GOVERNMENT POLYTECHNIC, PUNE
(An Autonomous Institute of Govt. of Maharashtra)

Programme	**:**	**Diploma in ET**/CE/EE /ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/**17**/21/22/**23**/24/26
Course	**:**	**English**
Course Code	**:**	**HU181**

Teaching Scheme:

	Hours/Week	**Total Hours**
Theory	**02**	**32**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term Work**
Duration	**Two Class Tests each of 60 Minutes**	**03 Hrs.**	**---**	**---**	**---**
Marks	**20**	**80**	**---**	**---**	**25**

Course Rationale:

This is been noticed that diploma pass outs lack in grammatically correct written and oral communication in English. It is also been noticed that communication is not a problem of students, communication in correct English is the basic problem of Diploma pass outs. Students will have to interact in this language so far as their career in industry is concerned. In order to enhance this ability in students English is introduced as a subject to groom their personality.

Course Objectives:

After studying this course, the student will be able to

- Comprehend the passage.
- Answer correctly the questions on unseen passages.
- Increase the vocabulary.
- Apply rules of grammar for correct writing.
- Speak correct English

Course Content:

Chapter No.	Name of Topic/Subtopic		Hrs	Marks
1	**GRAMMAR**			
	1.1	Tenses : Past Perfect, Past Perfect Continuous	12	20
	1.2	Types of Sentences: Simple, Compound and Complex.		
	1.3	Verbs		
	1.4	Reported Speech : Complex Sentences		
	1.5	Uses of 'too' and 'enough' : Conversion and Synthesis		
	1.6	Modal Auxiliary : Will, shall, can, could		
	1.7	Articles		
	1.8	Preposition		
	1.9	Conjunctions Interjections		
	1.10	Affirmative and negative, interrogative		
	1.1	Question tag		
2		**PARAGRAPH WRITING**		
	2.1	Types of paragraphs (Narrative, Descriptive, Technical)	04	10
3		**COMPREHENSION**		
	3.1	Unseen passages	10	40
4		**VOCABULARY**		
	4.1	Homophones: To understand the difference between meaning and spelling of words	04	06
	4.2	Vocabulary : Understanding meaning of new words	02	04
	Total		**32**	**80**

List of Practical /Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs.
1	Building of Vocabulary – 2 assignments 25 new words for each assignment with sentence	04
2	Conversational Skills – Role play student will perform the role on any 6 situations. Dialogue writing for the given situations.	04
3	Grammar – 2 assignments	04
4	Write paragraphs on given topics. 2 assignments.	04
5	Errors in English 2 assignments. Find out the errors and rewrite the sentences given by the teacher.	04
6	Essay writing 2 assignments. Write 2 assays on topic given by the teacher.	04
7	Biography (Write a short biography on your role model approximately in 250-300 words)	04
8	Idioms and phrases Use of idioms and phrases in sentences(20 examples)	04

	Use of idioms and phrases in sentences(20 examples)	
Total		**32**

The term work will consist of 10 assignments.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Grammar	Class room Teaching
2	Paragraph Writing	Class room Teaching
3	Comprehension	Class room Teaching
4	Vocabulary	Class room Teaching

Reference: Books:

Sr. No.	Author	Title	Publication
1	J.D.O. Connors	Better English Pronunciation	London Cambridge University Press ELBS
2	Geofrey Leech	A communicative Grammar of English	Essex Longman Group Ltd. : ELBS
3	Randolf Quirk	University Grammar of English	Essex Longman Group Ltd. : ELBS

Learning resources: Books, Audio Visual aids

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Grammar	--	10	10	20
2	Paragraph Writing	--	05	05	10
3	Comprehension Of Unseen Passages	--	30	10	40
4	Vocabulary/Homophones	02	04	04	10
	Total	**02**	**49**	**29**	**80**

Prepared by :

(M.A.Surdikar)	**(S.V.Chaudhari)**	**(R.N.Shikari.)**
Lecturer in English	**Member Secretary PBOS**	**Chairman PBOS**

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/21/22/**23**/24/26/16/**17**
Name of Course	**:**	**Communication Skill**
Course Code	**:**	**HU182**

Teaching Scheme:

	Hours/Week	**Total Hours**
Theory	**02**	**32**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term Work**
Duration	**One Class Tests of 60 Minutes and an Oral**	**03 Hrs.**	**--**	**--**	**--**
Marks	**20**	**80**	**--**	**25**	**--**

Course Rationale:

Classified under human sciences this subject is intended to introduce students with the process of communication so that they can identify conditions favorable to effective communication. They will also be taught basic and applied language skills viz. listening, speaking, reading and writing – all useful for the study of a technical course and communication. Specifically, writing and oral presentation skills are two top ranking capabilities needed for professional careers and must be developed systematically.

Course Objective:

After studying this course, the student will be able to

- Understand and use the basic concept of communication and principles of effective communication in an organized set up and social context.
- Give a positive feedback in various situations to use appropriate body language & to avoid barrier for effective communication.
- Write the various types of letters and office drafting with the appropriate format.
- Communicate with the Industry Professionals.

Course Content:

Chapter No.	Name of Topic/Subtopic		Hrs	Marks
1	**Basic Concepts And Principles Of Communication**			
	1.1	**The Communication Event** The Communication event : Definition The elements of communication: The sender, receiver, message, channel, feedback	12	24
	1.2	**The communication Process** The Communication Process : Definition Stages in the process : defining the context, knowing the audience, designing the message, encoding, selecting the proper channels, transmitting, receiving, decoding and giving feedback.		
	1.3	**Principles of Effective communication** Effective Communication : definition Communication Barriers and how to overcome them at each stage of communication process. Developing effective message: Thinking about purpose, knowing the audience, structuring the message, selecting proper channels, minimizing barriers and facilitating feedback.		
2	**Organizational Communication**			
	2.1	What is an organization? Goal. Patterns of communication : Upward, Downward, Horizontal and Grapevine	04	12
3	**Non-verbal Communication**			
	3.1	Non Verbal Codes : Kinesics (eye-contact, gesture, postures, body movements and facial expressions) Proxemics (using space), Haptics (touch), Vocalics (aspect of speech like tone, emphasis, volume, pauses etc.) Physical Appearance, Chronemics (manipulating time), Silence.	06	12
4	**Business Correspondence and Office Drafting**			
	4.1	Business Correspondence : Letter of Enquiry, Order letter, Complaint Letter.	10	32
	4.2	Office Drafting : Circular, Notice and Memo		
	4.3	Job Application with Resume.		
	Total		**32**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs.
1	Self Introduction	02
2	Elocution	04
3	Extempore	04
4	Mock Interview	04
5	Debate	02
6	Variety Application/Reports	02
7	Writing Paragraphs on Technical Subjects	02
8	Business letter	02
9	Individual/Group Presentation on identified topics	02
10	Group discussion	02
11	Role play	06
	Total	**32**

Reference Books:

Sr. No.	Author	Title	Publication
1	MSBTE	Communication skills	MSBTE
2	Joyeeta Bhatacharya	Communication skills	Macmillan Co.
3	Sarah Freeman	Written communication in English	Orient Longman Ltd.
4	Krishna Mohan and Meera Banerji	Developing Communication skills	Macmillan India Ltd.

Learning Resources: Books, Audio - Visual aids

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Basic Concepts and Principles of communication	08	08	08	24
2	Organizational communication	04	04	04	12
3	Non Verbal communication	---	---	12	12
4	Business Correspondence and Office Drafting	---	---	32	32
	Total	**12**	**12**	**56**	**80**

Prepared by:

(M.A.Surdikar)	**(S.V.Chaudhari)**	**(R.N.Shikari)**
Lecturer in English	**Member Secretary PBOS**	**Chairman PBOS**

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/21/22/**23**/24/26/16/**17**
Name of Course	**:**	**Applied Mathematics - I**
Course Code	**:**	**SC181**

Teaching Scheme:

	Hours / Week	**Total Hours**
Theory	**03**	**48**
Term Work /Tutorial	**01**	**16**

Evaluation:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests of 60 minutes duration**	**3 Hrs**	**--**	**--**	**--**
Marks	**20**	**80**	**--**	**--**	**--**

Course Aim:

The students of Diploma in Engineering and technology must acquire some essential Competencies in Mathematics.

Course Objectives:

The students will be able to think logically and systematically. They will learn the Importance of accuracy and develop attitude of problem solving with diligence and perseverance**.**

Course Content:

Chapter No.	Name	Hrs	Marks
1	**ALGEBRA**	**18**	**32**
	1.1 Logarithms: Definition, Laws of Logarithms, Simple examples based on laws.	02	04
	1.2 Determinants: Determinants of second and third orders, solution of simultaneous equations in two and three unknowns (Cramer's Rule), Properties of determinants of order 3 and examples.	03	06
	1.3 Partial fractions: Rational fractions, resolving given rational fraction into partial fraction (Type : Denominator containing non-repeated, repeated linear factors and non repeated quadratic factor)	03	06
	1.4 Matrix Algebra - Definition of a matrix, types of matrices, Equal matrices, Addition, subtraction, multiplication of matrices. Scalar multiple of a matrix. Transpose of a matrix, Singular and Non singular matrix. Adjoint of a square matrix. Inverse of a matrix. Solution of simultaneous linear equations in 3 unknowns by Adjoint method.	06	10
	1.5 Binomial Theorem Definition of factorial notation, definition of permutation and combinations with formula, Binomial theorem for positive index, General term, Binomial theorem for negative index, Approximate value (only formula)	04	06
2.	**TRIGONOMETRY**	**20**	**32**
	2.1 Trigonometric ratios and fundamental identities.	04	08
	2.2 Trigonometric ratios of allied angles, compound angles, Multiple angles (2A, 3A), submultiples angle.	06	08
	2.3 Sum and product formulae.	06	08
	2.4 Inverse Circular functions. (definition and simple problems)	04	08
3.	**COORDINATE GEOMETRY**	**10**	**16**
	3.1 Straight Line Slope and intercept of straight line. Equation of straight line in Slope point form, slope-intercept form, two-point form, two-intercept form, normal form. General equation of line. Angle between two straight lines. Condition of Parallel and Perpendicular lines. Intersection of two lines. Length of perpendicular from a point on the line and perpendicular distance between parallel lines.	06	10
	3.2 Circle Equation of circle in standard form, Centre-radius form, Diameter form, two intercept form. General equation of a circle and its centre & radius.	04	06

(For Tutorials a batch of 20 students)

Referene Books:

Author	Title	Publisher
Shri S.P. Deshpande	Mathematics for Polytechnic Students	Pune Vidyarthi Griha
Shri S.L. Loney	Plane Trigonometry	Macmillan and London
Shri H.K. Dass	Mathematics for Engineers (Vol.I)	S.Chand and Comp.
Shri Shantinarayan	Engg. Maths Vol.I and II	S. Chand and Comp.

Learning Resources – Chalk, Board etc

Specification Table :

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Algebra	08	16	08	32
2.	Trigonometry	08	16	08	32
3.	Co-ordinate Geometry	04	08	04	16
	Total	**20**	**40**	**20**	**80**

Prepared by :

(V.B.Shinde)	(S.V.Chaudhari)	(R.N.Shikari)
Prepared By	**Member Secretary PBOS**	**Chairman PBOS**

Programme	**:**	**Diploma in ET**/CE/EE /ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/**17**/21/22/**23**/24/26
Course	**:**	**Applied Mathematics –II**
Course Code	**:**	**SC 182**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Term Work /Tutorial	**01**	**16**

Evaluation:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests of 60 minutes duration**	**3 Hrs**	**--**	**--**	**--**
Marks	**20**	**80**	**--**	**--**	**--**

Course Aim:

This subject intends to teach students basic facts, concepts, principles and procedure of Mathematics as a tool to analyze Engineering problems and as such it lays down foundation for the understanding of engineering science and core technology subjects.

Course Objectives:

The students will be able to,

1. Under stand basic facts of Mathematics about the field of analysis of any Engineering problem.
2. Know the standard ways in which the problem can be approached.
3. Apply basic concepts to engineering problems.

Course Contents:

Sr. No	Name	Periods	Marks
1	**FUNCTIONS AND LIMITS :**	**13**	**18**
	1.1 Functions: Concept of functions, Types of functions; (only definitions)	03	06
	1.2 Limits: Concept of limits and limits of functions. (Algebraic, trigonometric, logarithmic and exponential.)	10	12
2	**DERIVATIVES:**	**16**	**24**
	2.1 Definition of the derivative, derivatives of standard Functions.	03	04
	2.2 Differentiation of sum, difference, product and quotient of two or more functions	03	04
	2.3 Differentiation of composite, inverse, implicit functions.	04	06
	2.4 Differentiation of parametric, exponential and logarithmic Functions.	04	06
	2.5Successive differentiation.	02	04
3	**APPLICATIONS OF DERIVATIVES:**	**05**	**08**
	3.1 Geometrical meaning of derivative (Equations of tangents and Normals)	03	04
	3.2 Maxima and minima of functions.	02	04
4.	**VECTORS**	**06**	**14**
	4.1 Definition of vector, position vector, Algebra of vectors (Equality, addition, subtraction and scalar multiplication)	01	02
	4.2 Dot (Scalar) product with properties.	02	04
	4.3 Vector (Cross) product with properties.	02	04
	4.4 Workdone and moment of force about a point & line	01	04
5.	**NUMERICAL METHODS**	**08**	**16**
	5.1 Solution of algebraic equations : Bisection method, Regulafalsi method and Newton – Raphson method.	04	08
	5.2 Solution of simultaneous equations containing 2 and 3 Unknowns : Gauss elimination method. Iterative methods- Gauss Seidal and Jacobi's method	04	08
		48	**80**

(For Tutorials a batch of 20 students)

Reference Books:

Author	Title	Publisher
Vishwanath	Engineering Mathematics Vol.I	Satya Prakashan, New Delhi
S.P. Deshpande	Mathematic for polytechnic students I & II	Pune Vidyarthi Griha Prakashan
H.K. Dass	Mathematics for Engineering Vol-I	S.Chand and Company
Shantinarayan	Engineering Mathematics vol-I and II	S.Chand and Company

Learning Resources: Chalk, Board etc.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Function And Limits	04	08	06	18
2	Derivatives	08	16	00	24
3	Applications Of Derivatives	00	00	08	08
4	Vectors	04	04	06	14
5	Numerical Methods	04	04	08	16
	Total	**20**	**32**	**28**	**80**

Prepared by :

(V.B.Shinde)	(S.V.Chaudhari)	(R.N.Shikari)
Lecturer in Mathematics	**Member Secretary PBOS**	**Chairman PBOS**

Programme	**:**	**Diploma in ET**/CE/EE /ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/**17**/21/22/**23**/24/26
Course	**:**	**Engineering Physics**
Course Code	**:**	**SC183**

Teaching Scheme:

	Hours/Week	**Total Hours**
Theory	**03**	**48**
Term Work/Practical	**02**	**32**

Evaluation:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term Work**
Duration	**Two class test each of 20 Marks -1hr**	**3 Hrs**	**2 Hrs**	**--**	**--**
Marks	**20**	**80**	**50**	**--**	**--**

Course Aim:

1. To understand various phenomena, principles and concepts in physics.
2. To understand the applications in Engineering Physics.
3. To solve the applied numerical problems.

Course Objective:

1. The student should able to appreciate the role of physics.
2. The student should able to think in scientific manner and apply the basic Knowledge in different situations.

Course Content :

Chapter No	Topic / Sub topic	Hrs	Marks
1	**Motion**	06	08
	1.1 Introduction **1.2 Circular Motion**: UCM, angular displacement, angular velocity, Angular acceleration, radial velocity, tangential velocity, periodic time, frequency, relation between linear and angular velocity, explanation of centripetal and centrifugal force, with application, relation between velocity frequency and wavelength. **1.3 SHM**: Definition, SHM as a projection of UCM on the diameter, Equation of SHM, displacement and graphical representation.		
2	**Properties of Matter**	08	12
	2.1 Surface Tension : Molecular theory of surface tension, Cohesive and adhesive forces, Angle of contact, shape of liquid surface in capillary tube, capillary action (Examples). Surface tension by capillary rise method, (no derivation), simple problem, effect of impurity and temperature on surface tension. **2.2 Viscosity:** Definition, velocity gradient, Newton's & Stokes' law of viscosity, terminal velocity, coefficient of viscosity by stokes method(No derivation), type of flow of liquid - stream line flow, turbulent flow, Reynolds's number (significance), applications and simple problems. **Elasticity:** Elastic, plastic and rigid bodies, stress and strain Hook's law, types of elastic modulii with its relation, problems. Behaviour of wire under continuously increasing load.		
3	**Sound**	03	06
	Wave motion, Transverse and longitudinal waves, free and forced vibrations, Resonance - explanation and example. absorption, reflection and transmission of sound.		
4	**Heat**	04	06
	Explanation of Gas laws, Boyle's law, Charles's law, Gay Lussac's law, General Gas Equation, problems on gas laws, units of temperature ^{0}C, ^{0}K with their conversion, absolute scale of temperature, modes of heat transfer, conduction, convection and radiation.		
5	**Optics**	06	12
	5.1 Introduction to reflection and refraction of light, Snell's law, physical significance of refractive index, critical angle, total internal refraction of Light. **5.2 Fiber optics** : Propagation of light through optical fiber, numerical aperture, types of optical fibers, applications and comparison with		

	Electrical cable. **5.3 LASER:** Definition, spontaneous and stimulated emission, population inversion, He-Ne laser- construction and working, applications and properties of LASER.		
6	**Electrostatics**	06	10
	6.1 Electric charge, Coulomb's law in Electrostatics, unit of charge, electric field, intensity of electric field, electric lines of forces (Properties), electric flux, flux density. **6.2 Electric potential:** Explanation, definition**,** potential due to a point charge, potential due to a charged sphere, absolute electric Potential, simple problems.		
7	**Current Electricity**	06	10
	7.1 Current, resistance, specific resistance, Whetstone's network, meter bridge, balancing condition of meter bridge, measurement of Unknown resistance using meter bridge, problems. **7.2 Principle of potentiometer,** potential gradient, E.M.F., comparison of E.M.F. using potentiometer. **7.3 Electric work**, electric power, energy, units and calculations of electric bill.		
8	**Electromagnetism**	03	06
	Magnetic effect of electric current, Ampere's rule, intensity of magnetic field, magnetic induction, Biot- Savert's Law (Laplace's Law), Fleming's left hand rule, force experienced by current carrying straight conductor placed in magnetic field, problems.		
9	**Modern Physics**	06	10
	9.1 X- ray's, principle, production, properties and applications. **9.2 Photo electricity**: Plank's quantum theory, photoelectric effect (circuit diagram and working), threshold frequency, stopping potential, work function, Einstein's photoelectric equation, photocell, problems.		
	Total	**48**	**80**

List of Practicals: (Any Eight)

Sr. No.	Name of Experiment
1	Use of vernier calliper to measure the dimensions of different objects.
2	To understand the concept of error in instrument and to measure the dimensions of different objects using micrometer screw gauge.
3	To determine the velocity of sound using resonance tube method.
4	To determine period of simple pendulum.
5	To determine surface tension by capillary rise method.
	Repeat turn for experiments No.1 to 4
6	To determine the specific resistance using Ohm's law
7	To understand the concept of Whetstone's network and to determine the specific resistance using the meter bridge.
8	Comparison of EMF using single cell method.
9	To understand the concept of viscosity and hence to determine the coefficient of viscosity using Stokes' method.
10	Study of concept of total internal reflection.
11	Study of characteristics of photoelectric cell.
12	To determine permittivity of free space.
	Repeat turn for experiments No.5 to 8

Reference Books:

Author/s	Title	Publisher
R.K. Gaur and S. L. Gupta	Engineering Physics	Dhanpat Rai and Sons Publications
Manikpure, Prakash Deshpande and Dagwar	Basic Applied Physics	S. Chand and Co. New Delhi.
Modern Physics	Text book in Physics for diploma Engg. Student.	Sony Publications Pvt. Ltd.
Applid Physics	Schum's Series.	
Kshirsagar, Avdhanalu-	Engineering Physics	
M.S.Pawar, M.A.Sutar	Basic Physics (E Scheme)	

Learning Recourses:

1. Chart 2. Black Board 3.Television 4. Internet 5. Educational CD's
6. Models 7. Experimentation 8. Diagram Demonstration

Specification Table:

Sr. No	Topic	Cognitive Level			Total
		Knowledge	Comprehension	Applications	
1	General Physics	02	04	02	8
2	Properties of matter	04	04	04	12
3	Sound	02	02	02	06
4	Heat	02	02	02	06
5	Optics	04	04	04	12
6	Electrostatics	04	02	04	10
7	Current Electricity	04	02	04	10
8	Electromagnetism	02	02	02	06
9	Modern Physics	04	02	04	10
	Total	**26**	**24**	**30**	**80**

Note: Figures in the bracket indicate the marks for which question will be set to account for internal options.

Prepared by :

(Mrs. Y.D.Bhide)	**(S.V. Chaudhari)**	**(R.N.Shikari)**
Lect. in Physics	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in ET**/CE/EE /ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/**17**/21/22/**23**/24/26
Course	**:**	**Engineering Chemistry**
Course Code	**:**	**SC184**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Term Work /Practical	**02**	**32**

Evaluation:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests of 60 minutes duration**	**03 Hrs**	**02 Hrs**	**--**	**--**
Marks	**20**	**80**	**50**	**--**	**--**

Course Aim:

Applications of Material Science and Chemical Principles have resulted into the Development of new materials used in modern medicines and automobiles, synthetic fibers polymers, alloys, new energy sources and many other important products and processes.

Hence, Material Science is an important and expanding branch in scientific engineering and economic field of our society. Thus the principles of Material Science have a wide application in all the branches of engineering and technologies. In this syllabus, the coverage of various topics will orient the students to appreciate the principles Material Science in the fields of engineering and Technology.

The topic atomic structure includes the basic structure of matter, which governs the Mechanical, Electrical and Magnetic properties of the matter. Steels, alloys, plastic and Elastomers are included considering their present extensive use in automobiles, chemicals and heavy engineering industries. The contents of this curriculum which provide knowledge of cells and batteries, selection of appropriate materials for engineering applications and methods of protection by metallic and non-metallic coatings. This satisfies the need of the students to cope with the recent use of these materials and processes in their world of work.

Corrosion and methods of prevention will make students realize importance of care and maintenance of machines and equipments. Study of different polymers, insulators, adhesives and their chemical behavior will be useful in their applications in electrical appliances and electronics industries. Study of impurities and hardness in water and methods for water softening will help the students to make proper use of water. The knowledge of environmental pollution and its awareness is helpful to change

the attitude towards society and development by caring approach.

Nanomateials are widely used in engineering field .It will help to understand the need of material in different engineering fields.

Course objectives:

The student will be able to

- Develop interest in the fundamental structure of matter, which governs the properties of matter.
- Understand applications of basic concepts in chemistry
- Understand various Chemical Technological processes
- Apply principles and concepts of chemistry, to Engineering situations.
- Identify and formulate the changes and Analyze the chemical changes and effects
- Appreciate effect of chemical changes.
- Aware and Care about the environment

Course Content

Chapter No.	Name of the Topic	Hours	Marks
1	**ATOMIC STRUCTURE AND CHEMICAL BONDING** **1.1 Atomic Structure :** Definition of atom, structure of modern atom, Characteristics of fundamental particles of an atom, definition of atomic number, atomic mass number and their difference, Orbits: Bohr's energy levels, sub-energy levels, s, p, d, f orbital, shapes and description of s and p orbital. Definition and significance of quantum numbers:, Aufbau's principle, Hund's rule, orbital electronic configurations (s, p, d, f) of elements having atomic number 1 to 30, **1.2 Chemical Bonding :** • Definitions of valence electrons, valency. • Definition of electrovalency, positive and negative electrovalency, formation of Electrovalent compounds-*Nacl,Alcl*$_3$ Definition of covalency, single, double and triple covalent bonds, formation of Covalent compounds *H2O,CO2,N2*	04	08

2	**Electrochemistry** **2.1 Introduction** Definition of an electrolyte, electrolysis ,ionization, Assumptions of Arrhenius theory of electrolytic dissociation degree of ionization ,factors affecting degree of ionization, Difference between atom and ion, Activity series, Mechanism of electrolysis of i)$Cuso_4$ solution by using platinum ,cu rods. **2.2 Faraday's law of electrolysis.** Statements, explanation Numerical examples based on Faraday's laws of electrolysis. **2.3 Cell and cell reactions** Concept of electrode potential, standard electrode potential (E^O), significance of oxidation –reduction potential, type of electrodes, reference electrode and indicator electrode. Construction and working of hydrogen electrode and calomel electrode. EMF series and its application, constructions and working reactions of lead acid cell, Daniel cell with porous vessel and salt bridge. Applications of Electrolysis Electroplating and Electrore fining	08	12
3	**METAL AND ALLOYS** **3.1 Metal** Occurrence of metals, definitions of mineral, ore, flux, matrix, slag and metallurgy, mechanical properties of metal, flow chart showing different processes in metallurgy, classification, properties and application of carbon steel, heat treatment(definition, purposes and methods) **3.2 Alloys** Definition of alloy, purposes of making alloys with examples, classification of alloys(ferrous and non-ferrous), effects of alloying elements on the properties of steel(Ni, Co, Si, Mn, V, W) composition, properties and uses of heat resisting steel, magnetic steel ,shock resistance steel, stainless steel ,high speed steel spring steel, tool steel, duralumin, woods metal, brass and monel metal.	06	08
4	**4.1 PLASTIC AND RUBBER (POLYMER AND ELASTOMER)** Definition of monomer and polymer, types of polymer (Addition, and Condensation) Definition example-(formation of Polythene, PVC, Teflon, Bakelite) Thermo softening and thermosetting (definition and comparison), applications of Plastic based on its properties. Definition and applications of Conductive polymer, Definition of elastomer, isoprene unit. Natural rubber-drawbacks, vulcanization, properties of rubber and applications based on its properties. Difference between synthetic and natural rubber. **4.2 Engg. Materials -** Definition Properties and Applications of- 1) Cement and lime2) Ceramics and composites3) Glass and Insulating materials 4) Paint and adhesives.	05	10

5	**WATER** Definition of hard water and soft water, causes of hardness, types of hardness, analysis of degree of hardness in calcium carbonate equivalent(numerical), bad effect of hard water in industries (paper, textile, dye, sugar), removal of hardness by lime soda method, zeolite, ion exchange method, reverse osmosis, PH scale, applications of PH in engineering. Numerical based on PH and hardness.	05	08
6	**CORROSION** Definition, causes of corrosion types of corrosion-definition (atmospheric and electro chemical) Types of oxide films , mechanism of atmospheric and electrochemical corrosion (evolution of hydrogen, absorption of oxygen), factors affecting rate of atmospheric corrosion and electrochemical corrosion. Protection Methods- Galvanization and tinning processes, sherardizing, metal spraying , metal cladding.	05	08
7	**LUBRICANT** Definition and functions of lubricant, mechanism of lubrication(fluid film, boundary, extreme pressure lubrication), classification of lubricant, properties of lubricating oils(physical and chemical), selection of lubricant for light machines, I.C.E., gears, cutting tools, high pressure and low speed machines, transformers, spindles in textile industry, for refrigeration system.	04	08
8.	**FUELS** Definition, classification of fuels, characteristics of good fuel, comparison between solid, liquid and gaseous fuel, types of coal, analysis of coal by proximate and ultimate analysis, refining of crude petroleum, fractions obtained by distillation of crude oil, gasoline, kerosene, diesel as a fuel(properties and uses)	04	08
9.	**MATERIAL SCIENCE AND ENGINEERING** Definition of material science, terminology and scales, properties of materials, (mechanical, electrical, magnetic, optical, thermal with example) structure depended properties (example of hardness versus structure of steel.)Types of materials- metals, semiconductor, polymer ceramic and composites (examples and properties and applications).Engineering nanomaterial and its applications.	04	04
10	**ENVORNMENTAL EFFECT** (Awareness Level) Definition, types of pollution, air, water, soil, sound, nuclear pollution. (Causes, effect, control method), E-waste (origin effect control) deforestation, ozone depletion, greenhouse effect, preventative environmental management activities.	03	06

List of experiments:

SR NO.	NAME OF THE EXPERIMENT	Hours
1.	Write the electronic configuration of atoms (atomic no.1-30) Write the formation of compounds Nacl, $Alcl_3$,H_2o,Co_2,N_2.	04
2.	Determine acidic and basic radical from unknown solution (any two)	04
3.	Measure the voltage developed due to chemical reactions by setting up Daniel cell.	02
4.	To determine the percentage of iron in given steel sample by redox titration.	02
5.	To determine total hardness of sample of water by EDTA method.	02
6.	To determine chloride content in given sample of water by Mohr's method	02
	Revision / Repetition (Expts.1 to 6)	02
7.	To determine the percentage of Ca content in cement.	02
8.	To determine electrode potential of various metals to study their tendency to corrosion	02
9.	To determine the acid value of lubricant by using KoH	02
10.	To determine coefficient of viscosity by using Ostwald's viscometer.	02
11.	To determine percentage of ash or moisture in a given coal sample by proximate analysis.	02
12.	To determine the strength of hydrochloric acid by titrating against sodium hydroxide solution by using PH meter.	02
	Revision / Repetition (Expts.7 to12)	02

Learning Resourses:

Author	Title	Publisher
V. P. Mehta	Polytechnic Chemistry	Jain Brothers, New Delhi.
P.C. Jain and Monica Jain	Applied Chemistry	Dhanpat Rai and sons, New Del hi
M.M. Uppal	Engineering Chemistry	Khanna Publisher, Delhi.
S.N. Narkhede, M.M. Thatte	Applied Chemistry	Nirali Prakashan, Pune.

Internet, You tube ,Videos etc.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Atomic structure and chemical bonding.	04	02	02	08
2	Electrochemistry	04	06	02	12
3	Metal and alloys	04	02	02	08
4	Polymer ,Elastomer and Engg materials	04	02	04	10
5	Water	02	03	03	08
6	Corrosion	04	02	02	08
7	Lubricant	03	03	02	08
8	Fuel	03	03	02	08
9	Material science and Engineering.	00	02	02	04
10	Environmental effects	02	02	02	06
	Total	**30**	**27**	**23**	**80**

Prepared by :

(K. V. Mankar)	(S.V.Chaudhari)	(R.N.Shikari.)
Lecturer in Chemistry	**Member Secretary PBOS**	**Chairman PBOS**

Programme	**:**	**Diploma in ET**/CE/EE /ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/**17**/21/22/**23**/24/26/
Course	**:**	**Computer Fundamental**
Course Code	**:**	**CM 286**

Teaching Scheme:

	Hours/Week	Total Hours
Theory	**01**	**16**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term Work
Duration		**03 Hrs.**	**02**	**--**	**02**
Marks			**50**	**--**	**25**

Course Rationale:

In this world of high speed computing it is essential for diploma in computer engineering students to know about device of computers, its operation and graphical base applications and latest technologies in the market. This course is designed for basic perspective for first year diploma students.

Course Objectives:

After studying this course, the student will be able to

1. Use computer system effectively.
2. Describe and use different application software's.
3. Use the basic functions of an operating system.
4. Use five essential utility programs.
5. Compare major OS like Linux and MS-Windows
6. Understand working of input output devices.
7. Understand working of secondary storage devices.
8. Set the parameter required for effective use of hardware combined with and application Software's
9. Understand connectivity, internet multimedia and web

Chapter No.	Name of Topic/Subtopic		Hrs	Marks
1	**1 Introduction to computer peripherals**			
	1.1	Hardware: Input-output devices, CPU and general PC layout	03	--
	1.2	Data storage devices: RAM, ROM, External storage – magnetic & USB		
2	**Introduction to system software's**			
	2.1	Operating systems: Introduction to various operating systems like DOS, Windows, Android, Unix, Linux.	03	--
	2.2	Windows: working with Windows operating system		
	2.3	Utility software: Application and working of various utility software's like Antivirus, Internet browsers, Adobe reader, office Suite, media players etc.		
3	**GUI Based Editing, Spreadsheets, Tables & Presentation**			
	3.1	Application Software Common Features .	08	--
	3.2	Word Processors: Working with word processor for creating Documents & drafts.		
	3.3	Spreadsheets :: Features Creating and Working with spread sheets		
	3.4	Presentation Graphics : Features .Working with Presentation Graphics to create presentations		
	3.5	Software suites Introduction to Data Base Management System-Microsoft Access.		
4	**Communication & Connectivity**			
	4.1	Introduction to communication systems: Telephone, fax, e-mails, messengers (chatting), voice messaging system(voice mail), Video-conferencing system.	02	--
	Total		**16**	--

List of Practical/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment
1	Understanding computer layout and its peripherals.
2	Study of printing and scanning devices.
3	Working with operating systems like windows XP and understanding the working Environment (Desktop, My Computer, My Documents, Recycle bin, Programme files & control panel.)
4	Working with MS world (at least four programs including use of pictures/ clipart, word art, shapes, tables, mail merging options)
5	Working with MS Excel (at least three programs including creating spreadsheets, Performing arithmetic operations, creating charts & graphs).
6	Working with MS Powerpoint (at least three programs including creating simple Presentation, use of hyperlinks, use of animation). .
7	Page setting, page layout and printing Word, Excel & powerpoint documents.
8	Study of different types of networks and communication devices.
9	Internet practices: i) Getting started with internet, ii) Use of search engines iii) creating an email account, iv)E-travel & E-trading .
10	Assignment on cyber laws and ethics.
	Total

Text books:

Sr. No.	Author	Title	Publication
1	Timothy J. O. Leary and Linda I.O' Leary	Computing Essentials (Solving The Puzzles of It Literacy)	TMH
2	Vikas Gupta	Comdex Computer Course Kit	Dreamtech

Reference Books:

Sr. No.	Author	Title	Publication
1	P.K. Sinha	Computer Fundamentals	BPB
2	Henry C. Lucas	Henry C. Lucas	Tata McGraw Hill
3		XP/2000/2003/ Vista Users Guide	Manuals

Prepared By :

(Mrs. Seema Kolhe) **(Mr. S. Pathak)**	**(S.V.Chaudhari)**	**(R.N.Shikari.)**
Lect. In Civil Engg.	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in ET**/CE/EE /ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/**17**/21/22/**23**/24/26
Course	**:**	**Fundamentals of Electrical Engg.**
Course Code	**:**	**EE 283**

Teaching Scheme:

	Hours/Week	**Total Hours**
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term Work**
Duration	**Two Class Tests of 60 Minutes and an Oral**	**03 Hrs.**	**--**	**--**	**--**
Marks	**20**	**80**	**--**	**25**	**25**

Course Rationale:

Every branch of engineering is related with electrical engineering. Every student should know Fundamentals of electrical engineering. From this point of view this course is introduced.

