PREMLILA VITHALDAS POLYTECHNIC

S.N.D.T. WOMEN'S UNIVERSITY

DIPLOMA IN ELECTRONICS

CURRICULUM

First Year

2018-19

Sir Vithaldas Vidyavihar S.N.D.T. Women's University

Juhu Santacruz(W) Mumbai -400049

S.N.D.T. Women's University
SCHEME
FIRST YEAR DIPLOMA IN ELECTRONICS

Eligibility: S.S.C or Equivalent
SCHEME: SEMESTER I

Paper Code	Subjects	TH	PR/TU	D (Hrs.)	TP	TW Th+Pr	PR/V	T	Cr
DE1001	ELEMENTS OF ELECTRONICS	3	2	2	50	50	---	100	4
DE1002	ELECTRONICS WORKSHOP AND ENGINEERING DRAWING	---	8	0	---	50	50	100	4
DE1003	BASIC MATHEMATICS	3	/1	2	50	50	--	100	4
DE1004	COMMUNICATION SKILL - I	3	/1	2	50	50	--	100	4
DE1005	BASIC SCIENCE	3	2	2	50	50	--	100	4
DE1006	DEVELOPMENT OF GENERIC SKILL	2	--	--	--	--	--	--	--
	Total	14	12/2					500	20

TH = Theory Lectures / week, PR / TU = Practical / Tutorial in hrs, D = Duration of Theory paper for Examination in hrs, TP = Theory Paper-marks, TW = Term Work - marks, PR/V = Practical / Viva Voce - marks, T = Total, Cr = Credits

SCHEME: SEMESTER II

Paper Code	Subjects	TH	PR/TU	D (Hrs.)	TP	TW Th+Pr	PR/V	T	Cr
DE2001	ELECTRICAL TECHNOLOGY	3	2	2	50	50	--	100	4
DE2002	COMPUTER FUNDAMENTALS & C –PROGRAMMING	2	4	2	50	50	--	100	4
DE2003	APPLIED MATHEMATICS	3	/1	2	50	50	--	100	4
DE2004	COMMUNICATION SKILL – II	3	/1	2	50	50	--	100	4
DE2005	APPLIED SCIENCE	3	2	2	50	50	--	100	4
DE2006	BASIC ELECTRONICS	3	2	2	50	50		100	4
	Total	17	10/2					600	24

TH = Theory Lectures / week, PR / TU = Practical / Tutorial in hrs, D = Duration of Theory paper for Examination in hrs, TP = Theory Paper-marks, TW = Term Work - marks, PR/V = Practical / Viva Voce - marks, T = Total, Cr = Credits

CARRICULUM
FIRST YEAR DIPLOMA IN ELECTRONICS

SCHEME: SEMESTER I

Paper Code	Subjects	TH	PR/TU	D (Hrs.)	TP	TW Th+Pr	PR/V	T	Cr
DE1001	ELEMENTS OF ELECTRONICS	3	2	2	50	50	---	100	4
DE1002	ELECTRONICS WORKSHOP AND ENGINEERING DRAWING	---	8	0	---	50	50	100	4
DE1003	BASIC MATHEMATICS	3	/1	2	50	50	--	100	4
DE1004	COMMUNICATION SKILL – I	3	/1	2	50	50	--	100	4
DE1005	BASIC SCIENCE	3	2	2	50	50	---	100	4
DE1006	DEVELOPMENT GENERIC SKILL	2	0	---		---	---	---	--
Total		**14**	**12/2**					**500**	**20**

Course Name : **Diploma in Electronics**

Semester : **I**

Subject name : **Elements of Electronics**

Subject Code : **DE 1001**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme				
Theory (HRS)	Tutorial	Practical (HRS)	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks	Semester Exam Marks (TH)	Total Marks (TH/PR)	
3	0	2	4	2	50	50	100	
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral								

Note :- (Make changes as per your subject requirement)

1. Theory period is of 60 minutes and Practical Sessions is of 120 minutes

2. Minimum 40% marks are needed for passing in internal and semester examinations

3. **Internal marks**

    Project based Assignments (TW)   25 Marks

    Practical Lab   10 Marks

    Practical Skill Test   15 Marks

    Total   50 Marks

4. **Semester Examination (Theory)**

    Theory semester examination includes a two hour theory paper of 50 marks.

5. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

6. It is mandatory to appear for semester theory examination and skill tests. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignment and Laboratory experiment will not be declared successful for that examination head.

7. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

    (Direct Second year admitted students need to complete only Term Work (TW) of 25 Marks i.e Project Based Assignments as per their eligibility)

Rationale: Elements of Electronics intends to teach students about the different material required for manufacturing of electronic components. The students will learn the

properties of materials and their compositions. They will understand the principle of working of electronics components and get the ability to practically use them in circuits. Fabrication technologies for PCBs, single sided, double sided, multi-layer and flexible, etc. PTH technology for finishing of PCBs, screen printing and photographic methods for PCB-artwork will be studied in detail.

Course Outcomes: On successful completion of course, students will be able to :
1. Identify different components and their characteristics..
2. Learn different properties of material used in electronics.
3. Make Use of material for specific component
4. Design and make of PCBs with component testing

Learning Structure

Application	Applications of component and materials in the field of Electronic engineering
Procedure	Identification of components ,study of characteristics ,Fabrication Testing of PCB
Principle	Principal of working of Electronics Components Material and characteristics behavior of each
Concepts	Permittivity, Permeability ,Hysteresis loop Electromagnetic Domain Integrated Circuits Florescent and phosphorescent materials
Facts	Electronics Components, material and their Properties. Conductor Material, Resistance material ,Photoelectric Material s etc

Course Contents

THEORY

Unit	Chapter	Topic and Details	No. of Lectures assigned
I	1	Materials and their properties	
		Conductor materials: Pure metal & alloys conductivity and mechanical strength, super conductivity materials	4
		Resistance materials: pure metals and alloys carbon and ceramic specific resistance temperature coefficient of resistance	6
	2	Rectifying materials: metallic pairs, rectifying ratio and peak inverse voltage.	2

		Thermocouple material: thermoelectric effect, thermoelectric series.	4
	3	Photoelectric, photo-emissive and photo-conductive phenomenon and devices, photo voltaic cell, piezoelectric materials, florescent and phosphorescent materials	4
II	4	Magnetic materials: Electromagnetic domain theory, Ferromagnetic metals and alloys, soft and hard magnetic materials, rectangular magnetic characteristic materials, ferrox cube, permittivity and permeability, hysteresis loop, effect of air gap on hysteresis loop.	4
	5	Insulating materials: Cellulose, plastic glass, ceramic, liquids, compounds, quartz, inert gasses, permittivity, Di-electric strength and power factor, FeO_2 , ferrite materials, dielectric amplifiers	4
III	6	Components for Electronics: Resistors, capacitors, inductors, choke coils, transformers, permanent magnets, electromagnets, mechanical switches, solid state switches, connectors, electromechanical relay, solid state relay, diodes, SCR, Integrated Circuits, transistors, dry cell, storage batteries (accumulators). DISPLAYS : Seven Segment LED Display, Dot Matrix LED Display, Liquid Crystal Display	12
IV	7	Fabrication technology and testing: Fabrication technologies for PCBs, single sided, double sided, multi-layer and flexible, etc. PTH technology for finishing of PCBs, screen printing and photographic methods for PCB-artwork,	5

*Note: Number of units should be equal to number of credits

PRACTICALS

Sr. No	Course Outcome	Laboratory Activities	No. of Hrs assigned
01	CO1	Study of Resistors (Types, Size and Wattage etc.)	1
02	CO1	Study of Capacitors (Types, Leads orientation and Face Value etc.)	1
03	CO1	Perform inductor characteristic and its Types	1
04	CO1	Study of performance of Transformers	2
05	CO2	Study applications of switches Mechanical Switches and Rotary switches	1
06	CO2	Study of electromagnetic Relay	1
07	CO2	Study of Diodes (Appearance, Types and applications.)	1

08	CO1	Study performance characteristics Zener Diodes	1
09	CO2	Study of Bipolar Junction Transistors (Appearance, PNP and NPN types)	1
10	CO3	Study of Light Emitting and Photodiodes.	1
11	CO3	Study of LDR, Photo-cell and Solar Cell	1
12	CO3	Study of Semiconductor Device Naming (Coding) Methods	1
13	CO3	Study of different Connectors	1
14	CO4	Soldering Techniques	1
15	CO4	Performing soldering to prepare mini project	1

PROJECT BASED ASSIGNMENTS

Unit No	Course Outcome	Details	Marks
I	CO1	Write properties of different material used in electronics	2
	CO2	Test resistance of different metals and compare as conductors	2
	CO1	Make a chart of components.	2
II	CO2	Do magnetization of ferromagnetic substance and study the magnetizing core.	2
	CO4	Compare magnetic strength of given magnetic material with the help of an electromagnet	2
	CO2	Measure insulation resistance using Merger	2
	CO2	Make a Chart of insulator	2
III	CO3	Make coils of different sizes and study their inductance	2
	CO3	Make chart of different types of diode	2
	CO3	Make chart of different types of batteries	3
	CO4	Convert a given circuit into a solder side layout for PCB	4

Skill Test

Unit No	Course Outcome	Details	Marks
I	CO4	Prepare a small PCB and perform soldering by placing components	15

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	A OR A	b OR B	C	d	E	a	b OR b	A OR A	B	a OR a	B	a	B OR B
CO	1	2	3	3	2	2	3	1	1	2	1	3	3
Chapter	1	2	4	3	3	3	4	2	1	3	2	1	4
Marks	2	2	2	2	2	6	4	6	4	6	4	6	4
Level of Competence	R	R	R	U	U	R	A	A	R	U	A	A	U

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	12	14
2	12	20
3	16	22
4	10	18
Total	50	74

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	1(a) 3(a) 4(b)	2 6 4	12	24%

CO2	1(b) 2(a) 4(a)	2 6 6	14	28%
CO3	1(c) 1(d) 2(b) 5(b)	2 2 4 4	12	24%
CO4	1(e) 5(a) 3(b)	2 6 4	12	24%

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Practical Lab (10 Marks)	Project Based Assignments (25 Marks)	Skill Test [15 Marks]	Final Theory exam	Weightage% (Total)x100
CO1	2	6	0	12	24%
CO2	3or 4	7	0	14	24% or 28%
CO3	2 or 3	6	0	12	24
CO4	3 or 4	6	15	12	24
Total	10	25	15	50	100%

REFERENCES:

Text/ Reference Books:				
Sr. No	Book title	Author/s	Edition	Publication
1	Electronic Materials and Components	K. S. Patil	First	BPB Publication
2	Electronic Engineering Materials and Components	S K Bhattacharya	1st Edition	Khanna Publishers New Delhi
3	Electronic Materials Components and Devices Technology	A. Kalavar	1st Edition	Everest publishing House
4	Electronic Components & Materials	Dr. Madhuri Joshi	3rd Edition	Mc Press

5	Electronic Components And Materials	S. M. Dhir	1st Edition	Mc Graw Hill (INDIA) Pvt. Ltd. New Delhi
6	Electrical Engineering Materials And Electronic Components (English)	K. B. Raina and S. K. Bhattacharya	1st Edition	Pub.: S. K. Kataria & Sons. New Delhi

Online Reference material and links

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	www.freescience.info
2	www.freebookcentre.net
3	www.educypedia.caradiomov.in
4	www.archive.org
5	www.artikel-software.com

Course Name : **Diploma in Electronics**

Semester : **I**

Subject name : **Electronics Workshop and Engineering Drawing**

Subject Code : **DE 1002**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical (HRS)	Credit	Semester Exam Duration (PR)Hours	Internal Marks	Semester Exam Marks (PR)	Total Marks (TH/PR)
0	0	8	4	2	50	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Note :- (Make changes as per your subject requirement)

1. Only Practical Sessions of 120 minutes each

2. Minimum 40% marks are needed for passing in internal and semester examinations

3. **Internal marks**

   Project based Assignments   25 Marks

   Practical Lab   10 Marks

   Practical Skill Test   15 Marks

   Total   50 Marks

4. **Semester Examination (Practical)**

   practical semester examination includes a two-hour practical performance of individual student 50 marks.

5. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

6. It is mandatory to appear for semester practical examination and skill tests. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignment and Laboratory experiment will not be declared successful for that examination head.

7. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

Rationale:

Electronic workshop is a Foundation course and plays an important role in the field of electronics for technicians. This course is intended to teach the students the use of different tools, PCB making, simple household wiring etc. Students are also provided training of soldering and De-soldering of electronic components on printed circuit board along with it develop basic understanding, application of engineering drawing. It covers knowledge & application of drawing instruments to draw engineering drawing in electronic aspects. The curriculum aims at developing the ability to draw and read various drawings, used in electronic workshop.

Course Outcomes: On successful completion of course, students will be able to :

1 Draw different engineering curves and identify their applications

2 Draw Orthographic and Isometric Projection of different objects

3 Design and develop layout of PCB with fabrication.

4 Acquire hands-on experience in soldering.

5 Selection of material, Tools, & Equipment for the process of Cutting, Drilling, fitting job works

6 Prepare the job for confirming desired dimensions and shape

Learning Structure

For Electronics workshop (EW)	
Application	Develop the electronic circuit on PCB.
Procedure	Circuit Drawing, cutting, Mounting and Soldering, Measurement and testing using multimeter
Principles	Manual, Pattern Transfer, Etching, Drilling, earthing, fitting, carpentry
Concept	Units/symbols, Multi meter, CRO, workshop tools
Facts	Resistors, capacitors, Inductors, PN junction diode, BJT transistor, Multi meter, CRO, Tools used in Electronics workshop.

	For Engineering Drawing (ED)	
Application	visualization, interpretation and drawing of curves, Draw orthographic projections, and isometric views of simple objects.	
Procedure	Read, understand, visualize, interpret and draw engineering Curves, orthographic and isometric views.	
Principles	Orthographic projection by 1st angle method, Isometric Projections	
Concept	Reference planes , projections, isometric axis & Scale, locus of points, convention of lines, polygon, Dimensioning,	
Facts	Various objects, geometric entities, line, arc ,circle, drawing instruments	

Course Contents
Practical

Unit	Chapter	Topic and Details	No. of hours
		ENGINEERING DRAWING	
I	1.	**Basic Concept of Engineering Drawing** 1.1 Basic Graphical Techniques 1.2 Drawing Instruments and its Uses 1.3 Convention of lines and their applications 1.4 Dimensioning technique	4

	2.	**Engineering Curves**
		 2.1 Conical Sections
		     2.1.1 Ellipse, parabola, Hyperbola
		 2.2 Cycloid Curves
		     2.2.1 Cycloids
		     2.2.2 Epicycloids
		     2.2.3 Hypo Cycloids
			6

	3.	**Orthographic Projections** 3.1 Introduction to Orthographic projections 3.2 Conversion of pictorial view into Orthographic Views (First Angle Projection Method Only) – elevation, plan and end view	10
	4.	**Isometric Projections** 4.1 Isometric scale, comparison of true scale with isometric scale	10

		4.2 Conversion of orthographic views into isometric View / projection	
		ELECTRONICS WORKSHOP	
2	5.	**Measurement of AC and DC Quantities:** 5.1 Current 5.2 Voltage 5.3 Resistance 5.4 Capacitance 5.5 Inductance 5.6 Amplitude 5.7 Frequency	4
	6.	**Circuit Drawing and Soldering** 6.1 Drawing of simple regulated power Supply 6.2 Building the circuit on breadboard 6.3 Mounting and Soldering of Components on GPB 6.4 Testing of circuit using multimeter 6.5 PCB Fabrication Techniques Printing layout on board, photo etching and masking process	22
	7.	**Safety and Precautions** **7.1** General Safety Measures 7.1.1 Safety Precautions for electronics 7.1.2 Earthing	4
		WORKSHOP PRACTICE	
3	8.	**Workshop practice** 8.1 Introduction to workshop 8.1.1 Sketch general workshop layout. 8.1.2 Follow preliminary safety rules in workshop 8.2 Fitting 8.2.1 Select appropriate fitting tools for the required application 8.2.2 Prepare the simple jobs as per specification using fitting tools 8.3 Carpentry 8.3.1 Select appropriate carpentry tool for the required application. 8.3.2 Prepare the simple job as per specification using carpentry tools	60

PRACTICALS –LABORATORY WORK
ELECTRONIC WORKSHOP AND ENGINEERING DRAWING

Sr. no	Course outcome	Laboratory Activities	No. of Hrs. assigned
ENGINEERING DRAWING			
1	CO1	Geometrical Constructions draw the following figures with dimensions-Rectangle, circle, pentagon, hexagon	4
2	CO2	Engineering curves To draw a cycloid, epicycloids, hypocycloid	6
3	CO2	Two objects by first angle projection method	10
4	CO2	Isometric views of two objects	10
ELECTRONICS WORKSHOP			
5	CO4	Introduction to lab equipment General Safety Measures and Precautions.	4
6	CO3	Measure AC & DC Voltage & Current and Resistor using Digital and Analog Multimeter	4
7	CO4	Introduction and Demonstration of soldering and disordering tools like normal soldering gun, soldering metals, soldering flux, soldering pot, Disordering gun, disordering pump, disordering mesh.	8
8	CO3	Fabricate the PCB by pattern transfer, etching, cleaning and drilling Mount & solder the components on PCB And Testing of soldered PCB for continuity using multimeter	14
WORKSHOP PRACTICE			
9	CO5	Study of measuring instruments and gauges	4
10	CO5	Demonstrate use of different Carpentry tools 1. Observe operation of different carpentry tools and different Wood working processes like sawing, planning, marking, Chiselling, grooving and wood turning.	12
11	CO6	Job- Practice carpentry Prepare one simple job involving any one joint like mortise and Tenon, dovetail, bridle, half lap etc	16
12	CO5	Demonstrate use of different fitting tools 1. Observe different fitting, power tools and drilling machine. 2. Observe different operations in fitting shop like chipping filing, making, drilling, cutting, tapping.	12
13	CO6	Job- Practice fitting Prepare one simple job involving practice of chipping, filing, Drilling, tapping, cutting etc.	16

PROJECT BASE ASSIGNMENTS

Sr. No	Course outcome	Assignments	Marks
		ENGINEERING DRAWING	
1.	CO1	Geometrical Constructions and Engineering curves	2
2.	CO2	Orthographic projections	2
3.	CO2	Isometric projection	2
		ELECTRONIC WORKSHOP	
4	CO3	Study of Electrical Symbols and Electronic Circuit Symbols Are Used For Drawing Schematic Diagram.	2
5	CO3	Procedure of Fabrication of PCB	2
6	CO4	Mounting, Soldering and Testing on GPB	3
		WORKSHOP PRACTICE	
7	CO5	Assignment on different Carpentry Tools and Materials	6
8	CO6	Assignment on different Fitting Tools and Materials	6

SKILL TEST

Sr. No	Course outcome	Topic	Marks
1	CO1,CO2	geometrical constructions, orthographic, isometric view of given object	4
2	CO3,CO4	Mounting, Soldering and Testing for a given circuit on Prepared PCB during practical session.	4
3.	CO5,CO6	Preparation of Box casing for Power supply	7

Examination/Assessment Scheme:

TERM WORK   AND FINAL PRACTICAL EXAM: - 100 MARKS

Total (Internal & External) Course Outcome Weight-age Scheme :

S.No.	Practical Lab (10 Marks)	Project Based Assignments (25 Marks)	Skill Test (15 Marks)	Final PR exam	Weightage% (Total)x100
C01	1	02	4	12	25
CO2	2	04			
CO3	1	04	4	13	27
CO4	2	03			
CO5	2	06	7	25	48
CO6	2	06			
Total	10	25	15	50	100

*Note: Number of assignments should match with the number of lectures/practical
1) Students can use the A3 size sketchbook for class works.
2) Use approximately 570mm×380mm size drawing sheet for term work

REFERENCES:

Text/ Reference Books:				
Sr. No	**Book title**	**Author/s**	**Edition**	**Publication**
1	Electronic Materials and Components	K. S. Patil	First	BPB Publication
2	Electronic Engineering Materials and Components	S K Bhattacharya	1st Edition	Khanna Publishers New Delhi
3	Electrical engineering materials and Electronic components	Raina K. B., Bhattacharya S. K.,Juneja T.		TTTI Chandigarh
4	Workshop Practice	Swarn Singh	1st Edition	S.K. Kataria & Sons
5	Electronic Components And Materials	S. M. Dhir	1st Edition	Mc Graw Hill (INDIA) Pvt. Ltd. New Delhi
6	Engineering Drawing	N.D.Bhatt, V.M. Panchal, Pramod R. Ingle	53rd edition 2014	Charotar publishing house pvt. Ltdanand (gujarat) india

Online Reference Material and Links

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	www.freescience.info
2	www.freebookcentre.net
3	www.electrical-online.com
4	www.archive.org
5	https://www.wiziq.com/tutorials/engineering-drawing
6	http://www.FineWoodworking.com
7	http://www.electronics-tutorials.com/
8	https://www.youtube.com/watch?v=Kv1zo9CAxt4&feature=relmfu
9	https://www.youtube.com/watch?v=ggkOc4zrpSI

Course Name : **Diploma in Electronics**

Semester : **I**

Subject name : **Basic Mathematics**

Subject Code : **DE 1003**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical	Credit	Semester Exam Duration (TH)Hours	Internal Marks	Semester Exam Marks (TH)	Total Marks (TH)
3	1	0	4	2	50	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Note :-(Make changes as per your subject requirement)

1. Theory period is of 60 minutes and Tutorial Sessions is of 60 minutes

2. Minimum 40% marks are needed for passing in internal and semester examinations

3. Internal marks

Assignments	25 Marks
Open Book Test	10 Marks
Skill Test	15 Marks
Total	50 Marks

4. Semester Examination (Theory)

Theory semester examination includes a two hour theory paper of 50 marks.

5. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

6. It is mandatory to appear for semester theory examination and skill tests. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignment and Laboratory experiment will not be declared successful for that examination head.

7. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

(Direct Second year admitted students need to complete only Term Work (TW) of 25 Marks i.e Project Based Assignments as per their eligibility)

1. Rationale:

Basic mathematics intends to teach students basic facts, concepts principle and procedure of mathematics as a tool to analyze engineering problems and as such it lays down foundation for the understanding of electronics subject. This subject also improves logical and analytical skills in students. The concept of logarithms helps to understand logarithmic functions and Exponential functions. This helps to solve problems in differentiation and integration. Binomial theorem is used to find expansions of algebraic expressions. This has uses in further study of mathematics as well as statistics. Determinants help to find solutions of simultaneous equations .This has wide applications in engineering. Trigonometry is the study of triangles, its sides and angles .It defines trigonometric functions which are widely used in calculus .This helps to understand Periodic functions. Co ordinate geometry is the study of geometry using co ordinate system .It is widely used in physics and engineering .It lays the foundation of discrete and computational geometry

3. Course Outcomes:

1. Apply properties of logarithms to simplify logarithmic functions.
2. Determine the binomial expansion of algebraic functions.
3. Assess trigonometric ratios of allied angles, compound angles, multiple and sub multiple angles
4. Solve simultaneous equations in three variables using Cramer's rule and matrix method.
5. Identify and formulate equations of straight lines and circles.

Learning Structure

Application	Apply equations and mathematical methods of Logarithms, Binomial theorem, Determinants, Matrices, Trigonometry and Co-ordinate Geometry to solve engineering problems
Procedure	Mathematical calculation using Logarithms, Technique of using Determinant and matrix method Finding the Approximate value using Binomial expansion Evaluation of trigonometric ratios of compound angles Finding the required equation of a line and circle using given conditions

Principle	Properties of logarithms, Common and natural logarithms, value of a determinant, Binomial expansion of algebraic expression Fundamental identities, compound angles, multiple and sub-multiple angles Angle between straight lines, parallel and perpendicular lines
Concept	Logarithm of a number, minor and co-factor of a determinant, algebra of matrices Meaning of combination, factorial notation Trigonometric ratios of all angles, Distance between points, general equation of a straight line and circle
Facts	Real number system, base and exponent of logarithms, Binomial expression Arrangement of numbers as determinant or matrix Angles, measurement of angles, Co-ordinate of a point in a plane, slope and intercept of a line, centre and radius

Course Contents
THEORY

Unit	Chapter	Topic and Details	No. of Lectures
I	1	**1.Logarithms** 1.1 Definition 1.2 Laws of logarithms 1.3 Change of base 1.4 Common logarithm	5
	2.	**2.Binomial Theorem** 2.1: Binomial expansion 2.2: General and middle term in the binomial expansion 2.3 : Binomial theorem for fractional and negative indices 2.4 : Approximations	7
II	3	**3.Trigonometry:** 3.1 Angles 3.2 Trigonometric ratio of any angle 3.3 Signs of trigonometric ratios 3.4 Fundamental identities 3.5 Trigonometric ratios of compound ngles 3.6 Product formulae 3.7 Sum and difference formulae 3.8 Multiple and submultiples angles 3.9 Inverse trigonometric functions	15
III	4	**4.Determinants and Matrices:** 4.1 Value of a determinant	15

		4.2 Second order and third order determinant	
		4.3 Solution of simultaneous equations using crammer's rule	
		4.4 Properties of determinants	
		4.5 Types opf Matrices	
		4.6 Algebra Of Matrices	
		4.7 Multiplication of Matrices	
		4.8 Transpose of a Matrix	
		4.9 Adjoint of a matrix	
		4.10 solution of Simultanious equations using inverse of a matrix	
	5	**5.Co ordinate Geometry: Straight line and circle** 5.1 Distance formula 5.2 Section formula 5.3 Straight line-equations in various forms 5.4 Angle between two straight lines 5.5 Parallel and perpendicular lines. 5.6: Equation of a circle with given center and radius 5.7 General equation of a circle 5.8 Equations of tangent and normal to a circle.	18

ASSIGNMENTS:-

SR. NO	COURSE OUTCOME	ASSIGNMENTS	MARKS
1	CO1	Calculate logarithms of given numbers using definition of logarithm Apply properties of logarithms to simplify the given function. Evaluate logarithms using change of base.	5
2	CO2	Determine the given power of binomial expression using binomial theorem. Calculate the general term and middle term in a binomial expansion. Compute a term independent of x in a binomial expansion. Estimate the approximate value of given root of a number	5
3	CO3	Evaluate the trigonometric ratios of given angles. Evaluate the trigonometric ratios of given compound angles. value of given trigonometric identities using product formulae, sum or difference formulae. Calculate the inverse trigonometric ratios of given angles	5

| 4 | CO4 | Compute the value of a third order determinant. Solve the given system of simultaneous equations in three variables using Cramer's rule. Evaluate the given determinant using properties of determinants | 5 |
| 5 | CO5 | Measure the distance between the given points Formulate equations of straight lines under the given conditions. Identify whether the given lines are parallel or perpendicular. Formulate the equation of a circle under the given conditions. Formulate equations of tangent and normal to a circle. | 5 |

SKILL TEST

Sr. No	Course outcome	Topic	Marks
1	CO 3	Trigonometry	5
2	CO 4	Determinants and Matrices	5
3	CO 5	Co ordinate geometry	5

OPEN BOOK TEST

Sr. No	Course outcome	Topic	Marks
1	CO 3	Trigonometry	3
2	CO 4	Determinants and Matrices	3
3	CO 5	Co ordinate geometry	4

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	a OR a	b OR b	c	d	e	a	b OR b	a OR a	b	a OR a	B	a	b OR b
CO	1	2	3	4	5	2	5	3	3	4	4	5	5
Chapter	1	2	3	4	5	2	5	3	3	4	4	5	5
Marks	2	2	2	2	2	6	4	6	4	6	4	6	4

Level of Competence	U	U	U	U	U	A	A	U	A	A	A	A	A

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	2	4
2	8	10
3	12	18
4	12	18
5	16	24
Total	50	74

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	1(a)	2	2	4%
CO2	1(b) 2(a)	2 6	8	16%
CO3	1(c) 3(a) 3(b)	2 4 6	12	24%
CO4	1(d) 4(a) 4(b)	2 4 6	12	24%
CO5	1(e) 2(a) 5(a) 5(b)	2 4 6 4	16	32%

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Assignments (25 marks)	Open book test (10 Marks)	Skill Test [15 Marks)	Final Theory exam	Weightage% (Total)x100
C01	5	0	0	2	7%
CO2	5	0	0	8	13%
CO3	5	3	5	12	25%
CO4	5	3	5	12	25%
CO5	5	4	5	16	30%
Total	25	10	15	50	100%

REFERENCES:

Sr. No.	Title	Author	Publication
1	Mathematics for polytechnic students	S.P.Deshpande	Pune Vidyarthi Grihaprakashan
2	Engineering Mathematics	Patel & Rawal	Nirali Publication
3	Engineering mathematics	S.S.Sastry	Prentice Hall of India
4	Basic Mathematics	Dilip Gaikwad	S.Chand
5	Mathematics for Engineers and Technologists	H.Fox, W.Bolton	Butterworth Heinemann
6	Basic Mathematics	Pankaj D Kalsait	Pragati Books
7	Engineering Mathematics	A.M Kulkarni	Central Techno Publications
8	Basic Mathematics	Sameer Shah	Tech- Max Publications
9	Basic Mathematics	Dr.P.B.Bahatkar	VBD Publications

Online Reference material and links:

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1.	https://www.**khanacademy**.org/**math**
2.	htpp://www.mathopenref.com
3.	www.bbc.co.uk/education/megamaths/tables.html

4.	www.mathforum.com
5.	www.mathleague.com

Course Name : **Diploma in Electronics**

Semester : **I**

Subject name : **Communication Skills- I**

Subject Code : **DE 1004**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical	Credit	Semester Exam Duration (TH)Hours	Internal Marks	Semester Exam Marks (TH)	Total Marks (TH)
3	1	0	4	2	50	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Note :-(Make changes as per your subject requirement)

1. Theory period is of 60 minutes and Tutorial Sessions is of 60 minutes

2. Minimum 40% marks are needed for passing in internal and semester examinations

3. **Internal marks**

   Assignments   25 Marks

   Open Book Test   10 Marks

   Skill Test   15 Marks

   Total   50 Marks

● **Semester Examination (Theory)**

   Theory semester examination includes a two hour theory paper of 50 marks.

● Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

● It is mandatory to appear for semester theory examination and skill tests. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignment and Laboratory experiment will not be declared successful for that examination head. Also student has to failing which student will not

● Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

Rationale:

The most commonly used medium to express oneself is language. English, being a global language, is used in all the spheres of human life i.e., personal, professional and social. A diploma student is expected to be proficient in English language and pursue the existing course of study to handle the future jobs. The content of the text includes the aspects related to language skills.

Course Outcome: After completing semester I communication skills students will be able to

1. Implement the rules of grammar in writing

2. To develop listening and understanding the conversations in English.

3. To read and interpret the English context.

Learning Structure

Application	Students will be able to write articles, paragraphs, letters, and will do formal and informal written communication, they also will get fluency in spoken communication.
Procedure	Apply grammatical rules to form correct sentences so as to develop spoken and written communication.
Principle	Parts of Speech, Active and Passive Voice, Direct and Indirect sentences, Tenses, Transformation of Sentences: simple, compound and complex.
Concept	Grammatical rules to form correct sentence, Correct Prepositions as per context, phonology, Vocabulary Building- synonyms n antonyms, Conversation individual Presentation Group Discussion
Facts	Students will be able to draft letters and will do oral communication.

Course Contents
THEORY

Unit	Chapter	Topic and Details	No. of Lectures/TU assigned
I	1	**1. Writing Skills- grammar** 1.1. **Articles:** Appropriate use of definite and indefinite Articles 1.2. **Prepositions:** To use correct Prepositions as per context 1.3**. Conjunction:** Coordinating and sub-coordinating Conjunctions 1.4. **Tenses:** Correct usages of past, present and future tenses	10

		1.5. **Active and Passive Voice**: Use of Active and Passive voice 1.6. **Direct and Indirect sentences**: Conversion of direct into indirect sentence and vice versa 1.7. **Transformation of Sentences**: simple, compound and complex. 1.8. **Auxiliaries**: can, shall, should, may, might 1.9. **Sentence**: types, parts, clauses and infinitives 1.10. **Question type**: 'Wh' and yes/no type	
	2. **Write-up**	Write-up 2.1. **Paragraph Writing**: Elaborate and expand the ideas with cohesion, coherence and use of correct punctuation marks. Importance of communication Merits of English Language Barriers in communication 2.2. **Types of Paragraph**: Narrative, Descriptive, Technical, Comparison and Contrast. 2.3. **Dialogue Writing**: Base on various situations. 2.4. **Speech Writing based on situations**: Welcome Speech, Farewell Speech, Vote of Thanks and Introducing a Guest.	05
II	3	**3 Reading Skills** 3.1. **Articles**: related engineering and technology. 3.2. **Comprehension Passages**: Comprehending passages and writing the answers of the questions given. 3.2.1. Words Often Confused. 3.2.2.Collocation 3.2.3.Prefix and Suffix 3.2.4.Synonyms and Antonyms 3.2.5. Root words Prefix suffix/meaning /words n term related electronics and technology with their meaning. 3.2.6. Note taking and note making	05+10

III	4	**1.Speaking and Listening Skills**	15
		4.1.Conversation- day today and the on situations provided	
		4.2.Individual Presentation- on the given topic	
		4.3. Group Discussion- on current topic as well on topics related engineering.	
		4.4. Debate- on current topic as well on topics related engineering.	
		(Contents: on the given current topics related to social, political, economical and subject related.)	
		4.5. Vowels n diphthongs in English, Reading/speaking English with proper accents and intonations. Full form of TOFEL and IELTS	

TUTORIALS

Sr. No	Course Outcome	Topic	Marks
1	CO1	Enhance the topics.	1
2	CO1	Develop the central idea	1
3	CO1	Elaborate the phrases / idioms	1
4	CO1	Summarising the passage	1
5	CO1	Writing in formal letter	1
6	CO2	Reading passages loudly	1
7	CO2	Reading speeches for all	1
8	CO2	Making enquiry by role play technique	1
9	CO2	Placing an order in a restaurant	1
10	CO2	Preparing responses for an interview	1
11	CO3	Use technical word in written and spoken communication	1
12	CO3	Writing engineering passage with its questions and answers	1
13	CO3	Writing technical passage.	1
14	CO3	Reading the cutting of electronics related article	1
15	CO3	Writing synonyms and antonyms of routinely used words	1

ASSIGNEMENTS

Unit No	Assignment No.	Details	Marks
I	CO1	Write short notes on the topics given	1
	CO1	Write an essay on the topics given.	2
	CO1	Solve the mixed grammar exercise	2
II	CO2	Write five reading comprehensive passages related to science, technology, electronics with their question and answers in Microsoft word.	10
III	CO3	Practice listening to the phonetic sounds in English.	2
	C03	Practice listening to the comprehensive passages in English.	2
	CO3	Speaking on social, economical, educational, political topics.	3
	CO3	Making an inquiry, reply to inquiry, intro self and other situations.	3

OPEN BOOK TEST

Sr. No	Course outcome	Topic	Marks
1	CO1	Do as directed mixed grammar exercise	3
2	CO2	Giving conversational situations to practice.	3
3	CO3	Reading texts and orally explaining the summary.	4

SKILL TEST

Sr. No	Course outcome	Topic	Marks
1	CO1	Correct the sentences	5
2	CO2	Making enquiries, replies to enquiry, greetings etc..	5
3	CO3	Reading passages with proper accents and intonations.	5

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	a OR a	b OR B	c	d	e	A	b OR b	a OR a	b	a OR a	b	a	b OR B
CO	1	2	2	3	3	1	2	3	2	3	1	2	3
Chapter	1	2	3	4	2	1	3	4	2	3	2	4	2
Marks	2	2	2	2	2	4	6	6	4	6	4	6	4
Level of Competence	R	R	U	U	U	A	A	U	A	E	U	E	U

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	**With option**
1	**10**	**15**
2	**10**	**15**
3	**15**	**22**
4	**15**	**22**
Total	**50**	**74**

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weight age% (Total/50)x100
C01	1(a) 2(a) 4(b)	2 4 4	10	20%

CO2	1(b)	2	20	40%
	1(c)	2		
	2(b)	6		
	3(b)	4		
	5(a)	6		
CO3	1(d)	2	20	40%
	1(e)	2		
	3(a)	6		
	4(a)	6		
	5(b)	4		

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Open book Test (10 Marks)	Assignments (25 Marks)	Skill Test [15 Marks)	Final Theory exam	Weightage% (Total)x100
C01	3	5	5	10	23%
CO2	3	10	5	20	38%
CO3	4	10	5	20	39%
Total	10	25	15	50	100%

REFERENCES

Sr. No.	Title	Author	Publication
1	"Business Communication: Theory & Practices"	Dr. Dharmaji Kharat	New Man Publication, Mumbai, June 2015 ISBN 978-93-83871-69-8
2	"REMEDIAL ENGLISH for Elementary & Intermediate Learners"	Dr. Dharmaji Kharat	New Man Publication, Mumbai, June 2015 ISBN 978-93-83871-70-4
3	"Essential English Grammar"	Raymond Murphy	Cambridge.

4	"High School English Grammar and Composition"	Wren and Martin	S Chand & Co.
5	"English Vocabulary Today"	Terry O'Brien	Little Red Book
6	"Idioms and Phrases"	Terry O'Brien	Little Red Book
7	"Word Power Made Easy"	Norman Lewis	Millenium, Edition 2005
8	"Basic Communication Skills"	P. Kiranmai Dutt and Geetha Rajeevan	Foundation Books
9	Oxford Advanced English Dictionary		

Online Resources:

Online Reference material and links:	
Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1.	www.communicationskills.com
2.	www.businesscommunication.com
3.	www.openlibrary.org

Course Name : **Diploma in Electronics**

Semester : **I**

Subject name : **Basic Science**

Subject Code : **DE 1005**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks	Semester Exam Marks (TH/PR/OR)	Total Marks (TH/PR)
3	0	1	4	2	50	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Note :-

1. Theory period is of 60 minutes and practical session is of 120 minutes.

2. Minimum 40% marks are needed for passing in internal and semester examinations.

3. **Internal marks**

   Practical Lab   10 Marks

   Project based Assignments   25 Marks

   Practical Skill Test   15 Marks

   Total   50 Marks

4. **Semester Examination (Theory)**

   Theory semester examination includes a two-hour theory paper of 50 marks.

5. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

6. It is mandatory to appear for semester theory examination and skill tests. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignment and Laboratory experiment will not be declared successful for that examination head.

7. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

Rationale:

The contents of this curriculum will provide knowledge of Basic science (Physics and Chemistry). The knowledge and processes used by Basic science have produced new and exciting technologies that are in everyday use. Almost any example of modern technology has its origins in mechanics, electronics, atomic structure, alloy, electrochemistry etc.

The content of the subject is designed such that the technical knowledge can be gained more effectively using concepts of Basic Science. The kind of knowledge that students receives in Basic science develops the students ability to grasp things quickly. Also they become more focused and improves their ability of problem solving.

Course Outcomes:
On successful completion of course, student will be able to:

1. Measure various Physical quantities in different systems of units.
2. Apply basic concepts of Basic science for solving problems related to chemical analysis, basic electronics, etc.
3. Demonstrate application of various basic concepts/laws/principles of Basic Science in industry situations and those observed in nature.
4. Design, Construct/build , Draw, prepare& label various diagrams, tables, simple circuits, models etc.

Learning Structure:

Application	Apply the Acquired knowledge in the daily life i,e. related to friction , Apply the knowledge of Chemical ,Physical properties and processes in Engineering field.
Procedure	Effective resistance of various combination, formation of Electrovalent and Covalent Compounds, electrolysis, Faradays' Law, Classification of Alloys
Principles	Principal of Moment, static friction, kinetic friction etc.
Concept	Electric field, electric lines of force . Isotopes ,Isobars ,Valency, Electronic configuration, Electrolytic dissociation, Electrolyte, Electrodes, Properties of metals
Facts	Laws , definitions of electric lines of force , physical quantities, Atom ,Molecules Atomic number ,Atomic mass number, Cathode ,Anode , Cation , Anion, Metals ,Alloys.

Course Contents:
THEORY

Unit	Chapter	Topic and Details	No. of Lectures assigned
I	1	1.Mechanics 1.1.1 Physical quantities and systems of units. 1.1.2 Scalar and vector. 1.1.3 Dimensions. 1.1.4 Errors.	2
		1.2 Force : 1.2.1 Resultant force and Triangle law of forces. 1.2.2 Parallelogram law of forces. 1.2.3 Resolution of forces. 1.2.4 Moment of force and law of moments of force. 1.2.5 Couple and moment of couple.	4
		1.3 Work power and energy: 1.3.1 Work, positive and negative work done. 1.3.2 Power. 1.3.3 Energy, kinetic and potential energy. Law of conservation of energy.	3
		1.4 Friction: 1.4.1 Static, kinetic and rolling friction. 1.4.2 Limiting friction and laws of limiting friction. 1.4.3 Angle of friction and angle of repose. 1.4.4 Application and disadvantage of friction.	2
		1.5 Circular motion: 1.5.1 Angular displacement and angular velocity. 1.5.2 Centripetal and centrifugal force. 1.5.3 Applications of centrifugal force.	2
		1.6 Surface tension: 1.6.1 Surface tension on the basis of molecular theory. 1.6.2 Angle of contact. 1.6.3 Capillarity. 1.6.4 Applications of surface tension.	2
II	2 **Electricity**	**2.1 Static electricity:** 2.1.1 Concept of charge. 2.1.2 Newton's inverse square Law of Electrostatics. 2.1.3 Electric field, potential and potential difference between two points. 2.1.4 Electric Lines of force, electric intensity at a point.	4

		2.2 Current electricity: 2.2.1 Electric current, Potential difference and electromotive force. 2.2.2 Ohm's law, Resistance, Specific resistance, Resistors in series and parallel. 2.2.3 Meter bridge and potentiometer and applications.	**6**
III	**3** **Heat**	**3.1 Heat transfer:** 3.1.1 Different modes of heat transfer. 3.1.2 Steady state of temperature, thermal conductivity, coefficient of thermal conductivity, temperature gradient.	**3**
		3.2 Heat sink: 3.2.1 Heat sink, working of heat sink. 3.2.2 Computer heat sinks, selection of heat sink.	**2**
IV	**4** **Atomic Structure And Valencies**	**4.1 Atomic Structure:** 4.1.1 Bohrs atomic model, characteristics of fundamental particles of atom. 4.1.2 Atomic number ,atomic mass number, , Isotopes and isobars. 4.1.3 s ,p, d, f orbitals. 4.1.4 Aufbaus principle, Hunds rule, orbital electronic configuration of elements.	**3**
		4.2 Valency: 4.2.1 valence electrons, valence, Electrovalence, positive and negative electrovalence. 4.2.2 Formation of some electrovalent and covalent compounds.	**2**
V	**5** **Electro** **chemistry**	**5.1 Basic concepts of electrolysis:** 5.1.1 Electrolyte, types of electrolyte. 5.1.2 Ionization and electrolytic dissociation. 5.1.3 Arrhenius theory of electrolytic dissociation. 5.1.4 Degree of ionization, factors affecting it. 5.1.5 Significance of terms involved in electrolysis.	**2**
		5.2 Electrolysis: 5.2.1 Faradays law I and II and numerical. 5.2.2 Mechanism of electrolysis, electrolysis of $CuSO_4$ solution using copper and platinum electrode. 5.2.3 Application of electrolysis , primary and secondary cells.	**3**
VI	**6** **Metals and Alloys:**	**6.1 Metals:** 6.1.1 Introduction to metals. 6.1.2 Physical properties of metals and their application like Iron, cast iron ,Copper, Aluminium, Chromium, Nickel, Tin, Lead, Zinc, Cobalt, Tungsten.	**3**

		6.2 Alloys:	2
		6.2.1 Purpose of making alloys.	
		6.2.2 Classification of alloys.	
		6.2.3 Special alloys like steel alloy, heat resistant, magnetic steel, copper alloy, solder alloy.	

