Wire and Selection and Replacement. - Checking of ICDP / ICTP / MCB for proper functioning and Contact conditions. Earthing - Checking of Proper Earthing. - Earth-Resistance Testing. - Earth-Pit Repairing / Maintenance Contactors Circuit - Checking the Contact Points and Cleaning - Checking the soundness of Coil. Starters (DOL / Star-Delta) - Checking the Main & Auxiliary Contacts, Polish / Replace the Pitted Contacts. - Checking the Spring Tension / Replacement. - Checking Overload Setting / Adjustments & Time-Setting / Adjustments. 	
4.	<p><u>ELECTRICAL MACHINES</u> 05+10=15</p> <ul style="list-style-type: none"> - Cleaning / Blowing Air on Elect. Machines. - Checking of Over-Temperature and Bearing Noise etc. - Overhauling small Motor.(Checking Starting Current, Speed,IR-Value Bearing Condition, Earthing etc.) - Preparing Preventive Maintenance-Schedule. 	
5.	<p><u>SAFETY</u> 06+04=10</p> <ul style="list-style-type: none"> - Checking the condition for Personal Safety Rubber-Matting, Hand-Gloves, Insulated Hand-Tools, Insulation Resistance of M/c. etc. - Checking of Earth Connection & its continuity. - Special Protection & Safety Devices. - Fire-Fighting Equipments and Uses 	

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VII - SEMESTER

NAME OF SUBJECT : ELECTRONICS REPAIR, MAINTENANCE & TESTING

REFERENCES

Sl. No.	Name of the book	Name of the Author/Publisher
1.	Modern Electronic Equipment (Troble-shooting Repair & Maintenance)	R.S.Khandpur T.M.H.
2.	Electronic Testing and Fault Diagnosis.	G.C.Loveday Wheeler
3.	Electrical & Electronic Maintenance. ETG-24 (Engg. Training Guide)	EITB
4.	Circuit Diagram Book for Various TV & VCR	BPB
5.	SAMS, IBM PC Truobleshooting And Guide	Robber S.C.Benner BPB
6.	Maintenance Mannuals	

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ADVANCED DIPLOMA IN INDUSTRIAL-ELECTRONICS

VII-SEMESTER

INDUSTRIAL MANAGEMENT

RATIONALE

In the present industrial environment it is very much needed that one should be well aware of the Organization setup and its functionability. The industries also expect that the supervising employee must also know the management behavior and activities. One should also able to handle situation based difficulties arises time-to-time. Today it is also highly desirable that the Supervisor / Employee can handle Shopfloor activities independently when required.

The members present in the curriculum design strongly felt that the subject must provide adequate knowledge about the Industrial Management Techniques & its internals as well as Organizational behavior for developing a good working environment. Therefor, in the curriculum, it is always taken care that student must also gain enough knowledge to develop inter-personal skills, Environmental & Safety Components related to the Industry.

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ADVANCED DIPLOMA IN INDUSTRIAL-ELECTRONICS

VII - SEMESTER

NAME OF SUBJECT : INDUSTRIAL MANAGEMENT

SCHEME OF STUDIES AND SPECIFICATION TABLE

S. No.	Topic	Hrs. of Study			K	C	A	Total
		Th.	Pr.	Total				
1	Management Overview	04	-	04	10	-	-	10
2	Inventory Control	08	-	08	10	05	05	20
3	Organization & Organizational Climate	20	-	20	10	05	10	25
4	Organ. Changes and Organ. Conflicts	10	-	10	10	05	-	15
5	Management Qualities	12	-	12	10	-	05	15
6	Environment Pollution & Control	10	-	10	05	05	05	15
	TOTAL	64	-	64	55	20	25	100

Abbreviations :-

- K Knowledge
- C Comprehension
- A Application

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ADVANCED DIPLOMA IN INDUSTRIAL-ELECTRONICS

VII - SEMESTER

NAME OF SUBJECT : INDUSTRIAL MANAGEMENT

Theory per week :

Practical Per week :

Topic No	Topic Details	Hours of Study T+P=Total
1	<p><u>MANAGEMENT OVERVIEW</u></p> <ul style="list-style-type: none"> - Concept of Organization and Organizational Management. - Brief History of Management. - Function Of Management. <p>Planning, Organizing, Staffing, Directing, Co-ordinating, Controlling, Reporting, Innovating, Budgeting, Evaluation</p> <ul style="list-style-type: none"> - Management Phases <p>Pre-Planning, Planning, Implementation & Control.</p> <ul style="list-style-type: none"> - Application of Management <p>In Personnel / Marketing / Finance / Purchase / Production / Stores etc.</p>	04+00=4
2.	<p><u>INVENTORY CONTROL</u></p> <ul style="list-style-type: none"> - Concept of Inventory & Inventory Control. - Necessity and Advantages. - Types of Inventory Control. - Techniques of Inventory Analysis. - Techniques of Inventory Control. - Organisation of Inventory Control. 	08+00=08
3.	<p><u>ORGANIZATION & ORGANIZATIONAL CLIMATE</u></p> <p style="text-align: right;">20+00=20</p> <ul style="list-style-type: none"> - Concept of Organization Definition & Illustration - Principles of Organization - Organizational Structure & Organizational chart. - Types of Organization. - Formal Organization, Line, Functional, Line & Staff, Communities, Project, Matrix 	