Course Objectives:

After studying this course, the student will be able to

- Understand the basic and fundamental principle of Electrical engineering.
- Measure electrical quantity.
- Know the various electrical circuits concepts
- Know principle and construction of various electrical machines
- To explore electrical safety

Course Content:

Chapter No.	Name of Topic/Subtopic		Hrs	Marks
1	**Electrical Circuits**			
	1.1	Introduction to electric power supply system, AC Supply –single phase and three phases, DC supply.	04	08
	1.2	Resistance, Effect of temperature on resistance (pure metals, insulators, alloys), temperature Coefficient of Resistance.		
	1.3	Resistances in series, voltage division formula		
	1.4	Resistances in parallel, current division formula.		
2	**Magnetic Circuit:**			
	2.1	Introduction to magnetic circuit, M.M.F., absolute and relative permeability, reluctance, relation between M.M.F. and reluctance	04	06
	2.2	Comparison of magnetic & electrical circuits.		
	2.3	Simple series magnetic circuits, concept of useful Flux, leakage flux, total flux & fringing.		
	2.4	Magnetization curves.		
	2.5	Concept of hysteresis, hysteresis loop & loss		
3	**Electromagnetic Induction**			
	3.1	Faradays laws of Electromagnetic Induction.	04	06
	3.2	Types of induced e.m.f : Dynamically induced e.m.f and Statically induced e.m.f (self and mutually)		
	3.3	Lenz's law, Fleming's right hand rule.		
	3.4	Self and mutually induced inductance ,Coefficient of coupling		
4	**Electrostatics:**			
	4.1	Brief review of electric field, field density, permittivity, Relative permittivity, charge & their relation.	04	08
	4.2	Capacitor & Capacitance, Dielectric constant, Capacitors in series & parallel		
	4.3	Capacitance of parallel plate capacitor with single Dielectric and composite dielectric medium .		
	4.4	Charging and discharging of capacitor to give idea of R-c time constant (no derivation)		

5	**A.C. Fundamentals:**			
	5.1	Generation of single phase alternating voltage and current, Graphical representations of sinusoidal e.m.f and current. General Equation of Alternating quantity 3	10	16
	5.2	Definitions of instantaneous value, cycle, period, frequency, amplitude. Peak value, average value, r.m.s. value of an alternating quantity, peak factor and form factor		
	5.3	Concept of phase and phase difference. Concept of lagging and leading		
	5.4	Representation of an alternating quantity by phasor.		
	5.5	Waveforms and Phase diagram for a Purely resistive AC circuit Purely inductive AC circuit. Purely capacitive AC circuit. (Voltage, Current, power, p.f. relations and phasor Diagrams,).		
	5.6	RL Series circuit: Waveforms , phasor diagram, Impedance, Impedance triangle, power factor.		
	5.7	RC circuit: Waveforms, phasor diagram, Impedance, Impedance triangle, power factor		
6	**Three Phase Circuits**			
	6.1	Generation of 3-phase voltage and its waveform.	04	08
	6.2	Phase sequence, star & delta connection.		
	6.3	Concept of balanced load. Concept of balanced Supply system.		
	6.4	Voltage, current, power relations in star & delta Connected system & numerical, Vector diagram.		
7	**Single phase Transformer**			
	7.1	Definition, principal of working, construction.	04	06
	7.2	Types of transformer on the basis of voltage, power & Construction.		
	7.3	E.M.F. equation (No derivation).		
	7.4	Voltage, current ratio o f a transformer.		
	7.5	Losses in transformer, efficiency & regulation of Transformer.		
8	**Electrical Motors**			
		A) D.C. Motors	04	08

		8.1 Construction and Working principle of d .c. motor 8.2 Types of motors 8.3 Characteristics & applications of d. c. motors. 8.4 Necessity of a starter for dc Motor.		
		B) Induction Motor 8.1 Construction and working principle of three phase Induction Motor 8.2 Synchronous speed, slip 8.3 Necessity of a starter ,D.O.L starter for three phase Induction motor. 8.4 Change the direction of rotation 8.5 Single Phase Induction Motors- Working principle and applications of following Motors I)Split Phase a)Resistance b)Capacitance II)Capacitor start capacitor run III) Shaded pole. Reversal of rotation of above motors.		
		C) Special Motors 8.1 Working principle and applications-stepper motor servo motor-AC servo motor & DC servo motor		
9	**Electrical Safety**			
	9.1	I.E. rules for safety of person & equipment followed When working with electrical installation. Electrical Hazards : Causes and Remedies	04	06
	9.2	Electrical shock, Operational precautions necessary to avoid electrical shock ,Procedure for rescuing a person who has received an electrical shock.		
	9.3	Necessity of Earthing		
	9.4	Introduction to circuit protective devices: Concept of Overload O.C., S.C., leakage current, H.R.C. fuses, MCB, use of ELCB		
Total			**48**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs.
1	To determine temperature rise of resistance of metal.	04
2	Verification of Right hand rule for solenoid.	02
3	Verification of Faradays laws of Electromagnetic Induction.	02
4	To plot the B-H curve of a magnetic material.	02
5	To plot the charging & discharging curve of a capacitor.	02
6	To verify the relation between line & phase values of Current and voltage in a balanced star & delta connected circuit.	04
7	To determine voltage & current ratio of single-phase transformer and determine efficiency and voltage regulation of single phase transformer	04
8	Reversal of rotation of following motor I)D.C.Motor II)Three phase Induction motor	04
9	Demonstration o f use & tripping of MCB against overload & short circuit.	02
10	Demonstration of use & tripping of ELCB against leakage Current.	02
	Total	**32**

Note: All practicals are Compulsory

Instructional Strategy:

Sr.No.	Topic	Instructional Strategy
1	Electrical Circuits Lecture, Problem solving ,practical	Lecture, Problem solving ,practical
2	Magnetic Circuits	Lecture, Q/A Technique
3	Electromagnetic Induction	Lecture, Problem solving
4	Electrostatics	Lecture, Problem solving ,practical

5	A.C. Fundamentals:	Lecture, Problem solving ,practical, Q/A Technique
6	Three Phase Circuits	Lecture, Problem solving ,practical
7	Single phase Transformer	Lecture, Problem solving ,practical
8	Electrical Motors	Lecture, Problem solving ,practical
9	Electrical Safety	Lecture, Demonstration and PPTs 6

Text books:

Sr. No.	Author	Title	Publication
1	1 B.L.Theraja	Electrical Technology Vol. I & II.	S. Chand & Co.

Reference Books:

Sr. No.	Author	Title	Publication
1	Edvard Hughes	Electrical Technology	Pearson Education
2	H.Cotton	Electrical Technology	CBC,Delhi
3	V.N.Mittle	Basic Electrical Engineering	Tata McGraw Hill

Specification Table:

Sr.No.	Topic	Cognitive levels			Total
		Knowledge	Comprehension	Application	
1	Electrical Circuits	02	04	02	08
2	Magnetic Circuits	02	04	02	08
3	Electromagnetic Induction	02	04	00	06
4	Electrostatics	04	02	02	08
5	A.C.Fundamentals	08	06	02	16
6	Three Phase Circuits	04	02	02	06
7	Single phase Transformer	02	02	02	06
8	Electrical Motors	06	06	04	16
9	Electrical Safety	02	01	01	04

Prepared By :

V.L.Munde.		
(V.L.Munde.)	**(S.V.Chaudhari)**	**(R.N.Shikari.)**
Lect. In Electrical Engg.	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/**02**/**03**/04/05/06/07/08/**17**/21/**22**/**23**/24/26
Name of Course	**:**	**Engineering Drawing**
Course Code	**:**	**ME 284**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**02**	**32**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**4 hrs.**	--	--	--
Marks	--	--	--	--	**50**

Course Rationale:

Engineering drawing is the graphical language. It is used by engineers, designers, planners, supervisors and also the workers to express their thoughts, ideas and concepts. The expression by drawing is very accurate, precise and brief. At a glance one can understand detailed description of any part to be manufactured or a dam to be built or an electric circuit to be used. For all technicians through understanding of principles of engineering drawing (Graphic Skills) is essential.

Course Objectives:

After studying this course, the student will be able to

- Draw various engineering curves.
- Incorporate Indian Standards in drawings.
- Sketch various orthographic and isometric views.
- Draw all different views from given components vis-à-vis.
- Draw free hand sketches.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Marks
1.	**Introduction of Drawing Instruments, Lines, Letters etc.**			
	1.1	Use of different drawing equipments.	**02**	**--**
	1.2	Type of letters.		
	1.3	Conventions of lines.		
	1.4	Scales.		
2.	**Engineering Curves and Tangential Exercises**			
	2.1	Geometrical constructions and tangential exercises.	**04**	**--**
	2.2	To draw an ellipse by concentric circle method.		
	2.3	To draw a parabola by : i) Directrixfocus method.		
	2.4	To draw a hyperbola by : i) Directrixfocus method.		
3.	**Orthographic Projections**			
	3.1	Introduction to orthographic projections first and third angle method of projection. Conversion of simple pictorial view in to orthographic view, Dimensioning technique.	**10**	**--**
4.	**Sectional Orthographic Projections**			
	4.1	Introduction, converting the given pictorial view into sectional views.	**06**	**--**
5.	**Isometric Views**			
	5.1	Isometric scale and isometric views of simple objects.	**08**	**--**
	5.2	Isometric views of rectangular, cylindrical objects, Slots on sloping surface.		
6.	**Free Hand Sketches**			
	6.1	Fasteners, temporary threaded fasteners, locking arrangement, Foundation Bolts.	**02**	**--**
Total			**32**	**--**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
Six sheets on topics covered in the syllabus.		
1.	Line letters and numbers. (Sheet No.1)	06
2.	Engineering curves and tangential exercises. Any four problems (Sheet No.2)	06
3.	Orthographic projection,Sectional views, Each One Problems (Sheet No.3)	10
5.	Isometric projection. Minimum Two Problems. (Sheet No.4)	08
6.	Free hand sketches. Any Eight elements (Sheet No.5)	02
Total		**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction to Drawing instruments lines letters etc.	Classroom teaching and Demonstration.
2.	Curves and tangential exercises	Demonstrations and classroom teaching.
3.	Orthographic projection	Use of models and classroom teaching.
4.	Sectional orthographic projection	Use of models, transparencies and classroom teaching.
5.	Isometric views	Classroom teaching, self study and assignments.
6.	Free hand sketches	Classroom teaching and assignments & use of Models.

NOTE :Termwork evaluation on graphic skill.

Text Books:

Sr. No	Author	Title	Publication
1.	N.D. Bhatt	Elementary Engg. Drawing (Including plan and solid geometry)	Charotar Publication, Anand.
2.	Mali, Choudhary	Engineering Drawing	VrindaPrakashan, Jalgaon

Reference Books:

Sr. No	Author	Title	Publication
1	N.D. Bhatt	Geometrical and Machine Drawing	Charotar Publication, Anand.
2	--	I.S. 696 Latest version	B.I.S.
3	Curriculum Development Centre, TTTI, Bhopal	A Workbook in Engineering Drawing	Somaiyya Publication Pvt. Ltd., Mumbai
4	--	SP 46 – 1988	B.I.S.
5	G.R. Nagpal	Machine Drawing	--
6	K. Venugopal	Engineering Drawing and Graphics + AutoCAD	New Age International Publishers.

Learning Resources: Video cassettes No. 122, 123 of G.P.P. Library.

Prepared By:

(D.P.Khadse) **(B.V.Palampalle)**	**S.V.Chaudhari**	**R.N.Shikari**
Lect. In E &TC	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in ET**/CE/**EE**//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/**02**/**03**/04/05/06/07/08/21/**22**/**23**/24/26/**16**/**17**
Name of Course	**:**	**Basic Electronics**
Course Code	**:**	**ET 281**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests, each of 60 minutes**	**3 hrs.**	**3 hrs.**	--	--
Marks	**20**	**80**	**50**	--	**25**

Course Rationale:

Identify types of components and understand construction, working principle, specifications and applications.

Course Objectives:

After studying this course, the student will be able to

•	Identify types of components and understand construction, working principle , Specifications and applications.
•	Describe the formation of PN junction.
•	Draw the characteristics of basic components like diode, transistor etc.
•	Draw and describe the basic circuits of rectifier, filter, regulator and amplifiers.
•	Read the data sheets of diode and transistors
•	Explain construction, working, characteristics and applications of semiconductor devices and circuits.

Course Content:

Chap. No.	Name of Topic/Sub topic	Hrs	Marks
1	**Passive Components**	**16**	**18**
	1.1 Resistor: • Classifications of resistors, material used for resistor. • General specification of resistor- maximum voltage rating, power rating, • Application of resistors. • Colour coding: with three, four & five bands • Potentiometer : linear and logarithmic • constructional diagram, specifications, applications of carbon and wire wound resistor		
	1.2 Capacitor : • Classification of capacitor, dielectric materials used in capacitor • Capacitor specifications: working voltage, capacitive reactance, frequency characteristic • Fixed capacitor : specifications & applications • Electrolytic capacitor: constructional diagram & working • Variable capacitors: requirement of variable capacitor, construction, working, specification of air gang, PVC gang capacitor, trimmer capacitor • Coding of capacitors using numerals, colour band system		
	1.3 Inductor: • Introduction of magnetic materials- Ferromagnetic & ferrimagnetic. • B-H curve, hard & soft magnetic material, concept of Hysteresis, permeability, • Faradays law of electromagnetic induction, self & mutual induced emf. • Induction – Definition & expression (with simple derivation) of self inductance, mutual inductance, coefficient of coupling, Q factor, inductive Reactance. • Constructional diagram & application of Air core, iron core & ferrite core,		
2	**Semiconductor Diodes**	**16**	**20**
	• **2.1 P.N. Junction Diodes** • Working principle & circuit diagram • characteristic of PN junction diode, • Specification, Static & dynamic resistance, forward voltage drop, maximum forward current power dissipation.		
	2.2 Zener diode		

		• Symbol & Working principle • circuit diagram and characteristics of Zener diode • Specification: Zener voltage, power dissipation, dynamic resistance		
		2.3 Special Diodes • Construction, symbol & applications of • PIN diode • Schottky diode • Tunnel diode		
		2.4 Optical diodes • Construction, symbol, operating principle & applications of • LED, • LDR • Photodiode		
3		**Rectifiers and Filters**		
		3.1 Rectifiers • Need of rectifiers. Types of rectifiers : HWR,FWR (bridge and centre tap) circuit operation I/O waveforms for voltage & current • Parameters of rectifier (without derivation) Average DC value of current &voltage, ripple factor, ripple frequency, PIV of diode, TUF, efficiency of rectifier • Comparison of three types of rectifiers	**10**	**14**
		3.2 Filters • Need of filters • Circuit diagrams, operation and input-output waveforms of following types of filters • Shunt capacitor • Series inductor • LC filter • π filter		
4		**Wave shaping Circuit**		
		4.1 Linear wave shaping circuit • Need of wave shaping circuits, • comparison between linear and non-linear wave shaping circuits • Operations of wave shaping circuits • Linear circuits: RC Integrator & differentiator	**10**	**12**

		4.2 Non linear wave shaping circuits • Circuit diagram, operation, waveforms of different types of clippers using diodes: series, shunt, (biased and unbiased) • Circuit diagram, operation, waveforms of different types of clampers: positive and negative		
5	**Transistors**			
	5.1	**Bipolar junction transistor(BJT)** • Basic concept, • Types of transistors , • Structure & symbols Transistor operation, Conventional current flow. • Transistor configurations:- CB , CE & CC & their characteristics. • Transistor parameters- input resistance, output resistance, α, β & relation between them. Comparison between three configurations	**06**	**08**
6		**Regulators**		
	6.1	**Regulators** • What is regulator? • Need of regulators • voltage regulation factor • Concept of load regulation & line regulation • Basic zener diode voltage regulator	**06**	**08**
	6.2	**Linear Regulators**		
		• Basic block diagram of dc power supply • Transistorized series & shunt regulator – circuit diagram & operation. • Regulator IC's – 78xx, 79xx, 723 as fixed, variable & dual regulator. Pin diagrams , (only introduction)		
		Total	**64**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1	Compute values of resistors by multimeter and colour coding
2	Identify & test fixed and variable capacitors.
3	Identify & test inductors 5 inductor of different types.
4	Verify the performance of LDR and to draw its characteristics
5	Identify & test IC's (analog & digital)
6	Forward & Reverse characteristics of diode (1N4001 , BY127, 1N4007)
7	Forward & Reverse characteristics of Zener diode
8	Zener as voltage regulator.
9	Study of Rectifiers a] Half wave b] Full wave (Center tapped & Bridge) (Waveforms, AC (r.m.s.) voltage at input, AC (r.m.s.) voltage at out put , D.C. output voltage, Ripple factor, PIV.)
10	Study of filter circuits. a] Capacitor Filter b] Inductor filter. (Using rectifier circuits. Measurement of Vac, Vdc)
11	Draw outputs for positive, negative and combinational clippers from C.R.O.
12	Draw the outputs waveforms of positive and negative clampers from C.R.O.
13	Plot frequency response of RC integrator and differentiator circuits.
14	Input & output characteristics of transistor in CB mode. (Measurement of α, α D.C. & R0)
15	Input & output characteristics of transistor in CE mode. (Measurement of β , β D.C. & R0)

Note: Any 10 Practical's from above list.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Passive Components	Classroom teaching and laboratory work.
2	Semiconductor Diodes	Classroom teaching and laboratory work.
3	Rectifiers and Filters	Classroom teaching and laboratory work.
4	Wave shaping Circuit	Classroom teaching and laboratory work.
5	Transistors	Classroom teaching and laboratory work.
6	Regulators	Classroom teaching and laboratory work.

Text Books:

Sr. No	Author	Title	Publication
1	R.S.Sedha	Applied Electronics.	
2	Albert Malvino.	Basic Electronics.	Tata McGraw Hill
3	B.L.Theraja.	Basic Electronics.	S.Chand.
4	N.N.Bhargava, D.C. Kulashreshtha, S.C. Gupta - TTTI	Basic Electronics & Linear Circuits	Tata McGraw Hill
5	Grob Bernard	Basic Electronics	Tata McGraw Hill
6	David J. Bell	Electronics Devices & Circuits	Prentice Hall of India

Reference Books:

No	Author	Title	Publication
1.	Mottershed	Electronics Devices and Circuits.	Prentice Hall of India
2.	Milmann Halkies	Electronics Devices and Circuits.	Tata McGraw Hill

Learning Resources: 1. Reference Books, 2. Data Manual

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Passive Components	06	06	02	14
2	Semiconductor Diodes	04	04	02	10
3	Rectifiers and Filters	06	04	02	12
4	Wave shaping Circuit	06	04	02	12
5	Transistors	06	04	02	12
6	Regulators	04	04	02	08
	Total	**38**	**28**	**12**	**80**

Prepared By:

(P.B.Dighule) (R.S. Deulkar)	(S.V.Chaudhari)	(R.N.Shikari)
Lect. In E &TC	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Electronic workshop**
Course Code	**:**	**ET 282**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**--**	**--**
Tutorial	**01**	**16**
Practical	**04**	**64**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**---**	**---**	**--**	**3Hrs. For batch of 20 students**	**--**
Marks	**---**	**---**	**--**	**25**	**25**

Course Rationale:

To provide basic information regarding the materials used in Electronics Devices and components. It covers the types of various Electronics components and their constructions and also PCB manufacturing process.

Course Objectives:

After studying this course, the student will be able to

- Understand the different types of materials and components.
- Understand the constructions specification and application of different Electronics components.
- Understand the concept of PCB manufacturing.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
1.	**1.1 Passive components:** Introduction to Resisters, Capacitors & Inductors, Types of Resisters, Capacitors & Inductors, color codes, specifications, testing.	4	--
	1.2 Active components : Testing of semiconductor diode, zener diode, LED, BJT, FET, UJT,SCR by multimeter		
2.	**Switches & Relays** : Types of Switches & Relays, specifications, applications, testing.	2	--
3.	**Cable & connectors** : Types of Cable & connectors**,** applications, specification, testing.	2	--
4.	**Transformer** Types of Transformer**,** applications, specification , testing	2	--
5.	**Display Devices :** Types of Display Devices, applications, specification, testing.	2	--
6.	**Microphones & Speakers** Types of Microphones & Speaker, applications, specification, testing.	2	--
7.	**Introduction to PCB manufacturing** PCB layout drawing, etching, drilling, soldering.	2	--
	Total	16	--

List of Practical/Experiments/Assignment:

Sr. No.	Name of Experiment/Assignment
1.	Identify the different controls of electronic lab. equipment's (Analog multimeter, Digital multimeter, CRO, Function generator and IC Tester)
2.	Observe the square wave, triangular wave and sine wave generated by function generator and measure their amplitude and frequencies
3.	Identify various electronics components by physical observation.
4.	Test resistor, capacitors, inductor and diodes using CRO
5.	Verify values of resistors and capacitors by color codes and compare with actual values.
6.	Study specification of R, L and C from data manuals.
7.	Test various passive components by analog/digital multimeter.
8.	Identify various active components by physical observation.
9.	Test various active components by analog/digital multimeter.
10.	Write specification of active components from data books.
11.	Identify various switches and relays by physical observation.
12.	Test various switches and relays**.**
13.	Identify various cable and connectors by physical observation.
14.	Test various cable and connectors.
15.	Identify various transformers.
16.	Test various transformers.
17.	Identify various display devices by physical observation.
18.	Test various display devices.
19.	Identify various microphones and speakers by physical observation.
20.	Test various microphones and speakers.
21.	Test various types of ICs by IC tester.
22.	Practice of PCB layout drawing.
23.	Practice of etching.
24.	Practice of drilling.
25.	Practice of soldering.
26.	Continuity testing.
27.	Mini project (by individual student) : like regulated Power Supply(Fix & Variable), battery charger, fire alarm, Doorbell, clapswitch , running light , temperature controller etc.

- ***Visit to one PCB manufacturing industry**

Learning Resources:

Sr. No	Books/Software	Title	Publication
1	Dhir	Electronics components & Material	Tata Macgraw Hill
2.	Mrs. Madhuri Joshi	Electronics Material & components	
3.	Printed Circuit Boards	Walter C. Bosshart	Tata Macgraw Hill
4.	Video Clip for PCB manufacturing	http://www.youtube.com	Freeware
5.	Express PCB	http://www.expresspeb.com/ExpressPCBHtm/Download.htm	Freeware

Prepared By:

(C.D.Pophale.)	(S.V.Chaudhari)	(R.N.Shikari.)
Lect. In E & TC.	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**21/22/**23**/24/26
Name of Course	**:**	**Programming in C**
Course Code	**:**	**CM 282**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical/Tutorial	**02 +01**	**48**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Three class tests of 60 Minutes**	**03 hrs.**	**---**	**---**	**---**
Marks	**20**	**80**	**50**	**---**	**25**

Course Rationale:

In this era of high speed computing, it is necessary to program computers with the help of structured & dynamic languages like 'C' to study programming is useful in solving problems/tasks related to various domains. Now days almost every setup in software engineering domain chooses 'C' as a basic tool to develop software.

Course Objectives:

After studying this course, the student will be able to

- Write a programs using 'C' language
- Implement data types & structures related to problems.
- Solve the problems/tasks in structured way.

Course Content:

Chapter .No	Name of Topic/Sub topic		Hrs	Marks
1	**OVERVIEW OF 'C'**			
	1.1	Introduction: development of 'C',	**02**	**04**
	1.2	Importance of 'C',		
	1.3	Basic structure of 'C' programs, programming style, sample 'C' programs, execution of 'C' program		
2	**DATA TYPES & CHARACTER SET**			
	2.1	Character set, C tokens, keywords & identifiers, constants, variables. Data types, declaration of variables, assigning values to variables, defining symbolic constants.	**04**	**06**
3	**OPERATORS & EXPRESSIONS**			
	3.1	Operators: Arithmetic, relational, logical, increment & decrement, conditional, bit-wise special.	**06**	**10**
	3.2	**Expressions:**Arithmetic expressions, evaluation of expressions, procedure of arithmetic operators, type conversions in expressions, operator precedence & associatively, mathematical functions.		
	3.3	Managing input & output operators: Introduction, reading a character, writing a character, formatted input, formatted output.		
4	**DECISION MAKING**			
	4.1	Branching & looping introduction, decision making with if statement, simple if statement, the if-else statement, The else if ladder, The switch statement, The?: operator, the go to statement, looping , introduction , the while statement , jumps in the loop, break statement.	**04**	**08**
5	**ARRAYS**			
	5.1	Introduction, one- dimensional arrays, two-dimensional arrays, multidimensional arrays, Initialization of arrays	**04**	**12**
6.	**STRINGS**			
	6.1	Introduction, declaring & initializing string variables, reading string, writing strings, arithmetic operations on string , putting strings together , comparison of two strings, string handling functions, table of strings	**04**	**06**
7.	**USER DEFINED FUNCTIONS**			
	7.1	Need of user defined function, the types of C functions, return values & their types, calling a function.	**10**	**12**

	7.2	Category of functions: No argument- No return value,Argument-No return value, No argument-return value & No argument- return value.		
	7.3	Handling non-integer functions, nesting of functions, recursion, and unction with arrays.		
8.	**STRUCTURES & UNIONS**			
	8.1	Structure definition, giving values to members, structure initialization and comparison structure variables.	**08**	**12**
	8.2	Arrays of structures, arrays within the structure, structure and functions, Unions, size of structures, bit fields & bit operations.		
9.	**INTRODUCTION TO POINTERS**			
	9.1	Pointer Concept,& and * operators, Declaration of Pointers, Initialisation of pointers, Pointer Expressions, Application of pointers, Array of Pointers, Pointer to array, function, structure, Function returning pointer and passing addresses to functions.	**06**	**10**
		Total	**48**	**80**

List of Practicals / Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Demonstration of GCC Compiler, Creating a program Compiling & linking executing programs.	02
2.	Write 'C' programs based on declaring variables & assigning values to variables. (Minimum 3)	02
3.	Write programs based on expressions and operators. Programs using scanf(), printf(), getch(), putch**().(Minimum 4)**	02
4.	Programs using following control statements: If statement,Switch statements,?: operator, go to statements Programs using following loop controls,while loop do.. while loop for loop**(Minimum 5)**	06
5.	Write programs based on arrays**. (Minimum 4)**	04
6.	Write programs using strings operations such as comparison, concatenation, copying etc.**(Minimum 3)**	04
7.	Examples on User defined functions, demonstration of return data types. Write programs demonstrating four categories of functions. Programs based on recursion & nesting of functions.**(Minimum 5)**	04
8.	Write programs based on structure definition and initialization. Write programs based on structure within structure. Write programs based on bitwise operations.**(Minimum 3)**	04
9.	Write programs based on Pointers and pointer applications. **(Minimum 3)**	04
	Total	**32**

Note:

- All Practicals should be performed on GCC compiler.
- Minimum 30 Programs as specified in practical coverage section should be executed.
- Actual program statements on practical topics should be framed by the respective teachers.
- During Tutorial session various examples should be taken as per the concepts of Theor

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Overview of 'C'	Demonstration of GCC Compiler, Create simple program
2.	Data types & character set	Write 'C' programs based on declaring variables & assigning values to variables.
3.	Operators & Expressions	Explanation of operators, expressions & managing i/p & o/p operators.
4.	Decision Making	Theoretical explanation + writing program using different control statements.
5.	Arrays	Theoretical explanation & implementation of arrays.
6.	Strings	Theoretical explanation & implementation of strings.
7.	User defined functions	Explanation & implementation of examples on user defined functions,
8.	Structures and Unions	Theoretical explanation & implementation of structures & Unions.
9.	Pointers	Explanation & implementation of examples on Pointers

Text Books:

Sr. No	Author	Title	Publication
1.	E. Balagurusamy	Programming in ANSI 'C'	Tata- McGraw Hill pub.(Second Edition)

Reference Books:

Sr. No	Author	Title	Publication
1.	Yeshwant Kanetkar	Let us 'C'	BPB Publication
2.	Madhusudhan Mothe	C for Beginners	SPD Publication

Learning Resources:

Black Board, Transparencies, Overhead projector, LCD, White Board.

Specification Table:

Sr.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Overview of 'C'	01	01	02	04
2	Data types & character set	02	01	03	06
3.	Operators & Expressions	03	03	04	10
4.	Decision Making	02	04	02	08
5.	Arrays	03	04	05	12
6.	Strings	02	02	02	06
7.	User defined functions	04	04	04	12
8.	Structures and Unions	05	04	03	12
9.	Pointers	03	02	05	10
	TOTAL	**25**	**25**	**30**	**80**

Prepared By:

V.U.Gaderao. **A.A.Shaikh.**	**S.V.Chaudhari**	**R.N.Shikari.**
Lect. In Comp. Engg.	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Industrial Measurements**
Course Code	**:**	**ET 283**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**02**	**32**
Tutorial	**01**	**16**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs.**	**3 Hrs. For batch of 20 students**	**--**
Marks	**20**	**80**		**--**	

Course Rationale:

The science of instrumentation system plays vital role in the development of technology. Different types of transducers used for measurement of different physical quantities with their construction, working principle, advantages, and disadvantages are studied through this subject.

Course Objectives:

After studying this course, the student will be able to

- Understand the nature and working of instrumentation system used in industrial & general applications.
- Classify the physical parameters with their proper units
- Understand the concepts of different types of transducers

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
1.	**Transducers:**		
	1.1 Instrumentation System: Block diagram of Instrumentation system: Function of each block, Explanation of basic instrumentation systems	**06**	**14**
	1.2 Transducer: Need of Transducer: Classification of transducers: Active and Passive, Analog and Digital, Primary and Secondary.		
	1.3 Electrical Transducers: Resistive transducers- Linear & Angular potentiometers Capacitive transducer Inductive transducer –LVDT, RVDT (As a displacement transducer) Piezoelectric transducer (Principle of operation and applications of above)		
	1.4 Selection criterion of transducers.		
2.	**Pressure Measurement**		
	2.1 Pressure: Definition Types - Absolute, Gauge, Atmospheric, Vacuum(Definition, Units)	**05**	**12**
	2.2 Classification of Pressure measuring devices		
	2.3 Non elastic pressure transducer: U tube Inclined Tube Well type manometer		
	2.4 Elastic pressure transducer: Bourdon Tube Bellows Diaphragm		
	2.4 Electronic pressure transducers: Bourdon tube with LVDT Diaphragm with Strain gauge		
3.	**Flow Measurement**		
	3.1 Flow: Definition Types of Flow –Laminar, turbulent , Reynolds number	**06**	**16**
	3.2 Classification of flow measuring transducers : Variable head flow meter- Venturimeter, orifice plate meter Variable area flow meter – Rota meter		

	Electromagnetic Flow meter.		
4.	**Level Measurement**		
	4.1 Level: Definition Need of level measurement	**06**	**16**
	4.2 Classification of level measurement methods: Float type – linear & rotary potentiometer (Contact type) Capacitive type (Contact type) Ultrasonic type (Non-contact type) Radiation type (Non-contact type)		
5.	**Temperature Measurement**		
	5.1 Temperature : Definition and units Different temperature scales & their conversions	**05**	**14**
	5.2 Classification of temperature measuring transducers: Gas Filled thermometer. Bimetallic thermometer Thermistor,RTD – (PT-100) , 2 wire systems (circuit diagram only) Thermocouple – Seeback & Peltier effect , Types J, K, R , S, T (Based on material, temperature ranges) Pyrometer - Optical, Radiation		
6.	**Special Transducers and Measurements**		
	6.1 Humidity:DefinitionTypes - Absolute, relative	**04**	**08**
	6.2 Humidity measurement devices: Psychrometer - Dry & wet Bulb thermometer type Hygrometer- hair type		
	6.3 Speed Definition Classification of speed measurement methods Photoelectric pick-up (Non contact type)		
	TOTAL	**32**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Measure DC Voltage & DC Current using PMMC instruments.
2.	Measurement of R.L.C using LCR, Q meter.
3.	Study front panel controls of specification of typical CRO.
4.	Measure frequency, voltage, phase difference (by time measurement) using CRO.
5.	Testing of component using CRO.
6.	Using Lissagous pattern find frequency & phase difference of unknown signal.
7.	Study & use of Digital Storage Oscilloscope.
8.	Measure frequency & voltage of the different o/p waveforms of function generator.
9.	Study of Logic analyzer
10.	Study of X-Y Recorders.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Transducers	Classroom Teaching
2.	Pressure Measurement	Classroom Teaching
3.	Flow Measurement	Classroom Teaching
4.	Level Measurement	Classroom Teaching
5.	Temperature Measurement	Classroom Teaching
6.	Special Transducers and Measurements	Classroom Teaching

Text Books:

Sr. No	Author	Title	Publication
1.	S.K.Singh	Industrial Instrumentation & Control Tata McGraw Hill Publishing	Co. Ltd; N. Delhi
2.	A.K.Sawhney	Electrical and Electronic	Measurements and Instrumentation Dhanpat Rai & Sons.
3.	D. Patranabis	Principles of Industrial Instrumentation	Tata McGraw Hill Publishing Co. Ltd; N. Delhi

Reference Books:

Sr. No	Author	Title	Publication
1.	B.C.Nakra K.K.Chaudhry	Instrumentation Measurement and Analysis	Tata McGraw Hill Publishing Co. Ltd; N. Delhi.
2.	Rangan Mani Sharma	Instrumentation Systems and Devices	Tata McGraw Hill Publishing Co. Ltd; N. Delhi

Learning Resources:

Reference Books, Manuals and journals of devices, Components brochures

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Transducers	6	4	4	14
2.	Pressure measurement	4	4	4	12
3.	Flow Measurement	6	6	4	16
4.	Level Measurement	6	6	4	16
5.	Temperature measurement	6	4	4	14
6.	Special Transducers and Measurements	4	-	4	8
Total		32	26	24	80

Prepared By:

(P.G.Gahukar.)		
(P.B.Dighule)	(S.V.Chaudhari)	(R.N.Shikari.)
Lect. In E & TC.	**Member Secretary, PBOS**	**Chairman, PBOS**

GOVERNMENT POLYTECHNIC, PUNE
(An Autonomous Institute of Govt. of Maharashtra)

Programme	**:**	**Diploma in** ET/CE/EE//ME/MT/CM/IT/**DDGM**
Programme Code	**:**	01/02/03/04/05/06/07/**08**/16/17/21/22/23/24/26
Name of Course	**:**	**Fashion Accessories**
Course Code	**:**	**DD287**

Teaching Scheme:

	Hours / Week	Total Hours
Theory	**1**	**16**
Term Work / Practical	**2**	**32**

Evaluation:

	Progressive Assessment	Theory	Practical	Oral	Term work
Duration	**-**	**-**	**04**	**-**	**-**
	-	**-**	**50**	**-**	**50**

Course Aim :

Design & create beautiful accessories for runway presentation. It also gives knowledge about growing market of accessories. The Course also incorporates knowledge of various types of fashionable accessories.

Course Objective :

Students will be able to –

- Design innovative & useful accessories.
- Make dressing complete & truly individual.
- Have knowledge about various types of fashion accessories.

Course Content : –

Sr. No.	Topic / Subtopic	Hours	Weightage	Practical
1.	**Textiles in Accessories** **A. Fibers & Yarns**	08		Market survey for trends in accessories, textiles &

	a) Different types of Fabric Structures. b) Adding colors & designs to fabrics c) Design & Surface effects. **B. Leather & Furs** a) History & significance of leather to fashion b) Anatomy of leather & fur c) Fur production process d) Types of leather			materials for accessories.
2.	**Closures, Belts & Footwear** a) History & usage of Closures in fashion accessories. b) Types of Closures c) History & Significance of Belts & Footwear d) Anatomy & Components of Belts & Footwear e) Types of Belts & Footwear	08		Develop five Designs & prepare (Any One) Belts & Footwear
3.	**Handbags & Headwear** a) History & significance Handbags & Headwear b) Anatomy of Handbags & Headwear c) Types of Handbags & Headwear	08		Develop five Designs & prepare (Any One) Handbags & Headwear's
4.	**Hosiery, Gloves, Shawls, Scarf's & Ties** a) History & Significance	08		a) Draping styles of Shawls & Scarf's b) Knotting the Necktie

	b) Anatomy of necktie. c) Types of shawl, scarves & neckties.			c) Fashion Jewelry

Note – All above accessories should be designed by students which is suitable for collection of Creative Fashion Presentation.

Reference Books :

Author	Title	Publisher
Jeff Stone & kim Johnson Gross	Simple Accessories	
	Femina, Elle	
Mckelvey Kathryn	Fashion Source Book	Blackwell

Learning Resources – Magazines, Internet, and Market Survey etc.

Instructional Strategy :

Sr. No.	Topic	Instructional Strategy
1.	Textiles in Accessories	Theoretical + practical treatment
2.	Closures, Belts & Footwear	Theoretical + practical treatment
3.	Handbags & Headwear	Theoretical + practical treatment
4.	Hosiery, Gloves, Shawls, Scarf's & Ties	Theoretical + practical treatment

Prepared by :

(K. Y. Kale)	**(S.V.Chaudhari)**	(K. Y. Kale)
Lecturer in DDGM	**Member Secretary (PBOS)**	**Chairman (PBOS)**

GOVERNMENT POLYTECHNIC, PUNE
(An Autonomous Institute of Govt. of Maharashtra)

Programme	**:**	**Diploma in** ET/CE/EE//ME/MT/CM/IT/**DDGM**
Programme Code	**:**	01/02/03/04/05/06/07/**08**/16/17/21/22/23/24/26
Name of Course	**:**	**Fundamentals of Draping**
Course Code	**:**	**DD288**

Teaching Scheme:

	Hours / Week	Total Hours
Theory	**01**	**16**
Term Work / Practical	**02**	**32**

Evaluation:

	Progressive Assessment	Theory	Practical	Oral	Term Work
Duration	-	-	**03**	-	-
Marks	-	-	**50**	-	**50**

Course Aim :

This course deals with the basics of draping in order to combine flat pattern making & draping which is ideal way to develop ideas & create new silhouette.

Course Objective:

Student will be able to

- Develop ideas & create new silhouette.
- Read & drape the patterns.
- Translate an endless Varity of ideas in to finish garment.