PRACTICAL LAB ACTIVITIES:

Sr. No	Course Outcome	Laboratory Activities	No. of Hrs assigned
1	C. O. 1	Use Vernier Calliper to measure Surface area, Volume etc. Of different objects.	2
2	C. O. 1	Use Screw Gauge to measure Surface Area, Volume etc. Of different objects.	2
3	C. O. 2	Determine the Coefficient of Static Friction using the Laws of Friction.	2
4	C. O. 2	Apply Ohm's law in different Circuits	2
5	C. O. 2	Apply law of Series Combination / Parallel combination and hence to determine the Effective Resistance of the given combination.	2
6	C. O. 4	Build the given circuit on Bread Board	2
7	C. O. 3	Determine basic Radical (Metallic Ion) and Acidic Radical (Non Metallic Ion) by Qualitative Analysis.	2
8	C. O. 3	Determine basic Radical (Metallic Ion) and Acidic Radical (Non Metallic Ion) by Qualitative Analysis.	2
9	C. O. 3	Determine basic Radical (Metallic Ion) and Acidic Radical (Non Metallic Ion) by Qualitative Analysis.	2
10	C. O. 3	Determine basic Radical (Metallic Ion) and Acidic Radical (Non Metallic Ion) by Qualitative Analysis.	2

PROJECT BASED ASSIGNMENTS :

Assignment No.	Course Outcome	Assignment	Marks
1	CO 1	Prepare a chart showing different systems of units	5
2	CO 2	Obtain the desire value of resistor using various combinations of given resisters, also prove it practically.	5

3	CO 3	Demonstrate / Prepare the chart, showing the law of conservation of energy in nature.	5
4	CO 3	Collect the information regarding the different properties of metals due to which they are used in preparation of electronics devices.	5
5	CO4	Draw suitable diagram explain the process of formation of electrovalent and covalent compound suggested by your teacher	5

SKILL TEST:

Skill Test No.	Course Outcome	Test	Marks
1	CO 3	Determine the coefficient of static friction between glass-glass using law of static friction.	5
2	CO 3	Demonstrate the spotting of Cation /anion in given Salt solution	5
3	CO 4	Build the given circuit on bread board and measure the current and P.D, across the each resistor and compare it with the calculated value.	5

PRACTICAL LAB:

Lab Test No.	Course Outcome	Practical lab Test	Marks
1	CO1	Measure the radius of the given sphere using vernier calipers / screw gauge	2
2	CO 1	Use multi meter to determine the potential difference across the resistors connected in circuit and the current flowing through each branch of the circuit	2
3	CO 2	Connect the circuit to determine the effective resistance of the series combination of three resistors.	2
4	CO 2	Determine basic Radical (Metallic Ion) and Acidic Radical(Non Metallic Ion)by Qualitative Analysis	2
5	CO 4	Build the given circuit on bread board.	2

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	A OR a	b OR B	c	d	e	a	b OR b	a OR a	B	a OR a	b	A	b OR B
CO	1	1	1	2	2	2	4	2	3	2	2	4	3
Chapter	1	2	3	1	2	1	2	3	1	4	2	5	6
Marks	2	2	2	2	2	6	4	6	4	6	4	6	4
Level of Competence	C	C	C	U	U	U	A	U	A	A	A	A	A

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option

1	14	16
2	12	18
3	8	14
4	6	12
5	6	6
6	4	8
Total	**50**	**74**

Final Theory Examination Course Outcome Weight-age Sheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	1(a) 1(b) 1(c)	2 2 2	6	12%
CO2	1(d) 1(e) 2 (a) 3 (a) 4 (a) 4 (b)	2 2 6 6 6 4	26	52%
CO3	3(b) 5(b)	4 4	8	16%
CO4	2 (b) 5 (a)	4 6	10	20%

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Practical Lab (10 Marks)	Project Based Assignments (25 Marks)	Skill Test [15 Marks]	Final Theory exam	Weightage% (Total)x100
C01	4	5	-	6	15 %
CO2	4	5	-	26	35 %
CO3	-	10	10	8	28 %
CO4	2	5	5	10	22 %
Total	10	25	15	50	100%

REFERENCES:

Text/ Reference Books:				
Sr. No	Book title	Author/s	Edition	Publication
1	Text Book of Engg.Chemistry	S.S.Dara	Eleventh	S.Chand&companyltd

2	Engg. Chemistry	N. Krishnamurthy	2ndEdition	PHI Learning
3	Applied Chemistry	Dr.V.M.Balsaraf	First	Synergy Knowledgeware
4	Inorganic Chemistry	James E. Huheey, EllenA. Keiter, Richard L.Keiter	4th Edition	Benjamin Cummings
5	Advanced Inorganic Chemistry	Gurdeep-Harish	10th edition	Goel publishing house
6	Text book of Electrochemistry.	Syed Aftab Ikbal , Ishaq		Discovery publishing house
7	Engineering Materials properties and applications of metals and alloys	Sharma C. P.		Pentis Hall , India lerning pvt. Ltd.
8	Concepts of Physics – Vol. 1 & Vol. 2	Verma H. C.	1 st	Bharti Bhawan – Publishers and distributers
9	Physics – Vol. 1 & Vol. 2	Resnik, Halliday , Krane	5 th	Wiley India Pvt, Ltd.
10	Engineering Physics	R. K. Gaur S. L. Gupta	7 th	PHI Learning Pvt, Ltd,

Online Resources:

Online Reference Material and Links	
Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	www.chemI.com
2	www.chemtutor.com
3	https://mahahsscboard.maharastra.gov.in
4	https://www.schandgroup.com
5	https://www.organic-chemistry.org
6	www. Physicsclassroom.com

Course Name   **: Diploma in Electronics**

Semester   **: I**

Subject name   **: Development of Generic Skill**

Subject Code   **: DE 1006**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks	Semester Exam Marks (TH/PR/OR)	Total Marks (TH/PR)
2	0	0	0	0	0	NA	0
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Note :- (Make changes as per your subject requirement)

Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

Rationale:

Generic skills have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life.. This aspect of Human Resource Development has become equally important in the era, when wage employment prospects have become meagre. Soft skills are required to be developed in diploma pass outs for enhancing their employability and self confidence

Course Outcomes: On successful completion of course, students will be able to:

1. Make team and Communicate between team members confidently to complete the given task

2. Self-management ,problem solving and time management for successful completion of given task

3. Main healthy and stress free environment in team/group

4. Consider all aspects of social values and ethics

Learning Structure

Application	To become a successful team leader or member to perform electronics projects and day today task
Procedure	Preparing a team for project work understanding problem and time management.
Principals	Self management, time management, communication in group, task management, problem solving
Concepts	Self development, cooperation, task management
Facts	Communications, confidence, soft skills, leadership, health, time, personality

Course Contents

Theory

Unit	Chapter	Topic and Details	No. of Lectures
I	1	Introduction to Generic Skills Importance of Generic Skill Development (GSD) Global and Local Scenario of GSD Life Long Learning (LLL) and associated importance of GSD.	04
	2	Managing Self Knowing Self for Self Development Self-concept, personality, traits, multiple intelligence such as language intelligence, Numerical intelligence, psychological intelligence etc. Managing Self – Physical, Personal grooming, Health, Hygiene, Time Management Managing Self – Intellectual development Information Search: Sources of information Reading: Purpose of reading, different styles of reading, techniques of systematic reading. Note Taking: Importance of note taking, techniques of note taking Writing: Writing a rough draft, review and final draft. Managing Self – Psychological	08

		Stress, Emotions, Anxiety-concepts and significance Techniques to manage.		
II	**3**	3. Managing in Team Team - definition, hierarchy, team dynamics .Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background .Communication in group - conversation and listening skills		04
	4	. Task Management Task Initiation, Task Planning, Task execution, Task close out ,Exercises/case studies on task planning towards development of skills for task management.		03
III	**5**	Problem Solving Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving Different approaches for problem solving. Steps followed in problem solving. Exercises/case studies on problem solving.		06

REFERENCES

Sl. No.	Title of Book	Author	Publication
1.	Generic Skills & Entrepreneurship Development	Yogesh Chabra	Eagle publication
2.	Skill Development & Entrepreneurship	Rameshwari Pandya	USB PUBLICATION
3.	Generic Skills & Entrepreneurship Development	A.K. Gupta	SK Karatia and Sons (2012)

Online Reference material and links

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	https://www.researchgate.net/publication/286901029_Generic_Skills_for_Sustainable_Development

2	http://www.eagleprakashan.com/index.php?page=download&op=getFile&id=354&title=Generic-Skills-%26-Enterpreneurship-Development
3	https://onlinelibrary.wiley.com/doi/book/10.1002/9780470757925; Essential guide to generic skill

CURRICULLUM
FIRST YEAR DIPLOMA IN ELECTRONICS

SCHEME SEMESTER II

Paper Code	Subjects	TH	PR/TU	D (Hrs.)	TP	TW Th+Pr	PR/V	T	Cr
DE2001	ELECTRICAL TECHNOLOGY	3	2	2	50	50	--	100	4
DE2002	COMPUTER FUNDAMENTALS & C –PROGRAMMING	2	4	2	50	50	--	100	4
DE2003	APPLIED MATHEMATICS	3	1	2	50	50	--	100	4
DE2004	COMMUNICATION SKILL – II	3	1	2	50	50	--	100	4
DE2005	APPLIED SCIENCE	3	2	2	50	50	--	100	4
DE2006	BASIC ELECTRONICS	3	2	2	50	50		100	4
	Total	**17**	**10/2**					**600**	**24**

TH = Theory Lectures / week, PR / TU = Practical / Tutorial in hrs, D = Duration of Theory paper for Examination in hrs, TP = Theory Paper-marks, TW = Term Work - marks, PR/V = Practical / Viva Voce - marks, T = Total, Cr = Credits

Course Name : **Diploma in Electronics**

Semester : **II**

Subject name : **Electrical Technology**

Subject Code : **DE 2001**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical (HRS)	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks	Semester Exam Marks (TH/PR/OR)	Total Marks (TH/PR)
3	0	2	4	2	50	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Note :-(Make changes as per your subject requirement)

1. Theory period is of 60 minutes and Practical Sessions is of 120 minutes

2. Minimum 40% marks are needed for passing in internal and semester examinations

3. **Internal marks**

   Practical Lab   10 Marks

   Project based Assignments   25 Marks

   Skill Test   15 Marks

   Total   50 Marks

4. **Semester Examination (Theory)**

   Theory semester examination includes a two hour theory paper of 50 marks.

5. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

6. It is mandatory to appear for semester examination and skill tests. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignment and Laboratory experiment will not be declared successful for that examination head.

7. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

   (Direct Second year admitted students need to complete only Term Work (TW) of 25 Marks i.e Project Based Assignments as per their eligibility)

Rationale: It provides the foundation for further studies in electrical engineering or related fields at post secondary level. The subject seeks to unlock the science and

technology that underpins the operation and control of lighting, power, security, communication systems etc for residential, and commercial and industrial applications. Students will learn, through a combination of theory lessons and hands-on practical training, principles and laws of electricity; electric circuits; appliances and systems. Students will also learn how to integrate and apply their knowledge to device solutions for real-life project electrical and control applications.

Course Outcomes: On successful completion course, students will be able to :

1. Understand the basic concept of electrical engineering.
2. Apply various network analysis theorems to analyze DC circuits.
3. Analyze basic single phase and three phase AC circuits.
4. Explain the working principle, construction, applications of DC machines, AC machines & Transformer.

Learning Structure:

Application	To analyze simple DC circuits, Single phase AC circuits and Three phase AC circuits. circuits, To select the appropriate electrical motor for a particular application, To Test transformers
Procedure	To solve D.C circuits by applying various network theorems .To solve single phase A.C. circuit A.C ,Operation and control of D.C. Motors Operation and control of A.C. motors Operation and control of F.H.P. Motors
Principle	Network theorems. Loop Current& node Voltage A.C.Series Circuit Method Construction and Working of D.C.Motor Construction and Working of A.C.Machines Construction and Working of F.H.P.Motors
Concept	Ideal and Practical I & V Sources, A. C.Fundamentals, Concept of D.C. Motor Concept of Transformer, Concept Of A.C.Motor, Concept Of F.H.P.Motors
Facts	Components in Electric circuit, Ohm's Law Kirchhoff's Laws, Parts of D.C.Machine, Parts of Transformer, Parts of 3 phaseA.C.Motors, Parts of F.H.P.Motors

Course Contents:
THEORY

Uni t	Chapte r No.	

I	1	**1 Units and Basic Concepts** 1.1 Units, Circuit elements and parameters 1.2 Fundamental laws and theorems 1.3 Network terminology – active, passive, linear, non- linear bilateral, unilateral networks 1.4 Kickoff's laws, Statement and DC mesh and nodal analysis 1.5 Explanation and application of Superposition, Thevenin's, Norton's theorems and Maxim 1.6 Star Delta transformation (no derivation)
II	2	**2 A.C. Fundamentals** 2.1 Difference between A.C. and D.C. quantity 2.2 Advantages of A.C. over D.C. waveform of sinusoidal A.C. cycle. 2.3 Definitions: instantaneous value, cycle, amplitude, time period, frequency, angular frequ algebra, representation of Phase angle, phase difference, concept of lagging and leading by waveforms, mathematical e 2.6 Pure resistance in A.C. circuit – waveforms, equations and vector diagram (no derivation) 2.7 Power in AC circuits, Power factor and its improvement, Power measurement methods 2.8 Non conventional sources of electrical energy generation. Basic concepts of Solar and wi
	3	**3 Transformers:** 3.1 Construction and working principles 3.2 Emf equation 3.3 Equivalent circuits of single phase transformer 3.4 Efficiency and voltage regulation 3.5 Open circuit and short circuit tests
III	4	**4 DC Motors:** 4.1 Construction and working principles 4.2 Back Emf and voltage equation, 4.3 Torque equation expression only (no derivation) 4.4 Types of D.C. motors: Series, shunt and compound motors and their basic characteristics 4.5Starting and Speed control of DC motors
	5	**5 AC Motors:** 5.1 Construction of Single phase induction motors

5.2 Torque production and starting of motor

5.3 Speed control methods: brief description of only Synchronous speed, slip speed, slip and

5.4 Fractional Horse Power (FHP) motors Choice of appropriate motors for specific engineer

PRACTICALS

Sr. No	Course outcome	Lab Activities	No. of Hrs assigned
1.	C01	Finding the equivalent resistance of a resistive network	2
2.	CO1	Verification of Star- Delta transformation	2
3.	CO1	Verification of ohms law	2
4.	CO1	Verification of Delta- Star Transformation	2
5.	CO2	Verification of Kirchhoff's Current Law	2
6.	CO2	Verification of Kirchhoff's Voltage Law	2
7.	CO2	Verification of Superposition Theorem	2
8.	CO2	Verification of Thevenin's Theorem	2
9.	CO2	Verification of Norton's Theorem	2
10.	CO3	To study the principle of generation of electricity	2
11.	CO3	To Study the various methods of electricity generation	2
12.	CO3	Determination of various AC fundamentals from given AC waveform	2
13.	CO3	Verification of characteristics of Purely capacitive network	2
14.	CO3	Verification of characteristics of Purely resistive network	2
15.	CO4	To study the operating principle of DC machines	2
16.	CO4	To study the construction of DC machines	2
17.	CO4	To study the Types of DC motors	2
18.	CO4	To study the operating principle of Transformer	2
19.	CO4	To study the open circuit and Short circuit Test of single phase Transformer	2
20.	CO4	To study load Test of Transformer of single phase transformer	2

Project Base Assignments

Sr. No	Course outcome	Assignments	Marks
1	CO3	Demonstration of principle of Electricity generation with suitable model	5
2	CO3	Industrial visit to any electricity generation plant and submitting a detailed report	5
3	CO4	Demonstration of operating principle of DC motor with suitable model	5
	CO4	Demonstration of resonance in electrical circuits with suitable model	5
4	CO4	Identifying and categorizing various electrical motors observed by the students at home and college	5

Examination/Assessment Scheme:

Question	Q.1					Q.2		Q.3		Q.4		Q.5	
Sub-Question	a	b	C	d	E	a	b	a	b	a	b	a	b
CO	1	1	1	1	1	2	1	3	4	3	4	2	3
Chapter	1	2	2	2	2	1	1	2	4	2	3	1	2
Marks	2	2	2	2	2	6	4	6	4	6	4	6	4
Level of competency													

Final Examination Chapter Weightage Scheme:

Chapter	Marks	
	Compulsory	With Options
1	**18**	**30**
2	**12**	**20**
3	**06**	**10**
4	**08**	**08**
5	**06**	**06**
Total	**50**	**74**

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Q.No.	Marks	Total	Weightage% (Total/50)x100
C01	1(a)	2	24	48%
	1(b)	2		
	2(a)	6		
	3(b)	4		
	4(a)	6		
	5(b)	4		

CO2	1(c) 2(b)	2 4	6	12%
CO3	1(d) 3(a) 5(a)	2 6 6	14	28%
CO4	1(e) 4(b)	2 4	6	12%

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Practical Lab (10 Marks)	Project Based Assignments (25 Marks)	Skill Test [15 Marks]	Final Theory exam	Weightage% (Total)x100
C01	1	10	0	24	35%
CO2	2	10	0	6	18%
CO3	1	5	0	14	20%
CO4	6	0	15	6	27%
Total	10	25	15	50	100%

REFERENCES:

Text/ Reference Books:

Sr. No	Book title	Author/s	Edition	Publication
1	Electrical Engineering Fundamentals	Vincent Del Toro	2nd edition	Prentice Hall of India
2	Basic Electrical and Electronics engineering	B.R.Patil	2nd edition	Oxford
3	Basic Electrical and Electronics engineering	Ravish Singh	2nd edition	Tata Mcgrawhill
4	A Textbook of Electrical Technology (Volume-1)	B.L. Thareja and A K Thareja	Revised edition	S Chand Publications

Online Reference material and links:

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	https://www.pannam.com/blog/free-resources-to-learn-electrical-engineering/
2	www.learnerstv.com/Free-Engineering-Video-lectures-ltv059-Page1.htm
3	https://alison.com/course/basics-of-electrical-technology
4	www.learnerstv.com/Free
5	https://www.youtube.com/watch?v=rLUyP6g1VNI

Course Name : **Diploma in Electronics**
Semester : **II**
Subject name : **Computer Fundamentals & C-Programming**
Subject Code : **DE 2002**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical HRS)	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks	Semester Exam Marks (TH/PR/OR)	Total Marks (TH/PR)
2	0	4	4	2	50	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Note :- (Make changes as per your subject requirement)

1. Theory period is of 60 minutes and Practical Sessions is of 120 minutes

2. Minimum 40% marks are needed for passing in internal and semester examinations

3. **Internal marks**

    Practical Lab   10 Marks

    Project based Assignments   25 Marks

    Skill Test   15 Marks

    Total   50 Marks

4. **Semester Examination (Theory)**

    Theory semester examination includes a two hour theory paper of 50 marks.

5. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

6. It is mandatory to appear for semester examination and skill tests. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignment and Laboratory experiment will not be declared successful for that examination head.

7. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

    (Direct Second year admitted students need to complete only Term Work (TW) of 25 Marks i.e Project Based Assignments as per their eligibility)

Rationale: Computer Fundamental intends to learn the students about the different parts of computer and its connecting ports. The students will able to decide the computer configuration as per requirements and develop the ability to assemble the computer system. C Programming is the universal core programming language. C programming is very essential for electronics applications and systems.

Course Outcomes: On successful completion course, students will be able to :

1. Decide optimal hardware configurations of a computer system for any given requirement.
2. Installation C Programming.
3. Use of different programming logics and data types to perform task.
4. Application of looping branching and user data functions for specific use.

Learning Structure:

Application	Assemble Computer system. Application of programming for given task
Procedure	Identification of Components and ports. Effective us of looping branching. Construct user defined function.
Principle	Principles of working of Computer and Hardware Components Programming, syntax and error handling.
Concept	Computer resources, input output and storage. Concept of programming, arithmetic and logical operations, functions arrays.
Facts	Computer Components, programming, execution.

Course Contents:

Unit	Chapter	Topic and Contents	Hours
Unit-1	1	**1. PC Architecture** **1.1** Trends in Technology **1.2** Defining Computer Architecture **1.3** Functional units and their interconnections, types of buses, bus architecture. **1.4 Input device (**Keyboard, Image scanner, Microphone Pointing device: (Graphics tablet, Joystick, Light pen, Mouse, Optical, Pointing stick)Touchpad, Touch screen, Trackball, Webcam) **1.5 Output devices**(Monitor, Printer, Plotter, Speaker, Head phone)	13

		1.6 SMPS (Working, trouble shoot)
		1.7 Processor : Types of processor and their generation
		    Budget processors
		      - AMD Sempron
		      - Intel Celeron
		    Mainstream processors
		      -AMD Athlon 64
		      - Intel Pentium 4
		      - Dualcore processors
		      - AMD Athlon 64 X2
		      - Intel Pentium D
		1.8 **Motherboard (**Schematic Diagram North bridge, South bridge, CPU slot, Basic Input/Output System (BIOS), Chipsets, Chase Memory, Expansion Bus, CPU Clock, switches and Jumpers)
		1.9 **Connecting Ports** Types of ports and their function (Serial, Parallel , USB, DIV, VGA, Ethernet, HDMI, SATA, IDE, Power)
		1.10 **Data storage devices:** Memory Units and
		    Representation
		      Types of Storage
		      - Primary and secondary
		      - Magnetic storage devices
		      - Optical storage devices
		       - Flash memory devices
		       - Online and cloud	

	2	**2. Introduction to C programming** 2.1 Classification of programming **2.2** Structure of C Programming **2.3** Different data types and input and output functions	5
Unit-2	3	**3. Arithmetic and logical Operations** 3.1-Programming on arithmetic and logical operations 3.2. Header files included for arithmetic and logical operations.	5
	4	**4. Looping and Branching** **4.1** Concepts of conditional and non conditional loops. 4.2 Programming on if ,else- if ,for- next, do- while, while etc 4.3 Nested looping**.**	7
	5	**5. Array and User Defined functions** **5.1** Single dimension and double dimension array .Data storing and retrieval in array. **5.2** Programming using arrays. **5.3** Different types of User defined functions **5.4** Calling user defined function inn main program.	4

		5.5 Programming on implementation of user defined function	

PRACTICAL-

Sr. No	Course outcome	Lab Activities	No. of Hrs assigned
1.	C01	Introduction of Assembled Working Computer. Demonstrate and introduce use of all input output peripheral devices of computer.	2
2.	CO1	Demonstrate computer cabinet, SMPS, different parts and ports of Computer.	2
3.	CO1	Verify motherboard compatibility with processor.	2
4.	CO2	Sequence the assembling steps of computer and assemble a Computer System	2
5.	CO2	Installation of Turbo C Programming Compiler	2
6.	CO2	Program for execution of small program to display messages	2
7.	CO2	Programming on use of different key works for display messages in different format	2
8.	CO2	Programming on accepting input from keyboard	2
9.	CO2	Different compilers of C-Programming	2
10.	CO2	Study of Structure of C-Programming	2
11.	CO3	Programming using of different data types in C	2
12.	CO3	Program on Arithmetic operations.	2
13.	CO3	Programming on Logical operations.	2
14.	CO3	Programming on use of Switch case statement.	2
15.	CO4	Understanding Looping and branching	2
16.	CO4	Programming using If else –if	2
17.	CO4	Programming on Do-While and While loop	2
18.	CO4	Programming of For –Next loop to perform iterations	2
19.	CO4	Programming on nested If-Else loop	2
20.	CO4	Programming on nested for-next loop	2
21.	CO4	Distinguish between conditional and non-conditional loops	2

22.	CO4	Programming on switch case statement	2
23.	CO4	Programming on arithmetic operation using int float data	2
24.	CO4	Programming character string	2
25.	CO4	Define user defined functions	2
26.	CO4	Calling user defined function in main programming.	2
27.	CO4	Different types of user defined function in C Programming language	2
28.	CO4	Simple program using function.	2
29.	CO4	Programming using different types of user defined functions	2
30.	CO4	Programming by calling multiple user defined function in main program	2

PROJECT BASE ASSIGNMENTS

Sr. No	Course outcome	Assignments	Marks
1.	CO1	Note down minimum two computers specification from the any one department of college. Evaluate cost of computer parts and branded computer/ laptops. Bring minimum two quotations for each of the configuration.	5
2.	CO1	Compare difference between desktop computer, notebook computers, net books, and tablets. Evaluate their performances and use.	5
3.	CO2	Installation of Turbo C Programming Language.	5
4.	CO2	Execution of program Debugging and error correction.	5
5.	CO3	Write program to calculate the net salary of an employees	5

SKILL TEST

Sr. No	Course outcome	Topic	Marks
1	CO4	Write a program to display the result of student with percentage and class using user defined function.	15

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	a OR a	b OR b	c	d	e	A	b OR b	a OR a	b	a OR a	b	a	b OR B
CO	1	1	2	3	4	1	2	3	1	1	4	3	1

Chapter	1	2	3	4	5	1	3	4	1	1	5	4	2
Marks	2	2	2	2	2	6	4	6	4	6	4	6	4
Level of Competence	R	R	U	U	U	A	A	U	A	E	U	E	U

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	18	26
2	06	12
3	06	10
4	14	20
5	06	06
Total	50	74

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	1(a)	2	24	48%
	1(b)	2		
	2(a)	6		
	3(b)	4		
	4(a)	6		
	5(b)	4		
CO2	1(c)	2	6	12%
	2(b)	4		
CO3	1(d)	2	14	28%
	3(a)	6		
	5(a)	6		
CO4	1(e)	2	6	12%
	4(b)	4		

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Practical Lab (10 Marks)	Project Based Assignments (25 Marks)	Skill Test [15 Marks]	Final Theory exam	Weightage% (Total)x100
C01	1	10	0	24	35%
CO2	2	10	0	6	18%

CO3	1	5	0	14	20%
CO4	6	0	15	6	27%

REFERENCES:

Text/ Reference Books:				
Sr. No	**Book title**	**Author/s**	**Edition**	**Publication**
1	Fundamentals of Computer	Balaguruswamy	Second	McGraw-Hill
2	Computer Fundamentals	Pradeep Sinha and Priti Sinha	**First**	BPB Publications
3	Introduction to C-Programming	Yeshwant Kanetkar	**First**	McGraw-Hill
4	Programming in C	Balaguruswamy	First	McGraw-Hill

Online Reference material and links

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	www.tutorialspoint.com/computer_fundamentals
2	https://www.youtube.com/watch?v=prU6Z4XstKM
3	https://www.youtube.com/watch?v=YS7M4qfbo20
4	http://study.com/academy/lesson/computer-system-components-computer-parts-functions.html
5	http://www.gcflearnfree.org/office

Course Name : **Diploma in Electronics**
Semester : **II**
Subject name : **Applied Mathematics**
Subject Code : **DE 2003**
Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical	Credit	Semester Exam Duration (TH)Hours	Internal Marks	Semester Exam Marks (TH)	Total Marks (TH)
3	1	0	4	2	50	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Note :-(Make changes as per your subject requirement)

1. Theory period is of 60 minutes and Tutorial Sessions is of 60 minutes

2. Minimum 40% marks are needed for passing in internal and semester examinations

3. **Internal marks**

    Assignments   25 Marks

    Open Book Test   10 Marks

    Skill Test   15 Marks

    Total   50 Marks

4. **Semester Examination (Theory)**

    Theory semester examination includes a two hour theory paper of 50 marks.

5. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

6. It is mandatory to appear for semester theory examination and skill tests. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignment and Laboratory experiment will not be declared successful for that examination head.

7. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

(Direct Second year admitted students need to complete only Term Work (TW) of 25 Marks i.e Project Based Assignments as per their eligibility)

Rationale:

Engineering is the practical application of math's and science to solve problems. Engineering mathematics paves the way to understand and solve problems in all technical areas .All mathematics is the ultimate form of logical rigor. This is certainly a quality required of engineers.

Functions and limits provide a rigorous foundation for calculus. Calculus can be called as a collection of techniques for manipulating certain limits.

Differential calculus studies the behavior and rate on how different quantities change. Concepts of calculus are used in motion, electricity, heat, light etc. Signal processing has its roots in calculus for analysis of circuits. Applications of differential calculus include computations involving velocity and acceleration, the slope of a curve, Fourier series etc.

Complex numbers are used in signal analysis and other fields for a convenient description for periodically varying signals. Control theory also makes use of complex numbers. In order to analyze AC circuits, it became necessary to represent multi dimensional quantities. For this complex numbers are used.

Course Outcome: After completing semester II of Engineering Mathematics students will be able to

1. Transform a given complex number in the polar form.
2. Distinguish different types of functions and determine the value of a function.
3. Evaluate limits of functions.
4. Determine the derivative of functions.
5. Assess the maxima and minima of functions.

Learning Structure

Application	Apply methods of differentiation and knowledge of complex numbers to solve problems in various engineering areas
Procedure	- Separate a complex number in to real and imaginary parts. Apply De-Moivre's theorem to find root of a complex number - Find value of a function. Find inverse functions - Evaluate limit of a function. Find continuity of a function

	● Find derivatives of functions. Find higher order derivatives. Find maxima and minima of a function	
Principle	● Polar form of a complex number.De- Moivre's theorem ● Classification of functions ● Theorems of limits. Continuity of a function ● Rules of differentiation. Geometrical meaning of differentiation	
Concept	● Real and imaginary parts of a complex number. Conjugate, modulus and amplitude of a complex number ● Domain and range of a function. Constant function. Types of functions ● First order derivative. Successive differentiation. Increasing and decreasing functions	
Facts	● Complex number ● Variables and constants and functions. ● Modulus of a complex number. ● Limit of a function ● Instantaneous rate of change.	

Course Contents

THEORY

Unit	Chapter	Topic and Contents	Hours
I	1	**1.Complex numbers** 1.1 Definition 1.2 Algebra of complex numbers 1.3 Argand diagram 1.4 Polar form of a complex number 1.5 De Moivres theorem 1.6 Roots of a complex number	10
2	2	**2.Functions**: 2.1 Definition and idea of a function 2.2 Value of a function 2.3 Different types of functions 2.4 Classification of functions	6
	3	**3.Limits** 3.1 Concept of limits 3.2 Method of finding limits of a function 3.3 Evaluation of limits using simplification, rationalization and factorization 3.4 Trigonometric limits 3.5 Continuity of a function	6
3	4	**4.Differential calculus**: 4.1 Introduction to differentiation 4.2 Differentiation using first principle	30

		4.3 Differentiation of sum, product and quotient of functions 4.4 Differentiation of composite functions 4.5 Differentiation of exponential, logarithmic, trigonometric and inverse trigonometric functions 4.6 Differentiation of implicit functions 4.7Logarithmic differentiation 4.8 Differentiation Of parametric functions	
	5	**5.Higher order derivatives and Applications of differentiation:** 5.1 Successive differentiation 5.2 Geometrical meaning of derivative 5.3 Increasing and decreasing functions 5.4Maxima and minima of a function and its applications	8

Internal Assessment:
Assignments

Sr. no	Course outcome	Assignment (25 Marks)	Marks
1	CO1	Separate the given complex number into real and imaginary parts. Calculate the modulus and amplitude of the given complex number. Transform the given complex number in the polar form. Use De-Moivre's theorem to simplify the given complex number. Assess the roots of the given complex number using De-Moivre's theorem.	5
2	CO2	Categorize the range and domain of the given function. Calculate the value of the given function. Identify the type of function.	5
3	CO3	Calculate the limit of the function using factorization, simplification, rationalization and trigonometric transformation.	5

		Discuss the continuity of the given function.	
4	CO4	Differentiate the given sum or difference of functions. Differentiate using product rule, quotient rule. Calculate the derivative of the given exponential function, algebraic function,logarithmic function, trigonometric function. Apply logarithmic differentiation to find the derivative Differentiate the given implicit function and parametric function.	5
5	CO5	Determine the higher order derivatives. Assess the range of values for which given function is increasing or decreasing. Calculate the maximum and minimum values of the given function.	5

OPEN BOOK TEST

Sr. No	Course outcome	Topic	Marks
1	CO2	Functions	3
2	CO3	Limits	3
3	CO4	Differential Calculus	4

SKILL TEST

Sr. No	Course outcome	Topic	Marks
1	CO4	Differential Calculus	15

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	a OR a	b OR b	c	d	e	a	b OR b	a OR a	B	a OR a	b	a	b OR b
CO	1	2	3	4	5	1	1	4	4	4	4	5	4
Chapter	1	2	3	4	5	1	1	4	4	4	4	5	4
Marks	2	2	2	2	2	6	4	6	4	6	4	6	4
Level of Competence	U	U	U	U	U	A	A	A	A	A	A	A	A

Chapter	Marks	
	Compulsory	**With option**
1	12	18
2	2	4
3	2	2
4	26	42
5	8	8
Total	50	74

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	1(a) 2(a) 2(b)	2 6 4	12	24%
CO2	1(b)	2	2	4%
CO3	1(c)	2	4	4%
CO4	1(d) 3(a) 3(b) 4(a) 4(b)	2 6 4 6 4	26	52%

	5(b)	4		
CO5	1(e) 5(a)	2 6	8	16

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Assignments (25 Marks)	Open book test (10 Marks)	Skill Test [15 Marks)	Final Theory exam	Weightage% (Total)x100
C01	5	0	0	12	17%
CO2	5	3	0	2	10%
CO3	5	3	0	2	10%
CO4	5	4	15	26	50%
CO5	5	0	0	8	13%
Total	10	25	15	50	100%

References:

Sr. No.	Title	Author	Publication
1	Mathematics for polytechnic students	S.P.Deshpande	Pune Vidyarthi Grihaprakashan
2	Engineering Mathematics	Patel & Rawal	Nirali Publication
3	Engineering mathematics	S.S.Sastry	Prentice Hall of India
4	Higher engineering mathematics	B.S.Grewal	Khanna publications
5	Mathematics for Engineers and Technologists	H.Fox, W.Bolton	Butterworth Heinemann
6	Calculus –Differentiation and Integration	ICFAI University	Pearson
7	Schaum's 3000 solved problems in calculus	Mendelson,Elliot	Schaum"s Series
8	Advanced Calculus-Theory and Problems	Murray R. Spiegel	Schaum;s Series
9	Mathematical Methods for Engineering and science students	M.J.Engelfield	Edward Arnold

Online resources link /website

Sr.No	
1	htpp://www.mathopenref.com

2	www.bbc.co.uk/education/megamaths/tables.html
3	https://www.khanacademy.org/...**complex**
4	https://www.khanacademy.org/math/**differential-calculus**
5	www.mathforum.com
6	www.mathleague.com

Course Name   **: Diploma in Electronics**

Semester   **: II**

Subject name   **: Communication Skills- II**

Subject Code   **: DE 2004**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical	Credit	Semester Exam Duration (TH)Hours	Internal Marks	Semester Exam Marks (TH)	Total Marks (TH)
3	1	0	4	2	50	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Note :- (Make changes as per your subject requirement)

1. Theory period is of 60 minutes and Tutorial Sessions is of 60 minutes

2. Minimum 40% marks are needed for passing in internal and semester examinations

3. **Internal marks**

   Assignments   25 Marks

   Open Book Test   10 Marks

   Skill Test   15 Marks

   Total   50 Marks

- **Semester Examination (Theory)**

  Theory semester examination includes a two hour theory paper of 50 marks.

- Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

- It is mandatory to appear for semester theory examination and skill tests. A student remaining absent in any of the examination/test or fails to complete prescribed

number of assignment and Laboratory experiment will not be declared successful for that examination head. Also student has to failing which student will not

- Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

Rationale:

The most commonly used medium to express oneself is language. English, being a global language, is used in all the spheres of human life i.e., personal, professional and social. A diploma student is expected to be proficient in English language and pursue the existing course of study to handle the future jobs. The content of the text includes the aspects related to language skills.

Course Outcome: After completing semester II language in communication skill-II students will be able to

1. Make draft on various situations.

2. Responds to professional spoken communication accurately.

3. Interpret the English context and understands engineering and technology concepts and dictions.

Learning Structure

Application	ferent types of communication like graphical, body language to overcome different barriers in formal and informal communication. Drafting office notice memo, resume, business correspondence and presentation. Can participate in debate and group discussion confidently.
Procedure	Identify the principles and barriers in the communication process. Effective use of body language and nonverbal codes. View and interpret graphical information precisely.
Principle	Formal, informal, verbal, non-verbal, vertical, horizontal, diagonal. Principles Barriers of communication, ethnical jargons, pronunciation and allusions. Graphical communication
Concept	Artefacts Communication ,Body language
Facts	Letters, documents ,Communication and body language Tabulation of data and its bar graphs and pie charts

Course Contents
THEORY

Unit	Chapter	Topic and Details	No. of Lectures/TU assigned	%Weightage
I	**1**	**Writing Skill: Introduction to communication** 1.1. Definition of communication 1.2. Process of communication 1.3. Types of communication- 1.4. Formal, informal, verbal, non-verbal, vertical, horizontal, diagonal 1.5 Barriers in Communication: Physical Barrier Mechanical: Machine oriented Psychological barriers and Language.	05	11
	2	**Non-verbal and Graphical communication** 2.1Non-verbal codes: Artefacts 2.2Aspects of body language Facial expression, eye contact, vocalic, Para language, gesture, posture, dress and appearance. 2.3 Graphical communication Advantages and disadvantages of graphical communication Tabulation of data and its depiction in the form of bar graphs and pie charts.	05	
	3	**Formal Written Communication** 3.1. Office Drafting: Notice, memo, memorandum, drafting brochure and user manual, repair estimate, e-mail, job application and resume. 3.2. Business Correspondence: Inquiry letter, order letter, complaint letter of collection and settlement and sales letter	10	22

		3.3. Report writing: investigation report, project report, progress reports and industrial visit report. 3.4 Describing objects and giving instructions		
2.	4	**Speaking and Listening Skills** 2.1. Conversation: telephonic, responding to query, seeking advice, suggesting alternative, methods of handling tasks, responding to business related oral communication, seeking clarification, giving instructions, introducing speaker, vote of thanks. 2.2. Individual Presentation 2.3. Group Discussion 2.4. Debate and interview- practicing interview responses.	15	33
3.	5	**Reading Skills** 1. Introduction to LSRW and its Importance. 2. Importance of soft skills 3. Comprehensive passages- related engineering, technology and current affairs.	05	11
	6	**Vocabulary Building:** 1. Engineering and technological words and terms and their meanings 2. Homonyms 3. Root words Prefix suffix	05	11

TUTORIALS

Sr. No	Course outcome	Topic	Marks
1	CO1	Writing letter to the principal asking for permission	1
2	CO1	Writing letter to the principal requesting him to appear for semester exam as attendance is below 70%	1
3	CO1	Writing a letter of enquiry for the electronics components required for students practical's	1

4	CO1	Write letter for placing an order	1
5	CO1	Writing application for a job and prepare resume	1
6	CO2	Telephonic conversation with a boss	1
7	CO2	Conversation with a stranger at railway/airport	1
8	CO2	Techniques of Active participation in group discussion	1
9	CO2	How to face an interview?- techniques	1
10	CO2	How to prepare and present a technical report.	1
11	CO3	Writing routinely used technical words and their meanings	1
12	CO3	Writing engineering passage with its questions and answers	1
13	CO3	Writing technical passage with its questions and answers	1
14	CO3	Reading the cutting of electronics related article to enhance the vocabulary	1
15	CO3	Writing meaning of homonyms / homophones and forming single sentence by making the use of both	1

ASSIGNEMENTS

Unit No	Assignment No.	Details	Marks
I	CO1	Draw the diagram of communication cycle.	1
	CO1	Draw suitable bar-graph and pie-charts by using the given data	2
	CO1	Draft the letters on the ten different situations given	2
II	CO2	Practice listening the reading with proper accents and pronunciation	2
	CO2	Practice listening the comprehensive passages in English	2
	CO2	Speaking on social, economical, educational, political topics.	2

	CO2	Making inquiry, reply to inquiry, intro self and other situations like role-play.	4
III	CO3	Write five comprehensive passages related to science, technology, electronics with their question and answers.	10

OPEN BOOK TEST

Sr. No	Course outcome	Topic	Marks
1	CO1	Writing formal and informal letters	3
2	CO2	Reading the dialogues by using the role play method	3
3	CO3	Reading the comprehension passages and orally explaining the summary.	4

SKILL TEST

Sr. No	Course outcome	Topic	Marks
1	CO1	Writing Speeches on given situation (Introduction of speaker /Vote of Thanks)	5
2	CO2	Conversations on given situations (Inquires/Interviews)	5
3	CO3	Comprehending text ,articles and writing the answers of the questions asked.x	5

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	a OR A	b OR b	c	d	e	A	b OR b	a OR a	b	a OR a	b	A	b OR b
CO	1	2	2	3	3	1	2	3	2	3	1	2	3

Chapter	1	3	4	5	6	2	3	5	4	6	2	4	5
Marks	2	2	2	2	2	4	6	6	4	6	4	6	4
Level of Competence	R	R	U	U	U	A	A	U	A	E	U	E	U

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	**With option**
1	2	4
2	8	8
3	08	14
4	12	12
5	12	22
6	08	14
Total	**50**	**74**

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weight age% (Total/50)x100
C01	1(a) 2(a) 4(b)	2 4 4	10	20%
CO2	1(b) 1(c) 2(b) 3(b) 5(a)	2 2 6 4 6	20	40%
CO3	1(d) 1(e) 3(a) 4(a) 5(b)	2 2 6 6 4	20	40%

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Open book Test (10 Marks)	Assignments (25 Marks)	Skill Test [15 Marks)	Final Theory exam	Weightage% (Total)x100
C01	3	5	5	10	23%
CO2	3	10	5	20	38%
CO3	4	10	5	20	39%
Total	10	25	15	50	100%

REFERENCES:

Sr. No.	Title	Author	Publication
1	"Business Communication: Theory & Practices"	Dr. Dharmaji Kharat	New Man Publication, Mumbai, June 2015 ISBN 978-93-83871-69-8
2	"REMEDIAL ENGLISH for Elementary & Intermediate Learners"	Dr. Dharmaji Kharat	New Man Publication, Mumbai, June 2015 ISBN 978-93-83871-70-4
3	"Essential English Grammar"	Raymond Murphy	Cambridge.
4	"High School English Grammar and Composition"	Wren and Martin	S Chand & Co.
5	"Mastering Business Communication"	Woolcott L…,and W. Unwin	Macmillan, London
6	"Business Communication Today"	Courtland L. Bov'ee and John V	McGraw Hil, Third Edition 1992
7	"Business Communication"	the Registrar	University of Mumbai
8	"Group Discussion and Interview Skills"	Priyadarshi Patnaik	Foundation Books

9	Oxford Advanced English Dictionary		

Online Reference material and links:

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1.	www.communicationskills.com
2.	www.businesscommunication.com
3.	www.openlibrary.org

Course Name : **Diploma in Electronics**
Semester : **II**
Subject name : **Applied Science**
Subject Code : **DE 2005**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks	Semester Exam Marks (TH/PR/OR)	Total Marks (TH/PR)
3	0	1	4	2	50	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Note :-

1. Theory period is of 60 minutes and practical session is of 120 minutes.

2. Minimum 40% marks are needed for passing in internal and semester examinations.

3. **Internal marks**

   Practical Lab 10 Marks

   Project based Assignments 25 Marks

   Practical Skill Test 15 Marks

   Total 50 Marks

4. **Semester Examination (Theory)**

   Theory semester examination includes a two-hour theory paper of 50 marks.

5. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

6. It is mandatory to appear for semester theory examination and skill tests. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignment and Laboratory experiment will not be declared successful for that examination head.

7. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

Rationale:

The contents of this curriculum will provide knowledge of Applied Science (Physics and Chemistry). The knowledge and processes used by Applied science have produced new and exciting technologies that are in everyday use. The content of the subject is designed

such that the technical knowledge can be gained more effectively using concepts of Applied Science. Employers value the kind of knowledge that student received in Applied science. Also they become more focused and improves their ability of problem solving.

Course Outcomes:

After completion of the course students will be able to

1. Identify, formulate, differentiate &select various entities in different situations

2. Design and Demonstrate operating principles &/or reaction mechanism of various chemical phenomena/ physical phenomena

3. Apply concepts of applied science for solving problems in daily life/ industrial situation

4. Perform , evaluate & interpret various chemical/physical tests & results

Learning Structure:

Application	Apply the knowledge of Chemical , Physical properties and processes in Engineering field, Total internal reflection, resonance, ultra sonic, photoelectric effect, heating effect of electric current, applications of ultra violet waves, X-rays.
Procedure	Vulcanization of Rubber, Polymerization of Rubber, Identification of cause of corrosion and protection, production of stationary waves, velocity of sound using resonance tube,
Concept/principles	Thermosetting ,thermo softening plastic, Elasticity, Effect of environment of metals, sound effect in building , image formation by lens/mirror.
Facts	Plastic ,Rubber, Insulator, Corrosion, electromagnetic waves, properties of electromagnetic waves, reflection of light, refraction of light, wave motion and its properties

Course Contents:
THEORY

UNIT	CHAPTER	Topic and Details	No. of Lectures assigned
I	1 SOUND	**1.1 Wave Motion:** 1.1.1 Wave motion, properties of wave motion and different types of waves. 1.1.2 Longitudinal and transverse waves.	2

		1.2 Sationary Waves: 1.2.1 Natural, forced and damped vibrations, resonance, stationary waves. 1.2.2 Formation of stationary waves in an pipe closed at one end, resonance tube. 1.2.3 Applications of resonance.	3
		1.3 Acoustics And Ultrasonics: 1.3.1 Reflection of sound, Echo, reverberation. 1.3.2 Conditions for good acoustics, the factors to be considered in acoustic planning of building. 1.3.3 Ultrasonic, production of ultrasonic waves, uses of ultrasonic waves.	5
II	2 OPTICS	**2.1 Electromagnetic Waves:** 2.1.1 Electromagnetic spectrum. 2.1.2 Production, properties and applications of: Infra red rays, visible spectrum, ultra violet rays and X-rays.	2
		2.2 Reflection, Refraction And Total Internal Reflection: 2.2.1 Reflection of light, laws of reflection, regular and irregular reflection, total internal reflection and its applications. 2.2.2 Reflection at curve surfaces, concave mirror and convex mirror. 2.2.3 Refraction of light, laws of refraction, refractive index of medium. 2.2.4 Lenses, image formation by concave and convex lens.	5
		2.3 Prism And Dispersion Of Light: 2.3.1 Refraction through prism, angle of minimum deviation, prism formula. 2.3.2 Dispersion, dispersive power, expression for dispersive power.	3
III	3 APPLED PHYSICS	**3.1 Thermoelctricity:** 3.1.1 Thermocouple, seeback effect, factors affecting the thermo emf 3.1.2 Thermoelectric series. 3.1.3 Applications.	3
		3.2 Photoelctric Effect: 3.2.1 Photo electric effect. 3.2.2 Characteristics if photoelectric effect and applications.	3
		3.3 Heating Effcet Of Electric Current: 3.3.1 Joule's law , Joule's calorimeter, determination of J by electric method. 3.3.2 Electric power, relation between K.W.h. and joule. 3.3.3 Expression for electric energy consumed, numerical.	4
IV	4 NON METALIC ENGINEE RING MATERIA LS	**4.1 Plastics:** 4.1.1 Definition of polymerization, addition and condensation polymerization. 4.1.2 Thermosetting and thermo softening plastics. 4.1.3 Properties and application of plastics.	3
		4.2 Rubber:	2

		4.2.1 Natural rubber, draw backs, vulcanization, synthetic rubber. 4.2.2 Properties and application of rubber.	
		4.3 Electrical Insulators: 4.3.1 Preparation, of electrical insulators like thermo coal, glass wool, cellulose, plastic glass, ceramic, silicone. 4.3.2 Properties and applications of electrical insulators.	3
V	5 **CORROSI ON**	**5.1 Corrosion:** 5.1.1 Introduction, mechanism and types of corrosion. 5.1.2 Factors affecting rate of corrosion. 5.1.3 Methods of protection of corrosion, like proper design and material selection, galvanizing, tinning, sherardising, cladding, paints.	7

PRACTICAL LAB ACTIVITIES:

Sr. No	Course Outcome	Laboratory Activities	No. of Hrs assigned
1	CO 2	Demonstrate the phenomena of Resonance using Resonance Tube and hence determine the Velocity of Sound at room temperature	2
2	CO 2	Using Plane Mirror , verify the Laws of reflection.	2
3	CO 2	Determine the angle of Minimum Deviation for the given Prism	2
4	CO 2	Determine the Refractive Index of the material of glass slab using Law of Refraction.	2
5	CO 3	Using U-V method determine the Focal Length of the Convex Lens	2
6	CO 4	Volumetric Analysis.(Weak acid/weak base)	2
7	CO 4	Volumetric Analysis.(Strong acid/ strong base)	2
8	CO 4	Volumetric Analysis.(Strong acid/weak base)	2
9	CO 4	Gravimetric Analysis(Precipitation of nickel sulphate)	2
10	CO 4	To prepare Phenol Formaldehyde resin used in manufacturing of Bakelite Plastic	2

PROJECT BASED ASSIGNMENTS:

Assignment No.	Course Outcome	Assignment	Marks
1	CO 1	Identify various applications of resonance, ultrasonic in industry and electronics	5
2	CO 1	Name any Five electronic devices where Plastic materials are used. Differentiate the plastic used along with its properties	5
3	CO 2	Demonstrate dispersion of light with simple experiments .	5
4	CO 3	List total number of electric appliances in your home and learn the calculation of electric bill	5
5	CO4	Observe the process of corrosion of given Aluminum Strip in acidic and basic medium and find relation between decrease in weight due to corrosion and time	5

SKILL TEST:

Skill Test No.	Course Outcome	Test	Marks
1	CO 2	Demonstrate and verify third law of reflection using plane mirror	5
2	CO 3	Using U-V method determine the focal length of the convex lens	5
3	CO 4	Determine strength of given acid	5

PRACTICAL LAB:

Lab Test No.	Course Outcome	Practical lab Test	Marks
1	CO 2	Demonstrate the refraction through glass slab	2
2	CO 2	Demonstrate the angle of deviation for the given angle of incidence of prism	2
3	CO 3	Find the angle of reflection for the given angle of incidence	2
4	CO 4	Volumetric Analysis.	2

5	CO 4	Gravimetric Analysis.	2

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	a OR A	B OR B	c	d	e	A	b OR b	a OR a	b	a OR a	b	a	b OR b
CO	1	1	1	3	3	3	4	1	1	4	3	3	1
Chapter	1	1	2	2	3	3	2	1	2	4	3	5	4 & 5
Marks	2	2	2	2	2	6	4	6	4	6	4	6	4
Level of Competence	C	C	C	U	U	U	A	U	A	A	A	A	A

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	10	20
2	12	16
3	12	12
4	8	16
5	8	10
Total	50	74

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	1(a) 1(b) 1(c) 3 (a) 3 (b) 5 (b)	2 2 2 6 4 4	20	12%
CO2	-	-	-	00 %
CO3	1(d) 1(e) 2 (a) 4 (b) 5 (a)	2 2 6 4 6	20	16%
CO4	2 (b)	4	10	20%

	4 (a)	6		

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Practical Lab (10 Marks)	Project Based Assignments (25 Marks)	Skill Test [15 Marks)	Final Theory exam	Weightage% (Total)x100
C01	-	10	-	20	30 %
CO2	4	5	5	-	14 %
CO3	2	5	5	20	32 %
CO4	4	5	5	10	24 %
Total	10	25	15	50	100%

REFERENCES:

Text/ Reference Books:				
Sr. No	Book title	Author/s	Edition	Publication
1	Text Book of Engg.Chemistry	S.S.Dara	Eleventh	S.Chand&companyltd
2	Engg. Chemistry	N. Krishnamurthy	2nd Edition	PHI Learning
3	Applied Chemistry	Dr.V.M.Balsaraf	First	Synergy Knowledgeware
4	Inorganic Chemistry	James E. Huheey, EllenA. Keiter, Richard L.Keiter	4th Edition	Benjamin Cummings
5	Advanced Inorganic Chemistry	Gurdeep-Harish	10th edition	Goel publishing house

6	Hand Book of Electrical and electronic insulating materials	W. T. Shugg		Wiley Black Well
7	Concepts of Physics – Vol. 1 & Vol. 2	Verma H. C.	1 st	Bharti Bhawan – Publishers and distributers
8	Physics – Vol. 1 & Vol. 2	Resnik, Halliday , Krane	5 th	Wiley India Pvt, Ltd.
9	Engineering Physics	R. K. Gaur S. L. Gupta	7 th	PHI Learning Pvt, Ltd,

Online Reference Material and Links

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	www.chemI.com
2	www.chemtutor.com
3	https://mahahsscboard.maharastra.gov.in
4	https://www.schandgroup.com
5	https://www.organic-chemistry.org
6	www. Physics classroom.com

Course Name : **Diploma in Electronics**
Semester : **II**
Subject name : **Basic Electronics**
Subject Code : **DE 2006**
Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks	Semester Exam Marks (TH/PR/OR)	Total Marks (TH/PR)
3	0	1	4	2	50	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Note :- (Make changes as per your subject requirement)

1. Theory period is of 60 minutes and Practical Sessions is of 120 minutes

2. Minimum 40% marks are needed for passing in internal and semester examinations for theory and practical

3. **Internal marks**

   Practical Lab   10 Marks

   Project based Assignments   15 Marks

   Skill Test   25 Marks

   Total   50 Marks

4. **Semester Examination (Theory)**

   Theory semester examination includes a two hour theory paper of 50 marks.

5. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

6. It is mandatory to appear for semester examination and skill tests. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignment and Laboratory experiment will not be declared successful for that examination head.

7. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

   (Direct Second year admitted students need to complete only Term Work (TW) of 25 Marks i.e Project Based Assignments as per their eligibility)

Rationale: The increasing uses of Electronics in human life have increased the growth area for entrepreneurship and job possibilities in the field. In each and every field electronic systems are used. The subject "Basic Electronics" is base of all advance analog and digital electronics. It starts with semiconductor PN junction which makes the student to follow the functioning of all semiconductor based electronics. This is a core group subject and it develops cognitive and psychomotor skills.

Course Outcomes: On successful completion course, students will be able to :

1. Compare construction and characteristic behavior and test various diodes and transistors.
2. Design various wave shaping circuits as clipper, clamper, multiplier, filter, rectifier and logic gates
3. Design a linear power supply, amplifier and oscillator with given specifications.

Learning Structure:

Application	Wave shaping circuits, Linear power supply, Discrete component amplifier, oscillator
Procedure	**Identification testing and use of** following Passive devices:- Switching diodes, rectifier diodes and special purpose diodes Active Devices:- bipolar transistor (BJT), field effect transistor (FET) and Metal oxide FET Components and ports. **Design Procedure of** Unregulated power supply, Linear power supply, Discrete component amplifier
Principle	**Characteristic of** **Passive devices**:- Switching diodes, rectifier diodes and special purpose diodes **Active Devices**:- bipolar transistor (BJT), field effect transistor (FET) and Metal oxide FET **Principle of** Rectification, Regulation, wave shaping and filtering, amplification and oscillation **Operation of** Switch Mode Power Supply and Uninterrupted Power Supply
Concept	**Construction and specifications of** **Passive devices**:- Switching diodes, rectifier diodes and special purpose diodes **Active Devices**:- bipolar transistor (BJT), field effect transistor (FET) and Metal oxide FET Concept of Biasing and stability **Power supplies** Linear , switch mode and universal power supply

Facts	Extrinsic semiconductor, PN junction, Resistor, Inductor, Capacitor, transformers. Power supplies

Course Contents:

Unit	Chapter	Topic and Contents	Hours
1	1	**1. Diode** 1.1 Semiconductor Physics Insulator, Conductor and semiconductors energy bar diagrams Basic concepts, Intrinsic and extrinsic semiconductors, diffusion and drift currents 1.2 General purpose Diode P-N junction under open-circuit, reverse bias and forward-bias conditions, p-n junction in the breakdown region, Ideal diode, Characteristics and Parameters, static and dynamic resistance of a diode, Diode approximations, Rectifying diode Review of P-type and N-type semiconductor Junction of P-type & N-type i.e. PN junction Barrier voltage , depletion region ,Junction Capacitance Forward biased & reversed biased junction Diode symbol , circuit diagram for characteristics (forward & reversed) 1.3 Special Purpose Diode Zener diodes, construction (reference to doping level) Symbol , circuit diagram for characteristics (forward & reversed) Avalanche & zener breakdown Specifications:- Zener voltage , power dissipation , break over current, dynamic resistance & maximum reverse	13
2	2	**2. Transistors** 2.1 Bipolar Junction Transistor Basic concept Types of transistors, symbols Transistor structure, operation Conventional current flow , relation between different currents in transistor, Unbiased PNP and NPN Principal of Operation of a PNP Transistor, Principle of Operation of an NPN Transistor , Transistor Voltages and Currents Amplification, Transistor parameters- input resistance, output resistance, α, β & relation between them.	15

		2.2 Field Effect Transistor Junction Field Effect Transistor : Physical structure, principle of operation, current-voltage characteristics, JFET configuration as CS, CD & CG, UJT.	
	3	**3. Wave Shapers** 3.1 **Circuit analysis** Definition of instantaneous, peak, root mean square and average value of sinusoidal voltage and current, half wave and full wave, voltage current relationship in resistor, inductor and capacitor, power in ac circuits, average power, active power and reactive power 3.2 **Diode Circuits** Clippers, Clampers, Multipliers, Rectifiers, Filters	**19**
	4	**4. Power Supply** 4.1 Linear Power Supply L, C, LC, CLC filter concept and design, Circuit operation, dc output voltage, ripple factor (formula), ripple frequency, Line and Load regulation, Dependence of ripple factor on load, Input/output waveforms , limitations & advantages, Unregulated power supply block diagram and design 4.2 Regulated power Supply	**13**

PRACTICAL LAB

Sr.No	Course outcome	Lab Activities	No. of Hrs assigned
1	C01	Testing of rectifier diode, switching diode, zener diode, germanium diode, LED, photodiode using Analog, digital multi-meter, curve tracer of CR	2
2	CO1	Forward and reverse characteristic of diode	2
3	CO1	Forward and reverse characteristic of ZENER diode	2
4	CO1	O/P Characteristic and Load line of CE- NPN transistor	2
5	CO1	Characteristic of CS- FET	2
6	CO 1	Characteristic of UJT	2
7	CO2	Load regulation of Half Wave Rectifier	2
8	CO2	Load regulation of full centre tap Wave rectifier	2
9	CO2	Load regulation of full wave bridge Wave rectifier	2

10	CO2	Positive and Negative clipper	2
11	CO2	Positive and Negative clamper	2
12	CO2	Voltage doubler	2
13	CO3	Design of Zener voltage regulator	2
14	CO3	Design of three terminal IC voltage regulator	2
15	CO3	Design of variable voltage series regulator	2

PROJECT BASE ASSIGNMENTS

Sr. No	Course outcome	Assignments	Marks
1.	CO1	Note down minimum two eliminator/ battery charger specifications.	5
2.	CO1	Note down minimum two eliminator/ battery charger specifications.	5
3.	CO1	Compare specifications of any of the two Zener diodes	5
4.	CO1	Compare specifications of any of the two photo diodes	5
5.	CO1	Compare specifications of any of the two light emitting diodes	5
6.	CO1	Compare specifications of any of the two NPN transistors	5
7.	CO 1	Compare specifications of any of the two FETs	5
8.	CO 1	Compare specifications of any two MOSFETs	5
9	CO 1	Prepare a detailed report on semiconductor devices available in electronics department	5
10.	CO 2	Write detailed description of clipper uses in electronics measuring instruments	5
11	CO 2	Write detailed description of clamper uses in electronics measuring instruments	5
12.	CO 2	Write down detailed description of voltage multipliers in electronic gadgets.	5
13.	CO 2	Prepare Comparative report of T filter and π filter uses in electronics power supplies	5
14.	CO 2	Prepare a specification chart for full wave rectifier with bridge circuit	5
15.	CO 2	Design a unregulated power supply to charge a battery of 6 volt which requires charging current of 1 Ampere	5
16.	CO 2	Prepare Comparative report of logic families used in making logic gates.	5
17	CO3	Prepare a report on SMPS used in desktop computer	5
18	CO3	Prepare a report on SMPS used in laptop computer	5
19	CO3	Prepare a report on SMPS used in microcontroller kit	5
20	CO3	Prepare a report on amplifier used in Public Address System	5
21	CO3	Prepare a report on amplifier used in sound amplification system of desktop/laptop computer	5
22	CO3	Prepare a report on oscillator used in digital systems	5

Note:- At least three project based assignments should be performed in a semester covering at least one assignment from each CO

SKILL TEST

Sr. No	Course outcome	Topic	Marks
1	CO3	Make a linear power supply for an electronics laboratory that fixed dual voltage regulated power supply for 15 - 0 -15 |@ 150 mA	10
2	CO3	Make a linear power supply for an electronics laboratory that fixed dual voltage regulated power supply for 15 - 0 -15 |@ 150 mA	10
3	CO3	Make a variable voltage regulator that gives output from $0 - 25$ volt @ 150 mA using regulator IC	10
4	CO 3	Make a variable voltage regulator that gives output from $0 - 25$ volt @ 150 mA using discrete components	10
5	CO3	Make a pulse amplitude modulator that uses discrete component amplifier circuit	5
6	CO3	Make a pulse width modulator circuit using transistor as comparator	5
7	CO 3	Make a circuit that depicts the operation of BJT as switch and variable resistor	5

Note:- At least three skill tests should be performed in a semester.

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	a OR a	b OR b	c	D	E	a	b OR b	a OR a	b	a OR a	b	a	b OR B
CO	1	2	3	3	2	2	3	1	1	2	1	3	3
Chapter	1	2	4	3	3	3	4	2	1	3	2	1	4
Marks	2	2	2	2	2	6	4	6	4	6	4	6	4
Level of Competence	R	R	R	U	U	R	A	A	R	U	A	A	U

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	12	14
2	12	20
3	16	22
4	10	18
Total	50	74

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	1(a) 3(a) 3(b) 4(b)	2 6 4 4	16	32%
CO2	1(b) 1(e) 2(a) 4(a)	2 2 6 6	16	32%
CO3	1(c) 1(d) 2(b) 5(a) 5(b)	2 2 4 6 4	18	36%

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Practical Lab (10 Marks)	Project Based Assignments (15 Marks)	Skill Test [15 Marks]	Final Theory exam	Weightage% (Total)x100
C01	3	5	0	16	24%
CO2	3 or 4	5	0	16	24% or 25%
CO3	4 or 3	5	25	18	52 % or 51%
Total	10	15	25	50	100%

REFERENCES:

Text/ Reference Books:				
Sr. No	Book title	Author/s	Edition	Publication
1	Electronics Principles	Albert Malvino, David J. Bates	Seven	Tata McGraw-Hill Education
2	Electronic Devices and Circuit Theory	Robert L. Boylestad, Louis Nashelsky	Tenth	Pearson

3	A text book of Electronic Circuits	R. S. Sedha	Illustration	S. Chand Publication
4	The art of Electronics	Paul Horowitz, Winfield Hill	Third, Illustrated	Cambridge Press Publication

Online Reference material and links

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	http://nptel.ac.in/courses/Webcourse-contents/IIT-ROORKEE/BASIC-ELECTRONICS/home_page.htm
2	https://www.youtube.com/playlist?list=PLDF9E14BFA48F852D
3	http://www.nptel.ac.in/courses/117103063/
4	http://booksite.elsevier.com/samplechapters/9780750676069/9780750676069.PDF
5	http://engineering.nyu.edu/gk12/amps-cbri/pdf/Basic%20Electronics.pdf

PREMLILA VITHALDAS POLYTECHNIC

S.N.D.T. WOMEN'S UNIVERSITY

DIPLOMA IN ELECTRONICS

CURRICULUM

Second Year

2019-20

Sir Vithaldas Vidyavihar S.N.D.T. Women's University

Juhu Santacruz(W) Mumbai -400049

S.N.D.T. Women's University

SCHEME

SECOND YEAR DIPLOMA IN ELECTRONICS

SCHEME: SEMESTER III

PAPER CODE	SUBJECTS	HRS	PR/TU	D	TH	TW	PR/V	T	CR
DE3001	ELECTRIC CIRCUITS AND NETWORKS	3	2/0	2	50	50	50	150	4
DE3002	PRINCIPLE OF ELECTRONIC CIRCUITS	3	2/0	2	50	50	50	150	4
DE3003	DIGITAL CIRCUITS AND FUNDAMENTALS OFMICROPROCESSOR.	3	2/0	2	50	50	50	150	4
DE3004	ELECTRONIC MEASUREMENTS &INSTRUMENTATIONS	3	2/0	2	50	50	50	150	4
DE3005	ENGINEERING MATHEMATICS –I	3	0/1	2	75	25	0	100	4
DE3006	ENVIRONMENTAL STUDIES	4	0	2	50	50	0	100	4
TOTAL		19	8/1					800	24

SCHEME: SEMESTER IV

PAPER CODE	SUBJECTS	HRS	PR/TU	D	TH	TW	PR/V	T	CR
DE4001	ANALOG TECHNIQUES	3	2/0	2	50	50	50	150	4
DE4002	ANALOG AND DIGITAL COMMUNICATION	3	2/0	2	50	50	50	150	4
DE4003	ELECTRONICS PROJECT-(Minor)	0	8/0	0	0	50	100	150	4
DE4004	MICROCONTROLLER AND APPLICATIONS	3	2/0	2	50	50	50	150	4
DE4005	ENGINEERING MATHEMATICS-II	3	0/1	2	75	25	0	100	4
DE4006	ENGINEERING PROFESSIONAL PRACTICES	4	0	2	50	50	0	100	4
TOTAL		16	14/1					800	24

HRS = Theory Lectures hours / week, PR / TU = Practical / Tutorial in hrs, D = Duration of Theory paper for Examination in hrs, TH- Theory Marks , TW = Term Work -marks, PR/V = Practical / Viva Voce - marks, T = Total, Cr = Credits

CARRICULUM

SECOND YEAR DIPLOMA IN ELECTRONICS

Course Name   **: Diploma in Electronics**

Semester   **: III**

Subject name   **: ELECTRIC CIRCUITS AND NETWORKS**

Subject Code   **: DE 3001**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme					
				Semester Exam Duration (hrs.)	Internal Marks		Semester Marks		Total Marks
Theory (hrs.)	Tutorial (hrs.)	Practical (hrs.)	Credit	TH/PR	TW	PR	TH	PR	(TW+TH+PR)
3	0	2	4	2	50	25	50	25	150
Abbreviations: TW-Term Work ,TH-Theory, TU- Tutorial, PR-Practical									

Examination Scheme:

1. Minimum 40% marks are needed for passing in all the internal assessments and semester examinations.

2. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

3. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignments and laboratory experiments will not be declared successful for that examination head.

4. **Internal Marks.**

   ● Term Work (TW)

     Project based Assignments   50 Marks

   ● Practical Internal (25 Marks)

     1. Practical Lab   10 Marks

     2. Practical Skill Test   15 Marks

5. **Semester Examination Marks:**

   ● Theory Paper(TH)   50 Marks

   ● Practical /Viva(PR/V)   25 Marks

Rationale:

Electrical Circuits and Networks is a course where students are introduced to simple electrical circuit concepts, principles, and analysis to have visualization of electrical engineering applications.

Course Outcomes:

On successful completion of course, students will be able to:

1.   Apply fundamental concepts in solving and analysing different Electrical networks.

2.   Evaluate the parameters for series, parallel resonant circuits and coupled circuits.

3.   Infer and evaluate transient response, Steady state response of network functions.

Prerequisites:

Students should know

1. Fundamentals of electrical Circuit Networks.
2. Use of Basic Electrical Laws like Ohm's Law, KCL, KVL.
3. Use of mesh/loop/nodal Analysis for different electrical networks.
4. Use of Network Theorem's.

Learning Structure

Application	To analyse different two port networks, network functions resonant circuit and coupled circuits. Evaluate the transient and steady state response and decides the stability of electric network functions.
Procedure	To solve different two port networks, network functions, resonant circuits, coupled circuits and transient response by applying various network theorems , mesh and node analysis.
Principle	Network theorems, Mesh Analysis, Node Analysis, Source Transformation
Concept	Ohm's Law, KVL, KCL, Voltage Divider rule, Current Division Rule
Facts	Passive Components in Electric circuit, Different types of Current & Voltage Sources

Course Contents

THEORY

Unit	Chapter	Topic and Details		No. of Lectures assigned	Weight age in %
I	1. Two Port Networks	1.1	Introduction	10	20
		1.2	Open Circuit Impedance Parameters (Z-Parameters)		
		1.3	Short-Circuit Admittance (Y-Parameters)		
		1.4	Transmission Parameters (ABCD Parameters)		
		1.5	Inverse Transmission Parameters (A'B'C'D' Parameters)		
		1.6	Hybrid Parameters (h-Parameters)		
		1.7	Inverse Hybrid Parameters (g-Parameters)		
		1.8	Interrelations between Parameters		
II	2. Network Functions	2.1	Introduction	10	30
		2.2	Driving Point Functions		

		2.3	Transfer Functions		
		2.4	Poles and Zeros of Network Function		
		2.5	Restrictions on Pole-Zero Locations for Driving Point Functions		
		2.6	Restrictions on Pole-Zero Locations for Transfer Functions		
		2.7	Time-Domain Behaviour from Pole-Zero Plot.		
	3.Resonance	3.1	Introduction	05	10
		3.2	Series Resonance		
		3.3	Parallel Resonance		
		3.4	Comparison of Series and Parallel Resonant Circuits		
III	**4.Coupled Circuits**	4.1	Self-Inductance	10	20
		4.2	Mutual Inductance		
		4.3	Coefficient of Coupling		
		4.4	Inductance in series		
		4.5	Inductances in Parallel		
		4.6	Dot Convention		
		4.7	Coupled Circuits		
		4.8	Tuned Circuits		
	5.Transient Analysis	5.1	Introduction	10	20
		5.2	Initial Conditions		
		5.3	Resistor-Inductor Circuit		
		5.4	Resistor-Capacitor Circuit		
		5.5	Resistor-Inductor-Capacitor Circuit		

PRACTICALS

Sr. No	Course Outcome	Laboratory Activities	No. of Hrs assigned	Weight age in %
01	CO1	Determine Open Circuit (Z) Parameters for given Network.	02	10
02	CO1	Determine short Circuit (Y) Parameters for given Network.	02	10
03	CO1	Determine transmission Parameters (ABCD) for given Network.	02	10
04	CO1	Determine inverse transmission Parameters (A'B'C'D') for given Network.	02	10
05	CO1	Determine Hybrid Parameters (h) for given Network.	02	10

06	CO2	To study the resonance in given R-L-C circuit by varying L and C or by using variable frequency supply.	02	10
07	CO3	Introduction to Sci-LAB part-I	02	10
08	CO3	Introduction to Sci-LAB part-II	02	10
09	CO3	To Plot a graph for a given network function	02	10
10	CO3	To Plot a pole-zero plot for a given network function.	02	10

PROJECT BASED ASSIGNMENTS

Sr. No	Course Outcome	Details Sample Assignments	Marks
1	CO2	Build the coupled circuit for understanding the concept of mutual inductance or Resonance.	10
2	CO3	Use of Sci-Lab to interpret Circuit response for given expression.	10
3	CO3	To plot a pole-zero plot for a given network function using Sci-lab	10
4	CO1	Write a code to find Z / Y / h or g for a given network using Sci-lab	10
5	CO1	Write a code to convert Z-Parameters to Y -parameters for a given network using Sci-lab	10

Skill Test

Sr No	Course Outcome	Details Sample Questions	Marks
1	CO1	To find parameters for given two port network. (Mathematical Analysis)	4
2	CO3	Determine Driving point / transfer function of given network.(Mathematical Analysis)	4
3	CO2	Draw Time–domain equivalent circuit for given coupled circuit.(Mathematical Derivation/ Graphical Representation)	2
4	CO2	Derive the formula for resonant frequency for given various combinations or series and parallel R-L-C circuits. (Mathematical Analysis)	2
5	CO3	To find transient response of given R-L-C circuit.	3

Examination/Assessment Scheme:

Question	Q1		Q2		Q3		Q4		Q5	
Sub-Question	A	B OR B	A	B OR B	A OR A	B	A OR A	B	A	B OR B

Marks	05	05/05	05	05/05	05/05	05	05/05	05	05	05/05
CO	CO 3	CO 1	CO2	CO3	CO2	CO 2	CO3	CO3	CO1	CO3
Chapter	5	1	4	2	4	3	5	2	1	2
Level of Competence	R	A	R	U	A	U	A	R	R	A

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	**With Option**
1	10	15
2	15	25
3	5	00
4	10	15
5	10	15
Total	**50**	**70**

Final Theory Examination Course Outcome Weight-age Scheme:

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	1(b)	05	10	20
	1(b)	05		
	5(a)	05		
CO2	2(a)	05	15	30
	3(a)	05		
	3(b)	05		
CO3	1(a)	05	25	50
	2(b)	05		
	2(b)	05		
	4(a)	05		
	4(a)	05		
	4(b)	05		
	5(b)	05		
	5(b)	05		

Total (Internal & External) Course Outcome Weight-age Scheme:

Sr.No.	Practical Lab (10 Marks)	Project Based Assignments (25 Marks)	Skill Test [15 Marks)	Final Theory exam	Total	Weightage% (Total)x100
CO1	04	10	04	10	28	28
CO2	03	05	04	15	27	27
CO3	03	10	07	25	45	45
Total	10	25	15	50	100	100%

References:

Text/ Reference Books:				
Sr. No	Book title	Author/s	Edition	Publication
1	Circuit Theory and Transmission Lines	Ravish R Singh	3rd Edition	McGraw Hill Education ISBN:978-9-3004-4
2	Circuits and Networks	Sudhakar A.,Palli Shayammohan S.	4th Edition	McGraw Hill ISBN:978-0-07-340458-5
3	Fundamentals of Electrical Networks	Gupta B.R. ,Singal Vandana	3rd Edition	S.Chandand Corp. New Delhi
4	Network Analysis	E.Van Walkenberg	5th Edition	PHI Ltd New Delhi 2011

Online Reference material and links

Sr. No	Online Reference material and links
1	https://nptel.ac.in/courses/108102042/21
2	https://www.tutorialspoint.com/network_theory/network_theory_coupled_circuits.htm
3	https://nptel.ac.in/courses/108105053/pdf/L-17(NKD)(ET)%20((EE)NPTEL).pdf
4	https://nptel.ac.in/courses/108105053/10
5	https://nptel.ac.in/courses/122105023/6
6	https://www.scilab.org/sites/default/files/Scilab_beginners_0.pdf
7	https://www.youtube.com/watch?v=vevJHUKi0_A
8	https://www.youtube.com/watch?v=YLGrugmDvc0
9	https://www.youtube.com/watch?v=GasWAlIvvD8

Course Name : **Diploma in Electronics**

Semester : **III**

Subject name : **PRINCIPLE OF ELECTRONIC CIRCUITS**

Subject Code : **DE 3002**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme					
				Semester Exam Duration (hrs.)	Internal Marks		Semester Marks		Total Marks
Theory (hrs.)	Tutorial (hrs.)	Practical (hrs.)	Credit	TH/PR	TW	PR	TH	PR	(TW+TH+PR)
3	0	2	4	2	50	25	50	25	150
Abbreviations: TW-Term Work ,TH-Theory, TU- Tutorial, PR-Practical									

Examination Scheme:

6. Minimum 40% marks are needed for passing in all the internal assessments and semester examinations.

7. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

8. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignments and laboratory experiments will not be declared successful for that examination head.

9. __Internal Marks.__

- Term Work (TW)

    Project based Assignments   50 Marks

- Practical Internal (25 Marks)

    3. Practical Lab   10 Marks

    4. Practical Skill Test   15 Marks

10. __Semester Examination Marks__:

- Theory Paper(TH)   50 Marks
- Practical /Viva(PR/V)   25 Marks

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__Rationale:__

The course will develop the fundamental understanding of electronic circuits viz amplifiers, oscillators and multivibrators using discrete and integrated devices. Testing and troubleshooting of circuits will enhance deeper learning

__Perquisites:__

Students should know

1. The basic structure and working of semiconductor devices(Diodes ,BJT,FET)
2. Basic circuits theorems and concepts.

Course Outcomes:

On successful completion course, students will be able to:

1. Understand the basic principles and working of electronic circuits.
2. Measure key parameters of basic electronic circuits specified in the curriculum.
3. Design basic electronic circuits for a given circuit parameters.
4. Analyze performance characteristics of discrete components of basic electronics.

Learning Structure:

Application	Discrete component Wave shapers
Procedure	Study circuits and learn design procedure of Power Amplifiers, FET Amplifier and Tuned Amplifier, Time Base Generator
Principle	Power/ FET/Tuned Amplifiers Feedback Amplifiers, Time Based Generators Multivibrators & Oscillator
Concept	Operating point, phase shift, cascading, multi staging, Bark hausen
Facts	Resistor, capacitor, indicator, diode, bipolar junction transistor, field effect transistor,

Course Contents:
THEORY

Unit	Chapter	Topic and Contents	Hours
1	1	**Introduction to Amplifier** 1.1 Operating point, Biasing of amplifier 1.2 **Amplifier characteristics** Input resistance, voltage gain, current gain, output resistance, power gain, voltage gain . 1.3 **Equivalent circuit Models** Input resistance, output resistance, inverting and non inverting amplifications, multistage amplifiers, inter stage loading	10

2	2	**Transistor Amplifiers**, 2.1 Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier 2.2 Classification Of Amplifiers according to biasing, types of devices used unipolar and bipolar supply and frequency range. **2.3** Power Amplification: DC Analysis, Load Line Analysis, Class B push pull amplifier. Need of heat sink, Need of multi stage amplifier, gain bandwidth product, multistage amplifiers and its types 2.4 Amplifiers Efficiency, Mode Of Operations, Efficiency Of Class A, Class B And Class C Amplifiers, **2.5 Feedback Amplifier:** Feedback Concept, Effect of Feedback On Amplification, Frequency response & Stability, 2.6 Types of negative feedback – voltage shunt, voltage series, current shunt & current series. 2.7 Advantages of negative feedback on voltage gain, bandwidth, input impedance, output impedance, stability, noise, distortion in amplifier.	17

	3	**Field Effect Transistors.**
		
		  4.1 MOSFETs, CS, CD & CG Amplifiers,
		
		  4.2 Amplifier Characteristics**,**
		
		  4.3 Amplifier analysis
			7

	4	**Oscillators:** **4.1** Introduction To Oscillators, 4.2 Concept of positive feedback , Barkhausen Criteria, Wien Bridge Oscillators, RC Phase Shift Oscillators using BJT, 4.3 Crystal Oscillators, Hartley Oscillators, Colpitt Oscillators, Voltage Controlled Oscillators**.** **4.4 Multivibrators** Transistor as switch. Definition & graphical representation of different time periods. Multivibrator classification, circuit working & frequency with specific application. MMV , AMV , BMV & Schmitt trigger	11

PRACTICAL LAB

Sr. No	Course outcome	Lab Activities	No. of Hrs assigned
1	C01 /CO2	To study biasing techniques of CE amplifier	2
2	C01	To study characteristics of a CE amplifier	2
3	CO1	To study characteristics of a CB / CC	2

4	CO2/CO3	To study frequency response of CE amplifier	2
5	CO2/CO3 /CO4	To study Multistage Amplifiers, RC coupled BJT Amplifiers / direct coupled BJT amplifiers	2
6	CO2/CO3 /CO4	To study Power Amplifiers: Amplifier classes and efficiency, Class A, B, AB, C Amplifiers Push Pull Amplifier, Distortion in Push-Pull Amplifier	2
7	CO2/CO3 /CO4	To study Power Amplifiers: Amplifier classes and efficiency, Class A, B, AB, C Amplifiers Push Pull Amplifier, Distortion in Push-Pull Amplifier	2
8	CO 1	To study MOSFET CS amplifier characteristics	2
9	CO2	To study the Multistage Amplifiers, Direct couple FET Amplifier	2
10	CO2/CO3 /CO4	Study and implementation of Wien Bridge / RC phase shift Oscillator	2
11	CO2/CO3 /CO4	Study and implementation of Colpitts / Hartley oscillator	2

PROJECT BASED ASSIGNMENTS

Sr. No	Course outcome	Assignments (SAMPLE ASSIGNEMENTS)	Marks
1.	CO1,CO2,CO3,CO4	Design and implementation of any four electronics circuits specific to curriculum.	50

SKILL TEST

Sr. No	Course outcome	Topic	Marks
1	CO 3,CO4	Design ,analysis and Troubleshooting of any circuit specified in curriculum	15

.

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	a OR a	b OR b	c	D	E	A	b OR b	a OR a	b	a OR a	B	a	B OR B
CO	1	2	3	3	4	2	3	1	1	2	4	4	3
Chapter	1	2	4	3	3	2	4	2	1	3	2	1	4
Marks	2	2	2	2	2	6	4	6	4	6	4	6	4
Level of Competence	R	C	C	U	U	R	A2	A1	R	E	A1	A2	U

R remember - 12, U understand - 8, A1 Apply - 10, A2 Analyze - 10, E evaluate - 6, C create -4

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	12	14
2	18	26
3	10	16
4	10	18
Total	50	74

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	1(a) 3(a) 3(b)	2 6 4	12	24%
CO2	1(b) 2(a) 4(a)	2 6 6	14	28%
CO3	1(c) 1(d) 2(b) 5(b)	2 2 4 4	12	24%
CO3	1(e) 5(a) 4(b)	2 6 4	12	24%

Total (Internal & External) Course Outcome Weight-age Scheme:

Sr. No.	Practical Lab (10 Marks)	Project Based Assignments (15 Marks)	Skill Test [15 Marks)	Final Theory exam	Weightage % (Total)x100
C01	3	5	0	12	20%
CO2	2	5	0	14	21%

CO3	2	0	15	12	29%
CO4	3	5	10	12	30%
Total	10	15	25	50	100%

REFERENCES:

Text/ Reference Books:				
Sr. No	Book title	Author/s	Edition	Publication
1	Electronic Devices and Circuit Theory	Theodore F. Bogart Jr.	6th Edition	Pearson Education India
2	Electronic Devices and Circuit Theory	Robert L. Boylestad, Louis Nashelsky	10th Edition	Pearson
3	Microelectronics Circuits Electronic Devices and Circuits	Sidra & Smith	7th Edition	Pearson
4	The art of Electronics	Paul Horowitz, Winfield Hill	3rd Edition	Cambridge Press Publication

Online Reference material and links

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	https://nptel.ac.in/courses/117101106/3#
2	https://www.ee.iitb.ac.in/uma/~wel/wel45/public_html/edl10a/Audio%20amplifier.pdf
3	http://aries.ucsd.edu/NAJMABADI/CLASS/ECE65/13-W/Slides/ECE65_W13-9-Discrete_Amps-A.pdf
4	https://www.allaboutcircuits.com/worksheets/oscillator-circuits/
5	https://nptel.ac.in/courses/117107095/20

Course Name   : **Diploma in Electronics**

Semester   : **III**

Subject name   : **DIGITAL CIRCUITS AND FUNDAMENTALS OF MICROPROCESSORS**

Subject Code   : **DE 3003**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme					
				Semester Exam Duration (hrs.)	Internal Marks		Semester Marks		Total Marks
Theory (hrs.)	Tutorial (hrs.)	Practical (hrs.)	Credit	TH/PR	TW	PR	TH	PR	(TW+TH+PR)
3	0	2	4	2	50	25	50	25	150
Abbreviations: TW-Term Work ,TH-Theory, TU- Tutorial, PR-Practical									

Examination Scheme:

11. Minimum 40% marks are needed for passing in all the internal assessments and semester examinations.

12. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

13. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignments and laboratory experiments will not be declared successful for that examination head.

14. Internal Marks.

- Term Work (TW)

    Project based Assignments   50 Marks

- Practical Internal (25 Marks)

    5. Practical Lab   10 Marks

    6. Practical Skill Test   15 Marks

15. Semester Examination Marks:

- Theory Paper(TH)   50 Marks

- Practical /Viva(PR/V)   25 Marks

Rationale:

The subject will help the students to learn facts, concepts, principle and procedure of digital electronics. These techniques can be used for designing sequential and combinational circuits which forms the basis of any digital electronic system. Also, this subject is designed to give clear idea about working principles of 8085 microprocessor and peripherals.

Course Outcomes:

On successful completion of course, students will be able to :

1. Understand the fundamental concepts and techniques used in digital circuits

2. Analyze and design basic combinational and sequential digital circuits.

3. Understand working of Microprocessor 8085

4. Perform simple Arithmetic and logical assembly programs

Prerequisites:

Students should know

1. Basic of computer architecture.

2. Basics of fundamental programming concepts like instructions algorithm and flowcharts.

3. Logical thinking to implement the loops and branching.

4. Execution of program and debug error.

5. Concept of electronics active components.

Learning Structure

Application	To apply principles of digital system design in Microprocessors, Controllers and computers, Enabling students to develop assembly language programs using instruction set, Procedures and macros
Procedure	Procedure for conversion of number systems and binary codes, Procedure to design digital systems , Microprocessor operation, coding and program execution
Principle	Different number systems & codes , Combinational & sequential circuits, Principle of digital design and principle of writing programs
Concepts	Combinational and Sequential digital circuits, Number systems, Binary codes, Logic families, Flip-flop, Register, Counter, Hardware, assembler, linker, debugger, Addressing modes, instructions and logic development
Facts	Number systems, codes, Microprocessors, Buses, Registers, Stack , Memory, keyboard display.

