



**TECHNICAL EXAMINATIONS BOARD  
GUJARAT STATE**

**GANDHINAGAR**

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**CURRICULUM FOR**

**DIPLOMA PROGRAMME**

**IN**

**ELECTRONICS & COMMUNICATION  
ENGINEERING (13)**

**SEMESTER SYSTEM**

**2005-06**



**DEVELOPED BY**

**CURRICULUM DEVELOPMENT CENTRE  
R.C.T.I. CAMPUS,  
TECHNOLOGY BHAVAN,  
2<sup>ND</sup> FLOOR, SOLA,  
AHMEDABAD-60**

**TECHNICAL EXAMINATIONS BOARD, GUJARAT STATE, GANDHINAGAR**  
**PROGRAMME STRUCTURE FOR SEMESTER SYSTEM**  
**DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING [ 13 ]**

**Semster First**

Sr No	Semester Course code	Name of course	Teaching Scheme		Examination Scheme				
			Lect	Pract.	Hr.	Th.	Pract.	T.W	Total
1.	S-101	Communication Skills	4	--	3	100	--	--	100
2.	S-102	Mathematics-I	4	--	3	100	--	--	100
3.	S-103	Applied Science-I[Physics]	2	--	2	50	--	--	50
4.	S-104	Engineering Measurements-I	--	2	--	--	--	50	50
5.	S-105	Engineering Drawing	2	4	4	100	--	50	150
6.	S-111	Office Automation	--	4	--	--	50	50	100
7.	S-114	Electronic Materials & Components	3	--	3	100	--	--	100
8.	S-126	Essentials of Environment and Seismic Engineering	3	--	3	100	--	--	100
			<b>18</b>	<b>10</b>		<b>550</b>	<b>50</b>	<b>150</b>	<b>750</b>

**Semester Second**

1.	S-201	Mathematics-II	3	--	2	50	--	--	50
2.	S-202	Applied Science-II[Chemistry]	2	--	2	50	--	--	50
3.	S-207	Engineering Measurements-II	--	2	--	--	--	50	50
4.	S-211	Basic Electrical Engineering	3	2	3	100	--	50	150
5.	S-212	Programming In C	2	4	3	100	--	50	150
6.	S-213	Electronic Practices	--	4	--	--	--	50	50
7.	S-227	Fundamentals of Information Technology	3	--	3	100	--	--	100
8.	SEC/SIC/SCE/SPE-251	Electronic Devices & Circuits-I	3	4	3	100	50	25	175
			<b>16</b>	<b>16</b>		<b>500</b>	<b>50</b>	<b>225</b>	<b>775</b>

**Semester: Third**

1.	S-301	Human Resource Management	3	--	3	100	--	--	100
2.	SEC/SIC/SPE-302	Electronic Devices & Circuits-II	3	4	3	100	50	25	175
3.	SEC/SIC/SPE/SCE-303	Digital Electronics	3	2	3	100	50	25	175
4.	SEC-304	Electronic Networks & Lines	3	2	3	100	50	25	175
5.	SEC-305	Communication Engineering-I	3	2	3	100	50	25	175
6.	SEC-306	Electronic Instruments & Measurements	3	2	3	100	50	25	175
7.	SEC/SPE-307	Electronics workshop	--	4	--	--	--	50	50
			<b>18</b>	<b>16</b>		<b>600</b>	<b>250</b>	<b>175</b>	<b>1025</b>

**Semester: Forth**

1.	S-401	Entrepreneurship Development	3	--	3	100	--	--	100
2.	SEC/SIC/SPE/SCE-402	Micro processor & Assembly Language Programming	3	2	3	100	50	25	175
3.	SEC-403	Antenna & Wave Propagation	3	2	3	100	--	25	125
4.	SEC-404	Industrial Electronics	3	4	3	100	50	25	175
5.	SEC-405	Communication Engineering-II	3	2	3	100	50	25	175
6.	SEC-406	Television Engineering	4	4	3	100	50	25	175
			<b>19</b>	<b>14</b>		<b>600</b>	<b>200</b>	<b>125</b>	<b>925</b>

**Semester: Fifth**

1.	SEC/SIC/SPE/SMKT-501	Microcontroller	3	2	3	100	50	25	175
2.	SEC-502	Mobile Communication	3	2	3	100	50	25	175
3.	SEC-503	Microwave Engineering	3	2	3	100	50	25	175
4.	SEC-504	Telecommunication Techniques and Applications	3	2	3	100	50	25	175
5.	SEC-505	Fiber optics communication	3	2	3	100	50	25	175
6.	SEC-506	Electronic projects	--	4	--	--	50	50	100

**Elective- Any One from following courses**

I	SEC-507	Computer Networks	3	2	3	100	50	25	175
II	SEC/SIC-508	Microprocessor Interfacing & Applications	3	2	3	100	50	25	175
III	SEC-509	Medical Electronics	3	2	3	100	50	25	175
IV	SEC-510	VLSI Technology	3	2	3	100	50	25	175
			<b>18</b>	<b>16</b>		<b>600</b>	<b>350</b>	<b>200</b>	<b>1150</b>

**Semester: Sixth**

1.	SEC-601	Industrial Training—one term	<b>One Term</b>		--	--	<b>100</b>	<b>50</b>	<b>150</b>
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**TECHNICAL EXAMINATIONS BOARD, GANDHINAGAR**  
**EQUIVALENT COURSES FOR MPE&CS TO SEMESTER SYSTEM**  
**DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING [13]**

<b>SEMESTER-I</b>			
Sr. No.	SEMESTER CODE	MPE&CS CODE	NAME OF COURSE
1	S-101	151	Communication Skills
2	S-102	155	Mathematics-I
3	S-103	157	Applied Science-I (Physics)
4	S-104	159	Engineering Measurements-I
5	S-105	251/201	Engineering Drawing
6	S-111	268	Office Automation
7	S-114	282	Electronic materials & Components
8	S-126	275	Essentials of Environment & Seismic Engineering

<b>SEMESTER-II</b>			
Sr. No.	SEMESTER CODE	MPE&CS CODE	NAME OF COURSE
1	S-201	156	Mathematics-II
2	S-202	158	Applied Science-II(Chemistry)
3	S-207	259	Engineering Measurements-II
4	S-211	266	Basic Electrical Engineering
5	S-212	273	Programming In C
6	S-213	283	Electronic Practices
7	S-227	357	Fundamentals of Information Technology
8	SEC/SIC/SCE/SPE-251	EC/IC/CE/PE-451/401	Electronic Devices & Circuits-I

<b>SEMESTER-III</b>			
Sr. No.	SEMESTER CODE	MPE&CS CODE	NAME OF COURSE
1	S-301	256	Human Resource Management
2	SEC/SIC/SPE-302	EC/IC/CE/PE-452/402	Electronic Devices & Circuits-II
3	SEC/SIC/SPE/SCE-303	EC/IC/CE/PE-453/403	Digital Electronics
4	SEC-304	EC-457 RE-407	Electronic Networks & Lines
5	SEC-305	EC-551 RE-501	Communication Engineering-I
6	SEC-306	EC-555 RE-505	Electronic Instruments & Measurements
7	SEC/SPE-307	EC-456 RE-406	Electronics workshop

<b>SEMESTER-IV</b>			
Sr. No.	SEMESTER CODE	MPE&CS CODE	NAME OF COURSE
1	S-401	356/306	Entrepreneurship Development
2	SEC/SIC/SPE/SCE-402	EC/IC/CE/PE-454/404 IT-463	Micro processor & Assembly Language Programming
3	SEC-403	EC-455 RE-405	Antenna & Wave Propagation
4	SEC-404	EC-557 RE-507	Industrial Electronics
5	SEC-405	EC-552 RE-502	Communication Engineering-II
6	SEC-406	EC-561	Television Engineering

<b>SEMESTER-V</b>			
Sr. No.	SEMESTER CODE	MPE&CS CODE	NAME OF COURSE
1	SEC/SIC/SPE/SMKT-501	EC/IC/PE-653 EC-562 MKT-662	Micro controller
2	SEC-502	-----	Mobile Communication
3	SEC-503	EC-556 RE-506	Microwave Engineering
4	SEC-504	EC-656	Telecommunication Techniques and Applications
5	SEC-505	EC-658	Fiber optics communication
6	SEC-506	EC-558 RE-508	Electronic projects
I	SEC-507	EC/IC-654 CE/IT-554	Computer Networks
II	SEC/SIC-508	EC/IC/PE-651	Microprocessor Interfacing & Applications
III	SEC-509	-----	Medical Electronics
IV	SEC-510	-----	VLSI Technology

<b>SEMESTER-VI</b>			
Sr. No.	SEMESTER CODE	MPE&CS CODE	NAME OF COURSE
1	SEC-601	EC-559	Industrial Training

**COURSE CODE : S-101****COURSE NAME : COMMUNICATION SKILLS****1. RATIONALE :**

Proficiency in Communication skills is one of the basic needs of technical students. A technician has to communicate all the time with peers, superiors, subordinates and clients in his professional life.

A study conducted by the Curriculum Development Centre has revealed that the Diploma passouts do not possess adequate communication skills in English. The industry survey have accorded high priority to the following basic communication skills:

1. Express ideas effectively in English in oral form.
2. Express views in English in written form effectively.
3. Write brief and precise process proposals and reports.
4. Write letters of different types.
5. Lead group discussions and meetings independently in English.

The Curriculum of 'Communication Skills' course has been revised following the need based approach. This curriculum aims at developing the following two communication skills.

1. Express ideas effectively in English in oral form, and
2. Express views in English in written form effectively.

The remaining skills will be developed through other technical courses of the diploma programmes.

While teaching this course the model (Practice - Feedback - Practice) will be adopted. Thus the language skills (Listening, Speaking, Reading and Writing) which facilitate effective communication, will be developed among the students. More emphasis will be laid on developing communication skills in classroom instruction.

**2. SCHEME OF STUDIES AND EXAMINATION :**

SR. NO.	CODE NO	NAME OF COURSE	L P	Exam. Scheme			
				Th.	Pr.	T.W.	Total
1.	S-101	Communication skills	4 -	100	-	-	100

**3. SCHEME OF TEACHING :**

SR.NO.	TOPICS	THEORY HOURS
1.	Passage for comprehension	20
2.	Short stories	06
3.	Grammar	10
4.	Summary and Comprehension of unseen passages	09
5.	Conversation Practice	11
<b>Grand Total</b>		<b>56 hours</b>

**4. OBJECTIVES :**

**1.0 EXPRESS IDEAS EFFECTIVELY IN ENGLISH IN ORAL FORM.**

**2.0 EXPRESS VIEWS IN ENGLISH IN WRITTEN FORM EFFECTIVELY.**

**5. TOPICS :**

**TOPIC 1.0 PASSAGES FOR COMPREHENSION.**

**Passages for comprehension from part one of the text book.**

1. The Language of Science.
2. My Thousandth Goal.
3. New Wonders in Cameras.
4. Rip Van Winkle Comes to Town.
5. Safety Practices.
6. The Robotic Revolution.
7. Entrepreneurship.

**OBJECTIVE :**

**1.0 EXPRESS IDEAS EFFECTIVELY IN ENGLISH IN ORAL FORM.**

To achieve above objective following activities are to be carried out.

- 1.1 Ask pertinent questions as well as to answer them.
- 1.2 Follow oral instructions and interpret them to others.
- 1.3 Explain salient features of product / process.
- 1.4 Read by word groups rather than word by word both in silent as well as oral reading.
- 1.5 Present oral summary of topics read or heard.
- 1.6 Use dictionaries and other reference books.
- 1.7 Adjust the speed of reading for newspapers, textbooks, letters etc.

**OBJECTIVE :**

**2.0 EXPRESS VIEWS IN ENGLISH IN WRITTEN FORM EFFECTIVELY.**

To achieve above objective following activities are to be carried out.

- 2.1 Write single sentence/multiple sentences answers to questions.
- 2.2 Take down lecture notes while listening.
- 2.3 Develop detailed write ups from lecture notes.
- 2.4 Comprehend main ideas and reproduce them.
- 2.5 Describe an object, process or procedure .
- 2.6 Write summary, or passage or an article.
- 2.7 Write precise of unseen passages.
- 2.8 Write free composition on various topics.
- 2.9 Write guided composition on different topics.
- 2.10 Given a passage use substitutes for identified words and expressions.
- 2.11 Draw out relationship between details and main points.

**TOPIC 2.0 : SHORT STORIES :**

**Short stories from part two of the text book:**

- 1.0 The Male Factor
- 2.0 An Astrologer's Day
- 3.0 The Last Leaf

**OBJECTIVE :**

**1.0 EXPRESS IDEAS EFFECTIVELY IN ENGLISH IN ORAL FORM.**

To achieve above objective following activities are to be carried out.

- 1.1 Ask pertinent questions as well as to answer them.
- 1.2 Follow oral instructions and interpret them to others.
- 1.3 Explain salient features of product/process.
- 1.4 Read by word groups rather than word by word both in silent as well as oral reading.
- 1.5 Present oral summary of topics read or heard.
- 1.6 Use dictionaries and other reference books.
- 1.7 Adjust the speed of reading for newspaper, text book, letters etc.

**OBJECTIVE :**

**2.0 EXPRESS VIEWS IN ENGLISH IN WRITTEN FORM EFFECTIVELY.**

To achieve above objective following activities are to be carried out.

- 2.1 Write single sentence/multiple sentences answers to questions.
- 2.2 Take down lectures notes while listening.
- 2.3 Develop detailed writeups from lecture notes.
- 2.4 Comprehend main ideas and reproduce them.
- 2.5 Write summary of passage or an article
- 2.6 Write precise of unseen passages.
- 2.7 Write guided composition on different topics.
- 2.8 Write the composition on various topics.
- 2.9 Given a passage use substitutes for identified words and expressions.
- 2.10 Draw out relationship between details and main points
- 2.11 Restate main points/theme from what is read.

### **TOPIC 3.0 : GRAMMAR :**

#### **Grammar form part three of the text book:**

1. Determiners
2. Auxiliary Verbs
3. Tenses
4. Tenses in Conditional Sentences
5. Subject Verb Agreement
6. The Passive
7. Infinitives
8. Prepositions
9. Clauses and connectors

#### **List of supportive skills to be developed through this part**

1. Construct grammatically correct sentences.
2. Use grammatical items in sentences.
3. Use grammatical items in paragraph writing.

#### **LANGUAGE COMPONENTS :**

Language components from Sr.No. 1 to 5 should be integrated while teaching selected passages and stories from Part One and Part Two of the Text Book.

Unseen passages on technical and general topics should be selected from other sources in order to develop stated skills / activities. ( It includes **topic 4**)

#### **1. VOCABULARY ITEMS :**

- 1.1 Word forms.
- 1.2 One word substitute.
- 1.3 Phrases.
- 1.4 Pairs of words.

#### **Supportive skills**

1. Use words and expressions appropriate to audience (peers, superiors, subordinates and others).
2. Read/write new words from various media.
3. Enrich vocabulary through reading.
4. Use dictionaries and other reference books.
5. Use word formation devices (prefixes, suffixes) and lexical inflections.
6. Given a passage use substitutes for identified words and expressions.
7. Use new words in sentences.

## **2. PASSAGES FOR COMPREHENSION :**

Activities/Major skills as listed in topic One/Two

### **\* Supportive skills.**

- 2.1 Write single sentence answers to questions.
- 2.2 Write multiple sentence answers to questions.

## **3. PARAGRAPHS FOR SUMMARISING :**

### **\* Supportive skills**

- 3.1 Write precise of the given passage in one third of its length.
- 3.2 Write a suitable title to the precise.

## **4. GUIDED AND FREE COMPOSITION :**

### **\* Supportive skills**

- 4.1 Write short paragraphs from given points/words.
- 4.2 Give a suitable title to the paragraph.

## **5. GRAMMER :** From part three of the text-book

### **5.1 Tenses :**

- 5.1.1 All tenses
- 5.1.2 Infinitives, Participles, and Gerunds

### **Supportive skills :**

1. Use correct tenses in sentences
2. Use sequence of tenses in sentences

### **5.2 Subject Verb Agreement :**

#### **Supportive Skills :**

1. Use singular and plural verb forms.
2. Write correct verb to agree with the subject in sentences.

### **5.3 Passive :**

- 5.3.1 All types of sentences i.e. statements, Questions, Imperatives and infinitives

#### **Supportive Skills :**

1. Use correct passive voice in sentences.
2. Change voice in the given sentences.

### **5.4 Auxiliaries :**

- 5.4.1 Anomalour Finites
- 5.4.2 Models

**Supportive Skills :**

1. Use anomalous finites in different types of sentences.
2. Use anomalous finites to avoid repetition.
3. Use different models in different contexts

**5.5 Determiners :**

5.5.1 Articles

5.5.2 Some, any ; all No. & None; Much, Many, A little, A few

**Supportive skills :**

1. Use correct articles in the sentences
2. Use different determiners in the sentences

**5.6 Prepositions :**

5.6.1 Time, Direction, Place, Position, agent, relation.

**Supportive skills :**

1. Write sentences by using correct prepositions.
2. Use correct prepositional phrases in sentences.

**5.7 Clauses and connectors :**

5.7.1 Clauses

5.7.2 Connectors

**Supportive skills :**

1. Use different connectors in sentences
2. Use different clauses in sentences and paragraphs.

**TOPIC 5.0 : CONVERSATIONAL PRACTICE :****samples of situations for conversational practice :**

- 5.1 Meeting and parting
- 5.2 Introducing and influencing
- 5.3 Requests
- 5.4 Agreeing and disagreeing
- 5.5 Inquiries and information
- 5.6 Linking and disliking

## **OBJECTIVE**

1.0 EXPRESS IDEAS EFFECTIVELY IN ENGLISH IN ORAL FORM.

### **List of Activities/Major skills to be developed by :**

1. Ask pertinent questions as well as to answer them.
2. Explain salient features of products/processes.
3. Speak on a topic fluently and confidently for 5 minutes or more.
4. Give instructions orally.
5. Participate in debates and conversations.
6. Use social skills as mentioned in the curriculum
7. Reproduce in oral form the facts or ideas presented by the speaker.
8. Use appropriate “Body Language” (gestures, eye, movements, facial expressions, postures)
9. Follow oral instructions and interpret them to others.
10. Speak extemporaneously in panel or group discussion
11. Use correct pronunciations and intonations.
12. Face oral examinations and interviews.

### **Supportive skills**

1. Pronounce the words correctly.
2. Use correct accent/stress for the words.
3. Speak the sentences with correct intentions.

## **6. SUGGESTIVE INSTRUCTIONAL STRATEGIES**

Student centred methods and techniques of teaching and learning e.g. group discussion, role play, individual and group assignments (Classroom, Library, Home) should be used so as to make the students actively participate in the teaching learning process. Emphasis should be laid on providing guided practice and feedback on student performance.

The students should be encouraged to use dictionaries and other reference books. Exercises in writing, reading, speaking and listening should be designed to give the students sufficient practice in the communication skills. Use of tape recorders and video cassettes can be made for practice in developing “Listening Skills” and “Speaking Skills”.

## **TREATMENT :**

The content of the course comprises

1. Passages for Comprehension
2. Stories
3. Grammar
4. Summary and Comprehension of unseen passages, and
5. Conversation practice.

Introductory period will make the students understand what the course is about, importance of English as a tool of written and spoken communication and how best it can be learnt.

Grammar need not be taught in isolation. However, attempt shall be made to integrate grammar teaching with that of passages and stories.

- The passages for comprehension, stories and unseen passages for summary and comprehension should be treated in the following line :
- The teacher will read the unit loudly so as to enable the students to improve their pronunciations and effective reading.
- Then they may be asked to read loudly a paragraph or two individually.
- They should be asked to note the unknown and difficult words they come across and to find the meanings thereof by referring to the dictionary.
- The teacher may give meanings of certain words, they come across and idiomatic expression in simple English.
- The teacher should then explain the passage or story in simple English. The students may be asked to summarise the unit in the words of their own and/or answer the questions.
- The situations in the stories can be dramatized to enable them to develop speaking ability.
- Exercises shall be given as home assignments and tutorials.
- Three unit tests will take place to evaluate the students continuously.
- During the tutorials the use of library, dictionary, reference books will be encouraged.

## **7. REFERENCES :**

1. Textbook for study :  
“Communication skills for Technical students” Compiled by :  
CDC, TTTI, Bhopal.  
Published by : Somaiya Publications Pvt. Ltd. 4th Revised  
Edition, July, 1995.
2. Advanced Learner’s Dictionary of current English edited by A.S. Hornby :  
Published by ELBS
3. B.B.C. English Stage 1
4. Communicative grammar of English by Geoffrey Leech and Jan Svartivik- Publication  
ELBS.