Course Content :

Sr. No.	Topic / Subtopic	Hours	Practical
1	**Basics of Fashion Draping**	02	**Basic Bodice block** **Basic Skirt block**
2	**Draping instruction of Dart with gathered leg**	01	**Draping Dart with gathered leg**
3	**Draping instruction of Princess**	02	**Draping Princess Style**
4	**Draping instruction of Halter Style**	01	**Draping Halter Style**
5	**Draping instruction of off Shoulder Design**	01	**Draping off Shoulder Design**
6	**Draping instruction of Cowls**	02	**Draping Cowls**
7	**Draping instruction of Cowl Skirt**	01	**Draping Cowl Skirt**
8	**Draping instruction of Strapless Dress**	01	**Draping Strapless Dress**
9	**Draping instruction of Collars**	01	**Draping Collars**
10	**Draping instruction of Trouser and Variation**	02	**Draping Trouser and Variation**
11	**Draping instruction of Creative Draping**	02	**Creative Draping**

Reference Book:

Author	Title	Publisher
Amade	Art of Fashion Draping	Fairchild
Hiddle Jaffe, Nuri Relis	Draping for Fashion Draping	Printice Hall, carrier & Tech.

Learning Resources: - **Dress forms, Material, Photographs etc.**

Instructional Strategy :

Sr. No.	Topic	Instructional Strategy
1	Basic Bodice block and Basic Skirt block	Theoretical + practical treatment
2	Draping Dart with gathered leg	Theoretical + practical treatment
3	Draping Princess Style	Theoretical + practical treatment
4	Draping Halter Style	Theoretical + practical treatment
5	Draping off Shoulder Design	Theoretical + practical treatment
6	Draping Cowls	Theoretical + practical treatment
7	Draping Cowl Skirt	Theoretical + practical treatment
8	Draping Strapless Dress	Theoretical + practical treatment
9	Draping Collars	Theoretical + practical treatment
10	Draping Trouser and Variation	Theoretical + practical treatment
11	Creative Draping	Theoretical + practical treatment

Prepared by :

(D.C.Kshatriya)	(S.V.Chaudhari)	(D.C.Kshatriya)
Lecturer in DDGM	**Member Secretary (PBOS)**	**Chairman (PBOS)**

Programme	**:**	**Diploma in ET**/CE/**EE**//ME/MT/**CM/IT**/DDGM
Programme Code	**:**	01/**02**/**03**/04/05/**06**/**07**/08/**16**/**17**/21/**22**/**23**/24/**26**
Name of Course	**:**	**Engineering Mathematics**
Course Code	**:**	**SC 282**

Teaching Scheme:

	Hours/Week	Total Hours
Theory	**2**	**32**
Term work /Tutorials	**1**	**16**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Two class tests of 60 Minute duration**	**3 Hours**	**--**	**--**	**--**
Marks	**20**	**80**	**--**	**--**	**--**

Course Aim:

The student shall learn various techniques in integration and differential equations and use these techniques to their related Engineering problems.

Course Objectives:

At the end of the course student will be able to

1. Apply the definition of integration as inverse of differentiation to solve problems.
2. Students will be able to apply various methods of integration..
3. To apply mathematical principle to solve engineering problems.
4. To draw and come to a valid conclusion.
5. To locate the exceptional and critical points in an engineering system.

Course Content:

Chapter No.	Name	Hrs	Marks
1	**INTEGRATION** Definitions, standard formulae, integration of algebraic sum of two or more functions, integration by substitutions and by trigonometric , transformations, integration of √ax2+ bx+c, 1⁄ √ax2+ bx+c, integration by parts, integration by partial fractions.	10	24
2	**DEFINITE INTEGRALS** Definition and properties of definite integrals. Example based on these properties	04	08
3.	**APPLICATION OF INTEGRATION** Mean value and root mean square value.	04	08
4	**DIFFERENTIAL EQUATIONS** Definition, order and degree of differential equations. Formation of differential equations. Solution of differential equations : (using following methods) i) Variable separable (ii) Reducible to variable separable. (iii) Homogeneous differential equations. (iv) Exact diff. equations. (v) Linear differential equations.	05	16
5	**COMPLEX NUMBERS** Definition and algebra of a complex numbers. Geometrical representation (Argand's diagram), modulus and amplitude of a complex number. De Moivre's theorem (without proof), roots of complex number.	05	12
6.	**LAPLACE TRANSFORMS** Definition, Laplace Transforms of elementary functions, important properties of Laplace Transforms, Inverse of Laplace Transforms, Convolution Theorem and application of Laplace Transform for solving differential equations.	04	12
	Total	32	80

(For Tutorials a batch of 20 students)

Reference Books:

Author	Title	Publisher
Grewal B.S.	Higher Engineering Mathematics	Khanna Publishers, New Delhi
Vishwanath	Engineering Mathematics Vol.II	Satya Prakashan, New Delhi
S.P. Deshpande	Mathematics for Polytechnic students	Pune Vidyarthi Griha Prakashan
H.K. Dass	Engineering Mathematics Part II	S. Chand & Co. Ltd. Delhi

Learning Resources: Chalk Board etc.

Specification Table:

Sr. No.	Topic / subtopic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Integration	08	16	00	24
2	Definite Integration	04	04	00	08
3	Application of integration	00	00	08	08
4	Differential Equations	04	08	04	16
5	Complex Numbers	04	04	04	12
6	Laplace Transform	04	04	04	12
	Total	**24**	**36**	**20**	**80**

Prepared by :

(V.B.Shinde)	(S.V.Chaudhari)	(R.N.Shikari.)
Lect. in Mathematics	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	:	**Diploma in Electronics & Telecommunication**
Programme Code	:	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	:	**Programming in C**
Course Code	:	**ET 286**

Teaching Scheme:

	Hours/week	**Total Hours**
Theory	**03**	**48**
Practical/Tutorial	**02+01**	**48**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Three class tests of 60 minutes**	**03 Hrs.**	**---**	**---**	**---**
Marks	**20**	**80**	**50**	**---**	**25**

Course Rationale:

Studying programming is useful in solving problems/tasks related to various domains. 'C' computer programming language provides general formal solution in the fields of electronics and telecommunication engineering, due to its features like- support of structured programming, low level capabilities, minimal runtime support, easy hardware access etc. 'C' has been used as a basic tool to develop software in electronics domain.

Course Objectives:

After studying this course, the students will be able to-

- Write programs in 'C' programming language
- Diagnose the programming errors and correct it
- Effectively make use of primary, derived and user defined data types
- Solve the programming tasks in structured way

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
1	**OVERVIEW OF 'C'**		
	1.1 Introduction to C programming language: Development	03	06
	1.2 Importance of 'C'		
	1.3 Basic structure of 'C' program, programming style, Sample 'C' programs, Execution process of 'C' program		
2	**'C' CHARACTER SET AND DATA TYPES**		
	2.1 Character set	05	10
	2.2 C Tokens		
	2.3 Keywords and Identifiers		
	2.4 Constants and Variables		
	2.5 Data types		
	2.6 Declaration, initialization/assigning values to variables		
	2.7 Defining symbolic constants		
3	**OPERATORS AND EXPRESSIONS**		
	3.1 Operators- Arithmetic, Relational, Logical, Assignment, Conditional, Increment and decrement	08	12
	3.2 Expressions- Arithmetic expressions, Evaluation of expressions, Operators precedence and associativity		
	3.3 Library functions- Some mathematical functions		
	3.4 Managing input and output operations- reading a character (getchar), writing a character (putchar), formatted input (scanf), formatted output (printf)		
4	**DECISION MAKING, BRANCHING AND LOOPING**		
	4.1 Introduction to decision making and branching	08	12
	4.2 Decision making with simple if statement, if...else statement, Nested if...else statement,		
	4.3 The switch statement		
	4.4 ? : Conditional operator		
	4.5 goto statement		
	4.6 Introduction to Looping		
	4.7 while statement		
	4.8 do...while statement		
	4.9 for statement		
	4.10 Jumps in loops: using break and continue statements		

5	**ARRAYS**		
	5.1 Introduction	04	08
	5.2 One-dimensional arrays: Declaration, initialization		
	5.3 Two-dimensional arrays: Declaration, initialization		
	5.4 Multi-dimensional arrays		
	5.5 Programs based on one dimensional arrays only		
6	**STRINGS**		
	6.1 Introduction	04	08
	6.2 Declaring and initialization of string variables		
	6.3 Reading and writing strings		
	6.4 String handling functions- strcat, strcmp, strcpy, strlen		
7	**USER DEFINED FUNCTIONS**		
	7.1 Introduction	08	12
	7.2 Types of functions in 'C'		
	7.3 Need of User defined functions		
	7.4 Elements of user defined functions		
	7.5 Calling a user defined function		
	7.6 Categories of user defined functions- No argument- No return value, Argument- No return value, No argument- Return value, Argument- Return value		
	7.7 Recursion		
8	**STRUCTURES AND UNIONS**		
	8.1 Introduction	04	08
	8.2 Structure definition		
	8.3 Declaring structure variables		
	8.4 Accessing structure members		
	8.5 Structure variables initialization		
	8.6 Arrays of structures		
	8.9 Introduction to Unions		
9	**INTRODUCTION TO POINTERS**		
	9.1 Pointer concept	04	04
	9.2 & (Address) and * (Indirection) operators		
	9.3 Declaration of pointer variables		
	9.4 Initialization of pointer variables		
	9.5 Accessing a variable through its pointer		
	Total:	**48**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1	Demonstration of GCC Compiler, creating a program, compiling, Linking and executing programs.	02
2	Write 'C' programs based on declaring variables and assigning values to variables (Minimum 3)	02
3	Write programs based on expressions and operators. Programs using scanf(), printf(), getch(), putch(). (Minimum 4)	02
4	Programs using following control statements: if...else statements, switch statement, ?: operator, goto statement, while, do...while, for looping statements (Minimum 5)	06
5	Write programs based on arrays (Minimum 3)	04
6	Write programs using strings operations such as concatenation, comparison, copying etc (Minimum 3)	04
7	Examples of user defined functions. Demonstration of return types. Write programs demonstrating four categories of functions. Programs based on recursion (Minimum 5)	04
8	Write programs based on structure definition and initialization. (minimum 2)	04
9	Write programs based on pointers (Minimum 2)	04
	Total:	**32**

Note:

- ✓ All practicals should be performed on GCC compiler.
- ✓ Minimum 25 programs specified should be executed
- ✓ Actual program statements on practical topics should be framed by respective teachers.
- ✓ During Tutorial session various examples should be taken as per the concepts of Theory.

Instructional strategy:

Sr. No.	Topic	Instructional strategy
1	Overview of 'C'	Demonstration of GCC compiler, Create simple programs
2	'C' character set and Data types	Write 'C' programs based on declaring variables & assigning values to variables
3	Operators and Expressions	Explanation of operators, expressions and managing input and output operators
4	Decision making, Branching and Looping	Theoretical explanation and writing programs using different control statements
5	Arrays	Theoretical explanation and implementation of arrays
6	Strings	Theoretical explanation and implementation of string variables
7	User defined functions	Explanation and implementation of examples on user defined functions
8	Structures & Unions	Theoretical explanation and implementation of structures
9	Pointers	Explanation and implementation of examples on pointers

Text Books:

Sr. No.	Author	Title	Publication
1	E. Balgurusamy	Programming in ANSI 'C'	Tata-McGraw Hill Pub. (Second Edition)

Reference Books:

Sr. No.	Author	Title	Publication
1	Byron S. Gottfried	Programming with C	McGraw-Hill Publication
2	Yeshwant Kanetkar	Let us 'C'	BPB Publication
3	Madhusudan Mothe	C for Beginners	SPD Publication

Learning Resources:

Black board, Transparencies and Overhead projector, LCD projector, White board.

Note: In semester end theory evaluation 70% weightage should be given to theoretical concepts & 30% weightage should be given to programming skills.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Overview of 'C'	01	01	02	04
2	'C' character set and Data types	02	01	03	06
3	Operators and Expressions	03	03	04	10
4	Decision making, Branching and Looping	02	04	02	08
5	Arrays	03	04	05	12
6	Strings	02	02	02	06
7	User defined functions	04	04	04	12
8	Structures & Unions	05	04	03	12
9	Pointers	03	02	05	10
TOTAL		**25**	**25**	**30**	**80**

1. V. N. Gangapure 2. S. C. Dhir		R. N. Shikari
Prepared by	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Mini Project**
Course Code	**:**	**ET 381**

Teaching Scheme:

	Hours/Week	**Total Hours**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term Work**
Duration	**---**	**--**	**--**	**02**	**---**
Marks	**--**	**----**	**---**	**25**	**25**

Course Rationale:

The miniproject work is included in the curriculum to encourage the student to under take various electronic applications.

Course Objectives:

After studying this course, the student will be able to

- Work independently as a leader as well as member of the team also to manage project work.
- Collect necessary data, information from reference manuals, hand books, journal and websites.
- Design PCB layout.
- Develop soldiering and components mounting skills.

Course Content:

Chapter No.		Hrs	Marks
1.	Project Work	16	25
2.	Progressive assessment	16	25
	Total	32	50

List of Practical's/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment
1	Study of various publications, Journals, Books related to electronics field.
2	Selection of Topic.
3	Selection of Project.
4	Design a layout using software.
5	Build and run a project on breadboard.
6	Etching and drilling
7	Study of soldering
8	Continuity testing
9	Run the project.
10	seminar

The term work will consist of Project report.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Project Selection	In consultation with the guide the student should do the survey and should prepared basic building blocks for the project.
2	Seminar	It should be project releated and relevant reference books and journal list should be attached. Guidance should be provided to prepare seminar report transparancies power point presentation

Prepared by:

(C.D.Pophale.)	(S.V.Chaudhari)	(R.N.Shikari.)
Prepared By	**Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/21/22/**23**/24/26/16/**17**
Name of Course	**:**	**Network Analysis**
Course Code	**:**	**ET 382**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	**02**	**32**
Tutorial	**01**	**16**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs.**	**--**	**--**
Marks	**20**	**80**	**25**	**--**	**--**

Course Rationale:

To familiarize the students with the basic laws, definitions and theorems used in analysis of electrical and electronic circuits.

Course Objectives:

After studying this course, the student will be able to

- Understand the basic laws & definitions and theorems used in circuit's analysis,
- Be able to analyze the circuits,
- Appreciate the working of the circuits as a filter, resonant circuits, attenuators and equalizers
- Understand the use of P-Spice in circuit analysis

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
1.	**Circuit Analysis: - Laws & Definition**		
	1.1 Kirchhoff's Laws. 1.2 Calculation of Voltage, Current & Power in Series & Parallel components. 1.3 Types of Sources. 1.4 V-I relations of R, L & C. 1.5 Voltage & Current divider principles. 1.6 Star to delta & delta to star Transformations. 1.7 Source Transformations. 1.8 Characteristics impedance. 1.9 Types of Network Elements - (Only Definitions) Active / Passive, Unilateral / Bilateral, Lumped / Distributed, Linear / Nonlinear Elements	**08**	**10**
2.	**Mesh & nodal Analysis**		
	2.1 Mesh analysis-concept and numerical 2.2 Nodal analysis- concept and numerical 2.3 Duality-concept, Principle ,Numerical	**09**	**14**
3.	**Two port Network**		
	3.1 Impendance (Z) parameters 3.2 Admittance (Y) parameters 3.3 Hybrid parameters 3.4 Transmission (ABCD) parameters 3.5 Interrelationship between Z and Y parameters	**08**	**12**
4.	**Theorems**		
	Statement, explanation and Numerical on- 4.1 Superposition theorem 4.2 Thevenin's theorem 4.3 Norton's theorem 4.4 Maximum Power transfer theorem 4.5 Reciprocity theorem 4.6 Millman's Theorem	**09**	**16**
5.	**Resonant Circuits**		
	5.1 Series resonant circuits- Expression for the resonant frequency, effect of Q on bandwidth, relation between Fr, Q and BW. 5.2 parallel resonant circuits- Expression for the resonant frequency, effect of Q on bandwidth, relation between Fr, Q and BW. 5.2 Voltage magnification factor, Q- factor, Bandwidth.	**04**	**08**
6.	**Filters and attenuators**		
	6.1Definition, Types ,need, applications of filter 6.2Constant-K type High pass, 6.3Constant-K type low pass, 6.4Constant-K type band pass,	**06**	**12**

	6.5Constant-K type Band rejects filters. 6.6Attenuators Equalizers - Definition,Types, applications.		
7.	**Transmission Line**		
	7.1 Fundamentals of transmission line 7.2General equivalent circuit of transmission line 7.3Characteristic impedance 7.4losses in transmission line 7.5 standing waves 7.6 transmission line components, stub and baluns.	**04**	**08**
	TOTAL	**48**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Verification of KCL
2.	Verification of KVL.
3.	Measurement of Node voltages.
4.	Measurement of loop currents.
5.	Calculate Z Parameters of two ports Network
6.	Calculate Y Parameters of two ports Network
7.	To verify Super position theorem
8.	To verify Thevenin's Theorem
9.	To verify Maximum Power Transfer theorem
10.	To plot frequency response of Series resonance circuit.
11.	To plot frequency response of parallel resonance circuit.
12.	Study of Low pass filter Characteristic
13.	Study of High pass filter Characteristic
14.	Observe standing waves of a transmission line.

Minimum 12 Experiments should be performed.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Circuit analysis	Classroom teaching & Laboratory work
2.	Mesh & Nodal Analysis	Classroom teaching & Laboratory work
3.	Two port network	Classroom teaching & Laboratory work
4.	Theorems	Classroom teaching & Laboratory work
5.	Resonant circuits	Classroom teaching & Laboratory work
6.	Filters	Classroom teaching & Laboratory work
7.	Transmission Line	Classroom teaching & Laboratory work

Text Books:

Sr. No	Author	Title	Publication
1.	Shyammohan S. Palli	Circuits & Networks Analysis and Synthesis	Tata McGraw Hill
2.	John Ryder	Network analysis	Tata McGraw Hill
3.	Sudhakar	Circuits & Networks Analysis	

Reference Books:

Sr. No	Author	Title	Publication
1	Chatopadhyay	Electrical circuits	Tata McGraw hill
2.	Umesh Sinha	Network Analysis	Sinha publications

Learning Resources:

Reference Books, Manuals and Journals

Prepared By:

(R.S. Deulkar) (P.C. Mitkari)	(S.V.Chaudhari)	(R.N.Shikari.)
Prepared By	**Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/21/22/**23**/24/26/16/**17**
Name of Course	**:**	**Applied Electronics**
Course Code	**:**	**ET383**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**04**	**64**
Practical	**04**	**64**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**2 Hrs.**	--	--
Marks	**20**	**80**	**50**	--	--

Course Rationale:

As a core technology subject, it intends to teach operating principle and application of electronic circuits and devices like amplifiers, oscillators, Feedback amplifiers, Time base generators,. The subject knowledge is required in Industrial electronics, Instrumentation and Communication system. Understanding of the subject will provide skill to the students for trouble shooting & testing of some of circuits & devices.

Course Objectives:

After studying this course, the student will be able to

- Classify different types of BJT and their configuration
- Understand the need for biasing.
- Understand working of FET and MOSFET based on application, concept of biasing
- Compare different power amplifiers,
- Select the FET tuned amplifier for appropriate application
- Compare and classify feedback amplifiers ,oscillators, Time base generator

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
	SECTION-I		
1.	**Transistors**		
	1.1 Introduction • Types of transistors, Transistor packaging & terminal identification, symbols • Operation of PNP & NPN transistors • Configuration (CB, CC & CE),input -output characteristics, • Relation between α, β, γ, Comparison between CB, CC & CE, • Transistor as switch	**14**	**16**
	1.2 BJT Biasing • Need for biasing, • Concept of DC load lines, • Operating point (Q), stabilization, thermal runaway, • Types of biasing i. Fixed biasing circuits. ii. Base biased with emitter feedback. iii. Voltage divider		
2.	**Field Effect Transistors (FET):**		
	2.1 FET • Construction of JFET, (n-channel & p-channel) • Working, principle & characteristics (Drain characteristics & Transfer characteristics)	**08**	**08**
	2.2 FET biasing • Self bias • Source bias • Voltage divider bias • Applications of FET		
	2.3 MOSFET: • Introduction, types, construction • Working& Applications.		
3.	**Power Amplifiers**		
	3.1 Introduction • Small signal Amplifier concept • Comparison between small signal amplifier and power amplifier • Classification: class A, class B, class AB & class C.with respect to operating point on load line, efficiency,	**12**	**16**
	3.2 Single stage class A Amplifier • Operation, input output		

	• Single stage class A operating point on load line, efficiency, 3.3 Class B push-pull amplifier, • Operation, input output • Advantages & disadvantages, applications of power amplifier.		
	SECTION-II		
4.	**Tuned Amplifier**		
	4.1 Introduction • Introduction & necessity of tuned amplifier • Basic tuned circuit • Circuit diagram & operating principle of single & double tuned Amplifiers • Stager tuned Amplifier	**05**	**08**
5.	**Feedback Amplifiers and Oscillators:**		
	5.1 Concept of Feedback series & current shunt. • Types of feedback: negative and positive feedback • Types of feedback connections, voltage shunt, voltage series, current series & current shunt.	**10**	**12**
	5.2 Introduction to Oscillators: • Need and condition for oscillators (Barkhausen's criteria) • Type of oscillator: LC Oscillators-Hartley Oscillator, Colpitts Oscillators, RC phase shift oscillator and crystal oscillator-Concept, working and applications		
6.	**Multivibrators**		
	6.1 Multivibrators. • Classification • AMV circuit working ,waveforms & frequency • BMV circuit working ,waveforms & frequency • MMV circuit working ,waveforms & frequency • Applications. • Schmitt trigger	**05**	**08**
7	**Time Base Generators:**		
	7.1 Unijuction Transistor (UJT): • Construction, Working principle & characteristics		
	7.2 Types of Time Base Generators: • Free running time base generator, working principle of UJT as time base generators, (Relaxation oscillator). • Circuit diagram and working of i. Voltage time base generator, ii. Current time base generator, iii. Bootstrap time base generator, iv. Miller's sweep generator & its applications.	**10**	**12**
	Total	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1	Input output characteristics of common base configuration.
2	Input output characteristics of common emitter configuration.
3	Switching characteristics of BJT.
4	V-I characteristics of UJT.
5	Frequency response of single stage common emitter amplifier, determine gain and BW.
6	Frequency response of two stage RC coupled amplifier using BJT.
7	Frequency response of single tuned amplifier of BJT& determine tuned frequency and BW.
8	Plot Frequency response of FET amplifier
9	Study of Class A, Class B, Class C, power amplifier
10	Study function of Astable Multivibrators
11	*Study* function of Monostable Multivibrator
12	Study function of Bistable Multivibrator
13	Study function of Schmitt's Trigger circuit
14	Study function of UJT relaxation oscillator
15	Study of Miller sweep generator.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Transistors	Classroom Teaching and laboratory work
2.	FET	Classroom Teaching and laboratory work
3.	Power Amplifiers	Classroom Teaching and laboratory work
4.	Tuned Amplifier	Classroom Teaching and laboratory work
5.	Feedback Amplifiers and Oscillators	Classroom Teaching and laboratory work
6.	Multivibrators	Classroom Teaching and laboratory work
7.	Time Base Generators	Classroom Teaching and laboratory work

Text Books:

Sr. No	Author	Title	Publication
1.	R.S.Sedha	Applied Electronics	S.Chand & Co.

Reference Books:

Sr. No	Author	Title	Publication
1.	P.Ramesh Babu	Electronics Device and Circuit	Scitech
2	Allen Mottershed	Electronics Devices & Circuits	Prantice Hall India LTD.
5	Robert L.Boylestead Louis Neshelsky	Electronics Circuit and Circuit Theory	Pearson

Learning Resources:

1. Reference Books, 2. Data Manual

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Transistors	04	08	04	16
2.	FET	04	--	04	08
3.	Power Amplifiers	04	08	04	16
4.	Tuned Amplifier	--	04	04	08
5.	Feedback Amplifiers and Oscillators	04	04	04	12
6.	Multivibrators	--	08	-	08
7.	Time Base Generators	04	04	04	12
Total		**20**	**36**	**24**	**80**

Prepared By:

(P.N.Malu)		
(P.B.Dighule.)	(S.V.Chaudhari)	(R.N.Shikari.)
Lect. In E &TC	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Electronics Instrumentation**
Course Code	**:**	**ET 384**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs.**	**--**	**--**
Marks	**20**	**80**	**25**	**--**	**--**

Course Rationale:

Electronic Technicians are required to handle measuring Instruments as tool, frequently. Hence, knowledge and hands on experience of these instruments is essentials.

Course Objectives:

After studying this course, the student will be able to

- To understand Static & Dynamic Characteristics of Measuring Systems.
- To know the construction of the instruments.
- To understand the principles and operation of different measuring instruments.
- To understand Measuring principles of Digital Instruments.
- To understand Measuring principles of AC&DC Bridges.
- Observing reading and interpreting the values from different meters.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
1.	**Basics of Measurement:**		
	Contents • Introduction to measurement systems. • Generalized block dig. Of instrumentation system. • Classification of Instruments: Absolute , Secondary Instruments • Definitions of Static characteristics of Instruments: (Accuracy, Precision, Sensitivity, Resolution, Static error, Reproducibility, Drift, Dead Zone) • Definitions of dynamic characteristics of Instruments: (Speed of response, Lag, fidelity, Dynamic error) • Types of Errors- Gross, Systemic, Random • Definition of Standards and their classification: (International, Primary, Secondary) • Calibration: Definition, Need of calibration.	**6**	**10**
2.	**Analog DC and AC Meters**		
	• Classification of analog ammeter and voltmeter • Working principle and construction of PMMC instruments • Analog DC Ammeter: Shunt resistor type, Ayrton Shunt type • Analog DC Voltmeter: Multiplier voltmeter • Multirange voltmeter: Voltmeter sensitivity, loading effect. • Analog AC Voltmeter (No derivation)- Half Wave rectifier type, Full wave rectifier type, Multirange type • Analog AC Ammeter •Analog multimeter: Electrical circuit diagram, operation	**08**	**14**
3.	**Digital Meters**		
	Concepts of ADC & DAC (Review) (No marks) • Advantages and Disadvantages of Digital Instruments and comparison with analog instruments • Block diagram, operation and applications of a. Digital Frequency meter b. Digital Voltmeter c. DMM (Ramp type DVM, Integrating type DVM, Successive approximation type DVM, Dual slope type DVM). d. LCR, Q-Meter	**08**	**14**

4.	**AC/DC Bridges & Their Applications**		
	• Bridge balance condition for DC bridge • Study of following Dc bridges : • Whetstone's bridge • Kelvin's bridge • Bridge balance condition for AC bridge • Study of following AC bridges. a. Capacitance comparison bridge b. Inductance comparison bridge c. Maxwell's bridge. d. Hay bridge. e. Schering's bridge f. Wien's bridge. • Wagner ground connection.	**08**	**14**
5.	**Oscilloscope**		
	Contents • CRO: Basic Block diagram and function of each block • CRT: Construction and working • Vertical Deflection System –Block diagram and operation • Horizontal deflection system – Block diagram and operation • Function of delay line • Applications of CRO: a. Time & frequency measurement b. Voltage measurement c. Lissagous patterns for Phase and Frequency measurement • Concept, block diagram and Operation of: Single beam dual **trace** & Dual beam Dual Trace CRO • Block diagram, operation and applications of digital storage oscilloscope(DSO)	**12**	**18**
6.	**Signal Generator and Wave Analyzer**		
	Contents Signal Generator: • Definition and need of signal generator • Block diagram, operation and applications of : a) AF and RF type signal generator b) Function generator • Wave analyzers: • Definition and need of waveform analyzer • Block diagram, operation and applications of : a) Logic analyzer	**06**	**10**

	b) Spectrum analyzer		
	TOTAL	**48**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Measure DC Voltage & DC Current using PMMC instruments.
2.	Extension of range of Ammeter & voltmeter
3.	Measurement of R.L.C using LCR, Q meter.
4.	Study front panel controls of specification of typical CRO.
5.	Measure frequency, voltage, phase difference (by time measurement) using CRO.
6.	Testing of component using CRO.
7.	Using Lissagous pattern find frequency & phase difference of unknown signal.
8.	Study & use of Digital Storage Oscilloscope.
9.	Study of wheatstone's bridge for measurement of unknown resistance.
10.	Measurement of unknown capacitance using bridge.
11.	Measurement of unknown inductance using bridge
12.	Measure frequency & voltage of the different o/p waveforms of function generator.
13.	Study & use of signal Generator
14.	Study & use of pulse generator.

Minimum 10 practicles should be performed.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Measuring Systems & Characteristics of Instruments.	Class room teaching
2.	Analog DC and AC Meters	Class room teaching & Laboratory work
3.	Digital Meters.	Class room teaching & Laboratory work
4.	Bridges	Class room teaching & Laboratory work
5.	Oscilloscope.	Class room teaching & Laboratory work
6.	Signal Generator and Analyzer.	Class room teaching & Laboratory work

Text Books:

Sr. No	Author	Title	Publication
1.	Modern Electronic Instrumentation & Measurement Techniques	W.D. Cooper	PearsonEducation, NewDelhi
2.	Electronic Instruments	H S Kalsi	Tata Mc Grow Hill
3.	Electronics Instrumentation & measurement Systems	J.G.Joshi	Khanna Publication

Reference Books:

Sr. No	Author	Title	Publication
1.	Electrical & Electronic Measurements & Instrumentations	A.K. Sawhney	Dhanpat Rai &Co.

Learning Resources:

Reference manuals, Instrumentation Hand book by Liptak, Instrumentation Hand book by Anderson, Technical Reference book of Instruments, Service Manuals of Instruments, Handouts, O.H.P. Transparencies / L.C.D. Projector.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Measuring Systems & Characteristics of Instruments.	4	4	2	10
2.	Analog DC and AC Meters	4	6	4	14
3.	Digital Meters.	4	6	4	14
4.	Bridges	2	10	2	14
5.	Oscilloscope.	4	10	4	18
6.	Signal Generator and Analyzer.	2	6	2	10
Total		**20**	**42**	**18**	**80**

Prepared By:

(DR.N.L.Janrao.)		
(G.N.Hainalkar.)	S.V.Chaudhari	R.N.Shikari.
Lect. In E &TC	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/21/22/**23**/24/26/16/**17**
Name of Course	**:**	**Analog Communication**
Course Code	**:**	**ET 385**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs.**	**--**	**--**
Marks	**20**	**80**	**50**	**--**	**--**

Course Rationale:

This subject is introduced with the view that students are made familiar with basics of communication system like Amplitude, Frequency Modulation and modern communication systems.

Course Objectives:

After studying this course, the student will be able to

- To understand concept of analog Communication system
- To develop skills to enable them to operate and service the circuits in the systems
- Understand the operation of AM/ FM transmitter and receiver.
- Understand the concept of radio wave propagation.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
	SECTION I		
1.	**Basics of Electronic Communication.**		
	1.1 Introduction • The importance of electronic communication. • Definition: Analog signal, Digital signal, Baseband signal • The elements of basic electronic communication system • (Draw block diagram and explain each block.): • Noise in communication system and types • Types of electronic communication. Simplex, Duplex- full / Half. • The electromagnetic spectrum. • Concept of transmission bandwidth.	**10**	**10**
	1.2 Basics of Modulation • Need for modulation • Types: AM, FM, PM. Definition ,waveforms		
2.	**Amplitude Modulation**		
	2.1 **Modulation index-(Time domain display method)** • Definition, its effect on modulated signal, Simple numerical. • Mathematical representation of amplitude modulated wave & its meaning., • Bandwidth requirement • Representation of AM signal in time & frequency domain • Power relations in AM wave, simple numerical	**10**	**12**
	2.2 AM Transmitter • Block diagram of AM transmitter(low level and high level) and its operation • Circuit and operation of AM modulators using collector modulator class C amplifier		
	2.3 Concepts of side band • SSB • DSB • Suppress carrier(DSBSC,SSBSC) • Generation of SSBSC using frequency discriminator method, Phase discriminator method, Phase shift method		
3	**Frequency and Phase modulation**	**10**	**12**
	3.1 Frequency modulation • Deviation ratio, maximum deviation ratio, mathematical representation of FM & its meaning		

	• Representation of FM signal in time domain & frequency domain • Bandwidth requirements and simple numerical • Concept of Pre-emphasis & De-emphasis • Generation of FM -Reactance modulator, varactor diode • FM Transmitter (Armstrong Method), circuit diagram and its working		
	3.2 Phase Modulation		
	• Phase modulation(Definition), Representation of PM signal • comparative advantages & disadvantages of AM ,FM&PM		
4	**Noise and transmission lines**		
	4.1 Noise • Definition • S/N ratio • Sources of noise • Only Types of Noise(External, Internal)		
	4.2 Transmission Lines • Equivalent circuit of transmission line (general, RF Equivalents.) • Characteristics impedance and its method of calculation, Simple Numerical. • Losses in transmission line.	**06**	**06**
	SECTION II		
5	**Radio Receiver**		
	5.1 Demodulation • Basic principles of demodulation	**12**	**16**
	5.2 **Demodulation of AM signal** • Diode detector, practical diode detector. • Need of AGC & its types – simple, delayed.		
	5.3 **FM detector** • Simple slop detector • Balanced slope detector • Phase Discriminator • Ratio detector. • PLL as FM demodulator		
	5.4 **Radio Receiver Types** • Block diagram of Tuned Radio Frequency receiver and its Working with waveforms. • Block diagram of AM super heterodyne receiver and its Working with waveforms. • RF Section and Characteristics of AM radio receiver (Sensitivity, selectivity, fidelity) Image frequency and its rejection, Frequency changing and tracking(Two point and tree point tracking)		
6	**Radio Wave Propagation**		

	6.1 Introduction • Fundamental of electromagnetic waves , • Transverse electromagnetic wave, • polarization **6.2 Types of Wave Propagation** • Ground Wave. • Sky wave, ionosphere & its effect. • Space Wave , Duct propagation • Troposphere scatter propagation • Concept of actual height & virtual weight • Critical frequency, skip distance & fading, maximum usable frequency	**10**	**12**
7	**Pulse Modulation**		
	• Sampling theorem, • Natural sampling, • flat top sampling , • sample & Hold circuit, • PAM, PWM, PPM (Definition and Wave forms)	**04**	**06**
8	**Antennas**		
	8.1 Antenna fundamentals • Resonant antenna and Non-resonant antennas • Definition : Radiation pattern ,polarization, bandwidth, beam • width, antenna resistance, directivity & power gain, antenna gain **8.2 Dipole antenna** • Half wave dipole antenna (Resonant Antenna) & its Radiation • Pattern. • Folded dipole antenna & its radiation pattern. • Radiation pattern for Dipole Antenna of different length. **8.3 Structure, radiation pattern & application of antennas.** • Loop antenna. • Telescopic antenna. • Yagi-Uda antenna • Micro wave antenna – Dish antenna &Horn antenna • Micro strip patch antennae- Rectangular, square and circular	**04**	**06**
	TOTAL	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Observe and draw the waveform of AM & calculate modulation index of AM
2.	Observe and draw input/output waveforms of AM detector.
3.	Observe and draw the waveform of FM & calculate modulation index of FM
4.	Observe and draw the waveforms of FM modulator
5.	Observe and draw the waveforms of FM demodulator
6.	Observe the wave forms at various points in AM receiver.
7.	Observe & Plot the graph of RF Characteristics of Radio Receiver: Selectivity, Sensitivity, Fidelity
8.	Observe the wave forms PAM and PWM.
9.	Observe the wave forms PPM
10.	Study of analog sampling and reconstruction of signal.
11.	Study of various antennas.
12.	Plot the radiation pattern of Dipole & Yagi-Uda antenna.
13.	Measure the characteristic impendence of co-axial cable Find the impendence and VSWR.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Basics of Electronic Communication.	Classroom teaching
2.	Amplitude Modulation	Classroom teaching & laboratory work.
3.	Frequency and Phase modulation	Classroom teaching & laboratory work.
4.	Radio Receiver	Classroom teaching & laboratory work.
5.	Noise and transmission lines	Classroom teaching & laboratory work.
6.	Radio Wave Propagation	Classroom teaching & laboratory work.
7.	Pulse Modulation	Classroom teaching
8.	Antennas	Classroom teaching & laboratory work

Text Books:

Sr. No	Author	Title	Publication
1.	Kennedy	Principles of communication	McGraw Hill
2.	Roddy Collen	Electronic communication	Prentice Hall
3.	Wayne Tomasi	Electronic Communication System	Pearson

Reference Books:

Sr. No	Author	Title	Publication
1.	Louis E Frenzel	Communication Electronics	TATA Mc-Graw Hill 5th Edition
2.	Taub & Schilling	Principles of communication system	McGraw Hill
3.	M.L.Gupta	Electronic & Radio Engineering	Dhanpat Rai Pub.