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Course Contents

THEORY

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Unit	Chapter	Topic and Details	No. of Lectures assigned	Weight age in %
I	1	**Number systems and logic families.**	06	10

		Decimal, binary, octal and hexadecimal number systems. Conversion from one system to another, Binary arithmetic, signed numbers. Codes-BCD, Excess-3, Gray, alphanumeric, Concept of parity and error detection and correction. **Logic Families and Circuits** TTL, Logic Family, NAND Gates ,7400 and 5400 series of IC logic families: RTL, DCTL, DTL, TTL, MOS and CMOS; their characteristics and circuit configuration, tri-state logic.		
	2	**Logic Gates and Boolean Algebra** Definitions, symbols and truth table of NOT, OR, AND, NAND, NOR, XOR, XNOR gates, Basic laws of Boolean algebra, De Morgan's theorems; Realization of basic gates using universal gates; Realization of simple Boolean equations using universal gates, Karnaugh-map	06	10
2	3	**Combinational logic Design** Design of Adder and Subtractor, Block diagram, Truth table, logical expression and logical diagram of Multiplexers and De-multiplexers, Design of digital combinational circuits	06	20
	4	**Flip Flops And Sequential Logic Design** One bit memory cell, Symbol, Logic diagram using NAND gates, Working, Truth table and Timing diagram of R-S,J-K, D and T flip flop, Block diagram and working of Master- Slave flip-flop. Concept of Registers, Types of shift registers, Working of different types of shift registers, Concept, Modulus, working, truth table and Timing Diagram of a counter, Design of mod N-counter: Working, truth table and timing diagram, Digital memories, RAM, ROM, PROM, EPROM and EEPROM	09	20
III	5	**Microprocessors** Evaluation of microprocessors, microcomputer organizatio 8-bit, microprocessor-Intel 8085 architecture buses, flags an register organization, timing signals, instruction sets, addressin modes. Programming in machine and assembly language Memory interfacing.	12	30

IV	6	**Interfacing memory and I/O devices**-address space partitioning, different data transfer schemes,	06	10

PRACTICALS

Sr. No	Course Outcome	Laboratory Activities	No. of Hrs assigned	Marks
01	CO1	Verification of static characteristics of logic gates.	02	.5
02	CO1	Verification of Demerger's theorems	02	.5
03	CO1	Synthesis of gate using NAND and NOR gates.	02	.5
04	CO1	Reducing given logical function using K-Map and implementing the obtained logical expression using logic gates	02	.5
05	CO2	To Verify the operations of SR and JK Flip-flops	02	.5
06	CO2	To verify the operation of 4 bit Shift registers using IC	02	.5
07	CO2	To implement 3 bit synchronous counter and verify its operation	02	1
08	CO3	Write an ALP using data transfer instruction.	02	1
09	CO3	Write an ALP using Arithmetic instruction.	02	1
10	CO4	Write an ALP using Logical instruction.	02	.5
11	CO4	Write an ALP using branch instruction.	02	.5
12	CO4	Write an ALP to find smallest/ largest number from array of n numbers.	02	.5
13	CO4	Write an ALP to arrange numbers in array in ascending/ descending order.	02	5

PROJECT BASED ASSIGNMENTS

Sr. No	Course outcome	Assignments (SAMPLE ASSIGNEMENTS)	Marks
1.	CO1,CO2,CO3,CO4	Design and implementation of any three application based digital electronics circuits and one assignment on microprocessor as per specific to curriculum.	50

SKILL TEST:

Unit No	Course Outcome	Details	Marks
I	CO2 & CO4	Design of a digital circuit and write an ALP to perform a particular task in Microprocessor	15

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	A OR A	b OR b	C	D	E	A	b OR b	A OR A	b	A OR A	B	a	b OR b
CO	CO1	CO3	CO2	CO4	CO4	CO1	CO2	CO2	CO2	CO3	CO4	CO3	CO4
Chapter	1	5	2	7	6	3	4	4	3	5	6	6	7
Marks	2	2	2	2	2	4	6	4	6	4	6	4	6
Level of Competence	U	R	U	R	U	U	A	A	A	U	A	U	A

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	2	4
2	2	2
3	10	10
4	10	20
5	6	12
6	12	12
7	8	14
Total	**50**	**74**

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que. No.	Marks	Total	Weightage% (Total/50)x100
C01	1(a) 2(a)	2 4	6	12

CO2	1(c)	2	18	36	
	2(b)	6			
	3(a)	4			
	3(b)	6			
CO3	1(b)	2	10	20	
	4(a)	4			
	5(a)	4			
CO4	1(d)	2	16	32	
	1(e)	2			
	4(b)	6			
	5(b)	6			

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Practical Lab (10 Marks)	Project Based Assignments (25 Marks)	Skill Test [15 Marks]	Final Theory exam	Weightage% (Total)x100
CO1	2	5		6	13
CO2	2	7	7	18	34
CO3	2	6		10	18
CO4	4	7	8	16	35
Total					100%

REFERENCES:

Text/ Reference Books:				
Sr. No	Book title	Author/s	Edition	Publication
1	Modern Digital Electronics	R.P.Jain		Tata Mcgraw Hill
2	Digital Principles	Malvino Leach		Prentice hall of india
3	Digital Fundamentals	Thomas Floyed		Pearson
4	Microprocessor & interfacing	Douglas V. Hall		Tata McGraw Hill

	(programming & hardware) Revised Second Edition			
5	Microprocessor Architecture, Programming and Applications with the 8085.	Ramesh S. Gaonkar		Penram International Publishing (India)

Online Reference material and links

Sr,No	Links and Recourses URL
1	https://www.tutorialspoint.com/digital_electronics/index.asp
2	https://www.youtube.com/watch?v=LeBsq41EUxs
3	https://www.notemonk.com/book/595/Digital.Electronics.&.Microprocessors/
4	https://www.openlearning.com/courses/microprocessor-system
5	https://www.mooc-list.com/tags/microprocessors
6	https://nptel.ac.in/courses/108105102/7

Course Name   **: Diploma in Electronics**

Semester   **: III**

Subject name   **: Electronic Measurements and Instrumentation**

Subject Code   **: DE 3004**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme					
				Semester Exam Duration (hrs.)	Internal Marks		Semester Marks		Total Marks
Theory (hrs.)	Tutorial (hrs.)	Practical (hrs.)	Credit	TH/PR	TW	PR	TH	PR	(TW+TH+PR)
3	0	2	4	2	50	25	50	25	150
Abbreviations: TW-Term Work ,TH-Theory, TU- Tutorial, PR-Practical									

Examination Scheme:

16. Minimum 40% marks are needed for passing in all the internal assessments and semester examinations.

17. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

18. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignments and laboratory experiments will not be declared successful for that examination head.

19. Internal Marks.

- Term Work (TW)

  Project based Assignments   50 Marks

- Practical Internal (25 Marks)

  7. Practical Lab   10 Marks

  8. Practical Skill Test   15 Marks

20. **Semester Examination Marks:**

- Theory Paper(TH)   50 Marks

- Practical /Viva(PR/V)   25 Marks

Rationale:

Instrumentation is an emerging field used in data detection, acquisition, analysis and control in industrial applications. Analog instruments are mainly used to determine different process parameters. These instruments present desired information in visual indication either in analog or digital form. This subject presumes that the students are familiar with basic utilization of measuring instruments. The era of this subject consists of the information about concepts, principles and procedures of analog and digital electronic measuring instruments and Controlling of Instrumentation Systems.

Course Outcomes:

On successful completion of course, students will be able to:

1. Analyse the different electronic parameters, signals and errors in measurement.

2. Calibrate an electronic instrument.

3. Use and operate Signal Generator, Oscilloscope and signal analysis instruments.

4. Understand basics of data acquisition system and select as per application.

5. Use the principles of electronic and instrumentation to maintain electronic instruments and systems.

Prerequisites: -

Students should know

1. Fundamental concepts of electrical Parameters and its measurement.

2. Basic concepts of physical Parameters.

3. Basics of electronic components, analog and digital circuits.

Learning Structure

Application	Measure different electrical quantities using various instruments and Controlling of instrumentation Systems.
Procedure	Selection of proper instruments for measurement of respective quantity, measurement with selected analog or digital instruments

Principle	Working Principle & operation of multimeter, CRO & Signal generator, ADC, Principle & operation of, DSO, Wave Analysers
Concepts	Analog Instruments: Ammeter, Voltmeter, Signal generator, Oscilloscope, ADC, Digital Instruments: DSO, Wave generator
Facts	Units of measurement, characteristics of instruments, Different types of Transducers, electronic measurement of electrical / physical parameters, measuring instruments & system

Course Contents

THEORY

Unit	Chapter	Topic and Details	No. of Lectures assigned	Weight age in %
I	1. **Industrial Measurement Fundamentals**	1.1 Need of Measurement & Generalized block diagram of Instrumentation. 1.2 Static Performance Characteristics: Accuracy, Precision, Linearity, precision, Dead band 1.3 Errors in measurement. 1.4 Units, standards and Calibration 1.5 Classification of transducers on the basis of physical parameters like pressure, temperature, level, Light intensity displacement, photoelectric, piezoelectric, resistive and capacitive parameters 1.6 Selection Criteria of Instrument and Transducer	8	12
Unit – II	2.**Current & Voltage Measurements**	2.1 PMMC Meter, Construction, Principle of operation and its Working 2.2 DC Ammeter and Multi-range Ammeter 2.3 DC Voltmeter and Multi-range Voltmeter 2.4 Digital Voltmeter and its types like Ramp Type, Single slope ADC, Dual slope ADC, SAR 2.5 Different types of DAC R-2R and Binary Weighted Type	8	16

Unit –III	3.Signal Generation	3.1	Standard Signal Generator	05	12
		3.2	Classification of Signal Generators		
		3.3	Audio Frequency Signal Generator		
		3.4	RF Generator		
		3.5	Function Generator		
		3.6	Pulse Generator		
Unit –IV	4.Oscilloscope	4.1	Oscilloscope block diagram	12	30
		4.2	Vertical Deflection System		
		4.3	Horizontal Deflection System		
		4.4	Delay line,		
		4.5	CRO Probes		
		4.6	DSO		
		4.7	Frequency and Phase measurement using CRO.		
		4.8	Frequency Counter		
		4.9	Period Measurement		
Unit –V	5.Wave Analysers	5.1	Basics of Wave Analyser	6	15
		5.2	Types of Wave Analyser		
		5.3	Frequency Selective Wave Analyser		
		5.4	Heterodyne Wave Analyser		
		5.5	Spectrum Analyser		
		5.6	Logic Analyser		
		5.7	Comparison of CRO and Wave Analyser		
Unit –VI	6.Data Acquisition System	6.1	Data Acquisition System	6	15
		6.2	Single Channel DAS		
		6.3	Multichannel DAS		
		6.4	Application of DAS		
		6.5	Signal Conditioning and Instrumentation Amplifier		

PRACTICALS

Sr. No	Course Outcome	Laboratory Activities	No. of Hrs assigned	Weight age in %
01	CO1	To measure accuracy of analog and digital multimeter for voltage measurement.	02	10

02	CO3	To study the front panel control of Function Generator	02	10
03	CO3	To study the front panel control of Cathode Ray Oscilloscope.	02	10
04	CO3	To measure frequency of unknown signal using Lissajous pattern.	02	10
05	CO3	To measure phase of unknown signal using Lissajous pattern.	02	10
06	CO2	To convert given permanent magnet moving coil (PMMC) movement (1mA, 50Ω) into multi range DC voltmeter.	02	10
07	CO2	To design and Verify R-2R DAC.	02	10
08	CO 4	To test Temperature controller circuit using PT100.	02	10
09	CO1	To measure the displacement using LVDT.	02	10
10	CO5	To calculate gain of designed Instrumentation amplifier.	02	10

PROJECT BASED ASSIGNMENTS

Sr. No.	Course Outcome	Details	Marks
1	CO3	Test various active and passive components and CRO Probe using CRO.	10
2	CO2	To Calibrate Analog Multimeter for Voltage	10
3	CO5	To design various transducer circuits systems for measuring different non-electrical quantities.	10
4	CO4	To design 3-Bit Binary Weighted DAC.	10
5	CO1	To build object detector using IR sensor	10

SKILL TEST

Unit No	Course Outcome	Details	Marks
IV	CO 3	Identify the different components by observing the patterns on CRO and comment on its working status.	3
IV	CO 3	To measure unknown frequency by Lissajous pattern using DSO. Store displayed pattern and print it.	3
III	CO 1	To generate different test signals and measure its electrical parameters DSO and Comment on your result.	3
IV	CO 4	Verify resistive transducers using instrumentation amplifier to generate control signal	3
IV	CO 5	A network engineer wants to maintain the temperature of server room at 20^0 C So, help him to design instrumentation system by selecting different types of transducer, signal conditioning system and output device with its specifications.	3

Examination/Assessment Scheme:

Question	Q1		Q2		Q3		Q4		Q5	
Sub-Question	A	B OR B	A	B OR B	A OR A	B	A OR A	B	A	B OR B
Marks	05	05/05	05	05/05	05/05	05	05/05	05	05	05/05
CO	CO 3	CO 4	CO 4	CO3	CO3	CO 2	CO2	CO 3	CO3	CO1
Unit	4	6	6	3	5	2	2	4	5	1
Level of Competence	R	A	R	A	U	R	A	R	U	R

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With Option
1	05	05
2	10	15
3	05	10
4	10	15
5	10	15
6	10	15
Total	50	75

Final Theory Examination Course Outcome Weight-age Scheme:

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	5(b)	5	5	10
CO2	3(b)	5	10	20
	4(a)	5		
	4(a)	5		
CO3	1(a)	5	25	50
	2(b)	5		
	2(b)	5		
	3(a)	5		
	3(a)	5		
	4(b)	5		
	5(a)	5		
CO4	1(b)	5	10	20
	1(b)	5		
	2(a)	5		

Total (Internal & External) Course Outcome Weight-age Scheme:

Sr. No.	Practical Lab (10 Marks)	Project Based Assignments (25 Marks)	Skill Test [15 Marks)	Final Theory exam	Weightage% (Total)x100
CO1	1	5	3	5	14

CO2	3	5	3	10	21
CO3	4	5	3	25	37
CO4	1	5	3	10	19
CO5	1	5	3	--	09
Total	10	25	15	50	100%

REFERENCES:

Text/ Reference Books:				
Sr. No	**Book title**	**Author/s**	**Edition**	**Publication**
1	Electronic Measurement and Instrumentation	Dr. R.S.Sedha	1st Edition	S.Chand
2	A Course In Electrical And Electronic Measurements And Instrumentation	Sawhney, A.K.	4th Edition	Dhanpat Rai & Sons. New Delhi, 2011
3	Measurement Systems	Kalsi, H.S.	2nd Edition	Mcgraw Hill Pub., New Delhi, 2012
4	Modern Electronic Instrumentation & Measurement Techniques	Helfrick & Cooper	3rd Edition	PHI Learning, New Delhi, 2011
5	Transducers and Instrumentation	Murthy D. V. S.	2nd Edition	PHI Learning, New Delhi, 2011

Online Reference material and links

Sr. No	Online Reference material and links
1	http://www.pc-education.mcmaster.ca/Instrumentation/go_inst.htm
2	http://www.edumedia-sciences.com/
3	https://www.oreilly.com/library/view/electronic-measurements-and/9788131721995/#toc-start
4	https://www.youtube.com/watch?v=IEFUv3NI7Vc
5	https://www.khanacademy.org/science/ap-physics-1/ap-circuits-topic/dc-ammeters-and-voltmeters-ap/v/voltmeters-and-ammeters

| 6 | https://nptel.ac.in/courses/117106108/109 |

Course Name   **: Diploma in Electronics**

Semester   **: III**

Subject name   **: ENGINEERING MATHEMATICS-I**

Subject Code   **: DE3005**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical	Credit	Semester Exam Duration (TH)Hours	Internal Marks (TH+TW)	Semester Exam Marks (TH)	Total Marks (TH)
3	1	0	4	2	50	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Examination Scheme:

1. Minimum 40% marks are needed for passing in all the internal assessments and semester examinations.

2. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

3. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignments will not be declared successful for that examination head

1. **Internal marks**

Assignments	25 Marks
Open Book Test	10 Marks
Skill Test	15 Marks
Total	50 Marks

Rationale:

Students entering engineering and engineering technology courses are expected to be competent in mathematics. This is due to the fact that mathematics including calculus is a primary gateway to an engineering technology career. Calculating voltage or current through capacitor require both integral and differential calculus. Integral calculus calculates the area under the curve. Differential equations are the basis of power flow problems, control systems and machines.

Course Outcomes:

1. Analyze different methods of integration and apply appropriate method to integrate various functions.

2. Evaluate a definite integral within a given range.

3. Apply methods of integration to calculate area under a curve, mean value of a function and R.M.S value of a function.

4. Identify various types of differential equation with its order and degree and and use appropriate method to evaluate the general solution and particular solution .

5. Apply methods of differential equations to find current, voltage etc. in simple RL,RC circuits with given initial conditions

Prerequisites:

1. Adequate knowledge of algebraic operations

2. Concept of differentiation.

3. Methods of finding derivative of a function.

Learning Structure

Application	Apply methods of integration to find area under a curve, mean value and R.M.S. value of a function. Use solution of differential equation to find current and voltage in a circuit.
Procedure	Integration using substitution, Integration by parts, Integration using partial fraction,Various methods of solution of differential equations
Principle	Integration as summation, Solution of a differential equation
Concept	Various methods of integration, Definite integrals, Formation of differential equation, Categories of differential equations
Facts	Integration as reverse process of differentiation, standard integrals, Ordinary differential equations, Order and degree

Course Contents

THEORY

Unit	Chapter	Topic and Details	No. of Lectures/TU assigned	Weightage (%)
I	1	**Integral Calculus** 1.1: Rules of integration 1.2 standard integrals	25	40

		1.3 Integration of algebraic rational functions		
		1.4 Integration of trigonometric functions		
		1.5 Integration by substitution		
		1.6 Standard integrals involving radicals		
		1.7 Integration by parts		
		1.8Iintegration using partial fractions		
II	**2.**	**Application of Integration** 2.1 Definite integrals 2.2properties of definite integrals 2.3Area under a curve 2.4Mean value 2.5 Root mean square value	10	20
III	3.	**Differential equations** 3.1 Order and degree of a differential equation 3.2 Formation of differential equation 3.3 Solution of differential equation 3.4 Variable separable 3.5 Homogeneous equations 3.6 Non homogeneous differential equations 3.7 Linear differential equations 3.8 Bernoulli's equations 3.9 Exact differential equations	20	30
IV		**Applications of differential equations** 4.1 Applications of differential equations to simple RL-RC circuits	5	10

ASSIGNEMENTS

Sr. No	Course outcome	Assignments	Marks
1.	CO1	Evaluate the given integral using appropriate method of integration, Evaluate the given integral using integration by parts , partial fraction	10
2.	CO2	Evaluate the given definite integral	5
4.	CO4	Identify the order and degree of the given differential equation, Formulate a differential equation from its solution	5

5.	CO5	Identify the given differential equation and evaluate the general solution and particular solution	5

OPEN BOOK TEST

Sr. No.	Course outcome	Topics	Marks
1	CO 1	Evaluate the given integral using appropriate method of integration, Evaluate the given integral using integration by parts , partial fraction	5
2	CO4	Identify the given differential equation and evaluate the general solution and particular solution	5

SKILL TEST

Sr. No	Course outcome	Topic	Marks
1	CO1	Evaluate the given integral using appropriate method of integration	5
2	CO3	Calculate the area under a curve, mean value of a function, R.M.S value of a function	5
3	CO4	Find the general solution and particular solution of the given differential equation	5

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	a OR a	B OR b	c	D	e	A	b OR b	a OR a	b	a OR a	B	A	b OR B
CO	1	1	1	1	1	1	1	3	2	4	4	4	5
Chapter	1	1	1	1	1	1	1	2	2	3	3	3	4
Marks	2	2	2	2	2	6	4	6	4	6	4	6	4

Level of Competence	U	U	U	U	U	A	A	A	A	A	U	A	A

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	20	28
2	10	16
3	16	22
4	4	8
Total	50	74

Final Theory ExaminationCourse Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	1 a,b,c,d,e 2 a 2 b	10 6 4	20	40%
CO2	3 b	4	4	8%
CO3	3 a	6	6	12%
CO4	4 a 4 b 5 a	6 4 6	16	32%
CO 5	5 b	4	4	8%

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Assignments (25 marks)	Open book test (10 Marks)	Skill Test [15 Marks)	Final Theory exam	Weightage% (Total)x100
C01	10	5	5	20	40%
CO2	5	0	0	4	9%

CO3	0	0	5	6	11%
CO4	5	5	5	16	31%
CO5	5	0	0	4	9%
Total	25	10	15	50	100%

REFERENCES:

Sr. No.	Title	Author	Publication
1	Applied Mathematics	Patel & Rawal	Nirali Publication
2	Higher Engineering Mathematics	Dr. B.S .Grewal	Khanna Publishers
3	Engineering mathematics	S.S.Sastry	Prentice Hall of India
4	Mathematics for Engineers and Technologists	H.Fox, W.Bolton	Butterworth Heinemann
5	Engineering Mathematics	A.M Kulkarni	Central Techno Publications

6	Calculus –Differentiation and Integration	ICFAI University	Pearson
7	Schaum's 3000 solved problems in calculus	Mendelson,Elliot	Schaum"s Series
8	Advanced Calculus-Theory and Problems	Murray R. Spiegel	Schaum;s Series
9	Mathematical Methods for Engineering and science students	M.J.Engelfield	Edward Arnold

Online Reference material and links:

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1.	Integral calculus https://www.**khanacademy**.org/**math**
2.	htpp://www.mathopenref.com
3.	Introduction to integration https://www.mathsisfun.com
4.	Integration applications https://www.**khanacademy**.org/**math**

| 5. | Differential equations https://www.**khanacademy**.org/**math** |

Course Name   : **Diploma in Electronics**

Semester   : **III**

Subject name   : **ENVIRONMENTAL STUDIES**

Subject Code   : **DE3006**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical	Credit	Semester Exam Duration (TH)Hours	Internal Marks	Semester Exam Marks (TH)	Total Marks (TH/PR)
4	0	0	4	2	50	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Examination Scheme:

Minimum 40% marks are needed for passing in internal and semester examinations

1. **Internal marks**

   Project based Assignments   50 Marks

   Total   50 Marks

2. **Semester Examination (Theory) :**

   Theory exam of 50 marks will be conducted

Rationale:

This course shall create awareness about the importance of environment, the effect of technology on the environment and ecological balance. It will make them sensitive to the environmental problems in their professional endeavor .

Course Outcomes:

On successful completion of course, students will be able to:

1. Understand the role of a human being in maintaining a clean environment
2. Maintain ecological balance and preserve bio-diversity.
3. E-waste management.

Prerequisite:

1. Different natural resources on earth.
2. Pollution ,types , causes and consequences

Learning Structure

Application	Different natural resources and their importance for better life on earth.
Procedure	Control of pollution and waste management ,disaster management, wild life protection
Principles	Environment ,Ecosystem and Bio diversity, waste
Concepts	Importance of Natural resources, exploitation, deforestation , habitat loss
Facts	Pollution, natural resources ,ponds forests, rivers, sea ,genetic species, E-waste, disaster

Course Contents
Theory

Unit	Chapter	Topic and Details	No. of Lectures	Weightage in %
I	1	**1. ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY** 1.1. Definition, scope and importance of environment. 1.2. Need for public awareness 1.3. Concept of an ecosystem 1.4. Structure and function of an ecosystem 1.5. Producers, consumers and decomposers 1.6. Energy flow in the ecosystem 1.7. Ecological succession 1.8. Food chains, food webs and ecological pyramids	8	

	<u>2</u>	**2. ENVIRONMENTAL POLLUTION**
		
		2.1. Definition causes, effects and control measures of:
		   ● Air pollution
		   ● Water pollution
		   ● Soil pollution
		   ● Marine pollution
		   ● Noise pollution
		   ● Thermal pollution
		   ● Light pollution
		   ● Nuclear hazards
		2.2. Solid waste management:
			10	

		Causes, effects and control measures of municipal solid wastes, role of an individual in prevention of pollution 2.3 Impact of Disaster on environment : floods, tsunami ,earthquake, cyclones, wildfires and landslides etc.		
II	**3**	3. **NATURAL RESOURCES** 3.1 Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people. 3.2 Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems 3.3 Mineral resources: Use and exploitation, Environmental effects of extracting and using Mineral resources. 3.4 Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, hazards of chemical fertilizers and pesticides, water logging, salinity. 3.5 Energy resources: Growing energy needs, renewable and non-renewable energy rsources, use of alternate energy resources. 3.6 Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification role of an individual in conservation of natural resources	8	
	4	4. **SOCIAL ISSUES AND THE ENVIRONMENT** 4.1 From unsustainable to sustainable development 4.2 Urban problems related to energy mismanagement. 4.3 Water conservation, rain water harvesting, watershed management, drip water irrigation ,use of check dems. 4.4 Resettlement and rehabilitation of people; its problems and concerns, case studies 4.5 Role of non-governmental organization. 4.6 Environmental ethics: Issues and possible solutions	10	

		4.7 Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.		
		4.8 Wasteland reclamation Consumerism and waste products		
		4.9 The Environmental protection act: The Air (Prevention and Control of Pollution) act, The Water (Prevention and control of Pollution) act ,The Wildlife protection act and The Forest conservation act .		
		4.10 Enforcement machinery involved in environmental legislation.		
		4.4 Central and state pollution control boards		
		4.5 Public awareness.		
	5	5. **ELECTRONICS AND ITS IMPACT ON ENERGY AND ENVIRONMENT:** 5.1 Green Electronics council 5.2 EPEAT tools and standards ,environmental impact, 5.3 Bio-Degradable Electronics. 5.4 Sustainable Electronics 5.5 Photovoltaic and solid state lighting.	6	
III	6	6. **E-WASTE MANAGEMENT** Pollutant like ,Liquid crystal Lithium – Mercury Nickel PCBs (poly chlorinated biphenyls) Transformers, capacitors, softening agents for paints, glue, plastic Selenium Silver, Zinc, arsenic, barium Brominated flame proofing agent, lead cobalt ,copper and use of many such electronics material and their effect on environment. E-waste management policies form clean and safe environment in India and abroad. Methodology for the calculation of sales, e-waste generated, and stocks. Classifications for E-waste, Measuring Framework of E-waste Statistics, E-Waste Stocks, E Waste standards.`	18	

		Disposal and recycle of E-Waste.		

PROJECT BASED ASSIGNMENTS

CO	Assignment No.	Details(Samples)	Marks
1	1	Field study of local polluted site – Urban / Rural / Industrial / Agricultural.	10
	2	Effects of industries on natural Resources-case study	10
	3	Documentary/short film on Social issues and environment-	10
II	1	Field study of common plants, insects, bird's parks.	10
III	1	Role of information technology in environment and human health – Case studies	05
	2	E-Waste and its Management in India	05

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	a OR a	b OR b	C	D	E	A	b OR B	A OR A	B	A OR A	B	a	B OR B
CO	1	3	2	1	2	3	2	1	3	2	1	2	3
Chapter	1	5	3	2	4	5	3	2	5	4	1	3	5
Marks	2	2	2	2	2	6	4	6	4	6	4	6	4
Level of Competence	R	R	R	U	U	R	A	A	R	U	A	A	U

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	14	22
2	20	30
3	16	22
Total	50	74

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	1(a)	2	14	28%
	1(d)	2		
	3(a)	6		
	5(a)	4		
CO2	1(c)	2	20	40%
	1(e)	2		
	2(b)	4		
	4(a)	6		
	5(a)	6		
CO3	1(b)	2	16	32%
	2(a)	6		
	3(b)	4		
	5(b)	4		

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Practical Lab (10 Marks)	Project Based Assignments (25 Marks)	Skill Test [15 Marks)	Final Theory exam	Weightage% (Total)x100
CO1	0	30	0	14	44%
CO2	0	10	0	20	30%
CO3	0	20	0	16	36%
Total		50		50	100%

REFERENCES

Sl. No.	Title of Book	Author	Publication
1.	Introduction to Environmental Engineering and Science	Gilbert M.Masters	2nd edition, Pearson Education (2004).

2.	Environmental Science and Engineering	Benny Joseph,	Tata McGraw-Hill,NewDelhi, (2006).
3.	Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards	R.K. Trivedi,	Vol. I and II, Enviro Media.
4.	Environmental Encyclopaedia	Cunningham, W.P. Cooper, T.H. Gorhani,	Jaico Publ., House, Mumbai, 2001.
	Environmental law	Dharmendra S. Sengar,	Prentice hall of India PVT LTD, New Delhi, 2007.
	Environmental Studies-From Crisis to Cure	Rajagopalan, R,	Oxford University Press (2005)

Online Reference material and links	
Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	https://www.class-central.com/subject/environmental-science
2	http://www.openculture.com/environment-free-online-courses
3	https://ocw.mit.edu/courses/civil-and-environmental-engineering/1-018j-ecology-i-the-earth-system-fall-2009/

CURRICULUM

FOURTH SEMESTER DIPLOMA IN ELECTRONICS

Course Name   **: Diploma in Electronics**

Semester   **: IV**

Subject name   **: ANALOG TECHNIQUES**

Subject Code   **: DE4001**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme					
				Semester Exam Duration (hrs.)	Internal Marks		Semester Marks		Total Marks
Theory (hrs.)	Tutorial (hrs.)	Practical (hrs.)	Credit	TH/PR	TW	PR	TH	PR	(TW+TH+PR)
3	0	2	4	2	50	25	50	25	150
Abbreviations: TW-Term Work ,TH-Theory, TU- Tutorial, PR-Practical									

Examination Scheme:

21. Minimum 40% marks are needed for passing in all the internal assessments and semester examinations.

22. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

23. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignments and laboratory experiments will not be declared successful for that examination head.

24. Internal Marks.

- Term Work (TW)

    Project based Assignments   50 Marks

- Practical Internal (25 Marks)

    9.   Practical Lab   10 Marks

    10. Practical Skill Test   15 Marks

25. Semester Examination Marks:

- Theory Paper(TH)   50 Marks
- Practical /Viva(PR/V)   25 Marks

Rationale:

Integrated circuits are basis of high density electronics circuits enabled to reduce size, weight and cost of equipments. This subject will make students familiar with general analog principles and design methodologies using integrated circuit for system design.

Course Outcomes:

On successful completion of course, students will be able to:

1. Understand various linear and non linear applications of Op-Amp
2. Apply op-amps fundamentals in design and analysis of different applications circuits.
3. Selection of appropriate Op-Amp for given applications.

Prerequisites:

1. Amplifier fundamentals
2. Feedback concepts
3. Network theory

Learning Structure

Application	Op-Amp applications in linear and non-linear circuits like Timer circuits, voltage regulators, VCOs PLLs, function generator.
Procedure	Prototyping ,Visual inspection, Measuring and Plotting of characteristics etc
Principle	Virtual ground node ,very small or zero bias currents ,very large voltage gain and input impedance , large gain –bandwidth product etc
Concepts	Operational Amplifier parameter slew rate ,CMRR, PSRR,Linear Circuits and non-linear circuits
Facts	Amplifier, timers, filters,Multivibrator and Oscillator

Course Contents

THEORY

*Note: Number of units should be equal to number of credits

Unit	Chapter	Topic and Details	No. of Lectures	Weight age in %
I & II	1	Introduction to Operational Amplifier: 1.1 Basic terms and definition ,block diagram, pin configuration ,application, schematic symbol, internal circuit diagram Equivalent circuit of an op amp ,ideal voltage transfer curve, electrical Characteristics of an ideal Op-Amp, linear/digital IC	6	15
	2&3	Op-amps in Linear and Non -Linear Analog Systems:	12	27

		The basic inverting and non-inverting amplifier,differential amplifier,instrumentation amplifier,differentiator,integrator,logrithemic and exponential amplifier,analog multiplier,analog comparator and its applications,VIC,IVC,DAC,ADC ,S/H circuits		
III	**4**	**The Integrated Circuit Timer IC-555**: Basic structure, Principle of Operation and waveform application as astable monostable and bistable multivibrator, applications in industry, designing of circuits using IC-555.	6	12
	5	**The Monolithic VCO-IC 566:** Basic Schematic Structure, Principle of operation and waveforms, extension to positive and negative ramp and pulse generation, frequency modulation and other applications On usage	6	12
IV	**6**	**The Monolithic Function Generator-IC 8038 & XR 2206:** Basic Schematic structure, Principles of operation and wave-forms, practical circuit for Function generation, Remarks on usage.	6	12
	7	Special ICs: 7217, LF398, CD 4046, & their applications, Active Filters and Sinusoidal oscillators.	9	22

PRACTICALS

Sr. No	Course Outcome	Laboratory Activities	No. of Hrs assigned
01	CO1	Study of Op amp parameters	1
02	CO1	Determine the gain of Inverting Amplifier	1
03,04	CO1	Determine the gain of Non-Inverting Amplifier and Voltage Follower	1
05	CO2	Verify the operation of summing Amplifier	1
06	CO2	Verify the working principal of Zero crossing detector (Comparator)	1
07	CO2	Verify the working principal of Inverting /Non Inverting Comparator.	1
08	CO1	Verify the operation of Differentiator Circuit	1
09	CO2	Study of Precision Rectifier Circuit	1

10	CO3	Assemble 555 Astable / Monostable Multivibrator circuit and determine frequency of oscillation and duty cycle	1
11	CO3	Assemble 555 Monostable Multivibrator circuit and determine frequency of oscillation and duty cycle	1
12	CO3	Study of PLL IC 565, CD4046 PLL and determine capture range , lock range and free running frequency	1
13	CO3	Study of VCO IC 566 and determine control voltage and Nominal frequency F0.	1
14	CO3	Study of IC XR 2206 Monolithic function generator ,8038 Precision function generator	1
15	CO3	Study of IC 7217 four digit pre settable up/down counter ,LF398 Sample and Hold amplifier	1

PROJECT BASED ASSIGNMENTS

Unit No	Course Outcome	Details	Marks
I	CO1	Determine the Closed loop Inverting / Non-Inverting Amplifier gain and other parameters.	10
II	CO2	Derive the expression for Summing Amplifier, scaling and averaging amplifier	10
	CO2	Understand Comparators and compare operation of Inverting and Zero crossing detector.	10
III	CO3	Design timer circuit & determine its parameters	10
	CO3	Design PLL circuit & Find out free running frequency	10

Skill Test

Unit No	Course Outcome	Details	Marks
I	CO1,CO2,CO3	Prepare a small mini project using 741 OR 555 and trouble shoot the same Interpret the waveforms. Find faults in Circuits Testing and Measurement.	15

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	A	b OR b	C	d	E	A	b OR b	A OR A	B	a OR a	B	a	B OR B

CO	1	2				1	3	1	2	3	1	2	3
Chapter	I	II				I	IV	I	II	III	I	II	IV
Marks	5	5				4	6	4	6	4	6	4	6
Level of Competence	R	U				R	A	R	U	A	R	U	A

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	23	27
2	11	22
3	16	26
Total		

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	1(a) 2(a) 3(a) 3(b) 4(b)	5+4+4+6+4	23	46%
CO2	1(b) 5(a)	5+6	11	22%
CO3	2(b) 4(a) 5(b)	6+4+6	16	32%

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Practical Lab (10 Marks)	Project Based Assignments (25 Marks)	Skill Test [15 Marks)	Final Theory exam	Weightage% (Total)x100
CO1	3	5	0	23	31%
CO2	2.8	10	0	11	23.8%
CO3	4.2	10	15	16	45.2
Total	10	25	15		100%

REFERENCES:

Text/ Reference Books:				
Sr. No	Book title	Author/s	Edition	Publication
1	Op-Amps and Linear Integrated Circuits	Ramakant A. Gayakwad	Latest	Prentice Hall of India
2	Operational Amplifiers and Linear Integrated Circuits	K. Lal Kishore	First	Pearson Education India, 2009
3	Analysis and Design of Analog Integrated Circuits,	P. Gray, P. Hurst, S. Lewis, and R. Meyer	First	Jon Wiley and Sons, 2001
4	Analog Integrated Circuit Design	Kenneth Martin David Johns Tony Chan Carusone	second	John Wiley & Sons; 2nd Edition
5	Analog Integrated Circuits	A.P.Godse U.A.Bakshi	First	Technical Publications, 2009

Online Reference material and links

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	https://lecturenotes.in/subject/668/linear-integrated-circuits-lic

2	http://studentsfocus.com
3	https://onlinecourses.nptel.ac.in
4	https://www.tutorialspoint.com

Course Name   **: Diploma in Electronics**

Semester   **: IV**

Subject name   **: ANALOG AND DIGITAL COMMUNICATION**

Subject Code   **: DE4002**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme					
				Semester Exam Duration (hrs.)	Internal Marks		Semester Marks		Total Marks
Theory (hrs.)	Tutorial (hrs.)	Practical (hrs.)	Credit	TH/PR	TW	PR	TH	PR	(TW+TH+PR)
3	0	2	4	2	50	25	50	25	150
Abbreviations: TW-Term Work ,TH-Theory, TU- Tutorial, PR-Practical									

Examination Scheme:

26. Minimum 40% marks are needed for passing in all the internal assessments and semester examinations.

27. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

28. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignments and laboratory experiments will not be declared successful for that examination head.

29. Internal Marks.

- Term Work (TW)

  Project based Assignments   50 Marks

- Practical Internal (25 Marks)

  11. Practical Lab   10 Marks

  12. Practical Skill Test   15 Marks

30. Semester Examination Marks:

- Theory Paper(TH)   50 Marks

- Practical /Viva(PR/V)   25 Marks

Rationale:

Communication plays vital role in our lives. Development in communication technology have increased its applications in allied fields of electronics including satellite, mobile, RADAR, telephony, telegraphy, industrial controls, etc. Communication technologies have undergone radical changes, especially due to convergence of computers and communication.. This subject will enable the student to comprehend facts, concept and working principles of analog and digital communication systems. The Knowledge acquired by student will help them to apply in various modern communication systems.

Course Outcomes:

On successful completion course, students will be able to:

1. Explain the basic principles of electronic communication and wave propagation.
2. Compare analog and digital modulation techniques.
3. Design circuits and make measurements for modulation and demodulation.

Prerequisites:

1. Basics properties of signals.
2. Difference between analog and digital signal

Learning Structure:

Application	Analog & Digital Communication System, mobile communication, satellite communication,
Procedure	Generation of analog and digital modulating and demodulating waves. Calculation of modulation index.Troubleshooting and Servicing of AM and FM radio receiver and TV receiver.
Principle	Transmission Lines and Wave propagation, super heterodyne radio receiver .Antenna radiation and reception .
Concept	TEM Wave, Polarization, Propagation, Characteristic impedance, SWR, Radiation Pattern , Carrier Signal modulating signal, modulation, modulation index, Sampling, Quantization, coding and decoding.
Facts	Signal ,Information ,Data ,Channel, Noise, Bandwidth, Wavelength, , Amplitude, Phase and frequency, transmitter ,receiver.