**8. ASSESSMENT SCHEME :**

<b>SR.NO.</b>	<b>TOPICS</b>	<b>PERCENTAGE WEIGHTAGE</b>
1.	Passage for comprehension	35
2.	Short stories	10
3.	Grammar	25
4.	Summary and Comprehension of unseen passages	15
5.	Conversation Practice	15
	<b>Total</b>	100

**9. RESOURCE GROUP :****(A) POLYTECHNIC FACULTY :**

1. Shri S.N. Adesara,
2. Shri I.S. Halpati,
3. Shri D.M. Patel,
4. Shri K.M. Upadhyay,

**(B) CDC FACULTY :**

1. Prof. A. M. Patel
2. Shri K. D. Joshi

**(C) TTTI FACULTY :**

1. Prof. N.P.Tiwari.

**1. RATIONALE :**

The entrance qualifications for a Diploma technician is 10th pass. They have gained sufficient knowledge of the course Mathematics in the standard 10th to qualify for further studies in diploma programmes. A technician engineer needs to study relevant theories and principles of Mathematics to enable them to understand & grasp the concepts of the advance courses of diploma programme and their various engg. applications.

With this view, the necessary content for the course Mathematics is designed and developed in consultations with the senior technical teachers to make students capable to understand the technology related courses at higher levels. It is presumed that this course-content will provide a suitable foundation for all the engineering applications which technician is supposed to come across in his field and will be able to use it in understanding them during his diploma study.

**2. SCHEME OF STUDIES AND EXAMINATION :**

SR. NO.	COURSE CODE	COURSE NAME	L	P	Exam scheme (Marks)			
					Th.	Pr.	T.W.	Total.
1.	S-102	Mathematics - I	4	--	100	--	--	100

**3. SCHEME OF TEACHING :**

SN.	Topics	Theory Hours
	<b>Part-I Algebra</b>	
1.	Indices & Surds	5
2.	Logarithm	3
3.	Arithmetic & Geometrical Progression	5
4.	Binomial Theorem	5
5.	Matrices	7
6.	Vector Algebra	7
	<b>TOTAL</b>	<b>32</b>
	<b>Part-II Trigonometry</b>	
1.	Measurement of angles	1
2.	Trigonometric Ratios	3
3.	Standard & Allied angles	3
4.	Periodic Functions & Graphs	4
5.	Compound angles	3
6.	Multiple & Sub-multiple angles	4
7.	Inverse Trigonometric Functions	2
8.	Properties & Solutions of triangle	3
9.	Height & Distances	1
	<b>TOTAL</b>	<b>24</b>
		<b>Grand Total 56 hrs.</b>

#### **4. TOPICS AND SUB TOPICS**

##### **Part-I Algebra**

##### **Topic 1. Indices & Surds 5 hrs.**

- 1.1 Indices
  - 1.1.1 Concept and rules
  - 1.1.2 Examples on indices
- 1.2 Surds
  - 1.2.1 Definition & concept
  - 1.2.2 Simple examples on surds
  - 1.2.3 Square root of surds
  - 1.2.4 Examples on square root of surds

##### **Topic 2. Logarithm 3 hrs.**

- 2.1 Definition & concept
- 2.2 Logarithm rules
- 2.3 Examples based on rules and calculations

##### **Topic 3. Arithmetic & Geometrical Progression (A.P & G.P) 5 hrs.**

- 3.1 Sequence, series and progression.
  - 3.1.1 Difference between the terms.
  - 3.1.2 Problem based on the terms .
- 3.2 Arithmetic progression
  - 3.2.1 Definition
  - 3.2.2 Formula for nth term of an A.P
  - 3.2.3 Sum of n terms of an A.P.
  - 3.2.4 Definition of Arithmetic mean.
  - 3.2.5 Examples.
- 3.3 Geometrical progression.
  - 3.3.1 Definition
  - 3.3.2 Computation of nth term of a G.P.
  - 3.3.3 Sum of n terms of G.P.
  - 3.3.4 Definition of geometrical mean.
  - 3.3.5 Examples.

**Topic 4. Binomial Theorem****5 hrs.**

- 4.1 Meaning of the terms  $n!$  (Factorial  $n$ ),  $nCr$ .
  - 4.1.1 Examples.
- 4.2 Expansion of  $(x+a)^n$  for positive integral values of  $n$ .
  - 4.2.1 Formula for  $(r+1)$ st term of  $(x+a)^n$ .
  - 4.2.2 Examples of finding any term of middle term/terms of  $(x+a)^n$ .
  - 4.2.3 Finding constant term & coefficient of  $x^r$ .
  - 4.2.4 Examples of  $(1+x)^n$ ,  $n \in \mathbb{Q}$
- 4.3 Approximate value by Binomial theorem.
  - 4.3.1 Rules
  - 4.3.2 Examples.

**Topic 5. Matrices****7 hrs.**

- 5.1 A brief idea of determinant of order three.
  - 5.1.1 Definition.
  - 5.1.2 Examples of expansion.
- 5.2 Matrix of order  $m \times n$ .
  - 5.2.1 Definition.
  - 5.2.2 Examples.
- 5.3 Types of matrix.
  - (1) Null matrix.
  - (2) Square matrix.
  - (3) Unit matrix.
  - (4) Diagonal matrix.
  - (5) Skew symmetric matrix.
- 5.3.1 Examples based on types of matrix.
- 5.4 Addition and subtraction of matrices.
  - 5.4.1 Rules and explanation
  - 5.4.2 Problems based on subtraction and addition.
- 5.5 Product of a matrix with scalar.
  - 5.5.1 Definition and examples.
- 5.6 Product of two matrices.
  - 5.6.1 Definition and examples.
- 4.7 Transpose of a matrix.
- 4.8 Adjoint of a matrix,
  - 4.8.1 Definition & Examples.
- 4.9 Inverse of a matrix for order 3.
  - 4.9.1 Definition & Examples.
- 5.0 Examples to solve linear simultaneous equations of three variables.

## Topic 6. Vector Algebra

7 hrs.

- 6.1 Vector and scalar quantities
  - 6.1.1 Definition of the terms
  - 6.1.2 Examples, non-examples
- 6.2 Types of vectors
  - (i) Position Vector
  - (ii) Equal Vector
  - (iii) Negative Vector
  - (iv) Coplanar Vector
  - (v) Unit Vector
  - (vi) Co-initial Vectors
  - 6.2.1 Definition of types of vectors
  - 6.2.2 Examples of types of Vectors
- 6.3 Geometrical representation of vectors
- 6.4 Addition and subtraction of vectors
  - 6.4.1 Principle and its explanation
  - 6.4.2 Problems based on addition and subtraction.
- 6.5 Unit Vectors  $i$ ,  $j$  and  $k$ 
  - 6.5.1 Use of unit vectors
  - 6.5.2 Position vectors of a vector in terms of  $i$ ,  $j$  and  $k$
- 6.6 Magnitude and direction of vectors
  - 6.6.1 Definition of magnitude and direction
  - 6.6.2 Examples based on magnitude and direction of vectors in terms of  $i$ ,  $j$  and  $k$
- 6.7 Product of a vector and a scalar
  - 6.7.1 Definition of product of a vector and a scalar.
  - 6.7.2 Examples.
- 6.8 Dot and cross product of two vectors
  - 6.8.1 Definition.
  - 6.8.2 Examples.
- 6.9 Applications
  - 6.9.1 Definition of work done by force and moment of force.
  - 6.9.2 Examples.

**NB: This topic must be taught after completing all topics of Algebra & Trigonometry.**

**Part 2 TRIGONOMETRY :**

<b>Topic 1. Measurement of angles</b>	<b>1 hr.</b>
1.1 Degree and radians	
1.2 Area of sector and arc-length	
<b>Topic 2. Trigonometric ratios</b>	<b>3 hrs.</b>
2.1 Definition and identities	
2.2 Examples on T-ratios	
<b>Topic 3. Standard &amp; allied angles.</b>	<b>3 hrs.</b>
3.1 Values of T-ratios for 30°, 45°, 60° & 90°	
3.2 Concept of allied angles	
3.3 Examples	
<b>Topic 4. Periodic functions &amp; Graphs</b>	<b>4 hrs.</b>
4.1 Definition & concept of periodic function	
4.1.1 Examples on periodic functions	
4.2 Graphs of Sine & Cosine	
<b>Topic 5. Compound angles</b>	<b>3 hrs.</b>
5.1 Concept of addition & subtraction formula	
5.2 Sum & difference formula	
5.3 Examples	
<b>Topic 6. Multiple &amp; Sub-multiple angles</b>	<b>4 hrs.</b>
6.1 Formulae for 2A & 3A and their multiples	
6.2 Product formulae	
6.3 A/2 formulae	
6.4 Examples	
<b>Topic 7. Inverse T-functions</b>	<b>2 hr.</b>
7.1 Definition and concept	
7.2 Simple examples.	
<b>Topic 8. Properties and solutions of triangle</b>	<b>3 hrs.</b>
8.1 Sine and cosine rules	
8.2 Projection formulae	
8.3 Napier's formula (Tangent rule)	
8.4 $\Delta = \frac{1}{2} ab \sin c$ $= \sqrt{s(s-a)(s-b)(s-c)}$ , $s = \frac{a+b+c}{2}$	
8.5 Solution of triangle using above given formula.	
<b>Topic 9. Height &amp; Distances</b>	<b>1 hr.</b>
9.1 Simple examples	

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**Grand Total      56 hrs.**

## 5. REFERENCES :

- |  |                |
|--|----------------|
| (1) Engg. Mathematics                              | P.N. Wartikar  |
| (2) Engg. Mathematics                              | B.S. Greval.   |
| (3) Engg. Mathematics                              | I. B. Prasad   |
| (4) Polytechnic Mathematics (Vol. I & II)          | TTTI Bhopal    |
| (5) College Algebra                                | Shah and Desai |
| (6) Mathematics for Polytechnic                    | S.P.Deshpande  |
| (7) Co-Ordinate Geometry                           | Bansilal       |
| (8) Technical Ganitshashtra(Part I,II in Gujarati) | R.D.Desai      |

## 6. ASSESSMENT SCHEME :

Sr.No.	Name of Topics	% weightage
	<b>Part-IAlgebra</b>	
1.	Indices & Surds	10
2.	Logarithm	06
3.	Arithmetic & Geometrical Progression	10
4.	Binomial Theorem	10
5.	Matrices	12
6.	Vector Algebra	12
	<b>Total Marks</b>	<b>60</b>
	<b>Part-II Trigonometry</b>	
1.	Measurement of angles	2
2.	Trigonometric Ratios	4
3.	Standard & Allied angles	5
4.	Periodic Functions & Graphs	7
5.	Compound angles	4
6.	Multiple & Sub-multiple angles	5
7.	Inverse Trigonometric Functions	2
8.	Properties & Solutions of triangles	8
9.	Height & Distances	3
	<b>Total Marks</b>	<b>40</b>

**Grand Total** 100 Marks

## 7. RESOURCE GROUP :

**(A) POLYTECHNIC FACULTY :** **(B) CDC FACULTY :** **(C) EXPERT/EDITOR :**

- |                         |                      |                    |
|-------------------------|----------------------|--------------------|
| (1) Kum. Ashaben Sharma | 1. Prof. A. M. Patel | 1. Prof. B.C.Bhatt |
| (2) Shri. R.M. Bhavsar  | 2. " R. M. Thakkar   |                    |
| (3) Shri H. C.Suthar    | 3. " H. B. Darji     |                    |

**COURSE CODE : S-103**

**COURSE NAME : APPLIED SCIENCE-I (PHYSICS)**

**1 . RATIONALE :**

Science is the foundation for all technician courses. The basic aim of teaching science is to develop in the student the habit of scientific enquiry, ability to establish the cause and effect relationship and logical development of different disciplines.

Thus a good foundation in basic sciences will help the students in their self-development, to cope up with the continuous flow of innovation and discoveries in technology.

**2 . SCHEME OF STUDIES AND EXAMINATION :**

SR. NO.	CODE NO	NAME OF COURSE	L	P	Exam. Scheme			
					Th.	Pr.	T.W.	Total
1.	S-103	Applied Science-I (PHYSICS)	2	–	50	–	–	50

**3. SCHEME OF TEACHING :**

S r . No .	Name of Topics	Theory Hours
1 .	Units & Measurement	3
2 .	Surface Tension	3
3 .	Sound Waves	7
4 .	Optics	4
5 .	Radio activity & Nuclear Physics	6
6 .	Modern Physics	5
	<b>Total</b>	<b>28</b>

#### **4. OBJECTIVES**

1. Understand the System of Units.
  - (i) Define base units
  - (ii) Express derived units in terms of base units.
2. Understand the concept of Wave Motion.
  - (i) Demonstrate sound travels in a medium
  - (ii) Define and distinguish between transverse and longitudinal waves.
  - (iii) Solve problems based on velocity, frequency, wave length, relation.
  - (iv) Explain simple harmonic motion.
  - (v) Understand use of ultrasonic waves in Industries.
  - (vi) Use materials to improve acoustics of buildings.
3. Understand the phenomenon of light.
  - (i) Demonstrate different characteristics of light.
  - (ii) Use lenses to construct optical instruments.
4. Understand phenomenon of Radio Activity
  - (i) Define radio activity
  - (ii) Describe properties of Alpha, Beta and Gamma rays.
  - (iii) Appreciate that in radio active emission energy is produced.
  - (iv) Gives examples of nuclear fission and nuclear fusion process.
5. Develop awareness about modern topics like X-rays, LASERS, Fluorescence & Phosphorescence.

#### **5 . TOPICS & SUB - TOPICS :**

##### **TOPIC - 1 UNITS AND MEASUREMENT**

**03 HRS**

- 1.1 Physical Quantities.
- 1.2 Measurement in various systems.
  - 1.2.1 C.G.S.
  - 1.2.2 M.K.S.
  - 1.2.3 S.I.
- 1.3 Basic physical quantities in S.I.
  - 1.3.1 Length
  - 1.3.2 Mass
  - 1.3.3 Time
  - 1.3.4 Current
  - 1.3.5 Temperature

- 1.3.6 Luminous Intensity
- 1.4 Definitions, Units and Symbols of Basic Physical quantities.
- 1.5 Derived quantities - Definition and Units.
- 1.6 Multiples and Sub-multiples of Standard Units.
- 1.7 Measuring Instruments.
  - 1.7.1 Vernier Callipers.
  - 1.7.2 Micrometer Screw Gauge.
  - 1.7.3 Physical Balance
  - 1.7.4 Determination of Least Count of three instruments.

**TOPIC - 2 : SURFACE TENSION**

**03 HRS**

- 2.1 Introduction
- 2.2 Cohesive and Adhesive force
- 2.3 Surface tension
  - 2.3.1 Illustrations of surface tension
  - 2.3.2 Definition, Unit.
  - 2.3.3 Explanation of surface tension by molecular phenomenon.
  - 2.3.4 Effect of temperature on surface tension.
- 2.4 Angle of contact
  - 2.4.1 Definition and illustrations.
- 2.5 Capillary action.
- 2.6 Derivation of expression for surface tension

$$T = \frac{r h g}{2 \cos \theta}$$

- 2.6.1 Determination of surface tension of a liquid using capillary action.
- 2.7 Relation between surface tension and surface energy of a liquid.
  - 2.7.1 Definition of surface tension in terms of surface energy.
- 2.8 Problems based on surface tension.

**TOPIC - 3 : SOUND WAVES**

**07 HRS**

- 3.1 Introduction
- 3.2 Waves
  - 3.2.1 Type of waves
    - Transverse
    - Longitudinal
  - 3.2.2 Distinction between these waves

- 3.3 Definitions - Periodic time, Frequency, Wave Length, Speed of Sound, SHM.
- 3.4 Requirement of medium for propagation of sound waves.
- 3.5 Relation between Velocity, Wave Length & Frequency  $V = n\lambda$ 
  - 3.5.1 Problems based on  $V = n\lambda$
- 3.6 Acoustics of building
  - 3.6.1 Importance of Reverberation.
  - 3.6.2 Reverberation time.
  - 3.6.3 Optimum time of Reverberation.
  - 3.6.4 Coefficient of absorption of Sound.
  - 3.6.5 Sabine's formula for Reverberation time
  - 3.6.6 Factors affecting Reverberation time and acoustics of building.
- 3.7 Ultra sonic waves
  - 3.7.1 Definition
  - 3.7.2 Production of ultrasonic waves
    - 3.7.2.1 Magnetostriction method
    - 3.7.2.2 Piezo-electric effect method.
  - 3.7.3 Application of ultrasonic waves.

**TOPIC - 4 : OPTICS**

**04 HRS**

- 4.1 Properties of light.
  - 4.1.1 Electromagnetic waves.
  - 4.1.2 Rectilinear motion
  - 4.1.3 Velocity of light (in vacuum  $3 \times 10^8$  m/s)
  - 4.1.4 Reflection.
  - 4.1.5 Refraction
  - 4.1.6 Interference
  - 4.1.7 Polarisation
- 4.2 Lenses
  - 4.2.1 Types of Lenses
  - 4.2.2 Definitions
    - 4.2.2.1 Focal Point
    - 4.2.2.2 Optical Centre
    - 4.2.2.3 Focal Length (F)
    - 4.2.2.4 Object Distance (Do)    4.2.2.5 Image Distance (Di)

4.2.2.6 Lens formula  $\frac{1}{F} = \frac{1}{Do} + \frac{1}{Di}$

4.3 Magnification and Magnifying power.

4.4 Uses of Lenses.

4.5 Optical Instruments.

4.5.1 Simple Microscope.

4.5.1.1 Magnifying Power.

## **TOPIC - 5 : RADIOACTIVITY AND NUCLEAR PHYSICS**

**06 HRS**

5.1 Radioactivity.

5.1.1 Definition.

5.1.2 Kinds of radioactivity. ( Natural & Artificial )

5.1.3 Units of radioactivity.

5.1.4 Laws of radioactivity.

5.1.5 Half Life, Average Life & Decay Constant.

5.2 Radioactive Rays.

5.2.1 Properties and uses of alpha particles

5.2.2 Properties and uses of beta particles.

5.2.3 Properties and uses of gamma rays.

5.3 Nuclear Physics.

5.3.1 Structure of nucleus.

5.3.2 Mass defect.

5.3.3 Binding Energy.

5.4 Nuclear fission.

5.4.1 Phenomenon of fission.

5.4.2 Elements undergoing fission.

5.4.3 Chain reactions and multiple chain reactions.

5.4.4 Application of nuclear fission.

5.5 Nuclear fusion.

5.5.1 Phenomenon of fusion.

5.5.2 Elements undergoing fusion.

5.5.3 Application of nuclear fusion.

5.6 Nuclear reactor

5.6.1 Uses of nuclear reactor.

5.6.2 Waste disposal of nuclear reactor.

**TOPIC - 6 : MODERN PHYSICS**

**05 HRS**

6.1 X – Rays.

6.1.1 Production.

6.1.2 Properties.

6.1.3 Applications.

6.2 LASER

6.2.1 Meaning of LASER.

6.2.2 Production.

6.2.3 Properties.

6.2.4 Applications.

6.3 Fluorescence.

6.3.1 Phenomenon.

6.3.2 Materials.

6.4 Phosphorescence

6.4.1 Phenomenon

6.4.2 Materials

**6. SUGGESTIVE INSTRUCTIONAL STRATEGIES :**

Sr. No.	Objective Number	Instructional Strategy
1 .	1 (ii)	Practice conversion of Derived Units in terms of Base Units
2 .	2 (i) 2(ii)2(iii)  2 (ii) 2 (iv)  2 (v)	Demonstrate sound does not travel in vacuum. Transparency to (a) Show types of waves phase and phase difference (b) Simple harmonic motion Show materials used to improve Acoustics of halls, auditoriums Film to show ultrasonic waves and its applications.
3 .	3 (i)	Demonstrate, (i) rectilinear motion of light reflection (ii) refraction (iii) interference (iv) polarization of light by ripple tank or smoke box.
4 .	3 (ii) 4 (i)  4 (ii)  4 (iv)	Construct a simple microscope using lens. (i) Transparency showing radioactive decay curves, halflife and formation of new element. (ii) Show chart related to alpha, beta and gamma ray properly, video or 16mm film on nuclear energy (TTTI) Video 16mm film on chain reaction fission and fusion.
5 .	5	Transparencies showing LASER Action stimulation emission popluation inversion etc. Video film on LASER.