Learning Resources:
Reference Books, Journals, Data Manuals, Computer Based Teaching.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Basics of Electronic Communication	3	4	5	12
2.	Amplitude Modulation	3	4	5	12
3.	Frequency and Phase modulation	3	4	5	12
4.	Radio Receiver	4	4	4	12
5.	Noise and transmission lines	3	2	3	08
6.	Radio Wave Propagation	4	3	3	10
7.	Pulse Modulation	2	2	2	6
8.	Antennas	3	-	5	08
Total		25	23	32	**80**

Prepared By:

(P.G.Gahukar)	S.V.Chaudhari	R.N.Shikari.
Lect. In E &TC	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/21/22/**23**/24/26/16/**17**
Name of Course	**:**	**Linear Integrated Circuits**
Course Code	**:**	**ET 386**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**03**	**48**
Practical	**02**	**32**
Tutorial	**01**	**16**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs.**	**--**	**--**
Marks	**20**	**80**	**25**	**--**	**--**

Course Rationale:

The physical world is inherently analog, indicating that there is always need for analog circuitry. Today the growth of any industry is depend upon electronics to a great extent. This subject acquaints students with general analog principles and design methodologies using practical devices & application. It focus on process of learning about signal conditioning, signal generation, instrumentation, timing & control using various IC circuitry.

Course Objectives:

Learning of this subject will help the student to gain the following information

•	Describe working principle of OPAMP and its application
•	In defining the Op-amp characteristics.
•	To learn the features and advantages of integrated circuits.
•	Design electronic circuit using OPAMP for various mathematical operation.
•	Design electronic circuit using OPAMP for industrial application.
•	Design electronic circuit using timer IC's
•	In analyzing the response of frequency selective circuit such as PLL with respect to the incoming signal.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
1.	**Operational Amplifier (Op-Amp):**		
	1.1 Importance of Op-Amp: 1.2 Block diagram of Op-Amp and function of each block with the circuit such as balanced, Unbalanced, differential amplifiers with simple current source, level shifter and complementary push-pull amplifier. 1.3 Parameters of Op-Amp: Input offset voltage, Input offset current, Input bias current, differential input resistance, Input capacitance, Input voltage range, offset voltage adjustment range, Common Mode Rejection Ratio (CMRR), Supply Voltage Rejection Ratio(SVRR), large signal voltage gain and transfer characteristics, supply voltages, supply current, output voltage swing, output resistance, slew rate, gain bandwidth product, output short circuit current 1.4 Ideal op-amp: electrical characteristics 1.5 Ideal voltage transfer curve 1.6 OPAMP IC's: 741 pin diagram and pin function 1.7 Open loop and closed loop configuration of op-amp, its comparison 1.8 Basic concept of frequency compensation of op-amp	**09**	**14**
2.	**OP-AMP basic circuits:**		
	2.1 Virtual ground concept 2.2 Open loop configuration – Inverting , Non-inverting 2.3 Close loop configuration – Inverting, non- inverting, differential amplifier, unity gain amplifier (voltage follower) inverter (sign changer) 2.4 Inverting & non-inverting configuration of Adders (summing amplifier, scaling Amplifier, averaging amplifier),Substractor 2.5 Basic Integrator 2.6Basic Differentiator 2.7 Numerical based on designing of above circuits	**09**	**14**
3.	**Applications of Op-Amp:**		
	3.1 Instrumentation amplifier using two three OPAMP requirements		

	,Circuit diagram, circuit operation, derivation of output voltage equation advantages & applications. Pin diagram pin functions and specifications of IC LM 324 3.2Voltage to current converter (with floating load, with grounded load) Current to voltage converter. 3.3 Sample and hold circuit 3.4Logarithmic and antilogarithmic amplifiers (using Diodes)Analog divider and analog multiplier 3.5 Concept of comparator: zero crossing detector,Schmitt trigger, window detector, phase detector, active peak detector, peak to peak detector	**12**	**16**
4.	**Filters**		
	4.1Introduction to filters 4.2 Classification of filters 4.3 Merits & demerits of active filters over passive filters 4.4 Concept of passive & active filters 4.5Ideal and actual characteristics, terms: - cut off frequency, pass band, stop band, center frequency, roll off rate, BW, Q-factor, first order & second order Butterworth filters 4.6 Low pass filter, high pass filter, band pass filter(wideband pass , narrow band pass filter) Band reject filter(wide band reject, narrow band reject filter), all pass filter 4.7 Numerical based on design of different filters.	**08**	**14**
5.	**Timers:**		
	5.1 Introduction to timer IC 555 5.2 Block diagram of IC 555 and its pin diagram & function of each pin 5.3 Concepts of different timer circuits used in industries: water level controller, touch plate switch, frequency divider etc. 5.4 Monostable multivibrator, astable multivibrator, bistable multivibrator, Schmitt trigger, voltage controlled oscillator 5.5 IC 556 features , pin diagram and specifications 5.6 Numerical based on timers	**08**	**14**
6.	**PLL**		
	6.1IC 565 (phase lock loop), its block diagram and pin diagram, 6.2 IC566 (voltage controlled oscillator) , its block diagram and pin diagram, 6.3 Application of PLL as frequency multiplier, FM demodulator.	**04**	**08**
	TOTAL	**48**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	To assemble inverting and non inverting amplifier and draw input output waveforms.
2.	To assemble adder using OPAMP
3.	To assemble substractor using OPAMP
4.	Observe output of active integrator for different types of input (sine and square)
5.	Observe output of active differentiator for different types of input (sine and square)
6.	Study of input and output for V to I converter and I to V converter
7.	To assemble zero crossing detector
8.	Study of astable multivibrator using IC555
9.	Study of Bistable multivibrator using IC555
10.	Study of Monostable multivibrator using IC555
11.	Study of Schmitt triggers using IC 555.
12.	Plot the frequency response of first order butterworth low pass filter.
13.	Plot the frequency response of first order butterworth band pass filter/ band reject filter.
14.	Plot the frequency response of second order butterworth high pass filter
15	Plot the frequency response of second order butterworth low pass filter
16	Plot the characteristics of PLL

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Operational Amplifier (Op-Amp):	Classroom Teaching
2.	OP-AMP basic circuits:	Classroom Teaching & Laboratory work
3.	Applications of Op-Amp:	Classroom Teaching & Laboratory work
4.	Filters	Classroom Teaching & Laboratory work
5.	Timers	Classroom Teaching & Laboratory work
6.	PLL	Classroom Teaching ,Projector & PPTs

Reference Books:

Author	Title	Publisher
SergioFranco	Design with OPAMP & analog integrated ckts	Tata McGraw-hill New Delhi
G B Clayton	Operational Amplifiers	British library cataloguing in publication data
William d. Stanley	Operational Amplifier with Linear Integrated Circuits	Pearson Education
Ramakant Gaikwad	Op-Amp & Linear Integrated Circuits	Prentice-hall of India New Delhi
Coughlin & Dirscoll	Operational amplifier & Linear Integrated circuits	Pearson Education
K.R. Botkar	Integrated circuits	Khanna Publisher, New Delhi
D Roy Choudhari & Salil Jain	Linear Integrated circuits	New Age International (P) Ltd. Publishers New Delhi

Learning Resources:
Reference Books, Manuals and journals of devices, Components brochures

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Operational Amplifier (Op-Amp):	4	6	4	14
2.	OP-AMP basic circuits:	4	8	2	14
3.	Applications of Op-Amp:	4	4	8	16
4.	Filters	4	6	4	14
5.	Timers	--	8	--	08
6.	PLL	--	10	4	14
Total		**16**	**42**	**22**	**80**

Prepared By :

(R.S.Deulkar) (P.N.Malu.)	S.V.Chaudhari	R.N.Shikari.
Lect. In E &TC	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Power Electronics**
Course Code	**:**	**ET 387**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs.**	**3 Hrs. For batch of 20 students**	**--**
Marks	**20**	**80**	**--**	**25**	**--**

Course Rationale:

Engineers should have concepts of industrial electronics. Electronic control circuits have major role in Industries for which study of power devices is essential. Industrial electronic is the foundation subject to study industrial drives, and advanced industrial electronics. Industrial electronics makes Students conversant with major industrial applications.

Course Objectives:

After studying this course, the student will be able to

- Understand construction and operating principle of various power electronic devices. Study construction and operation of controlled rectifiers, choppers and inverter and industrial control circuits. Students will be able to identify faults in Circuits. Students will be able to state necessity of controls provided in industry.

Course Content:

Chapter No.		Name of Topic/Sub topic	Hrs	Marks
1.	**Power Electronics**			
	1.1	Introduction to power electronics.	**04**	**08**
	1.2	Power MOSFET- Construction, Operating Principle, V-I characteristics and Uses of Depletion and Enhancement type Power MOSFET.		
	1.3	IGBT- Construction, Operating Principle, V-I characteristics And Uses of IGBT.		
2.	**Thyristor Family Devices**			
	2.1	SCR: Construction, Operating Principle with Two transistor analogy, V-I characteristics, Latching Current (IL) and Holding Current (IH). Applications of SCR, SCR protection circuits, Snubber circuit, gate protection circuit, SCR crowbar circuit, Series & parallel operations of SCRs.	**12**	**14**
	2.2	Thyristor family devices LASCR, SCS, GTO and TRIAC: Construction, Operating Principle, V-I characteristics and Applications.		
	2.3	Triggering Devices- Construction, Operating Principle, V-I characteristics and applications of UJT, PUT, SUS, SBS and DIAC.		
3.	**Turn ON and Turn OFF methods of SCR**			
	3.1	Concept of Turn ON mechanism of SCR: High Voltage triggering, thermal triggering, Illumination triggering, dv/dt triggering Gate triggering of SCR.	**16**	**18**
	3.2	Gate trigger circuits - Resistance triggering circuit, Resistance Capacitance triggering circuit (Operation, applications and limitations)		
	3.3	SCR triggering using UJT, PUT-Relaxation Oscillator circuit And Synchronized UJT triggering circuit: (Operation and applications).		
	3.4	Pulse transformer used in triggering circuit (Operation and Applications).		
	3.5	Concept of Turn OFF mechanism and methods of - Class A-Series resonant commutation circuit, Class B-Shunt resonant commutation circuit, Class C-Complimentary Symmetry commutation circuit		

4.	**Phase controlled Rectifiers**			
	4.1	Concept of phase control. (Firing Angle **α** and conduction angle **Ø**)	**14**	**16**
	4.2	Circuit diagram, working, equations for and Waveforms of VDC of following rectifiers.		
	4.3	Single phase half wave controlled rectifier with R, RL load. Effect of freewheeling diode.		
	4.4	Single phase centre tapped full wave controlled rectifier with R, RL load. Effect of freewheeling diode.		
	4.5	Single phase Bridge type full wave controlled rectifier with R, RL load. Effect of freewheeling diode.		
	4.6	Basic three phase half wave uncontrolled and controlled Rectifier.		
	4.7	Need and Uses of Polyphase rectifier		
5.	**Converters**			
	5.1	Concept of Choppers	**10**	**12**
	5.2	Chopper: basic circuit and its operation.		
	5.3	Step Up and Step down Chopper, Jones chopper.		
	5.4	Inverters-Need of an inverter, Classification of inverters, Basic series & parallel inverter, Important applications of inverter.		
	5.5	Working principle of single phase half bridge inverter		
	5.6	Definitions of performance parameters of inverter.		
6.	**Industrial Control Circuits.**			
	6.2	Light dimmer circuit using DIAC-TRIAC	**08**	**12**
	6.4	Battery charger using SCR.		
	6.5	Emergency Lighting System		
	6.7	Speed Control of fan using TRIAC		
	6.8	Block diagram and Concept of UPS.		
	6.9	Block diagram and Concept of SMPS		

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Study of SCR characteristics
2.	Characteristics of diac.
3.	Characteristics of triac.
4.	Plot transfer and output characteristics of Insulated - Gate Bipolar Transistor (IGBT).
5.	Observe the effects of variation of R, C in R and RC triggering circuits on firing angle of SCR.
6.	Observe the effect of variation of R on firing angle in synchronized UJT triggering circuit.
7.	Study of half controlled rectifier.
8.	Study of fully controlled rectifier.

9.	Study of series inverter.
10	Study of parallel inverter.
11.	Study of chopper.
12.	Light Dimmer
13	Mini project based on application of power electronics

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Power Electronics	Class room teaching & Laboratory work
2.	Thyristor Family Devices	Class room teaching & Laboratory work
3.	Turn ON and Turn OFF methods of SCR	Class room teaching & Laboratory work
4.	Phase controlled Rectifiers	Class room teaching & Laboratory work
5.	Converters	Class room teaching & Laboratory work
6.	Industrial Control Circuits.	Class room teaching & Laboratory work

Text Books:

Sr. No	Author	Title	Publication
1.	Singh, Khanchandani	Power Electronics	Tata McGraw Hill Publication.
2.	Rashid	Power Electronics	Tata McGraw Hill Publication.
3.	Alok Jain	Power Electronics and Its Applications	Penram International Publishing (India) Pvt. Ltd

Reference Books:

Sr. No	Author	Title	Publication
1.		SCR Manual.	General Electric.

Learning Resources : Reference Books, Manuals and journals

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Power Electronics	04	02	02	08
2.	Thyristor Family Devices	08	03	03	14
3.	Turn ON and Turn OFF methods of SCR	10	04	04	18
4.	Phase controlled Rectifiers	08	04	04	16
5.	Converters	08	02	02	12
6.	Industrial Control Circuits.	04	02	06	12
	Total	**42**	**17**	**21**	**80**

Prepared By:

(N.SBakade.)		
(P.B.Dighule.)	S.V.Chaudhari	R.N.Shikari.
Lect. In E &TC	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/21/22/**23**/24/26/16/**17**
Name of Course	**:**	**Digital Electronics**
Course Code	**:**	**ET 388**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs.**	**3 Hrs. For batch of 20 students**	--
Marks	**20**	**80**	**25**	**---**	25

Course Rationale:

This subject forms the foundation of digital electronic systems. It is essential to know these fundamentals to understand the concept of microprocessors & its applications.

Course Objectives:

After studying this course, the student will be able to

- Know the Concept of Digital system.
- Understand the operations of fundamental digital circuits.
- Simplify logic circuits using Boolean algebra
- Construct simple logic circuits.
- Understand and implement the operations of combinational and sequential circuit.
- Understand the functions of various ICs of data converters and memories.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
1.	**Number system**		
	1.1 Introduction to digital system • Analog signal Vs Digital signal • Number systems (Decimal, binary, octal, hexadecimal) conversion of one system into other	**08**	**14**
	1.2 Binary Arithmetic: - (Numerical) • Addition, • Subtraction(1's and 2's complement) • Multiplication • Division • BCD addition and subtraction using 9's and 10' complement		
	1.3 Codes: • BCD • Grey • EX-3 • ASCII		
2.	**Logic families and gates**		
	2.1 Logic families such as TTL, CMOS. • Characteristics of logic families & Comparison between different logic families • TTL NAND gate – Totem pole output • CMOS Inverter	**06**	**12**
	2.2 Logic Gates • Basic gates and Derived gates (IC diagram) • NAND and NOR as Universal gates • Fundamentals of Boolean laws (Numerical) • Duality Theorem, De Morgan's theorems.(Numerical)		
3.	**Combinational Logic Circuits**		
	3.1 K-map reduction techniques (up to 4 variable maps) using SOP & POS Forms	**10**	**16**
	3.2 Design using K-map • Half and Full Adder, • Half and Full Subtractor		

	3.3 Code Converter using K-map • Gray to Binary, • Binary to Gray Code (upto 4bit)		
	3.4 IC 7447 as BCD to 7 segment decoder – driver		
	3.5 IC 7483 as Adder & Subtractor, 1 digit BCD adder.		
	3.6 ALU (Truth table & Block Diagram) • IC 74181 • IC 74381.		
	3.7 Applications and realization • Necessity of combinational circuit. • Multiplexers(MUX): study of IC 74151 ,MUX tree • Demultiplexers (DEMUX): study of IC 74155 ,Demultiplexer tree, Demultiplexer as decoder • Encoder: Priority Encoder 8:3, Decimal to BCD Encoder • Tristate logic, Unidirectional & bidirectional buffer ICs: IC 74244 and IC 74245		
4.	**Sequential Logic Circuits**		
	4.1 Sequential circuits: • Comparison between Combinational & Sequential circuits, • One bit memory cell - RS latch – using NAND & NOR. • Edge and level trigger • Flip Flops - S R Flip flop, Clocked SR flip flop with preset and clear, • Drawbacks of SR Flip flop • Clocked JK Flip flop with preset & clear, Race around condition in JK flip-flop, Master slave JK flip flop. • D and T type flip flop. • Excitation table of flip flops.	**10**	**16**
	4.2 Study of Counters : • Counter: Modulus of counter, their types as Asynchronous and Synchronous counter. • Asynchronous counter: (Ripple counter , 4 bit up/down Counter • Synchronous counter: Excitation table of flip flops, implementation of 3bit synchronous counter, its truth table and waveforms. • Block schematic and waveform , IC 7490 as MOD-N Counter		

	4.3 Shift Register: • Logic diagram , Truth Table and waveforms of : 4-bit Shift registers (SISO,SIPO, PISO,PIPO) • 4 Bit Universal Shift registers. Applications of Shift Register (Logic Diagram with waveforms) of: Ring counter, Twisted ring counter		
5.	**Analog to Digital and Digital to Analog converter**		
	5.1 Necessity of Code	**08**	**14**
	5.2 Digital to Analog converter • Types of DAC along with Mathematical derivation: Weighted resistor method and R-2R Method • Comparison of types of DAC		
	5.3 Analog to Digital converter (Block diagram & working) • Single slope ADC • Dual slope ADC • SAR ADC		
	5.4 Use of IC 0800, 0809 in practical applications		
6.	**Memories**		
	6.1 Principle of operation and classification of memory. • Organization of memories • RAM (Static, Dynamic), Volatile and Non-Volatile • ROM (PROM, EPROM, EEPROM) • Flash memory. • Comparison between EPROM and Flash	**06**	**08**
	6.2 Study of memory ICs : • Identification of IC number and their function of following ICs: IC 7481& IC 6116.		
	TOTAL	**48**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	To check different IC's using IC tester.
2.	Verify Truth table of basic logic gates ,universal gate.
3.	Verify NAND and NOR gate as universal logic gate.
4.	Verify De Morgan's Theorem
5.	Realize half Adder & Full Adder
6.	Realize Half Subtractor & Full subtractor
7.	Verify the operation of Multiplexer IC 74151 and Demultiplexer IC 74155.
8.	Verify truth table of Encoder & Decoder
9.	Realize and verify RS flip flop using NAND gate and verify master slave JK Flip-Flop
10.	Implement 4 bit ripple counter/Decade counter.
11.	Verify the operational features of ADC – IC 0809/IC 0808 and DAC 0800
12.	Implement 3 bit R-2R D/A converter
13.	To study ALU IC 74181

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Number System	Classroom Teaching
2.	Digital Logic Families	Classroom Teaching & Laboratory work
3.	Combinational Logic Circuits	Classroom Teaching & Laboratory work
4.	Sequential Logic Circuit	Classroom Teaching & Laboratory work
5.	Analog to Digital and Digital to Analog converter	Classroom Teaching & Laboratory work
6.	Memories	Classroom Teaching ,Projector & PPTs

Text Books:

Sr. No	Author	Title	Publication
1.	Malvino Leach	Principles of Digital Electronics	Mcgraw Hill
2.	R.P.Jain	Digital Electronics	Tata Mcgraw Hill
3.	Anand Kumar	Fundamental of Digital Electronics	PHI

Reference Books:

Sr. No	Author	Title	Publication
1.	Anil K. Maini	Digital Electronics, Principles and Integrated Circuits	Wiely India Edition
2.	Mathur	Introduction to microprocessor	Tata Mcgraw Hill

Learning Resources :
Reference Books, Manuals and journals of devices, Components brochures

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Number System	4	8	2	14
2.	Logic families and gates	2	4	6	12
3.	Combinational Logic Circuits	4	8	4	16
4.	Sequential Logic Circuit	4	8	4	16
5.	Analog to Digital and Digital to Analog converter	2	8	4	14
6.	Memories	4	4	--	08
Total		**20**	**40**	**20**	**80**

Prepared By:

(P.N.Malu.) (P.G.Gahukar)	S.V.Chaudhari	R.N.Shikari.
Lect. In E &TC	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET/**CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**21/22/**23**/24/26
Name of Course	**:**	**Microcontroller and Applications**
Course Code	**:**	**ET389**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**04**	**64**
Practical	**04**	**64**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs.**	**3 Hrs. For batch of 20 students**	**--**
Marks	**20**	**80**	**50**	**--**	**--**

Course Rationale:

This subject gives preliminary knowledge of 8051 microcontroller architecture, peripheral interfacing to it and assembly language programming. Microcontroller is heart of all domestic, industrial, consumer goods and other high end products. Automation in every field of life is being used and microcontroller is inbuilt element of these systems and devices. Microcontroller is in built element of embedded system. The subject will help the students to study concepts of embedded system. This subject mainly fouses to understand design of simple microcontroller systems.

Course Objectives:

After studying this course, the student will be able to

- Preliminary Knowledge of Micro controller 8051
- Develop logic for programs in assembly language.
- Interface peripherals to microcontroller
- Knowledge of working of microcontroller systems in various fields.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
	SECTION-I		
1.	**Introduction to Microcomputers and Microcontrollers**		
	1.1 Introduction to single board microcomputer ➢ Block Diagram of Microcomputer. ➢ Elements of Microcomputer. (Buses, Microprocessor, memory, I/O devices). ➢ Different types of buses: address, Data, and control bus. 1.2 Introduction to Microcontroller ➢ General block diagram of microprocessor and microcontroller ➢ Comparison of Microprocessors and Microcontrollers. ➢ Types of architectures - Harvard and Von-neuman. ➢ Selection factors of microcontroller(Architecture type, speed, Word size, instruction set, memory, and I/O capability)	**5**	**8**
2.	**8051 Microcontroller**		
	2.1 8051 architecture ➢ Features, Architecture (description of each on chip peripheral, Pin description. 2.2 Special Features of 8051 ➢ Boolean Processor, Power saving options- idle and power down mode, Derivatives of 8051.	**10**	**12**
3.	**8051 Instruction set and Programming**		
	3.1 Addressing modes and instruction set. ➢ Assembler directive- ORG, DB, EQU, END, CODE, DATA 3.2 Instruction Set ➢ Data moving instructions, logical &arithmetic Instructions,. Jump, call instructions, subroutines, Bit related instructions. 5.3 Assembly language programming 5.4 Software development cycle- Editor, Assembler, cross compiler, linker, locater, compiler	**12**	**14**
4.	**MCS 51 Parallel Ports**		
	4.1 Port structure 4.2 Reading and writing a port 4.3 Port programming 4.4 Interfacing of LED	**03**	**06**
	SECTION-II		
5.	**MCS** 51 **Timer/counter**		
	5.1 Timer / Counter logic and modes 5.2 Simple programs on timer to generate time delay using polling and interrupt method.	**06**	**08**

6.	**MCS** 51 **Serial port**		
	6.1 Serial Communication-SCON, SBUF 6.2 Modes of serial communication (Mode 0 to 3). 6.3 Simple programs for serial communication.	**06**	**08**
7.	**MCS 51 Interrupts.**		
	7.1 Interrupts and polling. 7.2Interrupts structure of 8051SFR - IE, IP 7.3 Simple programs based on interrupts and polling method	**06**	**06**
8.	**External Memory Interfaces**		
	8.1 Semiconductor memory 8.2 Memory address decoding 8.3 Interfacing external ROM 8.4 External data memory space	**06**	**06**
9.	**External Interfaces**		
	Interfacing and programming of external interfaces. 9.1 LCD Display , 9.2 Keyboard , 9.3 DAC & ADC 9.4 sensor interfacing(temperature ,humidity) 9.5 Relays and opto isolators interfacing 9.6 Stepper Motor 9.7 DC.Motor 9.8 RTC Interfacing	**10**	**12**
	TOTAL	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Identification & observation of 8051 system board on the kit.
2.	Introduction of Keil software or any other IDE
3.	Assembly language programs which cover Data moving, Arithmetical, Logical, single bit instructions and jumps. Time delays using timers .(Any 15)
4.	Generate square wave and rectangular wave on port pin with a program
5.	External interfacing of leds with 8051
6.	External interfacing of switches/Keyboard with 8051
7.	External interfacing of LCD with 8051
8.	External interfacing of relay with 8051
9.	ADC Interfacing with 8051
10.	External interfacing of stepper motor with 8051
11.	External interfacing of D.C. motor with 8051

12.	A mini project with any one application on demo board

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction to Microcontrollers	Class room teaching & Laboratory work
2.	8051 Microcontroller	Class room teaching & Laboratory work
3.	8051 Instruction set and Programming	Class room teaching & Laboratory work
4.	MCS 51 Parallel Ports	Class room teaching & Laboratory work
6.	MCS 51Timer/counter	Classroom Teaching & Lab. work
7.	MCS 51 Serial Ports	Classroom Teaching & Lab. Work
8.	MCS 51 Intruppts	Classroom Teaching & Lab. Work
9.	External Memory Interfaces	Classroom Teaching & Lab. Work
10.	External Interaces	Classroom Teaching & Lab. Work

Text Books:

Sr. No	Author	Title	Publication
1.	Kenneth J. Ayala	The 8051 Microcontroller	Thomson Publishers
2.	Mohmad-ali-mazidi, Janice-Gelispe-mazidi Roline D. Mckinlay	8051 microcontroller and Embedded Systems	Pearson/PHI

Reference Books:

Sr. No	Author	Title	Publication
1.	Ajit pal	Micro controller principal & application	prentice hall of India
2.	Ajay Deshmukh	Microcontroller theory & application.	Tata McGraw- Hill
3.	Rajkamal	Microcontroller Architecture, programming, interfacing, & system design	Pearson
4.	Satish shaha	8051 Microcontroller Mcs-51 family and its variant.	Oxford

Learning Resources:
Reference Books, Journals, Data Manuals, and URL's.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
	Section I				
1.	Introduction to Microcomputers and Microcontrollers	4	4	-	8
2.	8051 Microcontroller	8	4		12
3.	8051 Instruction set and Programming	6	4	2	14
4.	MCS 51 Parallel Ports	2	-	4	6
	Section II				
5.	MCS 51Timer/counter	2	2	4	8
6.	MCS 51 Serial Ports	2	2	4	8
7.	MCS 51 Intruppts	2	2	4	6
8.	External Memory Interfaces	2	-	4	6
9.	External Interaces	2	2	8	12
Total		**30**	**20**	**30**	**80**

Prepared By:

(P.M.Zilpe.)	(S.V.Chaudhari)	(R.N.Shikari.)
Lect. In E &TC	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Project & Seminar**
Course Code	**:**	**ET 481**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	--	--
Practical	**04**	**128**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	--	--	--	**2 Hrs**	--
Marks	**50**	--	**50**	**50**	**50**

Course Rationale:

The project work is included in the curriculum to encourage the students to under take various electronics applications.

Course Objectives:

After studying this course, the student will be able to

- Work Independently as a leader as well as member of the team also to manage project work.
- Collect necessary data, information from reference manuals, hand books, journals and websites.
- Use and integrate the knowledge various subjects .
- Design PCB Layout.
- Develop soldering and components mounting skills

Course Content:

Chapter No.	**Name of Topic/Sub topic**	**Hrs**	**Marks**
1.	Project Work	100	50
2.	Progressive assessment. (Project seminar and demo)	28	50
	TOTAL	128	100

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	The project work will be completed by a group of 4 to 6 students. The students will decide a project related to electronic field. They will have to complete a fabrication of project and to submit the project report. Oral exam of project is based on this project work.
2.	Students should study various periodicals, Journals, Books etc or various advanced topics in the field of Electronics & Telecommunication. Topic should be selected in consultation with the guide .Seminar may be project related brief write up should be prepared for the seminar. The duration for the seminar presentation should be of 10 to 15 minutes. It should be interactive. Project seminar will be held at the end of first term. Project Demo will be held at the end of second term.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Project Selection	In consultation with the guide the student should do the survey and should prepared basic building blocks for the project
2.	Seminar	It should be project related and relevant reference books and journals list should be attached Guidance should be provided to prepare seminar report transparencies power point presentation etc.

Prepared By:

(P.B.Dighule.)		
(P.G.Gahukar.)	(S.V.Chaudhari)	(R.N.Shikari.)
Lect . in E & TC	Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Audio Video Engineering**
Course Code	**:**	**ET482**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	Three class tests, each of 60 minutes	3 Hrs.	3 Hrs.	3 Hrs	--
Marks	**20**	**80**	--	**25**	**--**

Course Rationale:

This subject is introduced with view that the students are made familiar with Audio Video Communication Systems.

Course Objectives:

After studying this course, the student will be able to

•	Understand operation of audio amplifiers
•	Analyze quality of reception of various sound systems and graphic equalizer
•	Understand working of Hi-Fi System, P A system
•	Understand CD, DVD and BDR player mechanism.
•	Understand the principle of operation of various advanced TV systems.
•	Understand working of colour T.V., CCTV, Cable TV.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
1.	**Hi-Fi System,P A system**		
	Hi Fi Audio Amplifier 1.1 Introduction to Amplifiers: Mono, Stereo,. 1.2 Difference between stereo amplifier & Mono amplifier. 1.3 Hi-Fi sound System –Characteristics,Block diagram of Hi Fi amplifier & explanation 1.4 Controls available on it & its function & other facility available on it like (Mic in, Aux.in, earphone in) 1.5 Parametric equalizer-concept, Graphic equalizer- concept, circuit diagram and operation. (5 Point Circuit diagram) 1.6 Dolby NR recording system 1.7 Types of speaker –I) woofer, II) Mid-range,III) Tweeter 1.8 Cross over network- Definition, need, Types, circuit & its function, 1.9 Baffles- Definition, need , Types & there function Public Address system 1.10 Need and use 1.11 Block Diagram, operation 1.12 Requirements of a Public Address system 1.13 Typical installation planning for 1.13.1Auditorium 1.13.2Sports Ground 1.13.3 Sports Stadium etc.	**08**	**14**
2.	**Optical Recording**		
	2.1 Types of Optical recording 2.2 Methods of optical recording of sound on Film 2.3 Reproduction of sound from films **Compact disc(CD)** 2.4 Compact disc-Optical recording on disc 2.5 CD- material used, size 2.6 CD structure 2.7 Principle & working of detection used in CD player. **2.8CD Encoding and its process** 2.9 Component used for CD mechanism. I) CD pick-up assembly,II) gear system, III) drive motors, IV) CD lens. 2.10 Block diagram of CD player & explanation. 2.11 Function of controls. 2.12 Parts, function of remote control (transmitter unit) 2.13 Advantages and disadvantages of CD player 2.14 Advantages of florescent display system used in CD player. 2.15 Block diagram of CD, VCD player & explanation. DIGITAL VIDEO DISC(DVD) 2.16 DVD forum 2.17 DVD formats	**07**	**12**

	2.18 Techniques used to increase capacity in DVDs 2.19 Features of DVDs 2.20 Applications of DVDs BLU-RAY DISC(BD) 2.21 Need for high density discs 2.22 Development of new disc based on Blue laser 2.23Advantages of BD as a storage medium 2.24 Block diagram of BD player 2.25 Comparison of VCD,DVD,BD		
3.	**TV Fundamentals**		
	3.1 Concept & explanation of following: Aspect ratio, image continuity, sequential scanning, interlace scanning, scanning periods – horizontal & vertical, vertical resolution, horizontal resolution. 3.2 Vestigial sideband transmission, bandwidth for Colour signal, brightness, contrast, viewing distance luminance, hue, saturation, compatibility. 3.3 Colour theory, primary colours & secondary colors, Grassman's law, additive Colour mixing, subtractive Colour mixing. 3.4 Composite Video Signal explain with waveform: Pedestal height, Blanking pulse, Colour burst, Horizontal sync pulse details, Vertical sync pulse details, Equalizing pulses, CCIR B standards for Colour signal transmission & reception. 3.5 TV channel allocation for band I & band III.	**08**	**14**
4.	**TV Transmitters & Receiver**		
	4.1 Audio and Video signal transmission 4.2 Positive and Negative modulation 4.3 Merits and Demerits of Negative modulation 4.4 Introduction to television camera tube (working & principle only) a) Vidicon b) Plumbicon c) Solid State camera based on CCD. **4**.5 Color Picture tube (working & principle only). a) PIL b) Delta gun picture tube. 4.6 Block diagram of monochrome TV transmitter (Function of each block) 4.7 Block diagram of Colour TV transmitter. 4.8 Block diagram of monochrome TV Receiver.	**10**	**15**
5.	**Colour TV**		
	5.1 Block Diagram & operation of color TV receiver (PAL D type) 5.2 Yagi Uda Antenna. 5.3 Explain block diagram of PAL-D decoder. 5.4 Circuit diagram and operation of 5.4.1chroma signal amplifier, 5.4.2 Burst pulse and Blanking pulse, 5.4.3 Colour killer control,	**10**	**15**

	5.4.4 Basic Circuit for Separation of U & V signals. 5.4.5 AGC Amplifier. 5.4.6 Colour signal matrixing, 5.4.7 RGB drive amplifiers. 5.5 EHT generation: circuit explanation for line output stage using transistor or IC in Colour TV. 5.6 Comparisons between NTSC, PAL & SCAM Systems. 5.7 HDTV: Development of HDTV, NHK , MUSE System and NHK Broadcast. 5.8 LCD/LED Technology: Principle and working of LCD and LED TV 5.9 Plasma: Display basics, What is plasma , Inside display gas, electrodes and phosphor ,Advantages of plasma		
6.	**Non Radiating Video Systems**		
	6.1Working principle & specification of following components: Dish antenna, LNBC, Multiplexer, Attenuators Connectors (two ways & three ways), Amplifier & cable. 6.2 Master Antenna Television –Block Diagram and operation 6.3 Cable Television- Block Diagram and operation of plan of typical CATV system, Channels for CATV, Pay TV through cables, Block diagram of two way cable systems and function of each block, Digital CATV, Applications of CATV 6.4 Closed Circuit Television- Block diagram of CCTV and its working, Application of CCTV 6.5 Block diagram of dB meter with working principle. 6.6 Direct to Home System (DTH)- Introduction , Block diagram of Transponder for DTH and its working, Block diagram of DTH receiver and function of each block.	**08**	**10**
	TOTAL	**48**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment(Any 8 Practicals From 1to13)
1.	Trace and analyze voltage of Hi –Fi amplifier system. a) Trace the output stage of given Hi Fi amplifier system. b) Voltage analysis of a given Hi Fi amplifier.
2.	Fault Finding (three different faults) in a Hi Fi Audio amplifier: a) By Signal injection method. b) Confirmation of faulty stage by voltage analysis method.
3.	Study installation of PA system
4.	Plot frequency response of a) Graphic equalizer and b) Filters used in graphic equalizer
5.	Draw & study the drive mechanism ,layout of CD Player
6.	Fault finding in CD Player
7.	Study of DVD Player
8.	Trace: a) Chroma Section, b) Picture Tube, c) Video Amplifier
9.	Trace: a) Horizontal section b) Vertical section c) Power supply section of TV receiver
10.	Voltage analysis of: a) Chroma section b) Picture Tube c) Video Amplifier a) Vertical Section b) horizontal section c) Power supply of TV receiver.
11.	Fault finding in given Colour TV: a) No colour b) Red Colour only c) Blue colour only d) Green color only e) Magenta color only f) Cyan only g) Yellow only h) No raster, No Sound.
12.	Fault finding in given Colour TV: a) Fault in HSYNC section. b) Fault in VSYNC section. c) Fault in SYNC separator. d) Fault in video amplifier.
13.	Trace the circuit layout of LED or LCD television receiver.
14.	To collect information about Set Top box used for Cable TV at home and Installation of DTH System.
15.	To estimate the cost and layout of Cable TV.
16.	To collect information about LED and LCD display used in TV.
17.	Visit to TV transmitter station and write report. (Or Recording and reproduction studio)

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Hi-Fi System & P.A.System	Class room teaching & Laboratory work
2.	CD and DVD Player	Class room teaching & Laboratory work
3.	Television	Class room teaching & Laboratory work

Learning Resources:

I. Books:

Sr. No	Title	Author	Publication
1.	Television & Radio Engineering	A.M Dhake	Tata McGraw-Hill
2.	Modern TV Pratice (4th edition)	R.R Gulati	New age International
3.	Television Engineering and Video System	R.G Gupta	Tata McGraw-Hill
4.	Audio Video Systems	R.G Gupta	Tata McGraw-Hill
5.	Modern CD Player Servicing Manual	Manohar Lotia	BPB Publication
6.	Basic Television and Video System	Bernard Grob	Tata McGraw-Hill

II. Websites:

- http://en.wikipedia.org/wiki/Compact_Disc_player.
- http://en.wikipedia.org/wiki/High-definition_television.
- http://www.howstuffworks.com.
- http://en.wikipedia.org/wiki/Backlight.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Hi-Fi System & P.A.System	6	4	4	14
2.	CD and DVD Player	5	3	2	10
3.	Television	7	4	5	16
4.	Satellite Communication	7	4	5	16
5.	Cable TV & Satellite TV	4	2	2	8
6.	Radar	6	5	5	16
Total		**35**	**22**	**23**	**80**

Prepared By:

(N.S.Bakde)	(S.V.Chaudhari)	(R.N.Shikari.)
Lect. In E &TC	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Microwave Communication**
Course Code	**:**	**ET 483**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs.**	**3 Hrs**	**--**
Marks	**20**	**80**	**--**	**25**	**--**

Course Rationale:

This subject is introduced with view that the students are made familiar with microwave devices & to gain knowledge of Microwave Communication Systems.