Course Contents:

THEORY

Unit	Chapter	Topic and Contents	Hours

| 1 | 1 | 1.1 **Transmission lines**

1.1.1 Fundamentals of transmission line, Equivalent circuit of transmission line, General equivalent circuit, RF equivalent circuit

1.1.2 Characteristics impedance, methods of calculations & simple numerical, Losses in transmission line,

1.1.3 Standing wave SWR, VSWR, Reflection coefficient, simple numerical.

1.1.4 Quarter wave & half wavelength line, Impedance inversion by quarter wavelength line, Quarter wave transformer & impedance matching, Properties of line of various lengths, Impedance matching, Stubs single & double, Baluns

1.2 Wave Propagation

1.2.1 Fundamental of electromagnetic wave, Transverse electromagnetic wave, polarization, Ground wave, Ionosphere,

1.2.2 Sky wave propagation Concept of actual height and virtual height, Definition – critical frequency, max. useable frequency, skip distance, fading, Space wave propagation, Duct propagation, Troposphere scatter propagation | 10 |
| II | 2 | **2.1 Introduction to electronic communication**

2.1.1 Importance, Block diagram of communication system, Modulation, Need for modulation,

2.1.2 Types of Electronics communications, Simplex, Duplex Full &

Half, Digital, Analog , Applications of communication,

2.1.3 The electromagnetic spectrum (different bands & their frequencies), Concept of Transmission bandwidth, Types of Modulation

2.2 Analog Modulation

2.2.1 Amplitude modulation & Phase modulation, Definition, Modulation index, its effect on modulated signal, simple numerical,

2.2.2 Mathematical representation of amplitude modulated wave & | 14 |

		its meaning, concept of sidebands, Bandwidth requirement, Representation of AM signal in time & frequency domain, Power relation in AM wave, simple numerical, circuit diagram, Frequency modulation, Deviation ratio, max. Deviation ratio, 2.2.3 Mathematical representation of frequency modulation and its meaning, Representation of frequency modulated signal in time domain and frequency domain, Bandwidth requirement simple numerical, 2.2.4 FM signal generation using reactance modulator circuit (transistorized), Concept with graph-pre emphasis and de-emphasis, Block diagram of FM transmitter explanation with waveform	
III	3	**3.1 Digital Communication** 3.1.1 Define Digital Communication, communication channel, element of Digital Communication, 3.1.2 Compare analog with digital communication Contents, block diagram, Communication channel types and their Characteristics (bit rate, bandwidth, repeater distance) applications, and Channel modelling, channel noise, 3.1.3 Introduction. Block diagram of basic digital communication system. Measure of information, Amount of information, Average information, Information rate, Channel capacity – Definition and Expression, Hartley's laws related to channel capacity, Shannon & Hartley theorem, Problems on above topics 3.1.4 Channel noise and its effect, Multilevel systems, Comparison with binary coding system , Communication efficiency **3.2 Digital Pulse Modulation Techniques.** 3.2.1 PULSE COMMUNICATIONS: Pulse modulation, Comparison with CW modulation, Advantages, Classification of Pulse modulation Sampling theorem and its importance 3.2.2 Analog Pulse modulations: PAM, PWM & PPM Pulse Amplitude modulation (PAM) – Definition, Waveforms, Types - Single and Double Polarity type, Flat top and natural	10

		PAM, Generation of PAM, Pulse Width modulation (PWM) Definition, waveforms, Description, Symmetrical PWM, leading edge and trailing edge. PWM, Generation of PWM, Pulse Position Modulation (PPM) Definition, waveforms, description, Generation of PPM from PWM; Block diagram of PPM transmitter Relative advantages and disadvantages of PAM, PWM & PPM systems,	
	3.2.3	Digital Pulse Modulation Pulse Code Modulation (PCM) Definition, Waveforms, Principles of PCM Quantization of signal for PCM and Quantization error, Block diagram of 5 channel and 10 channel PCM transmitter, Companding, Demodulation of PCM Block diagram of PCM receiver, Delta Modulation - working principle	
IV	4	4.0 **BINARY MODULATION TECHNIQUES:** Digital CW modulation techniques, 4.1 AMPLITUDE SHIFT KEYING (ASK) :Definition, description, waveforms, ASK modulator, ASK receiver, Advantages, disadvantages and applications, ASK modulator circuit 4.2 FREQUENCY SHIFT KEYING (FSK) : Definition, description, waveforms, FSK modulator circuit, FSK receiver (PLL type), Advantages, disadvantages and applications, 4.3 PHASE-SHIFT KEYING (PSK):Definition, description, waveforms of BPSK signal, BPSK transmitter - Circuit diagram study using Ring Modulator, BPSK receiver, QPSK- definition, waveforms, constellation diagram, QPSK - transmitter and receiver systems, QAM – definition, constellation diagram, types, QAM transmitter	11

PRACTICAL LAB

Sr.No	Course Outcome	Lab Activities	No. of Hrs assigned
1	C01	Principle of transmission line	2
2	C01	Electronic Wave propagation	2

3	CO2	Amplitude Modulation	2
4	CO2	Amplitude demodulation	2
5	CO2	Frequency modulation	2
6	CO2	Frequency demodulation	.2
7	CO2	ASK modulation demodulation	.2
8	CO2	FSK modulation demodulation	2
9	CO3	PSK modulation demodulation	2
10	CO3	Sampling	2
11	CO3	PAM modulation	2
12	CO3	PWM modulation	2
13	CO3	PPM modulation	2
14	CO2 CO3	PCM modulation	2

PROJECT BASE ASSIGNMENTS

Sr. No	Course outcome	Sample Assignments	Marks
1.	CO1	Write a report on use of wave propagation for an application on his own blog (Topics will be given by subject expert).	5
2.	CO1	Describe operation of communication system in EPBAX	5
3.	CO1	Any one assignment as per subject teachers understanding	5
4.	CO 2	Compare FM transmission with AM transmission of radio	5
5	CO 2	Compare ASK with FSK for an application	5
6.	CO 2	Compare analog telephony with mobile communication	5
7	CO3	Identify the block in radio communication and draw block diagram on a chart	10
8	CO3	Identify the block in TV communication and draw block diagram on a chart	10

SKILL TEST

Sr. No	Course outcome	Sample topic	Marks

1	CO2,CO3	Use of ASK/FSK in a small project on digital modulation and Prepare a report on practical use of analog communication and digital communication system	15

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	A OR a	B OR B	c	D	E	A	b OR b	a OR a	b	a OR a	b	a	b OR B
CO	1	2	3	3	2	2	3	1	1	2	1	3	3
Chapter	1	2	4	3	3	3	4	2	1	3	2	1	4
Marks	2	2	2	2	2	6	4	6	4	6	4	6	4
Level of Competence	R	U	U	U	U	R	A2	A1	R	E	A1	A2	U

R remember - 12, U understand - 12, A1 Apply - 10, A2 Analyze - 10, E evaluate - 6, C create - 0

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	**With option**
1	12	14
2	12	20
3	16	22
4	10	18
Total	50	74

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	1(a)	2	16	32%
	3(a)	6		
	3(b)	4		
	4(b)	4		
CO2	1(b)	2	16	32%
	1(e)	2		
	2(a)	6		
	4(a)	6		
CO3	1(c)	2	18	36%
	1(d)	2		
	2(b)	4		
	5(a)	6		
	5(b)	4		

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Practical Lab (10 Marks)	Project Based Assignments (15 Marks)	Skill Test [15 Marks)	Final Theory exam	Weightage% (Total)x100
C01	3	5	5	16	29%
CO2	3 or 4	5	10	16	34% or 35%
CO3	4 or 3	5	10	18	37 % or 36%
Total	10	15	25	50	100%

REFERENCES:

Text/ Reference Books:				
Sr. No	**Book title**	**Author/s**	**Edition**	**Publication**
1	Electronic Devices and Circuits Electronic Devices and Circuit Theory	Theodore F. Bogart Jr.	6	Pearson Education India
2	Electronic Devices and Circuit Theory	Robert L. Boylestad, Louis Nashelsky	Tenth	Pearson
3	Microelectronics Circuits Electronic Devices and Circuits	Sidra & Smith		
4	The art of Electronics	Paul Horowitz, Winfield Hill	Third, Illustrated	Cambridge Press Publication

Online Reference material and links

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	https://nptel.ac.in/courses/117105143/
2	https://onlinecourses.nptel.ac.in/noc18_ee26/preview
3	https://nptel.ac.in/courses/117101051/
4	https://www.wisdomjobs.com/e-university/analog-communication-tutorial-1677.html
5	https://www.youtube.com/watch?v=ozeYaikI11g
6	https://www.toppr.com/guides/physics/communication-systems/propagation-of-electromagnetic-waves/
7	https://www.youtube.com/watch?v=r-shNhpBkhs
8	https://www.youtube.com/watch?v=1eQUqULgIX8
9	https://www.youtube.com/watch?v=ZW1glqkIgcw
10	https://www.youtube.com/watch?v=vN-hvrcEBvQ
11	https://www.youtube.com/watch?v=GT6_h7yhST4&t=8s

Course Name   **: Diploma in Electronics**

Semester   **: IV**

Subject name   **: ELECTRONICS PROJECT –(MINOR)**

Subject Code   **: DE4003**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical	Credit	Semester Exam Duration (PR)Hours	Internal Marks	Semester Exam Marks (PR)	Total Marks (PR)
0	0	8	4	0	75	75	150
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Examination Scheme:

1. Minimum 40% marks are needed for passing in all the internal assessments and semester examinations.

2. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

3. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignments and laboratory experiments will not be declared successful for that examination head.

Internal marks

Project based Assignments	50 Marks
Practical Lab	15 Marks
Viva	10 Marks
Total	75 Marks

Rationale:

Electronics Project intends to teach students about the programming skills in single board computing systems, PCB design and project documentation for minor project developments in electronics field. The students will enhance programming skills and PCB schematic and design. They will understand the programming concepts and get the ability to develop own program and PCB design skills.

Course Outcomes:

On successful completion of course, students will be able to :

1. Program single board computing system.
2. Build a customized Printed Circuit Board (PCB) for single board computing system.
3. Prepare Project report.

Prerequisites:

1. Basics of computers
2. Working of basic electronics components.
3. Programming C.
4. Digital and Microprocessor fundamentals.

Learning Structure

Application	Develop customized single board computing systems with technical report.
Procedure	Develop programming using logical thinking and technical skills.
Principle	Development flow and Algorithm
Concepts	Programming and design concepts
Facts	Open source software's, Electronics Components,..etc

Course Contents

PRACTICALS

Sr. No	Course Outcome	Laboratory Activities	No. of Hrs assigned	Weight age in %
01	CO1	**Digital Input & Digital Output** Experiments on digital input and digital output on single board computing systems and using LED and Buzzer.	6	5
02	CO1	**Analog Input & Analog Input** Experiments on analog input and analog output on single board computing systems using PWM. Different outputs on LED.	6	5
03	CO1	**LCD, Seven segment and LED Matrix Display** Experiment on LCD, Seven segment and LED Matrix display:-Print numbers, Name, Time etc.	6	5
04	CO1	**Serial Port**	6	5

		Serial Communication between single board computing systems and PC:-character send and received, Read and display voltage		
05	CO1	**DC Motor Control** Experiments on DC Motor to control motor speed and direction of rotation	6	5
06	CO1	**Servo Motor Control** Experiments on servo Motor to rotate servo motor.	6	5
07	CO1	**Stepper Motor Control** Experiments on Stepper Motor to rotate bidirectional.	6	5
08	CO1	**TV Remote** Experiments on TV Remote with LCD.	6	5
09	CO1	**Timer** Experiments with Timer:-play tones, time interval measurement etc.	6	5
10	CO1	**Ethernet** Experiment on Ethernet with web page static IP	6	5
11	CO1	**Bluetooth & Wi-Fi** Experiments on Blue tooth and Wi-Fi	6	5
12	CO2	**Schematic** Getting started with Tools The Capture work environment Starting a project Setting up your project	8	7
13	CO2	**Design structure** Placing, editing, and connecting parts and electrical symbols	6	5
14	CO2	Adding and editing graphics and text Changing your view of a schematic page About libraries and parts Creating and editing parts	6	5
15	CO2	About the processing tools Preparing to create a net list	4	3.5

16	CO2	Creating a net list Creating reports Exporting and importing schematic data	4	3.5
17	CO2	**PCB DESIGN** Footprint , Importing Parts placement Mechanically defined components	6	5
18	CO2	PCB Construction (Power and Ground Plane) Routing guidelines Copper Pour DRC Checking form Layout to production	6	5
19	CO3	Project Management Process.	6	5
20	CO3	Project documentation and its importance	8	7

PROJECT BASED ASSIGNMENTS

Unit No	Course Outcome	Detail	Marks
I	CO1	**Project 1: Application on single board using following components** 1. Sensors 2. Keyboard 3. LCD 4. LED Matrix 5. Seven Segment Display	10
		Project II: Enhance above application on single board using following components 1. DC Motor 2. Servo motor 3. stepper motor 6. Timer	10
		Project IIi: Enhance above application on single board using following components 1. Serial Communication 2. TV Remote 3. Ethernet	10

		4. Bluetooth & Wi-Fi	
II	CO2	Design Schematics and PCB for above project on developed single board system.	5
III	CO3	Prepared project report for above project on designed single board system.	5

Viva

Unit No	Course Outcome	Details	Marks
I	CO1 CO2 CO3	Viva on above designed project	10

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Practical Lab (10 Marks)	Project Based Assignments (30 Marks)	Viva [10 Marks)	Final Theory exam	Weightage% (Total)x100
CO1	5	20	05	Nil	30
CO2	3	05	02	Nil	10
CO3	2	05	03	Nil	10
Total				Nil	50

REFERENCES:

Text/ Reference Books:				
Sr. No	Book title	Author/s	Edition	Publication
1	**Schematic Design**	David Kent Ballast	First	Professional Publications, Inc. (2008)
2	**Designing Circuit Boards With EAGLE:**	Matthew Scarpino	1st Edition	Prentice Hall

3	Technical Report Writing Today	Daniel Riordan	10th Edition	Cengage Learning

Online Reference material and links

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	www.arduino.cc
2	www.orcad.com
3	www.truity.com/career-profile/technical-writer

Course Name : **Diploma in Electronics**

Semester : **IV**

Subject name : **MICROCONTROLLER AND APPLICATIONS**

Subject Code : **DE4004**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme					
				Semester Exam Duration (hrs.)	Internal Marks		Semester Marks		Total Marks
Theory (hrs.)	Tutorial (hrs.)	Practical (hrs.)	Credit	TH/PR	TW	PR	TH	PR	(TW+TH+PR)
3	0	2	4	2	50	25	50	25	150
Abbreviations: TW-Term Work ,TH-Theory, TU- Tutorial, PR-Practical									

Examination Scheme:

31. Minimum 40% marks are needed for passing in all the internal assessments and semester examinations.

32. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

33. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignments and laboratory experiments will not be declared successful for that examination head.

34. Internal Marks.

- Term Work (TW)

    Project based Assignments   50 Marks

- Practical Internal (25 Marks)

    13. Practical Lab   10 Marks

    14. Practical Skill Test   15 Marks

35. Semester Examination Marks:

- Theory Paper(TH)   50 Marks
- Practical /Viva(PR/V)   25 Marks

➢ **Rationale:**

the course covers architecture and programming of typical 8051 microcontroller using asembly as well as C programming environment to control peripheral devices.. The course will cover 8-bit Microcontroller in detail with sufficient exposure to design an automated system.

➢ **Course Outcomes:** On successful completion of course, students will be able to:

1. Understand architecture and features of microcontroller .

2. Able to write and execute ASM and C language program for given application.

3. Interface different peripheral to 8051 microcontrollers.

4. Understand the principles of working of present day microcontroller systems

in various fields.

Prerequisites:

1. Fundamentals of Microprocessor and digital circuits.

2. C programming concepts .

Learning Structure

Application	Microcontroller based systems.
Procedure	Steps for writing assembling and executing assembly language program for 8051. Procedural steps for interfacing peripherals to 8051.
Principle	Principles of assembly / C language programming. Principles of interrupt, timer, and serial communication. Principles of memory, ports and device interfacing.
Concepts	Microcontroller 8051 microcontroller architecture. Microprocessor and Micro-computer
Facts	Memory, Latches, buffers, Registers Counters, tri-state devices decoders, ALU, Boolean algebra, logic operations, MUX, DE-MUX

Course Contents

THEORY

Unit	Chapter	Topic and Details	No. of Lectures assigned	Weight age in %
I	1. Introduction of Microcontroller	1.1 Microcontrollers and embedded processors 1.2 Overview of the 8051 Family 1.3 8051 block diagram 1.4 8051 architecture 1.5 8051 pin diagram	3	7%
	2. 8051 Assembly Language Programming	2.1 Introduction to 8051 assembly programming 2.2 overview of 8051 instructions 2.3 8051 Flags, Registers, register bank and stack 2.4 8051 data types and directives	8	18%

		2.5	8051 addressing modes		
II	3.I/O Port Programming	3.1	Overview of 8051 I/O programming	8	18%
		3.2	Introduction I/O bit manipulation Programming		
		3.3	I/O programming in 8051 in C language		
		3.4	Data types, time delay in 8051 C		
		3.5	Logic operations, data conversion programs in 8051 C		
III	4.Timer and Serial Port Programming	4.1	Introduction to Programming 8051 timers	9	20%
		4.2	overview of counter programming		
		4.3	Programming of timer 0 and 1 in 8051 C		
		4.4	Introduction to serial Communication		
		4.5	overview of 8051 connection with RS232		
		4.6	overview of serial port programming		
		4.7	Serial port programming in C		
	5.8051 Interrupts Programming	5.1	Introduction to 8051 Interrupts	8	18%
		5.2	Interrupt priority in 8051		
		5.3	Programming of timer Interrupts		
		5.4	Programming of external hardware interrupts		
		5.5	Programming of serial communication interrupt		
IV	6.Interfacing of External Peripheral Devices	6.1	Interfacing of LCD, 7 Segment	9	20%
		6.2	Key board interfacing		
		6.3	ADC interfacing		
		6.4	analog and digital sensor interfacing		

		6.5	Relay interfacing		
		6.6	Stepper motor interfacing		
		6.7	DC Motor interfacing		

PRACTICALS

Sr. No	Course Outcome	Laboratory Activities	No. of Hrs assigned
01	CO1	Overview of Keil software along with overview of development board	02
02	CO2	Basic assembly language programming	02
03	CO3	Overview of C language with I/O port Programing - Interfacing of LEDs	02
04	CO3	C language with I/O port Programing - Interfacing of LCD, 7 Segment	02
05	CO3	C language programming- Interfacing of Keypad	02
06	CO2	C language timer programming	02
07	CO2	C language serial port programming	02
08	CO2	C language interrupt programming	02
09	CO3	C language programming with Analog sensor interfacing	02
10	CO3	C language programming with Motor interfacing	02

PROJECT BASED ASSIGNMENTS

Sr.No	Course Outcome	Details	Marks
1	CO3	Automatic bidirectional visitor counting system.	10
2	CO2	PWM based DC Motor Speed Control using Microcontroller:	10
3	CO2	Temperature Indicator Using LM35, Microcontroller 8051, LCD	10
4	CO4	Design and Implement Digital clock	10

| 5 | CO4 | Domestic Automatic plant watering system | 10 |

Skill Test

Sr.No	Course Outcome	Details	Marks
1	CO1	Understand hardware and instruction set	5
2	CO2	Develop and execute assembly language program	5
3	CO3	Interface different peripherals with 8051	5

Examination/Assessment Scheme:

Question	Q1		Q2		Q3		Q4		Q5	
Sub-Question	A	B OR B	A	B OR B	A OR A	B	A OR A	B	A	B OR B
Marks	05	05/05	05	05/05	05/05	05	05/05	05	05	05/05
CO	**CO 3**	CO4	CO1	CO2	**CO3**	CO 2	CO3	CO4	CO3	CO4
Unit	IV	VI	I	II	V	III	IV	VI	V	VI
Level of Competence	R	A	R	A	A	R	A	U	U	R

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	5	-
2	5	10
3	5	-
4	10	15
5	10	15
6	15	25
Total	50	65

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	2(a)	05	05	10
CO2	2(b)	05	10	20
	2(b)	05		
	3(b)	05		
CO3	1(a)	05	20	40
	3(a)	05		
	3(a)	05		
	4(a)	05		
	5(a)	05		
CO4	1(b)	05	15	30
	1(b)	05		
	4(b)	05		
	5(b)	05		
	5(b)	05		

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Practical Lab (10 Marks)	Project Based Assignments (25 Marks)	Skill Test [15 Marks]	Final Theory exam	Weightage% (Total)x100
CO1	1	-	5	5	11
CO2	4	10	5	10	29
CO3	5	5	5	20	35
CO4	-	10	-	15	25
Total	10	25	15	50	100%

REFERENCES:

Text/ Reference Books:				
Sr. No	Book title	Author/s	Edition	Publication
1	The 8051 Microcontroller and Embedded Systems	Muhammad ali Mazidi	Second Edition	Pearson Publication

2	The 8051 Microcontroller	Ayala	Third Edition	Cengage Learning Publication
3	C and the 8051	Thomas W Schultz	Forth Edition	Wood Islands Prints
4	Embedded C	Michael J Pont	First Edition	Pearson Education
5	The 8051 Microcontroller	I. Scott MacKenzie	Third Edition	Pearson

Online Reference material and links

Sr. No	**Online Reference material and links**
1	NPTEL Videos: https://nptel.ac.in/courses/108105102/23
2	Use of Keil Software : https://www.youtube.com/watch?v=57KamEIqwEA
3	8051 C library Files : https://exploreembedded.com/wiki/8051_Family_C_Library
4	Keil software : https://www.keil.com/download/
5	8051 based Projects (Electronics For You) : https://electronicsforu.com/electronics-projects/8051-microcontroller-projects

Course Name   : **Diploma in Electronics**

Semester   : **IV**

Subject name   : **ENGINEERING MATHEMATICS-II**

Subject Code   : **DE4005**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical	Credit	Semester Exam Duration (TH)Hours	Internal Marks	Semester Exam Marks (TH)	Total Marks (TH)
3	1	0	4	2	50	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Note :-(Make changes as per your subject requirement)

1. Theory period is of 60 minutes and Tutorial Sessions is of 60 minutes

2. Minimum 40% marks are needed for passing in internal and semester examinations

3. **Internal marks**

    Assignments   25 Marks

    Open Book Test   10 Marks

    Skill Test   15 Marks

    Total   50 Marks

4. **Semester Examination (Theory)**

    Theory semester examination includes a two hour theory paper of 50 marks.

5. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

6. It is mandatory to appear for semester theory examination and skill tests. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignment and Laboratory experiment will not be declared successful for that examination head. Also student has to failing which student will not

7. Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

    Rationale

    Engineering mathematics uses principles of advanced mathematics to examine problems in related areas like engineering. Many of the phenomena studied in engineering and science are periodic in nature. For example, the current and voltage in an alternating circuit. Fourier methods gives us a set of powerful tools for representing any periodic function as a sum of sines and cosines. Fourier methods are used in all areas of signal processing. Laplace transform is an integral transform which

takes a function of a real variable t to a function of a complex variable s and the inverse Laplace transform takes a function of a complex variable s and gives a function of a real variable t. Laplace transform is widely used by electronics engineers to quickly solve differential equations occurring in the analysis of electronic circuits. Approximately we can say that vectors are numbers with direction. Knowledge of vectors are important because many quantities used in science are vectors. Vector algebra was invented in order to solve two dimensional and three dimensional problems without the use of geometry. Partial derivatives are the basic operation of multivariable calculus. Statistics helps you to effectively conduct research. Most technical journals contain some statistics. An understanding of basic statistics will provide students with fundamental skills necessary to read and evaluate results in research. Quality control and process control use statistics as a tool to manage conformance to specifications of manufacturing processes and the products.

Course Outcomes:

1. Transform a given function into a Fourier series
2. Evaluate Laplace transform, inverse Laplace transform, and hence determine solution of a differential equation with given initial conditions
3. Evaluate the sum and product of vectors and determine the work done by a force .
4. Evaluate higher order partial derivatives and total derivative
5. Analyse data using averages and measures of dispersion.

Prerequisites: Students should know :

1. Adequate knowledge of algebraic operations.
2. Concept of integration
3. Methods to evaluate general integral and definite integral of a function.

Learning Structure

Application	Apply Euler's formula to find Fourier expansion of odd and even functions, apply Laplace transform method to find solution of differential equations, apply dot product to find the work done by a force , compare data using dispersion
Procedure	Fourier expansion using Euler's formula, Inverse Laplace transform of a function, product of vectors, Total derivative, measures of dispersion
Principle	Euler's formula, Laplace transforms of derivatives, position vector of a point, Euler's theorem on homogeneous functions, averages
Concept	Conditions for Fourier expansion, Laplace transforms of elementary functions, addition and subtraction of vectors, partial derivatives , organization of data

Facts	Periodic and continuous functions ,odd and even functions, definite integrals, Functions of two or three variables, scalars and vectors, Statistical data

Course Contents

THEORY

Unit	Chapter	Topic and Details	No. of Lectures and tutorials assigned
1	**1**	**Fourier Series:** 1.1 Euler's formula 1.2 Fourier expansion of functions having some points of discontinuity 1.3 change of interval 1.4 Fourier expansion of odd and even periodic functions 1.5Half range Fourier series	11
	2.	**Laplace transforms** 2.1Laplace transforms of elementary functions 2.2Propeties of Laplace transforms 2.3First shifting property 2.4Laplace transforms of derivatives 2.5Inverse Laplace transforms 2.6 Solution of differential equations using Laplace transforms	15
2	3	**Vector Algebra** 3.1 Vectors and scalars 3.2 Addition of vectors 3.3 Position vector of a point 3.4 Co-ordinates of a point in space 3.5 scalar product of vectors 3.6 Application of dot product 3.7 Vector product	15

	4	**Partial Differentiation:** 4.1 Partial derivatives 4.2 Partial derivatives of higher order 4.3 Euler's theorem on homogeneous functions 4.4 Total derivative	5
3	5	**Statistics** 5.1 Statistical data 5.2 Arithmetic mean 5.3 Median 5.4 Mode 5.5 Graphical representation 5.6 Range and mean deviation 5.7 Standard deviation and coefficient of variation	14

ASSIGNMENTS:-

SR. NO	COURSE OUTCOME	ASSIGNMENTS	MARKS
1	CO1	Determine the Fourier expansion of certain standard functions, functions having some points of discontinuity, odd and even functions, half range functions.	5
2	CO2	Determine the Laplace transform and inverse Laplace transform. Solve differential equations using Laplace transform method.	5
3	CO3	Evaluate dot product and cross product of vectors. Evaluate work done by a force using dot product	5
4	CO4	Determine the partial derivative and total derivative of functions.	5
5	CO5	Calculate arithmetic mean , median, mode, mean deviation and standard deviation of frequency distribution. Compare variability of data	5

SKILL TEST

Sr. No	Course outcome	Topic	Marks
1	CO 1	Fourier series	5
2	CO 2	Laplace transforms	5
3	CO 3	Vectors	5

OPEN BOOK TEST

Sr. No	Course outcome	Topic	Marks
1	CO 2	Laplace transforms	3
2	CO 3	Vectors	3
3	CO 5	Statistics	4

Examination/Assessment Scheme:

Question	Q1					Q2		Q3		Q4		Q5	
Sub-Question	a OR a	b OR b	c	d	e	A	b OR b	a OR a	b	a OR a	B	a	b OR b
CO	1	2	3	5	5	1	2	3	3	2	4	5	5
Chapter	1	2	3	5	5	1	2	3	3	2	4	5	5
Marks	2	2	2	2	2	6	4	6	4	6	4	6	4
Level of Competence	U	U	U	U	U	A	A	A	A	A	A	A	A

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	8	10
2	12	24
3	12	18
4	4	4
5	14	18
Total	50	74

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	1(a) 2(a)	2 6	8	16%
CO2	1(b) 2(b) 4(a)	2 4 6	12	24%
CO3	1(c) 3(a) 3(b)	2 6 4	12	24%
CO4	4(b)	4	4	8%
CO5	1(d) 1(e) 5(a) 5(b)	2 2 6 4	14	28%

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr.No.	Assignments (25 marks)	Open book test (10 Marks)	Skill Test [15 Marks)	Final Theory exam	Weightage% (Total)x100
C01	5	0	5	8	18%
CO2	5	3	5	12	25%
CO3	5	3	5	12	25%
CO4	5	0	0	4	9%
CO5	5	4	0	14	23%
Total	25	10	15	50	100%

REFERENCES:

Sr. No.	Title	Author	Publication
1	Applied Mathematics	Patel & Rawal	Nirali Publication
2	Higher Engineering Mathematics	Dr. B.S.Grewal	Khanna Publishers
3	Fundamentals of Statistics	S.C.Gupta	Himalaya Publishing House
4	Engineering Mathematics	A.M Kulkarni	Central Techno Publications
5	Engineering mathematics	S.S.Sastry	Prentice Hall of India
6	Mathematics for Engineers and Technologists	H.Fox, W.Bolton	Butterworth Heinemann

Online Reference material and links:

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	Fourier Series https://www.mathsisfun.com https://brilliant.org.>wiki>fourier-series
2	Laplace transform/Differential equations/Math/Khan Academy https://www.khanacademy.org/math
3	Vectors https://www.mathsisfun.com An introduction to vectors-https://mathinsight.org
4	Partial derivatives https://www.mathsisfun.com Partial derivative examples https://mathinsight.org
5	https://statistics.laerd.com

Course Name   : **Diploma in Electronics**

Semester   : **IV**

Subject name   : **ENGINEERING PROFESSIONAL PRACTICES**

Subject Code   : **DE4006**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme			
Theory	Tutorial	Practical	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks	Semester Exam Marks (TH/PR/OR)	Total Marks (TH/PR)
4	0	0	4	2	50	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral							

Examination Scheme:

1. Theory period is of 60 minutes and Practical Sessions is of 120 minutes

2. Minimum 40% marks are needed for passing in internal and semester examinations

3. Theory semester examination includes a two-hour theory paper of 50 marks.

Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms. It is mandatory to appear for semester theory examination and skill tests. A student remaining absent in any of the examination/test or fails to complete prescribed number of assignment and Laboratory experiment will not be declared successful for that examination head.

4. Internal marks :

1. Project based Assignments   50 Marks
2. Total   50 Marks

5. Semester Examination Marks:

● Theory Paper(TH)   50 Marks

Rationale:

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence for their In plant training in the next semester i,e semester V .

Course Outcomes: On successful completion of course ,students will be able to :

1. Interpret the data acquired from different sources.

2. Prepare and present reports for given topic.

3. Interact with peers to share thoughts and face interviews.

4. Demonstrate the professional ethics in industry environment.

Learning Structure:

Application	. To make effective use of knowledge & information for presentation, building confidence, stage daring & working in team to execute the task
Procedure	Use reading techniques and information search engines to prepare notes for presentation of content in soft and hard copy. Possesses good moral and ethic to maintain industry
Principle	Principles of Effective and efficient Reading and information search. Rules of formal communication and body language for effective communication. Group formation, Expressing views & ideas. Use of feedback, appropriate styles & skills.
Concept	Collecting information & organizing into reports, substantiate innovative ideas into application. Analyze & improve perception
Facts	Formal communication, industrial ethics, discipline, time management, reports.

Course Contents:

THEORY

Unit	Chapter	Topic and Contents	Hours
1	1	Information Search: (Any Two) Form a group of 2 students. Information should be collected from various resources like Internet, books, journals etc. on the following allocated topics or any other suitable topic suggested by teacher. Prepare Individual technical report on selected topics of 8-10 pages & deliver seminar on at least one i) Electronic rolling display ii) Electronic systems used in Multiplex iii) Electronic traffic control system iv) Any other suitable topic	15
	2	Industry Visit : (At least One) Industry visit should be arranged and each student should submit the technical report individually as a part of term work. Visits can be arranged in any industry which focuses on computer automation, data processing, computer network and computer control machine.	15

| 2 | **3** | Prepare Individual technical report on selected topics of 8-10 pages & deliver seminar on at least one i) Electronic rolling display ii) Electronic systems used in Multiplex iii) Electronic traffic control system iv) Any other suitable topic | **15** |
| 33 | 4 | Prepare Yourself :
Professional ethics, Integrity, honesty , empathy etc
Personal grooming: Dressing sense, overall appearance and body gesture during in industry environment and during interview.
Preparing for interview: CV , Preparation for Interview, prepare for important questions to be asked in interview, (Mock interview) | 15 |

PROJECT BASED ASSIGNMENTS

Unit No	Course Outcome	Details	Marks
1	CO1	Collect the information/data on any topic given by teacher using different resources	10
	CO1	Prepare the report on the industry visit	10
2	CO 2	Prepare the technical report on any topic related to electronics of minimum 8-10 pages.	10
	CO 2	Deliver the prepared report on any topic related to electronics in front of the class and note the feedback given for betterment in future.	10
3	CO 3	Demonstrate the interview techniques through a small act with your class mates.	10

REFERENCES:

Sr. No.	Title	Author	Publication
1	Professional engineering practice and ethical aspects	Carson Morrison and Phillip Hughes	McGraw-Hill Ryerson Ltd.
2	Engineering professional practice	D. Rajendra Adhikari	- Pashupati Publishing House

Online Reference material and links:

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	

	https://nptel.ac.in/courses/110105097/
2	https://www.apgo.net/registration/ppe
3	https://www.onlineethics.org/Resources.aspx

S.N.D.T. Women's University

SCHEME OF CARRICULUM

THIRD YEAR DIPLOMA IN ELECTRONICS

SCHEME: SEMESTER V

PAPER CODE	SUBJECTS	HRS	PR/TU	D	TP	TW	PR/V	T	CR
DE5001	INPLANT TRAINING-I	0	24 Weeks	0	0	100	100	200	20
	TOTAL							200	20

SCHEME: SEMESTER VI

PAPER CODE	SUBJECTS	HRS (Th)	HRS (Pr/Tu)	D	TH	TW	PR	T	CR
DE6001	POWER ELECTRONICS	3	2/0	2	50	50	50	150	4
DE6002	ADVANCED MICROCONTROLLER SYETEMS	3	2/0	2	50	50	50	150	4
DE6003	CONTROL SYSTEMS AND PLC	3	2/0	2	50	50	50	150	4
DE6004	DIGITAL SYSTEM DESIGN	3	2/0	2	50	50	50	150	4
DE6005	EMBEDDED OPERATING SYSTEMS	3	2/0	2	50	50	50	150	4

DE3006	MAJOR PROJECT –I	0	8/0	0	0	50	50	100	4
TOTAL		15	18					850	24

DIPLOMA IN ELECTRONICS SEM-V

SUB_CD	SUBJECT NAME	CREDIT	TH				PR				TW				TOTAL	
			INT		EXT		INT		EXT		INT		EXT		MIN	MAX
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
DE5001	INPLANT TRAINING	20	0	0	0	0	40	100	40	100	0	0	0	0	80	200

DIPLOMA IN ELECTRONICS SEM-V

SUB_CD	SUBJECT NAME	CREDIT	TH/PR	INT		EXT		TOTAL	
				MIN	MAX	MIN	MAX	MIN	MAX
DE5001	INPLANT TRAINING- I	20	TH	0	0	00	00	00	00
			PR	40	100	40	100	80	200

SUB_CD	SUBJECT NAME	CREDIT	TH				PR				TW				TOTAL	
			INT		EXT		INT		EXT		INT		EXT		MIN	MAX
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
DE6001	POWER ELECTRONICS	4	0	0	20	50	10	25	10	25	20	50	0	0	60	150
DE6002	ADVANCED MICROCONTROLLER SYETEMS	4	0	0	20	50	10	25	10	25	20	50	0	0	60	150
DE6003	CONTROL SYSTEMS AND PLC	4	0	0	20	50	10	25	10	25	20	50	0	0	60	150
DE6004	DIGITAL SYSTEM DESIGN	4	0	0	20	50	10	25	10	25	20	50	0	0	60	150
DE6005	EMBEDDED OPERATING SYSTEMS	4	0	0	20	50	10	25	10	25	20	50	0	0	60	150
DE6006	MAJOR PROJECT –I	4	0	0	0	0	20	50	0	0	20	50	0	0	40	100

DIPLOMA IN ELECTRONICS SEM-VI

| SUB_CD | SUBJECT NAME | CREDIT | TH/PR | CA/UA | INT | | EXT | | TOTAL | |
					MIN	MAX	MIN	MAX	MIN	MAX
DE6001	POWER ELECTRONICS	4	TH	UA	0	0	20	50	20	50
			PR	UA	10	25	10	25	20	50
			TW	CA	20	50	0	0	20	50
DE6002	ADVANCED MICROCONTROLLER SYETEMS	4	TH	UA	0	0	20	50	20	50
			PR	UA	10	25	10	25	20	50
			TW	CA	20	50	0	0	20	50
DE6003	CONTROL SYSTEMS AND PLC	4	TH	UA	0	0	20	50	20	50
			PR	UA	10	25	10	25	20	50
			TW	CA	20	50	0	0	20	50
DE6004	DIGITAL SYSTEM DESIGN	4	TH	UA	0	0	20	50	20	50
			PR	UA	10	25	10	25	20	50
			TW	CA	20	50	0	0	20	50
DE6005	EMBEDDED OPERATING SYSTEMS	4	TH	UA	0	0	20	50	20	50
			PR	UA	10	25	10	25	20	50

			TW	CA	20	50	0	0	20	50
DE6006	MAJOR PROJECT –I	4	PR	UA	20	50	0	0	20	50
			TW	CA	20	50	0	0	20	50

Course Name   : **Diploma in Electronics**

Semester   : **V**

Subject name   : **INPLANT TRAINING-I**

Subject Code   : **DE 5001**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme				
Theory	Tutorial	Practical Hr.	Credit	Semester Exam Duration (TH/PR)Hours	Term Work Marks	Internal Marks	Semester Exam Marks (TH/PR/OR)	Total Marks (TH/PR)
0	0	24 Weeks	8	0	50	50	100	200
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral								

Note:-

Minimum 40% marks are needed for passing in internal and semester examinations.

College will assign two mini projects to be performed in during in plant training in industry to achieve hands on practice and skill to be developed under industrial facilities to ensure all the perquisites of higher semester.

1.   Internal Marks

Term work

Log Book   40 Marks

Mini Projects (2)   10 Marks

| In plant Training Industry Viva | 50 Marks |
| Total | 100 Marks |

2. Semester Examination

Semester examination includes

Final Practical viva/voce	50 Marks.
In plant training report writing	50 Marks
Total	100 Marks

Rationale:

An In plant Training is an opportunity offered to students, to work in the Industry for the period of 24 weeks. Industry allocation will be done based on the job roles opted by the students and availability of the industry catering to that specific job role. Trainees will prepare a report on the work done during the In-plant training and maintain a log book of daily work. In-Plant Training Certificate will be awarded by the industry after successful completion of training. Students may opt to appear for job role specific examination conducted by sector skill council.

Scope:

In plant Training provides a real time exposure for the students on the latest and trending technologies in the core companies. Below are some of the job roles in Electronics Industry.

- Calibration Engineer,
- Solar Panel Installation Technician, solar and LED Technician
- LED Light Design Engineer
- PCB Assembly Operator
- Through Hole Assembly Operator
- PCB Designer

- Programming &debugging

Course Outcomes: On successful completion of course, students will be able to demonstrate

1. Job role specific skills
2. Work and interact effectively with superiors and colleagues
3. Follow safety procedures

 List of Industries

Students are being sent to the industries in Mumbai and Thane.

Below are the names of industries where our students are regularly placed for In-plant training.

1. Tata Institute of Fundamental Research (TIFR)
2. Bhabha Atomic Research Centre (BARC)
3. Aditya Solutions (website)
4. Ashida Electronics Pvt. Ltd. (website)
5. Dipel Electronics (website)
6. Electrolab India Pvt. Ltd.
7. Electronics Regional Testing Laboratory (ERTL)
8. Industrial Design Centre, IIT-Bombay
9. NCC Telecom Pvt. Ltd.
10. Core Technologies
11. Western Regional Instrumentation Centre (WRIC)
12. Larsen & Toubro Ltd.
13. APLAB Ltd. (website)
14. Systems Creator
15. Quality Logger
16. Simtek Medico Systems Ltd
17. Radix Electrosystems Pvt Ltd
18. Artemis Pvt Ltd
19. GenMeaint Pvt Ltd
20. Applied Digital Microsystems Pvt Ltd.

SCHEME: SEMESTER VI

PAPER CODE	SUBJECTS	TH	PR/TU	D (HRS.)	TP	TW TH/PR	Internal PR/V	T	CR
DE6001	POWER ELECTRONICS	3	2/0	2	50	50	50	150	4
DE6002	ADVANCED MICROCONTROLLER SYETEMS	3	2/0	2	50	50	50	150	4
DE6003	CONTROL SYSTEMS AND PLC	3	2/0	2	50	50	50	150	4
DE6004	DIGITAL SYSTEM DESIGN	3	2/0	2	50	50	50	150	4
DE6005	EMBEDDED OPERATING SYSTEMS	3	2/0	2	50	50	50	150	4
DE3006	MAJOR PROJECT –I	0	4/0	0	0	50	50	100	4
	TOTAL	15	14/1					850	24

Course Name   : **Diploma in Electronics**

Semester   : **VI**

Subject name   : **POWER ELECTRONICS**

Subject Code   : **DE6001**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme				
Theory Hrs.	Tutorial Hrs.	Practical Hrs.	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks (TH + PR)	Semester Exam Marks (TH)	Semester Exam Marks (PR)	Total Marks (TH/PR)
3	0	2	4	2	75	50	25	150
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral								

Note:-

1. Minimum 40% marks are needed for passing in internal and semester examinations for theory and practical

2. **Internal marks**

   Project Based Assignments 50 Marks

   Practical Lab   10 Marks

   Skill Test   15 Marks

   Total   75 Marks

3. **Semester Examination (Theory)**

   Theory semester examination includes a two hour theory paper of 50 marks and practical/viva-voce examination of 25 marks.

   - Progressive evaluation is to be done by the subject teacher as per the prevailing curriculum implementation and assessment norms.

- It is mandatory to appear for semester examination and skill tests. A student remaining absent in any of the examination/test or fails to complete the prescribed number of assignments and Laboratory experiment will not be declared successful for that examination head.

Rationale:

The power electronic devices and converters employing power electronics devices are now widely used in domestic applications as well as in industrial applications like Electrical Drives, Power Systems, Renewable Energy based power generation, heating applications etc. The course is aimed to act as a foundation block and to provide exposure about various aspects (construction, characteristics, operation, ratings etc.) of power electronic devices. It also covers power electronic converters such as chopper, inverters, with its application

Course Outcomes: On successful completion course, students will be able to:

CO	CO Statement	Marks % Weightage
CO1	Understand construction and operating principle of power devices	20
CO2	Implement triggering / gate drive circuit for a power device	21
CO3	Study construction and operation of controlled rectifiers, choppers & inverters	37
CO4	Understand industrial and power applications	22

Prerequisite

Basic Electronics & Microcontrollers

Learning Structure:

Application	Applications of Power Devices used in Industrial Electronics, Different Industrial Control Circuits, and Choppers, Inverters, , Battery charger, Light dimmer circuit.
Procedure	Operation of Power Devices & their Turn ON-Off, Operation Of Controlled Rectifiers, Operation of Choppers and Inverters, Operation of Industrial Control circuits
Principle	V-I Characteristics of Power Devices, Operating principles of Rectifiers, Choppers and Inverters.
Concept	Power Electronic Devices, Control Rectifiers, Choppers, Inverters and Control Circuits
Facts	Power Devices, Triggering Circuits, Turn OFF Circuits, Control, Rectifiers, Choppers, Inverters and Converters etc.

Course Contents:

THEORY

Unit	Chapter	Topic and Contents	Hours	% Weightage
I	Introduction to Thyristors and	1.1. Basic difference between normal electronic devices and power devices	10	26%

	other power electronics devices	1.2. Characteristics and symbolic representation of SCR, ,GTO, SUS, LASCR,SCS,SBC 1.3. DIAC / TRIAC – construction and operating Principle, specifications, Applications. 1.4. Power MOSFET: PMOSFET, Construction, Operation, Static characteristics, switching characteristics, forward and reverse bias, safe Operating Area, Parallel operation; 1.5. IGBT: Construction, Operation, Steady state characteristics, Switching characteristics, Safe operating area		
II	2. Gate triggering circuits	2.1. Firing of thyristors ,pulse transformer, optical isolators 2.2. Gate Drive/Triggering circuits: R trigger, RC trigger, 2.3. UJT and PUT as an oscillator and triggering circuit	06	18%
III	3. Phase Controlled (AC to DC) Converters	3.1. Principle of phase controlled converter 3.2. Operation of 1-phase half wave converter with R, RL load; Significance of free-wheeling diode ; 3.3. 1-phase full wave converter : Center-tapped and Bridge configuration; Operation with R,RL load	08	12%

IV	4. DC to DC Converters	4.1. Basic principle of DC chopper, Classification of DC choppers, Control strategies 4.2. operation of Step-down (Buck), Step-up (Boost), Step up/down (Buck-Boost), Continuous conduction and Discontinuous conduction operation 4.3. Chopper configurations: Voltage Commutated, Current Commutated, Load Commutated Chopper 4.4. Application of DC to DC converters	08	12%
V	5. Inverters	5.1. Classifications of inverters, 5.2. Single phase bridge inverters, 5.3. Series and parallel inverters	06	12%
VI	6. Power electronics applications	5.4. RF heating, 5.5. battery charge controller, 5.6. Time delay circuit 5.7. BLDC motors 5.8. Power Application Controller ICs PAC5523, PAC 52XX (introduction)	07	20%

PRACTICAL LAB

Sr. No	Course outcome	Lab Activities	No. of Hrs. assigned
1	CO1	Testing of power devices	2

2	CO2	Study of UJT relaxation oscillator	2.
3	CO2	Study of PUT relaxation oscillator	2
4	CO3	Step up chopper	2
5	CO3	Step down chopper	2
6	CO1	DIAC switching characteristic	2.
7	CO3	Study Of AC Power Control Using TRIAC & DIAC lamp dimmer	2
8	CO3	Sequential timer using IC 555	2
9	CO3	Study of inverters	2
10	CO4	Study of RF heating	2

SAMPLE PROJECT BASED ASSIGNMENTS

Unit No	Course Outcome	Details	Marks
I,	CO1	Testing of available power devices	10
II	CO2	Triggering of power devices using microcontroller	5
	CO2	Thyristors phase angel control using microcontroller	5
III,IV, V	CO3	Testing of inverter circuits	5
	CO3	Testing of choppers circuits	5
	CO3	Testing of Phase control rectifiers circuits	5
	CO3	Buck converter using microcontroller	5

VI	CO4	Light intensity control,/fan regulator	5
	CO4	Speed control of dc motor using microcontroller	5

Note: - It is expected to build one mini project in a group of two students covering all the course outcomes. The entire mini project will be divided into five assignments.

SKILL TEST

UNIT	Course outcome	Topic	Marks 15
I TO VI	CO1 to CO4	Identify different power devices and its specification Triggering of given power device Identify and test chopper /inverter circuit Prepare and test one power electronics application	15

Note: - At least three skill tests should be performed in a semester.