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VII - SEMESTER

NAME OF SUBJECT : INDUSTRIAL MANAGEMENT

Theory per week :

Practical Per week :

Topic No	Topic Details	Hours of Study T+P=Total
1	<p><u>MANAGEMENT OVERVIEW</u></p> <ul style="list-style-type: none"> - Concept of Organization and Organizational Management. - Brief History of Management. - Function Of Management. <p>Planning, Organizing, Staffing, Directing, Co-ordinating, Controlling, Reporting, Innovating, Budgeting, Evaluation</p> <ul style="list-style-type: none"> - Management Phases <p>Pre-Planning, Planning, Implementation & Control.</p> <ul style="list-style-type: none"> - Application of Management <p>In Personnel / Marketing / Finance / Purchase / Production / Stores etc.</p>	04+00=4
2.	<p><u>INVENTORY CONTROL</u></p> <ul style="list-style-type: none"> - Concept of Inventory & Inventory Control. - Necessity and Advantages. - Types of Inventory Control. - Techniques of Inventory Analysis. - Techniques of Inventory Control. - Organisation of Inventory Control. 	08+00=08
3.	<p><u>ORGANIZATION & ORGANIZATIONAL CLIMATE</u></p> <p style="text-align: right;">20+00=20</p> <ul style="list-style-type: none"> - Concept of Organization Definition & Illustration - Principles of Organization - Organizational Structure & Organizational chart. - Types of Organization. - Formal Organization, Line, Functional, Line & Staff, Communities, Project, Matrix 	

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ADVANCED DIPLOMA IN INDUSTRIAL-ELECTRONICS

VII - SEMESTER

NAME OF SUBJECT : INDUSTRIAL MANAGEMENT

Theory per week :

Practical Per week :

Topic No	Topic Details	Hours of Study T+P=Total
4.	<ul style="list-style-type: none"> - Internal Organization - Classification Of Organization - Authority & Delegation Of Authority - Centralization & De-centralization. - Authority & Responsibility <p><u>GROUP-DYNAMICS</u></p> <ul style="list-style-type: none"> - Concept - Basic Characteristics of Group - Reasons for Formation Of Group - Advantages & Dis-advantages of Group <p><u>ORGANIZATIONAL CHANGE & ORGANIZATIONAL</u> 10+00=10</p> <p><u>CONFLICTS</u></p> <p>Organizational Change Concept of Managing Changes in Org.</p> <ul style="list-style-type: none"> - Cause Of Org. Changes - Response Of Changes - Process Of Changes <p>Organizational Conflict</p> <ul style="list-style-type: none"> - Concept Of Org. Conflict - Types Of Conflict - Conflict between Groups in an Org. - Conflict between Org. - Process / Stages Of Conflict - Sources & Impact Of Conflict - Resolution/ Mode of Conflict Management 	
5.	<p><u>MANAGEMENT QUALITIES</u> 12+00=12</p> <ul style="list-style-type: none"> - Introduction to qualities of a Manager - Concept and Factors affecting Motivation 	

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VII - SEMESTER

NAME OF SUBJECT : INDUSTRIAL MANAGEMENT

Theory per week :

Practical Per week :

Topic No	Topic Details	Hours of Study T+P=Total
	<ul style="list-style-type: none"> - Motivation Process - Secondary Motivation Drives - Aggressiveness, Acquisitiveness, Self assertion, Constructiveness, Gregoriousness Expression, Repression - Various Behavioural Theories Leadership Qualities - Definition of Leadership - Personal Skills required for Leadership Persuasion, Influence, Rapport etc. - Relationship between Motivation and Leadership. - Type Of Leadership Autocratic, Democratic, Free Rein Supervision - Concept of Supervision - Personal Attitude of Supervisor - Duties & Responsibilities of Supervisor Time Management - Definition of Time Management - Importance - Procedure Communication - Concept of Communication - Types, Process, Channels & Barriers - Effective Communication Person to person With Groups In Meetings / Committees Grievances - Definition - Cause of Grievances - Recognising Grievances - Solving of Grievances 	

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VII - SEMESTER

NAME OF SUBJECT : INDUSTRIAL MANAGEMENT

Theory per week :

Practical Per week :

Topic No	Topic Details	Hours of Study T+P=Total
6.	<p><u>ENVIRONMENT POLLUTION & CONTROL</u> 10+00=10</p> <ul style="list-style-type: none">- Factors Causing Pollution- Effects of Pollution on Human-Health- Types of various Pollution and its effects <p>Air Pollution</p> <ul style="list-style-type: none">- Sources of Air-Pollution- Effect of Air-Pollution and related Device- Method / Device of Air-Pollution Control <p>Water Pollution</p> <ul style="list-style-type: none">- Introduction to Water-Pollution- Effect of Water-Pollution- Sources of Water Pollution- Control of Water-Pollution <p>Noise-Pollution & its Control</p>	