Course Objectives:

After studying this course, the student will be able to

- To Understand working of microwave components & devices.
- To Understand working of microwave amplifier.
- To Understand working of microwave tubes.
- To Understand working Principle of radar.

Course Content:

Chapter No	Name of Topic/Sub topic	Hrs	Marks
1.	**Introduction to Microwave**		
	1.1 Electromagnetic Wave Spectrum 1.2 Introduction to Microwave and its Applications 1.3 Microwave region and Band designation	02	04
2.	**Wave Guides**		
	2.1Introduction to TEM/TE/TM/HE wave destination. 2.2Comparison of wave guide with two wire transmission line. 2.3 Propagation of waves in rectangular wave guide and circular wave guide. (Introduction to wave guide only) 2.4TE & TM Modes in rectangle wave guide with field pattern. Concept of dominant mode. 2.5 Definition and interpretation of cut off frequency of a waveguide, guide wave length, phase velocity, group velocity(Simple Numerical) 2.6 Cavity Resonators	08	14
3.	**Microwave Components**		
	3.1 Construction, Working principle & application of H-plane Tee,E-Plane Tee, E-H Plane TEE, wave guide Twists, wave guide bends and corners, 3.2 Fixed and variable attenuator, detector mount, matched termination 3.3 Multihole directional coupler, circulator, Isolator. 3.4 Mixer, switches and its types 3.5 Waveguide coupling & its types: slot, rotating.	08	14
4.	**Microwave Tubes**		
	construction & working principle of : 4.1 Microwave triodes and UHF triodes. 4.2 Multicavity Klystron Amplifier 4.3 Reflex Klystron. 4.4 TWT. 4.5 Magnetron.	10	16
5.	**Semiconductor Microwave Devices & Circuits**		
	5.1 Transistors & ICs. 5.2 Varactor & step recovery diodes. 5.3 Frequency multipliers. 5.4 Tunnel diodes.	10	16

	5.5 Negative resistance amplifiers. 5.6 Gunn effect & Diodes. 5.7 PIN Diodes.		
6.	**Radar Theory**	10	16
	6.1Fundamentals: Basic concept of Radar, Block diagram of an elementary pulsed Radar, Duplexer concept. 6.2 Concept of continuous Wave Radar, Doppler effect & Speed Measurement. 6.3 Block diagram and explain the operation of MTI radar 6.4 Application of Radar		
	TOTAL	**48**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Measurement of Guide wavelength & free space wavelength.
2.	Measurement of voltage standing wave ratio (V.S.W.R.) & reflection coefficient.
3.	Study of attenuators, TEEs, matched termination
4.	Study of cross directional coupler, isolator and circulator.
5.	Characteristics of Gunn Oscillator.
6.	Measurement of Microwave frequency.
7.	To plot V-I characteristics of varactor diode.
8.	To plot V-I characteristics of Gunn diode.
9.	To plot V-I characteristics of tunnel diode.
10.	To plot V-I characteristics of PIN diode.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction to Microwave	Class room teaching & Laboratory work
2.	Wave Guides	Class room teaching & Laboratory work
3.	Microwave Components	Class room teaching & Laboratory work
4.	Microwave Tubes	Class room teaching , Laboratory work , Simulation & Presentation on PC
5.	Semiconductor Microwave Devices & Circuits	Class room teaching & Laboratory work
6.	Radar Theory	Class room teaching , Simulation & Presentation on PC

Text Books:

Sr. No	Author	Title	Publication
1.	Kennedy	Principle of communication	Mcgraw Hill
2.	Gerd Keiser	Optical communication	

Reference Books:

Sr. No	Author	Title	Publication
1.	M. Kulkarni	Microwave and Radar Engg.	
2.	Roddy coolen	Electronics Communication	PHI

Learning Resources: Reference Books, Manuals and Journals of Devices, Components Brochures, Notes, Websites

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction to Microwave	02	00	02	04
2.	Wave Guides	06	04	04	14
3.	Microwave Components	07	03	04	14
4.	Microwave Tubes	08	04	04	16
5.	Semiconductor Microwave Devices & Circuits	08	03	05	16
6.	Radar Theory	06	04	06	16
Total		**37**	**18**	**25**	**80**

Prepared By:

(N.S.Bakde.)	(S.V.Chaudhari)	(R.N.Shikari.)
Lect. In E &TC	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Optical Communication**
Course Code	**:**	**ET 484**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs.**	**3 Hrs**	**--**
Marks	**20**	**80**	**--**	**25**	**25**

Course Rationale:

This subject is introduced with view that the students are made familiar with optical devices & to gain knowledge of fiber optic Communication Systems.

Course Objectives:

After studying this course, the student will be able to

- To Understand fiber optic Technology.
- To Understand working of optical fiber.
- To Understand working of optical sources &detectors
- To Understand working Principle of optical Communications.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
1.	**Fiber Optic Communication**		
	1.1 Light Wave Spectrum 1.2 History of Fiber Optic. 1.3 Advantage & disadvantages of Fiber optic communication. 1.4 Application of FOC in Industrial, Defense, Commercial Field. 1.5Block Diagram of Fiber Optic Communication.	**02**	**10**
2.	**Fiber Optic Cables & Ray Theory**		
	2.1 Basic Optical Laws & Definition: Reflection, Refraction, Refractive index, Snell"s law, Numerical aperture, acceptance angle, acceptance cone, critical angle 2.2 Construction of Fiber Optic Cable. 2.3 Single mode, multimode, step index and graded index fiber. 2.4 Fiber materials	**08**	**14**
3.	**Losses in Optical Fiber**		
	3.1 Attenuation and absorption 3.2 Absorption loss, scattering loss 3.3 Bending loss- Micro bending and macro bending 3.4 core and cladding losses. 3.5 Dispersion-Material, chromatic and waveguide dispersion, Intramodal and Intermodal dispersion 3.6 Block diagram & working of OTDR.	**08**	**14**
4.	**Splices and connectors**		
	4.1 Fiber material. 4.2 Fiber alignment and joint losses 4.3 Splicing techniques 4.4 Connectors. 4.5 Couplers.	**10**	**14**
5.	**Optical Sources & Optical Detector.**		
	5.1 LED:-surface emitting & edge emitting LED – Construction, working principle, characteristics 5.2 Laser:-fabry-perot resonator cavity, Structure & Characteristics of laser diode. 5.3 Photo detectors- Principle of photo detectors, types of Photo detectors -PIN, APD & their characteristics.	**12**	**16**
6.	**Fiber Optics Communication System.**		
	6.1 Basic system components. 6.2 Power launching and coupling. 6.3 Optical analog communication system - basic block diagram. 6.4 Optical digital communication systems - basic block diagram. 6.5 Repeaters 6.6 Time and power budget. 6.7 Long haul communication.	**08**	**12**

	6.8 WDM.		
	TOTAL	**48**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Setting of fiber optic analog links
2.	Setting of fiber optic digital links.
3.	Measurement of bending losses
4.	Measurement of propagation losses
5.	Measurement of NA
6.	Measurement of optical power using optical power meter.
7.	To study different types of Fibers
8.	To study different type of components
9.	Verify the characteristics of LED.
10.	Verify the characteristics of Photo Diode.
11.	Attenuation measurement in given FOC.
12.	Visit Industry to see Use of OTDR (Demonstration)
13.	Visit Industry to see Use of Splicing Technique (Demonstration)

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Fiber Optic Communication	Class room teaching & Laboratory work
2.	Fiber Optic Cables & Ray Theory	Class room teaching & Laboratory work
3.	Losses in Optical Fiber	Class room teaching & Laboratory work
4.	Splices and connectors	Class room teaching , Laboratory work , Simulation & Presentation on PC
5.	Optical Sources & Optical Detector.	Class room teaching & Laboratory work
6.	Fiber Optics Communication System.	Class room teaching , Simulation & Presentation on PC

GOVERNMENT POLYTECHNIC PUNE
AUTONOMOUS INSTITUTE
TECHNICAL EDUCATION FOR SELF RELIANCE

Text Books:

Sr. No	Author	Title	Publication
1.	Keiser	Optical Fiber Communication	Tata McGraw-Hill International
2.	John Senior	Optical Fiber Communication	Prentice Hall of India
3.	A. Selverajan	Optical Fiber Communication	Tata McGraw-Hill
4.	Kennedy	Principle of communication	Mcgraw Hill

Reference Books:

Sr. No	Author	Title	Publication
1.	Sinior	Optical fiber Communication	PHI
2.	Roddy coolen	Electronics Communication	PHI

Learning Resources: Reference Books, Manuals and Journals of Devices, Components Brochures, Notes, Websites

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Fiber Optic Communication	06	02	02	10
2.	Fiber Optic Cables & Ray Theory	08	03	03	14
3.	Losses in Optical Fiber	08	03	03	14
4.	Splices and connectors	07	03	04	14
5.	Optical Sources & Optical Detector.	08	02	06	16
6.	Fiber Optics Communication System.	06	02	04	12
Total		**43**	**15**	**22**	**80**

Prepared By :

(N.S.Bakde)	(S.V.Chaudhari)	(R.N.Shikari.)
Lect. In E &TC	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Digital Communication**
Course Code	**:**	**ET485**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs.**	**--**	**--**
Marks	**20**	**80**	**50**	**--**	**--**

Course Rationale:

Knowledge of Data communication is of prime importance, now a days. Digital communication has flexibility in Data Transmission. This is a core technology subject which will enable student to comprehend facts, concepts & working principle of digital communication system. This subject familiarizes the student with information theory, measurement of information rate &capacity. This subject helps the student to understand the concept of various pulse modulations, Digital modulation techniques, coding methods and error control, multiplexing & multiple access techniques and S.S. modulation. The knowledge acquired by students will help them to apply it in various modern communication systems.

Course Objectives:

After studying this course, the student will be able to

- To Compare analog communication system & digital communication system.
- To Understand sampling theorem.
- To Understand & Compare PAM, PWM, PCM.
- To Study the block diagram of PCM, DM, ADM, and DPCM.
- To Study block of PSK transmitter & receiver. Compare ASK, FSK, PSK.
- To Study block diagram for QFSK, QAM DP
- To Study various types of coding methods, error detection and correction.
- To Study concept of TDMA, FDMA, and CDMA.
- Define PN sequence.
- Explain spread spectrum modulation.
- Compare Direct sequence & & frequency spread spectrum signal.

Course Content:

Chapter .No.	Name of Topic/Sub topic	Hrs	Marks
	SECTION – I		
1.	**Introduction of Digital Communication**		
	Basic digital communication system, block diagram, Channel capacity-definition, Hartley's law, Shannon-Hartley theorem, Channel capacity equation, channel noise and its effect, entropy, Advantages and disadvantages of digital communication.	**04**	**08**
2.	**Pulse Communication**		
	Introduction, comparison with Continuous Wave Modulation, Advantages, Sampling theorem, Nyquist rate, aliasing, natural & flat top sampling, PAM, PWM, PPM definition, generation, block diagram, waveform analysis, and their comparison, Pulse code modulation- block diagram of PCM transmitter & receiver, sampling quantization, quantization error, compading, inter symbol interference, Delta modulation- block diagram of DM, slope overload, granular noise, ADM, DPCM, block diagram and its working.	**13**	**16**
3.	**Digital Modulation Techniques**		
	ASK, FSK, PSK definition & waveforms, their transmitter and receiver block diagram and working, M-Ary encoding, QPSK, QAM, DPSK block diagram of transmitter and receiver and working, Bandwidth for each modulation technique and their comparison.	**13**	**16**
	SECTION – II		
4.	**Coding Methods and Error Control**		
	Baud rate, Bit rate, Line coding – unipolar, bipolar – NRZ, RZ, Manchester, Source coding, ASCII, EBCDIC and baudot code, Channel coding, Error, Causes of error and its effects, error detection & correction using parity, Hamming code & simple numerical.	**06**	**12**
5.	**Multiplexing and Multiple Access**		
	Need of Multiplexing, TDM, FDM definition block diagram and their comparison, Introduction to WDM. Access technique TDMA, FDMA, CDMA (only concepts), advantages of TDMA over FDMA.	**06**	**12**
6.	**Spread Spectrum Modulation (Only Descriptive Treatment)**		
	Introduction, PN Sequence, Model of spread spectrum modulation system, Direct sequence spread spectrum signal, Frequency hop spread spectrum, slow frequency hopping, and fast frequency hopping, Application S. S. modulations.	**06**	**16**
	TOTAL	**48**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Observe waveforms of Pulse Amplitude modulation (using natural sampling & flat top sampling).
2.	Observe waveforms of Pulse Position modulation (using natural sampling.
3.	Observe waveforms of Pulse code modulation and demodulation.
4.	Observe waveforms of Delta modulation.
5.	Observe waveforms of Adaptive delta Modulation.
6.	Observe waveforms of ASK modulation & demodulation.
7.	Observe waveforms of FSK modulation & demodulation.
8.	Observe waveforms of PSK modulation & demodulation.
9.	Observe waveforms of QPSK modulation & demodulation.
10.	Observe waveforms of QAM modulation & demodulation.
11.	Error detection & correction using parity bits.
12.	Time division multiplexing/ de multiplexing system.
13.	Frequency division multiplexing/ de multiplexing system.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction of Digital Communication	Classroom Teaching.
2.	Pulse Communication	Classroom Teaching & Laboratory Work.
3.	Digital Modulation Techniques	Classroom Teaching & Laboratory Work.
4.	Coding methods and Error control	Classroom Teaching & Laboratory Work.
5.	Multiplexing and Multiple Access	Classroom Teaching & Laboratory Work.
6.	Spread spectrum modulation (Only Descriptive treatment)	Classroom Teaching.

Text Books:

Sr. No	Title	Author	Publication
1.	Digital Communication	Siman Haykin	John wiley & sons
2.	Communication System	Roddy Collen	Prentice Hall of India
3.	Digital Communication	Amitabha Bhattacharya	Tata McGraw Hill

Reference Books:

Sr. No	Author	Title	Publication
1.	Roddy coolen	Electronics Communication	PHI

Learning Resources : Reference Manuals, Text Books, Reference Books, O.H.P. Transparencies L.C.D. Projector, Computer aided Instructional packages, Simulation of signals using simulation soft-wares, Reference Books, Manuals and Journals of Devices, Components Brochures, Notes, Website.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction of Digital Communication	4	2	2	08
2.	Pulse Communication	6	4	6	16
3.	Digital Modulation Techniques	6	4	6	16
4.	Coding methods and Error control	8	2	2	12
5.	Multiplexing and Multiple Access	6	3	3	12
6.	Spread spectrum modulation (Only Descriptive treatment)	8	4	4	16
Total		**38**	**19**	**16**	**80**

Prepared By :

(P.B.Dighule.)	(S.V.Chaudhari.)	(R.N.Shikari.)
Lect. In E &TC	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Instrumentation & Control**
Course Code	**:**	**ET 486**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs**	**--**	**--**
Marks	**20**	**80**	**--**	**25**	**25**

Course Rationale:

The advancement of both knowledge and technique has resulted in the development of controls in process industry. The progression of human existence from a primitive state to the present complex technological world was paced by learning new and improved methods to control the environment.
Control means methods to force parameters in the environment to have specific values. Varying the room temperature OR guiding a space craft to Saturn necessities to examine elements of control system.
Nature of controller action for systems with operation and variables is highlighted for continuous values. This subject is beneficial for process control variation in any process control industry which equips the student for maintenance and quality analysis.

Course Objectives:

After studying this course, the student will be able to

- Learn and understand about open loop and closed loop systems.
- Feedback control and transfer function.
- Steady state, time response, and frequency response analysis.
- Study of stability
- Control actions of electronic controllers.
- Servo system and its application.

Course Content:

Chap No	Name of Topic/Sub topic	Hrs	Marks
	SECTION – I		
1.	**Introduction**		
	1.1 Block diagram of general instrumentation system.	**02**	**4**
2.	**Transducers**		
	2.1 Electrical Transducers, Selecting a transducers	**12**	**20**
	2.2 Resistive Transducers & Resistive position Transducers Strain gauges, Resistance Thermometer, Thermister		
	2.3 Inductive Transducers, Differential output Transducers, Linear Variable Differential Transducer (LVDT)		
	2.4 Pressure Inductive Transducer		
	2.5 Capacitive Transducer		
	2.6 Piezo Electrical Transducer, Photo electric transducer, Photo voltaic cell, Semiconductor Photo Diode, Photo - Transistor		
3	**Signal Conditioning & Data Acquisition System**		
	3.1 Introduction	**10**	**16**
	3.2 Operational Amplifier		
	3.3 Basic Instrumentation Amplifier		
	3.4 Application of Instrumentation Amplifier(Specific Bridges)		
	3.5 Introduction, Objectives of DAS		
	3.6 Signal conditioning of the inputs		
	3.7 Single Channel, DAS, Multi channel DAS Computer Based DAS		
	3.8 Digital to Analog(D/A) and Analog to Digital (A/D) Converters		
	3.9 Digital Transducers		

SECTION-II

1.	**Overview of Control System**		
	1.1 System- definition & practical example. Control system – definition and practical example. Open loop & closed loop systems – definition, block diagram, practical example, and Comparison	**08**	**10**
	1.2 Laplace transform – Significance in control system, developing differential equations of R-C and R-L-C electric circuits.		
	1.3 Transfer function – definition, derivation of transfer function for close loop control system.		

	1.4 Order of a system – definition, 0, 1, 2 order system standard equation, practical examples.		
	1.5 Block diagram representation of a system- need, reduction rules, problems.		
2.	**Dynamic Analysis of a System**		
	2.1 Dynamic analysis of measurement systems- definition, time domain and frequency domain analysis.		**8**
	2.2 Time domain analysis – Transient and steady state response, steady state error.		
	2.3 Standard test inputs - step, ramp, parabolic& impulse. Need of them, significance, and corresponding Laplace representation		
	2.4 Poles & zeros – definition.		
	2.5 Time response specifications (no derivations) ; problems on time response specifications		
3.	**Stability & Introduction to servo system**		
	3.1 S-plane – Introduction	**08**	**14**
	3.2 Stability - stable, unstable, critically stable & conditionally stable system; relative stability; Root locations in S-plane for stable and unstable systems		
	3.3 Routh's stability criterion-different cases & conditions (statement method); problems (Time response analysis)		
	3.4 Introduction, advantages & disadvantages of frequency response analysis; frequency response specifications		
	3.5 Servo system –definition, block diagram,		
	3.6 AC & DC servo systems- comparison, practical example, schematic diagram , concept and principle		
4.	**Control actions & process controllers**		
	4.1 Process control system – block diagram , elements	**08**	**8**
	4.2 Control actions: discontinuous & continuous modes;		
	4.3 On off controllers: neutral zone Proportional controllers (offset, proportional band) Integral & derivative controllers;		
	4.4 Composite controllers; PI, PD, PID controllers		
	4.5 Control actions of electronic controllers with circuits & equations (with op amp)		
	Total	**48**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1	Resistive Transducers
2	Capacitive Transducer
3	Inductive Transducers
4	DC position control system
5	DC servo motor
6	Characteristics of potentiometer as error detector
7	Signal conditioning
8	Instrumentation Amplifier
9	Proportional mode controller using op-amp
10	Integral controller using op-amp
11	Derivative controller using op-amp
12	PID controller using op-amp

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Overview of Control system	Class room teaching & Laboratory work
2.	Transducers	Class room teaching & Laboratory work
3.	Stability & frequency response analysis	Class room teaching & Laboratory work
4.	Overview of Control System	Class room teaching & field visit
5.	Stability & Introduction to servo system	Class room teaching & Laboratory work
6.	Dynamic Analysis of a System	Class room teaching & field visit
7.	Control actions & process controllers	Class room teaching & field visit

Text Books:

Sr. No	Author	Title	Publication
1.	M. Gopal	Digital Control System	Tata McGraw-Hill
2.	J.J.Nagrath & M. Gopal	Control system engg	
3.	M.Gopal	Control System	Tata McGraw-Hill
4.	K. Ogata	Modern control engg	
5.	Kumar	Control systems	Tata McGraw-Hill
6.	C. D. Johnson	Process control instrumentation Technology	

Prepared By :

(N.L.Jamrao.) (G.N.Hainalkar,)	S.V.Chaudhari.	R.N.Shikari.
Lect. In E &TC	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Computer Networks**
Course Code	**:**	**ET 487**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	--	--	--
Marks	**20**	**80**	--	--	**25**

Course Rationale:

There is revolution in computer Network field with new technologies coming in. This Course introduces concepts, topologies, protocols and components of Computer Network systems

Course Objectives:

After studying this course, the student will be able to

- Understand physical topology and interfacing concepts of Network.
- Classify Networks in different ways.
- Understand OSI & TCP/IP reference model.
- Understand Network Components.
- Brows & Operate Internet.
- Familiarize with Network Administration and utilities.
- Hands on experience with Network commands.

Course Content:

Chap No.	Name of Topic/Sub topic		Hrs	Marks
1.	**Introduction**			
	Uses of computer Networks		12	16
	1.1	Network Hardware Transmission Technology- Broadcast link and Point to point link,		
	1.2	Types of communication-simplex,half duplex ,full duplex		
	1.3	Types of network topology-Bus,Star,Mesh,Ring,Tree		
	1.4	Introduction to LAN,MAN,WAN		
	1.5	Design Issues, interfaces & services.		
	1.6	Connection Oriented & Connectionless services.		
	1.7	Reference Models - OSI & TCP/IP, their comparison.		
	The Physical Layer			
	1.8	Transmission Media – Guided and Wireless transmission		
	1.9	Physical layer design issues		
2.	**The Data Link Layer**			
	2.1	Data Link Layer Design issues.	10	12
	2.2	Classification of Error Detection & Correction(only)		
	2.3	Automatic Repeat Request. - Stop and Wait ARQ.		
	2.4	Sliding Window Protocols. - 1 bit sliding window protocol.		
	2.5	Go Back N ARQ.		
	2.6	Selective Repeat ARQ.		
	2.7	Introduction & Frames format of Point -To-Point protocol.		
3.	**Medium Access Sub layer**			
	3.1	Channel Allocation Problem - Static & Dynamic.	10	12
	3.2	Multiple Accesses protocols – Pure ALOHA and slotted ALOHA, CSMA-CSMA/CA AND CSMA/CD.		
	3.3	Classification of Collision Free Protocols.		
	3.4	Introduction of hardware component Hub, switch, bridges, router, gateway.		
4.	**The Network Layer**			
	4.1	Network layer Design issues.	10	12
	4.2	Circuit Switching, Packet Switching.		
	4.3	Routing Algorithms-Dijkstra's algorithm,Distance vector routing algorithm.		
	4.4	The network layer in the internet - the IP protocol,		
	4.5	IP addresses subnets,IPv4		
	4.6	Address Resolution Protocol.		
	4.7	Reverse Address Resolution Protocol.		

5	**The Transport Layer**			
	5.1	The transport service	**12**	**16**
	5.2	Elements of Transport Protocols		
	5.3	The internet transport protocol		
	5.4	TCP Service model.		
	5.5	TCP Segment Header.		
	5.6	TCPConnection-Connection Establishment, Termination & Release.		
	5.7	User Datagram Protocol (UDP)		
	5.8	Port Number, User Datagram format		
6.	**The Application Layer**			
	6.1	Client -Server model.	**10**	**12**
	6.2	Socket Interface.		
	6.3	Domain name system. (DNS)		
	6.4	Electronic mail (SMPT) and File Transfer. (FTP)		
	6.5	HTTP and World Wide Web.		
	6.6	Network Security-Cryptography.		
	6.7	Symmetric-Key Cryptography.		
	6.8	Public-key Cryptography.		
		TOTAL	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Installation of Windows XP and Networking operating system
2.	Study of component required for LAN networking.
3.	Preparation of patch cords & cross connection cable required for LAN.
3.	Installation of shared devices. (for e.g. printer)
5.	Implementation of LAN using star topology and connectivity between two computers using cross over UTP CAT5 cable.
6.	Installation and configuration of Web Server
7.	Installation and configuration of Network Application FTP.
8.	Installation and configuration of Network Application Telnet.
9.	Installation of network browser for dialup connecting to network.
10.	Visit to any two Industries to observe Network

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction & Physical layer	Explanation & demonstration of N/W Components, card, cables.
2.	The Data Link Layer	Explanation.
3.	Medium Access Sub layer	Explanation & demonstration of N/W connection technologies.
4.	The Network Layer	Explanation & demonstration IP address
5.	The Transport Layer	Explanation & Demonstration Port number & TCP
6.	The Application Layer	Explanation & hands on experience DNS,FTP,,SMPT,HTTP ,Network security services

Text Books:

Sr. No	Title	Author	Publication
1.	Computer Networks	Andrew S. Tanenbaum.	Pearson Education.
2.	Data Communication & Networking	Behrouz A. Forouzan.	Tata McGraw-Hill.

Reference Books:

Sr. No	Title	Author	Publication
1.	Data & Computer Communications	William Stallings.	Printice-Hall India
2.	Computer Networks and Internetworking	D. E. Comer	Pearson Education.

Learning Resources :

OHP, LCD, Projector, and Transparencies, White board, computers, websites,
Magazines : Electronics for You, Network Security, DIGIT.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction & Physical layer	06	04	06	16
2.	The Data Link Layer	04	04	04	12
3.	Medium Access Sub layer	04	04	04	12
4.	The Network Layer	04	04	04	12
5.	The Transport Layer	06	04	06	16
6.	The Application Layer	04	04	04	12
	Total	28	24	28	80

Prepared By :

(M.B.Hande)	(S.V.Chaudhari)	(R.N.Shikari)
Lect. In E &TC	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08//16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Peripheral Interface Controller**
Course Code	**:**	**ET 488**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs.**	**3 Hrs. For batch of 20 students**	**--**
Marks	**20**	**80**	**50**	**--**	**--**

Course Rationale:

Microcontroller is heart of all domestic, industrial, consumer goods and other high end products. Automation in every field of life is being used and microcontroller is inbuilt element of these systems and devices. Microcontroller is in built element of an embedded system. This subject mainly focuses to understand design of RISC microcontroller systems. PIC is the most popular controller in industries. Students will be able to develop PIC microcontroller based systems for different applications using different I/O devices and also will study different communication protocols .

Course Objectives:

After studying this course, the student will be able to

- Have basic knowledge of PIC 18 microcontroller.
- Develop logic for programs in assembly language for PIC 18.
- Interface peripherals to microcontroller to PIC 18
- Knowledge of developing microcontroller based systems.
- Knowledge of communication protocols

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
	SECTION-I		
1.	**Introduction PIC 18 Microcontroller**		
	1.1 Introduction to Microcontroller ➢ Types of architectures - Harvard and Von-neuman - RISC and CISC ➢ Concept of pipelining. 1.2 PIC 18 Microcontroller ➢ Features, Architecture (description of each on chip peripheral) Pin description (PIC18F452) ➢ RISC features of PIC 18 ➢ Oscillator configuration ➢ RESET options. ➢ Memory organisation- Program Memory,Flash Program Memory , Data Memory organisation, Data EEPROM	**12**	**12**
2.	**PIC 18 Instruction set and Programming**		
	2.1 Addressing modes and instruction set ➢ Assembler directive- ORG, DB, EQU, END, LIST,SET 2.2 Instruction Set ➢ Data moving instructions, logical &arithmetic Instructions, branching, call , Time delay, bank switching, table processing instructions, subroutines, Bit related instructions. 2.3 Assembly language programming	**10**	**12**
3.	**PIC 18 on-Chip Peripheral**		
	Understanding on chip peripherals with their internal blocks ,special function registers and programming techniques 3.1 Input- Output ports 3.2 Timer module. 3.3 Serial Port(UART) module.(RS232 PORT) 3.4 Interrupts module. 3.5 ADC module. 3.6 CCP module.	**12**	**16**
	SECTION-II		
4.	**External Interfaces** Interfacing and programming of external interfaces. 4.1 Interfacing of LED and switches 4.2 LCD Display , 4.3 Keyboard , 4.4 DAC 4.5 sensor interfacing(temperature ,humidity)	**12**	**16**

	4.6 Relays and opto isolators interfacing 4.7 Stepper Motor 4.8 DC.Motor 4.9 RTC Interfacing		
5.	**Communication Protocols**		
	Study of communication of protocols with their features , OSI layer diagram and working : 5.1 I2C 5.2 USB 5.3 SPI 5.4 BLUETOOTH 5.5 ZIGBEE 5.6 CAN	**10**	**12**
6.	**Integrated Development Environment (IDE) for Microcontrollers.**		
	6.1 Software development cycle- Editor, Assembler, cross compiler, linker, locater, compiler. 6.2 MPLAB IDE for PIC micro controllers . 6.3 Study of programming using assembly language and "C" Cross compiler, 6.4 Programming tools such as simulator, assembler,"C"cross compiler, emulator and debugger. 6.5 Illustrative applications and programming techniques 6.6 Tutorial programs either in C **OR** assembly language should include programming using: Arithmetic instructions, Jump, Loop and Call instructions, I/O programming, Logic instructions, Single bit instructions, Timer/Counter Programming,UART programming, Interrupt Programming 6.7 Analysis of reference design : ➢ Application examples: Fully Automatic Washing Machine, Elevator , Microwave Oven ➢ Reference circuit schematic with specification application and firmware analysis can be done.	**10**	**12**
	TOTAL	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Identification & observation of PIC 18 system board on the kit.
2.	Introduction of MPLAB IDE software .
3.	Assembly language **or** C programs which cover data moving instruction ,block transfer by indirect addressing Arithmetic instructions, Jump, Loop and Call instructions, I/O programming, Logic instructions, Single bit instructions, Timer/Counter Programming, UART programming, Interrupt Programming (Any 15) can be performed using simulator.
4.	Generate square wave and rectangular wave on port pin with a program
5.	External interfacing of leds with PIC 18
6.	External interfacing of switches with PIC 18
7.	External interfacing of LCD with PIC 18
8.	External interfacing of relay with PIC 18
9.	Sensor Interfacing with on chip ADC of PIC 18
10.	External interfacing of stepper motor with 8051
11.	External interfacing of D.C. motor with 8051

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction to PIC 18 Microcontrollers	Class room teaching & Laboratory work
2.	PIC 18 Instruction set and Programming	Class room teaching & Laboratory work
3.	PIC 18 on-Chip Peripheral	Class room teaching & Laboratory work
4.	External Interfaces	Class room teaching & Laboratory work
5.	Communication Protocols	Classroom Teaching
6.	Integrated Development Environment (IDE) for Microcontrollers.	Classroom Teaching & Lab. Work

Text Books:

Sr. No	Author	Title	Publication
1.	Mohmad-ali-mazidi, Roline D. Mckinlay	PIC microcontroller and Embedded Systems	Pearson
2.	MICROCHIP PIC 18 DATASHHET	---	www.microchip.com

Reference Books:

Sr. No	Author	Title	Publication
1.	Han-Way Huang	PIC microcontroller: an introduction to software and hardware interfacing	Cengage Learning, 2005
2.	Micheal Predko	Programming and Customizing the PIC Microcontroller	McGraw-Hill
3.	Tim Wilmshurst	Designing Embedded systems with PIC microcontroller: Principles and Applications	Newnes

Learning Resources:
Reference Books, Journals, Data Manuals, and URL's.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
	Section I				
1.	Introduction to PIC 18 Microcontrollers	8	4	--	12
2.	PIC 18 Instruction set and Programming	4	4	4	12
3.	PIC 18 on-Chip Peripheral	4	4	8	16
	Section II				
4.	External Interfaces	4	4	8	16
5.	Communication Protocols	8	4	--	12
6.	Integrated Development Environment (IDE) for Microcontrollers.	2	-	10	12
	Total	**30**	**20**	**30**	**80**

Prepared By :

(P.M.Zilpe.)	(S.V.Chaudhari.)	(R.N.Shikari.)
Lect. In E &TC	**Member Secretary, PBOS**	**Chairman, PBOS**

Name of programme	**:**	**CE/ EE/ET/ME/MT/CM/IT/DDGM**
Programme Code	:	**01/02/03/04/05/08//16/17/18/19/21/22/23/24/15**
Name of course	:	**Environmental Science**
Course code	:	**AU481**

Teaching Scheme:

	Hours/Week	**Total Hours**
Theory	--	--
Term work / Practical	2	32

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term Work**
Duration	--	--	--	--	--
Marks	--	--	--	--	**50**

Course Content :

Sr. No	**Topic/Subtopic**	**Hours**	**Marks**
1.	**Introduction** 1.1 Need of the study of environmental science, definition scope and importance of environmental studies. 1.2 Environment & its component need of public awareness, effect of human activities on technological environment. 1.3 Depleting Nature of environmental sources such as soil, water, minerals & forests. Need of conserving natural resources preserving the environment.	04	
2.	**Sustainable Development:** 2.1 Concept of sustainable development. 2.2 Social, Economical & Environmental aspect of sustainable development. 2.3 Control measure: 3 R (Reuse, Recovery, and Recycle). Appropriate Technology, Environmental education.	04	

3	**Environmental Pollution:** 3.1 Introduction. 3.2 Water Pollution: Sources of water pollution- Sewage, Industrial waste, Agriculture chemicals, Thermal & radioactive waste, Heavy metals. Effects of water pollution. Control of water pollution. 3. 3 Air pollution: Introduction, sources of air pollution, types of air pollution, effects of air pollution, control measures of air pollution. 3.4 Concept of Global Warming, Ozone Layer Depletion, Acid rain, Greenhouse effects. 3.5 Noise Pollution: Definition, Classification of noise pollution, effects of noise pollution, control of noise pollution. 3.6 Land Pollution: Causes, effects and remedies. 3.7 E-Pollution: Definition, Causes and effects and remedies measures. 3.8 Introduction to solid waste management. 3.9 Water Conversation: Rainwater harvesting, Watershed Management	16	
4	**Renewable sources of Energy:** Biomass, Biogas, Solar Energy, Nuclear Power, Hydropower, Wind Energy, Ocean (Tidal Energy), Geothermal Energy.	04	
5	**Environmental Legislation:** 5.1 Introduction 5.2 Ministry of Environment and Forest. (MOEF) Organizational Structure of MOEF. 5.3. Functions & Powers of Control Pollution Control Board. 5.4 Functions & Powers of State Pollution Control Board. 5.5 Environment Protection Act.	04	

Assignments:

1. Study of air quality of Pune city.
2. Study of noise pollution in Pune city.
3. Study of solid waste management of Pune city.
4. Study of E-waste management of Pune city.

5. Study of Environmental Status Report of Pune city prepared by Pune Municipal Corporation.

Text Books:

Sr. No	Author	Title	Publication
1	S.P. Nisture, D. A. Joshi, G.S.Chhawsaria	Basic Civil and Environmental Engineering	Pearson
2	Anindita Basak, D.L. Manjunath	Basics of Environmental Studies	Pearson
3	L.D. Danny Harvey	Global Warming The Hard Science	Pearson
4	Benny Joseph	Environmental Studies	TataMcGraw Hill
5	Godfrey Boyle	Renewable Energy	Oxford Publications
6	R. Rajagopalan	Environmental studies	Oxford University Press

Websites:

1. **http://www.mpcb.gov.in/**
2. **http://www.cpcb.nic.in/**
3. **http://www.envfor.nic.in/**
4. **http://www.neeri.res.in/**

Prepared by :

(R.M.Aghav) **(V.M. Kolhe)** **(D.K. Fad)**	**(S. V. Chaudhari)**	**(R.N.Shikari)**
Lect. in CE	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in CE**/EE/ ET/ ME/MT/ CM/ IT
Programme Code	**:**	**01**/02/03/04/05/06/07/**15**/16/17/18/19/**21**/24/26
Name of Course	**:**	**Community Development**
Course Code	**:**	**AU482**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**02**	**32**
Practical		

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests of 60 min Duration**	**3 Hrs**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

The course has been introduced to make young Engineers especially aware of the present status of Villages &to motivate them to make improvement in villages when they start their Engineering carrier.