Examination/Assessment Scheme:

Question	Q1		Q2		Q3		Q4		Q5	
Sub-Question	A	B OR B	A	B	A	B	A OR A	B OR B	A OR A	B OR B
Marks	05	05/05	04	06	04	06	04/04	06/06	04/04	06/06
CO	CO2	CO1	CO4	CO3	CO2	CO4	CO1	CO3	CO1	CO3

Unit	2	1	6	5	2	6	1	4	1	3
Level of Competence	R	U	A	A	U	R	A	R	U	R

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	13	26
2	09	09
3	06	12
4	06	12
5	06	06
6	10	10
Total	50	75

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100

CO1	Q1(B)	5	13	26%
	Q1(B)	5		
	Q4(A)	4		
	Q4(A)	4		
	Q5(A)	4		
	Q5(A)	4		
CO2	Q1(A)	5	09	18%
	Q3(A)	4		
CO3	Q2(B)	6	18	36%
	Q4(B)	6		
	Q4(B)	6		
	Q5(B)	6		
	Q5(B)	6		
CO4	Q2(A)	4	10	20%
	Q3(B)	6		

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr. No.	Project Based Assignments (50 Marks)	Skill Test (15 Marks)	Practical Lab (10 Marks)	Final Practical exam (25 Marks)	Final Theory exam (50marks)	Weightage% (Total)x100
CO1	10	0	2	5	13	20

CO2	10	5	2	6	9	21
CO3	20	5	5	7	18	37
CO4	10	5	1	7	10	22
Total	50	15	10	25	50	100%

REFERENCES:

Text/ Reference Books:				
Sr. No	Book title	Author/s	Edition	Publication
1	Power electronics	P. C SEN	latest edition	TMH Publication, New Delhi
2	Power Electronics	Singh M D and Khanchandani K.B.	Second edition	TMH Publication, New Delhi
3	Power Electronics Circuits Devices and Applications	Muhammad H. Rashid	latest edition	Prentice Hall of India
4	Power Electronics	Bimbhra, P.S.	latest edition	Khanna Publisher, New Delhi

Online Reference material and links	
Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	http://www.epanorama.net/links/searchlinks.html#datasheets
2	http://www.epanorama.net/links/componentinfo.html#thyristor

3	http://en.wikipedia.org/wiki/Thyristor
4	http://en.wikipedia.org/wiki/Induction_heating
5	http://en.wikipedia.org/wiki/Dielectric_heating
6	http://www.allaboutcircuits.com
7	www.youtube.com

Course Name   : **Diploma in Electronics**

Semester   : **VI**

Subject name   : **ADVANCED   MICROCONTROLLER   SYSTEMS**

Subject Code   : **DE 6002**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme						
Theory Hrs.	Tutorial Hrs.	Practical Hrs.	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks		Semester Exam		Total Marks (TH/PR)	
					TW	PR	TH	PR		
03	00	02	04	02	50	25	50	25	150	
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral										

Note:-

1. Minimum 40% marks are needed for passing in internal and semester examinations for theory and practical

2. **Internal marks**

      Project Based Assignments   50 Marks

      Practical Lab   10 Marks

      Skill Test   15 Marks

Total   75 Marks

3. **Semester Examination (Theory)**

Theory semester examination includes a two hour theory paper of 50 marks and practical/viva-voce examination of 25 marks.

- Progressive evaluation is to be done by the subject teacher as per the prevailing curriculum implementation and assessment norms.
- It is mandatory to appear for semester examination and skill tests. A student remaining absent in any of the examination/test or fails to complete the prescribed number of assignments and Laboratory experiment will not be declared successful for that examination head.

Rationale:

Students need to learn basic concepts of digital circuits and systems which leads to the design of complex digital systems such as microprocessors. The students need to know combinational and sequential circuits using digital logic fundamentals. The students will learn the design of combinational and sequential circuits. This is the course by which students get exposure to the digital electronics world.

Course Outcome: On successful completion course, students will be able

CO	CO statement	Marks % weightage
CO1	Understand the features of embedded systems, architecture of ARM7 and applications	10
CO2	Analyze and understand the development tools of ARM	10
CO3	Analyze and understand the programming of ARM	20
CO4	Understand the exception, interrupts and interrupt handling schemes	10
CO5	Understand the architectural features of LPC2148 microcontrollers	10

CO 6	Understand the hardware and interfacing peripheral devices to LPC2148	30

Prerequisite

Knowledge of 8051 microcontroller, C Programming language, Embedded C programming.

Learning Structure

Application	Interrupts and interrupt handling schemes
Procedure	Circuit design, interfacing peripheral devices such as LED, LCD, Keypad
Principle	ARM structure, development tools of ARM
Concept	Basic programing concepts, features of embedded systems, architecture of ARM7
Facts	Electronic components, features of microcontrollers

Course Contents

Theory

Unit	Chapter	Topic and Details	No. of Lectures assigned	Marks Weightage in %
I	INTRODUCTION TO ARM PROCESSOR	1.1. Introduction to embedded system and ARM Processor. 1.2. ARM related Companies and its opportunities. 1.3. ARM processor family. 1.4. Application of ARM Processor. 1.5. Compiler. 1.6. Emulation and Debugging. 1.7. Difference between RISC & CISC	02	05
II	Introduction to ARM LPC 2148 Controller	2.1. LPC2148 ARM 7 microcontroller. 2.2. Features of LPC2148. 2.3. Block diagram of LPC2148. 2.4. Pin diagram of LPC2148. 2.5. Architectural overview. 2.6. On-chip flash program memory.	06	10

		2.7. On-chip static RAM		
III	SYSTEM CONTROL	3.1. Crystal Oscillator 3.2. PLL 3.3. Reset and Wake-up Timer 3.4. Brownout detector 3.5. Code Security 3.6. External Interrupt input 3.7. Memory Mapping Control 3.8. Power Control, VPB. 3.9. Pin Connect Block 3.9.1.1.1. General Purpose Parallel I/O 3.9.1.1.2. 8 Bit LED's and switches 3.9.1.1.3. Relay and Buzzer 3.9.1.1.4. Keypad 3.9.1.1.5. LCD	12	20
IV	TIMER, ADC, DAC, UART	4.1 General purpose timer/ External event counters 4.2 10-bit ADC 4.3 10-bit DAC 4.4 UART Serial Communication. 4.5 Interrupt Controller. 4.6 Interrupt Sources. 4.7 External Interrupt	15	30

V	I2C, SPI, PWM, RTC, WATCHDOG TIMER	5.1 I2C – bus serial I/O Controller 5.2 SPI- Serial I/O Controller 5.3 Watchdog timer 5.4 Pulse Width Modulator	06	20
VI	ARM CORTEX Processors	6.1 Introduction to ARM CORTEX series. 6.2 Improvement over classical series and advantages for embedded system design. 6.3 CORTEX A, CORTEX M, CORTEX R processors series, versions, features and applications. 6.4 Need of operating system in developing complex applications in embedded system 6.5 Desired features of operating system & hardware support from processor, Firmware development using CMSIS standard for ARM Cortex. 6.6 . Survey of CORTEX M3 based controllers, its features and comparison.	04	15

PRACTICALS

Sr. No	Course Outcome	Laboratory Activities	No. of Hrs. assigned	Weight age in %	Marks

01	CO1, CO 2	Designing the circuit of LED interfacing with ARM7 LPC2148	2	4	10
02	CO1 CO2	Use of keil software Creating a project and generate .hex file. Downloading the program using Flash Magic Software	2	4	10
03	CO1,CO3, CO6	Interfacing LED and Switches	2	4	10
04	CO1, CO3, CO6	Designing the circuit of Keypad interfacing and programming	2	4	10
05	CO1, CO3, CO6	Designing the circuit of LCD interfacing	2	4	10
06	CO1 ,CO3, CO6	Interfacing Temperature Sensor LM35	4	4	10
07	CO1 ,CO5	Interfacing Relay and Buzzer	2	4	10
08	CO1, CO5	Program to change Led intensity using PWM	2	4	10
19	CO1, CO4, CO6	Program to generate delay using internal Timer without interrupt (polling method)	4	4	10
10	CO1, CO4, CO6	Program to generate delay using internal Timer with interrupt	4	4	10

SR.NO	Course Outcome	Details	Marks
11	CO1, CO4, CO6	program to display time using internal RTC	4	4	10

Sample Project Based Assignments:

SR.NO	Course Outcome	Details	Marks
1	CO1, CO2, CO3	Collect data on (i) ARM variants (ii) ARM processor cores likeARM7, ARM9, ARM10, ARM11, SA and Cortex processors (iii)After collecting the data make compression between each.	10
2	CO1, CO2 CO 3	Prepare a report on pin functions of LPC2148	10
3	CO4, CO5, CO6	Prepare a report on USB controller, UART, I2C, SPI, SSP and so on 4 Prepare a report on ARM products, Embedded ARM applications	10
4	CO4, CO5 CO6	Project based on ARM	20

Note: - It is expected to build one mini project in a group of two students covering all the course outcomes. The entire mini project will be divided into five assignments.

<u>**Skill Test**</u>

SR. No	Course Outcome	Details	Marks
1	CO1 to CO6	Interpret the operations. Interpret the variation in hardware depending on the used loop. Debug program. Find faults in the circuits given. Synthesize VHDL program for given mini Project	15

<u>**Examination/Assessment Scheme:**</u>

Question	Q1		Q2		Q3		Q4		Q5	
Sub-Question	A	B OR B	A	B	A	B	A OR A	B OR B	A OR A	B OR B
Marks	05	05/05	06	04	06	04	04/04	06/06	04/04	06/06
CO	CO 3	CO 4	CO5	CO6	CO3	CO 2	CO2	CO3	CO3	CO1

Unit	I	IV	VI	II	III	IV	III	V	VI	IV
Level of Competence	R	A	R	A	U	R	A	R	U	R

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With Option
I	05	05
II	04	04
III	10	14
IV	15	26
V	06	12
VI	10	14
Total	**50**	**75**

Final Theory Examination Course Outcome Weight-age Scheme:

Course Outcome	Q. No.	Marks	Total	Weightage% (Total/50)x100

C01	5(b) / 5(b)	06/06	06	12
CO2	3(b) 4(a) / 4(a)	04 04/04	08	16
CO3	1(a) 3(a) 4(b) / 4(b) 5(a) / 5(a)	5 06 06/06 04/04	21	42
CO4	1(b) / 1(b)	05/05	05	10
CO5	2(a)	06	06	12
CO6	2(b)	04	04	8

Total (Internal & External) Course Outcome Weight-age Scheme:

CO	Project Based Assignments (50 Marks)	Practical Lab (10 Marks)	Skill Test (15 Marks)	Final Theory exam(50)	Semester Exam Marks (PR) (25)	Weightage% (Total)x100
CO1	8	1	-	06	04	19

CO2	8	1	-	08	04	21
CO3	10	2	5	21	04	42
CO4	8	2	5	05	04	24
CO5	8	2	-	06	04	20
CO6	8	2	5	04	05	24
Total	50	10	15	50	25	150

Text/ Reference Books:

Sr. No	Book title	Author/s	Edition	Publication
1	ARM Simplified: with LPC2148	Prof K Subramani	1st	Oxford University Press
2	Microcontroller Programming	Pratik Tawade	3rd	SPD Publication
3	Atmel ARM Programming for Embedded Systems: Volume 5	Mazidi & Naimi Arm	2nd	Microdigitaled
4	Embedded Systems: An Integrated Approach	Lyla B Das	4th	Pearson Education India

Online Reference Material and Links

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	http://www.ocfreaks.com/lpc2148-gpio-programming-tutorial/ http://www.ocfreaks.com/lpc214x-pll-tutorial-for-cpu-and-peripheral-clock/ http://www.ocfreaks.com/lpc2148-timer-tutorial/ http://www.ocfreaks.com/lpc2148-pwm-programming-tutorial/ http://www.ocfreaks.com/lpc2148-adc-programming-tutorial/ http://manish4u.com/interfacing-of-dac-arm-lpc2148

Course Name : **Diploma in Electronics**

Semester : **VI**

Subject name : **CONTROL SYSTEMS AND PLC**

Subject Code : **DE6003**

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme				
Theory Hr.	Tutorial Hr.	Practical Hr.	Credit	Semester Exam Duration (TH/PR) Hours	Internal Marks (TH + PR)	Semester Exam Marks (TH)	Semester Exam Marks (PR)	Total Marks (TH/PR)
03	0	02	04	02	75	50	25	150
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral								

Note:-

1. Minimum 40% marks are needed for passing in internal and semester examinations for theory and practical

2. Internal marks

Project based Assignments	50 Marks
Practical Lab	10 Marks
Skill Test	15 Marks

Total   75 Marks

3. **Semester Examination (Theory**)

Theory semester examination includes a two hour theory paper of 50 marks and practical/viva-voce examination of 25 marks.

- Progressive evaluation is to be done by the subject teacher as per the prevailing curriculum implementation and assessment norms.

- It is mandatory to appear for semester examination and skill tests. A student remaining absent in any of the examination/test or fails to complete a prescribed number of assignments and Laboratory experiment will not be declared successful for that examination head.

RATIONALE:

It is a prerequisite for the students to know the various total plant controls in the process industry along with its design. It is essential to know all elements of physical systems using mathematical modelling. An automatic control system saves manpower, reduces cost of production, improves the performance of the system, increases the accuracy of the final product and helps in mass production so that the knowledge of this subject is required to have deeper grasp of the control techniques as need to be studied in the subjects (in process control, process instrumentation). This course will facilitate students to use the different control systems used in various applications from simple home heating controllers using a thermostat to large Industrial control systems used for controlling processes.

COURSE OUTCOMES: On successful completion course, students will be able to:

CO	CO statement	Marks % weightage
CO 1	Understand the basic elements of the control system and PLC.	35
CO 2	Determine the stability of the control system.	25

CO 3	Analyze performance characteristics of the system using frequency response methods.	25
CO 4	To create ladder diagrams for different process control applications.	15

LEARNING STRUCTURE:

Application	Servomechanism, PLC based systems, Automation in industries.
Procedure	Standard test inputs, Process Control using Discontinuous, Continuous and Composite control actions.
Principle	Block diagram reduction technique, Stability and Performance of control system (Time Domain and frequency Domain), Process Control, Ladder (programming language) diagram
Concept	Open loop, closed loop, Linear and non- linear systems, Time varying and time In-varying systems, State variable models, impulse response models
Facts	Electrical, Mechanical, Pneumatic and Hydraulic systems , ON-OFF and Composite controllers, PLC

Course Contents

THEORY

Unit	Chapter	Topic and Details	No. of Lectures assigned	Weight age in %

1	Control system basics	Control system basics: Basic block diagram of control system and its practical examples
		
		1.2 Classification of control systems:
		    Open loop, closed loop, Linear and non-linear systems,
		    Time varying and time In-varying systems.
		
		1.3 Basic elements of servomechanism
		
		1.4 Transfer function (TF) models of mechanical, electrical
		    thermal, and hydraulic systems
		
		1.5 Block diagram reduction technique: Requirement, reduction rules.
		
		1.6 Concepts of state variable models, impulse response
		    Models
			10	25

2	Standard test inputs and stability	2.1 Standard test inputs: Step, Ramp And Parabolic And Impulse Time Response: Transient and steady state. 2.2 Stability of control system 2.3 Stability and Performance (Time Domain) 2.4 Stability and Performance (Frequency Domain) 2.5 Concept of stability	15	30

3	Process Control & Industrial Pneumatics	3.1 Process Control System
		 3.2 Control Actions:
		     3.2.1 Discontinuous control action: ON-OFF
		     3.2.2 Continuous control action: Proportional
		     3.2.3 Composite Control actions: PI, PD, PID
		 3.3 Fundamentals of pneumatic control system
		     3.3.1 Function and applications of pneumatic components
		     3.3.2 Application of Pneumatics
			07	20

4	PLC Basics	4.1 Basics of PLC:
		     Block diagram [functions of each block],
		     Classification, Specifications
		 4.2 Requirements of PLC in Industries
			06	10

5	PLC Logic	5.1 PLC modules: Discrete and analog. Input / Output modules 5.2 PLC Addressing and Instruction set 5.3 Programming using Ladder programming language	07	15

PRACTICALS

Sr. No	Course Outcome	Laboratory Activities	No. of Hrs. assigned
1	CO1	Introduction to Scilab and Plot standard test signals using Scilab	02
2	CO2 CO3	Test step response of RC, RLC circuit	02
3	CO2 CO3	Test the function of temperature control using on-off control	02
4	CO1	Study of P, PI, PID controllers using Scilab	02
5	CO2 CO3	Impulse response of a transfer function. / Transfer function using Scilab	02
6	CO2 CO3	Time domain analysis of second order system / Time response analysis using XCOS	02
7	CO2 CO3	Frequency response analysis of Lead / Lag compensating network	02
8	CO1	Identify and test different parts of PLC	02
9	CO1 CO4	Develop a ladder diagram to test the function of logic gates.	02
10	CO1 CO4	Develop ladder diagrams for Adder and Subtractor.	02
11	CO1 CO4	Develop ladder diagram for ON and OFF control of lamp using timer and counter.	02

| 12 | CO1 CO4 | Develop ladder diagram for temperature control system | 02 |
| 13 | CO1 CO4 | Develop ladder diagram for Parking system | 02 |

SAMPLE PROJECT BASED ASSIGNMENTS:

Sr. No	Course outcome	Assignments	Marks
1	CO1	Prepare a report on different control systems used in regular applications.	10
2	CO1	Prepare reports on different controllers available in the market.	10
3	CO1	Visit nearby Institute / Industry and prepare a report on different processes available and control systems used to control it.	10
4	CO2 CO3	Test on-off controller for the given type of control loop and prepare a report.	10
5	CO1	Do the market survey of different manufacturers of PLC and submit the small survey report of at least two manufacturers of PLC.	10
6	CO1	Develop a ladder diagram and for Automatic door control system.	10
7	CO4	Industry visit :Automation (Pneumatic/PLC based) After industry visit, submit technical reports along with micro Observation of small things. b) Prepare technical specification list of PLC. c) Operational and maintenance practices of PLC and Pneumatic based systems.	10

		d) Download any one video of PLC based applications and share with your friend on Google classroom.	
8	CO4	Develop a ladder diagram for any applications of process control.	10

Note: - It is expected to build one mini project in a group of two students covering all the course outcomes. The entire mini project will be divided into five assignments.

SKILL TEST:

Sr. No	Course Outcome	Topic	Marks
1	CO2	Study performance of the RC /LC/RLC circuits of given system	5
2	CO2	Study and test performance of time response of a given system	5
3	CO3	Comment on stability of given system	5
4	CO3	Performance analysis of given PLC based system	5
5	CO1 CO4	Prepare and Test a ladder diagram for traffic light control system.	5
6	CO1 CO4	Prepare and Test a ladder diagram for toggle the lamp using timer and counter.	5
7	CO1 CO4	Prepare and Test a ladder diagram for water level system.	5

Note: - At least three skill tests should be performed in a semester.

EXAMINATION/ASSESSMENT SCHEME:

Question	Q1		Q2		Q3		Q4		Q5	
Sub-Question	A	b OR b	a	b	a	b	a OR a	b OR b	a OR a	B OR b
Marks	05	05	04	06	04	06	04	06	04	06
CO	03	02	04	02	01	03	01	04	02	01
Unit/Chapter	02	03	05	01	03	02	01	04	02	05
Level of Competence	U	U	A1	R	U	A2	U	R	R	R

R Remember - 22, U Understand - 18, A1 Apply - 4, A2 Analyze - 6, E Evaluate - 0, C Create – 0

 FINAL EXAMINATION CHAPTER WEIGHT-AGE SCHEME:

Chapter	Marks	
	Compulsory	With option
1	10	14
2	15	19
3	09	14
4	06	12
5	10	16
Total	50	75

Final theory examination course outcome weight-age scheme:

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
CO1	3(a) 4(a)/ 4(a) 5(b) / 5 (b)	04 04 06	14	28
CO2	1(b)/1(b) 2(b) 5(a)/ 5(a)	05 06 04	15	30
CO3	1(a)	05	11	22

	3(b)	06		
CO4	2(a)	04	10	20
	4(b) / 4(b)	06		

TOTAL (INTERNAL & EXTERNAL) COURSE OUTCOME WEIGHT-AGE SCHEME:

Course Outcome	Project Based Assignments (50 Marks)	Practical Lab (10 Marks)	Skill Test (15 Marks)	Final Theory exam (50 Marks)	Semester Exam (PR) (25 Marks)	Weightage% (Total)x100
CO1	20	2	-	14	6	42
CO2	10	2	5	15	7	39
CO3	10	2	5	11	6	34
CO4	10	4	5	10	6	35
Total	50	10	15	50	25	150%

REFERENCES:

Text/ Reference Books:				
Sr. No	Book title	Author/s	Edition	Publication
1	Introduction to programmable	Dunning,Gary	8th	Cenage learning

	logic control			
2	Programmable logic controllers and industrial automation	Mitra Madhuchanda Gupta,samarjit sen	1st	Penram
3	Programmable logic controllers	Petruzella,F.D	3rd	Tata-McGraw Hill
4	Control system Engineering	Nagrath and Gopal	5th	New Edge International Publisher
5	Modern control theory	U.A.Bakshi and M.V.Bakshi	3rd	Technical Publications

Online Reference material and links	
Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	www.openplc.fossee.in
2	www.plcs.net
3	www.ab.rockwellautomation.com >> Allen Bradely
4	w3.siemens.com ,Siemens PLC Simatic S7-1500
5	https://easyengineering.net/modern-control-theory-by-bakshi/#Download_Link
6	https://easyengineering.net/control-systems-books/

Course Name : Diploma in Electronics

Semester : VI

Subject Name : DIGITAL SYSTEM DESIGN

Subject Code : DE 6004

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme				
Theory Hrs.	Tutorial Hrs.	Practical Hrs.	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks (TH+PR)	Semester Exam Marks (TH)	Semester Exam Marks (PR)	Total Marks (TH/PR)
03	00	02	04	02	75	50	25	150
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral								

Note:-

1. Minimum 40% marks are needed for passing in internal and semester examinations for theory and practical

2. **Internal marks**

Project Based Assignments	50 Marks
Practical Lab	10 Marks
Skill Test	15 Marks
Total	75 Marks

3. Semester Examination (Theory)

Theory semester examination includes a two hour theory paper of 50 marks and practical/viva-voce examination of 25 marks.

- Progressive evaluation is to be done by the subject teacher as per the prevailing curriculum implementation and assessment norms.
- It is mandatory to appear for semester examination and skill tests. A student remaining absent in any of the examination/test or fails to complete the prescribed number of assignments and Laboratory experiment will not be declared successful for that examination head.

Rationale:

The students need to learn basic concepts of digital circuits and systems which leads to the design of complex digital systems such as microprocessors. The students need to know combinational and sequential circuits using digital logic fundamentals. The students will learn the design of combinational and sequential circuits. This is the course by which students get exposure to the digital electronics world.

Course Outcome: On successful completion course, students will be able

CO	CO statement	Marks % weightage
CO1	To design and analyze combinational circuits using VHDL based VLSI design flow	30
CO2	To design and analyze sequential circuits using VHDL based VLSI design flow	30
CO3	To design and analysis preview of digital circuits using PLDs	30
CO4	Understand CPLDs and FPGAs	10

Prerequisite

Basic Electronics and Digital logic circuits

Learning Structure

Application	Sequential, Combinational machines, memory devices , complex digital machines
Procedure	Mealy/ moore machine designing procedure, combinational circuit design procedure, compilation, simulation and synthesis procedure of VHDL
Principle	Modelling principles of VHDL, principles of logic reduction, Mealy and Moore machine principles
Concept	Logic circuit reduction, Finite state machines, combinational and sequential machines, PLDs and FPGAs architectures
Facts	Electronic components, number system, boolean algebra, logic gates, memory devices, Integrated circuits, VLSI libraries, PLDs and FPGAs

Course Contents

Theory

Unit	Chapter	Topic and Details	No. of Lectures assigned	Weight age in %
I	Introduction to Finite State Machines (FSM)	1.1 Need for state machines state machine, basic concepts in state machine analysis 1.2 Mealy Sequential Circuit Design 1.3 Moore Sequential Circuit Design Equivalent States	02	05
II	Introduction to VHDL	2.1 Introduction to VHDL Hardware Description Languages VHDL Description of Combinational Circuits VHDL Modules 2.2 Sequential Statements and VHDL Processes Modeling Flip-Flops Using VHDL Processes Processes Using Wait Statements Compilation, Simulation, and Synthesis of VHDL Code VHDL Data Types and Operators Simple Synthesis Examples.	06	10

III	Combinational logic circuit design and VHDL implementation	Introduction 3.1.1 Full Adder and Subtractor 3.1.2 Decoder and Encoder 3.1.3 ALU and Barrel Shifter 3.1.4 4X4 keyboard encoder 3.1.5 Multiplexer and Demultiplxer 3.1.6 Multiplier and Divider 3.1.7 Hamming code encoder and correction circuits 3.1.8 BCD to 7-Segment Display Decoder 3.1.9 BCD Adder 3.1.10 Traffic Light Controller State Graphs for Control Circuits	12	20
IV	Synchronous state machine design and VHDL implementation	4.1 Sequential counters 4.2 State changes referenced to clock Number of state flip-flops Input and Output forming logic 4.3 Generation of a state diagram from a timing chart ,Redundant states 4.4 General state machine architecture 4.5 Concept of asynchronous state machine and	15	30

			comparison to synchronous state machine		
		4.6	Design and VHDL implementation of FSMs Linear feedback shift register (pseudorandom and CRC)		
		4.7	VHDL Models for Multiplexers. VHDL Libraries Modeling Registers and Counters Using VHDL Processes		
		4.8	Behavioral and Structural VHDL Variables, Signals, and Constants, Arrays, Loops in VHDL		
V	Programmable Logic Devices	5.1	Introduction to Programmable Logic Devices Read-Only Memory	06	20
		5.2	Programmable Logic Arrays (PLA)		
		5.3	Programmable Array Logic (PAL)		
		5.4	Combinational PLD-Based State Machines		
		5.5	State Machines on a Chip		
VI	CPLD –Altera Series and FPGA	6.1	Introduction to Programmable Logic Devices	04	15
		6.2	Programming and applications using complex programmable logic devices Altera series		

		6.3 FPGA – Logic blocks, routing architecture, Design flow, Technology Mapping for FPGAs		

PRACTICALS

Sr. No	Course Outcome	Laboratory Activities	No. of Hrs. assigned
01	CO1,CO2	Introduction to Quartus II, VHDL	02
02	CO1,CO2	Introduction to VLSI Kit	02
03	CO1	Compile, Simulate and Synthesize a VHDL program to performs Gate operations	02
04	CO1	Compile, Simulate and Synthesize a VHDL program to perform 4:1 multiplexer operation using when else code.	02
05	CO1	Compile, Simulate and Synthesize a VHDL program to perform 4:1 multiplexer operation using with select code.	02
06	CO1	Compile, Simulate and Synthesize a VHDL program to perform a 4:1 multiplexer operation using process and If else statement.	02

07	CO1	Compile, Simulate and Synthesize a VHDL program to performs 4:1 multiplexer operation using case select statement	02
08	CO1	Compile, Simulate and Synthesize a VHDL program to performs adder operations	02
09	CO1	Compile, Simulate and Synthesize a VHDL program to subtraction operations	02
10	CO1	Compile, Simulate and Synthesize a VHDL program for encoder operations	02
11	CO1	Compile, Simulate and Synthesize a VHDL program for decoder operations	02
12	CO2	Compile, Simulate and Synthesize a VHDL program for flip-flop operations	02
13	CO2	Compile, Simulate and Synthesize a VHDL program for counter operations	02
14	CO2	Compile, Simulate and Synthesize a VHDL program for register operations	02

Sample Project Based Assignments:

Sr. No.	Course Outcome	Details	Marks
1	CO1	Simulate Basic logic gates/ universal gates or XOR and XNOR using VHDL code	5
	CO1	Simulate combinational logic circuit using VHDL code (Half adder/full adder/half subtractor/Full subtractor /multiplexer /de-multiplexer /encoder /decoder)	5
2	CO2	Simulate sequential logic circuit using VHDL code (SR f/f,, D f/f, JK f/f, T f/f,)	5
	CO2	Simulate sequential logic circuit using VHDL code (3-bit UP counter / 3- Bit DOWN counter)	5
	CO2	Simulate SISO/SIPO/PISO/PIPO shift register using VHDL code	5
3	CO3	Simulate a PROM circuit using VHDL code for given machine.	5
	CO3	Simulate PAL circuit using VHDL code for given machine.	5
	CO3	Simulate PLA circuit using VHDL code for given machine.	5
4	CO4	Implementation of given machine using CPLD	5
	CO4	Implementation of given machine using FPGA	5

Note: - It is expected to build one mini project in a group of two students covering all the course outcomes. The entire mini project will be divided into five assignments.

Skill Test

Unit No	Course Outcome	Details	Marks
I to VI	CO 1 to 4	Interpret the operations. Interpret the variation in hardware depending on the used loop. Debug program. Simulate VHDL program, Find faults in circuits. Synthesize VHDL program Making of mini Project	15

Examination/Assessment Scheme:

Question	Q1		Q2		Q3		Q4		Q5	
Sub-Question	A	B OR B	A	B	A	B	A OR A	B OR B	A OR A	B OR B

Marks	05	05/05	06	04	06	04	04/04	06/06	04/04	06/06
CO	CO 3	CO 4	CO4	CO3	CO3	CO 2	CO2	CO3	CO3	CO1
Unit	I	IV	VI	II	III	IV	III	V	VI	IV
Level of Competence	R	A	R	A	U	R	A	R	U	R

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With Option
I	05	05
II	04	04
III	10	14
IV	15	26
V	06	12
VI	10	14
Total	50	75

Final Theory Examination Course Outcome Weight-age Scheme:

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	5(b) / 5(b)	06/06	06	12
CO2	3(b) 4(a) / 4(a)	04 04/04	08	16
CO3	1(a) 2(b) 3(a) 4(b) / 4(b) 5(a) / 5(a)	5 04 06 06/06 04/04	25	50
CO4	1(b) / 1(b) 2(a)	05/05 06	11	22

Total (Internal & External) Course Outcome Weight-age Scheme:

CO	Project Based Assignments (50 Marks)	Practical Lab (10 Marks)	Skill Test (15 Marks)	Final Theory exam(50)	Semester Exam Marks (PR) (25)	Weightage% (Total)x100

CO1	12	2	-	06	04	24
CO2	12	2	5	08	07	34
CO3	14	3	5	25	07	54
CO4	12	3	5	11	07	38
Total	50	10	15	50	25	150

Text/ Reference Books:

Sr. No	Book title	Author/s	Edition	Publication
1	Digital Logic & State Machine Design	David J. Comer	3rd	Oxford University Press
2	Digital Logic and Computer Design	M Morris Mano	4th	Prentice Hall Publication
3	Digital Principles and Applications	Malvino & Leach	7th	McGraw-Hill Education
4	Modern Digital Electronics	R.P.Jain	4th	Tata McGraw-Hill Education
5	Digital Electronics: Principles and Integrated Circuits.	A.K. Maini	1st	Wiley India Publications

6	Digital Design	M. Morris Mano and Michael D. Ciletti	3rd	Pearson Education
7	Circuit Design and Simulation with VHDL.	Volnei A. Pedroni	2nd	The MIT Press Cambridge, Massachusetts London, England
8	VHDL: Programming by Example	Douglas L. Perry	4th	McGrawHill publication

Online Reference Material and Links

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	http://www.pld.ttu.ee/~alsu/Pedroni_2010_Circuit%20Design%20and%20Simulation%20with%20VHDL.pdf
2	https://peer.asee.org/practical-design-projects-utilizing-complex-programmable-logic-devices-cpld.pdf
3	https://journal.portalgaruda.org/index.php/EECSI/article/download/1059/622

Course Name : **Diploma in Electronics**

Semester : **VI**

Subject name : EMBEDDED OPERATING SYSTEMS

Subject Code : **DE 6005**

Teaching and Examination Scheme:

Teaching scheme	Examination Scheme

Theory Hr	Tutorial Hr.	Practical Hr.	Credit	Semester Exam Duration (TH/PR) Hours	Internal Marks (TH + PR)	Semester Exam Marks (TH)	Semester Exam Marks (PR)	Total Marks (TH/PR)
03	0	02	04	02	75	50	25	150
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral								

Note:-

1. Minimum 40% marks are needed for passing in internal and semester examinations for theory and practical

2. **Internal marks**

Project based Assignments	50 Marks
Practical Lab	10 Marks
Skill Test	15 Marks
Total	75 Marks

3. **Semester Examination (Theory)**

Theory semester examination includes a two hour theory paper of 50 marks and practical/viva-voce examination of 25 marks.

● Progressive evaluation is to be done by the subject teacher as per the prevailing   curriculum implementation and assessment norms.

● It is mandatory to appear for semester examination and skill tests. A student remaining absent in any of the examination/test or fails to complete a prescribed number of assignments and Laboratory experiment will not be declared successful for that examination head.

Rationale:

Embedded Operating Systems intends to learn the students about the basic concepts and kernel architecture of Embedded Operating Systems. This type of operating system is typically designed to be resource-efficient and reliable. The hardware running an embedded operating system can be very limited in resources

such as <u>RAM</u> and <u>ROM</u>, therefore embedded design of these operating systems may have a narrow scope tailored to a specific application in order to achieve desired operation under these constraints. The students will be able to decide optimal hardware configuration for the embedded application and the ability to develop a programmable embedded platform.

Course Outcome: On successful completion course, students will be able to :

CO	CO statement	Marks % weightage
CO1	To decide optimal hardware configuration for the embedded application.	15
CO2	To understand the basic concepts and kernel architecture of Embedded Operating Systems.	18
CO3	To demonstrate Embedded Operating Systems functionality on Free RTOS and Arduino platform.	33
CO4	To develop Embedded Operating systems for Embedded systems and IoT application	34

Learning Structure:

Application	Embedded System with Embedded Operating Systems. Application of programming for given task
Procedure	Decide optimal hardware configuration for the embedded application. Effective us of Embedded Operating Systems.

Principle	Principles of working of Embedded Hardware, Programming, creating, deleting, suspending tasks and interrupt handling, Memory Managements
Concept	Computer resources, input output and storage. Concept of programming, library
Fact	Embedded Hardware , Computer, software's(IDE software and Embedded Operating System platforms)

Course Contents

Theory

Unit	Chapter	Topic and Contents	Hours	Weight age in %
I	1.Introduction to Embedded	1.1 A brief history of Embedded Systems 1.2 Architectures and Requirements of Embedded System	04	10

	Systems and Resource	1.3 Design characteristics and challenges of Embedded System 1.4Resources, Resource analysis and communicating with the outer world of Embedded systems.		

	2.Embedded Operating System:-	2.1 Operating System Functionality:-
		
		    2.1.1 Memory, Process, Device (Drivers) and File management.
		
		    2.1.2 Control over the system performance, Job accounting, Error aids
		
		    2.1.3 Coordination between other software and users.
			04	24

II	3.Kernel Architectures and Functions	3.1 Kernel Architectures
		
		    3.2.1 Monolithic kernel
		
		    3.2.2 Microkernel
		
		    3.2.3 Modular Kernel
		
		    3.2.4 Advantages and disadvantages
		
		3.2 Kernel Functions
		
		    3.2.1 Processes:-Process descriptor -run
		        state, address space , open file ,Process
		        state - running , waiting (Interruptible or
		        Uninterruptible), stopped.
		
		    3.2.2 Managements:-Virtual memory
		        managements, Large address space,
		        memory protection, Memory
		        mapping, fair
		        physical memory allocation,
		        shared virtual memory
		
		    3.2.3 Scheduling:-Scheduling define running
		        order of processes, priority scheduler,
		        multiple processor systems, queue per
		        processor, workload balance
		
		    3.2.4 Interrupt:-Interrupt category, interrupt handler,
		interrupt context.
			10	34

		3.2.5 Resources:-Input /output device management		
		3.2.6 Communication:-Inter process, Input/output device communication.		
		3.2.7 Security and Protection Management		
III	4. Real Time Operating Systems:	4.1 Introduction to RTOS in embedded system 4.2 Difference between in GPOS and RTOS 4.3 Uses, Types ,Features and classification of RTOS 4.4 Factors for selecting RTOS 4.6 Some applications on Real time Operating Systems 4.7 Disadvantage of RTOS 4.8 Applications of Real Time Operating System 4.9 Real-Time Service Utility	06	16

	5.Network Embedded Systems	5.1Communication Protocol
		    5.1.1 Bus Network:- I^{2}C, SPI,CAN bus
		    5.1.2 Ethernet network:- TCP/IP
		5.2 Wireless Sensor Network
		    5.2.1 Automotive Network and Industrial Networks
		    5.2..2 Network Architecture, Deployment Issues
		    5.2.3 Network Operating Systems: Tiny OS, RIOT OS, Contiki OS
			06	16

PRACTICALS

Sr. No.	Course Outcome	Lab Activities	No. of Hr. assigned
1	CO3	Free RTOS Arduino Getting Started Example. Arduino IDE and installed the RTOS library.	4
2	CO1,CO3	Develop a Program to Creating, Deleting and Delaying task in Free RTOS and Arduino	4
3	CO1,CO3	Develop a Program to Suspending and Resuming task in Free RTOS and Arduino	4
4	CO1,CO3	Develop a Program to Handling Interrupt in Free RTOS and Arduino	4
5	CO1,CO3	Develop a Program to Queue Management – Read/Write to Queues in Free RTOS and Arduino	4
6	CO1,CO3	Develop a Program to Inter -task Communication Queue in Free RTOS and Arduino	4
7	CO1,CO3	Develop a Program Direct To Task Notifications in Free RTOS and Arduino	4

8	CO1,CO3	Develop a Program Mutex Scheduling in Free RTOS and Arduino	4
9	CO1,CO3	Develop a Program Memory Managements in Free RTOS and Arduino	4
10	CO1,CO3	Develop a Program Stack Space Managements in Free RTOS and Arduino	4
11	CO1,CO3	Develop a Program Low Power Management in Free RTOS and Arduino	4
12	CO3	Installation to Embedded Network Operating System	4
13	CO2,CO3 .CO4	Develop a Program Asynchronous TCP/IP client Asynchronous TCP/IP client and multi-core task implementation	4
14	CO2,CO3 .CO4	Develop a Program for IoT application	4
15	CO2 CO4	Develop a Program for Wireless Sensor N/W with five nodes and one Routers	4

SAMPLE PROJECT BASED ASSIGNMENTS

Sr. No	Course outcome	Assignments	Marks
1	CO1,CO2	Identify embedded systems applications around you and list hardware used. Also identify kernel architecture of Embedded Operating Systems.	10
2	CO3	Explore the library function available in Free RIOS	10
3	CO2,CO3	Decide the Embedded System Application and Collect required hardware of your application.	10
4	CO4	Develop Embedded Operating Systems for decided Above Application	10

| 5 | CO4 | Develop Embedded Systems with Embedded Operating Systems | 10 |

Note: - It is expected to build one mini project in a group of two students covering all the course outcomes. The entire mini project will be divided into five assignments.

SKILL TEST

Sr. No	Course Outcome	Topic	Marks
1	CO3	Develop a Program to Suspending and Resuming task in Free RTOS and Arduino	5
2	CO3	Develop a Program Memory Managements in Free RTOS and Arduino	5
3	CO4	Develop a Program to communication with other device in Free RTOS , Arduino, Bluetooth devices...etc.	5

Examination/Assessment Scheme:

Question	Q1		Q2		Q3		Q4		Q5	
Sub-Question	a	b OR b	a	B	a	b	a OR a	b OR b	A OR a	b OR b
CO	1	2	1	3	2	4	1	3	2	4

Chapter	1	3	2	4	3	5	2	4	3	5
Marks	5	5/5	6	4	6	4	6/6	4/4	6/6	4/4
Level of Competence	U	U	A1	U	A2	U	A1	A2	A1	U

U- Understand, A1 -Apply, A2 -Analyze

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	5	5
2	12	18
3	17	28
4	8	12
5	8	12
Total	50	75

Final Theory Examination Course Outcome Weight-age Scheme:

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
CO1	1(a)	5	17	34
	2(a)	6		
	4(a)/4(a)	6		

	1(b)/1(b)	5		
CO2	3(a)	6	17	34
	5(a)/5(a)	6		
CO3	2(b)	4	08	16
	4(b)/4(b)	4		
CO4	3(b)	4	08	16
	5(b)/5(b)	4		

Total (Internal & External) Course Outcome Weight-age Scheme:

Sr. No.	Project Based Assignments (50 Marks)	Skill Test (15 Marks)	Practical Lab (10 Marks)	Final Theory exam (50 Marks)	Final Practical Exam (25 Marks)	Total Marks 150	Weightage% (Total)x100
CO1	05	-	-	17	-	22	15
CO2	10	-	-	17	-	27	18
CO3	15	10	7	08	10	50	33
CO4	20	05	3	08	15	51	34
Total	50	15	10	50	25	150	100

REFERENCES:

Text/ Reference Books:

Sr. No	Book title	Author/s	Edition	Publication
1	Embedded Systems - Architecture, Programming and Design	Raj Kamal	3rd	Tata McGraw-Hill
2	Embedded Operating Systems	P D Patil, N K Kadale, S D Shirke	1st	Nirali Prakashan
3	Embedded Software Development with C	Kai Qian, David DenHaring, Li Cao	3rd	Tata-McGraw Hill
4	Embedded Systems and Real-Time Operating Systems	V. N. Ghodke	1st	Chinttan
5	Embedded System Design	Santanu Chattopadhyay	3rd	PHI Learning
6	Embedded Operating Systems: A Practical Approach	Alan Holt and Chi-Yu Huang	2nd	Zeetta Networks
7	Embedded and Real-Time Operating Systems	K. C. Wang	1st	Springer

Online Reference material and links

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	https://www.engineersgarage.com/article_page/rtos-real-time-operating-system/
2	https://www.coursera.org/learn/real-time-systems
3	https://www.coursera.org/learn/arduino-platform.
4	https://microcontrollerslab.com/use-freertos-arduino/
5	https://www.youtube.com/watch?v=7efj3bJbGbk&list=PLEfMFrwVdbPYzMgeaLiFRb4og jV8m3lt6&index=1
6	https://microcontrollerslab.com/arduino-freertos-queues-create-read-write-examples/

Course Name   : **Diploma in Electronics**

Semester   : **VI**

Subject name   : **MAJOR PROJECT-I**

Subject Code   : **DE 6006**

Teaching and Examination Scheme:

Teaching scheme	Examination Scheme	

Theory Hrs.	Tutorial Hrs.	Practical Hrs.	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks (TW+PR)	Semester Exam Marks (TH)	Semester Exam Marks (PR)	Total Marks (TW+PR)
00	00	08	04	00	100	00	00	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral								

Note:

1. Minimum 40% marks are needed for passing in Internal Term work (TW) and Practical examination

2. Internal Marks

Term Work	50 Marks
Practical Examination	50 Mark
Total	100 Marks

- Term Work marks will be given based on the performance of student in Assignments (Assignments in Annexure A) given throughout semester
- Practical Examination will consist of a review session where students of a concerned group will present their project idea, prototype, implementation methods, budget, and project deadline. Students will be assessed based on Criteria as mentioned in Annexure B

Rationale:

Change is the only constant; technology is rapidly changing due to high speed developments. To pace with the modern technology, it is important for diploma electronics graduates to develop self-learning skills. The course "Major Project-I" is designed with an aim to meet self-learning capabilities along with project management. This includes project selection, planning, design thinking within the time allocated along with documentation.

The Major Project I is also included with Seminar with the aim to develop certain set of

Communication skills (drafting survey questions and writing survey report performing requisite lab experiments , writing conclusions of the work done and physical phenomenon observed, participating in group discussions, verbally defending the project in the form of Seminar etc.)