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ADVANCED DIPLOMA IN INDUSTRIAL-ELECTRONICS

VII - SEMESTER

NAME OF SUBJECT : INDUSTRIAL MANAGEMENT

REFERENCES

No.	Name of the book	Name of the Author/Publisher
1.	Belts, P.W., Supervisory Management,	(ELBS with 6th Edition, Pitman Publishing, 1994)
2.	Khanna, O.P., Industrial Engineering and Management,	(Dhanpat Rai and Sons 1995)
3.	Koontz, O'Donnell, Weihrich, Essentials of Management, 4th Edition,	Mc Graw-Hill Book Company 1986
4.	Indira Gandhi National Open University,	Module Published for Diploma in Management Course.
5.	Buffa, Modern Production Operations Management, 7th Edition	Wiley Eastern Ltd. 1983
6.	Goel, B.S., Production Operations Management,	(Pragati Prakashan, 1986)

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M.P. BOARD OF TECHNICAL EDUCATION, BHOPAL
ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
VII TH SEMESTER
SUBJECT: MAJOR PROJECT

RATIONALE

The approach to this subject is basically different from other subjects, in the sense that while in other subjects the entire learning experience is totally controlled by the teachers, in this subject the students are exposed to self learning. This strategy promotes in the students the habit of enquiry, develops confidence to tackle new problems, develops the attitudes leading to creativity etc. This is deemed necessary because every student after leaving the institute has to solve many live problems in his job all on his own.

With this view the project work may not be bound in any limit or boundary. As such this curriculum has been designed with the objective that the student should be able to design and develop complete electronic system by his initiative and develops confidence to solve problems in industrial processes. Assuming that the student has the ability to conduct all tasks and processes stated in minor project work independently.

ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VII TH SEMESTER

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SUBJECT: MAJOR PROJECT

EXPECTED QUALITIES TO BE DEVELOPED IN THE STUDENT AFTER COMPLETION OF PROJECT:

- A student should have idea about market survey, financial implications and marketability of his project.
- Student should develop the ability to judge the impact of ambient conditions on his project.
- Student should have complete knowledge of the raw materials, machine tools, equipment and processes used in his project and its relevance to the industry.
- Student should develop skills in measurement, testing, maintenance and repair aspects for various processes and equipment.
- Student should have an insight into the upgradation and further modification / improvements that could be carried out on the project made by him.
- Student should have knowledge about alternative solutions if any to achieve the same goal in his project.
- Student should be able to adapt himself for latest developments and to handle independently new situations.
- Student should develop entrepreneurship and leadership qualities.
- Student should develop an inquiring aptitude and confidence to solve small industrial problems. He should develop take initiative in all tasks demanding group coordination.
- He should develop good expression power and presentation abilities.

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VII TH SEMESTER 31/188
SUBJECT: MAJOR PROJECT

PROCESS TO BE ADOPTED (IN 16 WEEKS):

Task / Process	No. Of Week	Evaluation	Marking
• Orientation of students by HOD / Guide about project.	1	-	-
• Selection and finalisation of topic in front of a committee*.	1	Seminar I at the end of the week	10
• Market Survey and resource collection.	2 to 3	-	20
• Detailing and preparation of project.	4 to 5	-	35
• Testing, improvements and finalisation of project.	4	-	35
• Report writing and presentation in front of committee*.	2 to 3	Seminar II on the last day	10
• Compilation of information and writing a report on a small scale industry / entrepreneurship development program.	1 to 2	-	10
TOTAL:			120

*Committee : Comprising of (1) HOD, (2) Guide, (3) One representative of industry.

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS

VII TH SEMESTER
SUBJECT: MAJOR PROJECT

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SUGGESTED AREA FOR PREPARATION OF MAJOR

PROJECT:

Identifying the project based on curriculum depending upon the availability of material component and facilities in the institution, working model or demonstration / trainer model may be prepared in the following areas:

Electronics – Analog, Digital , Power, Industrial etc.

Microprocessor – Software / Hardware.

Computer – Software / Hardware.

Communication

Process Control – PLC etc.

Electrical Machines.

CAD, CAM etc.

CNC, Robotics etc.

Study of concepts related to any advanced field having contemporary importance.

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ADVANCED DIPLOMA IN INDUSTRIAL ELECTRONICS
VII TH SEMESTER
SUBJECT: MAJOR PROJECT

REFERENCES

- Magazines, Periodicals, Journals etc. in related field.
- Industrial Bulletins.
- Entrepreneurship Development Board's magazines.
- Design Data books , Data sheets and manuals for various components used.
- Relevant I.S. Codes.
- Engineering Experimentation Course, T.T.T.I. , Bhopal.