## 7. REFERENCES :

- |                          |   |                 |
|--------------------------|---|-----------------|
| 1. Principles of Physics | — | T.T.T.I. Bhopal |
| 2. Modern Physics        | — | H.G. White      |
| 3. Intermediate Physics  | — | D.S. Jog        |

## 8. ASSESSMENT SCHEME :

Sr. No.	Name of Topic	Percentage weightage
1.	Units & Measurement	5
2.	Surface Tension	5
3.	Sound Waves	10
4.	Optics	10
5.	Radio activity & Nuclear Physics	10
6.	Modern Physics	10
<b>Total</b>		<b>50</b>

## 9 . RESOURCE GROUP :

### (A) POLYTECHNIC FACULTY :

- 1 . Prof. L.C. Pandya
- 2 . Shri A.A. Trivedi,
- 2 . Shri K.J. Patel,

### (B) CDC FACULTY :

- 1 . Prof. A. M. Patel
- 2 . Shri R.M.Thakkar
- 3 . Shri H.B.Darji

### (C) TTTI FACULTY :

- 1 . Dr. M.K. Shrivastava
- 2 . Dr. Anju Rawlley

**1. RATIONALE :**

Work in an industry is characterized by certain specific features which in turn makes certain demands on the technician. First of all, he must be able to accurately measure physical quantities using appropriate measuring equipment. He must perform all experiments and related operations accurately in strict accordance with the relevant manual, standards or text books. Particular care must be taken to use these apparatus/ instruments carefully.

This course on Engineering Measurement intends to develop elementary measurement skills in the students. It is an interdisciplinary course emphasizing the development of personal attributes like spirit of enquiry, problem solving etc. Some elementary skills in error analysis, safety precautions and interpretation of results are to be developed through this course.

**2. SCHEME OF STUDIES AND EXAMINATION :**

SR. NO.	COURSE CODE	COURSE NAME	L	P	Exam scheme			
					Th.	Pr.	T.W.	Total
1.	S-104	Engineering Measurements - I	--	2	--	--	50	50

**3. SCHEME OF TEACHING :**

Sr. No.	Particulars	Hours
1.	Planning & Introduction	04
2.	Performing Experiments	20
3.	Assessment/Submission	04
<b>Total</b>		<b>28</b>

**4. OBJECTIVES :**

The students should be able to :

- \* Use appropriate units for each physical quantities.
- \* Read the physical quantities for basic measuring instruments .
- \* Record Observed data in the designed observation table accurately.
- \* Compute/Report the results based on the measurements taken accurately wherever necessary.

## 5. LABORATORY EXPERIENCES :

1. Linear measurement by using vernier callipers
2. Precision measurement by Micrometer screw gauge.
3. Measurement of specific gravity of given solid and lubricating oil.
4. Varification of Ohm's law.
5. Measurement of resistance by using Wheastone bridge.
6. Determination of resultant resistance of series and parallel combination.
7. Determination of acceleration due to gravity (g) using simple pendulum.
8. Determination of surface tension of a given liquid.
9. Determination of hardness of given sample of water.
10. Determination of Young's modulus.
11. Determination of acid value and saponification value of lubricating oil.
12. Determination of Centre of gravity for given lamina.
13. Determination of moisture content of given sample of coal.

- Note :
1. Minimum 10 experiences to be performed during the term in this course from the above given list looking to the available resources at the Polytechnic.
  2. The experiences should be changed every year as far as possible.
  3. Assessment should be continuous and progressive.
  4. Student should be provided an opportunity to take measurement independently.
  5. Lectures should be arranged before starting actual laboratory work.
  6. Practical examination : 50 % marks of term work.

## 6. RESOURCE GROUP :

### (A) POLYTECHNIC FACULTY

- |                        |                     |
|------------------------|---------------------|
| 1. Shri A.A. Trivedi   | 2. Shri K.J. Patal  |
| 3. Shri R.B. Prajapati | 4. Dr. A.S. Patel   |
| 5. Shri S.N. Soni      | 6. Shri V.V.Vora    |
| 7. Shri A.H.Oza        | 8. Shri M.M.Makwana |

### (B) CDC FACULTY :

1. Prof. S. R. Mishra
2. Shri R. M. Thakkar

**COURSE CODE : S-105**  
**COURSE NAME : ENGINEERING DRAWING**

**1. RATIONALE :**

Engineering Drawing is an effective language of engineers. It is the foundation block which strengthens the engineering & technological structure. Moreover, it is the transmitting link between ideas and realisation.

It is an attempt to develop fundamental understanding and application of Engg. Drawing. It covers knowledge & application of drawing instruments & also familiarise the learner about Bureau of Indian standards. The curriculum aims at developing the ability to draw and read various drawings, curves & projections.

**2. SCHEME OF STUDIES AND EXAMINATION :**

SR. NO.	CODE NO	NAME OF COURSE	L	P	Exam. Scheme			
					Th.	Pr.	T.W.	Total
1.	S-105	Engineering Drawing	2	4	100	–	50	150

**3. SCHEME OF TEACHING**

Sr. No.	Topic	Th Hrs	Pr Hrs	Total Hrs
1.	Uses of Drawing Aids	–	6	6
2.	Planning & Layout of Drawing	–	2	2
3.	Lines, Lettering & dimensioning	–	6	6
4.	Engineering Curves	6	8	14
5.	Projection of points, Lines & Planes	8	10	18
6.	Orthographic Projections	6	10	16
7.	Isometric Projections	5	8	13
8.	Fasteners	–	2	2
9.	Graphs & Charts	2	4	6
10.	Modern methods of storing, reproduction of drawings	1	–	1
<b>Grand Total</b>		<b>28</b>	<b>56</b>	<b>84</b>

#### **4. OBJECTIVES :-**

1. Use drawing equipment, instruments & Materials. (Topic 1)
2. Follow and apply standard practice as per bureau of I.S for planning & layout. (Topic 2)
3. Develop the ability to use Lines, lettering & dimensioning. (Topic 3)
4. Develop the ability to draw Engg. curves with proficiency and speed. (Topic 4)
5. Develop concepts of orthographic projections. (Topic 5)
6. Draw the projection of points, lines and planes. (Topic 5)
7. Draw the orthographic views of objects. (Topic 6)
8. Develop the concept & ability to draw the isometric views. (Topic 7)
9. Sketch various fasteners. (Topic 8)
10. Prepare graphs & charts as per need. (Topic 9)
11. Develop the awareness of reproduction and modern storing methods of drawings. (Topic 10)

#### **5. TOPICS & SUB TOPICS :-**

##### **TOPIC 1. USES OF DRAWING AIDS :**

- Drawing equipment instruments and materials
- Construction of Polygons.

##### **TOPIC 2. PLANNING & LAYOUT OF DRAWING :**

- I.S. codes for planning & layout

##### **TOPIC 3. LINES, LETTERING & DIMENSIONING :**

- Different types of lines
- Vertical capital & lower case letters
- Inclined capital & lower case letters
- Numerals & Greek alphabets.
- Dimensioning methods—aligned method & unilateral with chain, parallel, progressive & combined dimensioning.

##### **TOPIC 4. ENGINEERING CURVES :**

- Various types of curves like Ellipse, parabola, hyperbola, cycloid, epicycloid, hypocycloid, Involute & spiral.

**TOPIC 5. PROJECTIONS OF POINTS, LINES & PLANES :**

- Reference planes, orthographic projections
- 1st Angle and 3rd Angle
- Projections of points
- Projections of Lines–determination of true lengths & inclinations.
- Projections of plane–determination of true shape.

**TOPIC 6. ORTHOGRAPHIC PROJECTIONS :**

- Front view
- Top view
- Side view
- Bottom view & rear view

**TOPIC 7. ISOMETRIC PROJECTIONS :**

- Difference between isometric projections & isometric drawing.
- Isometric views & isometric projections.

**TOPIC 8. FASTENERS :**

- Detachable & permanent fasteners–difference
- Sketches of elements of screw threads
- Sketches of thread forms–B.S, B.A,
- Square with worm, Acme with Knuckle
- Buttress–Seller Unified.
- Internal & external threads
- Left hand & right hand threads
- Single & multi start threads
- Lead & pitch
- Sketches of studs, cap screws machine screws, set screws, Locking devices, bolts, hexagonal & square nuts & nut bolt & washer assembly.
- Sketches of plain spring lock, toothed lock, washers, cap nut, check nut, slotted nut, cassette\ nut, sawn nut, wing nut, eye bolt, tee bolt & foundation bolt.
- Sketches of various types of rivet heads (snap–pan–conical–countersunk)
- Sketches of keys (sunk, flat, saddle, gib head, woodruff)
- Sketches of hole & shaft Assembly.

**TOPIC 9. GRAPHS & CHARTS :**

- Advantages–types (Bar, Pie, Percentage bar, Logarithmic)
- Preparation & interpretation of the graphs and charts.

**TOPIC 10. MODERN METHODS OF STORING & REPRODUCTION OF DRAWING :**

- Advantages
- Methods- Micro films & computer Aided

**6. LABORATORY PRACTICE :**

**Sheet 1 :- Use of drawing Instruments. Tee square & set square.**

- Problem – 1 Drawing horizontal, vertical, 30 degree, 45 degree, 60 & 75 degree lines using Tee and set square.
- Problem – 2 Types of Lines
- Problem – 3 Types of dimensioning
- Problem – 4 Alphabets & Numerical ( Vertical & inclined as per I.S.)
- Problem – 5 Drawing Polygon

**Sheet 2 :- Types of Curves**

- Problem – 1 Construction of Ellipse using any two methods
- Problem – 2 Construction of parabola
- Problem – 3 Construction of Hyperbola
- Problem – 4 Construction of spiral
- Problem – 5 Construction of Hypocycloid & Epicycloid
- Problem – 6 Construction of involute

**Sheet 3 :- Projection of points & lines**

- Problem – 1 Projection of points
- Problem – 2 to 6 Projection of Lines with different conditions

**Sheet 4 :- Projections of Plane**

- Problem – 1 to 4 Projection of different planes with different situations.

**Sheet 5 :- Orthographic projections**

- Problem – 1 to 3 Orthographic projection of different blocks

**Sheet 6 :- Problem 1 to 2 on Multi views**

**Sheet 7 :- Isometric Projections**

- Problem – 1 to 3 Isometric drawing

**Note :-**

- (1) Theory & Practical should be in First Angle Projections and IS Code should be followed wherever applicable.
- (2) The sketchbook containing all problems and solutions of sheets and sketches of fasteners, graph, charts is to be submitted with sheets.
- (3) A hand out containing applicable standards from IS Code should be given to each students by concerned teacher.

**7. REFERENCES :-**

1. Elements of Engg. Drawing – N.D. Bhatt
2. Engineering Drawing – P.J.Shah
3. Fundamentals of Engg. Drawing – W.J.Luzzadar
4. Fundamentals of Drawing – K.R.Gopalkrishna
5. Engg. Drawing – Parkinson & Zozzora
6. Machine Drawing – V. Laxminarayan & M.L.Mathur
7. Fundamentals of Engg. Drawing – French & Vierck

**8. ASSESSMENT SCHEME :**

<b>Sr. No.</b>	<b>Topic</b>	<b>Percentage weightage</b>
1.	Uses of Drawing Aids	05
2.	Planning & Layout of Drawing	05
3.	Lines, Lettering & dimensioning	05
4.	Engineering Curves	10
5.	Projection of points, Lines & Planes	15
6.	Orthographic Projections	20
7.	Isometric Projections	15
8.	Fasteners	10
9.	Graphs & Charts	10
10.	Modern methods of storing, reproduction of drawings	05

TOTAL 100

## **9. RESOURCE GROUP**

### **(A) POLYTECHNIC FACULTY**

1. Shri S.H.Patel,
2. Shri N.K.Lapsiwala,
3. Shri R.A.Shah,

### **(B) CDC FACULTY**

1. Prof. J. P. Patel
- 2.. Prof. S. R. Mishra

**COURSE CODE NO: S-111**

**NAME OF COURSE: OFFICE AUTOMATION**

**1. RATIONALE :**

This course gives a practical introduction to the DOS and WINDOWS operating system .It makes the students proficient in the use of MS OFFICE packages namely WORD, EXCEL & POWER POINT , Basics of HTML which used to create sample web pages.

**2. SCHEME OF STUDIES AND EXAMINATIONS :**

COURSE CODE NO.	NAME OF COURSE	TECHING SCHEME		EXAMINATION SCHEME			
		L	P	TH.	PR	TW.	TOTAL
S-111	OFFICE AUTOMATION	--	4	--	50	50	100

**3. LABORATORY EXPERIENCES :**

The laboratory experiences will be based on the following :

**1. DOS**

- 1.1 Introduction to DOS 6.22 and advanced versions
- 1.2 DOS basic controls
  - 1.2.1 DIR, MD, RD, CD, COPY, REN, DEL, EDIT commands
- 1.3 Customizing with DOS
- 1.4 Computer fundamentals

**2. WINDOWS**

- 2.1 What is Windows?
- 2.2 Introduction to windows and Advance Window Versions
- 2.3 Windows Basic Control
- 2.4 Working With Programs
- 2.5 Managing Files and Folders
- 2.6 Customizing With Windows
- 2.7 Accessories of Windows

**3. MICROSOFT OFFICE.**

- 3.1 How Office Works Menu, Toolbars and more
- 3.2 Offices and Internet
- 3.3 Getting Help from the office assistant

**4. MICROSOFT WORD.**

- 4.1 Creating a New Office Document
  - 4.1.1 Creating a Document Using a Wizard or Template
  - 4.1.2 Entering Text
  - 4.1.3 Turning on Paragraph marks on
- 4.2 Opening and Editing Documents
  - 4.2.1 Finding and Replacing Text
  - 4.2.2 Using Print Layout View, Outline View, Web Layout View
- 4.3 Making Documents Look Great
  - 4.3.1 Changing Font, Font Size, Boldfacing, Italicizing, Underlying, Expanding and Condensing Character spacing, Changing the Case of Text, Using special Font Effects
  - 4.3.2 Selecting Paragraphs, Using the ruler to Indent Paragraphs, Setting a Different First Line Indent, Indent Using paragraph Dialog Box, Double Spacing Paragraphs, Centering and Justifying Paragraphs, Setting tabs, Addling Bullets to Paragraphs, Setting Tabs, Adding bullets to Paragraphs, Numbering Paragraphs

- 4.3.3 Finding And Replacing Formatting, Using Style, Choosing Text Style, Creating a Paragraph style, Modifying a paragraph Style, Creating a character style
- 4.3.4 Changing the Page size and Orientation, Changing Margins, Setting up Headers and Footers, Creating Multiple Sections, Paginating the Document, Numbering Pages, Setting up Multiple Columns, Auto Formatting a Document
- 4.3.5 Creating A tables, Drawing a table, Entering, Aligning, Totaling Data in a Table, Turning on Borders and Shading, Converting Text to Table and vice a versa
- 4.4 Fancy Word Tricks
  - 4.4.1 Automatically Correcting Types, Inserting Symbols from the Wingdings Font, Using Auto text, Printing Envelopes, Saving a Document as a Template, Using Automatics Saves, Creating Form Letters using Mail Merge
  - 4.4.2 Inserting Hyperlinks, Editing Hyperlinks, Previewing a document as a web page, saving a document as a web page, using the web wizard to create a web site, formatting a document with a web theme.
- 5 MICROSOFT EXCEL**
  - 5.1 Creating New Workbooks and Worksheets
    - 5.1.1 Moving within a sheet, Entering, Editing Cells, Filling an Entry Range, Auto filling a range, Entering a Simple Calculations, Building a Simple Formula, Summing Columns and Rows, Sum Function, Copying Formulas, Average Functions, Function Wizard
    - 5.1.2 Enlarging Columns and Rows, Inserting Rows and Columns, Inserting and Deleting Cells, Moving & Copying Data, Freezing the Headings
  - 5.2 Building a Better Worksheet
    - 5.2.1 Enlarging Columns and Rows, Inserting Rows and Columns, Inserting and Deleting Cells, Moving & Copying Data, Freezing the Headings
  - 5.3 Making Your Worksheet Look Great
    - 5.3.1 Choosing an AutoFormat, Formatting Text, Centering a Title Above a Range, Formatting numbers, Adding Borders & Shading to Range, Applying Conditional Formatting
  - 5.4 From Numbers to Pictures: All About Charts
    - 5.4.1 Creating a Default Chart, Creating a Chart using Chart Wizard, Modifying: Chart, Chart Type, Chart Area, Plot Area, Gridlines, Titles, Axes, Legend, a Data Series
    - 5.4.2 Adding data to a chart, adding data Tables and Trend lines
  - 5.5 Extra Special Excel Tricks
    - 5.5.1 Changing to Another Sheet, Naming Sheets, Referring to Data From Other Sheets in Formulas, Consolidating to a Sheet, Naming Ranges, Auditing a Workbook, Seeking Goals, Tracking Changes, Reviewing Changes, Inserting Comments, Protecting and Sharing a workbook, merging workbooks
  - 5.6 Making a Bill in Excel
- 6 MICROSOFT POWERPOINT**
  - 6.1 Creating New Presentation
    - 6.1.1 Using Auto content Wizard, Using a Design Template, Using Sample Presentation, Changing Views, Adding Slides
    - 6.1.2 Outlining the Presentation
    - 6.1.3 Creating Text Slides
  - 6.2 Making Great Looking Presentation
    - 6.2.1 Selecting new design, Changing Color Scheme, Switching to Slide and Title Master Views, Changing the Background color and shading, Text Fonts, Header and Footer Information, Adding logo to Background, Reordering Slides, Duplicating and deleting Slides.
    - 6.2.2 Drawing shapes, lines, Adding Predefined shapes and Text boxes, Adding Shadows and 3-D Effects, Making text conform to shapes, Grouping and Ungrouping Shapes, Rearranging and Rotating Shapes

- 6.3 Showtime ! Presenting on Paper, In Person and on the Wave
  - 6.3.1 Adding Transition Effects, Adding Preset Animation, Creating Custom Animations, setting up the show, Displaying the Show
- 6.4 Making on Organization Structure in Power Point
  - 6.4.1 Starting an organization chart, Entering names and Titles, Adding Members, Formatting the Boxes, Text and Lines, Rearranging the Org Chart, Finishing the Chart
- 7 Introduction to Hypertext Markup Language**
  - 7.1 Tools required for creating an HTML Document
    - 7.1.1 Notepad & Browser
    - 7.1.2 Creating HTML Document
      - 7.1.2.1 Document Structure Elements
 

```
<!DOCTYPE>, <HTML> ... </HTML>, <HEAD> ...</HEAD>,
<BODY> ..... </BODY>, <TITLE> ... </TITLE>
```
  - 7.2 Formatting HTML Document
    - 7.2.1 Character Formatting
    - 7.2.2 Information Type Formatting
    - 7.2.3 Block Formatting Elements
      - 7.2.3.1 <ADDRESS>, <FONT>, <BASEFONT>, HEADING <H1>.... <H6>, <BR>), <CENTER>, <HR>, <MARQUEE>, <P> , <PRE>, <UL>, <LI>, <OL>,<DL><DT>
  - 7.3 Fonts and Colors
    - 7.3.1 Adding Fonts
    - 7.3.2 Adding Colors
  - 7.4 Lists and Tables
    - 7.4.1 Using Lists an HTML Document
    - 7.4.2 Using Tables in an HTML Document
  - 7.5 Hyperlinks
    - 7.5.1 Creating Hyperlinks
  - 7.6 Images
    - 7.6.1 Inserting Images in an HTML Pages

#### **4. REFERENCES :**

1. Microsoft Office for windows ( 'O' Level DOEACC)  
by Sagman Pub: Pearson Education ISBN 81-7808-341-8
2. World Wide Web Design with HTML By C. Xavier TMH
4. HTML and XML An Introduction NIIT PHI EEE
3. Mastering MS OFFICE - 2000 COURTERTECHMEDIA Professional addition.
4. Personal Computer Software 'O' Level Modue-2 Part-II (MSWORD + EXCEL)  
by Er. V. K. Jain BPB Publication
5. Microsoft Office 2003 Bible  
By Edward C Willett Pub: Wiley Dreamtech
6. .MS OFFICE - 2000 COURTERTECHMEDIA No experience required

#### **SUPPORT GROUP:**

#### **POLYTECHNIC FACULTY:**

Smt. M. P. Mehta

#### **CDC FACULTY:**

Shri P. N. Patel

Shri D.K.Patel

Shri A. K. Popat

**COURSE CODE: S-114**

**COURSE NAME: ELECTRONIC MATERIALS & COMPONENTS**

1. RATIONAL:

The main objective of this courses is to impart knowledge of different electronics materials and various components used in electronics industries. The courses also describes suitability & characteristics of various electronics components for different applications.

2. SCHEME OF STUDIES AND EXAMINATION:

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Code No.	Course Name	L	P	Exam Scheme			Total
				Th.	Pra.	T.W.	
<b>S-114</b>	Electronic Materials & Components	3	-	100	--	--	100

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3. SCHEME OF TEACHING AND ASSESSMENT:

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Sr.No	Topics	Th.	Pra.	Total	% Weightage
1.	Conducting Materials	08	-	08	20
2.	Magnetic Materials	08	-	08	20
3.	Insulating Materials	08	-	08	20
4.	Semiconductors	06	-	06	15
5.	Electronics Components	12	-	12	25
Total		42	-	42	100

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4. TOPICS AND SUBTOPIC:

1. CONDUCTING MATERIALS:

- 1.1 Electronic properties of solids, band theory.
- 1.2 Resistivity - factors affecting resistivity.
- 1.3 Temperature co-eff. of resistance.
- 1.4 Thermal conductivity.
- 1.5 Properties and applications of -copper, aluminum, nickel, silver, tungsten, manganese, tantalum , brass & bronze and resistive alloys.
- 1.6 Superconductivity.