Course Objectives:

After studying this course, the student will be able to

•	Able to understand present situation in villages and realize the gravity of the village development.
•	Able to make survey of villages, collect the data, analyze it and identify the area of development.
•	Able to identify the available natural resources and how they can be utilized for betterment of villages.
•	Able to collect the useful information for starting probable new industries in villages.
•	Able to guide villagers in building low cost durable houses taking in to considerations weather conditions of that area.
•	Able to guide villagers for development good habits regarding health and hygiene.
•	Motivated to bring about all round development of villages.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Marks
1.	**Introduction**			
	1.1	Present status of rural and urban community.	**02**	**04**
	1.2	Necessity of community development.		
	1.3	Identifying needs of community, Ways to develop community.		
2.	**Human Power Development**			
	2.1	Present scenario of Human power in India,	**04**	**08**
	2.2	Socioeconomic survey to ascertain requirement of human requirements.		
	2.3	Methodology for training the human power		
	2.4	Wage employment and self employment,		
	2.5	Support from financial institutions for self employment.		
3.	**Appropriate Technology and Technology Transfer**			
	3.1	Technological development of India, Additional needs of community due to technology development,	**04**	**12**
	3.2	Classification of rural industries,		
	3.3	Areas of appropriate technology,		
	3.4	Use of locally available materials,		
	3.5	Methods of transfer of technology, Project reports preparation.		
4.	**Industrialization**			
	4.1	Present status of rural traditional industries,	**04**	**12**
	4.2	Renewal of old industries in villages- Manufacturing new commodities such as plastic utensils, nylon ropes, ceramics Repairing – agricultural implements, tractors, automobiles, electrical or diesel pump sets, domestic appliances Food processing – Papad, jam, jelly, pickles, preservation, spices, syrups, ketchups Utilization of waste product – Gobar gas, fuel cake, Construction – Brick clamp, stone quarry, sand supply, and crusher. Miscellaneous – Handlooms, power looms, Ginning mills, Jaggery making Service Industry –House keeping Public facility centre (suvidha Kendra-setu) Net café, Bachat Gat concept and working. Housing support to industrialization.		
5.	**Non Conventional Energy Sources**			
	5.1	Availability of energy sources in India,	**06**	**20**
	5.2	Needs of use of non conventional energy sources.		
	5.3	Availability of such sources in India.		

	5.4	Various types of non conventional energy sources. Solar energy – Solar water heater and solar cooker, wind energy, wind mill and wind turbines, bio-gas-generation.		
6.	**Community Services**			
	6.1	Health and Hygiene awareness,	**04**	**08**
	6.2	Health services,		
	6.3	Educating the community for good habits of health and hygiene, Potable drinking water, purifying well water, low cost latrines, drainage system and soak pits Tree plantation programmes, roads and communications.		
7.	**Waste Management**			
	7.1	Generation of waste, causes	**04**	**08**
	7.2	Types of waste – domestic, commercial, industrial, E-waste, hazardous waste.		
	7.3	Waste separation of domestic waste e.g. wet, dry, reusable, recyclable,		
	7.4	Waste disposal – methods, treatments, etc.		
	7.5	Reduce, Reuse, and Recycle, 3Rs in Waste Management.		
8.	**Developments**			
	8.1	Programmes for all round development of	**04**	**08**
	8.2	Community, Various government schemes, IRDP – Integrated Rural Development Programme.		
	8.3	Active participation of community in development programmes		
	8.4	Motivation for participation.		
		Total	**32**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Class rooms teaching
2.	Man power developments	Class rooms teaching, data collection
3.	Appropriate technology & technology transfer	Class rooms teaching
4.	Industrialization	Class rooms teaching
5.	Non-conventional energy sources	Class rooms teaching
6.	Community services	Class rooms teaching
7.	Waste Management	Class rooms teaching
8.	Developments	Class rooms teaching

GOVERNMENT POLYTECHNIC PUNE
AUTONOMOUS INSTITUTE
TECHNICAL EDUCATION FOR SELF RELIANCE

Text Books:

Sr. No	Author	Title	Publication
1.	Katav Sing	Rural Development Principles, Policies and management.	---
2.	S.P. Sukhatme	Solar Energy	---
3.	G.P. Rai	Non-Conventional Sources of Energy	---
4.	Debendra K. Das	Dynamics of rural development, perspectives	Deep & Deep Publications Delhi

Reference Books:

Sr. No	Author	Title	Publication
1.	T.T.T.I. Madras	Environmental Engg.	Tata McGraw Hill Publishing Co. Ltd. New Delhi.

Learning Resources: Internet, Daily News paper

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction	04	--	--	04
2.	Man-power development	04	04	--	08
3.	Appropriate technology & its transfer	04	04	04	12
4.	Industrialization	04	04	04	12
5.	Non-conventional Energy Sources	08	06	06	20
6.	Community Services	04	04	--	08
7.	Waste Management	--	04	04	08
8.	Developments	04	04	--	08
	Total	**32**	**30**	**18**	**80**

Prepared By :

(J. N Thorat-Shingte)	(S. V. Chaudhari)	(R.N.Shikari)
Lect. in CE	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in CE/EE/ET/ME/MT/CM/IT**
Programme Code	**:**	**01/02/03/04/05/06/07/15/16/17/18/19/24**
Name of Course	**:**	**Renewable & Sustainable Energy Management**
Course Code	**:**	**AU483**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	**02**	**32**
Practical	**--**	**--**

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	**Two class tests each of 60 minutes**	**3 Hrs**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

Energy is an important aspect in all sectors of country's economy. The energy crisis is mainly caused due to increased population and enhanced standard of living and life style of people. The conventional sources of energy are insufficient to meet these demands. Hence alternative energy sources are utilized for power production. The use of alternative energy source is increasing day by day. Diploma Engineers are to develop, operate and maintain these systems therefore essential to know basics of energy conversion, conservation, energy audit and waste heat recovery techniques.

Course Objectives:

After studying this course, the student will be able to

•	Know the National scene of energy production, utilization, consumption and reserves.
•	Appreciate the need for non-conventional energy sources.
•	Understand relative advantages and disadvantages of various non-conventional energy sources.
•	Develop awareness for effective utilization of alternative energy sources.
•	Identify different components of solar energy and wind energy sources.
•	Identify and analyze biomass plant.
•	Identify and apply energy conservation techniques for commonly used Power absorbing and generating devices.
•	Apply principles of energy conservation and energy management techniques.

Course Content:

Chapter No.		Name of Topic/Sub topic	Hrs	Marks
1.		**Review of conventional sources of energy**		
	1.1	Types of conventional energy sources, availability and important power plants in India	**03**	**06**
	1.2	India's production and reserves for fossil fuels, waterpower, nuclear power.		
	1.3	Need for non-conventional energy sources.		
	1.4	Environmental impact of various energy sources. Green building, sustainable development. Carbon credits and its significance		
2.		**Solar Energy**		
	2.1	Principle of conversion of solar energy into heat and electricity Solar radiation. Solar radiations at earth's surface	**04**	**10**
	2.2	Solar radiation geometry- declination, hour Angle, altitude angle, incident angle, zenith angle, solar azimuth angle.		
	2.3	Solar collectors and their types ,applications, advantages and limitations		
3		**Applications of Solar energy**		
	3.1	Solar electric power generation: solar photovoltaic cell, solar cell principle and working, its applications, advantages and disadvantages.	**04**	**10**
	3.2	Solar water heating, Solar distillation, Solar cooking and furnace,		
	3.3	Solar pumping and Green house, Agriculture and industrial process heat.		
	3.4	Space heating, space cooling,		
4.		**Wind Energy**		
	4.1	Basic principles of wind energy conversion, power in wind, available wind power formulation, power coefficient, and maximum power	**05**	**16**
	4.2	Main considerations in selecting a site for wind mills, advantages and limitations of wind energy conversion		
	4.3	Classification of windmills, construction and working of horizontal And vertical axis wind mills, their comparison.		
	4.4	Main applications of wind energy for power generation and pumping.		
5.		**Energy From Biomass**		
	5.1	Common species recommended for biomass, methods for obtaining energy from biomass.	**05**	**12**
	5.2	Classification of biomass- gasified, fixed bed and fluidized		
	5.3	Application of gasifier		
	5.4	Biodiesel production and application		

	5.5	Agricultural waste as biomass, biomass digester, comparison of biomass with conventional fuels.		
6.		**Geothermal Energy and Tidal Energy**		
	6.1	Availability, forms of geothermal energy- Dry steam, wet steam, hot dry rock, magnetic chamber system	**06**	**16**
	6.2	Different power plants available.		
	6.3	Tidal power, factors for selection of tidal power plant		
	6.4	Classification-Single basin, double basin type		
	6.5	Tidal power plants in world, ocean thermal plants.		
7		**Energy Conservation and management**		
	7.1	Energy conservation, Concept of energy management, need and importance of energy conservation	**05**	**10**
	7.2	Concept of payback period, return on investment, life cycle cost, Sankey diagrams, specific energy consumption, Distribution of energy consumption		
	7.3	Energy audit, types of audit, methods of energy conservation		
	7.4	Cogeneration and its application.		
		Total	**32**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Review of conventional sources of energy	Classroom teaching and Internet browsing
2.	Solar Energy	Classroom teaching and field visits, use of charts
3.	Wind Energy	Classroom teaching, field visit & use of charts
4.	Energy From Biomass	Classroom teaching, field visit & use of charts
5.	Geothermal Energy	Classroom teaching and Internet browsing
6.	Tidal Energy	Classroom teaching and Internet browsing
7.	Energy Conservation	Classroom teaching
8.	Energy Conservation Techniques	Classroom teaching and case study

Reference Books:

Sr. No	Author	Title	Publication
1.	Non conventional energy resources	Dr B.H.Khan	Tata McGraw Hill
2.	Non conventional energy Resources	G. D. Rai	Khanna publication
3.	Solar energy	S. P. Sukhatme	Tata McGraw Hill
4.	Solar energy	H. P. Garg	Tata McGraw Hill
5.	Power plant engineering	Arrora Domkundwar	Dhanpat Rai & co.
6.	India- The energy sector	P.H. Henderson	Oxford University Press
7.	Industrial energy conservation	D. A. Ray	Pergaman Press
8.	Non-conventional energy source	K. M. Mittal	---
9.	Energy resource management	Krupal Singh Jogi	---
10.	Website for Akshay Urja News Bulletin. (www.mnes.nic.in)	---	---

Learning Resources: Charts of solar water heater and cooker, Models of solar water heater and cooker, Photovoltaic cells etc., video cassette no.131, 365 of G.P.P. library

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Review of conventional sources of energy	06	--	--	06
2.	Solar Energy	04	06	--	10
3.	Applications of Solar energy	--	04	06	10
4.	Wind Energy	04	04	08	16
5.	Energy From Biomass	04	02	06	12
6	Geothermal Energy &Tidal Energy	06	04	06	16
7.	Energy Conservation& management	04	06	--	10
	Total	**28**	**26**	**26**	**80**

Prepared By:

(E. C. Dhembare)	(S. V. Choudhari)	(R.N.Shikari)
Prepared By	**Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in CE/EE/ET/ME/MT/CM/IT**
Programme Code	**:**	**01/02/03/04/05/06/07/15/16/17/18/19**
Name of Course	**:**	**Engineering Economics**
Course Code	**:**	**AU484**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**02**	**32**
Practical	--	--

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Three class tests of 60 min Duration**	**3 Hrs**	--	--	--
Marks	**20**	**80**	--	--	--

Course Rationale:

Diploma Engineers working in middle level management are no longer confined to the role of professional technicians. They often have to take business decisions, for which they are required to apply economic concepts, logic, tools of analysis and economic theories as they advance in their carrier. It is for this reason that diploma students are required to posses some working knowledge of economic concepts, economic policy of our country, also the effects of globalization, GATT, WTO etc.

Course Objectives:

After studying this course, the student will be able to

- Various concepts, applications, contribution of Micro Economics and macro economics to engineering business decisions.
- Consumer demand, market demand, supply and production.
- Prices and cost - Break even analysis, price decisions.
- Concept of National income.
- Inflation, Deflation and unemployment.
- Money and Banking, New economic environment.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Marks
1	**Introduction to Economics**			
	1.1	Definitions of economics, Objectives, Importance, concept of engineering economics.	**04**	**10**
	1.2	General concepts on micro & macro economics- Market economy, Command economy, Mixed economy.		
2	**Demand Analysis**			
	2.1	Utility related demand- total and marginal utility, law of diminishing marginal utility, cardinal and ordinal utility.	**07**	**20**
	2.2	Law of demand, Determinants of demand, Elasticity of demand, Factors governing the elasticity of demand.		
	2.3	Techniques and methods for forecasting of demand.		
3	**Supply, Production and Cost analysis**			
	3.1	Law of supply, Determinants of supply, Elasticity of supply and factors governing elasticity.	**06**	**14**
	3.2	Theory of production, Laws of production.		
	3.3	Cost concepts, Elements of costs, Preparation of cost sheet, Segregation of costs into fixed and variable costs. Break-even analysis-Linear approach. (Simple numerical problems to be solved)		
4	**Time value of money**			
	4.1	Simple and compound interest.	**08**	**16**
	4.2	Principle of economic equivalence. Evaluation of engineering projects, Cost-benefit analysis in public projects.		
	4.3	Depreciation- Causes of depreciation, Methods of calculating depreciation- Straight line method and declining balance method.		
5	**National Income and Inflation**			
	5.1	Concepts and measurement of national income, Gross domestic and national production (GNP, GDP).	**03**	**08**
	5.2	Inflation and deflation, measures, kinds and effects.		
	5.3	Unemployment causes, kinds, effects and remedies.		
6	**Finance, Money and Banking and New Economic Environment**			
	6.1	Financial statements i.e. Profit & Loss (Income) Statement, Balance sheet, Book – Keeping, Financial reporting.	**04**	**12**
	6.2	Money- Kinds and functions, significance.		
	6.3	Banking- Meaning and functions of commercial banks and Reserve Bank of India.		
	6.4	Liberalization- merits and demerits, GATT and W.T.O.		
		Total	**32**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Introduction to Economics	Lecture method, discussion
2	Demand Analysis	Lecture method, Assignment, surveys, case study, discussion
3	Supply Production and cost analysis	Lecture method, Assignment, surveys, case study, discussion
4	Time value of money	Lecture method, Assignment, surveys, case study, discussion
5	National income and inflation	Lecture method, Literature survey, discussion.
6	Finance, money and banking and New economic environment	Lecture method, visits journals review, discussion.

Text Books:

Sr. No	Author	Title	Publication
1	D.N. Dwivedi and Abhishek Dwivedi	Engineering Economics	Vikas publishing House Pvt. Ltd., New Delhi,
2	Maheshwari	Managerial Economics (2nd ed)	Prentice Hall of India Pvt. Ltd. New Delhi

Reference Books:

Sr. No	Author	Title	Publication
1	Pannerselvam	Engineering Economics	Prentice Hall of India Pvt. Ltd. New Delhi
2	Sasmita Mishra	Engineering economics & Costing	Prentice Hall of India Pvt. Ltd. New Delhi
3	Newnan, Eschenbach, and Lavelle,	Engineering Economic Analysis, 9th Edition,	Oxford University Press, 2004.
4	Eschenbach, Ted G.	Engineering Economy - Applyir Theory to Practice	Irwin, 1995
5	Newnan and Wheeler,	Study Guide for Engineering Economic Analysis, 9th Edition,	Oxford University Press, 2004.
6	Anthony J. Tarquin	Engineering Economy	McGraw-Hill, 1989

Learning Resources: Books, Journals, and Reports etc.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Introduction to Economics	04	06	--	10
2	Demand Analysis	06	08	06	20
3	Supply Production and cost analysis	06	04	04	14
4	Time value of money	06	06	04	16
5	National Income and Inflation	04	04	--	08
6	Finance, Money and Banking and New economic environment	06	04	02	12
	Total	**32**	**32**	**16**	**80**

Prepared By:

(S.S.Aaglave)	(S.V.Chaudhari)	(R.N.Shikari)
Prepared By	**Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in CE**/EE/ET/ME/MT/CM/IT
Programme Code	**:**	**01**/02/03/04/05/06/07/**15**/16/17/18/19/**21**/24
Name of Course	**:**	**Construction Management**
Course Code	**:**	**MA481**

Teaching Scheme:

	Hours/Week	**Total Hours**
Theory	**04**	**64**
Practical	**--**	**--**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Three class tests of 60 min duration**	**3 Hrs**	**--**	**--**	**--**
Marks	**20**	**80**	**--**	**--**	**--**

Course Rationale:

The Civil Engineer has to plan, Manage and execute Civil Engineering works. He has to manage different resources. He should have knowledge of basic management of basic management processes related to Civil engineering field.

Objectives:

The student will able to

1. Understand management techniques.
2. Plan, Monitor and execute various types of construction work
3. Manage different resources (Men, Material, Money, Machines)
4. Read, draw & update bar charts, CPM and PERT.
5. Inspect & control quality of construction.

Contents:

Topic No.	**Topic & Subtopic**	**Hrs**	**Marks**
1	**Construction Industry** 1.1 Importance of construction industry in National Development. 1.2 Special characteristics of Civil engineering works. 1.3 Classification and types of construction works. 1.4 Agencies associated with construction works. 1.5 Resources of construction industry, Material, Manpower, Money, Machinery. 1.6 Stages in construction – Planning stage execution stage. 1.7 Objectives of Construction Management.	**06**	**06**

2	**Scientific Management** 2.1 Definition of Management. 2.2 Necessity Of Scientific management. 2.3 Principles of Management. 2.4 Functions of Management. 2.5 Application of Principal and function of management to Civil Engineering works.	**07**	**08**
3	**Leadership and human relationship** 3.1 Leadership – styles of leadership 3.2 Desirable qualities of leadership of effective Execution of construction work. 3.3 Functions of leadership 3.4 Human relation, Human needs 3.5 Motivation and its importance and need, functions of Motivation, Hygiene and motivation factors.	**07**	**08**
4	**Planning and scheduling of construction works** 4.1 Levels and stages of planning –(pre & post tenders) 4.2 Necessity and Importance of planning. 4.3 Planning for owner/client and planning for contractor. 4.4 Site selection and orientation of building. 4.5 Study of drawing, Design, Raw materials Equipment sand human resources required. 4.6 Methods of scheduling, Advantages of scheduling. 4.7 Bar chart. Preparing construction schedule. Advantages and limitations of bar charts. 4.8 Planning and scheduling by Network Construction, Logic, Determine of various timings EST, EFT, LST, LFT. Total float preparation of activity table, Example on developing Critical path, Introduction to PERT. Terms used. 4.9 Comparison between CPM and PERT. 4.10 Preparing Construction schedule comprising of items of work and duration. 4.11 Resource Aggregation for labour.	**14**	**24**
5	**Communication at site** 5.1 Importance of communication at construction site. 5.2 Types of communication. 5.3 Barriers to effective communication. 5.4 Techniques to overcome barriers of effective communication.	**04**	**06**
6	**Safely in Civil Engineering** 6.1 Importance of safely in construction works. 6.2 Common Causes of accidents, types of accidents, Remedial measures. 6.3 Terms used- Injury frequency rate(IFR), Injury Severity rate (ISR), Injury Index (II), Accident cost. 6.4 Effective safety Programme.	**06**	**08**
7	**Site layout** 7.1 Storing and stacking of material site. 7.2 Location of Machinery and equipment.	**06**	**08**

	7.3 Factors on which site layout depend. 7.4 Preparation of site layout.		
8	**Inspection and quality** 8.1 Concept of quality. 8.2 Supervision techniques to establish dimensional control such as line, Level Gradient, Slope, Plumb Camber. 8.3 Functions of Inspection Department. 8.4 Quality assurance and quality control. 8.5 Sampling Techniques.	**06**	**08**
9	**Application of Computer in Construction Management.** 9.1 Types of software 9.2 Application of software & Areas. 9.3 Merits and Demerits of software.	**04**	**004**
10	**Entrepreneurship in Construction Management** 10.1 Concept of Entrepreneur and Entrepreneurship 10.2 Merits of Entrepreneurship and employment. 10.3 Types of Construction Management.	**04**	**06**
	Total	**64**	**80**

Suggested Instructional Strategies:
Lecture Method, Use of teaching aids, Demonstration, Case Study.

Learning Resources: Books, Journals

Reference Book:

SN	Author	Title	Publisher
1	M.L.Dhir, Gehlot	Construction Planning & Management	Wiley New Delhi
2	Harpal Singh	Construction Management & Accounts	Tata McGraw Hill
3	B.Sengupta & Guha	Construction management & planning	Tata McGraw Hill
4	R.L.Peurifoy	Construction Planning equipment and methods	McGraw-Hill Co. Ltd.
5	Banga & Shoral	Origination of Management	McGraw-Hill Co. Ltd.

Prepared By:

(N.G.Waykole)	**(S. V.Chaudhari)**	**(R.N.Shikari)**
L.C.E.	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in CE/EE/ET/ ME/MT/CM/IT**
Programme Code	**:**	**01/02/03/04/05/06/07**
Name of Course	**:**	**Industrial organization Management**
Course Code	**:**	**MA482**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	---	---

Evaluation:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Three class tests of 60 Minutes**	**03 Hrs.**	---	---	---
Marks	**20**	**80**	---	---	---

Course Aims:

At the end of course, student will be able to :

- Create necessary awareness and motivation of technical student for promoting self-employment and alternative to wage employment
- Develop skill for organizing market survey and managements.
- Appreciate importance of human relations in industry.

Course Objectives:

After going through this course the diploma technician will be able to know :

- The basic knowledge about entrepreneurship
- Fundamentals of accounting finance, marketing.
- Various aspects of management, Taylor's principle.
- Management techniques.
- Different acts used in factories.

Course Content:

Sr. No.	Topic/Subject	Hrs.	Marks
1.	**Overview of Business and Entrepreneurship :** Type of Business: Service, Manufacturing, Trade. Industrial sectors introduction to: Engineering Industry, IT Industry, Banking, insurance, Retail. Globalisation: Introduction, Advantages and Disadvantages w.r.t. India.	05	08
2.	**Organizational Management :** Organization: Definition, Steps in organization. Types of Organization: Line, Functional, Line and Staff, Project. Departmentation: By product, by process, by function. Principles of Organization: Authority and responsibility, Span of control, Effective delegation, Communication. Forms of Ownership: Proprietorship, Partnership, Joint stock, Co-operative society, Government sector.	08	14
3.	**Management Process :** What is management : Evolution, Various definition of management, concept of management, Levels of management, administration of management, scientific management by F W Taylor. Principle of management: Function of management: Planning, organizing, directing, coordinating, controlling	08	14
4.	**Financial Management and Accounting :** Financial management objective and function. Capital generation and management: type of capital-fixed and working, sources of raising capital, feature of short term, medium term and long term sources. Budget and account: types of budget, production budget-sample format, fixed and variable budget-concept, profit and loss account, important accounting terminology, types of account: rules for debit and credits, systems of book keeping, books of accounts, Balance sheet: meaning, sample format, meaning of different terms involved.	07	12
5.	**Material Management :** Inventory concept, its classification, functions of inventory: ABC analysis-necessity and steps: Economic order quantity concept, graphical representation, determination of EOQ: Standard steps in purchasing : Modern technique of material management: material resources planning(MRP)-function of MRP, input to MRP, benefit of MRP. Enterprise resource planning (ERP)-concepts, list of modules, advantages and disadvantages of ERP.	07	12
6.	**Marketing :** Market survey, definition, modern concept of marketing orientation,	05	08

	project report preparation, utility, project report preparation of utility for evaluation, market oriented report, product costing, project costing, format, evaluation of project report, costing and pricing classification of costs, calculation of break even point, packing and advertising.		
7.	**Industrial Safety and legislative acts :** Safety management: cause of accident, types of industrial accident, preventive measure, safety procedure. Industrial legislation – necessity of acts: important definition and main provision of following act – workman compensation act, minimum wages act, Indian factory act.	04	06
8.	**Quality management and ISO :** Meaning of quality: quality management system –activities, benefits, Quality control-objective, function, advantages, quality circle-concepts, characteristics and objectives, quality assurance-concepts, quality assurance system. Meaning of total quality and TQM: components of TQM-concept, element of TQM, benefits. Modern technique and system of quality management like-Kaizen, 5S, Six Sigma. ISO 9001:2000: benefits, Main clauses.	04	06

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	**Overview of Business and Entrepreneurship**	Class room Teaching,
2.	**Organizational Management**	Class room Teaching
3.	**Management Process**	Class room Teaching
4.	**Financial Management and Accounting**	Class room Teaching
5.	**Material Management**	Class room Teaching
6.	**Marketing**	Class room Teaching
7.	**Industrial Safety and legislative acts**	Class room Teaching
8.	**Quality management and ISO**	Class room Teaching

Reference Books :

Author	Title	Publisher
Sept. 1988, TTTI, Chandigarh	Entrepreneurship development training material	Sept. 1988, TTTI, Chandigarh
March 1988, TTTI, Chandigarh	Report for institutional entrepreneurship development and management courses in selected institutions	March 1988, TTTI, Chandigarh

GOVERNMENT POLYTECHNIC PUNE
AN AUTONOMOUS INSTITUTE
TECHNICAL EDUCATION FOR SELF RELIANCE

Uday Parikh, T.V. Rao and D.M. Pestonjee	Behavioural processes in organizations	Tata McGrawhill.
O.P. Khanna	Industrial engineering and management	Dhanpat Rai and sons.
Banga and Banga	Project Planning and entrepreneurship	Khanna Publishers.
David, Kroenke	Management Information Systems	McGraw Hill Book Co.
Lester R. Bittel, John W. Newstrom	What every supervisor should know	McGraw Hill Book Co.

Specification Table :

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Entrepreneurship development	03	03	--	06
2.	Finance and accounting	06	02	--	08
3.	Marketing	--	04	04	08
4.	Fundamentals of accounting	06	02	--	08
5.	Organization	07	04	04	15
6.	Management	10	10	06	26
7.	Acts	04	--	--	04
8.	Fields of industrial psychology	05	--	--	05
	Total	40	26	14	80

Prepared By:

C.Y.Totewar	**(S. V. Chaudhari)**	**(R.N.Shikari)**
Lect. in Electrical	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in CE/ EE/ET/ME/MT/CM/ IT**
Programme Code	**:**	**01/02/03/04/05/06/07/15/16/17/18/19**
Name of Course	**:**	**Entrepreneurship Development**
Course Code	**:**	**MA483**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	---	---

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests of 60 Minutes**	**03 Hrs.**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

To make the students aware of entrepreneurship as one of the career options and hence to teach them the various aspects of starting a enterprise.

Course Objectives:

After studying this course, the student will be able to

- SWOT analysis.
- Business Environment scanning and opportunity scanning. (Search)
- Market assessment.
- Project formulation.
- Identification of product / Technology / Equipment
- Financial Sources.
- Sales and Marketing
- Reasons of failure of entrepreneurs.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
1.	**Entrepreneurship Awareness**		
	Entrepreneurship – need, scope & philosophy. Definition of an entrepreneur, attributes, Entrepreneurship. Need Analysis: Human Need, SWOT Analysis, goal setting, business environment, emerging trends, Information & collection techniques, opportunities. Role of Entrepreneur in Indian economy	08	10
2.	**Starting & Identification of Project**		
	Product and services, demand availability & resource requirement. Market survey technique – Identification of market, marketing trends, market survey techniques, agencies & organizations to be contacted. Product, suppliers of plant, equipment & raw material technology. Venture Capital Funding	08	14
3.	**Preparation of Project report**		
	Structure of project report, purpose of project report. Working & fixed capital, financial institutions, procedures & Norms for financing feasibility criteria, project planning, time management, legal formalities, municipal by laws. Safety considerations, plant layout, commissioning of plant & equipment, trial production.	10	16
4.	**Information & support systems**		
	Information needed & their sources. Information related to Project Information related to procedures & formalities. Support systems a) Small scale business planning Requirements b) Govt. & financial Agencies, Formalities. Role of Central Government and State Government in promoting Entrepreneurship- introduction to various incentives, subsidies and grants – Export Oriented Units – fiscal and tax concession available. Role of following agencies in the Entrepreneurship Development - District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB)	10	16
5.	**Management of Enterprises**		
	Forms of business Organization. Human behavior, personnel management, sales Management. Marketing practice, distribution channels, Advertisings, Packaging.	06	12
6.	**Why do entrepreneurs fail?**		
	The four entrepreneurial pitfalls (Peter Ducker) Case studies of successful entrepreneur. Women entrepreneurs – Reasons for low women entrepreneurs, problems & prospectus.	06	12
	Total	**48**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Entrepreneurship Awareness	Lecture, market survey, workshops, interviews.
2.	Starting & Identification of Project	
3.	Preparation of Project report	
4.	Information & support systems.	
5.	Management of Enterprises	
6.	Why do entrepreneurs fail?	

Text Books:

Sr. No	Author	Title	Publication
1.	S. Saini, B.S. Rathore	Entrepreneurship – Theory & Practice	

Reference Books:

Sr. No	Author	Title	Publication
1.	Vasant Dsai, Pragati Desai	Entrepreneurial development Vol. I	
2.	Vasant Dsai, Pragati Desai	Entrepreneurial development Vol. II	
3.	Vasant Dsai, Pragati Desai	Entrepreneurial development Vol. III	
4.	Colombo Staff College, Manila	Entrepreneurship Development Plan	TMH, New Delhi
5.	Jerald Greenberg, Robert A. Baron/ Carol A. Sales/ Frances A. Owen / Verlag (1999)	Behaviour in organizations, Pearson Education.	Tata Mcgraw Hill.
6.	The winning Edge, corporate creativity.	Pradip N. Kandwalla	Tata Mcgraw Hill.(2006)
7.	John L. Colley, Jacqueline L. Doyle,	Corporate Governance	Tata Mcgraw Hill. (2003)
8.	Timpe, Dale A	Creativity	M/s. Jaico Publishing House, New Delhi. Tata Mcgraw Hill. (2005),

Learning Resources: Books, Articles, Case studies

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Entrepreneurship Awareness	02	06	02	10
2	Starting & Identification of Project :	04	06	04	14
3.	Preparation of Project report business plan.	03	10	03	16
4	Information & support systems.	04	08	04	16
5	Management of Enterprises :	04	06	02	12
6	Why do entrepreneurs fail?	04	04	04	12
	Total	**21**	**40**	**19**	**80**

Prepared By:

(R.N.Shikari)	(S. V. Chaudhari)	(R.N. Shikari)
H.O.D. E & TC	**Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in CE**/EE/ET/ME/MT/CM/IT
Programme Code	**:**	**01**/02/03/04/05/06/07/08/**21**/22/23/24/26/**15**/16/17/18/19
Name of Course	**:**	**Material Management**
Course Code	**:**	**MA484**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	**--**	**--**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Three class tests of 60 Minutes**	**03 Hrs.**	**--**	**--**	**--**
Marks	**20**	**80**	**--**	**--**	**--**

Course Rationale:

This course deals with management of materials. Smooth running of any industry depends upon the interdepartmental relations and planning for execution of work jointly. Efficiency of production department also depends upon the availability of raw material of required quality and quantity. Therefore there should be proper co-ordination between production department, production planning, stores department and purchase department. Incorrect materials planning can also lead to higher inventories & high cost.

Course Objectives:

After studying this course, the student will be able to

- To know the importance of materials and inventory management
- To know the different aspects of buying procedure and price forecasting.
- To acquaint with latest techniques in materials management
- To know procedure for giving requisition of materials along with specifications
- To know different features of negotiation technique and management of obsolete and scrap materials.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Marks
1	**Importance of Materials Management**			
	1.1	Growing importance of Materials Management	**10**	**16**
	1.2	Scope of Materials Management		
	1.3	Objectives and functions of Materials Management		
	1.4	Organizing for Materials Management		
	1.5	Introduction to Materials planning		
	1.6	Importance of specifications in Materials Management		
2	**Inventory Management**			
	2.1	Selective control – ABC Analysis - Purpose and objectives of ABC Analysis Mechanics	**10**	**16**
	2.2	Advantages of ABC Analysis limitations of		
	2.3	ABC Analysis		
	2.4	Order point – Lead Time, safety stock, Re-order point, standard order. Economic order		
	2.5	Quantity (EOQ), Graphical & Analytical Method		
3	**Buying procedure**			
	3.1	Sourcing, Buy or lease	**10**	**16**
	3.2	Purchase systems		
	3.3	Problems in relations with supplier		
	3.4	Value Analysis → Definition & scope		
	3.5	Selection of products for value analysis		
	3.6	Value analysis framework		
	3.7	Implementation & methodology		
	3.8	Ethics in purchasing		
4	**Price forecasting**			
	4.1	Importance & Approaches	**01**	**02**
5	**Inventory control & Cost reduction techniques**			
	5.1	Inventory turns ratios	**05**	**08**
	5.2	Standardization- need & importance		
	5.3	Codification- concept, benefits.		
	5.4	Value engineering & Value analysis- concept &process		
6	**Latest Techniques in Materials Management**			
	6.1	Just in Time (JIT) zero inventory concept	**05**	**10**
	6.2	Integrated computerized management systems in Materials Management		
	6.3	Introduction to SAP.		
7	**Management of obsolete Surplus and Scrap material**			
	7.1	Definitions, Reasons for generation and accumulation of obsolete Surplus and scrap, Survey committee, presale	**07**	**12**

		preparations, sale, auction, sale by tender.		
		Total	**48**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Importance of Materials Management	Class room teaching
2	Inventory Management	Class room teaching
3	Buying procedure	Class room teaching
4	Price forecasting	Class room teaching
5	Inventory control & Cost reduction techniques	Class room teaching
6	Latest Techniques in Materials Management	Class room teaching
7	Management of obsolete & scrap material	Class room teaching

Text Books:

Sr. No	Author	Title	Publication
1	Ammer Deans S.	Materials Management	R.D. Irwin Hllions
2	P. Gopalkrishan and M. Sundaresan	Materials Management An Integrated approach	Prentice – Hall of India Pvt. Ltd. New Delhi.
3	M.M. Shah	An integrated concept of Materials Management	Tata McGraw Hill Publisher Co. Ltd. New Delhi

Reference Books:

Sr. No	Author	Title	Publication
1	P.G. Menon	Materials Management	
2	A Deb	Materials Management	Academic Publishers
3	Dobler D.W. and Lee C	Purchasing and Materials Management	---
4	Brandy C.S.	Materials Handbook	---

Learning Resources: OHP, LCD, Projector, and Transference, White board

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Importance of Materials Management	6	6	4	16
2	Inventory Management	6	6	4	16
3	Buying procedure	6	6	4	16
4	Price forecasting	--	1	1	02
5	Inventory control & Cost reduction techniques	2	4	2	08
6	Latest techniques in Materials Management	2	4	4	10
7	Management of obsolete and scrap materials	6	6	--	12
	Total	**28**	**33**	**19**	80

Prepared By:

(Smt.N.S.Kadam)	(S.V.Chaudhari)	(R.N.Shikari)
Prepared By	**Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in** CE/EE / **ET**/ ME/MT/ CM / IT
Programme Code	:	01/02/**03**/04/05/06/07/15/16/**17**/18/19/21/**23**/24/26
Name of Course	**:**	**Supervisory Management**
Course Code	**:**	**MA485**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	---	---

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 Min. duration**	**03 Hrs**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

The diploma holders are intended to work as a supervisor in the industry. He has to perform a versatile role in the activities of an industry; he has to coordinate his subordinates and the higher personals. The students are required to understand to function as a supervisor. He should be able to plan, organize, and direct the subordinates to achieve better results within time for a task assigned to him.