Course Outcome: On successful completion course, students will be able

CO	CO statement	Marks % Weightage
CO1	To select and draft project problem statement and write specifications.	30
CO2	To test the feasibility of practical implementation of defined problem statement	30
CO3	Apply project management techniques	30
CO4	To communicate effectively and confidently as a member of a team	10

ROADMAP FOR PROJECT GUIDES:

1. The project work is proposed to be carried out during the VI and VII semesters so that learners prepare during the VI semester, do some field work based on the preparation during the mid-semester vacation and report the analysis and inferences during the VII semester.

2. The learners would reach a level of maturity by the time they reach VI semester and so a meaningful project lasting for a year can be executed by them.

3. To execute the project with involvement needs constant guidance and monitoring of the progress of the learners by the guide.

4. This does not mean teacher has to advice learners.

5. be confident about the ability of the learner and "intellectually provoke" them with challenging questions. These questions should prompt the learners to search information and update themselves (to be carried out during the first two weeks).

6. Do not feed information to learners. Instead crate a 'cognitive dissonance' (a challenging question or situation that the learner is not able to find an immediate answer but feels the need to search for information to find a solution).

7. Defer judgment on learners and give them identified sources if required like a journal article, book or a web site.

8. Even if the learners report their inability to solve do NOT give or prescribe a solution.

9. Be patient and give time for the learner to construct his knowledge.

10. Give corrective feedback to the learner by challenging his solutions so that his logic is questioned and it develops further.

11. This leads to the first activity viz., literature survey and conceiving a project.

12. During this phase meet the project team in a group and create a healthy competition among the learners to search different sources and synthesize their findings in the group.

13. Aim for bringing out a workable innovative project conceived within the first eight weeks as given in the schedule attached.

14. During these two phases and the third phase the teacher should assess the strengths and weakness of the members of the group and allocate differential work to team members on the remaining tasks to be carried out during the next thirty weeks.

15. This is to ensure active participation of all the members of the team.

16. By the end of the twelfth week finalize the project and a schedule of further activities for each member indicating the time frame in which his activities are to be executed may be made ready. A soft copy of this schedule may be collected from each learner by the guide to follow up.

17. This schedule prepared by each learner need to be documented for checking further progress of the project.

18. The next few phases of the project may require active guidance of the guide especially regarding the sources of collecting data, if a sample data is to be collected the number of units has to be decided, collating the data/fabricating, tryout/analysis and finally coming out with meaningful conclusions or models or application

19. Data like models, designs, technical specifications, source code, protocols and original records need be collected from one authentic source as there will not be any variation. The teacher may guide the learners to authentic source.

20. Data having limited variability like product/service quality, processes and standards, procedures need to be collected from a sample as there is a variation. The number of units from whom (source) the data is to be collected is called sample. The sample needs to be representative of the expected variation. The

decision on the size of the sample and the number of units need guidance from the teacher. For example, data regarding the quality of a product/service need be collected from 3 to 5 personnel at different levels of a service provider or dealers of a product. The numbers given are suggestive but a guide based on his experience has to make valid suggestions.

21. Data having a wide range of variation like customer satisfaction where the customers are members of the public need a larger number of units to accommodate the diversity. A tool like questionnaire with predetermined questions need to be prepared, tried out on a small sample and finalize the questions. Data may be collected from at least 30 units. This number is suggested to apply statistical analysis for meaningful conclusions. Guides may decide on the sample size depending on the accessibility of data.

22. The intention of the above three points viz., 19, 20 and 21 is to ensure objectivity in data collection i.e., to reduce the subjectivity of the human mind.

23. All the above activities need to be completed before three to four weeks before the end of VI semester (refer the spread sheet related to scheduling).

24. The learners may be instructed to collect data objectively with identified sample during the next 4 to six weeks which includes the mid semester holidays. This would enable the learners to visit the field and collect data without the constraint of reporting to institution and attending classes on a regular basis.

25. The collected data need to be organized and entered to spread sheets or similar formats for analysis. Qualitative data may be converted to quantitative using a rating scale or similar data organization procedures.

26. The result of most analysis on spreadsheet could be obtained in tables or graphs as per the requirement.

27. Activities mentioned in points 24, 25 and 26 may be carried out by learners during 4 to 8 weeks after commencement of VII semester.

28. Interpretation of the analyzed tables and graphs to arrive at meaningful inference. The guide at this stage may defer his ideas on interpretation allowing the learners to do this. In case the learners err in the process they may be given corrective feedback.

29. A report of the whole process of doing the project may be written, word processed and submitted as mentioned.

30. Guides may contact industries and try to solve their problems so that the learners get a field experience and they get ready for the industry.

31. Innovations and innovative practices may be encouraged among the learners to be pursued as a project. Developing prototypes, (in simulation or real) trying out feasibility of new ideas, changing existing systems by adding modules, combining, assembling new modules and developing new systems may be given higher priority over routine bookish projects.

32. The schedule of events proposed is for an investigative project as a model. Guides may alter the prescribed schedule to suit the kind of innovative projects sited in point No.31 above.

33. Industry personnel may be involved in conceiving, executing and evaluating projects. This gives credibility to the institute and acceptance of learners for absorption into the company.

GUIDELINES TO LEARNERS TO COMPLETE PROJECT:

1. On the basis of 6th Sem. Preparation, field work should be done during the mid-Semester vacation and reporting of analysis and inferences should be done in the VII semester.

2. You have the ability and the level of maturity needed to conceive an innovative and meaningful project accomplishing which gives you recognition by the industry and empowers you with the power of knowledge.

3. Understand your strength and weakness and make an effort to find the strength and Weakness of other peers in the team.

4. Complement each other's strength rather than compete with peers within the team. This will enable you to complete a comprehensive and innovative project relevant to the industrial needs rather than doing a routine copy of what others have done.

5. Seek guidance from the teacher and update him/her about the progress.

6. Be confident about your ability and that of other members of your group. Take extra efforts to collect information, share with your peers and synthesize your knowledge.

7. Question everything including the ideas of your teacher. Accept the ideas and instructions which are internally consistent (logical).

8. Involve actively in group activities and contribute towards the tasks.

9. Do not depend too much on the teacher as a source of information, search on your own and build your knowledge structure. Search for authentic sources like journal articles, books and authentic sites rather than blogs and tweets.

10. Though brief, record your thoughts and activities including searches immediately.

11. Prepare a schedule for your work on a spread sheet and encourage your peers to do the same.

12. Show your schedule and that of others to the teacher and get his feedback.

13. Keep reviewing the schedule every fortnight and take corrective steps if needed. For doing this keep the general guideline schedule given in the curriculum as a backdrop.

14. Tools used for data collection like instruments, testing machines, questions to be asked and software may be tried out and standardized by the twelfth week of the project. Seek the teacher's help who is experienced in doing this.

15. Collect data dispassionately or objectively (without applying your personal prejudice). Complete this task before the VII semester begins.

16. While entering data into the spread sheet ask your peer member to verify. This will ensure accuracy of data entry.

17. Use appropriate mathematics/statistics for calculations. Seek help from external sources (other than your teacher) if required.

18. The results of your analysis need to be graphically represented and documented. You may also add photographs and video clips to increase the validity.

19. This task needs to be completed within 8 weeks after commencement of VII semester.

20. Interpret the data (after analysis) and arrive at meaningful inferences on your own in discussion with your peers. Get it ratified by your teacher. Suggestions from the teacher may be discussed among your peers and incorporated if they are internally consistent.

21. The project report may be word processed (videos, photographs attached in soft copy) and submitted in triplicate two weeks before the end of VII semester.

22. Involve passionately in the team work, make constructive contributions and come out with an industry friendly project which will equip you in your professional development.

ASSIGNMENTS :

Sr. No.	Assignment	Marks

1	Idea generation using one of the following methods- Disrupt method , Mind mapping method, Brain storming Method	10
2	Idea evaluation using one of the following methods- Decision matrix , Paired comparison, 5Q Method	10
3	Implementation methodologies Project life cycle ,Stake holder analysis, Scope planning, Cost, Risk , Procurement and Schedule management, Introduction to agile project management, Project Closure	10
4	Prototyping/Modelling	10
5	Questionnaire for idea validation	10

ASSESSMENT CRITERIA

Sr. No.	Criteria	Marks
1	Project Identification	10
2	Punctuality and overall contribution	10
3	Innovation and feasibility	10
4	Plan Execution	10
5	Presentation	10
Total		50

PREMLILA VITHALDAS POLYTECHNIC

S.N.D.T. WOMEN'S UNIVERSITY

DIPLOMA IN ELECTRONICS

CURRICULUM

Fourth Year

2021-22

Sir Vithaldas Vidyavihar S.N.D.T. Women's University

Juhu Santacruz(W) Mumbai -400049

SUB_CD	SUBJECT NAME	CREDIT	TH				PR				TW				TOTAL	
			INT		EXT		INT		EXT		INT		EXT		MIN	MAX
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
DE7101	ELECTRONICS SURVEILLANCE AND SECURITY-(ELECTIVE)	4	0	0	20	50	10	25	10	25	20	50	0	0	60	150
DE7201	COMPUTER NETWORKS AND SECURITY-(ELECTIVE)	4	0	0	20	50	10	25	10	25	20	50	0	0	60	150
DE7002	INTERNET OF THINGS	4	0	0	20	50	10	25	10	25	20	50	0	0	60	150
DE7003	ROBOTICS AND AUTOMATION	4	0	0	20	50	10	25	10	25	20	50	0	0	60	150
DE7004	ADVANCED COMMUNICATION	4	0	0	20	50	10	25	10	25	20	50	0	0	60	150
DE7005	MAJOR PROJECT –II	4	0	0	0	0	0	0	20	50	20	50	0	0	40	100

DIPLOMA IN ELECTRONICS SEM-VII

	SUBJECT NAME	CREDIT	TH/PR	CA/UA	INT		EXT		TOTAL	
					MIN	MAX	MIN	MAX	MIN	MAX
DE7101	ELECTRONICS SURVEILLANCE AND SECURITY-(ELECTIVE)	4	TH	UA	0	0	20	50	20	50
			PR	UA	10	25	10	25	20	50
			TW	CA	20	50	0	0	20	50
DE7201	COMPUTER NETWORKS AND SECURITY -(ELECTIVE)	4	TH	UA	0	0	20	50	20	50
			PR	UA	10	25	10	25	20	50
			TW	CA	20	50	0	0	20	50
DE7002	INTERNET OF THINGS	4	TH	UA	0	0	20	50	20	50
			PR	UA	10	25	10	25	20	50
			TW	CA	20	50	0	0	20	50
DE7003	ROBOTICS AND AUTOMATION	4	TH	UA	0	0	20	50	20	50
			PR	UA	10	25	10	25	20	50
			TW	CA	20	50	0	0	20	50
DE7004	ADVANCED COMMUNICATION	4	TH	UA	0	0	20	50	20	50
			PR	UA	10	25	10	25	20	50
			TW	CA	20	50	0	0	20	50
DE7005	MAJOR PROJECT –II	4	PR	UA	0	0	20	50	20	50
			TW	CA	20	50	0	0	20	50

DIPLOMA IN ELECTRONICS SEM-VIII

SUB_CD	SUBJECT NAME	CREDIT	TH				PR/VIVA				TW				TOTAL	
			INT		EXT		INT		EXT		INT		EXT		MIN	MAX
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
DE8001	INPLANT TRAINING-II	20	0	0	0	0	20	50	40	100	20	50	0	0	80	200
DE8002	ENTREPRENEURSHIP AND INNOVATION –ONLINE MODE	4	0	0	0	0	20	50	0	0	20	50	0	0	40	100

DIPLOMA IN ELECTRONICS SEM-VIII

SUB_CD	SUBJECT NAME	CREDIT	TH/PR	INT		EXT		TOTAL	
				MIN	MAX	MIN	MAX	MIN	MAX
DE8001	INPLANT TRAINING -II	20	PR	40	100	40	100	80	200

| DE8002 | ENTRAPRENERSHIP AND INNOVATION (ONLINE MODE) | 4 | OR | 0 | 0 | 20 | 50 | 20 | 50 |
| | | | TW | 20 | 50 | 0 | 0 | 20 | 50 |

S.N.D.T. Women's University

SCHEME of CURRICULUM

FOURTH YEAR

DIPLOMA IN ELECTRONICS

SCHEME: SEMESTER VII

PAPER CODE	SUBJECTS	TH	PR/TU	D (HRS)	TP	TW (TH/PR)	PR/V	T	CR
DE7101	ELECTRONICS SURVEILLANCE AND SECURITY-(ELECTIVE)	3	2/0	2	50	50	50	150	4
DE7201	COMPUTER NETWORKS AND SECURITY -(ELECTIVE)	3	2/0	2	50	50	50	150	4
DE7002	INTERNET OF THINGS	3	2/0	2	50	50	50	150	4
DE7003	ROBOTICS AND AUTOMATION	3	2/0	2	50	50	50	150	4
DE7004	ADVANCED COMMUNICATION	3	2/0	2	50	50	50	150	4
DE7005	MAJOR PROJECT –II	0	8/0	0		50	50	100	4
	TOTAL	12	18/0					700	20

SCHEME: SEMESTER VIII

PAPER CODE	SUBJECTS	TH	PR/TU	D (HRS.)	TP	TW(TH/PR)	PR/V	T	CR
DE8001	INPLANT TRAINING	0	24 Weeks	0	0	100	100	200	20
DE8002	ENTRAPRENERSHIP AND INNOVATION –ONLINE MODE	4	0	0	0	50	50	100	4

	TOTAL	4	40					300	24

Course Name   : Diploma in Electronics

Semester   : VII

Subject name   : Electronics Surveillance and Security (Elective)

Subject Code   : DE 7101

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme				
Theory Hrs.	Tutorial Hrs.	Practical Hrs.	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks (TH + PR)	Semester Exam Marks (TH)	Semester Exam Marks (PR)	Total Marks (TH/PR)
3	0	2	4	2	75	50	25	150

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral

Note:-

1. Minimum 40% marks are needed for passing in internal and semester examinations for theory and practical

2. Internal marks

         Project Based Assignments   50 Marks

         Practical Lab   10 Marks

         Skill Test   15 Marks

         Total   75 Marks

3. Semester Examination (Theory)

- Theory semester examination includes a two-hour theory paper of 50 marks.

- Practical semester examination includes a two-hour Practical/Viva of 25 marks.

- Progressive evaluation is to be done by the subject teacher as per the prevailing curriculum implementation and assessment norms.

- It is mandatory to appear for semester examination and skill tests. remaining absent in any of the examination/test or fails to complete the prescribed number of assignments and Laboratory experiment will not be declared successful for that examination head.

Rationale:

Electronics security industry has developed over a decade and become industry standard across the worldwide.

The CCTV Camera Security Industry has grown at rapid pace with development happening in all the Tier 1, Tier 2 and Tier 3 Cities across all spectrum right from housing colonies, government departments and commercial establishments.

Every small and big businesses have opted for the latest advanced technologies in the electronics surveillance and security systems.

Electronics surveillance and security industry needs qualified trained professionals and this course is introduced to students to developed skills as per industry requirements.

Course Outcomes: On successful completion course, students will be able to:

CO	CO Statement	Marks % Weightage
CO1	Understand the Security & Surveillance System in terms of equipment, system, tools.	51%
CO2	Install &maintain the security& Surveillance System	49%

Prerequisite

Basics knowledge of electronics communication systems and devices.

Learning Structure:

Application	CCTV security & surveillance Monitoring Detecting.
Procedure	Installation and maintenance electronics surveillance and security systems
Principle	Back light compensation, ICR Digital Zoom Motion detection wall mount, ceiling mount.
Concept	Configuration of electronic surveillance and security devices.
Facts	CCTV cameras. cables & connectors DVR Monitor display Smoke detector, Passive infrared detectors etc..

Course Contents:

THEORY

Unit	Chapter	Topic and Contents	Hours	% Weightage
I	1.Introduction to Electronics surveillance and security systems	1.1 Features, components, system configuration of different electronics surveillance and security systems 1.2 The Role of Video in Asset Protection	05	18
II	2.Basic of CCTV cameras	2.1 Camera types and uses: - Fixed and movable, indoor and outdoor monochrome and colour, day and night. 2.2 Camera specifications: - Sensitivity, signal to noise ratio and resolution 2.3 Types of camera – Box, Bullet, IP, Wireless Cameras Lens types: - Fixed and variable focal length, manual and motorised zoom. Use of lens calculator	08	22
III	3.CCTV Networking and Recording	3.1 Introduction to DVR Access controls and NVR technologies 3.2 Password Management, Power over Ethernet Concepts and Open Network Video Interface Forum (ONVIF). 3.3 Network configurations of CCTV systems 3.4 Storage Calculation Concepts, Play and up of security systems. 3.5 Cloud Technologies related to CCTV Camera based Security systems 3.6 Planning ,marketing in office automation and site survey	10	20

IV	4. Installation of CCTV	4.1 Installation techniques like Wall Mount and ceiling mount 4.2 Camera addressing setting 4.3 Protocol & baud rate setting 4.4 Configuration and Setting of advance features like auto scan, camera power, Back light compensation ICR, Digital Zoom. Focus mode, Iris mode, white balance mode and motion detection. 4.5 Maintenance of CCTV security systems	10	20
V	5. Installation and testing of Smoke detectors &Alarm System	5.1 Introduction to Smoke detectors & Alarm System Design, principle, sensor type 5.2 Passive infrared detectors 5.3 Electrical and Mechanical parts of smoke detector & Alarm System Installation, 5.4 Testing and checking of smoke detector & Alarm System	12	20

PRACTICAL LAB

Sr. No	Course outcome	Lab Activities	No. of Hrs assigned
1	CO1	Set up a Camera	2
2	CO1	Set up a Monitor	2.
3	CO1	Set up Network devices	2
4	CO1	Set up Encoder and Decoders	2
5	CO1	Set up recording devices (DVR)	2
6	CO1	Set up Server and Storage	2
7	CO1	Set up UPS	2
8	CO2	Connect & test system elements	2
9	CO2	Set up smoke detector	2
10	CO2	Set up Alarm system	2

PROJECT BASE ASSIGNMENTS

Unit No	Course Outcome	Details	Marks
I,II,V	CO1	Identify the different component of CCTV system, smoke detectors / Alarm system with its features and specifications	10
I,II,V	CO1	Planning ,marketing in office automation and Site survey	10
III,IV,V	CO2	Electrification and wiring the site.	10
III,IV,V	CO2	Perform Testing and Commissioning.	10
III,IV,V	CO2	Perform Trouble shooting and maintenance	10

Note: - At least three project based assignments should be performed in a semester covering at least one assignment from each CO.

SKILL TEST

UNIT	Course outcome	Topic	Marks 15
I ,II,III	CO1	Identifying the different parts of CCTV Surveillance, with its working and uses.	8
IV,V	CO2	Testing of smoke detector and alarm systems.	2
	CO2	Setup a security and surveillance system with specified requirement	5

Note:-At least three skill tests should be performed in a semester.

Examination/Assessment Scheme:

Question	Q1		Q2		Q3		Q4		Q5	
Sub-Question	A	B OR B	A	B	A	B	A OR A	B OR B	A OR A	B OR B
Marks	05	05/05	04	06	04	06	04/04	06/06	04/04	06/06
Cos	CO1	CO2	CO1	CO2	CO1	CO2	CO2	CO1	CO2	CO1

Unit	1	2	3	4	5	3	4	2	1	5
Level of Competence	R	U	A	A	U	R	A	R	U	R

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	09	13
2	11	22
3	10	10
4	10	14
5	10	16
Total	50	75

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage%(Total/50)x100
CO1	Q1(A)	5	25	50%
	Q2(A)	4		
	Q3(A)	4		
	Q4(B)	6		
	Q5(B)	6		
CO2	Q1(B)	5	25	50%
	Q2(B)	6		
	Q3(B)	6		
	Q4(A)	4		
	Q5(A)	4		

Total (Internal & External) Course Outcome Weight-age Scheme:

Sr. No.	Project Based Assignments (50 Marks)	Skill Test (15 Marks)	Practical Lab (10 Marks)	Final Practical exam (25 Marks)	Final Theory exam (50marks)	Weightage% (Total)x100
CO1	20	8	7	17	25	51%

CO2	30	7	3	8	25	49%
Total	50	15	10	25	50	100%

REFERENCES:

Text/ Reference Books:				
Sr. No	Book title	Author/s	Edition	Publication
1	CCTV Technology Handbook	Prepared by Space and Naval Warfare Systems Centre Atlantic	-	U.S. Department of Homeland Security
2	CCTV Surveillance	Herman kruegle	2nd edition	ELSEVIRE
3	Fire detection and alarm system, cctv and access control- Project Description	Prepared by: HaskoningDHV, Lda The African Development Bank	-	HaskoningDHV, Lda Maputo – Mozambique
4	Application Guide- Smoke Detectors	---	---	National Fire Protection Association (NFPA) Battery march Park Quincy, MA 02269-9101
5	What is CCTV?: Electronic Surveillance	SATISH UBHALKAR	1 edition	Addayyan Books Publication

Online Reference material and links	
Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	https://www.youtube.com/watch?v=hoCUbAQ34_A
2	https://www.youtube.com/watch?v=D-52qjKJMqc
3	https://www.youtube.com/watch?v=cxv81ilBXdg
4	https://www.youtube.com/watch?v=e5QKl8EyeEs

5	https://www.youtube.com/watch?v=Qx35Vlf0pHU
6	https://www.youtube.com/watch?v=ScnFObV156c
7	https://www.cctvcameraworld.com/setup-ip-camera-system-on-network/

Course Name   : Diploma in Electronics

Semester   : VII

Subject name   : Computer Networks and Security-(Elective)

Subject Code   : DE 7201

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme				
Theory Hrs.	Tutorial Hrs.	Practical Hrs.	Credit	Semester Exam Duration (TH/PR) Hours	Internal Marks (TH + PR)	Semester Exam Marks (TH)	Semester Exam Marks (PR)	Total Marks (TH/PR)
3	0	2	4	2	75	50	25	150
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral								

Note:-

1. Minimum 40% marks are needed for passing in internal and semester examinations for theory and practical

2. Internal marks

        Project Based Assignments   50 Marks

        Practical Lab   10 Marks

        Skill Test   15 Marks

        Total   75 Marks

3. Semester Examination (Theory)

● Theory semester examination includes a two-hour theory paper of 50 marks.

● Practical semester examination includes a two-hour Practical/Viva of 25 marks.

● Progressive evaluation is to be done by the subject teacher as per the prevailing curriculum implementation and assessment norms.

- It is mandatory to appear for semester examination and skill tests. remaining absent in any of the examination/test or fails to complete the prescribed number of assignments and Laboratory experiment will not be declared successful for that examination head.

Rationale:

Present computing era is based on internet and hence networking is an essential part of course. Prime concern is that in current advanced digital world various security threats are increasing day by day posing problems to data confidentiality, integrity and availability. This course aims at learning basic cryptography techniques and applying security mechanisms for operating systems as well as private and public network to protect them from various threats.

Course Outcomes: On successful completion course, students will be able to:

CO	Statement	Marks % Weightage
CO1	Use basic concepts of networking for setting up computer network.	37
CO2	Identify and describe the common types of security threats are risks to the Computer Systems.	15
CO3	Ability to configure various computer networks with security levels.	29
CO4	Maintain wired and wireless secure networks.	19

Prerequisite

Computer Fundamentals,

Concepts of analog and digital communication

Learning Structure:

Application	Configure, Install, Manage and administer of server based network with security concerns.
Procedure	Installation and administration of computer network.

Principle	Configuring Network, Managing Network resources
Concept	Network Configuration, Concept of Wireless networks
Facts	Computer, Networking Devices and Tools, protocols, Intrusion Viruses, Trojan's, etc..

Course Contents:

THEORY

Unit	Chapter	Topic and Contents	Hours	% Weightage
I	1.Introduction Computer Network	1.1 Introduction to Computer Network 1.2 Network Topologies 1.3 Network Connecting Devices and their role 1.4 Switching Networks -Message switching, Circuit Switching and Packet Switching 1.5 Basics of network computing models: peer to peer, Client Server, Introduction to OSI Reference model 1.6 Internet protocols and IP addressing- UDP, TCP/IP, DHCP, Mobile IP, Internet Routing Protocol 1.7 Unix Commands for device configurations	8	14
	2.Introduction to Security Threats	2.1 Threats to security: Viruses and Worms, Intruders, Insiders, Criminal organizations, Terrorists, Information warfare 2.2 Avenues of Attack, steps in attack 2.3 Security Basics – Confidentiality, Integrity, Availability 2.4 Types of attack: Denial of service (DOS), backdoors and trapdoors, sniffing, spoofing, man in the middle, replay, TCP/IP Hacking, Phishing attacks, Distributed DOS, SQL Injection. Malware: Viruses, Logic bombs	6	12

II	3.Organization al Security & Cryptograph y	3.1 Password selection, Piggybacking, Shoulder surfing, Dumpster diving, Installing unauthorized Password selection, access by non-employees 3.2 Physical security: Access controls Biometrics: finger prints, hand prints, Retina, Patterns, voice patterns, signature and writing patterns, keystrokes, Physical barriers 3.3 Password Management, vulnerability of password, password protection, password selection strategies, components of a good password. 3.4 Introduction Plain text, Cipher Text, Cryptography, Cryptology, encryption & De-cryption.	12	24
	4.Network Security	4.1 Firewalls: working, design principles, trusted systems, Kerberos. 4.2 Security topologies – security zones, DMZ, Internet, Intranet, VLAN, security implication, tunnelling. 4.3 IP Security: overview, architecture, IP Sec configurations, IP Sec security 4.4 Email Security: security of email transmission, malicious code, spam, mail encryption 4.5 Web Security: Intruders, Intrusion detection systems (IDS): host based IDS, network based IDS, logical components of IDS, signature based IDS, anomaly based IDS, network IDS components advantages and disadvantages of NIDS, and host based IDS components, advantages and disadvantages of HIDS.	10	20
III	5.Wireless Networks and Security	5.1 Introduction to Wireless Networks, Wireless LANS Wi-fi & ad-hoc wireless networks, wireless sensor networks, Cellular Mobile Networks, Comparison of wireless and Fixed Telephone Networks.	5	16

		5.2 Wireless network security Connecting to WEP/WPA PSK secured networks, monitoring and diverting wireless traffic.		
	6.Network services vulnerabiliti es	6.1 Introduction to Network vulnerability, Types of network Vulnerabilities-Hardware based Software based and human based, 6.2 General Security countermeasure techniques spoofing, network scanning and fingerprinting etc.	4	14

PRACTICAL LAB

Sr. No	Course outcome	Lab Activities	No. of Hrs assigned
1.	CO1	Study of various networking devices and use of Unix commands	02
2.	CO1	Installation of windows server	02
3.	CO2	Installation of Web-browser with security setting concern.	02
4.	CO1	Installation and configuration of Network Interface card and identify its MAC address.	02
5.	CO1	Learn to do network cable crimping	02
6.	CO1	To study installation and Configuration of Access Point.	02
7.	CO3	Setup network and configure IP addressing, subnetting and masking.	02
8.	CO3	Learn to manage networking resources like Sharing files / folders, devices and printers in the network and access the shared resources from other nodes.	02
9.	CO1	Learn to use network cable testing and troubleshooting tools.	02
10.	CO4	i) Use Telnet to Login a remote machine ii) Connect remote machine using Secure Shell(SSH)	02
11.	CO2	Study of the features of firewall in providing network security and to set Firewall Security in windows.	02
12.	CO4	To study WLAN Setup using ADHOC mode.	02
13	CO4	To implement Wi-Fi Protected Access (WPA) security in WLAN.	02

Any 10 experiments to be performed and assessed.

PROJECT BASED ASSIGNMENTS

Unit No	Course Outcome	Details	Marks
CO1 CO3	CO1	Create a small Physical network using computers using relevant software and Draw network layout with its topology for network setup.	10
	CO1	Learn to network cable crimping and network cable testing	10
	CO1,CO3	Installation of Windows Server Share files / folders, devices and printers in the network and access the shared resources from other nodes.	10
II	CO2	Study of steps to protect your personal computer system by creating User Accounts with Passwords and types of user Accounts for safety and security and also "How to make strong passwords" and "passwords cracking techniques".	10
III	CO3, CO4	Configure security settings of browsers you used for surfing. Install and configure Wi-Fi Router with Security Setting.	10

SKILL TEST

Unit	Course outcome	Topic or Sample Questions	Marks (15)
I	CO3	Install Web-browser and Configure Web browser security settings.	02
	CO1	Install and configure Network Interface card and identify its MAC address.	02
II	CO1	To do network cable crimping and testing	02
	CO3	To install windows server and protect your personal computer system by creating User Accounts with Passwords and types of User Accounts for safety and security.	02
III	CO1	To set up a small computer network.	03
	CO4	Configure Wi-Fi Router with Security Setting.	02
	CO2	To configure firewall security settings in windows.	02

Examination/Assessment Scheme:

Question	Q1	Q2	Q3	Q4	Q5

Sub-Question	A	B OR B	A	B	A	B	A OR A	B OR B	A OR A	B OR B
Marks	05	05/05	04	06	04	06	04/04	06/06	04/04	06/06
CO	CO1	CO4	CO1	CO3	CO4	CO3	CO2	CO4	CO3	CO3
Unit	I	V	I	IV	V	III	II	VI	IV	III
Level of Competence	R	U	A	A	U	R	A	R	U	R

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	09	09
2	04	08
3	12	18
4	10	14
5	09	14
6	06	12
Total	50	75

Final Theory Examination Course Outcome Weight-age Scheme:

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
CO1	Q1 (A)	5	09	18%
	Q2 (A)	4		
CO2	Q4 (A)	4	04	08%
CO3	Q2 (B)	6	22	44%
	Q3 (B)	6		
	Q5 (A)	4		
	Q5 (B)	6		

CO4	Q1 (B)	5	15	30%
	Q3(A)	4		
	Q4 (B)	6		

Total (Internal & External) Course Outcome Weight-age Scheme:

Sr. No.	Project Based Assignments (50 Marks)	Skill Test (15 Marks)	Practical Lab (10 Marks)	Final Practical exam (25 Marks)	Final Theory exam (50marks)	Weightage% (Total)x100
CO1	25	07	04	10	09	37
CO2	10	02	02	05	04	15
CO3	10	04	02	05	22	29
CO4	05	02	02	05	15	19
Total	50	15	10	25	50	100%

REFERENCES:

Text/ Reference Books:

Sr. No	Book title	Author/s	Edition	Publication
1.	Computer System and Network Security	Gregory White Erich A.Fisch & Udo W. Pooch	First	CRC Press
2.	Cryptography and Network Security Principal and Practices	Atul Kahate	Sixth	Tata-McGraw-Hill
3.	Computer Networks	Andrew S.Tanenbaum	Fifth	Pearson
4.	Guide to Computer Network Security	Joseph Migga Kizza	Fifth	Springer
5.	Cryptography and Network Security	B. A. Forouzan	Second	TMH
6.	Computer Security	Dieter Gollman	Second	Wiley India Education

Online Reference material and links

Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	LAB MANUAL for Computer Network www.ace-edu.in › wp-content › uploads › 2018/06 › CN-...

2	Open Networking Lab onl.kmi.open.ac.uk	17
3	<u>Advanced Network Technologies Virtual Lab — IIT Kharagpur</u> vlabs.iitkgp.ernet.in ›	
4.	Wireshark Traffic Analysis/Packet Sniffing Tool, Snort Packet Sniffing tool.	

Course Name   : Diploma in Electronics

Semester   : VII

Subject name   : Internet of Things (IoT)

Subject Code   : DE7002

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme				
Theory Hrs.	Tutorial Hrs.	Practical Hrs.	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks (TH + PR)	Semester Exam Marks (TH)	Semester Exam Marks (PR)	Total Marks (TH/PR)
3	0	2	4	2	75	50	25	150
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral								

Note:-

1. Minimum 40% marks are needed for passing in internal and semester examinations for practical

2. Internal marks

        Project Based Assignments   50 Marks

        Practical Lab   10 Marks

        Skill Test   15 Marks

        Total   75 Marks

3. Semester Examination (Theory)

● Theory semester examination includes a two-hour theory paper of 50 marks.

● Practical semester examination includes a two-hour Practical/Viva of 25 marks.

● Progressive evaluation is to be done by the subject teacher as per the prevailing curriculum implementation and assessment norms.

● It is mandatory to appear for semester examination and skill tests. remaining absent in any of the examination/test or fails to complete the prescribed number of assignments and Laboratory experiment will not be declared successful for that examination head.

Rationale:

Internet-of-Things (IoT) is a network of connected devices. The IoT network includes digital machines, objects, tags, electronic devices, etc. each with unique identifiers (UIDs). Smart devices are used for detecting and transferring data for real-time monitoring and other applications. The design course, "Internet of Things (IoT)" aims to learn about the Architecture, Machine to Machine connectivity, IoT enabling technologies, IoT Protocols, IoT Privacy, Security and Governance which helps students to develop Domain Specific Applications on IoT platform.

Course Outcomes: On successful completion course, students will be able to:

CO	CO Statement	Marks % Weightage
CO1	Apply design concept to IoT solutions	27%
CO2	Analyse various M2M and IoT architectures	37%
CO3	Create IoT solutions using sensors, actuators and Devices	36%

Prerequisite

LPC 2148 architecture and Programming, Free RTOS etc.

Learning Structure:

Application	Application on Internet of Things (IoT) platform for given tasks.
Procedure	Decide optimal hardware configuration for the IoT.
Principle	IoT Architecture and Machine to Machine connectivity
Concept	Concept of programming, libraries of Embedded Operating System, ARM structure, development tools of ARM
Facts	Embedded Hardware , Computer, software's(IDE software and Embedded Operating System)

Course Contents:

THEORY

Unit	Chapter	Topic and Contents	Hours	% Weightage
I	1. Introduction to IoT	1.1 IoT and its characteristics, IoT vision, IoT Conceptual Framework, IoT Architectural overview, Technology behind IoT, Sources of IoT.	5	10
II	2. IoT Architecture	2.1 IoT Reference Model- Introduction, Reference Model and architecture, IoT reference Model, 2.2 IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.	6	12
III	3. IoT enabling technologies	3.1 Wi-Fi Modules and Interfacing: Different Wi-Fi Modules, Introduction to ESP8266 and Node MCU – Concept, Pin Diagram, Interactive computing with Node MCU, Offline and Online webserver.	10	24
IV	4. IoT Protocols	4.1 Introduction to M2M, IoT 4.2 Difference between IoT and M2M, HTTP, 4.3 Thing Speak & MQTT and Cloud Services.	10	22
V	5. IoT Privacy, Security and Governance	5.1 Introduction, Overview of Governance, Privacy and Security Issues. 5.2 IoT security challenge, Spectrum of security considerations, Unique security challenges of IoT devices.	10	24
VI	6. Domain Specific Applications of IoT	6.1 IOT Applications. 6.1.1 Energy Monitoring (case study) 6.1.2 Smart water management (case study) 6.1.3 Intelligent Traffic systems (case study)	4	08

__PRACTICAL LAB__

Sr. No	Course outcome	Lab Activities	No. of Hrs assigned
1	CO1	To Interface Bluetooth Shield with Microcontroller and Perform Client-Server Bluetooth Communication between Two Boards	2
2	CO1	To Interface Ethernet Shield with Microcontroller and Perform Client-Server Wi-Fi Communication between Two Boards	2.
3	CO1	To Interface RTC DS3231 with Microcontroller and Perform real time communication between Two Boards	2
4	CO2	To display "Hello world" on the browser from device using Ethernet shield for Microcontroller board.	2
5	CO2	To display output of sensor value on the browser from device using IP address of device using Ethernet for Microcontroller board.	2.
6	CO2	To Toggle LED over the internet using MQTT protocol	2
7	CO2	To sensor value from the sensor in the database.	2
8	CO2	To sensor value from the sensor in the database in every time interval	2
9	CO2	To control LED through Switch and display it in graph on cloud	2
10	CO2	To control Stepper motor Switch and display it in graph on cloud	2.
11	CO2	To rotate stepper motor in different speed and display it in graph on cloud	2
12	CO3	To upload sensor values on Think Speak Website	2
13	CO3	To upload sensor values on MQTT Website	2
14	CO3	To develop simple Android app using MIT App Inventor	2

15	CO3	To control LED with Android Mobile app	2

Note: - Sensor are Temperature, Humidity, and Proximity...etc

PROJECT BASE ASSIGNMENTS

Unit No	Course Outcome	Details	Marks
I	CO1 &CO2	Analyse IOT application in Indian Scenario for ex: i) IOT and Aadhaar ii) IOT for health services. iii) IOT for financial inclusion. iv) IOT for rural empowerment. v) IOT for agriculture sector	10
II	CO1 &CO2	Decide the IoT Application.	10
III,IV,V	CO2	Apply design concept to IoT solutions for decided Above Application	10
VI	CO3	Develop IoT Application for decided Above Application	20

Note: - At least three project-based assignments should be performed in a semester covering at least one assignment from each CO

SKILL TEST

UNIT	Course outcome	Topic	Marks 15
I	CO1	Control device using MQTT protocol	5
,II,III,IV,V	CO2	Send Message on Web Browser from device	5
VI	CO3	Information exchange between two devices.	5

Note: - At least three skill tests should be performed in a semester.

Examination/Assessment Scheme:

Question	Q1		Q2		Q3		Q4		Q5	
Sub-Question	A	B OR B	A	B	A	B	A OR A	B OR B	A OR A	B OR B
Marks	05	05/05	06	04	06	04	04/04	06/06	04/04	06/06
CO	CO1	CO2	CO2	CO3	CO3	CO1	CO1	CO2	CO1	CO3
Unit	I	IV	IV	VI	V	III	III	II	III	V
Level of Competence	R	A	U	A	A	R	A	R	U	A

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	05	05
2	06	12
3	12	20
4	11	14
5	12	18
6	04	04
Total	50	75

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
CO1	Q1(A)	5	17	34%
	Q3(B)	4		
	Q4(A)	4		
	Q5(A)	4		
CO2	Q1(B)	5	17	34%
	Q2(A)	6		
	Q4(B)	6		
CO3	Q2(B)	4	16	32%
	Q3(A)	6		
	Q5(B)	6		

Total (Internal & External) Course Outcome Weight-age Scheme :

Sr. No.	Project Based Assignments (50 Marks)	Skill Test (15 Marks)	Practical Lab (10 Marks)	Final Practical exam (25 Marks)	Final theory exam (50marks)	Weightage% (Total)x100
CO1	10	05	03	05	17	27%
CO2	20	05	04	10	17	37%
CO3	20	05	03	10	16	36%
Total	50	15	10	25	50	100%

REFERENCES:

Text/ Reference Books:

Sr. No	Book title	Author/s	Edition	Publication
1	Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud (Make: Projects) ISBN-13: 978-1449393571 ISBN-10: 1449393578	Cuno Pfister (Autho)	1st Edition	Make Community, LLC; 1st edition (June 21, 2011)
2	Learning Internet of Things ISBN-10 : 1783553537 ISBN-13 : 978-1783553532	Peter Waher (Author)	1st Edition	Packt Publishing (January 27, 2015)
3	Designing the Internet of Things ISBN-13: 978-1118430620 ISBN-10: 111843062X	Adrian McEwen (Author)	1st Edition	Wiley; 1st edition (December 9, 2013)
4	The Silent Intelligence: The Internet of Things ISBN-13: 978-0989973700 ISBN-10: 0989973700	Daniel Kellmereit (Author)	1st Edition	DND Ventures LLC; 1st edition (September 20, 2013)

Online Reference material and links	
Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	https://wso2.com/whitepapers/a-reference-architecture-for-the-internet-of-things/
2	https://www.i-scoop.eu/internet-of-things-guide/
3	https://www.guru99.com/iot-tutorial.html

Course Name   : Diploma in Electronics

Semester   : VII

Subject name   : Automation and Robotics

Subject Code   : DE 7003

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme				
Theory Hrs.	Tutorial Hrs.	Practical Hrs.	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks (TH + PR)	Semester Exam Marks (TH)	Semester Exam Marks (PR)	Total Marks (TH/PR)
3	0	2	4	2	75	50	25	150
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral								

Note:-

1. Minimum 40% marks are needed for passing in internal and semester examinations for practical

2. Internal marks

   Project Based Assignments   50 Marks

   Practical Lab   10 Marks

   Skill Test   15 Marks

   Total   75 Marks

3. Semester Examination (Theory)

● Theory semester examination includes a two-hour theory paper of 50 marks.

● Practical semester examination includes a two-hour Practical/Viva of 25 marks.

● Progressive evaluation is to be done by the subject teacher as per the prevailing curriculum implementation and assessment norms.

● It is mandatory to appear for semester examination and skill tests. remaining absent in any of the examination/test or fails to complete the prescribed number of assignments and Laboratory experiment will not be declared successful for that examination head.

Rationale:

In today's era Automation is playing a key role in Industries. Industries are adopting automation and robotics for economic viability and mass production.

A diploma holder with knowledge of systems/components required for automation of a modern industrial unit have tremendous job opportunities in automated manufacturing units/assembly lines, process industry, Power generation stations.

It is important for the students to learn the basics of robotics and automation, how the system works and the importance of PLC, SCADA and robots in automation.

Course Outcomes: On successful completion course, students will be able to:

CO	CO Statement	Marks % Weightage
CO1	Identify function of electronic, electrical and mechanical hardware for a robotic application.	24
CO2	Assist in maintenance and troubleshooting of robots in industries / automation.	23
CO3	Suggest Automation system to meet customer requirements.	21
CO4	Plan and design automation system using Programmable Logic Controllers.	32

Prerequisites:

Students should know:

1. Knowledge of Basic Electronics, Digital Electronics, Electronics measurement and Instruments.
2. Fundamentals of sensors and Actuators.
3. Basics of Microprocessor and Microcontrollers.
4. Knowledge of interfacing of Simple I/O with microprocessor and microcontroller.