2. MAGNETIC MATERIALS:

- 2.1 Introduction of magnetic materials.
- 2.2 Classification of magnetic materials.
- 2.3 Magnetization curve and magnetic properties.
- 2.4 Hysterisys loss and eddy current loss- methods to reduce eddy current losses.
- 2.5 Soft and hard magnetic materials.
- 2.6 Properties and uses of magnetic steel and steel alloys.
- 2.7 Ferrites & powdered core- their construction, characteristics and uses.
- 2.8 Choice of material for transformer core, armature of motors, loud speakers, submarine communication, long distance telephone lines, current, transformers, audio-frequency transformers, moving iron instruments, TV tubes.

### 3. INSULATING MATERIALS:

- 3.1 Classification of insulating materials on the basis of operating temperatures.
- 3.2 Electrical and chemical properties of insulating materials (Insulation resistance, di-electric strength, di-electric constant, di-electric loss and chemical resistance)
- 3.3 Common insulating material : Ceramic, glass, paper, mica, rubber, plastics- thermosetting and thermoplastic materials, PTFE, FRP (Fiber Reinforced Plastic), their important properties and applications.

### 4. SEMICONDUCTORS :

- 4.1 Qualitative discussion of semiconductors.
- 4.2 Electrical properties of silicon and germanium.
- 4.3 Intrinsic semiconductors, trivalent and pentavalent impurities.
- 4.4 Extrinsic semiconductors.
- 4.5 Formation of P and N type semiconductors, P-N junction.
- 4.6 Point contact and junction diode.

### 5. ELECTRONIC COMPONENTS:

- 5.1 Construction and use of common electronic components.
- 5.2 Resistors - carbon composition, carbon film, cracked carbon, metal oxide film, wire-wound, variable resistors.
- 5.3 Capacitors - paper , silvered paper, mica, silvered mica, ceramic plastic foil, electrolytic, variable resistor.
- 5.4 Inductors - fixed and variable inductors.
- 5.5 Relays - electromagnetic and reed relay.
- 5.6 Chokes - A.F and R.F chokes.
- 5.7 Printed circuit board and its fabrication.
- 5.8 Piezo electric crystal - Principle, cat. & applications.

### 6. REFERENCES:

1. Electronics Engg. Materials            Rains & bhatacharya    Khanna
2. Electrical Engg. Materials.        M.L. Gupta                Khanna
3. Text book of Applied Electronics R.S. Sedha                S. Chand

### 7. SUPPORT GROUP:

#### POLYTECHNIC FACULTY:

1. Prof. J.G. Dave
2. " M.B. Patel
3. " A.H. Dhanrajani
4. " H.N. Parikh

#### CDC FACULTY:

1. Prof. S.R. Mishra
2. Shri. K.D. Joshi

**COURSE CODE : S-126**  
**COURSE NAME : ESSENTIALS OF ENVIRONMENT AND SEISMIC ENGINEERING**

**1. RATIONALE**

Since last two decades, Environmental Education has attracted the interests of educationalists and practitioners at all levels of education throughout the World. The growing concern about the natural resources degradation, air & water pollution, deforestation and other environmental problems has prompted educationalists to introduce a course on Essentials of Environment in various technical Curricula. As technicians occupy middle level managerial positions in industries, it is essential that they are provided with right kind of environmental education and training. It is with this aim that a course on” Essentials of Environment” is being introduced in diploma programme.

**2. SCHEME OF STUDIES AND EXAMINATION**

SR NO	CODE NO	NAME OF COURSE	L	P	EXAM.SCHEME			
					TH	PR	TW	TOTAL
1	S-126	ESSENTIALS OF ENVIRONMENT AND SEISMIC ENGINEERING	3	--	100	--	--	100

**3. SCHEME OF TEACHING :**

TOPIC NO	NAME OF TOPIC	TH	PR	TOTAL
1	Introduction	02	--	02
2	Ecological aspects of environment	05	--	05
3	Natural resources	07	--	07
4	Global environmental problems	05	--	05
5	Environmental pollution	07	--	07
6	Clean Technologies	05	--	05
7	Fundamentals of seismic engineering	08	--	08
8	Natural Disasters	03	--	03
	<b>Total</b>	<b>42</b>	<b>--</b>	<b>42</b>

**4. OBJECTIVES :**

In view of developing new attitudes and behavioral patterns to enable students make decisions which help preventing deterioration of environment & as certain concept of sustainable development, the following objectives for Essentials of Environment course have been identified:

- 1.1 Understand the scope of Environmental education.
- 1.2 Understand the importance of environmental awareness.
- 2.1 Understand the natural system.

- 2.2 Understand a biotic and biotic components of natural system.
- 2.3 Understand various processes of natural system.
- 2.4 Appreciate Eco system, food chain & webs and other biological systems.
- 2.5 Estimate future ecological prospects of man.
- 3.1 Know the natural resources.
- 3.2 Assess the impact of human population on environment.
- 3.3 Understand abiotic and biotic resources.
- 3.4 Appreciate forest as natural resource.
- 3.5 Recognize the concept of sustainable development.
- 3.6 Appreciate the importance of management, consumption & conservation of natural resources.
- 4.1 Create awareness for Global Environmental problems.
- 5.1 Understand causes of environmental pollution.
- 5.2 Understand water pollution.
- 5.3 Understand air pollution.
- 5.4 Understand the Noise as pollutant.
- 5.5 Know radiation and its pollution effects.
- 6.1 Understand clean technology.
- 6.2 Recognize the importance of waste minimization.
- 6.3 Know importance of bio-fertilizers.
- 6.4 Understand the Integrated Pest Management (IPM) system.
- 7.1 Understand the need of seismic engineering.
- 8.1 Understand the various types of natural disaster.

## **5. TOPICS & SUB-TOPICS**

### **1. Introduction**

- 1.0 Introduction
- 1.1 Environment & its components
- 1.2 Environment in India
- 1.3 Public awareness

### **2. Ecological aspects of Environment**

- 2.0 Introduction to Environment
- 2.1 Ecology
  - 2.1.1 Eco system
  - 2.1.2 Factors affecting Eco system
- 2.2 Elton pyramid
- 2.3 Biogeochemical cycles.
  - 2.3.1 Hydrologic cycle
  - 2.3.2 Carbon cycle
  - 2.3.3 Nitrogen cycle

- 2.3.4 Phosphorus cycle
- 2.3.5 Sulphur cycle
- 2.4 Biodiversity
  - 2.4.1 Biodiversity Index
- 2.5 Future of human being
- 3. Natural Resources**
  - 3.0 Natural Resources
  - 3.1 Types of resources
  - 3.2 Quality of life
  - 3.3 Population and Environment
  - 3.4 Water resources
    - 3.4.1 Sources of water
  - 3.5 Population projection
    - 3.5.1 Arithmetic progression method
    - 3.5.2 Geometric progression method
    - 3.5.3 Incremental Increase method
    - 3.5.4 Logistic curve method
    - 3.5.5 Declining growth method
  - 3.6 Water demand
  - 3.7 Forest as resource
    - 3.7.1 Forest and Environment
    - 3.7.2 Deforestation
    - 3.7.3 Afforestation
    - 3.7.4 Forest conservation, its methods
  - 3.8 Land
    - 3.8.1 Uses and abuses of waste and wet land
  - 3.9 Wild life
    - 3.9.1 Conservation of wild life
    - 3.9.2 Important National parks, Safaries, Reserves.
  - 3.10 Other resources
    - 3.10.1 Oil and mineral resources
    - 3.10.2 Their depletion
    - 3.10.3 Effects
- 4. Global Environmental Problems**
  - 4.0 Introduction
  - 4.1 Major Global problems
  - 4.2 Acid rain
    - 4.2.1 Effect of Acid rain
  - 4.3 Green house effect
  - 4.4 Depletion of Ozon layer

4.4.1 Effect of Ozon layer depletion

4.5 Human predictiments

4.5.1 Introduction of global warming

4.5.2 Measures against global worming

## **5. Environmental Pollution**

5.0 Introduction

5.1 Water pollution

5.2 Characteristics of domestic waste water.

5.3 Principles of treatment

5.4 Water treatment plant

5.6 Air pollution

5.6.1 Pollutants

5.6.2 Sources of pollution

5.6.3 Effect of pollutants

5.6.4 Air monitoring system

5.6.5 Air pollution control

5.7 Noise pollution

5.7.1 Acoustic treatment for noise pollution

5.7.2 Place of noise pollution

5.7.3 Effect of noise pollution

5.8 Radio active pollution

5.8.1 Radiation

5.8.2 Adverse effects of radiation & thermal pollution

## **6. Clean technologies**

6.0 Introduction

6.1 Clean technology

6.2 Types of Energy

6.2.1 Conventional Energy Sources

6.2.2 Non-conventional Sources of Energy

6.3 Recycling pollution control

6.4 Types of Pesticides

6.5 Integrated Pest Management

## **7 Fundamentals of seismic engineering**

7.1 Introduction

7.1.1 Definition

7.1.2 History of earthquake

7.1.3 Earth and its' structure

7.2 Terminology

7.2.1 Epicenter

7.2.2 Hypocenter

7.2.3 Focus

- 7.2.4 Epicenter distance
- 7.3 Waves generated due to earthquake
  - 7.3.1 P waves
  - 7.3.2 S waves
- 7.4 Causes of earthquake
- 7.5 Measurement of earthquake
  - 7.5.1 Intensity and magnitude of earthquake
  - 7.5.2 Sysmo-graph
  - 7.5.3 Sysmo-scope
  - 7.5.4 Sysmo-meter
  - 7.5.5 Richter scale
- 7.6 Zoning of earthquake as per I.S.
- 7.7 Effects of earthquake on
  - 7.7.1 Soil
  - 7.7.2 Low-rise and high-rise buildings
  - 7.7.3 Human psychology
  - 7.7.4 Communication
  - 7.7.5 Geology
- 7.8 General instructions for protection of people during earthquake
- 7.9 General guidelines for construction and maintenance of earthquake proof /resistant masonry structure

## **8 Natural disasters**

- 8.1 Types of natural disaster
  - 8.1.1 Cyclone
  - 8.1.2 Flood
  - 8.1.3 Fire
  - 8.1.4 Desert storms
  - 8.1.5 Land slides
  - 8.1.6 Snow avalanches
- 8.2 Cyclone
  - 8.2.1 Introduction
  - 8.2.2 Fundamentals
  - 8.2.3 Characteristics
  - 8.2.4 Causes & effects
  - 8.2.5 Preventive and Remedial measures
- 8.3 Flood
  - 8.3.1 Introduction
  - 8.3.2 Fundamentals
  - 8.3.3 Causes and effects
  - 8.3.4 Preventive and Remedial measures
- 8.4 Fire
  - 8.4.1 Fundamentals
  - 8.4.2 Causes & effects
  - 8.4.3 Preventive and remedial measures

## 6.SUGGESTIVE INSTRUCTIONAL STRATEGIES

Sr. No.	Objectives	Instructional Strategy	Key Resources needed
1	1.1, 1.2	Lecture	Encyclopedia of Environmental Education and Administration
	2.1 to 2.5	Use charts, Slides Films	Film on Environmental Problems
	3.1 to 3.6	Explain with live examples	Case studies on environmental protection
	4.1	News Paper cuttings	Pollution control Board Laboratory
	5.1 to 5.5	Live demonstrations/ field laboratory visits	-----
	6.1 to 6.4	Use AV Aids	----
	7.1 to 8.4	Use IS codes, rules norms framed by Govt. of .India.	Codes on Environmental protection Acts and rules (Central and State)

### Note :

The above instructional strategies are only suggestive. The individual teacher is free to design his own strategy looking to the constraints and resources available.

### 7. REFERENCES :

1. Environmental Engineering by Pandey & Carney, TMH, New Delhi.
2. Environment Administration Law and Judicial attitudes.
3. Introduction to Environmental Engineering and Science by Gilbert M. Masters, Printers Hall India, New Delhi.
4. Waste Water Engineering - Treatment, Disposal & re-use by Metcalf & Eddy, 2nd edition, TMH, New Delhi.
5. Environmental Engineering by Peavy, TMH International, New York.
6. Video - films developed by Centre for Environmental Education, Thaltej Tekra Ahmedabad.52

### 8. ASSESSMENT SCHEME :

SR. NO	NAME OF TOPIC	PERCENTAGE WEIGHTAGE
1	Introduction	05
2	Ecological aspects of environment	10
3	Natural resources	15
4	Global environmental problems	10
5	Environmental pollution	20
6	Clean Technologies	10
7	Fundamentals of seismic engineering	15
8	Natural disasters	15
	TOTAL	100

**9. RESOURCE GROUP**

**(A) POLYTECHNIC FACULTY :**

1. Prof. V.A. Patel
2. Prof. P.K. Bhatt
3. Prof. V.R. Pandya
4. Prof. P.V.Gohel
5. Shri R.M.Thakkar
6. Shri K.H.Bhatt
7. Smt. M.B.Soneji

**(B) CDC FACULTY :**

1. Prof. M.P. Pandya
2. Shri P.N.Patel
3. Shri A.K.Popat

**(C) TTTI FACULTY, BHOPAL :**

1. Prof. K.K. Shrivastava,
2. Prof. J.P. Tegar,

**COURSE CODE : S-201**  
**COURSE NAME : MATHEMATICS-II**

1. **RATIONALE** :The entrance qualifications for a Diploma technician is 10th pass. They have gained sufficient knowledge of the course Mathematics in the standard 10th to qualify for further studies in diploma programmes. A technician engineer needs to study relevant theories and principles of Mathematics to enable them to understand & grasp the concepts of the advance courses of diploma programme and their various engg. applications.

With this view, the necessary content for the course Mathematics is designed and developed in consultations with the senior technical teachers to make students capable to understand the technology related courses at higher levels. It is presumed that this course-content will provide a suitable foundation for all the engineering applications which technician is supposed to come across in his field and will be able to use it in understanding them during his diploma study.

2. **SCHEME OF STUDIES AND EXAMINATION :**

SR. NO.	COURSE CODE	COURSE NAME	L	P	Exam scheme (Marks)			
					Th.	Pr.	T.W.	Total.
1.	S-201	Mathematics - II	3	--	50	--	--	50

3. **SCHEME OF TEACHING :**

SN.	Topics	Theory Hours
	<b>Part-I CO-ORDINATE GEOMETRY</b>	
1.	Point	3
2.	Straight line	3
3.	Circle	3
	<b>TOTAL</b>	<b>9</b>
	<b>Part-II CALCULUS</b>	
1.	Functions & Limit	5
2.	Differentiation	13
3.	Integration	15
	<b>TOTAL</b>	<b>33</b>
		<b>Grand Total 42 hrs.</b>

#### 4. TOPICS AND SUB-TOPICS

##### Part-I CO-ORDINATE GEOMETRY:

###### TOPIC-1 : Point

3 hrs

- 1.1 Distance formula for  $R^2$ .
- 1.2 Circum-centre of a triangle.
- 1.3 Area of a triangle.
- 1.4 Division of a line segment.
- 1.5 Locus of point.

###### TOPIC-2 : Straight line

3 hrs

- 2.1 Cartesian equation of a straight line.
- 2.2 Equation of a straight line in  $R^2$ :  $ax+by+c=0$ .
- 2.3 Slope of a straight line.
- 2.4 Intercepts on axis.
- 2.5 Equation of a straight line passes through two points  $(x_1, y_1)$  and  $(x_2, y_2)$
- 2.6 Equation of straight line having slope  $m$  and passing through the point  $(x_1, y_1)$ .
- 2.7 Equation of st. line having intercepts on  $y$ -axis and slope  $m$
- 2.8 Parallel and perpendicular straight line relation between their slope.
- 2.9 Angle between two straight lines.

###### TOPIC-3: CIRCLE

3 hrs

- 3.1 Definition of a circle
- 3.2 General equation
- 3.3 Standard equation
- 3.4 Formation of equation of a circle
- 3.5 Tangent & Normal.

##### PART-II CALCULUS

###### TOPIC-1: Functions & Limit

5 hrs

- 1.1 Definition of function
- 1.2 Examples
- 1.3 Concept & rules of limit
- 1.4 Evaluation of Standard limit of algebraic & trigonometric function.

**TOPIC-2 : Differentiation:**

**13 hrs.**

- 2.1 Definition.
- 2.2 Derivation of constant function.
- 2.3 Formula:  $X^n$ ,  $a^x$ ,  $\text{Sin}x$ ,  $e^x$ , etc.
- 2.4 Formula for sum, product and quotient of functions.
- 2.5 Chain rule.
- 2.6 Derivation of parametric and Implicit functions.
- 2.7 Second order differentiation.
- 2.8 Application of derivatives.
  - (i) Velocity
  - (ii) Acceleration
  - (iii) Maxima and minima, radius of curvature

**TOPIC-3. Integration**

**15 hrs.**

- 3.1 Introduction of Integration
- 3.2 Formula for standard function as mentioned in 2-3.
- 3.3 Simple basic rules of Indefinite Integration.
- 3.4 Evaluation of simple Indefinite Integrals.
- 3.5 Integration by Substitution.
- 3.6 Definite Integral
  - 3.6.1 Lower limit
  - 3.6.2 Upper limit
  - 3.6.3 Properties of definite integral
- 3.7 Solution of simple problems of definite Integral.
- 3.8 Application of Integration.
  - (1) Area & volume of circle, parabola & ellipse only.

---

**Grand Total 42 hrs.**

**Grand Total 50 Marks**

## 5. REFERENCES :

- |  |                |
|--|----------------|
| (1) Engg. Mathematics                              | P.N. Wartikar  |
| (2) Engg. Mathematics                              | B.S. Greval.   |
| (3) Engg. Mathematics                              | I. B. Prasad   |
| (4) Polytechnic Mathematics (Vol. I & II)          | TTTI Bhopal    |
| (5) College Algebra                                | Shah and Desai |
| (6) Mathematics for Polytechnic                    | S.P.Deshpande  |
| (7) Co-Ordinate Geometry                           | Bansilal       |
| (8) Technical Ganitshashtra(Part I,II in Gujarati) | R.D.Desai      |
| (9) ---do---                                       | Anant Shashtri |

## 6. ASSESSMENT SCHEME :

Sr.No.	Name of Topics	% weightage
	<b>Part-I CO-ORDINATE GEOMETRY</b>	
1.	Point	5
2.	Straight line	5
3.	Circle	5
	<b>TOTAL (Marks)</b>	<b>15</b>
	<b>Part-II CALCULUS</b>	
1.	Functions & Limit	5
2.	Differentiation	15
3.	Integration	15
	<b>Total (Marks)</b>	<b>35</b>
	<b>Grand Total</b>	<b>50 Marks</b>

## 7. RESOURCE GROUP :

### (A) POLYTECHNIC FACULTY : (B) CDC FACULTY : (C) EXPERT/EDITOR

- |                         |                      |                    |
|-------------------------|----------------------|--------------------|
| 1. Kum. Ashaben Sharma, | 1. Prof. A. M. Patel | 1. Prof. B.C.Bhatt |
| 2. Shri. R.M. Bhavsar   | 2. " R. M. Thakkar   |                    |
| 3. Shri H. C.Suthar     | 3. " H. B. Darji     |                    |

**COURSE CODE : S-202**  
**COURSE NAME : APPLIED SCIENCE-II (CHEMISTRY)**

**1. RATIONALE :**

Science is the foundation for all technician courses. The basic aim of teaching science is to develop in the student the habit of scientific enquiry, ability to establish the cause and effect relationship and logical development of different disciplines.

Chemistry forms the part of applied science. The study of basic concepts Chemistry like atom, corrosion, lubrication etc. will help the students in understanding engineering subjects where the emphasis is laid on the application of these concepts.

Chemistry is concerned with the changes in structure and properties of matter. Many of the processes, which are involved to bring out these changes; form the basis for engineering activities. Teaching of chemistry should be aimed at developing right type of attitudes in the students and the ability to predict the results under given conditions of chemical activities.

Thus a good foundation in basic sciences will help the students in their self-development, to cope up with the continuous flow of innovation and discoveries in technology.