Course Objectives:

After studying this course, the student will be able to

- Know the basic duties of a supervisor.
- Plan a particular job by splitting the whole job into pieces and monitoring each step.
- Understand human behaviors, identify skills, utilize skills, and observe safety of workers.
- Achieve better overall efficiency and utilize maximum capacity of machineries.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Marks
1.	**Introduction**			
	1.1	Management of a job. Necessity for Scientific Management for supervisor. Handling complexity and achieving optimization.	**02**	**04**
2.	**Planning by Supervisor**			
	2.1	Objectives of planning. Planning activities. Planning by supervisor. Detailing and following of each step. Prescribing standard forms for various activities. Budgeting at supervisory level for materials and man power. Planning a programme and actions for a job.	**04**	**08**
3	**Organizing by supervisor**			
	3.1	Organizing physical resources. Matching human needs with job needs. Allotment of tasks to individual and establishing relationship among persons working in a group.	**04**	**08**
4.	**Directions by supervisor**			
	4.1	Need for such directions and instructions to subordinates. Need for clarity, completeness and feasibility of instructions. Reviving of effectiveness of communication. Personal counseling. Advance predictions of possible mistakes. Elaborating decisions. On the spot adjustments during execution of job. Laying disciplinary standards in over all working.	**06**	**10**
5.	**Motivation to subordinates**			
	5.1	Workers participation in management of a job. Achievement motivation. Recognition for devotion. Delegating responsibilities to subordinates. Activities and intensions towards the growth of an individual. Identification of human needs and providing safety to the workers.	**06**	**10**
6.	**Coordination & implementation**			
	6.1	Understanding link between various departments in respect of process and quality standards. Synchronization of duties of subordinates. Control over the performance in respect of quality; quality of production; time and cost. Measuring performance, comparing with standard, correcting unfavorable deviations.	**10**	**14**
7.	**Check list by supervisor**			
	7.1	Introduction to subordinates regarding the job undertaken. Planning the days work suitable for the job. Responsibility survey. Checking possibility for acceptance of assignment from new department.	**08**	**10**
8.	**Moving up in the organization**			
	8.1	Demonstration of job competence. Exhibition of leadership and initiative. Looking for to accept challenging responsibilities and acceptance of the same. Attitude and actions to be followed and avoided. Stressing the value of own contribution. Achievement of trust of subordinates and the higher management.	**08**	**16**
		Total	**48**	**80**

GOVERNMENT POLYTECHNIC PUNE
AUTONOMOUS INSTITUTE
TECHNICAL EDUCATION FOR SELF RELIANCE

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Lecture method
2.	Planning by supervisor	Lecture method
3.	Organizing by supervisor	Lecture method
4.	Directions by supervisor	Lecture method
5.	Motivation to subordinates	Lecture method
6.	Coordination & implementation	Lecture method
7.	Check list by supervisor	Lecture method
8.	Moving up in the organization	Lecture method

Text Books:

Sr. No	Author	Title	Publication
1	Industrial Management	Shrinivasan	Khanna publisher,New Delhi

Reference Books:

Sr. No	Author	Title	Publication
1.	Industrial organization and Engineering Economies	Banga and sharma.	Khanna publisher,New Delhi
2.	Industrial Engineering and Management	O.P. Khanna	Dhanpat Rai and Sons, New Delhi
3.	What every Supervisor Should Know	Lestec R. Bittel John W. Newstrom	McGraw Hill Publishing Company, (GREGG Division)

Learning Resources: Books, Articles, C.D.'s, Visits, Video Cassettes No. 115 and 120

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction	02	02	-	04
2.	Planning by supervisor:	06	01	01	08
3.	Organizing by supervisor	04	02	02	08
4.	Directions by supervisor	05	03	02	10
5.	Motivation to subordinates	05	03	02	10
6.	Coordination & implementation	10	02	02	14
7.	Check list by supervisor	06	02	02	10
8.	Moving up in the organization	08	04	04	16
	Total	**46**	**19**	**15**	**80**

Prepared By:

(S.V.Chaudhari)	(S. V.Chaudhari)	(R.N.Shikari)
L.C.E.	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in CE/**EE / ET/ ME/MT/ CM / IT
Programme Code	**:**	**01/**02/03/04/05/06/07/15/16/17/18/19/**21**
Name of Course	**:**	**Total Quality Management**
Course Code	**:**	**MA 486**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical / Tutorial	---	---

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3Hrs.**	--	--	--
Marks	**20**	**80**	--	--	--

Course Rationale:

In today's international market the quality is another name for universal acceptance for product and services .Hence the mechanical engineers must have consciousness about various quality aspects required for manufacturing /service sector.
To fulfill this need this subject about various factors and philosophies in quality development is introduced. So that student will have most of basic inputs before they enter their profession.

Course Objectives:

After studying this course, the student will be able to

	To understand the importance of Quality Standards and consumer need for quality items for price paid by him..
	To understand Quality Management Foundation and introduction to total quality management
	To know about Quality circle, Kaizen and various Quality improvement tools.
	To know about Quality Assurance Systems and Quality Management through ISO 9000 series.
	To know about Toyota way and Six Sigma concepts.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Marks
1.	**Introduction**			
	1.1	Basic concepts related with quality, Various definition of quality. Quality of design and quality of conformance, Service quality Vs product quality.	**06**	**08**
	1.2	Quality policy: definition and objectives. Quality audit.		
	1.3	Quality assurance: - definition, meaning it's various forms and advantages .Quality audit, quality mindedness, inspection and quality control.		
2.	**Quality Management Foundation and introduction to total quality management.**			
	2.1	Strategic quality management (HoshinKanri) Strategic quality planning, quality goals. The vision – future state of organization, good understanding by everyone, inspiration, achievable QCDF (Quality Cost Delivery Flexibility), Customer focus, sharing by all values of the leadership, organization and employees.	**08**	**12**
	2.2	Total Quality:- definition ,objectives, eight dimensional model of total quality.		
	2.3	Total Quality management:- definition , need ,mission, initiative and concept. Barriers, implementation and advantages..		
	2.4	TQM Models :-Juran trilogy , Deming programme , Mckinsey model, Crosby program..		
3.	**Quality Management Processes**			
	3.1	**Quality planning** Quality culture (Kaizen and Quality circle) Quality Circle: - concept, objective, structure, steps in formation of quality Circle. Roles of people involved in quality Circle. advantages of quality Circle.	**12**	**20**

	3.2	What is Kaizen. - The concept, meaning and definition ,areas for Kaizen - 10 ground rules for change. - Traditional methods Vs Kaizen , Kaizen Vs innovation - Types of waste and Waste elimination, value added work, hidden waste and obvious waste, Identification of wastes. - 5S in housekeeping and their meaning - Improvement in work methods. Achievement after Kaizen		
	3.3	Quality improvement Old statistical and analytical tools for quality. i) Tally-sheet ii) Graphs iii) Histograms iv) Stratification v) Scatter diagram vi) Control chart vii) Pareto diagram		
	3.4	New tools of quality (At least one example to be introduced for each tool) i) Ishikawa diagram ii) Arrow diagram iii) Relations diagram iv) Tree diagram v) Affinity diagram vi) Matrix diagram		
	3.5	Additional tools of quality improvement i) Brains storming ii) Flow charts iii) 5W & 1H iv) 5 WHYS		
4.	**Quality Management Infrastructure**			
		History of evolution of ISO 9000 standards. European economic community (EEC), need for quality system standards, International organization for standardization (ISO) adopted by Bureau of Indian Standards (BIS)	**12**	**16**

		ISO 9000: 2000 Quality system ISO 9000 series standards, ISO 9000 elements understanding requirement, assessment with respect to quality system. Documentation and implementation, quality manual, structure, internal quality audit, external audit and certification.		
	4.3	Various Quality Systems Vocabulary and features ISO 9001:2008 Requirements for a quality management system ISO 9004 : 2009 Guidelines for the effectiveness and efficiency of the quality management system IS 14000: 2004 series, its importance ISO 19011: guidance on auditing and environmental management systems.		
5.	**Principles of the Toyota way**			
	5.1	Introduction to Toyota way, Toyota production system (TPS), lean production, '4' P model of Toyota way.	**04**	**12**
	5.2	Toyota way principles and their meaning.		
6.	**Six Sigma**			
	6.1	Introduction to six sigma, Psychology of six sigma,	**06**	**12**
	6.2	Six sigma DMAIC process		
	6.3	The six sigma players, their roles and Responsibilities. Champions , Master black Belts, Black belts, Green belts.		
	6.4	Factors to be considered while selecting a project for six sigma, Do's and Don'ts for making six sigma effective. Advantages of six sigma. The zero defects concept.		
Total			**48**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Lecture method
2.	Quality Management Foundation and introduction to total quality management.	Lecture method
3.	Quality Management Processes	Lecture method, Transparencies, Internet surfing.

4.	Quality Management Infrastructure	Lecture method, Transparencies, Internet surfing.
5.	Principles of the Toyota way	Lecture, Ppt& Discussion
6.	Six Sigma	Lecture method, Ppt& Discussion

Text Books:

Sr. No	Author	Title	Publication
1.	Dr. K.C.Arora	Total Quality Management	S.K.Kataria and sons
2.	B.Janakiraman and R.K. Gopal	Total Quality Management Text and cases	Prentice Hall of India pvt. Ltd. New Delhi.
3.	Subburaj	Total Quality Management	Tata Mc - Graw Hill Co., New Delhi.
4.	Gupta, Srinivas N & B Valarmathi	Total Quality Management	Tata Mc - Graw Hill Co., New Delhi.

Reference Books:

Sr. No	Author	Title	Publication
1.	Peter S.Pande Robert P. Neuman Roland R.Cavanagh	Six Sigma way	Tata Mc - Graw Hill Co., New Delhi.
2.	Jeffrey K. Liker	The Toyota Way	Tata Mc - Graw Hill Co., New Delhi.
3.	Suganthi and Samuel	Total Quality Management	Prentice Hall of India pvt. Ltd. New Delhi

Learning Resources: Books, journals, Internet searches.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction	08	--	--	08
2.	Quality Management Foundation and introduction to total quality management.	08	04	--	12
3.	Quality Management Processes	08	08	04	20
4.	Quality Management Infrastructure	08	08	--	16
5.	Principles of the Toyota way	08	04	--	12
6.	Six Sigma	08	04	--	12
Total		**52**	**28**	--	**80**

Prepared By:

(P.U.Garge)	(S. V. Chaudhari)	(R.N.Shikari)
L.M.E.	Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in** CE/ EE/ET/ ME/MT/ CM /IT
Programme Code	**:**	01/02/03/04/05/06 /07/15/16/17/18
Name of Course	**:**	**Management Information System**
Course Code	**:**	**MA487**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	---	---

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	Two class tests, each of 60 Min. duration	**03 Hrs.**	---	---	---
Marks	**20**	**80**	---	---	---

Course Rationale:

MIS is a concept continuous to evolve, emerging trend consistent with the evolution of the MIS concept endures computing. It is the power of computers, which makes MIS feasible. It also deals with the impact of computers and information technology innovation and organizational design and planning. It is used to know how to manage any organization using Software requirement specification Data flow diagrams, coding techniques for evolution of manager. From this point of view, the course is introduced.

Course Objectives:

After studying this course, the student will be able to

	• Understand the role of MIS in various functional areas of management.
	• Understand the determination of requirement and analysis it to design information system necessary.
	• Understand the supporting role of MIS in decision-making, problem solving • Understand the management in finance department. • Understand the role of coding techniques for authentication • Develop and use different management skills • Visualize the impact of information Technology in organizational communication & leadership • Understand the concept of quality management • Understand the use of database management system in MIS • Understand the role of taxation in India by studying the types of taxes such as service tax,income tax,excise duty,VAT

	• Determine the alternative solutions • Understand various steps required to process any organization using system development cycle • Understand the concept of Profit and loss, details about budgeting system

Course Contents:

Chapter No.	Name of Topic/Sub topic		Hrs	Marks
1.	**Information Systems and Organizations**			
	1.1	Organizational and Information,System Structure,Data and Information,Management and Decision Making,Classification of Information Systems, Information support for functional areas of Management,Impact of Business on Information System,Organizing Information Systems	**04**	**10**
	1.2	Decision Support Systems: Definition, Evolution of DSS, Characteristics of DSS,Model Management, Group Decisions		
2.	**System Analysis and Design**			
	2.1	Organizational context of System Analysis,Role of System Analyst,System Development Life Cycle,Requirements Analysis	**04**	**10**
	2.2	System Requirements Specification: System requirements specification: Example, Data dictionary, Steps in Systems Analysis, Modularizing requirements specifications, Conclusions.		
3.	**Feasibility Analysis**			
	3.1	Deciding on project goals, Examining alternative solutions, Evaluating proposed solution, Cost-benefit analysis, Payback period, Feasibility report, and System proposal.	**08**	**15**
	3.2	Data flow diagrams: Symbols used in DFD's Describing a system with a DFD, Good conventions in developing DFDs Leveling of DFDs, Logical and Physical DFDs.		
	3.3	Process Specifications: Process specification methods, structured English Some examples of process specification.		
4.	**Management**			

	4.1	**Quality Management:** **Specific Objectives:** Meaning of Quality State Principles of Quality Management, Describe Modern Technique & Systems of Quality Management **Quality Management System**: Activities, Benefits Quality Control - Objectives, Functions, Advantages Quality Circle - Concept, Characteristics & Objectives Quality Assurance - Concept, Quality Assurance System **Total Quality:** Meaning of Total Quality **Total QualityManagement:** Components of TQM, Elements of TQM, Benefits Modern Technique & Systems of Quality Management like 6-Sigma, ISO 9001:2000 - Benefits, Main clauses.		
	4.2	**Financial Management** **Specific Objectives:** Explain functions of financial management**;** State the sources of finance & types of budgets, Describe concepts of direct & indirect taxes. Financial Management- Objectives & Functions **Budgets and accounts :**Types of Budgets Production Budget - Sample format: Labour Budget - Sample format, **Profit & Loss Account & Balance Sheet**: Meaning, sample format, Meaning of different terms involved. Meaning & Examples of - Excise Tax, ServiceTax, Income Tax,Value Added Tax, Custom Duty	**10**	**15**
	4.3	Data input Methods: Data input, Coding techniques, Detection of error in codes, Validating input data, interactive data input.		
5.	**Executive Information System and Executive Support System**			
	5.1	Why EIS and ESS? Internal factor and External factor		
	5.2	What is EIS and ESS? Characteristics of EIS and ESS		
	5.3	Informational characteristics, User Interface/Orientation Characteristics, Managerial/Executive Characteristics	**10**	**15**
	5.4	EIS/ESS Capabilities and Benefits		
	5.5	Expert System-Definition,Components,Application and Limitations		
6.	**Management Issues in MIS**			
	6.1	Information Security and Control :Why breakIT System Security?		
	6.2	Information System Security Threats: External Security Threats: Internet Connections,Remote Dial –in Capabilities Internal Security Threats: Passwords,User Terminations,Authorisation Levels, Special Privileges, Virus Checking, Audit Trails	**12**	**15**
	6.3	Ethical And Social Dimensions		

Total	**48**	**80**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Information and Management	**Class room teaching for all**
2.	Information Gathering	
3.	Feasibility Analysis	
4.	Decision Table	
5.	Database Management Systems (DBMS)	
6.	Control Audit and security of information systems	

Text Books:

Sr. No	Author	Title	Publication
1.	V Rajaraman	Analysis & design of Information system	PHI
2.	S.Sadagopan	Management Information Systems	PHI
3.	James A.O`Brien George M.Marakas	Management Information Systems -*Tenth Edition*	McGraw Hill

Reference Books:

Sr. No	Author	Title	Publication
1.	Gordon B. Davis and Margeth H. Olson	MIS	
2.	Kroenke Davis	Management information System	2nd edition
3.	Sein	MIS	
4.	Jawadekar W.S.	MIS	
5.	Millind Oka	MIS	
6.	Jayashankar	Decision Support Systems	
7.	Lucas	Information System Concepts for Management	4th edition

Learning Resources: OHP, LCD Projector and Transparency.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Information and Management	04	04	02	10
2.	Information Gathering	04	02	04	10
3.	Feasibility Analysis	02	08	05	15
4.	Decision Table	02	08	05	15
5.	Database Management Systems (DBMS)	06	04	05	15
6.	Control Audit and security of information systems	04	05	06	15
	Total	**22**	**31**	**27**	**80**

Prepared By:

A.B.Bhusagare **N.R.Wagh**	**S.V.Chaudhary**	**R.N.Shikari**
Lect in Computer	**Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in Dress Designing and Garment Manufacturing**
Programme Code	**:**	01/02/03/04/05/06/07/**08**
Name of Course	**:**	**Apparel Management**
Course Code	**:**	**MA488**

Teaching Scheme :

	Hours / Week	**Total Hours**
Theory	**03**	**48**
Term Work / Practical	**-**	**-**

Evaluation:

	Progressive Assessment	**Theory**	**Practical**	**Oral**	**Term Work**
Duration	**Two Class Tests of 60 Mins**	**03**	**-**	**-**	**-**
Marks	**20**	**80**	**-**	**-**	**-**

Course Aim –

This course provides an introductory view of the managerial and technical factors which influence the day to day operation of a clothing factory. The course makes aware the students about the dramatic role of the fashion which changes frequently and guides to reconcile the conflicting requirements of the market and its manufacturing facilities in order to stay in business.

Course Objective –

Student will be able to –

- Introduce the process, the structure, the technological environment of the apparel product development.
- Develop skills in the managerial ability of the organization of a clothing industry.

- Bifurcate various departments working together to run the activities of apparel product development such as design department, marketing department, finance department, purchasing department, production department & operation department.
- Explore the ideas and views about forecasting, fashion trends, price structure, designing, collection, planning, pattern making, grading and producing a sample garment to work in the department of designing in a clothing industry.
- Acquire the skill of marketing by getting introduced to various managerial task of marketing such as pricing distributing the product, selling, sales forecasting and budgeting.
- Explore the manner in which production functions are operated such as product manufacturing function, service functions, production engineering, personnel and training, machinery and equipment maintenance, general maintenance, store, production planning and control, budgetary control.
- Give he importance of quality and can control the system to assure the required quality.

Course Content –

Section – 1

Chapter No.	Topic / Subtopic	Hours	Marks
1	**The Process and the Structure of the Apparel Industry** a) Structure b) Technological Environment of Product development. c) The process of product development	04	10
2	**The Organization of a Clothing Industry** a) Principles of Management b) Definition of Management c) Functions of Management	06	10

	Planning, Organizing, Staffing, Direction, Control.		
3	**Design Department** a) Forecasting b) Fashion Trends c) Price Structure d) Designing e) Collection f) Planning g) Pattern Making h) Production of Sample Garment i) Pattern Grading.	08	08
4	**Marketing Department** a) Definition of Marketing Management b) Marketing calendar c) Product Pricing d) Price Evaluation e) Product Planning f) Customers g) Distribution h) Selling h) Sales Forecasting	06	12

Section – II

Chapter No.	Topic / Subtopic	Hours	Marks
5	**Finance Department** a) Definition of Finance Management b) Functions of the Finance Department c) Providing Management Information	04	06

	d) Budgeting e) Garment Costing Administration		
6	**Purchasing Department** a) Objective of the Purchase Department b) Function of the Purchase Department c) Information of Suppliers d) Prices e) Processing f) Verification g) Speculative buying h) Store keeping i) Stock management j) Purchase Order.	06	08
7	**Production Department** a) Objective and Functions of the Production department. b) Manufacturing Functions c) Service Functions d) Production Engineering e) Personnel and Training f) Machinery and Equipment Maintenance g) General Maintenance h) Technical Stores i) Control Functions j) Production Planning and Control h) Budgetary Control	08	12
8	**Operations Department** a) Company calendar	06	14

	b) Pre production planning and control c) Order Concentration d) The Production order e) Production Planning and Control f) Marker and cut Planning g) Marker planning h) Cutting Room Production Planning i) Control Procedures		

Learning Resources: - Books, Magazines, Journals LCD, etc.

Reference Books

Author	Title	Publisher
Gerry Cooklin	Introduction to Clothing Manufacture	Hartniolls Ltd. Cornwadl
Jones Richard M.	Apparel Industry	
Harold Carr-John Pomeroy	Fashion Design & Product Development	
Chuter A. J.	Introduction to Clothing Production Management	London BSP pro Books
Diamond Jay	Retail Buying	
Devid J. Tyles	Material Management in Clothing Production	Book Base Ltd.

Specification Table :

Sr. No.	Topic	Knowledge	Comprehension	Application	Total
1.	**Section – I** The Process and the Structure of the Apparel Industry	04	02	04	10
2.	The Organization of a Clothing Industry	04	02	04	10
3.	Design Department	02	02	04	08
4.	Marketing Department	04	04	04	12
5.	**Section – II** Finance Department	02	02	02	06
6.	Purchasing Department	04	02	02	08
7.	Production Department	04	04	04	12
8.	Operations Department	06	04	04	14

Instructional Strategy :

Sr. No.	Topic	Instructional Strategy
1.	**Section – I** The Progress and the Structure of the Apparel Industry	Theoretical treatment
2.	The Organization of a Clothing Industry	Theoretical treatment
3.	Design Department	Theoretical treatment
4.	Marketing Department	Theoretical treatment
5.	**Section – II** Finance Department	Theoretical treatment
6.	Purchasing Department	Theoretical treatment
7.	Production Department	Theoretical treatment
8.	Operations Department	Theoretical treatment

Prepared by :

Mrs. S. N. Shinde	**S.V.Chaudhary**	**R.N.Shikari**
Lecturer in DDGM	**Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	Diploma in CE/EE/**ET**/ME//MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/**17**/21//**22**/23/24/26
Name of Course	**:**	**Development of Soft Skills - I**
Course Code	**:**	**NC 481**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	--	--
Practical	**02**	**32**

*** NON EXAM.NON CREDIT COURSES (COMPULSORY) # Credits over & above 180 credits**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	--	--	--	--	--
Marks	--	--	--	--	**25**

Course Rationale:

This course aims to make students aware of good interpersonal relations, Professionalism in etiquettes, importance of time management and importance of good health. The techniques such as role play, group discussions can be used effectively to demonstrate understanding emotions of persons in daily contact.

Course Objectives:

After studying this course, the student will be able to

- Develop better interpersonal relations among their peer group, subordinates and superiors and work effectively.
- Display corporate etiquettes and professionalism while attending /answering phone calls. Plan time optimally/effectively in office –work as well for their personal growth.
- Understand strengths and weaknesses of self.
- Understand /feel emotions of persons (from office and family) in daily contact and take appropriate actions.
- Demonstrate habits for keeping good health by following good food habits and daily exercise.
- Develop overall personality and be successful in his/her career.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Marks
1.	**Interpersonal Skills through Personal Development**			
	1.1	Reducing conflict by preventing problems in the classroom.	--	--
	1.2	Interpersonal Skills through Self Development and change.		
2.	**Corporate Etiquettes & Professionalism**			
	2.1	Understanding Self	--	--
	2.2	Polished personal habits		
	2.3	Ethics & Etiquettes: a way of life		
	2.4	Personal Attire & Grooming		
	2.5	Cell phone manners		
3.	**Time Management**			
	3.1	Time management skills in groups for completion of project	--	--
	3.2	Factors that lead to time loss and how they can be avoided		
	3.3	Time matrix & urgent versus , Important jobs		
4.	**Managing Emotions**			
	4.1	To understand and identify emotions,	--	--
	4.2	To know our preferences		
	4.3	Strength, weaknesses ,opportunities and threats , Techniques of self control		
	4.4	To get desirable response from others		
5.	**Health Management**			
	5.1	Importance of health management,	--	--
	5.2	Relevance of it ,		
	5.3	Tips to maintain good health		
		Total	--	--

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Case studies to be discussed in a group and presentation of the same by group /group leader.	04
2.	Field exercises for the group of students.	02
3.	Role play by individual/group leader.	04
4.	Arranging Quizzes, puzzle- solving and educational games.	02
5.	Group discussions.	04
6.	Sharing of self -experiences in a group.	04
7.	Brain storming sessions	02
8.	Questionnaire -filling & discussing results of the same in a group.	04
9.	Live demonstrations on Yoga and other stress relieving techniques by professional persons.	06
	Total	**32**

Reference Books:

Sr. No	Author	Title	Publication
1.	Mr. Shiv Khera	You can win	
2.	Mr Abdul Kalam	Wings of Fire	
3.	Mr Nirfarake	Prabhavi Vyaktimatwa.(Marathi)	
4.	Mr Iyyengar	YogaDipika	
5.	Mr. Anand Nadkarni	Tan tanavache niyojan (Marathi)	
6.	Mr. Rajiv Sharangpani	Khusit raha ,Mast Jaga.(Marathi)	

Learning Resources: Video cassettes on 1. Effective Communication 2. Group discussions, 3. Corporate Etiquettes and professionalism.

Prepared By :

(D.K.Bhandare)	(S. V.Chaudhari)	(R.N.Shikari.)
Lect. in Civil Engineering	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	Diploma in CE/EE/**ET**/ME/ MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/8/**17**/21/22/**23**/24/26
Name of Course	**:**	**Development of Soft Skills – II**
Course Code	**:**	**NC 482**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**--**	**--**
Practical	**02**	**32**

*** NON EXAM.NON CREDIT COURSES (COMPULSORY) - B # Credits over & above 180 credits**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	--	--	--	--	--
Marks	--	--	--	--	**25**

Course Rationale:

This course aims to make students aware of importance of goal setting , develop self study techniques , importance of ethics and value system , This also aims one to inculcate creative mind along with interest in using problem solving techniques while dealing with any work. It also emphasizes about importance of stress relieving techniques to be practiced for good health.

Course Objectives:

After studying this course, the student will be able to

- Understand importance of goal setting and strategies for setting one's goal.
- Develop and practice self- study techniques.
- Use and practice stress management techniques for good health
- Use and practice problem solving skills.
- Understand importance of ethics and value system for positive interpersonal relations.
- Develop overall personality and be successful in his/her career.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Marks
1.	**Motivation & Goal Setting**			
	1.1	Importance of goal setting,	--	--
	1.2	How to set SMART goals.		
2.	**Study Habits**			
	2.1	Note taking, Methods of Learning,	--	--
	2.2	Memory Enhancement, self - Study Techniques,		
	2.3	Techniques for effective Reading and Writing.		
3.	**Stress Management**			
	3.1	Stresses in groups, how to control emotions,	--	--
	3.2	Strategies to overcome stress, understanding importance of good health to avoid stress.		
4.	**Ethics & Motivation**			
	4.1	What are ethics, how ethics help to ensure positive interpersonal relations,	--	--
	4.2	Personal value system, and personal quality primer		
5.	**Creativity**			
	5.1	Definition of Creativity, Tips and ways to increase creativity, importance of creativity.	--	--
6.	**Problem Solving Techniques**			
	6.1	Puzzles and technical quizzes to be organized to develop these skills.	--	--
	Total		--	--

List of Practical's/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Case studies to be discussed in a group and presentation of the same by group /group leader.	04
2.	Field exercises for the group of students.	02
3.	Role play by individual/group leader.	04
4.	Arranging Quizzes, puzzle- solving and educational games.	02
5.	Group discussions.	04
6.	Sharing of self -experiences in a group.	04
7.	Brain storming sessions	02
8.	Questionnaire -filling & discussing results of the same in a group.	04
9.	Live demonstrations on Yoga and other stress relieving techniques.	06
	Total	**32**

Reference Books:

Sr. No	Author	Title	Publication
1.	Mr. Shiv Khera	You can win	
2.	Mr Abdul Kalam	Wings of Fire	
3.	Mr Nirfarake	Prabhavi Vyaktimatwa.(Marathi)	
4.	Mr Iyyengar	YogaDipika	
5.	Mr. Anand Nadkarni	Tan tanavache niyojan (Marathi)	
6.	Mr. Rajiv Sharangpani	Khusit raha ,Mast Jaga.(Marathi)	

Learning Resources: Video cassettes on 1. Motivation & Goal Setting
2. Stress Management, 3. Ethics & Motivation

Prepared By:

(D.K.Bhandare.)	(S. V.Chaudhari)	(R.N.Shikari.)
Lect.inCivil Engineering	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/21/22/**23**/24/26/16/**17**
Name of Course	**:**	**Wireless and Mobile communication**
Course Code	**:**	**ET 581**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**--**	**3 Hrs.**	**--**
Marks	**20**	**80**	**--**	**25**	**25**

Course Rationale:

This subject is introduced with the view that students are made familiar with wireless and mobile communication.

Course Objectives:

After studying this course, the student will be able to

- Understand the concept of wireless communication.
- Understand the concept of wireless local Loop.
- Understand the Cellular mobile communication.
- Understand the Digital Cellular mobile communication.

Course Content:

SECTION I

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
1.	**Wireless Introduction and Standards**		
	1.1 Introduction • Introduction to wireless Communication Systems • Example of wireless communication	10	12
	1.2 Wireless communication system generation and standards • First Generation and Its standards (AMPS,NAMPS,PDC) • Second generation and its standard (GSM,IS-136,PDC, IS-95), • 2.5 Generation and its standard (HSCSD,GPRS,EDGE,IS-95B) • Third Generation and Its standards (W-CDMA,EDGE,TD-SCDMA,CDMA-2000		
	1.3 Local Loop • Wireless Local Loop(LMDS) • PAN		
2.	**Radio Propagation**		
	2.1 Three basic propagation mechanisms: **(Definitions and mathematical equations)** • Reflection: Reflection from dielectrics, Perfect Conductor • Diffraction: Fresnel Zone geometry, Knife-edge model • Scattering	12	14
	2.2 Free space propagation model(mathematical equation)		
	2.2 Practical link budget design using path loss models (mathematical equations) • Log distance path loss model • Log Normal shadowing		
	2.4 Multipath propagation • Small scale multipath Propagation(Factors, Doppler shift) • Types of Small Scale fading (based on time delay spread and Doppler spread) • Large scale path loss		
3.	**Multiple access techniques**		
	3.1 Introduction to multiple access techniques. • FDMA,TDMA • CDMA	10	14
	• Spread Spectrum Multiple access • FHSS (Frequency Hopped Spread Spectrum) • DSSS (Direct Sequence Spread spectrum)		
	3.2 Wi-Fi and Wi-Max • Introduction of wi- fi and its standards(802.11) • Introduction of Wi-Max and Its standards (802.16)		

SECTION II

4	**Introduction to cellular Mobile system**		
	4.1 Mobile system • Limitations of conventional Mobile communication system. • History of 800MHZ frequency. • Trucking Efficiency.	**10**	**14**
	5.2 Cellular Mobile communication • Definition of Cell, Size and shape of cell • Basic cellular System (Block diagram,MTSO) • Operation of Cellular systems		
5	**Elements of cellular Mobile radio system**		
	5.1 Introduction • Maximum number of calls per hr per cell. • Maximum number of frequency channels per cell	**12**	**16**
	5.2 Frequency reuse • Definition • Frequency reuse schemes • Frequency reuse factor		
	5.3 Hand off • Handoff concept • Hand off types (Hard,soft,delayed and queued hand off)		
	5.4 Co-channel interference • Co-channel interference reduction factor		
	5.5 Cell splitting • Cell splitting Concept • Sectoring • Microcell zone concept		
6	**Digital Cellular Mobile Systems**	**10**	**10**
	6.1 GSM System • GSM Features • GSM system Architecture • Frame structure of GSM system		
	6.2 IS-95 system • IS-95 system architecture. • Frequency and channel Specifications		
	TOTAL	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Study of 2G, 3G Network
2.	To understand the operation of multiple access technique.
3.	To observe and understand the various process of mobile system.
4.	To identify and understand different section and components of GSM Mobile.
5.	To observe and analyze input /output signals of different sections
6.	(Four Experiments)To understand and perform various operations of mobile phone through AT Commands
7.	To understand and perform fault finding and troubleshooting of mobile Phone handset.
8.	Two experiments on Mobile Handset Maintenance.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Wireless communication system	Classroom teaching & Laboratory work
2.	Mobile radio propagation	Classroom teaching
3.	Wi-fi, Wi- Max	Classroom teaching & Visit
4.	Introduction To Cellular Mobile system	Classroom teaching & Industrial Visit
5.	Elements of Cellular Mobile radio system Design	Classroom teaching & Industrial Visit
6.	Digital Cellular Mobile Systems	Classroom teaching & Laboratory work

Text Books:

Sr. No	Author	Title	Publication
1	T.S. Rapport	Wireless communication principle & Practice	PHI
2	C.Y.Lee	Mobile Cellular Telecommunication System	TMH

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Wireless Communication System	06	02	04	12
2.	Mobile radio propagation	05	05	04	14
3.	Wi-Fi, Wi- Max	04	02	04	14
4.	Introduction to Cellular Mobile system	06	04	04	14
5.	Elements of Cellular Mobile Radio System Design	04	05	05	14
6.	Digital Cellular Mobile Systems	04	04	04	12
Total		**24**	**44**	**12**	**80**

Prepared By :

Barati		
(P.G.Gahukar.)	**(S.V.Chaudhari.)**	**(R.N.Shikari.)**
Lect. In E &TC	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/21/22/**23**/24/26/16/**17**
Name of Course	**:**	**Satellite Communication**
Course Code	**:**	**ET 582**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**--**	**3 Hrs**	**--**
Marks	**20**	**80**	**--**	**25**	**25**

Course Rationale:

Expose the student to basic ideas of satellite communication via orbiting satellite, important parts of today's technology.

Course Objectives:

After studying this course, the student will be able to

- To understand a general principle of orbiting satellite communication.
- To make student aware of the terminology, model, analysis, methodology and principles of modern satellite links.
- To know the basic line power analysis to idealized and simplified satellite models.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
	SECTION – I		
1.	**Satellite Systems**		
	Historical development of satellites, orbiting satellite, frequency bands, Satellite Multiple Access formats. Orbital Aspects of satellite communication orbital Mechanics, equation of orbit, locating satellite in orbit, orbital elements, orbital perturbations.	**8**	**10**
2.	**Satellite Channel & Antenna**		
	Satellite channel, Electromagnetic field propagation, power flow, polarization, Antenna gains pattern, and common antenna types: the parabolic (dish), Atmospheric losses, power loss, rainfall effects, receiver noise, temperature noise, noise figure.	**8**	**10**
3.	**Satellite Link**		
	Satellite link analysis, satellite up link, satellite down link, direct broadcasting, up down link analysis and satellite cross-links. Frequency, polarization and depolarization of spot beams, satellite down links, Frequency reuse with spot beams, Multiple beams.	**8**	**10**
4.	**Satellite Transponder**		
	The transponder model ,The satellite front end, front end noise, Front-end filter, front-end wave forms. Filtering of digital carriers, satellite signal processing.	**8**	**10**
	SECTION – II		
5.	**Transponder Limitations**		
	Nonlinear satellite Amplifiers AM/AM conversion, AM/PM conversion on nonlinear amplifier model, Effect of nonlinear amplification of digital carrier.	**8**	**10**
6.	**Optical Satellite Communication**		
	Review of optical beam transmission and reception, lasers, optic filter photo detection Detector efficiency, Gain, Responsivety, Bandwidth, optical Receiver noise, optical background noise power, optical line analysis, Direct detection systems, Heterodyne systems, Atmospheric effects.	**8**	**10**
7.	**Laser Cross Link Analysis**		
	Laser cross link analysis, Digital optical cross links, pulse laser encoding, Beam acquisition tracking, pointing, acquisition.	**8**	**10**
8.	**Transmission System**		
	Introduction to frequency division multiple access, Time division multiple access, TDM formats, Code division multiple access.	**8**	**10**
	TOTAL	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	To Plot radiation pattern of parabolic antenna.
2.	Measurement of noise.
3.	Calculation of noise figure.
4.	Study of channel specifications.
5.	Study of unlinking & down linking.
6.	Study of transponders.
7.	Setting of optical link.
8.	Study of FDMA, EDMA and CDMA.
9.	Study experiment on DTH system operation.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Satellite systems	Classroom Teaching & Laboratory work
2.	Satellite channel & Antenna	Classroom Teaching & Laboratory work
3.	Satellite link	Classroom Teaching & Laboratory work
4.	Satellite transponder	Classroom Teaching & Laboratory work
5.	Transponder limiting	Classroom Teaching & Laboratory work
6.	Optical satellite communication.	Classroom Teaching & Laboratory work
7.	Laser cross link analysis	Classroom Teaching & Laboratory work
8.	Transmission system	Classroom Teaching & Laboratory work

Text Books:

Sr. No	Author	Title	Publication
1.	Robert Gagliardi	Satellite Communication	

Reference Books:

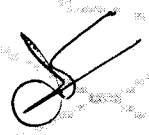
Sr. No	Author	Title	Publication
1.	Pratt	Satellite Communication	

Learning Resources: Different Technical Journals

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Satellite systems	4	3	3	10
2.	Satellite channel & Antenna	4	3	3	10
3.	Satellite link	4	3	3	10
4.	Satellite transponder	4	3	3	10
5.	Transponder limiting	4	3	3	10
6.	Optical satellite communication.	4	3	3	10
7.	LASER cross link analysis	4	3	3	10
8.	Transmission system	4	3	3	10
Total		**32**	**24**	**24**	**80**

Prepared By :

Pravati **(P.G.Gahukar.)**		
(P.B.Dighule.)	**(S.V.Chaudhari.)**	**(R.N.Shikari.)**
Lect. In E &TC	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/21/22/**23**/24/26/16/**17**
Name of Course	**:**	**Robotics**
Course Code	**:**	**ET 583**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**--**	**3 Hrs**	**--**
Marks	**20**	**80**	**--**	**25**	**25**

Course Rationale:

In present situation Diploma Engineer is working on production fields with interdisciplinary technologies. This subject is introduced with the view to make students aware with these technologies.