Learning Structure:

Application	To apply electronics system design in robotics and automation & develop programming required for specific application.
Procedure	Selection and interface of input and output devices for specific control application, develop algorithm and ladder diagrams.
Principle	Device interfacing and programming of controllers.
Concept	Ladder diagram for PLC, Controller Interfacing and programming.
Facts	Controllers, Drives, Sensors, Actuators, Power devices, Robots

Course Contents

THEORY

Unit	Chapter	Topic and Details	No. of Lectures assigned	Weight age in %
Unit -I	1 - Introduction to automation	1.1 Introduction: Automation overview, Requirement of automation systems, Architecture of Industrial Automation system, 1.2 Introduction of PLC and supervisory control and data acquisition (SCADA). 1.3 Industrial bus systems: Modbus & profibus 1.4 Controlling equipment's in Automation: Programmable counters, Timers, Temperature controllers with PID	10	22%
Unit -II	2 - Programmable logic controllers:	2.1 Programmable controllers: Analog, digital input and output modules, 2.2 PLC programming: Ladder diagram, Sequential flow chart, 2.3 HMI (Human Machine Interface): Types and working principle. 2.4 PLC Communication and networking, PLC selection, PLC Installation,	07	16%

Unit -III	3 - Introduction to Robotics	3.1 Definition, need, brief history, social justification	10	22%
		3.2 Basic Robot Terminology configuration and its working		
		3.3 Basic structure of a Robot (Industrial) and Classification –		
		Cartesian, cylindrical, spherical, horizontal articulated (SCARA), Mechanical arm, Degree of freedom, Links and joints, Wrist rotation, Mechanical transmission-pulleys, belts, gears, harmonic drive.		
		3.4 Linear and rotary motion and its devices.		
		3.5 Robot configurations:		
		(1) stand above		
		(2) in line		
		(3) cycle independent,		
		3.6 Selection criteria for robots.		
		3.7 Robot machine vision.		
Unit -IV	4 - Robotics and Automation components:	4.1 Robot Components (Anatomy): Manipulator, end effects, drive system, controller.	10	22%
		4.2 Kinematics systems: Forward & Inverse, Degree of Freedom		
		4.3 Sensors		
		4.4 Actuators: Electric, Hydraulic and Pneumatic		
		4.5 Introduction of DC and AC servo drives for motion control.		
		4.6 Feedback Devices (Rotary, Linear Encoders)		

Unit -V	5 - Industrial applications and Maintenance	5.1 Overview of Industrial automation using robots, PLC: Basic construction and configuration of robot, Pick and place robot, Welding robot. Metal detector etc. 5.2 Robot Maintenance need and types 5.3 Common Troubles and remedies in robot operation. 5.4 General Safety Norms, Aspects and precautions in robot handling.	08	18%

PRACTICALS

Sr. No	Course Outcome	Laboratory Activities	No. of Hrs assigned	Weight age in %
01	CO1	To study an introduction to Robots configuration	02	10
02	CO3	To study the different types of sensors and Actuators	02	10
03	CO4	Interface Drives and Stepper motors using μP or μC with feedback devices *(with rotary encoders)*	02	10
04	CO4	Interface PLC and prepare Ladder Diagram	02	10
05	CO2	Study of Robot with 2 DOF, 3 DOF	02	10
06	CO4	Develop a Program for golfer /thrower configuration	02	10
07	CO4	Develop a Program for coffee maker configuration using PLC	02	10
08	CO2	To study the robot programming	02	10

09	CO4	Develop a Program for Elevator using PLC	02	10
10	CO4	Logic implementation for car parking system	02	10
11	CO4	Logic implementation for Bottle Filling Application using PLC	02	10
12	CO4	Logic implementation for Metal detector Application using PLC	02	10
13	CO4	Use PLC for sensing level of water in the tank using float switch and control level of water using ON/OFF solenoid valve	02	10

PROJECT BASED ASSIGNMENTS

Unit No	Course Outcome	Details	Marks
IV	CO1/CO3	Industry visit : Robotics/Automation Submit following technical reports along with micro observation of small things. a) Prepare a small survey report of two automation industries. b) Operational and maintenance practices of robots and its systems.	10
I	CO 2	List two different Industrial types of robots and their application a) Latest Worldwide international level b) Latest National level c) compare both performance and features wise	10
III	CO2	a) Download free simulation software b) Study of a small program for Pick and place tasks.	10
I,II	CO 2 & CO 3	a) List various Robot controlling parameters and find how they affect the performance of Robots. b) list sensors used in automation. select appropriate sensor for various applications	10

V	CO 1/CO4	Do the internet / market survey and make a list of leading manufacturers of the PLC, SCADA, HMI and other industrial automation tools.	10
V	CO 4	Refer to the operating manual of the PLCs of reputed manufacturers and prepare step by step procedure to use PLC for the specific application.	10

Skill Test

Unit No	Course Outcome	Details	Marks
I	CO1,CO2,CO3,CO4	Use Simulator to perform material handling operations using Robotic Arm. Describe the procedure to common troubles. Prepare a small industrial application using a ladder diagram.	15

Examination/Assessment Scheme:

Question	Q1		Q2		Q3		Q4		Q5	
Sub-Question	A	B OR B	A	B OR B	A OR A	B	A OR A	B	A	B OR B
Marks	05	05/05	05	05/05	05/05	05	05/05	05	05	05/05
CO	CO 4	CO 3	CO1	CO3	CO2	CO 1	CO1	CO2	CO2	CO4
Unit	5	1	4	2	3	1	4	2	3	5
Level of Competence	A	U	R	A	U	R	U	R	U	A

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With Option
1	10	15
2	10	15
3	10	15
4	10	15
5	10	15
Total	50	75

Final Theory Examination Course Outcome Weight-age Scheme:

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
C01	2(a)	05	15	30
	3(b)	05		
	4(a)	05		
	4(a)	05		
CO2	3(a)	05	15	30
	3(a)	05		
	4(b)	05		
	5(a)	05		
CO3	1(b)	05	10	20
	1(b)	05		
	2(b)	05		
	2(b)	05		
CO4	1(a)	05	10	20
	5(b)	05		
	5(b)	05		

Total (Internal & External) Course Outcome Weight-age Scheme:

Sr. No.	Practical Lab 10 Marks)	Project Based Assignments (75 Marks)	Skill Test [15 Marks)	Final Theory exam	Final Practical exam	Total	Weightage% (Total)x100
CO1	01	10	04	15	6	36	24
CO2	00	10	03	15	6	34	23
CO3	01	10	04	10	6	31	21
CO4	08	20	04	10	7	49	32
Total	10	50	15	50	25	150	100%

References:

Sr. No	Book title	Author/s	Publication
1.	Robotics for Engineers	Koren Yoram	McGraw - Hill Education, New Delhi, 1st Edition
2.	Textbook On Industrial Robotics	Hedge, G S	Laxmi Publications, New Delhi, ,1st Edition
3.	Industrial Robotics: Technology, Programming and Applications	Groover Mikell P.	McGraw - Hill Education, New Delhi 2nd Edition
4.	Robotics	Fu K. S., Gonzalez R C., Lee C S G.	McGraw - Hill Education, New Delhi Pvt Ltd
5.	Robotic Engineering	Richard k lafter	PHI, New Delhi, 2012
6.	Robot applications design Manual	Jon Hoshizaki, Emily Bopp	John Wiley and Sons, Ne Delhi
7.	Understanding Automotive Electronics	William B. Ribbens Marcel Dekker.	Newnes, New York

Online Reference material and links

Sr. No	Online Reference material and links
1	http://www.mtabindia.com/
2	http://www.robotics.org/
3	http://pcbheaven.com
4	http://www.servodatabase.com
5	https://www.youtube.com/watch?v=fH4VwTgfyrQ
6	https://www.youtube.com/watch?v=aW_BM_S0z4k
7	http://www.autotronicsinc.com/pdf_files/design_notes.pdf
8	ht https://www.youtube.com/watch?v=YLGrugmDvc0
9	https://www.youtube.com/watch?v=GasWAlIvvD8
10	http://ave.dee.isep.ipp.pt/~mjf/act_lect/SIAUT/Material%20Auxiliar/ Automotive%20electrical%20systems.pdf
11	https://cyberbotics.com/#cyberbotics [For simulation, open source application]

Course Name : Diploma in Electronics

Semester : VII

Subject Name : Advanced Communication

Subject Code : DE7004

Teaching and Examination Scheme:

Teaching scheme				Examination Scheme				
Theory Hrs.	Tutorial Hrs.	Practical Hrs.	Credit	Semester Exam Duration (TH/PR)Hours	Internal Marks (TH + PR)	Semester Exam Marks (TH)	Semester Exam Marks (PR)	Total Marks (TH/PR)
3	0	2	4	2	75	50	25	150
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral								

Note:-

1. Minimum 40% marks are needed for passing in internal and semester examinations for theory and practical

2. Internal marks

Project Based Assignments	50 Marks
Practical Lab	10 Marks
Skill Test	15 Marks
Total	75 Marks

3. Semester Examination (Theory)

● Theory semester examination includes a two-hour theory paper of 50 marks.

● Practical semester examination includes a two-hour Practical/Viva of 25 marks.

● Progressive evaluation is to be done by the subject teacher as per the prevailing curriculum implementation and assessment norms.

● It is mandatory to appear for semester examination and skill tests. remaining absent in any of the examination/test or fails to complete the prescribed number of assignments and Laboratory experiment will not be declared successful for that examination head.

Rationale:

The field of electronic communication systems includes radio, mobile, optical and satellite communication. These skills are required in an electronic engineering diploma holder to maintain electronic communication equipment and circuits. This course is intended to lay the foundation for understanding these advanced communication systems.

Course Outcomes: On successful completion course, students will be able to:

CO	CO Statement	Marks % Weightage
CO1	Develop skill as an entry level fibre optic communication technician.	50
CO2	Develop skill as an entry level wireless communication technician.	50

Prerequisite

Principles of analog and digital electronic communication, Electromagnetic theory, Wave propagation, Antennas and Semiconductor physics.

Learning Structure:

Application	Application of devices & components in circuit, use of equipment's in repairing and maintenance of communication systems
Procedure	Network planning and survey, propagation methods and wireless data transmission, troubleshooting, lossless communication and splicing procedure.
Principle	Principle of devices & components, channel assignment strategies, satellite stabilization in orbit, principles of light theory.
Concept	Baud rate, Bit rate, strengths and limitations of communication systems, transmission mode characteristics, cellular concepts, spread spectrum techniques, characteristics of GSM

Facts	Mobile, satellite, information antenna, transmission media, losses in communication, GSM, components of communication systems.

Course Contents:

Theory

Unit	Chapter	Topic and Contents	Hours	% Weightage
I	Data Communication Media	1.1 Baud rate, Bit rate, types of errors in data communication and error correction technique Concept of gain unit decibel dB and dBm. 1.2 Types of communication media and frequency band of operation 1.3 Guided media: Types of cable-twisted pair cable, coaxial cable, fibre optic cable. 1.4 Unguided media: Microwave communication, Infrared communication.	3	8
II	Fiber Optics	2.1 Introduction to Fiber optic communication. 2.1.1 Strength and limitations of fiber optic system 2.1.2 Light propagation: reflection, refraction, Snell's law Light propagation through cable, Mode of propagation, index profile.	12	28

		2.1.3 Fiber optic cables: cable geometry and construction, fiber optics cable mode, single mode, step index fiber, multimode index fiber, multimode graded index fiber, tight and loose buffer tube cables, compliant in fiber optic cable, factors affecting performance of optical fibers as a transmission medium and fiber cable losses. 2.1.4 Light source and Detector: Light emitting diode (LED), Photo Transistor, Laser diode, 2.1.5 Optical tools and Instruments. 2.1.6 Fiber Optic Network Planning and Route Survey 2.1.7 Fiber internet:- Dark fiber and Lit Fiber, concept of the Last Mile and its types as FTTP/FTTH/FTTB/FTTD, FTTB, FTTC/FTTN/FTTS, Comparison of Fibers Internet with DSL, Cable, and Wireless Internet		
III	Microwave Communication	3.1 Introduction to Microwaves. 3.2 Microwave Transmission Concept of Mode, Characteristics of TEM, TE and TM Modes, Losses associated with microwave transmission. 3.3 Passive Devices: - Microwave Passive components: Directional Coupler, Magic Tee, Wave-guide Corners, Bends, Twists, Attenuator, Circulator, Isolator and Resonator.	8	16

		3.4 Microwave Active components: Tunnel diode, Varactor diodes, PIN diodes, Gunn Diodes, IMPATT diodes, Microwave Transistors, Microwave oscillators and Mixers. Microwave tubes: Klystron, TWT, Magnetron. 3.5 Microwave Systems Wireless Communications system		
IV	Satellite Communication	4.1 Introduction to Satellite Communication, Satellite Communication System 4.2 Orbits and Launching Methods: Introduction, Kepler's Laws, Definitions of Terms for Earth-Orbiting Satellites, Orbital Elements, Apogee and Perigee Heights, Orbit Perturbations, Effects of a non-spherical earth, Atmospheric drag. 4.3 The Space Segment: - Transponder, Stabilization of satellite in satellite orbit. 4.4 Radio Wave Propagation: Introduction, Atmospheric Losses, Ionospheric Effects, Rain Attenuation, Other Propagation Impairments.	6	16
V	Mobile Communication	5.1 Cellular Concept, Channel Assignment Strategies, Interference & System Capacity. 5.2 Mobile Radio Propagation, Basic Methods of Propagation, Outdoor Propagation Models, Multipath & Small-Scale Fading, Modulation Techniques.	10	20

		5.3 Spread Spectrum Techniques, Frequency Hopping Systems, Multiple Access Techniques, Frequency division multiple-access (FDMA) Time division multiple-access (TDMA) Code division multiple-access (CDMA) Space Division Multiple access (SDMA)		
		5.4 Various Generations of Wireless Networks First Generation Networks, Second Generation Networks, 2.5G Mobile Networks, 3G: Third Generation Networks, 4G: Fourth Generation Networks, 5G Fifth Generation Network.		
		5.5 Circuit switching Technique, Switching Node, Packet Switching, The X .25 Protocol		
VI	Generations in mobile communication technology.	1.5 Introduction, 1.6 Architecture of GSM, characteristics of GSM Standards and services, 1.7 Radio transmission parameters in GSM System, 1.8 Data transmission in GSM Applications. 1.9 Technology Variation from 1G to 5G.	6	12

PRACTICAL LAB

Sr. No	Course outcome	Lab Activities	No. of Hrs assigned
1	CO1	V-I Characteristics of LED (E - O converter)	2
2	CO1	Characteristics of Photodetector	2
3	CO1	Measurement of Numerical Aperture	2

4	CO1	Setting up Fiber Optic Analog & Digital Link	2
5	CO1	Characteristics of Fiber Optic Communication Link	2
6	CO1	Study of Bending Loss	2
7	CO1	Study of Propagation Loss in Optical Fiber	2
8	CO1	Transmitting & receiving three separate Signals (Audio, Video, and Tone/ Voice) simultaneously through satellite link and perform Link Fail Operations	2
9	CO1	Study the delay between Uplink transmitter and Downlink receiver during data transmission	2
10	CO1	Send Tele-command and receive Temperature & intensity of light from satellite	2
11	CO1	Fusion splicing of the glass optical fibers	2
12	CO1	Stripping and cleaving Light coupling	2
13	CO1	Ben loss sensing	2
14	CO2	Calculate the carrier to noise ratio for a satellite link	2
15	CO2	Introduction and identification of microwave components.	2
16	CO2	Study of the characteristics of the Klystron tube and to determine its electronic tuning range.	2
17	CO2	GSM Theory & Standards	2
18	CO2	Understanding of GSM technology, its network, GSM capability & data services.	2
19	CO2	Understanding RF environment & study of GSM network by actually connecting to the GSM environment by any service provider. Command Level Study	2

20	CO2	Real Time study of GSM 07.05 & 07.07 commands in various Categories	2
21	CO2	Interfacing GSM Module with Arduino	2
22	CO2	Understanding Global Positioning System (GPS)	2

(Any 10 experiments)

Project Base Assignments

Unit No	Course Outcome	Details	Marks
I, II	CO1	Compare Fiber optic communication with coaxial cable communication	5
	CO1	Compare light sources used in fiber optic communication	5
	CO1	Compare light detectors in fiber optics communication	5
	CO1	Identify the different OFC tools from given toolkit	5
	CO1	Write down the function of the given tools required for fusion splicing.	5
	CO1	Enlist the most common causes of fiber optic malfunctions and state remedies	5
	CO1	Study the survey report shared with you and submit conclusion	5
III, IV, V,	CO2	Summarize the role of satellites in the 21st century communications ecosystem	5
	CO2	Compare fourth and fifth generation networks	5
	CO2	Write the performance criteria of cellular mobile networks	5
	CO2	Write notes on traffic scheduling criteria for 4G wireless networks	5

| VI | CO2 | Compare GSM with CDMA | 5 |
| | CO2 | Enlist and describe steps followed to interface GSM with Arduino | 5 |

Note: - At least three project-based assignments should be performed in a semester covering at least one assignment from each CO

Skill Test

UNIT	Course outcome	Topic	Marks 15
I , II	CO1	Identify the Non- metallic OFC, Armored OFC, Arial cable, Submarine Cable, Patch cord and Pigtail from given set of fiber cables based on applications	5
		Obtain characteristic of given device	5
		Implement a fibre optic system and calculate losses	10
III, IV, V, VI	CO 2	Transmitting & receiving Signals simultaneously through satellite link and perform Link Fail Operations	5
		Identification of microwave components from given set and depict its uses	5
		Interfacing GSM Module with Microcontroller	10

Note: - At least three skill tests should be performed in a semester from CO1 and CO2.

Examination/Assessment Scheme:

Question	Q1	Q2	Q3	Q4	Q5

Sub-Question	A	B or B	A	B	A	B	A or A	B or B	A or A	B or B
Marks	05	05/05	04	06	04	06	04/04	06/06	04/04	06/06
CO	CO2	CO1	CO1	CO1	CO2	CO1	CO2	CO2	CO2	CO2
Unit	3	2	1	2	4	2	5	5	4	6
Level of Competence	R	A	R	A	U	R	A	R	U	R

Final Examination Chapter Weight-age Scheme:

Chapter	Marks	
	Compulsory	With option
1	4	4
2	17	22
3	5	5
4	8	12
5	10	20
6	6	12
Total	50	75

Final Theory Examination Course Outcome Weight-age Scheme :

Course Outcome	Que No.	Marks	Total	Weightage% (Total/50)x100
CO1	Q1 (B)	5	21	42 %
	Q2 (A)	4		
	Q2 (B)	6		
	Q3 (B)	6		
CO2	Q1 (A)	5	29	58%
	Q3 (A)	4		
	Q4 (A)	4		
	Q4 (B)	6		
	Q5 (A)	4		
	Q5 (B)	6		

Total (Internal & External) Course Outcome Weight-age Scheme:

Sr. No.	Project Based Assignments (50 Marks)	Skill Test (15 Marks)	Practical Lab (10 Marks)	Final Practical exam (25 Marks)	Final Theory exam (50marks)	Weightage% (Total)x100
CO1	25	8	6	15	21	50
CO2	25	7	4	10	29	50
Total	50	15	10	25	50	100%

References:

Text/ Reference Books:			
Sr. No	Book title	Author/s	Edition	Publication

1	Practical Industrial Data Communications	Reynders D., Steve Macky, Wright Edvin	1 edition	Newnes Publication, ISBN 10:07506639523
2	Data Communication & Networking	Forouzan B.A.	5 edition	McGraw Hill Education
3	Optical communications essentials,	Keiser, Gerd,		McGraw- Hill, New Delhi-2003 ISBN13:9780071412049
4	Fiber Optic Communication System	Agrawal, Govind P	4 edition	Wiley; ISBN 139780470505113
5	Principles of Digital communication systems and computer networks	Prasad K.V.K.K.,	4 edition	Dreamtech press, New Delhi, ISBN 13:9788177223620
6	Optical Fiber Systems: Technology, Design, and Applications	Kao, Charles K	1 edition	McGraw-Hill Inc.,US ISBN 13: 9780070332775
7	Electronic Communication & Data Communication	Hemant Kumar Garg, Soni Manish	1 edition	University Book House Private Ltd., ISBN 13:9788181980717
8	Telecommunication Switching Systems and Networks	Thiagarajan Vishwanathan	4 edition	PHI Publications
9	Wireless Communications Principles and Practice	Theodore Rappaport	2 Edition	Pearson Education

10	Opportunities in 5G Networks : A research & development perspective‖	Fei Hu	1 edition	CRC Press
11	Telecommunications Switching, Traffic and Networks	J. E. Flood	1 edition	Pearson Education
12	Mobile Communication Systems	Krzysztof Wesolowski	4 edition	Wiley Student Edition
13	Digital Telephony	John C. Bellamy,	3 Edition	Wiley Publications
14	Mobile Wireless Communications	Mischa Schwartz	4 edition	Cambridge University Press
15	Principles of Modern Wireless Communication Systems	Aditya Jagannatham	4 edition	PHI
16	Microwave devices and circuits	Samuel Liao	4 edition	PHI
17	Electronic Communication systems	G. Kennedy	4 edition	McGraw-Hill Book Company
18	Microwave Engineering	Sanjeev Gupta		Khanna Pub
19	.Satellite communications	T.Pratt, C. W.Bostian, J.E. Allnut	2nd edition	John Willey and sons

20	Satellite Communications Systems: systems, techniques and technology	G. Maral, M.Bousquet, Z.Sun	5th edition	John Willy and sons
21	Satellite Communications	Anil K. Maini, Varsha Agrawal	2015	Wiley India Pvt. Ltd, ISBN: 978-81-265-2071-8.

Online Reference material and links	
Sr. No	Website/e-book(open books) /Audio/video (full link of each)
1	http://ee.sharif.edu/~wireless.comm.net/references/Rappaport%20-%20Wireless%20Communications,Principles%20and%20Practice-ISBN%200130422320.pdf
2	http://www.ee.iitm.ac.in/~giri/pdfs/EE5141/book2-rapapport.pdf
3	https://www.vssut.ac.in/lecture_notes/lecture1428730613.pdf
4	https://mrcet.com/downloads/digital_notes/ECE/III%20Year/FIBER%20OPTICAL%20COMMUNICATIONS.pdf
5	https://circuitglobe.com/splicing-of-optical-fibers.html
6	https://tecratools.com/pages/tecalert/splicing_guide.html
7	https://www.esoa.net/Resources/Why-Satellites-Matter-Full-Report.pdf
8	https://link.springer.com/content/pdf/10.1007%2F978-0-387-74159-8_25.pdf
9	https://circuitglobe.com/difference-between-gsm-and-cdma.html
10	https://www.instructables.com/GSM-SIM900A-With-Arduino/

Course name   : Diploma in Electronics

Semester   : VII

Subject name   : Major Project-II

Subject code   : DE 7005

Teaching and examination scheme:

Teaching scheme				Examination Scheme				
Theory Hrs.	Tutorial Hrs.	Practical Hrs.	Credit	Semester Exam Duration (PR)Hours	Internal Marks (PR)	Semester Exam Marks (TH)	Semester Exam Marks (PR/VIVA)	Total Marks (TH/PR)
0	0	8	4	2	50	00	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral								

Note:-

1. Minimum 40% marks are needed for passing in internal and semester examinations for theory and practical

2. Internal marks

Term Work	25Marks
Practical Examination	25 Marks
Total	50 Marks

- Term Work marks will be given based on the performance of student in Assignments and Skill Component throughout semester
- Practical Examination will consist of a review session where students of a concerned group will present their project idea, prototype, implementation methods, budget, and project deadline. Students will be assessed based on Criteria as mentioned.

3. Semester Examination

Project Demonstration	25 Marks
Project Report	25 Marks
Total	50 marks

- Semester examination includes demonstration and presentation of their working projects followed by Practical/Viva of 25 marks.
- Evaluation of project report by the members includes 25 marks
- Progressive evaluation is to be done by the project guide as per the prevailing curriculum implementation and assessment norms.
- It is mandatory to appear for semester examination and skill tests. remaining absent in any of the examination/test or fails to complete the prescribed number of assignments and Laboratory experiment will not be declared successful for that examination head.

Rationale:

The final year project is a typical requirement in an engineering diploma. It introduces the students to professional engineering practice by providing them with an opportunity to work on an open-ended engineering problem. Typically, the students would apply knowledge from different areas or courses, which they have studied in their curriculum using methods, tools and techniques, which they learned to a real-world scenario. The project is also a major

requirement for accreditation of an engineering programme. This is due to the fact that students would have to apply not only their engineering knowledge and proficiencies (hard skills), but also to demonstrate their competence in generic, professional skills (soft skills). The project is also an ideal place to assess both types of skills. It also emphasizes the importance of life-long learning as a fundamental attribute of graduate engineers.

Course Outcome: On successful completion course, students will be able

CO	CO statement	Marks % Weightage
CO1	To implement project problem statements with stated specifications and design.	40
CO2	To Prepare Documentation on Project report.	40
CO3	To communicate effectively and confidently as a member of a team.	20

Roadmap for Project Guides:

1. To face an engineering problem and solve with the help of his guide using the concepts and knowledge assimilated during her education.

2. Through a project the engineering diplom makes a synthesis of the information received and uses it to solve an engineering problem in a particular discipline or across disciplines. It is also a vehicle for many skills required for engineering graduates.

3. The final year project in curricula is ideally to be a design project and is the culmination of all the subjects learned in various courses in curriculum.

4. It is intended to be a major educational experience and a rewarding effort on the part of both students and the guide / supervisor.

5. The goals of the project are:

   ● To give the students an experience of carrying out an individual project and sense of accomplishment associated with such an undertaking.

   ● To encourage the students to make a meaningful intellectual commitment to an engineering problem.

   ● To help in the development of one of the most important attributes of an engineer - self-discipline.

   ● To emphasize the use of fundamental concepts, and use of texts and references rather than rely on staff members for all of the answers.

- To emphasize the presentation of technical material by informal summary reports, drawings, formal reports and presentations.
- To help the students to critically evaluate their own work.

6. The following items are the essential features of an acceptable design project
   - Development of student creativity.
   - Use of open-ended problems.
   - Formation of design.
   - Problem statement and specification.
   - Synthesis of alternative solutions.
   - Feasibility.
   - Detailed system description.
   - Consideration of constraints (e.g. economic, safety, reliability, etc).
   - Utilization of engineering and scientific principles

7. In order to satisfy the above requirements, the ideal design project must satisfy the following criteria:
   - The project must be integrative; the student must integrate the material from several of the disciplines of particular areas of engineering.
   - Each project must have meaningful analysis; analysis will usually be required in completing the synthesis. In synthesis various alternatives must be considered, evaluated and the most suitable alternative selected.
   - The presentation (written report, drawing and oral presentation) must be of professional quality.
   - Economic analysis - the design of any item must include some cost analysis whether it is a single item or a mass-produced item.
   - Safety analysis - there are few if any items, which will not have safety implications. Safety is not some obscure meaningless regulation to be ignored whenever possible, but is a serious concern that every engineer must address.
   - Final evaluation - the final evaluation of proposed design should be a critical self-evaluation of team effort. This evaluation should consider such items as how good is the design, what would be needed to complete the design, what changes could be suggested for improving the design.

- Environmental impact - environmental issues have become crucial and environmental consequences (positive or negative) of any engineering solution should be carefully considered and addressed.
- Social impact - can be part of the environmental impact, but can also be considered as a separate item looking at the consequences of the engineering solution on the community and well-being of the individuals and families.

8. Skill part on project report creation to be conducted for following areas,
   - Writing of Abstract, Introduction
   - Writing of Paper, formatting of paper and publication procedure on reputed journals
   - Result compilation and deducing a conclusion
   - Document formatting on MS word and Latex

Guidelines to Students to Complete Project:

1. The ideal design project should be done in a certain sequence major steps can be identified as
   - The first step would cover design needs, problem recognition and definition, proposal writing, searching and optimization techniques leading to an algorithmic approach to design, cost estimation and economic evaluations.
   - The second step provides a complete design experience under professional guidance. This step covers the actual design of a project.
   - The third step includes completion of the design project, design liability, design presentations, design report, design evaluations and manuals.

2. The project is important to students not only because of the educational benefits, but also because it can bring some other benefits, such as getting a better job. Some of the items, which should be considered by students are summarized below:
   - who does an outstanding project gains self-confidence that carries over into her other work and which is also observed by the interviewers for a job.
   - Many students prepare brief summary documents on their projects and take these briefs with them to interviews. The impact of this effort can be significant.
   - The students are encouraged to enter a local/regional/national student paper and project contest where they compete with students. High quality oral presentations usually are made on the best designs.

- There are national prizes for student design projects. Each year many students have projects which are eligible for submission to these contests. Prizes are significant and the resume impact is more important.

3. Ideally, the project should be done in teams to provide students with the team-working skills. It would also improve communication with the supervisor and free exchange of ideas with peers. Team projects allow building experiences on how to resolve team conflicts and how to work with people who are not necessarily friends.

4. Major outcome of the project are
   - an ability to apply knowledge of mathematics, science, and engineering
   - an ability to design and conduct experiments, as well as to analyse and interpret data
   - an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
   - an ability to identify, formulate, and solve engineering problems
   - an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
   - an ability to function on multi-disciplinary teams
   - an understanding of professional and ethical responsibility
   - an ability to communicate effectively
   - a recognition of the need for, and an ability to engage in lifelong learning and
   - a knowledge of contemporary issues

Term work in the form of assignments, presentations, papers will be assessed based on the following criteria .

Assignments:

Sr. No.	Assignment	Marks
1	Writing Abstract & Introduction.	10
2	Writing and publishing Papers at start of project, during the project and at the end of project.	10
3	Compilation of result and Conclusion.	10
4	Project Report formatting on MS Word or Latex	10
5	Presentation and Demonstration of working project	10

Total	50

Skill Component:

Sr. No.	Skill	Marks
1	Innovation and creativity	10
2	Feasibility, Synthesis of alternative solutions, and Execution	10
3	Detailed system description and Consideration of constraints and scope for future modification.	10
4	Professional and ethical responsibility	10
5	Design of experiments, process & system and interpretation and analyses of data to meet desired results.	10
	Total	50

Total of above two components will be scaled down to 50 as a TW marks.

Final Exam Assessment Criteria:

Sr. No.	Criteria	Marks
1	Project Report	25
2	Project	25
	Total	50

References

http://www.wiete.com.au/journals/GJEE/Publish/vol17no3/02-Uziak-J.pdf

SCHEME: SEMESTER VIII

PAPER CODE	SUBJECTS	TH	PR/TU	D (HRS.)	TP	TW	PR/V	T	CR
DE8001	INPLANT TRAINING -II (24 weeks)	0	40	0	0	100	100	200	20
DE8002	ENTRAPRENERSHIP AND	4	0	0	0	50	50	100	4

	INNOVATION–(ONLINE MODE)									
	TOTAL	4	40						300	24

Course Name   : Diploma in Electronics

Semester   : VIII

Subject name   : Implant Training- II

Subject Code   : DE 8001

Teaching and Examination Scheme:

Teaching scheme	Examination Scheme

Theory	Tutorial	Practical	Credit	Semester Exam Duration (PR)Hours	Term Work Marks	Internal Marks	Semester Exam Marks (PR/OR)	Total Marks (TH/PR)
0	0	24 weeks	20	2	50	50	100	200
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral								

Note:-

Minimum 40% marks are needed for passing in internal and semester examinations.

College will assign two mini projects to be performed in during in plant training in industry to achieve hands on practice and skill to be developed under industrial facilities to ensure all the perquisites of higher semester.

1. Internal Marks

Term work

Log Book	50 Marks
In plant training report writing	50 Marks
Total	100 Marks

2. Semester Examination

Semester examination includes

Final viva/voce	50 Marks.
In plant Training Industry Viva	50 Marks
Total	100 Marks

Rationale:

An In-plant Training is an opportunity offered to students, called interns, to work at a firm for a fixed period of time. In Plant training is part of our curriculum with duration of 24 weeks and 8 hours per day. Interns will prepare a report on the work done during the In-plant training and In-Plant Training Certificate will be awarded by the industry after successful completion of training. During in plant training student get opportunity to implement, test and adopt their learnings on industrial platform. During In-plant training students are offered stipend from concern industry as per university norms.

Scope:

Internship Training provides a real time exposure for the students on the latest and trending technologies in the core companies which enables them employable.

Following are some of the Job Roles in Electronics Industry.

<u>Job role</u>

- System Designer.
- Junior engineer,
- Telecommunication/RF engineer
- Maintenance engineer,
- Technician/supervisor,
- Assembly line engineer,
- Service/support engineer,
- Sales engineer.
- Machine operator,
- Quality control engineer,
- Programmer,

Benefits of an Internship

1. An opportunity to develop your knowledge and skills in a particular field or industry

2. Exploring different roles to see which one you would like to pursue.

3. Getting insight into the way businesses work and what challenges they face on a daily basis

4. The opportunity to create a network of contacts.

5. Gaining valuable work experience to set you apart from other candidates

6. Acquiring university module credits.

7. Applying the concepts and strategies of academic study in a live work environment of industry

Course Outcomes: On successful completion of course, students will be able to perform:

a. To understand the work culture of the industry.

b. To understand the Product and its relation with changing needs of the society.

c. To adapt the work environment without compromising the principles.

d. To relate the knowledge with its industrial applications.

e. To improve the skills of the technicians like designing, testing, tracing, debugging, soldering, documenting and many more.

  f. To tackle the challenges successfully.

  g. To inculcate the spirit of social service for being eco-friendly

  h. To develop entrepreneurial spirit among trainee

i. Electronics technician work, Designing, Assembly and soldering work.

<u>Learning Structure</u>

Application	Work as engineer, technician in electronics and telecommunication sector.
Procedure	Machine operator, standard operating, Circuit designing and fault-finding procedures.
Principle	Rules and discipline of particular industry, etiquettes, social and work ethics.
Concepts	Work as professional, designing and programming concepts, fault finding, testing.
Facts	Profession, roles, discipline, technology, skills.

<u>List of Industries</u>

Students are being sent to the industries as per their interest and capability.

Below are the names of industries where our students are regularly placed for In-plant training.

1. Tata Institute of Fundamental Research (<u>TIFR</u>)
2. Bhabha Atomic Research Centre (<u>BARC</u>)
3. Aditya Solutions
4. Ashida Electronics Pvt Ltd
5. Dipel Electronics Pvt.Ltd.
6. Electrolab India Pvt. Ltd.
7. Electronics Regional Testing Laboratory (ERTL)
8. Industrial Design Centre, IIT-Bombay
9. NCC Telecom Pvt. Ltd.
10. Core Technologies Pvt. Ltd.
11. Western Regional Instrumentation Centre (WRIC)
12. Larsen & Toubro Ltd.
13. APLAB Ltd.
14. Systems Creator Pvt. Ltd.

15. Quality Logger Pvt. Ltd.

16. Simtek Medico Systems Pvt. Ltd.

17. Radix Electro systems Pvt Ltd

18. Artemis Pvt Ltd

19. GenMeaint Pvt Ltd.

20. Applied Digital Microsystems Pvt Ltd.

Course Name   : Diploma in Electronics

Semester   : VIII

Subject name   : Entrepreneurship and Innovation (Online mode)

Subject Code   : DE8002

<u>Teaching and Examination Scheme:</u>

Teaching scheme				Examination Scheme				
Theory Hrs.	Tutorial Hrs.	Practical Hrs.	Credit	Semester Exam Duration (TH/PR) Hours	Internal Marks (TW)	Semester Exam Marks (TH)	Semester Exam Marks (Viva)	Total Marks (TH/PR)
4	0	0	4	0	50	0	50	100
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term work								

<u>Evaluation (Theory)</u>

● Progressive evaluation is to be done by the subject teacher as per the prevailing curriculum implementation and assessment norms.

● It is mandatory to submit assignments given by the teacher. remaining absent in any or fails to complete the prescribed number of assignments will not be declared successful for that head.

<u>Rationale:</u>

This course aims to develop skills for becoming a successful entrepreneur by conceiving an enterprise. Resource generation and risk mitigation are integral part of the course. It involves "building something from nothing" and successful entrepreneurs know how to manage and mitigate uncertainty and risk. The course content is relevant to those individuals thinking about starting a business or who are already in business - large or small, those who are interested in commercializing their own innovations or of others, and those who advise project consultant or engage in policy making in the entrepreneurship area.

The course also aims to create sustainable entrepreneurs by providing required ecosystem.

Course Outcomes: On successful completion course, students will be able to

CO	CO Statement	% Weight age
CO1	Enable the students to learn the various aspects and techniques of creativity for innovation	25
CO2	To develop the qualities of entrepreneurs that contributed to their success	25
CO3	Evaluate the various sources of raising finance for startup ventures.	25
CO4	Engage in a continuing learning process through the interaction with peers in related topics, as individuals and as team members	25

   Prerequisite

Entire diploma in electronics curriculum.

   Learning Structure:

Application	Industry, Management, Startup, Grass root innovation
Procedure	Negotiation, decision making process and approaches, Effectuation and Causation;
Principle	Forms of business organizations; organizational structures promoting entrepreneurship.
Concept	Policy Initiatives and focus; role of institutions in promoting entrepreneurship Business model canvas, Business Pitching,
Facts	Business, workers, finance, customer, behavioral characteristics/traits, entrepreneurial challenges

Course Contents:

THEORY

Unit	Chapter	Topic and Contents	Hours	% Weightage
I	1	**Introduction to Entrepreneurship and Innovation** **Entrepreneurship** Entrepreneurs; entrepreneurial personality and intentions: characteristics, opportunities, attitude, traits and tendencies; entrepreneurial challenges. Real-life successes and failures of entrepreneurs **Introduction to Innovation & Start up** ● Innovation and Types ● Commercialization of Innovation ● Basic Concept of Startup ● Case study: Real-life successes and failures of Start-up ● About Grass root innovation, Creativity, Invention and innovation ● Relevance of Technology for Innovation The Indian innovations and opportunities	12	20
II	2	**Innovation & Entrepreneurship Process** ● Prototype Development ● Startup and Venture development ● Innovation and Startup ecosystem ● Pre-incubation and Incubation Stages ● Intellectual Property Right (IPR) & Patents	15	30

		● Current trends, development and general awareness on Innovation and startup		
III	3	**Business Finance and Arithmetic** • Unit of Sale, Unit Price and Unit Cost - for single product or service • Types of Costs - Start up, Variable and Fixed • Income Statement • Cash flow projections • Break Even Analysis - for single product or service •Computation of Working Capital • Inventory Control and EOQ • Return on Investment (ROI) and Return on Equity (ROE)	15	20
IV	4	**Fund Raising Process** ● Fundraising for a for-profit social enterprise, not-for-profit social enterprise ● Communication for fundraising to the sources and general public ● Investment, Angel, VC fund system ● Govt. Schemes and funding support to ideas, innovations, and startup ● Crowd funding, agencies schemes policies and initiatives competition	10	15
V	5	**Entrepreneurship development in India** · Growth and promotion of Entrepreneurship in India - Institutional arrangements · Entrepreneurial motivation - Values and Culture · Entrepreneurship in various sectors	8	15

		Details		
		• Access to finance, market, R&D and Technology • Policies and programs related to entrepreneurship development • Basic tools and methods for analyzing/examining new ideas.		

PROJECT BASE ASSIGNMENTS

Unit No	Course Outcome	Details	Marks
I,	CO1	Take Entrepreneur Interview and prepare report	10
II	CO2	Case Study: Read real start up stories – success and failure	10
III, IV,V	CO3 CO4	You are to undertake the following tasks: - Visit to Incubation Center - Develop five new ideas as to how you could build upon and expand the initial startup idea. - Raise funds for Center.	10
II, V	CO2 CO3 CO4	Convert your Idea into entrepreneurship opportunities: - Green entrepreneurship, - e-entrepreneurship - Start- up	20

Note: - At least five project-based assignments should be performed in a semester covering at least one assignment from each CO.

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REFERENCES:

Online Reference material and links	
Sr. No	Website/e-book(open books) /Audio/video (full link of each)

1	Web links :
	www.brikenbulbs.com
	www.en.wikipedia.org/wiki/business.plan
2	www.wdc-econdev.com
3	www.business.gov.au
4	www.ideo.com
5	www.mckinsey.com/
6	www.ecic.adelaide.edu.au
7	www.mind-mapping.co.uk
8	Journals
	There is a range of journals where entrepreneurship research scholars publish their research, such as (note that this list is not definitive):
	· Journal of Business Venturing
	· Entrepreneurship Theory and Practice
	· Journal of Small Business Management
	· Academy of Management Review
	· Journal of Small Business and Entrepreneurship
	· Venture Capital
	· Small Business Economics
	· Family Business review

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Rules -

1. Every student shall ordinarily be allowed to keep terms for the given semester (except In Plant Training) in a program of his enrolment for a particular subject, only if she fulfills at least seventy five percent (75%) of the attendance taken as an average of the total number of lectures, practical, tutorials etc. wherein short and/or long excursions/field visits/study tours/intra and intercollege competitions organized/permitted by the college and supervised by the shall be credited to her attendance for the total no of periods which are otherwise delivered on the material

day/s for that subject. In such case, student will not be able to appear for any of the examination and will be marked as a status "NAA" for the subject.

2. Without prejudice to what is stated here-in-above, the Principal shall be the competent authority to condone the absentee of any student further up to additional 10%, and Hon Vice Chancellor further up to additional 15% if deemed fit after verifying the genuineness and gravity of the problem that justifies the student to remain absent, which generally shall be limited to his own sickness, sickness of his parent, death of his parent etc. supported by valid evidence, documentary or otherwise.

3. It is compulsory for the students to attend In-Plant training of 24 weeks in Semester V and Semester VIII. During the training, students can avail public holidays and applicable casual leaves only after obtaining necessary prior permission. Principal shall be the competent authority to condone the absentee to additional 10%, if deemed fit after verifying genuineness and gravity of the problem that justifies the student to remain absent, which generally shall be limited to his own sickness, sickness of his parent, death of his parent etc. supported by valid evidence.

4. Subject may be further divided into Theory (INT/EXT), Practical (INT/EXT) and Termwork (INT). A candidate shall be declared to have passed the examination in a subject if he/she secures not less than 40% each of the heads of passing.

5. A student who PASSES in the Internal Assessment but FAILS in the End Semester Examination (EXT) of the course shall reappear for the End Semester Examination of that course. However, his/her marks of the Internal Assessment shall be carried over and he/she shall be entitled for grade obtained by him/her on passing.

6. If a student fails in TW (INT) or TH(INT) she will not be eligible to appear for the semester TH (EXT) of that particular subject. If a student fails in PR (Internal), then she will not be eligible for the semester PR (EXT) exam. In such case, TH(EXT) /PR(EXT) of the particular subject will be marked as a status "NAP" as applicable.

7. Marks obtained in 7th and 8th Semester will be considered for the award of class /grade in Diploma

8. Promotion Rules

   a. A student shall be allowed to keep term for Semester II irrespective of grades obtained in each course of Semester I.

b. A student shall be allowed to keep term for Semester III if she passes each of Semester I and Semester II OR she fails in not more than forty percent of heads of the passing of Semester I and Semester II have taken together and does not have pending NAA status in any of the semester I and semester II subject.

c. A student shall be allowed to keep term for Semester IV irrespective of grades obtained in each course of Semester III.

d. A student shall be allowed to keep term for Semester V (In-Plant Training) if she passes in all heads of Semester I, Semester II, Semester III and Semester IV

OR

She has passed in all heads of Semester I and Semester II and fails in not more than forty percent heads of passing Semester III and Semester IV taken together and does not have pending NAA status in any of the previous semester.

e. A student shall be allowed to keep term for Semester VI upon successful completion of In-Plant Training of 24 weeks in Semester V.

f. A student shall be allowed to keep term for Semester VII if she passes in all heads of Semester I, Semester II, Semester III, Semester IV, Semester V and Semester VI

OR

She has passed in all heads of Semester I, Semester II, Semester III, Semester IV and Semester V, and have failed in not more than forty percent heads of passing of Semester VI without any pending NAA status in any of the previous semester.

g. A student shall be allowed to keep term for Semester VIII (Internship) irrespective of grades obtained in each course of Semester VII.

9. Grace Marks

Grace Marks for Passing in each of head of passing (Theory /Practical /Oral /Termwork).

The examinee shall be given the benefit of grace marks only for passing in each head of passing, (Theory/Practical/Oral/Termwork) in External examinations as follows:

Head of Passing	Grace Marks Upto	Head of Passing	Grace Marks Upto
Upto- 50	2	251-300	7
51-100	3	301-350	8

| 101-150 | 4 | 351-400 | 9 |
| 151-200 | 5 | 401 & above | 10 |

Provided that benefit of such gracing marks given in different heads of passing shall not exceed 1% of the aggregate marks in that examination. Provided further that this gracing is concurrent with the rules and guidelines of AICTE.

Provided further that the benefit of gracing of marks under this Ordinance, shall be applicable only if the candidate passes the entire examination of semester.