**2. SCHEME OF STUDIES AND EXAMINATION :**

SR. NO.	CODE NO	NAME OF COURSE	L	P	Exam. Scheme			
					Th.	Pr.	T.W.	Total
1.	S-202	Applied Science-II (CHEMISTRY)	2	–	50	–	–	50

**3. SCHEME OF TEACHING :**

Sr. No.	Name of Topics	Theory Hours
1.	Atomic & Molecular Structure	4
2.	Ionisation & Electro Chemistry	5
3.	Corrosion of metals & its prevention	5
4.	Water Treatment	4
5.	Lubrication & Lubricants	3
6.	Chemistry of Engineering Materials	7
<b>Total</b>		<b>28</b>

#### 4. OBJECTIVES :

1. Understand the atomic model.
2. Understand the ionisation energy, ionisation affinity and chemical bonds.
3. Understand the molecular structure of solid, liquid and gases.
4. Understand the ionisation process and factors affecting the degree of ionisation.
5. Understand the importance of pH.
6. Appreciate the importance and use of buffer solutions.
7. Understand the types of electrolytes and their industrial uses.
8. Understand the electrolytic conductance of metals & salts.
9. Understand the process of oxidation - reduction and working of electrochemical cell.
10. Understand the terms : Standard conditions, hydrogen, electrode, halfcellpotential, electro chemical series.
11. Describe the different types of corrosion.
12. Comprehend the different factors affecting the rate of corrosion.
13. Appreciate the different protective measures to prevent corrosion.
14. Understand the types and degree of hardness of water.
15. Know the effects of hard water when used in boiler and methods of it's prevention.
16. Understand the method for removal of hardness of water.
17. Know the water quality and methods of treatment of water for town supply.
18. Understand the terms lubrications and lubricant.
19. Comprehend different tests of lubricants.
20. Understand the functions of additives to improve properties of lubrications.
21. Appreciate the process of selection of lubricant for gears cutting control and steam turbines.
22. Understand the process of polymerisation.
23. Know the properties and uses of natural and synthetic rubber.
24. Know the different types of adhesives, their characteristics and uses.
25. Know the ingrediants of paints and varnish.
26. Know the characterisitics and types of refractories.

27. Know the properties and uses of insulating materials.
28. Understand the preparation, properties and use of natural and synthetic rubbers.

**5 . TOPICS AND SUBTOPICS :**

**TOPIC – 1 ATOMIC AND MOLECULAR STRUCTURE 4 HRS.**

1. Arrangement of , p and n in atom.
2. Distribution of electrons in shell and subshell.
3. Concept of atomic orbitals.
4. Aufbau's principle and electronic configuration of elements.
5. Ionisation energy.
6. Electron affinity.
7. Different types of chemical bonds.
8. Motion of molecules.
9. Intermolecular force of attraction.
10. Molecular arrangement in solid, liquid and gases.
11. Structure of solids.

**TOPIC – 2 IONISATION AND ELECTROCHEMISTRY 05 HRS.**

1. Introduction
2. Ionisation and degree of ionisation.
3. Factors affecting the degree of ionisation.
4. Ionic equilibrium constant (kw) for water.
5. Definition of pH.
6. Ionisation of acid, base and salts.
7. pH calculations of acid, base and salt solution at different concentration.
8. pH of acid, base and neutral solution.
9. Importance of pH in various fields.
10. Definition of buffer solution.
11. Types of buffer solution.
12. Application of buffer solutions.
13. Metallic conductors and electrolytes.
14. Types of electrolytes.

15. Industrial applications of electrolytes.
16. Electrolytic conductance.
17. Effect of dilution on electrical conductance.
18. Electrical conductivity of elements, e.g., Li, Be, B, c etc.
19. 'N' and 'P' type semiconductors.

**TOPICS - 3 CORROSION OF METALS AND IT'S PREVENTION**

**05 HRS.**

1. Oxidation - reduction process
2. construction and working of electrochemical cell.
3. Interpretation of corrosion.
4. Definition of corrosion.
5. Standard conditions.
6. Standard hydrogen electrode.
7. Half cell potential.
8. Electrochemical series and its significance.
9. Atmospheric corrosion
10. Pitting corrosion.
11. Water line corrosion.
12. Crevice corrosion.
13. Nature of film.
14. pH of solution.
15. Area of cathode and anode.
16. Temperature.
17. Moisture
18. Purity of the metal.
19. Modification of environment.
20. Modification of the properties of metal.
21. Use of protective coatings.
22. Anodic and cathodic protection.
23. Modification in design and choice of material.

**TOPIC - 4 WATER TREATMENT**

**04 HRS.**

1. Hard water and soft water.
2. Types of hardness of water and it's units.
3. Salts producing hardness of water.
4. Method to express the hardness of water.
5. Scale and sludge formation and it's prevention.
6. Priming and foaming and it's prevention.
7. Caustic embrittlement and it's prevention.
8. Corrosion and it's prevention.
9. Chemical reactions involved in permutit and regeneration of permutit.
10. Chemical reactions involved in ion-exchange process and regeneration of acidic and basic-resins.
11. Purification of water by screening, sedimentation, co-agulation and filtration.
12. Sterilisation / Disinfection of water by boiling and chlorination by using chlorine and Bleaching - powder.

**TOPIC – 5 LUBRICATION AND LUBRICANTS**

**03 HRS**

1. Introduction and definition of lubricants and lubrication.
2. Functions of lubricants
3. Types of Lubrication
  - (a) Fluid film lubrication
  - (b) Boundry lubrication
4. Classification of lubricant
  - (a) Solid lubricants
  - (b) Semi-solid lubricants
  - (c) Liquid lubricants
  - (d) Synthetic oils
5. Test of lubricants and their significance like
  - (a) Viscosity and viscosity index
  - (b) Volatility
  - (c) Flash point and fire point
  - (d) Pour point and cloud point
  - (e) Neutralisation No. and acid value
  - (f) Saponification number

- (g) Emulification number
- (h) Corrosion test and copper strip test.
- 6. Additives to improve the quality of lubricants.
- 7. Purpose for the use of additives like
  - (a) Anti oxidants
  - (b) Corrosion inhibitors
  - (c) Antiwear agents
  - (d) Detergents and foam inhibitors
- 8. Selection of lubricants for
  - (a) Gears
  - (b) Cutting tools
  - (c) Steam turbine.

**TOPIC - 6 CHEMISTRY OF ENGINEERING MATERIALS**

**07 HRS.**

1. Outline of polymer and polymerisation
2. Classification of polymers with suitable examples
3. Thermoplastic and thermosetting
4. Properties and uses of thermosetting like Bakelite, melamine, epoxy and silicones
5. Properties and uses of thermoplastics like PVC, polyethelene.
6. Preparation and uses of elastomers.  
(Chemical, Structural aspects, should be avoided)
7. Comparison of properties of natural and synthetic elastomers.
8. Vulcanisation of rubber
9. Application of elastomers in industry.
10. Definition, characteristics, and examples of adhesives.
11. Classification of adhesives and their uses.
12. Purpose of using oil paint.
13. Characterisation of oil paint.
14. Ingredients of oil paint

15. Function and examples of each ingredient like ,
  - (i) Drying oil
  - (ii) Pigments
  - (iii) Thinner
  - (iv) Driers
  - (v) Extenders and plasticizers
16. Varnish and its types.
17. Difference between paint and varnishes.
18. Definition & application of refractories.
19. Characteristics of refractories like :-
  - (i) Refractoriness
  - (ii) Strength
  - (iii) Thermal expansion
  - (iv) Thermal conductivity
  - (v) Porosity
  - (iv) Thermal shock resistance
20. Classification of refractories like :-
  - (i) Acid refractories
  - (ii) Basic refractories
  - (iii) Neutral refractories
21. Uses of alumina and magnesia refractories.
22. Properties of ideal insulating materials.
23. Types of insulating materials :
  - (i) Natural insulating materials,
  - (ii) Insulating foils.
  - (iii) Insulating wool.
  - (iv) Manufactured insulating materials.
24. Properties and use of insulating materials like :-
  - (i) Glass wool.
  - (ii) Thermocole (foamable polystyrene)

## 6. REFERENCES :

1. Engineering Chemistry Jain
2. A Text Book of Polytechnic Chemistry V.P. Mehta.
3. A Text Book of Applied Chemistry  
(Vol.- I & II) J. Rajaram.
4. Engineering Chemistry M.M. Uppal
5. Polytechnic Chemistry Saxena.

## 7. ASSESSMENT SCHEME :

<b>Sr.No.</b>	<b>Name of Topic</b>	<b>Percentage weightage</b>
1.	Atomic & Molecular Structure	5
2.	Ionisation & Electro Chemistry	10
3.	Corrosion of metals & its prevention	10
4.	Water Treatment	5
5.	Lubrication & Lubricants	5
6.	Chemistry of Engineering Materials	15
<b>TOTAL</b>		<b>50</b>

## 8. RESOURCE GROUP :

### (A) POLYTECHNIC FACULTY :

1. Dr. A.S. Patel,
3. Prof. R.B. Prajapati,
3. Shri S.N. Soni,

### (B) CDC FACULTY :

1. Prof. A. M. Patel
2. Shri R.M.Thakkar
3. Shri H.B.Darji

### (C) TTI PFACULTY :

1. Dr. M.K. Shrivastava
2. Dr. Anju Rawlley

**COURSE CODE : S-207**  
**COURSE NAME : ENGINEERING MEASUREMENTS - II**

**1. RATIONALE :**

Work in an industry is characterized by certain specific features which in turn makes certain demands on the technician. First of all, he must be able to accurately measure physical quantities using appropriate measuring equipment. He must perform all experiments and related operations accurately in strict accordance with the relevant manual, standards or text books. Particular care must be taken to use these apparatus/ instruments carefully.

This course on Engineering Measurement intends to develop elementary measurement skills in the students. It is an interdisciplinary course emphasizing the development of personal attributes like spirit of enquiry, problem solving etc. Some elementary skills in error analysis, safety precautions and interpretation of results are to be developed through this course.

**2. SCHEME OF STUDIES AND EXAMINATION :**

SR. NO.	COURSE CODE	COURSE NAME	L	P	Exam scheme			
					Th.	Pr.	T.W.	Total
1.	S-207	Engineering Measurements -II	--	2	--	--	50	50

**3. SCHEME OF TEACHING :**

Sr. No.	Particulars	Hours
1.	Planning & Introduction	04
2.	Preforming Experiments	20
3.	Assessment/Submission	04
	<b>Total</b>	<b>28</b>

**4. OBJECTIVES :**

The students should be able to :

- \* Use appropriate units for each physical quantities.
- \* Read the physical quantities for basic measuring instruments .
- \* Record Observed data in the designed observation table accurately.
- \* Compute/Report the results based on the measurements taken accurately wherever necessary.

## 5. LABORATORY EXPERIENCES :

1. Determination of static friction.
2. Measurement of viscosity of a given liquid.
3. Measurement of pressure by using various instruments.
4. Determination of moment of inertia of flywheel.
5. Measurement of Electrical energy.
6. Measurement of area by Simpson's rule and square method.
7. Measurement of pH value of a given solution.
8. Measurement of flow rate.
9. Measurement of thermal conductivity of a metal.
10. Determination of percentage of iron in an alloy.
11. Measurement of rate of corrosion for given metals (like copper and aluminium) in acid or alkaline medium.
12. Measurement of power for different speed of a ceiling or a table fan.
13. Measurement of ash content of a given sample of coal.

- Note:**
1. Minimum 10 experiences to be performed during the term in this course from the above given list looking to the available resources at the Polytechnic.
  2. The experiences should be changed every year as far as possible.
  3. Assessment should be continuous and progressive.
  4. Student should be provided an opportunity to take measurement independently.
  5. Lectures should be arranged before starting actual laboratory work.
  6. Practical examination : 50 % marks of term work.

## 6. RESOURCE GROUP :

### (A) POLYTECHNIC FACULTY

- |                        |                     |
|------------------------|---------------------|
| 1. Shri A.A. Trivedi   | 2. Shri K.J. Patal  |
| 3. Shri R.B. Prajapati | 4. Dr. A.S. Patel   |
| 5. Shri S.N. Soni      | 6. Shri V.V.Vora    |
| 7. Shri A.H.Oza        | 8. Shri M.M.Makwana |

### (B) CDC FACULTY :

1. Prof. S. R. Mishra
2. Shri R. M. Thakkar

COURSE CODE NO. : S-211

NAME OF COURSE : BASIC ELECTRICAL ENGINEERING

Teaching Scheme		Examination Scheme					
Period of 1. Hour		Theory		Pract./Oral		T.W.	Total
Th.	Pr.	Hr.	Marks	Hr.	Mark	Marks	Marks
3	2	3	100	-	-	50	150

1. Magnetic circuit :

- 1.1 Revision of terms - M.M.F , magnetic force, permeability, hysteresis, reluctance, leakage factor etc.
- 1.2 State the relationships -  $B = \mu H$ ,  $\phi = mmf/s$ .
- 1.3 Solution of simple series magnetic circuits.
- 1.4 Comparison between a magnetic and an electrical circuit.

2. Electromagnetic induction :

- 2.1 State Faraday's laws.
- 2.2 Dynamically induced emf.
- 2.3 Statically induced emf - a. self induced emf and  
b. mutually induced emf.
- 2.4 Definition and equations of self & mutual inductance and coefficient of coupling.
- 2.5 Hysteresis loop and hysteresis loss.  
simple examples of hysteresis loss calculation.

3. Capacitance :

- 3.1 Definitions - capacitance, relative permittivity
- 3.2 Capacitors in series and parallel.

4. A.C fundamentals :

- 4.1 Define cycle, frequency, periodic time, amplitude, angular velocity or frequency with reference to alternating emf and current.
- 4.2 Different forms of alternating emf and current equations.
- 4.3 Definition and derivation by analytical method of R.M.S value ,average value, form factor and peak factor.
- 4.4 Vector representation of an alternating emf and current.
- 4.5 Mathematical representation of an alternating emf and current by : a. symbolic notation, operator "J"  
b. trigonometric form  
c. polar form.
- 4.6 Addition, subtraction, multiplication and division of emf and current vectors with reference to 4.5 (a) and 4.5 (c).

5. A.C circuits :

- 5.1 A.C through pure a. resistors, b. inductors and c. capacitors.
- 5.2 A.C through R-L series and R-C series circuit. Definition of impedance ,phase angle, lagging/leading impedance in rectangular and polar form.
- 5.3 Power in A.C circuits, definition of power factor.
- 5.4 Definition and relation between kW, KVA, KVAR, P.F
- 5.5 Simple RLC series circuits - determination of impedance current and P.F.
- 5.6 Simple parallel a.c. circuits. - determination of total currents ,power factor of the circuits comprising of RL and RC in parallel by :
  - a. vector/phasor method
  - b. admittance method - definition of admittance, susceptance, conductance.
- 5.7 Introduction of series and parallel resonance.
- 5.8 Generation of 3 phase voltages - their wave forms, equations and vector representation advantages.
- 5.9 Derive the relationship between phase voltage, line voltage, phase current, line current when the coils/loads are connected in a. star and b. delta. write power equations too.

6. Electrical machines :

- 6.1 Construction of a. field system b. armature c. lap and wave winding.
- 6.2 Working principle of D.C. generator and motor.
- 6.3 EMF equation and torque equation (without derivation).
- 6.4 Types of D.C. machines
  - a. separately excited and
  - b. self excited - shunt, series ,compound.
- 6.5 Requirement of starter and D.C. motor - its schematic diagram, operation and advantages.
- 6.6 VI characteristics of D.C. Generator and speed-torque characteristics of D.C. motor.
- 6.7 Application of each type of D.C. motors and generators.
- 6.8 Principle, construction, types and uses of Induction motor.

7. TRANSFORMER :

- 7.1 Construction, principle of transformer.
- 7.2 Derivation of an emf equation and transformation ratio, KVA etc.
- 7.3 No load or O.C operation of a transformer.
- 7.4 Various losses in transformer , efficiency equation.
- 7.5 Construction and use of autotransformer.

\* \* \* \* \*

**COURSE CODE : S-212**

**NAME OF COURSE : PROGRAMMING IN 'C'.**

1. Rationale:

This course gives fundamentals of programming language which is useful in developing applications in various fields & gives knowledge of latest concept of 'C' language. The fundamental concepts of learning a computer programming language have been covered in this course which will enhance their ability to suitably use it in their respective field of applications.

2. Scheme of Studies & Examinations :

Course Code	Name of Course	Teaching Scheme		Examination Scheme			
		L	P	Th. Prac.	Tw.	Total	
S-212	Programming in 'C'	2	4	100	--	50	150

3. Scheme of Teaching & Assessment :

Sr. No.	Name of Topic	No. of Hours			Weightage %
		L	P	T	
1.	Prog. Language Concepts	2	4	6	5
2.	Constants, Variable & Data types	4	4	8	10
3.	Operators & Expression	4	8	12	10
4.	Branching & Looping	4	8	12	20
5.	Arrays	4	6	10	15
6.	User-Defined functions	2	6	8	10
7.	Pointers	4	8	12	10
8.	Structure, Unions	2	4	6	10
9.	File Management	2	8	10	10
		28	56	84	100

4. Objectives :

The students should be able to

- Write high level & low level programs.
- Understands concepts of structure.
- Apply basic programming concepts in relevant field

5. Topic & Subtopic :

1. Programming language concepts :

- 1.1 Concepts of programming methodology.
- 1.2 Flowchart
- 1.3 Algorithm

2. Constants, Variables & Data types :
  - 2.1 Character set
  - 2.2 'C' token
  - 2.3 Keywords & Identifiers
  - 2.4 Constant, Variables
  - 2.5 Data types
  - 2.6 Storage Classes
3. Operators & Expressions :
  - 3.1 Arithmetic, logical, Assignment operators
  - 3.2 Increment & Decrement, Conditional operator
  - 3.3 Bit-wise special operators
  - 3.4 Formatted & Unformatted input & output
  - 3.5 Arithmetic, Evaluation of the types of expressions
4. Branching & Looping
  - 4.1 Decision making with IF statement
  - 4.2 Switch Statement
  - 4.3 The ? : Operator
  - 4.4 Goto Statement
  - 4.5 While, For Statement
  - 4.6 Macro substitutions
5. Arrays :
  - 5.1 Introductions
  - 5.2 One dimensional arrays
  - 5.3 Initiating two dimensional arrays
6. User defined functions :
  - 6.1 Introduction
  - 6.2 Call by value & Call by reference
  - 6.3 Nesting of functions
  - 6.4 Recursions
  - 6.5 Functions with arrays
7. Pointers :
  - 7.1 Introduction
  - 7.2 Understanding Pointers
  - 7.3 Pointers expressions
  - 7.4 Pointers & Arrays
  - 7.5 Pointers & Strings
  - 7.6 Pointers & Structures
  - 7.7 Pointer to Pointer

8. Structures, Unions :

- 8.1 Introduction
- 8.2 Structure definition & initialization
- 8.3 Arrays of Structures
- 8.4 Structures with Structures
- 8.5 Structures & functions
- 8.6 Unions

9. File Management :

- 9.1 Introduction
- 9.2 Defining, Opening and Closing file.
- 9.3 Input/Output operations on file
- 9.4 Command line arguments

6 Laboratory Experience :

Students should write programmes on the basis of prescribed curriculum of this course. (minimum 20 programmes are required)

7 References :

- |    |                         |                      |            |
|----|-------------------------|----------------------|------------|
| 1. | Programming in ANSI 'C' | Balagurusamy         | TMH        |
| 2. | Let us 'C'              | Kanetkar             | Tech Media |
| 3. | Programming in 'C'      | Venu Gopal           | TMH        |
| 4. | Programming in 'C'      | Kernigham &<br>Richi | TMH        |
| 5. | Program with 'C'        | Gottfried            | MHT        |

**COURSE CODE : S-213**  
**NAME OF COURSE: ELECTRONIC PRACTICES**

**1. RATIONALE :-**

This course is aimed at providing knowledge of working of simple circuits & Fabrication of PCBs soldering practice, study of electronic work bench etc.

The course covers preparation of simple PCB, drilling of holes, soldering technique and surfing through internet for datasheets of different components.

This course is useful in the project and setting up of many experiments in other basic technology and applied technology courses.