Course Objectives:

After studying this course, the student will be able to

•	Understand definition and scope of Mechatronics.
•	Know elements of Mechatronic systems.
•	Understand the application of electronics and instrumentation in mechanical and automobile engineering.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
	SECTION – I		
1.	**Basic Concepts of Robotics**		
	Definition of Robotics, different types of robotics, various generations of Robots. Robots Anatomy, Robotics system Components and schematic design, Robots configurations	**08**	**10**
2.	**Electrical and Mechanical Systems**		
	Electrical systems- AC and DC circuits. Mechanical systems- Hydraulic, Pneumatic, Nozzle-flapper.	**08**	**10**
3.	**Basic Mechanical Components**		
	Definition, types, operation only and applications of- Belts, Chains, Sockets, Cams and Gears.	**04**	**06**
4.	**Robotics sensors**		
	Robots drive system , variable speed arrangements path determination , micro machines in robotics Vision, ranging, fiber optic and tactile sensors. Proximity and Range sensors	**12**	**14**
	SECTION – II		
5.	**Applications of robot**		
	Mutiple robots , machine interface , robots in manufacturing and non- manufacturing applications , Selection of robot..	**06**	**08**
6.	**Control System Components**		
	AC and DC Servomotors, Stepper motors, Synchros, Servomechanism, AC and DC position control, Introduction to Programmable Logic Controllers (PLC)	**12**	**14**
7.	**Robotic Systems**		
	Definition, Types of robots, work envelope, degree of freedom, robot control systems, Speed motion load capacity , End effectors, Grippers, Applications of robots	**14**	**18**
	TOTAL	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Study of different types of gears and cams.
2.	Study of Synchros.
3.	Study of Steeper motor control.
4.	Study of Armature and Field control of DC motors
5.	Study of PLC.
6.	Simple programming on PLC.
7.	Study different types of robots by arranging industrial visits.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Basic concepts of Robotics	Classroom Teaching & Lab. work
2.	Electrical and Mechanical Systems	Classroom Teaching & Lab. Work
3.	Basic Mechanical components	Classroom Teaching & Lab. Work
4.	Introduction to control system	Classroom Teaching & Lab. Work
5.	Programmable Logic Controllers (PLC)	Classroom Teaching & Lab. Work
6.	Control System Components	Classroom Teaching & Lab. work
7.	Robotic systems	Classroom Teaching & Lab. work

Text Books:

Sr. No	Author	Title	Publication
1.	Mikell P. Weiss G.M	Industrial Robotics,	McGraw-Hill Singapore

Reference Books:

Sr. No	Author	Title	Publication
1.	Ghosh	Control in Robotics and Automation: Sensor Based Integration	Allied Publishers
2.	Alciatore D.G. Histand M.B.	Introduction to Mechatronics and Measurement systems	Tata McGraw Hill,N.Delhi
3.	John W Webb & Ronald A Reis	Programming Logic Controllers	PHI

Learning Resources: Manuals of PLC and CNC machine, 2 Industrial visits.

Prepared By :

(Dr.N.L.Janrao.) (G.N.Hainalkar..)	(S.V.Chaudhari.)	(R.N.Shikari.)
Lect. In E &TC	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/21/22/**23**/24/26/16/**17**
Name of Course	**:**	**Industrial Automation**
Course Code	**:**	**ET 584**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs.**	**3 Hrs**	**--**
Marks	**20**	**80**	**--**	**25**	**25**

Course Rationale:

This subject is introduced with the view that the students are made familiar with recent trends in industrial automation.

Course Objectives:

After studying this course, the student will be able to

- Understand the control modes.
- Understand the control strategies.
- Understand the PLC architecture, programming, etc.
- Understand the DCS and SCADA systems.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage
	SECTION – I		
1.	**Introduction**		
	Introduction to Closed loop control, Control modes like ON-OFF, Proportional, Integral Derivative, and combinations like PI, PD, and PID. Applications of PID controller. Pneumatic, Hydraulic and Electronic Controllers.	**10**	**12**
2.	**Advanced Controllers**		
	Control strategies: Ratio Control, Lead-Lag control, Cascade Control, Feed-Forward Control. Self tuning controllers, Digital controllers, Concept of Fuzzy Logic controller.	**10**	**12**
3.	**Programmable Controllers**		
	Introduction, definition & History of PLC, Manufacturing & Assembly Processes, PLC Advantages and Disadvantages, Overall PLC System, CPUs & Programmer/Monitors, PLC Input & Output Modules, Printing PLC Information. Applications of PLC	**12**	**16**
	SECTION – II		
4.	**PLC Programming**		
	Introduction, Programming Equipments, Programming Formats, PLC Ladder Diagrams, Process Scanning Consideration, Devices to which PLC Input and Output Modules are Connected, Input on/off Switching Devices, Input Analog Devices, Output on/off Devices, Output Analog Devices. PLC Selection Criteria	**10**	**12**
5.	**Hierarchical & Distributed Control System**		
	Concept of Computer aided process control system, Direct digital control, and Distributed control. Overview and Architecture. Operation of Workstations. Subsystems- Data collection subsystem, Process computing subsystem. Telemetry System- Methods of Telemetry, Fiber optic Transmission.	**10**	**14**
6.	**SCADA**		
	Supervisory Control and data Acquisition: Data Acquisition System, Basic Components of SCADA, Functions of Components, Types Communications- Configurations of SCADA, Comparison between DCS and SCADA. Applications of SCADA.	**12**	**14**
	TOTAL	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Experiment based on P Controller
2.	Experiment based on combination of P+I Controller
3.	Experiments based on combination of P+I+D Controller
4.	Concept of PID tuning
5.	Basic Ladder programming
6.	Trouble shooting of PLC Based system
7.	Industrial visit for study of DCS
8.	Industrial visit for study of SCADA

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Classroom teaching & Laboratory work
2.	Advanced Controllers	Classroom teaching & Laboratory work
3.	Programmable Controllers	Classroom teaching & Laboratory work
4.	Hierarchical control system	Classroom teaching & Industrial Visit
5.	Distributed Control System	Classroom teaching & Industrial Visit
6.	SCADA	Classroom teaching & Industrial Visit

Text Books:

Sr. No	Author	Title	Publication
1.	B. G. Liptak	Process Control	
2.	John W Webb & Ronald A Reis	Programming Logic Controllers	PHI

Learning Resources: Reference Books, Manuals and journals

Prepared By :

(N.L.Janrao.) (G.N.Hainalkar.)	(S.V.Chaudhari.)	(R.N.Shikari.)
Lect. In E &TC	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Very Large Scale Integration(VLSI)**
Course Code	**:**	**ET 585**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**3 Hrs.**	**3 Hrs. For batch of 20 students**	**--**
Marks	**20**	**80**	**--**	**25**	**25**

Course Rationale:

The influence of integrated-circuit technology in the past few years on our society has been pervasive, in area ranging from consumer products to business management to manufacturing control. The driving force behind this pervasiveness is that the functional capability of modern integrated circuitry has increased in scope and complexity exponentially with time over the past 20 years. The designers of modern integrated circuitry have continually endeavored to provide more computational speed with less dissipated electrical power and less circuit board area, while maintaining a low failure rate and an aggressive cost. The complexity and speed is finding ready application for VLSI systems in digital processing. Although silicon MOS-based circuitry will meet most requirements in such systems .The student can acquire knowledge in the design skill of combinational and sequential circuit with the help of VHDL and CMOS Logic circuit processing operation, student can use this knowledge as technician, supervisor and programmer in different sections of industry.

Course Objectives:

After studying this course, the student will be able to

•	Develop the state diagram, state table
•	Develop model of Moore and Mealy machine
•	Implement CMOS logic and logical equations.
•	Comprehend CMOS processing Technology
•	Comprehend Hardware description language , its components and programming syntax
•	Develop program to implement combinational and sequential logic circuit using VHDL
•	Comprehend VHDL simulation and synthesis
•	Comprehend ASIC, FPGA and PLDs.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
	SECTION – I		
1.	**Introduction**		
	1.1. Review of Sequential Logic : Asynchronous and Synchronous, Metastability, Noise margins, Power Fan-out, Skew (Definitions only) 1.2. Moore and Mealy Models, state machine notation, examples on Moore and mealy: counter, sequence detector only	8	12
2.	**VLSI Design Concepts and Technology**		
	2.1 Comparison of BJT and CMOS parameters 2.2 Design of Basic gates using CMOS: Inverter, NOR,NAND, MOS transistor switches, transmission gates. 2.3 Drawing of complex logic using CMOS (building of logic gate as per the Boolean equation of three variable) 2.4 Estimation of layout resistance and capacitance, switching characteristics, 2.5 Fabrication process: Overview of wafer processing,Oxidation, epitaxy, deposition, Ion–Implementation and diffusion, silicon gate process. 2.6 Basics of NMOS, PMOS and CMOS: nwell, pwell, twin tub process.	13	12
3.	**Introduction:Hardware Description Language (HDL)**		
	3.1 Introduction to HDL: History of VHDL, Pro's and Con's of VHDL 3.2 VHDL Flow elements of VHDL(Entity, Architecture,configuration, package, library only definitions) 3.3 Data Types, operators, operations 3.4 Signal, constant and variables(syntax and use)	12	16
	SECTION – II		
4.	**Hardware Description Language (HDL)**		
	4.1 Concurrent constructs (when, with, process) 4.2 Sequential Constructs (process, if, case, loop, assert, wait) 4.3 Simple VHDL program to implement Flip Flop, Counter, 4.4 shift register, MUX, DEMUX, ENCODER, DECODER 4.5 MOORE, MEALY machines 4.6Test bench and its applications	12	16
5	**Simulation and Synthesis**		
	5.1 Event scheduling, sensitivity list, zero modeling, simulation cycle 5.2 Comparison of software and hardware description language,delta delay 5.3 Types of simulator event based and cycle based . 5.4 HDL Design flow for synthesis 5.5 Efficient Coding Styles, Optimizing arithmetic expression,sharing of complex operator	13	12

6.	**Architecture of ASIC and PLD**		
	6.1 ASIC design flow 6.2 CPLD -Xilinx and Atmel series architecture, Details of internal block diagram 6.3 Introduction to FPGA like Xilinx (FPGA), SPARTAN 3 series and Atmel	06	12
	TOTAL	64	80

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Write VHDL program for any two basic gates.	02
2.	Write VHDL program for full adder / subtractor & Synthesize using FPGA	04
3.	Write VHDL program for 8:1 multiplexer & Synthesize using FPGA	02
4	Write VHDL program for 2:4 Decoder & Synthesize using FPGA	02
5.	Write VHDL program for 8:3 Encoder & Synthesize using FPGA	02
6.	Write VHDL program for synchronous counter & Synthesize using FPGA	04
7.	Write VHDL program for binary to gray code converter & synthesize using FPGA	02
8.	Write VHDL program for RS,JK, FLIPFLOP & Synthesize using FPGA	04
9	Write VHDL program for D ,T FLIPFLOP & Synthesize using FPGA	02
10.	Write VHDL program for SHIFT REGISTER& Synthesize using FPGA	04
11.	Implement four Bit ALU or sequence generator.	04
	Total	32

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Class room teaching
2.	VLSI Design Concepts and Technology	Class room teaching
3.	Introduction:Hardware Description Language (HDL)	Class room teaching and labortary
4.	Hardware Description Language (HDL)	Class room teaching and labortary
5.	Simulation and Synthesis	Class room teaching and labortary
6.	Architecture of ASIC and PLD	Class room teaching

Books:

Sr. No.	Author	Title	Publication
1.	Gaganpreet Kaur	VHDL Basics to programming	Pearson
2	John M. Yarbrough	Digital Logic: Application and design	Thomson
3	William I. Fletcher	An Engineering approach to digital design	Prentice-Hall of India
4	Neil H. E. Weste Kamran Eshraghian	Principals Of CMOS VLSI Design: A Systems Perspective	Pearson Education
5	Douglas Perry	VHDL Programming by example	Tata McGraw-Hill
6	Sarkar & Sarkar	VLSI design and EDA tools	Scitech Publication India Ltd

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction & Physical layer	06	04	06	16
2.	The Data Link Layer	04	04	04	12
3.	Medium Access Sub layer	04	04	04	12
4.	The Network Layer	04	04	04	12
5.	The Transport Layer	06	04	06	16
6.	The Application Layer	04	04	04	12
	Total	28	24	28	80

Prepared By:

(P.M.Zilpe.)	S.V.Chaudhari	R.N.Shikari.
Lect. In E &TC	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ET**/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26
Name of Course	**:**	**Embedded Systems**
Course Code	**:**	**ET586**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**04**	**64**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Two class tests, each of 60 minutes**	**3 Hrs.**	**--**	**3 Hrs. For batch of 20 students**	**--**
Marks	**20**	**80**	**--**	**25**	**25**

Course Rationale:

The study of embedded systems is essential. It deals with hardware with software embedded in it. This subject will enable student to develop logical thinking and use of "Firmware". This subject mainly deals with ARM-7 microcontroller, Students will be able to develop Real Time Systems, Device drivers, use interrupt service mechanism, program timing and counting devices and develop embedded C-Programs forMicrocontroller.

Course Objectives:

After studying this course, the student will be able to

•	Access embedded systems hardware units like processor, I/O device, On-chip and Offchip device, Power supply etc
•	Write embedded program
•	Knowledge of developing microcontroller based systems.
•	Knowledge of communication protocols
•	Perform software analysis, design, implementation, testing, debugging for embedded systems..

.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
	SECTION-I		
1.	**Introduction ARM controller**		
	1.1 RISC design philosophy ,ARM design philosophy, 1.2 Embedded System Hardware: arm bus technology ,arm bus protocol 1.3 Pipelining In Arm 1.4 ARM7 processor family 1.4 Simplified view – ARM7TDMI block diagram, core diagram , Thumb Mode concept 1.5 ARM7TDMI programming model – Registers, Operation modes, Exceptions and Interrupts, Reset Sequence , 1.6 On chip peripherals: - Internal memory, GPIOs, Timers, ADC, UART ,SPI,I2C, PWM, RTC,WDT (check for pins, block diagram, working of peripheral)	**12**	**16**
2.	**ARM 7 Instruction set and Programming**		
	2.1 Instruction Set, datatransfer,arithmetic,logical,comparison,multiply,loadstore,branching 2.2 simple programs depending on above instruction set expected .Can go for assembly or 'C' programs . 2.3 Simple programs of led blinking for GPIO (no programming for other on-chip peripherals in theory but can be done in lab)	**10**	**12**
3.	**Communication Protocols**		
	Study of communication of protocols with their features , OSI layer diagram and working 5.1 Serial protocols: USB, IEEE 1394 5.2 Network protocols: LIN,MODBUS, Ethernet 5.3 wireless protocols: IrDA, Bluetooth 5.4 Buses for Parallel Communication – ISA,PCI,PCI-X	**12**	**12**

SECTION-II

4.	**Overview of Embedded Software**		
	4.1Categories of embedded systems , 4.2 Requirements of embedded systems, and Applications of embedded Systems. 4.3 Hardware architectures for embedded systems. 4.4 System on chip (SOC) 4.5 Survey of software architecture 4.6 Embedded software tools. IDE, Compiler, Debugger, Simulator, Emulator, In circuit Emulator(ICE),TargetBoard, Device Programmer 4.7 Embedded software development CYCLE.	**12**	**12**
5.	**Device Driver & Interrupts Servicing Mechanism**		
	5.1 ISR concept 5.2 Intruppt sources 5.3 Intrupt handling mechanism 5.4 Multiple intruppts, context switching 5.5 Device Drivers 5.6 Parallel port device driver 5.6 Serial port device driver 5.7 Internal Programmable timing devices .	**10**	**12**
6.	**RTOS & Inter process Communication**		
	6.1 Concepts of RTOS -Requirement, Need and Specification of RTOS in embedded systems. 6.2 Inter process Communication- Shared Resources,TaskMultitasking ,Task synchronization , Context Switching, Kernels, Pre-emptive and non pre-emptive Schedulers, Static and Dynamic Priorities, Priority Inversion, Mutual Exclusion ,Starvation, Deadlock, Multiple process , Synchronization , Problem of sharing data by Multiple task and routines , 6.3 Inter task communication mechanisms: semaphores, Mailbox, Pipes.	**10**	**16**
	TOTAL	**64**	**80**

List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Identification & observation of ARM7 system board on the kit.	02
2.	Introduction of KEIL /IAR/ any IDE software .	02
3.	Assembly language **or** C programs which cover data moving instruction ,block transfer ,Arithmetic instructions, Jump, instructions, Logic instructions, comparison,multiply,load store.	14
4.	Generate square wave and rectangular wave on port pin with a program	02
5.	External interfacing of leds with ARM	02
6.	Blink LEDs in a controlled pattern	02
8.	Control an LED using a switch by interrupt method.	02
9.	Take analog readings on rotation of rotary potentiometer connected to an ADC channel	02
10.	Display message on LCD	02
11.	UART communication.	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction ARM controller	Class room teaching & Laboratory work
2.	ARM 7 Instruction set and Programming	Class room teaching & Laboratory work
3.	Communication Protocols	Class room teaching & Laboratory work
4.	Overview of Embedded Software	Class room teaching & Laboratory work
5.	Device Driver & Interrupts Servicing Mechanism	Classroom Teaching
6.	RTOS & Inter process Communication.	Classroom Teaching & Lab. Work

Text Books:

Sr. No	Author	Title	Publication
1.	Sloss Andrew N, Symes Dominic, Wright Chris,	ARM System Developer's Guide: Designing and Optimizing system software	Pearson
2.	ARM7TDMI Microcontroller datasheet and User Manual	---	Morgan Kaufman Publication
3.	Raj Kamal	Embedded Systems – Architecture: Programming and Design	TMH

Reference Books:

Sr. No	Author	Title	Publication
1.	Steve furber	ARM System-on-Chip Architecture	Pearson Education.
2.	Frank Vahid and Tony Givargis	Embedded System Design	Wiley

Technical references and user manuals on www.arm.com and Texas Instruments www.ti.com

Learning Resources: Reference Books, Journals, Data Manuals, and URL's.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
	Section I				
1.	Introduction ARM controller	8	4	4	16
2.	ARM 7 Instruction set and Programming	4	4	4	12
3.	Communication Protocols	4	4	4	12
4.	Overview of Embedded Software	8	4	-	12
5.	Device Driver & Interrupts Servicing Mechanism	4	4	4	12
6.	RTOS & Inter process Communication.	4	8	4	16
	Total	**32**	**28**	**20**	**80**

Prepared By :

(P.M.Zilpe.)	(S.V.Chaudhari.)	(R.N.Shikari.)
Lect. In E &TC	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in CM / IT**
Programme Code	**:**	**06 /07/26**
Name of Course	**:**	**Fundamentals of Electronics**
Course Code	**:**	**ET 284**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	Three class tests, each of 60 minutes	3 hrs.	3 hrs.	--	--
Marks	**20**	**80**		25	**25**

Course Rationale:

This course will be useful in understanding of construction, working and applications of semiconductor devices and circuits.

Course Objectives:

After studying this course, the student will be able to

- Explain construction, working, characteristics and applications of semiconductor devices and circuits.
- Build and test the circuits

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Marks
1.	**Semiconductor devices**			
	Concept& principles of electronics devices		**16**	**22**
	1.1	Rectifying diode: Review of P - type and N - type semiconductor ,PN junction, Barrier voltage , depletion region ,Junction Capacitance Forward biased & reversed biased junction. Diode symbol , forward & reversed Characteristics of PN junction diode **Specifications** : Forward voltage drop , Reverse saturation current, maximum forward current , power dissipation ,Package view of diodes of different power ratings (to be shown during practical hours)		
	1.2	**Zener diode :** Construction ,Symbol ,characteristics (forward & reversed) Avalanche &zener breakdown **Specifications :** Zener voltage , power dissipation , break over current,dynamic resistance & maximum reverse current (to be shown during practical hours)		
	1.3	**Rectifier :** Half wave and Full wave Rectifier, circuit diagram, working, comparison, merits and demerits. Filters, necessity, types, comparison, merits, demerits.		
	1.4	**Transistor :** construction, symbol, operating principle, characteristics, applications, rating and specifications, configurations, comparison between CB, CE, CC.		
	1.5	**UJT :** Construction, symbol, operating principle, characteristics, applications, rating and specifications.		
	1.6	**FET:** Construction, symbol, operating principle, characteristics, applications, rating and specifications, configurations, comparison.		
	1.7	**SCR :** Symbol, their construction, working, characteristics, applications		
2.	**Oscillator**			
	2.1	Block diagram, Barkhausan Criteria for sustained oscillations		

	2.2	classification: LC and RC. Oscillations in LC tank circuit; Hartley; Colpitts. RC Wein Bridge and Phase shift, Oscillator. Crystal Oscillator.	**08**	**16**
3.	**Linear ICs,**			
	3.1	OP AMP. IC 741, symbol, pin diagram, ideal and typical characteristics, Applications such as Inverting , Non Inverting amplifier, Difference amplifier, adder substractor , Integrator, differentiator.	**09**	**14**
	3.2	Timer IC 555: Block diagram, operating modes viz. Astable, Monostable.		
4.	**Instrumentation**			
	4.1	CRO: Cathode Ray Tube, Oscilloscope Block diagram, operation, oscilloscope specifications, Applications.	**07**	**12**
	4.2	Function generator, Block diagram, operation, specifications, applications		
5.	**Transducer**			
	5.1	Definition, classification: Active, Passive, Primary, Secondary, Mechanical, Electronic, Analog, Digital, Selection criteria, Resistive, Capacitive, Inductive, Transducers(LVDT), Photoelectric, Piezoelectric Transducers, proximity switch, Construction, Operation, One example of each, Applications,	**08**	**16**
		Total	**48**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Plot V-I characteristics of P-N junction diode.	02
2.	Study of Half wave and Full wave rectifier with and without filter.	02
3.	Plot the i/p and o/p characteristics in CE configurations.	02
4.	Plot the characteristics of FET.	02
5.	Plot the characteristics of UJT.	02
6.	Plot the characteristics of SCR.	02
7.	Study of Hartley and Colpitts oscillator.	02
8.	Study of RC phase shift and Wein Bridge.	02
9.	Study of Inverting and Non Inverting Amplifier.	02
10.	Study of Integrator and Differentiator.	02
11.	Study of astable multivibrator using 555.	02
12.	Study of C.R.O.	01
13.	Study of Function generator.	01
14.	Study of Transducers.	02
	Total	**32**

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Semiconductor devices.	Classroom teaching and laboratory work.
2.	Digital fundamentals.	Classroom teaching and laboratory work.
3.	Linear IC`s.	Classroom teaching and laboratory work.
4.	Oscillator.	Classroom teaching and laboratory work.
5.	Instrumentation.	Classroom teaching and laboratory work.
6.	Transducer.	Classroom teaching and laboratory work.

Text Books:

Sr. No	Author	Title	Publication
1.	Albert Malvino.	Basic Electronics.	TMH.
2.	Katre.	Basic Electronics.	Tech-Max.
3.	B.L.Theraja.	Basic Electronics.	S.Chand.
4.	RamakantGaikwad	Linear Integrated Circuits	PHI
5.	R P Jain	**Modern Digital Electronics**	TMH
6.	A K Sawheny	Instrumentation	DHANPAT RAI & SONS

Reference Books:

Sr. No	Author	Title	Publication
1.	Mottershed	Electronics Devices and Circuits.	PHI
2.	MilmannHalkies	Electronics Devices and Circuits.	TMH

Learning Resources: Reference Books, Data Manual

Prepared By :

(P.N.Malu.) (P.B.Dighule.)	(S.V.Chaudhari.)	(R.N.Shikari.)
Lect. In E &TC	Member Secretary, PBOS	Chairman, PBOS

Programme	**:**	**Diploma in ME / MT**
Programme Code	**:**	**04/ 05 /18/19**
Name of Course	**:**	**Elements of Electronics Engineering**
Course Code	**:**	**ET 285**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	Two class tests, each of 60 minutes	3 hrs.	--	--	--
Marks	**20**	**80**	**--**	--	**25**

Course Rationale:

This course will be useful in understanding of construction, working and applications of semiconductor devices and circuits.

Course Objectives:

After studying this course, the student will be able to

- Explain construction, working, characteristics and applications of semiconductor devices and circuits.
- Build and test the circuits

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Marks
1.	**Semiconductor devices**			
	1.1	1 **Semiconductor theory** **Types** : 1] intrinsic Semiconductor 2] Extrinsic semiconductor **-** P – type and N - type semiconductor. **PN junction diode**: Diode symbol, Working, Barrier voltage, depletion region, Junction Capacitance, Forward & reverse Characteristics.	15	20
	1.2	**Zener diode :** Diode symbol, Working, Forword & reverse Characteristics Avalanche & zener breakdown.		
	1.3	**Rectifier :** Defination , Classification Half wave and Full wave Rectifier: circuit diagram, working, comparison, merits and demerits. Filters, necessity, types , comparison, merits, demerits		
	1.4	**Transistor :** construction, symbol, operating principle, characteristics, configurations, comparison between CB, CE, CC ,applications		
	1.5	**FET:** Classification of FET : Construction, symbol, operating principle, characteristics, and applications of JFET.		
	1.6	**SCR :** Symbol, their construction, working, characteristics, applications		
2.	**Oscillator**			
	2.1	Block diagram, Barkhausan Criteria for sustained oscillations, Oscillations in LC tank circuit; Classification: LC and RC. Classification of RC Oscillator: Working of RC Phase shift & Wein Bridge Oscillator. Clasification of LC Oscillator: Working of Hartley, Colpitts, and Crystal Oscillator.	**07**	**12**
3.	**Digital Fundamentals**			
	3.1	Number systems: Decimal, Binary, Hexadecimal, Octal.	**07**	**12**
	3.2	Basic logic gates: AND, OR, NOT, NAND, NOR, EXOR symbols, IC numbers and Truth Table.		

	3.3	Boolean Algebra: Fundamentals of Boolean algebra, Basic laws,De Morgan`s theorem		
4.	**Linear ICs,**			
	4.1	OP AMP. IC 741, symbol, pin diagram, ideal and typical characteristics, Applications such as Inverting , Non Inverting amplifier, Difference amplifier, adder, substractor, Integrator, differentiator. (using closed loop system)	**07**	**12**
5.	**Instrumentation**			
	5.1	CRO: Cathode Ray Tube, Oscilloscope Block diagram, operation, oscilloscope specifications, Applications.	**05**	**12**
	5.2	Function generator, Block diagram, operation, specifications, applications		
6.	**Transducer**			
	6.1	Definition, Selection criteria of Transducer. **Classification:** Active, Passive, Primary, Secondary, Mechanical, Electronic, Analog, Digital, Resistive, Capacitive, Inductive Transducers. **Construction, Operation, Applications :** LVDT, RTD, Thermocouple , Photoelectric, Piezoelectric Transducers,	**07**	**12**
Total			**48**	**80**

List of Practicals / Experiments/Assignments:

Sr. No.	**Name of Practical/Experiment/Assignment**	**Hrs**
1.	Plot V-I characteristics of P-N junction diode.	02
2.	Study of Half wave and Full wave rectifier with and without filter.	02
3.	Plot the i/p and o/p characteristics in CE configurations.	02
4.	Plot the characteristics of FET.	02
5.	Plot the characteristics of SCR.	02
6.	Study of Hartley and Colpitts oscillator.	02
7.	Study of RC phase shift and Wein Bridge.	02
8.	Study of logic gates and verifications of logic gates.	02
9.	Verification of De Morgan`s theorem.	02
10.	Study of Inverting and Non Inverting Amplifier.	02
11.	Study of Adder, Substractor.	02
12.	Study of Integrator and Differentiator.	02
13.	Study of C.R.O.	02
14.	Study of Function generator.	02
15.	Study of Transducers.	02

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Semiconductor devices.	Classroom teaching and laboratory work.
2.	Digital fundamentals.	Classroom teaching and laboratory work.
3.	Linear IC`s.	Classroom teaching and laboratory work.
4.	Oscillator.	Classroom teaching and laboratory work.
5.	Instrumentation.	Classroom teaching and laboratory work.
6.	Transducer.	Classroom teaching and laboratory work.

Text Books:

Sr. No	Author	Title	Publication
1.	V.K. Mehata	Principle of Electronics	TMH.
2.	R.S.Sedha	Applied Electronics	TMH.
3.	B.L.Theraja.	Basic Electronics.	S.Chand.
4.	Ramakant Gaikwad	Linear Integrated Circuits	PHI
5.	R P Jain	Modern Digital Electronics	TMH
6.	H.S. Kalsi	Electronics Instrumentation	TMH

Reference Books:

Sr. No	Author	Title	Publication
1.	Mottershed	Electronics Devices and Circuits.	PHI
2.	Milmann Halkies	Electronics Devices and Circuits.	TMH

Learning Resources: Reference Books, Data Manual

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Semiconductor Devices	10	06	04	20
2.	Oscillators	04	06	02	12
3.	Digital Fundamentals	06	04	02	12
4.	Linear I C 's	06	04	02	12
5.	Instrumentation	06	04	02	12
6.	Transducers	06	04	02	12
Total		**38**	**28**	**14**	80

Prepared By :

(N.S.Bakade.)	(S.V.Chaudhari.)	(R.N.Shikari.)
Lect. In E &TC	**Member Secretary, PBOS**	**Chairman, PBOS**

Programme	**:**	**Diploma in** ET/CE/**EE**//ME/MT/CM/IT/DDGM
Programme Code	**:**	01/**02**/03/04/05/06/07/08/21/**22**/23/24/26/**16**/17
Name of Course	**:**	**Digital Electronics And Microprocessor**
Course Code	**:**	**ET 390**

Teaching Scheme:

	Hours /Week	**Total Hours**
Theory	**03**	**48**
Practical	**02**	**32**

Evaluation Scheme:

	Progressive Assessment	**Semester End Examination**			
		Theory	**Practical**	**Oral**	**Term work**
Duration	**Three class tests, each of 60 minutes**	**3 hrs.**	**--**	--	--
Marks	**20**	**80**	**50**	**--**	**--**

Course Rationale:

Now a day's application of digital circuits and microprocessors are extensively used in measurement and control applications in the field of electrical engineering and electrical power systems. So the digital electronics and microprocessor has been introduced as a subject in electrical engineering curriculum. This course covers digital circuits logic gates Flip-flop, microprocessor 8085 architecture, its instruction set, programming and applications. After completing this subject the student can write and execute programs for microprocessor based applications.

Course Objectives:

After studying this course, the student will be able to

•	Observe logic circuits
•	Assemble Logic circuits
•	Test the logic circuit
•	Observe logic circuits
•	Describe architecture and operation of microprocessor 8085
•	Design and develop microprocessor based systems

•	Explain various applications of microcontrollers
•	Develop assembly language programs using instruction set of 8085
•	Describe architecture and operation of microprocessor 8085

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Marks
1.	**Introduction to Digital Technique**		**08**	**12**
	1.1	Digital signal and Digital Circuit.		
	1.2	Advantages and Disadvantages of digital circuit.		
	1.3	Generation of Digital signal.		
	1.4	Number system- Introduction, decimal, binary, octal & hexadecimal		
	1.5	Conversion of Decimal to Binary Number & vice versa.		
	1.6	Decimal to Hex and vice versa		
	1.7	Hex to binary and vice versa		
	1.8	Octal to decimal and vice versa		
	1.9	Octal to binary and vice versa.		
	1.10	BCD number system.		
	1.11	1's compliments and 2's compliment.		
	1.12	Addition and Subtraction of Binary number**.**		
2.	**Logic gates and Boolean Algebra**		**08**	**16**
	2.1	Logical symbol, logical expression and truth table of AND, OR, NOT, NAND, NOR, EX-OR and EX-NOR gates.		
	2.2	Universal gates – NAND, NOR Gates.		
	2.3	Logical circuit of basic gates using universal gates.		
	2.4	TTL and CMOS Logic gates IC's and their Pin configuration.		
	2.5	Boolean Algebra – Fundamental concept, Basic Laws of Boolean Algebra.		
	2.6	Half-adder and Full – adder.		
	2.7	Introduction to Flip-Flop. - RS Flip-Flop, J.K.Flip-Flop, T & D Flip-flop and their Field of applications of flip-flop.		
	2.8	Introduction to Registers , shift to right and shift to left registers		
	2.9	Introduction to counter – up counter, down counter and decade counter		
3.	**Introduction to Microprocessor**		**06**	**12**

	3.1 3.2 3.3 3.4	Microprocessor as Physical system, pin diagram & Pin configuration of Intel 8085 Microprocessor. Architecture and organization of INTEL 8085. Data bus, Control bus, CPU, ALU, accumulator. Programming model of INTEL 8085		
4.		**INTEL 8085 Assembly Language Programming**		
	4.1 4.2 4.3 4.4 4.5 4.6 4.7	Instruction set for 8085/8085A Microprocessor. Addressing modes of 8085 Microprocessor. Data movement instruction, PUSH and POP, increment & decrement instruction, Rotate and shift instruction. Arithmetic Instructions such as add, sub. Compliment /decimal adjustment instruction. Logical instructions such as AND OR & EX-OR instruction. Branching instructions: - Jump, Call & instruction, conditional Jump call & Return instruction. Looping instructions Simple Programming on Addition, subtraction, multiplication, division, data movement, sorting, find largest/smallest number**.**	**10**	**20**
5.		**Memories**		
	5.1 5.2	Semiconductor memories: RAM, ROM volatile and non-volatile RAM. Memory Map.	**02**	**04**
6.		**Timing Diagram**		
	6.1	Timing diagram of fetch operation , read operation & right operation (with & without ATT States**)**	**04**	**06**
7		**Interfacing the Microprocessor**		
	7.1 7.2	General purpose programmable devices IC's:8255, 8253, 8237& key board interfacing 8279. Introduction to serial communication RS-232C		
		Total	**48**	**80**

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1	Verification of Truth table of logic gates.
2	Verification of De Morgan's Theorem
3	Verification of Truth Table of Flip-flops
4	Study of A/D Convertor.
5	Study of data sheets related to digital IC's
6	Assembly Language programming on – • 1's compliment • shift left operator • 8 bit addition of two numbers • 16-bit addition of two numbers • 8-bit subtraction of two numbers • Binary division • To find larger number • To find smaller number • To find largest number • To find smallest Number • To arrange numbers in ascending order • To arrange numbers in descending order.
7	Study of 8255 PPI IC
8	Study of 8279 PPI IC

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Introduction to Digital Technique.	Classroom teaching and laboratory work.
2	Logic gates and Boolean Algebra.	Classroom teaching and laboratory work.
3	Introduction to μP.	Classroom teaching and laboratory work.
4	INTEL 8085 Assembly Language Programming	Classroom teaching and laboratory work.
5	Memories	Classroom teaching and laboratory work.
6	Timing Diagram	Classroom teaching and laboratory work.
7	Interfacing the microprocessor	Classroom teaching and laboratory work.

Text Books:

Sr. No	Author	Title	Publication
1	Malvino	Principles of Digital Electronics	Mcgraw Hill
2	R.P.Jain	Digital Electronics	Tata Mcgraw Hill
3	B.Ram	Microprocessor &	S.Chand

Reference Books:

Sr. No	Author	Title	Publication
1.	Pal mer	Introduction to digital systems	Mcgraw Hill
2.	Mathur	Introduction to microprocessor	Tata Mcgraw Hill

Learning Resources: Class room & laboratory work, Reference books, Machine catalogs, Transparencies.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Introduction to Digital	04	02	06	12
2	Technique.	04	06	06	16
3	Logic gates and Boolean	06	04	02	12
4	Algebra.	04	06	10	20
5	Introduction to µP.	02	02	00	04
6	INTEL 8085 Assembly	02	04	00	06
7	Language Programming	04	04	02	10
	Total	**26**	**28**	**26**	**80**

Prepared By:

N.S.Bakade.	S.V.Chaudhari	R.N.Shikari.
Lect. In E &TC	**Member Secretary, PBOS**	**Chairman, PBOS**