**2. SCHEME OF STUDIES AND EXAMINATION :**

Sr.No.	Code No.	Course Name	L	P	Exam Scheme.			
					Th	Pra	T.W.	Total
1	S-213	Electronic Practices	-	4	-	-	50	50

**3. LABORATORY EXPERIENCIES :**

**1. Electronics Accessories**

**1.1 Wires & Cables**

- 1..1.1 SWG
- 1..1.2 Single core
- 1..1.3 Multi core
- 1..1.4 Single strand
- 1..1.5 Multi strand and their types
- 1..1.6 Armed cable
- 1..1.7 Shielded wires
- 1..1.8 Coaxial cables
- 1..1.9 Twisted pair
- 1.1.10 Flat ribbon cable
- 1.1.11 Teflon coated wires
- 1.1.12 Different types of Fiber cables

**1.2 Connectors**

- 1.2.1 BNC
- 1.2.2 TNC
- 1.2.3 Banana pin connector
- 1.2.4 D connector
- 1.2.5 FRC connector
- 1.2.6 Relimate
- 1.2.7 Burg strip
- 1.2.8 Edge connector
- 1.2.9 Euro connector
- 1.2.10 Power connector
- 1.2.11 SMA connector
- 1.2.12 RJ-45 connector
- 1.2.13 RJ-11 connector
- 1.2.14 JACK pin connector-Mono stereo

### 1.3 Fuses

- 1.3.1 Glass
- 1.3.2 Ceramic fuse
- 1.3.3 Resetable fuse
- 1.3.4 Shunt fuse- MOV
- 1.3.5 HRC fuse

### 1.4 Switches

- 1.4.1 Toggle switch- SPDT, DPDT, TPDT
- 1.4.2 Centre off, Without centre off
- 1.4.3 Rotary switch types depending on their poles and positions
- 1.4.4 Rocker switch
- 1.4.5 Push button latch and non latch
- 1.4.6 Tactile switch
- 1.4.7 Micro switch
- 1.4.8 Limit switch
- 1.4.9 DIP switch
- 1.4.10 Thumb wheel switch- BCD, Decimal
- 1.4.11 Membrane switch

### 1.5 Relays

- 1.5.1 Electro magnetic relay and their types according to their coil voltage and contacts
- 1.5.2 Reed & Reed relay
- 1.5.3 Semi conductor relay
- 1.5.4 Solid state relay
- 1.5.5 Contactors

### 1.6 Transformer

- 1.6.1 Step up
- 1.6.2 Step down
- 1.6.3 Center trapped
- 1.6.4 Current transformer
- 1.6.5 Pulse transformer
- 1.6.6 Audio transformer
- 1.6.7 Auto Transformer
- 1.6.8 R.F. Transformer, I.F. Transformer

## 2. Electronics Components

- 2.1.1 Resister
- 2.1.2 Carbon composition Resister
- 2.1.3 Carbon film resister
- 2.1.4 Metal film resister
- 2.1.5 Wire wound, Fusible resister
- 2.1.6 1/8w, 1/4w, 1/2w, 1w, 2w, 5w
- 2.1.7 Fixed & Variable Potentiometer-preset-multi turn-trim post wire wound, sliders
- 2.1.8 Colour codes

## 2.2 Inductor

2.2.1 Wire indicator- Air core

2.2.2 Ferrite core

2.2.3 Axial lead inductor

## 2.3 Capacitor

2.3.1 Electrolytic

2.3.2 Ceramic

2.3.3 Polyester

2.3.4 Metalized polyester

2.3.5 Tetantalum, mica

2.3.6 Ceramic

2.3.7 Paper capacitor

2.3.8 Gang capacitor- trimmer capacitors

## 2.4 Semi conductor component

2.4.1 Diode

2.4.2 Transistor

2.4.3 LED

## 2.5 SMD components

2.5.1 Resister

2.5.2 Capacitor

2.5.3 Diode

2.5.4 Transistor

2.5.5 Heat Sink

2.5.6 I.C. Packages

## 2.6 Component packages

2.6.1 DIP

2.6.2 SIP

2.6.3 TO-92

2.6.4 TO-3

2.6.5 TO-5

2.6.6 TO-220

## 2.7 Memory equipment

2.7.1 CRO

2.7.2 Multimedia

2.7.3 DMM

## 2.8 PCB-Introduction

2.8.1 Types

2.8.2 Single sided

2.8.3 Double sided

2.8.4 Multi layer

2.8.5 Strock-PTH

### 3 Wiring & Testing of simple electronics circuit

- 3.1 Bread board
  - 3.1.1 Series & parallel connection of Resister on bread board
- 3.2 Soldering
  - 3.2.1 Solider iron- Use and its characteristics
  - 3.2.2 Soldering station
  - 3.2.3 Good soldering & bad soldering
  - 3.2.4 Difficulties of dry soldering
  - 3.2.5 Zero defect soldering
  - 3.2.6 Soldering material
  - 3.2.7 Series and parallel connection of resister, capacitors
  - 3.2.8 SMD soldering and tools
  - 3.2.9 Liquid Flux
  - 3.2.10 Use of Thinner to clean Soldering contacts
- 3.3 De-soldering
  - 3.3.1 De-soldering pump
  - 3.3.2 Hot air gun
  - 3.3.3 De-soldering station
  - 3.3.4 SMD rework station

### 4. Literature survey & Industrial visit

- 4.1 Use of data Book for component data sheets.
- 4.2 Use of Internet surfing for component data sheets

### I. TERM WORK :-

This shall consist of the prescribed jobs as under, duly certified.

1. Writing circuit on bread board	4 Jobs
2. Writing circuits on General purpose PCB	2 Jobs
3. Soldering on PCB	2 Jobs
4. De Soldering from PCB	1 Jobs
5. PCB Drilling, Connector crimping	1 Jobs
6 SMD Soldering and Desoldering	2 Jobs
	-----
Total	12 Jobs

### 4 SUPPORT GROUP

#### Polytechnic faculty

- 1. Shri T .P. Chanpura
- 2. Shri V. B. Patel
- 3. Shri S.J. Chauhan
- 4. Shri A. A. Desai

#### CDC faculty

- 1. Shri D.K.Patel
- 2. Shri A. K. Popat

**COURSE CODE NO: S-227**

**NAME OF COURSE: FUNDAMENTALS OF INFORMATION TECHNOLOGY**

**1. RATIONALE:**

THE RATIONALE BEHIND THIS COURSE IS TO GENERATE AN AWARENESS REGARDING INFORMATION TECHNOLOGY, WHICH IS THE BUZZWORD OF THE WORLD, AS IT STEPS INTO THE 21<sup>ST</sup> CENTURY. THE COURSE AIMS TO GIVE AN INSIGHT INTO THE VARIOUS COMPONENTS WHICH GO ON TO MAKE THE WORLD OF INFORMATION TECHNOLOGY SO EXCITING.

THE SOLE AIM OF THIS COURSE IS TO IMPART BASIC / ELEMENTARY KNOWLEDGE ABOUT THE SIGNIFICANT COMPONENTS RELATED TO INFORMATION TECHNOLOGY.

**2. SCHEME OF STUDIES & EXAMINATION:**

CODE NO	NAME OF COURSE	L	P	TH	PR	TW	TOTAL
S-227	FUNDAMENTALS OF INFORMATION TECHNOLOGY	3	-	100	-	-	100

**3. SCHEME OF TEACHING:**

No	Name of Topic	Theory	Pract	Total Hrs.
1	INTRODUCTION	2	-	2
2	INTERNET	8	-	8
3	COMPUTER HARDWARE	6	-	6
4	COMPUTER SOFTWARE	9	-	9
5	COMPUTER NETWORKS	8	-	8
6	DATABASE TECHNOLOGY	6	-	6
7	MULTIMEDIA	2	-	2
8	VIRUS	1	-	1
	<b>TOTAL HRS</b>	<b>42</b>	<b>-</b>	<b>42</b>

**4. OBJECTIVES:**

On successful completion of this course the student will be able to:

1. Understand the importance of information technology and its impact on society.
2. Understand the concepts of a database management system (DBMS)
3. Understand the basics of computer networking
4. Understand the power and potential of the INTERNET

## 5. COMMUNICATION SKILLS:

The students should be able to:

- ◆ Write a report in English efficiently.
- ◆ Communicate the thoughts in oral form effectively.
- ◆ Express ideas in oral form and in writing.

## 6. TOPICS & SUB-TOPICS:

### 1. INTRODUCTION

2 hrs

- 1.1. What is information?
- 1.2. Information technology
- 1.3. Information processing cycle
- 1.4. Data
- 1.5. Data v/s information
- 1.6. Use of it/computer in:
  - 1.6.1. The home and at play
  - 1.6.2. Education and training
  - 1.6.3. Entertainment and the arts
  - 1.6.4. Business and industries
  - 1.6.5. Science, engineering and mathematics
  - 1.6.6. Medicine, defense, space application etc

### 2. INTERNET

8 hrs

- 2.1 What is the Internet?
- 2.2 Web pages
- 2.3 Home page
- 2.4 Use of web sites
- 2.5 Access providers
- 2.6 Types of access
- 2.7 The browser
- 2.8 Universal resource locators
- 2.9 Browsing or surfing the web
- 2.10 A search engine
- 2.11 Internet phone
- 2.12 Applications of the Internet:
  - 2.12.1 E-mail
  - 2.12.2 Voice mail
  - 2.12.3 Newsgroup
  - 2.12.4 Mailing list
  - 2.12.5 Internet relay chat
  - 2.12.6 Games
  - 2.12.7 Video-conferencing
  - 2.12.8 File transfer protocol

### **3. COMPUTER HARDWARE**

**6 hrs**

- 3.1. Classification of computers**
  - 3.1.1 Supercomputers**
  - 3.1.2 Mainframe**
  - 3.1.3 Desktop computers**
  - 3.1.4 Laptop computers/ Notebook computers**
- 3.2 Anatomy of a computer**
  - 3.2.1 Motherboard**
  - 3.2.2 CPU**
  - 3.2.3 SMPS**
  - 3.2.4 Expansion slots**
  - 3.2.5 Sockets and ports**
  - 3.2.6 Drives**
- 3.3 Special input devices:**
  - 3.3.1 Pointing devices:**
    - 3.3.1.1 Mouse**
    - 3.3.1.2 Track balls**
    - 3.3.1.3 Track sticks**
    - 3.3.1.4 Touch pads**
    - 3.3.1.5 Joysticks**
  - 3.3.2 Modems**
  - 3.3.3 Scanners**
  - 3.3.4 Speech recognition devices**
- 3.4 Special output devices:**
  - 3.4.1 Dot matrix printers**
  - 3.4.2 Laser printers**
  - 3.4.3 Color printers**
  - 3.4.4 Line printers**
  - 3.4.5 Photo printers**
  - 3.4.6 Plotters**

### **4 COMPUTER SOFTWARE**

**9 hrs**

- 4.1 What is software?**
- 4.2 Types of software:**
  - 4.2.1 Operating system**
  - 4.2.2 Application software**
  - 4.2.3 Utility programs**
  - 4.2.4 Language processors (compiler, interpreter)**
- 4.3 Interfaces and operating system.**
  - 4.3.1 Character based interface**
  - 4.3.2 Graphical user interface**
  - 4.3.3 Pen based interface**
  - 4.3.4 Touch screen interface**
  - 4.3.5 Conversation interface**
- 4.4 Types of operating system.**
  - 4.4.1 Desktop**
  - 4.4.2 Server**
  - 4.4.3 Mainframe**
  - 4.4.4 Embedded**
- 4.5 Characteristics of operating system**

- 5 COMPUTERS NETWORKS** **8 hrs**
- 5.1 **Network Architecture:**
    - Ring
    - Star
    - Bus
    - Peer to peer
    - Wireless LAN
  - 5.2 **Physical Link Between Devices:**
    - Ethernet
    - Token ring
  - 5.3 **Metropolitan and wide area networks**
  - 5.4 **Public networks**
  - 5.5 **Intranets**
  - 5.6 **Firewalls**
  - 5.7 **Network devices:**
    - Interface card
    - Repeated
    - Bridge
    - Router
    - Gateway
    - Modem
  - 5.8 **Types of networks**
    - Circuit switched networks
    - Packet switched networks
    - Integrated services digital network (ISDN)
  - 5.9 **Cable modem**
  - 5.10 **Types of network server system**
    - File server system
    - Print server system
    - Client server system

- 6. DATABASE TECHNOLOGY** **6 hrs**
- 6.1 **What is a database?**
  - 6.2 **Advantages of database**
  - 6.3 **Database organization**
  - 6.4 **Relational database**
  - 6.5 **Form**
  - 6.6 **Query**
  - 6.7 **Responsibilities of database administrator**
  - 6.8 **Distributed database system**
  - 6.9 **System approach of data processing:**
    - Integrated
    - Distributed

- 7 **MULTIMEDIA** 2 hrs
- 7.1 What is multimedia?
  - 7.2 Components of a multimedia system
    - CD ROM
    - Sound card
    - Graphical accelerator
    - Digital video devices
  - 7.3 Application of multi-media in:
    - Education and training
    - The web
    - Software training
    - Office works
    - Servers and database

- 8 **VIRUS** 1 hrs
- 8.1 What is a virus?
  - 8.2 Origin of virus
  - 8.3 Process of infection
  - 8.4 Classification of virus
    - Boot infectors
    - System infectors
    - General com or exe infectors
  - 8.5 Latest Know viruses
  - 8.6 Prevention
  - 8.7 Remedial measures

TOTAL 42 hrs

**7. REFERENCES:**

- |  |  |
|--|--|
| 1. INFORMATION TECHNOLOGY -<br>THE BREAKING WAVE | CURTIN, FOLEY, SEN, MORIN (TMH)        |
| 2. FUNDAMENTALS OF COMPUTERS                     | V. RAJARAMAN (3 <sup>rd</sup> EDITION) |
| 3. MANAGEMENT INFORMATION SYSTEM                 | S. SADAGOPAN                           |
| 4. INTERNET AN INTRODUCTION                      | CIStems TATA McGraw-Hill Series        |
| 5. LOCAL AREA NETWORKS AND<br>THEIR APPLICATIONS | BRENDAN TANGNEY & DONALD O'MAHONY      |

**8. PERCENTAGE WEIGHTAGE:**

NO.	NAME OF TOPIC	% WEIGHTAGE
1	INTRODUCTION	5
2	INTERNET	20
3	COMPUTER HARDWARE	15
4	COMPUTER SOFTWARE	20
5	COMPUTER NETWORKS	15
6	DATABASE TECHNOLOGY	15
7	MULTIMEDIA	5
8	VIRUS	5
	<b>TOTAL MARKS</b>	<b>100</b>

## **9. SUPPORT FACULTY:**

### **POLYTECHNIC FACULTY:**

1. **PROF. PUJARA DIPAK M.**
2.       **„ KOTAK PARESH P.**
3.       **„ DESAI MANISH J.**
4. **SMT. SRINIVASAN JAYASHREE**
5.       **„ VAMJA REKHA D.**

### **CDC FACULTY:**

1.       **PROF. THAKKAR RAVINDRA M.**
  2.       **„ DARJI H.B.**
-

**COURSE CODE : SEC-251**

**COURSE NAME : ELECTRONIC DEVICES AND CIRCUITS - I**

### **1. RATIONALE:**

The aim of introducing this course is to impart knowledge of basic electronics devices to the students of Electronics Engineering. Through the study of this course the students will get, knowledge of construction, working & characteristics of various types of diodes and transistors. The study of the devices will be helpful to understand the various basic and applied technology courses.

### **2. SCHEME OF STUDIES AND EXAMINATION:**

Sr. No.	Code No.	Course Name	L	P	Exam. Scheme			Total
					Th.	Pra.	T.W.	
1.	SEC-251	EDC-I	3	4	100	50	25	175

### **3. SCHEME OF TEACHING AND ASSESSMENT:**

Sr.No.	Topics	Th.	Pra.	Total	%
					Weightage
1.	Semiconductor physics and diodes	04	02	06	08
2.	Diode applications and other terminal devices.	08	14	22	20
3.	Transistor	06	10	16	12
4.	Transistor amplifier	06	06	12	18
5.	Transistor biasing circuits and thermal stability	04	06	10	12
6.	Frequency response of small signal transistor amplifier	06	04	10	10
7.	Hybrid parameter.	04	04	08	08
8.	Regulated Power Supply	04	10	14	12
TOTAL		42	56	98	100

### **4. TOPICS AND SUBTOPICS:**

#### **1. SEMICONDUCTOR PHYSICS AND DIODES:**

- 1.1 Energy levels of conductors, semiconductors and insulators.
- 1.2 Extrinsic material N & P type.
- 1.3 Ideal diode basic construction & characteristics.
- 1.4 D.C. & A.C. resistance of diode.
- 1.5 Diode equivalent circuits.
- 1.6 Drift and diffusion currents.
- 1.7 Transition and diffusion capacitance.

#### **2. DIODE APPLICATION AND OTHER TERMINAL DEVICES:**

- 2.1 Series and parallel diode configuration with d.c. inputs.
- 2.2 The half-wave, full-wave and bridge rectifier and determination of PIV.
- 2.3 Determination of average d.c. current, voltage, ratio of rectification and ripple factor.

- 2.4 Disadvantage of half wave rectifier.
- 2.5 Requirement of filters.
- 2.6 Simple capacitor filter & induction filter.
- 2.7 Diode clamper and clipper.
- 2.8 Voltage doubler and multipliers.
- 2.9 Zener diode characteristics & operation.
- 2.10 Schottky barrier diode.
- 2.11 Varactor/diode tunnel diode.
- 2.12 Photo diode , LDR, photo volatic cell, photo transistor.
- 2.13 Light emitting diode & Optocoupler, opto-isolator
- 2.14 Seven Segment display

### **3. TRANSISTOR :**

- 3.1 Transistor construction (NPN silicon planar transistor)
- 3.2 Transistor operation and amplifying action.
- 3.3 Common base configuration.
- 3.4 Common emitter configuration.
- 3.5 Relation between current gain, alpha and beta.

### **4. TRANSISTOR AMPLIFIERS :**

- 4.1 Principle of an amplifier.
- 4.2 Tr. common base amplifier working.
- 4.3 D.C. load line & operating point in CB amplifier.
- 4.4 Determination of  $A_v$ ,  $A_i$ ,  $A_p$ ,  $R_i$ ,  $R_o$  in CB amplifier.
- 4.5 Tr. common emitter amplifier.
- 4.6 Load line consideration & operating point in CE Amplifier, Determination of  $A_v$ ,  $A_i$ ,  $A_p$ ,  $R_o$ ,  $R_i$  in CE amplifier.
- 4.7 Tr. common collector amplifier.
- 4.8 Comparison of CB, CE and CC amplifier.
- 4.9 Darlington pair

### **5. TRANSISTOR BIASING CIRCUITS AND THERMAL STABILITY:**

- 5.1 Transistor biasing circuits.
- 5.2 Reasons for thermal instability.
- 5.3 Stability factor.
- 5.4 Stability factor of a CE amplifier.
- 5.5 Collector to base biasing methods for stabilisation.
- 5.6 Emitter biasing methods for stabilisation and emitter bypass capacitor.
- 5.7 Potential divider method of biasing, Thermal resistance & requirements of heat sink.

### **6. FREQUENCY RESPONSE OF SMALL SIGNAL TRANSISTOR AMPLIFIER**

- 6.1 Different methods of coupling in amplifier.
- 6.2 Circuits of R.C. coupled amplifier. using single stage (CE)
- 6.3 Two stage RC coupled amplifier.
- 6.4 Low frequency response of R-C coupled CE Amplifier.
- 6.5 Low frequency response and effect of coupling and emitter bypass capacitor
- 6.6 Low frequency response to a pulse.
- 6.7 High frequency response to a pulse.
- 6.8 High frequency Model for CE Amplifier.

## 7. HYBRID PARAMETERS

- 7.1 Transistor Amplifier as a four terminal network (Black Box Concept)
- 7.2 Hybrid parameter & derivation
- 7.3 Hybrid parameters for transistor Amplifier
- 7.4 Transistor amp analysis using H-parameters

## 8. REGULATED POWER SUPPLY

- 8.1 Simple series voltage regulators with over current and over voltage protection
- 8.2 Shunt regulator using transistor
- 8.3 SMPS (Switch mode power supply)
- 8.4 Three terminal voltage regulators like 7805, 7812, 7905 & 7912
- 8.5 Basic working principle and advantage of stabilizer & uninterrupted power supply (UPS)

## 5. LABORATORY EXPERIENCES:

1. To study the C.R.O.
2. To study function generator & T.P.S.U.
3. To study Multimeter.
4. Identification of components.
5. To study forward & reverse V-I characteristics of diode.
6. To study zener diode characteristic.
7. To study the characteristics of LED.
8. To study the characteristics of photodiode.
9. To test Half-wave rectifier.
10. To test full-wave rectifier with capacitor filter.
11. To test Bridge rectifier with choke filter.
12. To study the positive & negative clipping.
13. To study the positive & negative clamping.
14. To study the LDR characteristic.
15. To verify I/P & O/P characteristic of CB configuration.
16. To verify I/P & O/P characteristic of CE configuration.
17. To test CE amplifier & obtain the frequency response.
18. To test darlington pair.
19. To study colour coding of resistors, capacitors.
20. To Measure the load regulation and line regulation of Regulated Power Supply / SMPS
21. To study different types of capacitors.

## 8. REFERENCES:

- |                                     |                   |         |
|-------------------------------------|-------------------|---------|
| 1. Electronics Principles           | A.P.Malvino       | TMH     |
| 2. Electronic device & Circuits     | Allen Mottershead | MGH     |
| 3. Electronic devices & Ckts.theory | Robert Boylestand | PHI     |
|                                     | Louis Nashelsky   |         |
| 4. Electronic devices & Ckts.       | Millman-Halkias   | MGH     |
| 5. Electronic devices & Ckts.       | V. K. Mehta       | S.Chand |
| 6. Integrated Electronics           | Millman & Halkias |         |

## 9. SUPPORT GROUP:

### Polytechnic Faculty:

- |                   |                      |
|-------------------|----------------------|
| 1. Prof. J.G.Dave | 4. Prof. N.M.Santoki |
| 2. " M.B.Patel    | 5. " V.D.Nayak       |
| 3. " L.C.Solanki  | 6. " M.I.U. Memon    |

### CDC Faculty :

1. Prof. S.R. Mishra
2. Shri. K.D. Joshi

**COURSE CODE : S – 301**

**COURSE NAME : HUMAN RESOURCE MANAGEMENT**

**1. RATIONALE :**

Human relation and interpersonal skills are very crucial to the role of a supervisor in the changing cultural, managerial and economical environments. In the present era of globalisation, human resource is considered as dynamic asset which in turn will result in technological and social excellence.

Though this course which aims at developing intra-personal, inter-personal and social competencies, polytechnic students will be able to perform their future role effectively.

**2. SCHEME OF STUDIES AND EXAMINATION :**

SR. NO.	CODE NO	NAME OF COURSE	L	P	Exam. Scheme			
					Th.	Pr.	T.W.	Total
1.	S-301	Human Resource Management	3	-	100	—	—	100

**3. SCHEME OF TEACHING**

Topic No.	Title	Theory
1.	Introduction to Human Resource Management	01
2.	Human needs, relations and values	04
3.	Behavioural dynamics	10
4.	Supervisor's role in HRD	03
5.	Decision making	04
6.	Management of change	04
7.	Stress management	02
8.	Communication	14
	<b>Total</b>	<b>42</b>

#### **4. OBJECTIVES :**

1. Appreciate the importance of human factor in engineering and identify human needs and its importance in managing human resources.
2. Explain importance of human relations and human values.
3. Analyse interpersonal needs, orientation & attractions.
4. State effect of (2) on human behaviour.
5. List & explain theories of leadership & its effect on behaviour.
6. Use techniques to deal effectively with people.
7. Appreciate concept and use of group dynamics.
8. Appreciate Supervisor's role in HRD.
9. Develop ability to make the necessary decisions in different situations.
10. Appreciate the need for changes & change management.
11. Identify the role and objectives of trade unions in change management.
12. Identify the causes & types of conflicts.
13. List and explain the machineries to resolve the conflicts.
14. Appreciate the need and importance of stress management.
15. Appreciate the concept, types and importance of communication, in an organisation.
16. Write brief and precise proposals and reports.
17. Write letters of different types.
18. Lead group discussion and meetings independently in English.

#### **5. TOPICS AND SUB TOPICS**

##### **TOPIC 1 : INTRODUCTION TO HUMAN RESOURCE MANAGEMENT**

- 1.1 Need and scope of human resource management in industrial environment.
- 1.2 Impact of human factors on productivity and industrial harmony.

##### **TOPIC 2 : HUMAN NEEDS, RELATIONS AND VALUES**

- 2.1 x and y theory.
- 2.2 Importance of human resources in Indian philosophy.
- 2.3 Maslow's hierarchy, its importance in managing human resources.
- 2.4 Need of human relations and human values in the industry.
- 2.5 Desirable human values and their importance including ethics and morale value.

### **TOPIC 3 : BEHAVIOURAL DYNAMICS**

#### **3.1 INTERPERSONAL BEHAVIOUR**

##### 3.1.1 INTRODUCTION

3.1.2 Need for interpersonal competence.

3.1.3 Determinants of interpersonal behaviour.

3.1.4 Concept of interpersonal orientation and attractions and its importance in human behaviour.

#### **3.2 LEADERSHIP**

3.2.1 Situational approach to leadership

3.2.2 Power influence and compliance

3.2.3 Influence of Leadership.

3.2.4 Techniques to deal people effectively.

#### **3.3 GROUP DYNAMICS**

3.3.1 Concept of group dynamics.

3.3.2 Dynamics of group formation.

3.3.3 Types of group.

3.3.4 Role of group in organization.

3.3.5 Desirable characteristics of group member.

#### **3.4 ATTITUDE**

3.4.1 Concept & importance of positive attitude and openness of mind.

3.4.2 Do's and don'ts for developing positive attitude.

3.4.3 Importance of mental health.

### **TOPIC 4 : SUPERVISOR'S ROLE IN HRD**

4.1 Importance of HRD.

4.2 Need, importance & types of Training.

4.3 Need and importance of Motivation.

4.4 Supervisor's role as Trainer & Motivator.

4.5 Need, importance and use of Counselling and Mentoring.

### **TOPIC 5 : DECISION MAKING**

5.1 Importance of decision making in context of productivity, quality, cost consciousness, human relations and goal achievement.

5.2 Factors affecting decision making.

5.3 Types and process.

5.4 Make the decisions for given case/situation.

## **TOPIC 6 : MANAGEMENT OF CHANGE**

- 6.1 Need for change.
- 6.2 Barrier to change
- 6.3 Strategies to manage change.  
(Effective implementation and management of change)
- 6.4 Trade unions and their objectives.
- 6.5 Constructive role of trade unions in goal setting, achievement and change management
- 6.6 Causes and resolution techniques of conflicts.

## **TOPIC 7 : STRESS MANAGEMENT**

- 7.1 Concept of stress management.
- 7.2 Attributes of stress.
- 7.3 Stress measuring techniques.
- 7.4 Techniques to relieve the stress.

## **TOPIC 8 : COMMUNICATION**

### **8.1 Communication.**

- 8.1.1 Concept and definitions
- 8.1.2 Objectives
- 8.1.3 Types :downward,upward,lateral,grapevine.

### **8.2 Proposals and Reports**

- 8.2.1 Introduction
- 8.2.2 Features/Characteristics
- 8.2.3 Structure
- 8.2.4 Forms/ Types
- 8.2.5 Brief and precise proposal and report writing

### **List of Major Skills :**

- Write reports on experiments conducted in laboratories/ workshops/ and reports on field and industrial visits.
- Write report on project work (mini and major) undertaken.
- Fill up various types of forms/formats and maintain records.
- Write brief reports of various types (inspection, installation, commissioning, progress report, test reports, trouble reports, status report of materials, industrial visits, shift reports in log books etc.)
- Compile and interpret process data periodically.
- Write proposals (feasibility of projects, purchase, maintenance of machines and equipment, budget etc.)

### **8.3 Business letters**

8.3.1 Introduction

8.3.2 Form: Block, Indented

8.3.3 Characteristics

8.3.4 Structure

8.3.5 Types of Business letters.

8.3.6 Writing letters of different types

#### **List of Major Skills:**

- Write leave applications.
- Write applications for award of freeships and condonation of fine etc.
- Write letters to friends and parents.
- Prepare biodata/ resume.
- Write letters of application for jobs.
- Write letters of enquiry and replies to these letters.
- Write letters placing orders.
- Write letters of complaints and replies to these letters.
- Draft official memos and notices.
- Prepare tender documents
- Write self - appraisal and confidential reports.

### **8.4 Group Discussion and Meetings.**

#### **LEAD GROUP DISCUSSIONS AND MEETINGS INDEPENDENTLY IN ENGLISH**

#### **List of major Skills :**

- Prepare the agenda and schedule for meetings/ group discussions.
- Build rapport with individuals and the group.
- Assert one's point of view and convince others.
- Contribute effectively in group discussions and meetings.
- Accept other's point of view.
- Encourage the group members to contribute/participate effectively.
- Summarise the points agreed upon.
- Defend findings and reports presented.
- Organise and co-ordinate group discussions and meetings.

## **6. INSTRUCTIONAL STRATEGIES :**

### **1. CASE ANALYSIS**

Case based on human behaviour which includes behaviour with supervisors, colleagues, subordinates, suppliers etc.

### **2. GROUP DISCUSSION**

Decision making for situations such as ;

- For achieving goals under constraints of resources like man, material, time, money etc.
- For managing subordinates by setting an example of self behaviour.
- The topic for group discussion should be selected in which, behaviour of supervisor adversely affect the situation. For narrating the topic, news, magazines case, video film, narration etc. should be used. The discussion should be primarily on behavioural aspects.

### **3. SEMINARS**

Each student has to represent a seminar for 10 minutes on the topic assigned by teacher. The topics should be relevant to the topic no.4 “Supervisor’s role in HRD “.

### **4. MOK PLAY ON LEADERSHIP STYLE**

The role of each player will be assigned by teacher. Based on role assigned, natural interaction/ play should take place.

### **5. PRACTICE FOR STRESS RELIEVING TECHNIQUES**

Identify attributes for stress.

Discuss the suitable technique to relieve the stress, if feasible, practice the technique.

### **6. RATING EXERCISE ON CHANGE MANAGEMENT**

Students should be asked to self rate for given set of situation. Based on total score, the attitude towards change management may be known. The relevant feed back and discussion should be carried out.

### **7. GROUP DISCUSSION**

Group discussion on topics such as human values, need of ethics & morale value, importance of human values in leadership, etc.

### **8. COMMUNICATION SKILLS DEVELOPMENT :**

- \* Importance of communication in inter-personal relations.
- \* Steps to be followed in effective verbal communication.  
Dealing with superiors and with peers.
- \* Mannerism and gestures. Practices.

**Note :** The above instructional strategies are only suggestive. The individual teacher is free to design his own strategies looking to the constraints and resources available at the Polytechnic.

## 7. REFERENCES :

1. Ahuja, Jain & Chhabra, Managing people at work, Dhanpat Rai and Sons. Allahabad. 1977.
2. Astin, A.W. Scherrei R.A. Maximising leadership effectiveness. Jossey-Bass Publishers, Londo, 1980.
3. Butterworthsand Tamrehill R.E. , Motivation anbd management development, 1970.
4. Dessler, Garry, Improving performance at work, Reston Publishing Co. Inc. A prentice Hall Co. Reston, 1979, .
5. Hersey and Blanchard, Management of organisational behaviour, Prentice Hall, India, 1977.
6. Mitchel, Terence R., People in organisations, McGraw Hill, Koga-kusha, Ltd. , Tokyo, 1978.
7. Pareek, Udai and Rao T.V. Designing and Managing human resources systems, Oxford and TBH Publishing Co., New Delhi, 1981.
8. Pareek, Udai and Rao T.V., Behavioural processes in organisation, Oxford and TBH publishing CO., New Delhi, 1981.
9. Richman Eugence and Brara Arvinder, Practical guide to manging people, Parkar Publishing Co., INc., New York, 1975.
10. Schein, Edgar H., Organisational Psychology, Prentice Hall Inc., New Jersey. 1970.
11. Morse and Furst, stress for success, Van Nostrand Reinhold Co., 1979.

## 8. ASSESSMENT SCHEME :

<b>SR. NO.</b>	<b>NAME OF TOPIC</b>	<b>PERCENTAGE WEIGHTAGE</b>
1.	Introduction to Human Resource Management	05
2.	Human needs, relations and values	10
3.	Behavioural dynamics	20
4.	Supervisor's role in HRD	10
5.	Decision making	10
6.	Management of change	10
7.	Stress management	05
8.	Communication	30
	<b>Total</b>	<b>100</b>

**9. RESOURCE GROUP**

**(A) POLYTECHNIC FACULTY**

1. Shri A.M. TALSANIA
2. Shri S.N.ADESARA
3. Shri N.K.LAPSIWALA
4. Shri Y.R.JOSHI

**(B) CDC FACULTY**

1. Shri K.D.Joshi
2. Shri H.B.Darji

**COURSE CODE : SEC-302**

**COURSE NAME : ELECTRONIC DEVICES AND CIRCUITS - II**

### 1. RATIONALE:

This course is aimed at providing comprehensive knowledge of application of transistors as power amplifier, oscillator and multivibrators. It also provides knowledge of operational amplifier, FET, thyristors and fabrication of integrated circuits. The study of the topics will be very much useful in the courses like communication Engg. T.V. Engg., Microwave Engg., Industrial Electronics etc.

### 2. SCHEME OF STUDIES AND EXAMINATION:

Sr. No.	Code No.	Course Name	L	P	Exam. Scheme			
					Th.	Pra.	T.W.	Total
1.	SEC- 302	Electronic Devices and Circuits-II	3	4	100	50	25	175

### 3. SCHEME OF TEACHING AND ASSESSMENT:

Sr.No.	Topics	Th.	Pra.	Total	% Weigtege.
1.	Feedback in transistor amplifier and oscillator	06	08	14	15
2.	Transistor power amplifier	06	08	14	15
3.	Pulse circuits	06	10	16	10
4.	Operational amplifier	08	12	20	20
5.	Thyristors	06	10	16	15
6.	Field effect transistor	06	06	12	15
7.	Introduction to the fabrication of integrated circuits	04	02	06	10
TOTAL		42	56	98	100

### 4. TOPICS AND SUBTOPICS:

#### 1. FEEDBACK IN TRANSISTOR AMPLIFIER AND OSCILLATOR

- 1.1 General theory of feedback.
- 1.2 Negative feedback
- 1.3 Effect and advantages of negative feedback .
- 1.4 Types of negative feedback in transistor circuits.
- 1.5 Effect of positive feedback.
- 1.6 Requirements for oscillation.
- 1.7 R.C. phase shift oscillator & wein bridge oscillator.
- 1.8 Harley oscillator and colpitts oscillator.
- 1.9 Crystal oscillator.

#### 2. TRANSISTOR POWER AMPLIFIER

- 2.1 Class-A operation with transformer coupled load.
- 2.2 Class-B operation, Push-pull circuit.
- 2.3 Phase inverter, cross over distortion.

- 2.4 Class A-B push-pull operation.
- 2.5 Class-B efficiency, Complimentary Symmetry push-pull Amplifier

### **3. PULSE CIRCUITS**

- 3.1 Wave shaping circuits. Response of Differentiator and integrators to pulse waveform. Rise time and Fall time.
- 3.2 Multivibrators, Astable, Monostable- Bistable using transistor & IC
- 3.3 Schmitt Trigger Circuit.
- 3.4 Ramp Generator- Circuit.

### **4. OPERATIONAL AMPLIFIER**

- 4.1 Differential Amplifiers
- 4.2 Operational amplifier (IC-741), characteristics - Input offset voltage, input bias current, Input offset current CMRR, freq. response, slow rate, power bandwidth.
- 4.3 Non-inverting and inverting voltage feedback and its characteristics.
- 4.4 Application of OP-AMP (741) as summing amplifier, D-to-A convertor, integrator and differentiator current booster, Voltage comparator.
- 4.5 Analogue computer for solution of linear equation.

### **5. THYRISTORS**

- 5.1 Introduction of thyristor.
- 5.2 The four layer diode model.
- 5.3 SCR and its characteristics.
- 5.4 Bidirectional thyristors- Diac and Triac.
- 5.5 Unijunction transistors.
- 5.6 Thyristor Applications.

### **6. FIELD-EFFECT TRANSISTOR**

- 6.1 JFETS - Basic construction of JFET. its characteristics and operation parameters of FET.
- 6.2 Common source, drain and gate amplifier using JFET.
- 6.3 MOSFETS- construction, operation and enhancement type MOSFETS. Comparison with JFET.
- 6.4 IGBT, its characteristics & application.

### **7. INTRODUCTION TO THE FABRICATION OF INTEGRATED CIRCUITS**

- 7.1 Evaluation of integrated circuits.
- 7.2 Monolithic integrated circuits.
- 7.3 Integrated circuit components.
- 7.4 Methods of fabrication integrated circuits.
- 7.5 Large scale integration.

## 5. LABORATORY EXPERIENCES:

1. Build & test high pass filter & verify as differentiating circuit.
2. Build & test low pass filter & verify as integrating circuit
3. Build & test astable Multivibrator.
4. Build & test Bi-stable Multivibrator.
5. Build & test monostable Multivibrator.
6. Build & test schmitt trigger.
7. Build & test colpitt's oscillator.
8. Build & test hartely oscillator.
9. Build & test Wien's bridge oscillator.
10. Obtain the frequency response of negative feedback amplifier
11. Obtain the frequency response of non-inverting OPAMP circuit
12. Obtain the frequency response of inverting OPAMP circuit.
13. Build & test OPAMP as differentiating circuit.
14. Build & test OPAMP as integrating circuit.
15. Build & test OPAMP as summing circuit.
16. Obtain the frequency response of class-B push-pull amp.
17. Obtain the O/P characteristic n-channel JFET.
18. To study the FET as source follower.

## 6. REFERENCES:

1. Electronics devices & circuits - Robert Boylestad  
Louis Nashelsky
2. Electronic Devices and Circuits - PHI  
Allen Moterched
3. Electronic Principles - MGH  
A.P.Malvino
4. Principles of Electronics - TMH  
- V. K. Mehta
5. Electronic devices & circuits - Millman & Halkias

## 7. SUPPORT GROUP:

### POLYTECHNIC FACULTY:

- |                    |                       |
|--------------------|-----------------------|
| 1. Prof. J.G. Dave | 4. Prof. N.M. Santoki |
| 2. " M.B. Patel    | 5. " V.D. Nayak       |
| 3. " L.C. Solanki  | 6. " M.I.U. Memon     |

### CDC FACULTY:

1. Prof. S.R. Mishra
2. Shri. K.D. Joshi

**COURSE CODE : SEC – 303**  
**COURSE NAME : DIGITAL ELECTRONICS**

**1. RATIONALE:**

The object of introducing this course is to provide knowledge of digital electronics to the students.

This course explain the number systems and code, Basic logic gates, Boolean algebra, Combination logic, Flip flops, counters, Registers, Memories, A to D, D to A convertors. The study of these topics will be useful in understanding the courses like Micro processor, Advance Microprocessor and Computer hardware.

**2. SCHEME OF STUDIES AND EXAMINATION:**

Sr. No.	Code No.	Course Name	L	P	Exam. Scheme			Total
					Th.	Pra.	T.W.	
1.	SEC- 303	Digital Electronics	3	2	100	50	25	175

**3. SCHEME OF TEACHING AND ASSESSMENT:**

Sr.No.	Topics	Th.	Pra.	Total	% Weightage
1.	Number systems and codes	05	-	05	15
2.	Logic gates and IC logic families	06	06	12	15
3.	Boolean Algebra	04	-	04	10
4.	Combinational logic circuit	05	08	13	10
5.	Flip-Flops	05	06	11	10
6.	Counters	05	02	07	10
7.	Registers	04	02	06	10
8.	Memories	04	-	04	10
9.	Analog to Digital and Digital to Analog conversion	04	04	08	10
TOTAL		42	28	70	100

## **4. TOPIC AND SUBTOPICS:**

### **1. NUMBER SYSTEMS AND CODES.**

- 1.1 Binary number system.
- 1.2 Binary addition
- 1.3 Binary to decimal and decimal to binary conversion.
- 1.4 Binary subtraction method.
  - Simple binary subtraction(conventional method)
  - 1's compliment method of subtraction
  - 2's       "
- 1.5 Nine's and ten's compliments
- 1.6 Binary multiplication and division
- 1.7 Octal number system
- 1.8 Oct to dec, dec to oct, oct to bin, bin to oct conversion
- 1.9 Hexa decimal number system
- 1.10 Hexa decimal to bin and bin to hexa dec conversion
- 1.11 BCD codes
- 1.12 The parity bit
- 1.13 Gray codes
- 1.14 ASCII codes, EBCDIC codes.

### **2. LOGIC GATES AND IC LOGIC FAMILIES.**

- 2.1 Fundamental gates : AND, OR, NOT Gate
- 2.2 AND multiplication
- 2.3 OR addition
- 2.4 NOT operation
- 2.5 Positive and negative logic system
- 2.6 Combinational gates: NAND, NOR, EX-OR, EX-NOR gates
- 2.7 Two state operation
- 2.8 Saturated and nonsaturated logic
- 2.9 Bipolar integrated circuits.
- 2.10 Introduction to RTL,DTL logic families.
- 2.11 TTL nand gate circuit
- 2.12 TTL family characteristics.
- 2.13 TTL subfamilies introduction.
- 2.14 Open collector TTL
- 2.15 MOS and CMOS NAND/NOR logic
- 2.16 Three state TTL gates

### **3. BOOLEAN ALGEBRA ,(KARNAUGH MAP AND TABULAR METHOD)**

- 3.1 De Morgan's theorem
- 3.2 The universal building blocks, NAND and NOR
- 3.3 Laws and theorems of Boolean algebra
- 3.4 Algebraic simplification of Boolean expression
- 3.5 Fundamental products
- 3.6 Sum of products and product of sums expression
- 3.7 AND-OR network
- 3.8 Truth table and karnaugh maps
- 3.9 Four variable karnaugh maps and their simplification techniques
- 3.10 Don't care condition
- 3.11 NAND-NAND networks

## **4. COMBINATIONAL LOGIC CIRCUITS**

- 4.1 Arithmetic Circuits.  
Half adder, full adder, parallel binary adder, 1's compliment subtractor circuit, 2's compliment subtractor/adder circuits, 8421 adder, half and full subtractor, parallel binary subtractor.
- 4.2 Code Converters.  
1. Bin to gray and gray to bin code converters.
- 4.3 Decoder/Encoder
- 4.4 Comparator.
- 4.5 Parity Generators Checkers.
- 4.6 Multiplexer/ Demultiplexers.

## **5. FLIP-FLOPS**

- 5.1 S-R flip-flops asynchronous and synchronous S R flip flops
- 5.2 D flip flop and T flip flop edge triggered
- 5.3 J K flip flop and J K master slave flip flop

## **6. COUNTERS**

- 6.1 Asynchronous 4-bit binary counter, binary ripple counter, asynchronous counter with feedback
- 6.2 Synchronous counters  
-Parallel counters, combination counters, binary decade counters with decoding gates, BCD counter.
- 6.3 UP/DOWN counter
- 6.4 Special counters  
-Ring counters  
-Shift register  
-Digital Clock  
-Application of counters

## **7. REGISTERS**

- 7.1 Parallel shift register
- 7.2 Serial "
- 7.3 Shift-left, Shift-right operation

## **8. MEMORIES**

- 8.1 Memory Classifications
- 8.2 RAM - Static and Dynamic
- 8.3 ROM - ROM, PROM, EPROM.

## **9. ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERSION.**

- 9.1 Variable register n/w
- 9.2 Bin ladder n/w
- 9.3 D/A convertor
- 9.4 D/A Accuracy and resolution
- 9.5 A/D converter
- 9.6 Simultaneous A/D convertor
- 9.7 Counter type A/D converter
- 9.8 A/D accuracy and resolution

## 5. LABORATORY EXPERIENCES:

1. To realize the basic logic gates.
2. To realize the NAND gate as a universal building block.
3. To realize the NOR gate as a universal building block.
4. To realize the HALF ADDER circuit
5. To realize the FULL ADDER circuit.
6. To realize the HALF SUBTRACTOR circuit.
7. To realize the AND-OR-INVERT circuit.
8. To realize the parity checker circuit.
9. To Test the Ripple counter.
10. To test the SEVEN SEGMENT display.
11. To realize the exclusive-OR gate.
12. To realize the SR flip-flop.
13. To realize the JK flip-flop.
14. To test the shift register.
15. To test the digital to analog converter circuit.

## 6. REFERENCES:

- |    |                                |                 |               |
|----|--------------------------------|-----------------|---------------|
| 1. | Digital fundamentals           | Thomes L.Floyd  | UBS New Delhi |
| 2. | Digital Electronics            | Gothmen         | PHI           |
| 3. | Digital electronics Principles | Malvino & Leech | MGH           |
| 4. | Modern Digital Electronics     | R.P. Jain       | TMH           |
| 5. | Digital Electronics            | Tokneinh        | MGH           |
| 6. | Digital Electronics            | Morris Mano     |               |

## 7. SUPPORT GROUP:

### POLYTECHNIC FACULTY:

1. Prof. J.G. Dave
2. " M.B. Patel;
3. " L.C. Solenki
4. " N.M. sntoki
5. " V.D. Nayak
6. " M.I.U. Memon

### CDC FACULTY:

1. Prof. S.R. Mishra.
2. Shri. K.D.Joshi.

**COURSE CODE : SEC - 304**

**COURSE NAME : ELECTRONIC NETWORKS AND LINES**

### 1. RATIONALE:

Electronics network course is required to understand the concept of electronics network circuits. Complicated circuit can be simplified with help of various theorems.

The Network devices like filter, attenuator, Equalizer are used in modern communication network. This course is also helpful to understand the properties of transmission line.

### 2. SCHEME OF STUDIES AND EXAMINATIONS:

Sr.No.	Code No.	Course Name	L	P	Exam. Scheme			Total
					Th.	Pra.	T.W.	
1.	<b>SEC-304</b>	Electronic Networks and Lines	3	2	100	50	25	175

### 3. SCHEME OF TEACHING AND ASSESSMENT:

Sr.No.	Topics	Th.	Pra.	Total	%
					Weightage
1.	Network theorems	12	20	32	30
2.	Resonance & coupled circuits	08	08	16	15
3.	Attenuator & Equiliser	08	12	20	15
4.	Filters	08	16	24	25
5.	Transmission line theory	06	-	06	15
TOTAL		42	56	98	100

### 4. TOPICS AND SUBTOPICS:

#### 1. NETWORK THEOREMS

- 1.1 Kirchoff's Voltage and current Law.
- 1.2 Mesh and nodal analysis
- 1.3 Principle of Duality.
- 1.4 Driving point, Transfer impedance and image impedance.
- 1.5 Super position theorem
- 1.6 Thevenin's Theorem
- 1.7 Reciprocity Theorem.
- 1.8 Notron's Theorem.
- 1.9 Maximum Power Transfer Theorem.
- 1.10 Network Transformation T to Pai and Pai to T

#### 2. RESONANCE AND COUPLED CIRCUIT

- 2.1 Definition of Q(Quality Factor)
- 2.2 Series resonance
- 2.3 Parallel resonance
- 2.4 Bandwidth and selectivity of series and parallel resonance.
- 2.5 Mutual inductance.
- 2.6 Co-efficient of coupling.
- 2.7 Ironcore transformer.
- 2.8 Single Tuned air-core transformer without derivation.
- 2.9 Doubled air-core transformer without derivation.

### **3. ATTENUATOR AND EQUILISER**

- 3.1 Characteristic Impedance of T and Pai Network.
- 3.2 Attenuation in Nepers and Decibels and relation between Nepers and Decibels.
- 3.3 Symmetrical T and Pai attenuator.
- 3.4 Lattice Attenuator & Bridge T.
- 3.5 Amplitude equalizer( Series and Shunt).
- 3.6 Phase Equalizer.

### **4. FILTERS**

- 4.1 Difference between Active filter and Passive filter .
- 4.2 Passive filters : Low pass, High pass & band pass filter.
- 4.3 Active filters : Low pass, High Pass & band pass using OP Amp.

### **5. TRANSMISSION LINE-THEORY**

- 5.1 Transmission line general equation.
- 5.2 Infinite line.
- 5.3 Wave length, velocity of propagation.
- 5.4 Wave form distortion.
- 5.5 The Distortionless line.
- 5.6 Loading of Telephone cable.
- 5.7 Standing wave ratio and reflection coefficient.

### **5. LABORATORY EXPERIENCES:**

1. To verify kirchoff's current law and voltage law .
2. To verify the thevenin's theorem.
3. To verify superposition theorem.
4. To verify T to Pai conversion.
5. To obtain frequency response of series resonance circuit and to determine bandwidth and Q.
6. To obtain frequency response of parallel resonance circuit and to determine bandwidth and Q.
7. To obtain frequency response constant K-Lowpass filter.
8. To obtain frequency response of constant K-Highpass filter.
9. To obtain frequency response of M-derived Low pass filter.
10. To verify maximum power transfer theorem.
11. To design and test T-type attenuator.
12. To design and test Pai-type attenuator.
13. To design and test amplitude equalizer.

### **6. REFERENCES:**

- |   |                                     |
|---|-------------------------------------|
| 1. Network Lines and field                                  | J.D. Ryder                          |
| 2. Network Analysis   | G.K. Mithal                         |
| 3. Network theory and filter design                         | Vasudev K.Artré                     |
| 4. Transmission Lines filter of Network.                    | V. Vijay                            |
| 5. Handbook of line communication                           | Royal Signal                        |
| 6. Electronic devices and circuit theory<br>(sixth edition) | Robert Boysted &<br>Louis Nashelsky |

### **7. SUPPORT GROUP:**

#### **POLYTECHNIC FACULTY:**

- |                    |                       |
|--------------------|-----------------------|
| 1. Prof. J.G. Dave | 4. Prof. N.M. Santoki |
| 2. " M.B. PAtel    | 5. " V. D. Nayak      |
| 3. " L.C. Solanki  | 6. " M.I.U. Memon     |

#### **CDC FACULTY:**

- |                       |                      |
|-----------------------|----------------------|
| 1. Prof. S.R. Mishra. | 2. Shri. K.D. Joshi. |
|-----------------------|----------------------|

**COURSE CODE : SEC-305**  
**COURSE NAME : COMMUNICATION ENGINEERING - I**

1. RATIONALE:

The main objective of this course is to impart knowledge of Radio Communication System to the students. The course consists of A.M. Radio Communication System ,F.M. Radio Communication System and noise in Communication System.

2. SCHEME OF STUDIES AND EXAMINATION:

Sr.No.	Code No.	Course Name	L	P	Exam. Schem			Total
					Th.	Pra.	T.W.	
1.	SEC-305	Communication Engg.I	3	2	100	50	25	175

3. SCHEME OF TEACHING AND ASSESSMENT:

SrNo.	TOPICS	Th	Pr	Total	% Weightage
1	Introduction to communication systems	3	-	3	10
2	Noise	4	-	4	10
3	Amplitude Modulation	10	8	18	25
4	Frequency and phase Modulation	10	8	18	25
5	A.M. Radio Receiver	8	6	14	15
6	F.M. Receiver	7	6	13	15
<b>TOTAL</b>		<b>42</b>	<b>28</b>	<b>70</b>	<b>100</b>

4. TOPICS AND SUBTOPICS:

1. INTRODUCTION TO COMMUNICATION SYSTEMS

- 1.1 Block diagram of general communication system
- 1.2 Definition of Modulation.
- 1.3 Need for Modulation.
- 1.4 Types of Modulation.
- 1.5 Band width requirements.

2. NOISE

- 2.1 External Noise.
- 2.2 Internal Noise.
- 2.3 Noise Calculation.
- 2.4 Signal to noise Ratio.
- 2.5 Definition of Noise figure.

3. AMPLITUDE MODULATION.

- 3.1 Derivation of expression for AM waves.
- 3.2 Frequency spectrums of the AM waves.
- 3.3 Modulation Index.
- 3.4 Derivation of modulation index

- 3.5 Power relation on the AM wave.
- 3.6 Examples based on above relation
- 3.7 Generation of AM
- 3.8 Low level and High Level Modulation.
- 3.9 Grid and Plate modulated Class-c Amplifier.
- 3.10 Collector Modulated Class-C Amplifier.
- 3.11 Block diagram of AM broadcasting Transmitter,

#### **4. FREQUENCY AND PHASE MODULATION**

- 4.1 Description of systems
- 4.2 Mathematical representation of FM
- 4.3 Modulation Index for FM
- 4.4 Simple problems based on the mathematical representation of FM
- 4.5 Phase Modulation.
- 4.6 Comparison between FM and AM
- 4.7 Comparison of wideband and Narrowband of FM
- 4.8 Pre-Emphasis de-emphasis networks.
- 4.9 Generation of FM using
  - (a) Basic reluctance modulation
  - (b) Varactor diode Modulation
  - (c) Transistor redandance modulation
  - (d) Reactance tube modulation
- 4.10 Stabilised Reactance Modulation.
- 4.11 Indirect Method generation of FM (Armstrong Method)
- 4.12 A complete Block diagram of FM broadcasting Transmitter.

#### **5. AM RADIO RECEIVER**

- 5.1 Tuned Radio freq. receiver.
- 5.2 Characteristic of radio receiver : Sensitivity, Selectivity, fidelity, signal to noise ratio,
- 5.3 Super hydrodine Receiver.
- 5.4 RF Amp., section, circuit and working.
- 5.5 RF Converters and RF Mixers: circuits and working. : Multiband circuit.
- 5.6 Selection of intermediate frequency. and IF amp. section and its working
- 5.7 AM Detection and Automatics gain control Commercial Circuits and its working.
- 5.8 AF Sections of AM receiver Circuit and its working.
- 5.9 Tone Control circuits.
- 5.10 Different types of Micro Phones : Crystal microphone, condenser microphone, carbon microphone.
- 5.11 Loudspeaker : Moving coil carbon type loudspeaker, horn type

#### **6. FM RECEIVER**

- 6.1 FM receiver block diagram.
- 6.2 Comparison of FM receiver with AM, receiver
- 6.3 Amplitude Limiting.
- 6.4 Basic FM demodulators.
  - (a) Slop detection
  - (b) Balanced slop detection.
  - (c) Phase discriminator.
  - (d) Ratio detector and balanced ratio detector

**5. LABORATORY EXPERIENCES :**

1. To study the standard signal generator.
2. To measure modulation index for AM wave using CRO, SSG and AFG.
3. To measure modulation index for AM wave for different values of AF voltage [use collector modulation.
4. To study tuned plate modulation.
5. To study pre-emphasis and de-emphasis networks.
6. To plot the S curve for the ratio detector circuits.
7. To measure selectivity, sensitivity and fidelity of a super heterodyne AM receiver.
8. To plot the output voltage v/s frequency for a tuned RF amplifier and to find the bandwidth.
9. To study the fault finding procedure on AM receiver trainer kit.
10. To study the varactor diode modulator used for frequency modulation.
11. To take the observations for simple A.G.C. circuit used in the receiver.

**6. REFERENCES :**

1. Electronic communication systems George Kennedy  
[Third or Forth Edition.  
Mcgraw-Hill International Edition]
2. Electronic Communications Modulation  
and Transmission. 2<sup>nd</sup> Edition Robert J. Schoenbeck.  
Prentice-Hill of India]
3. Electronic Communications Dennis Roddy-John Coolen  
[Forth Edition]  
Prentice-Hill of India
4. Principles of Communication Engg. Anokh Singh. S.Chand &Co
5. Electronics Communication Sanjeev Gupta
6. Basic Radio & Televison S.P.Sharma  
[Tata Mcgraw HillPub].

**7. SUPPORT GROUP:**

**POLYTECHNIC FACULTY:**

- |                    |                  |
|--------------------|------------------|
| 1. Prof. J.G. Dave | 4. " H.N. Parikh |
| 2. " M.B. Patel    | 5. " R.B. Shah   |
| 3. " L.C. Solanki  |                  |

**CDC FACULTY:**

- |                       |                      |
|-----------------------|----------------------|
| 1. Prof. S.R. Mishra. | 2. Shri. K.D. Joshi. |
|-----------------------|----------------------|

**COURSE CODE : SEC-306**

**COURSE NAME : ELECTRONIC INSTRUMENTS AND MEASUREMENTS**

**1. RATIONALE :**

The aim of this course is to develop measurement techniques such as accuracy, precision, standards in the students of Electronics and communication engineering. This course covers the topics of Measurement of error, Bridges and their applications, voltmeter, Ammeter, Q meter, CRO Signal generator, Transducers, Frequency convertors etc.

**2. SCHEME OF STUDIES AND EXAMINATIONS:**

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Sr.No.	Code No.	Course Name	L	P	Exam. Scheme			Total
					Th.	Pra.	T.W.	
1.	SEC-306	Electronic Instruments & Measurements	3	2	100	50	25	175

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**3. SCHEME OF TEACHING AND ASSESSMENT:**

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SrNo.	TOPICS	Th	Pr	Total	%
					Weightage
1	Introduction	2	-	2	5
2	Bridges and their applications	6	6	12	15
3	Basic parameter measurements	6	4	10	15
4	Oscilloscope	8	4	12	15
5	Signal generation	6	4	10	15
6	Frequency counters	6	4	10	15
7	Transducers	6	4	10	15
8.	Semiconductor measurement	2	2	4	05
<b>TOTAL</b>		<b>42</b>	<b>28</b>	<b>70</b>	<b>100</b>

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**4. TOPICS AND SUBTOPICS:**

**1. INTRODUCTION**

- 1.1 Necessities of Measurements
- 1.2 Definitions
- 1.3 Accuracy
- 1.4 Precision
- 1.5 Types of errors
- 1.6 Limiting of errors

**2. BRIDGES AND THEIR APPLICATIONS**

- 2.1 Whetstone bridge
- 2.2 Kelvin's Double arm bridge
- 2.3 Capacitance and Inductance comparison bridge
- 2.4 Maxwell's bridge
- 2.5 Hay bridge
- 2.6 Schering bridge
- 2.7 Wien's bridge

**3. BASIC PARAMETER MEASUREMENTS**

- 3.1 Moving coil moving iron type, Electro static DC ameter
- 3.2 DC Voltmeter
- 3.3 Ac Voltmeter using three terminal half wave rectifier

- 3.4 Amplified DC meter
- 3.6 Electronic Multimeter
- 3.7 Consideration in choosing Analog voltmeter
- 3.8 Hot wire
- 3.9 Electrostatic instrument ,watt meter, Energy meter, Insulation testing megger,
- 3.10 Digital Voltmeter
  - Features of DVM
  - Advantages of DVM
  - Ramp type DVM
  - Integrating DVM
- 3.11 Q-Meter
  - Basic Q-meter ckt.
  - Applications of Q-meter
  - The series connection of Q-meter
  - The parallel connection of Q-meter

#### **4. OSCILLOSCOPE**

- 4.1 C.R.O. Block Diagram
- 4.2 Cathode Ray tube
- 4.3 Derivation of Electrostatic Deflector Sensitivity
- 4.4 Screens for CRT
- 4.5 Graticules
- 4.6 CRT Circuits
- 4.7 Vertical Deflection System
- 4.8 Delay Line
- 4.9 Multiple trace
- 4.10 Horizontal Deflection System
- 4.11 Oscilloscope probe
- 4.12 Oscilloscope Techniques
- 4.13 Determining frequency
- 4.14 Phase angle and Time delay Measurement
- 4.15 Determining modulation characteristics.

#### **5. SIGNAL GENERATORS**

- 5.1 Sine wave generation by
  - 1. Hartley oscillator
  - 2. Collpits oscillator
  - 3. Wien's bridge oscillator
- 5.2 Sweep frequency generator
- 5.3 Pulse and square wave generator
- 5.4 Function Generator
- 5.5 Audio Frequency signal generation

#### **6. FREQUENCY COUNTERS**

- 6.1 Simple frequency counter
- 6.2 Display counter
- 6.3 Cascading counters
- 6.4 Multiplexing of display in Frequency Counter
- 6.5 Time base
- 6.6 Input signal processing
- 6.7 Period Measurement
- 6.8 Measurement of errors
- 6.9 Gating errors
- 6.10 Time base errors
- 6.11 Triggering level errors
- 6.12 Extending frequency range of counter

#### **7. TRANSDUCERS**

- 7.1 Classification of transducers
- 7.2 Selection of transducers



**COURSE CODE : SEC - 307**  
**COURSE NAME : ELECTRONIC WORKSHOP**

**1. RATIONALE :**

In electronics, with theoretical knowledge the practice is also so important. Starting from identification of components to testing of different circuit the practice must be there now to identify each component how to use data book, lead identification. Use of test equipment such as multi-meter to oscilloscope included in practice at the same time soldering and desoldering practice makes perfect electronic engineer.

**2. SCHEME OF STUDIES AND EXAMINATIONS :**

SR. NO	COURSE CODE NO.	NAME OF COURSE	TEACHING SCHEME		EXAMINATION SCHEMES			
			L	P	TH.	PR.	TW	TOTAL
1.	SEC - 307	ELECTRONIC WORKSHOP	--	4	00	00	50	50

**3. SCHEME OF TEACHING AND ASSESSMENT :**

SR. NO	NAME OF TOPICS	TH. HRS.	PRA. HRS.	TOTAL HRS.	% WEIGHTAGE
1.	Identification of components	-	10	10	15
2.	Use of electronics instruments	-	08	08	15
3.	Design of PCB layout using computer software	-	08	08	25
4.	Soldering the PCB	-	10	10	15
5.	Testing of PCB	-	10	10	15
6.	Fault finding in Electronics Circuit	-	10	10	15
<b>TOTAL</b>		<b>00</b>	<b>56</b>	<b>56</b>	<b>100</b>

**4. LABORATORY EXPERIENCES :**

1. Identification of components
  - Practice for color coding of resistance
  - Practice for identification of various components such as diode, capacitors, transistors, SCR, Triac and different Ics.
  - Understand the use of data book for transistors, Diodes, SCR and triac.
  - Understand the use of data book for TTL and CMOS Ics.
  - Testing of different components using multi-meter.
  
2. Use of electronic instruments
  - Practice for the use of multi-meter
  - Practice for the use of signal generator
  - Practice for the use of power supply
  - Practice for the use of oscilloscope

3. Designing the PCB layout using computer software
  - Understanding the use of printed circuit board in electronics.
  - Designing practice of PCB layout for a simple electronics circuit such as rectifier, transistor, amplifier etc.
  - **Use of software --ORCAD, Smart work, Work bench and Math lab, Use of Multimedia**
4. Soldering the PCB
  - Soldering practice for PCB
  - Soldering the PCB design in layout topic.
  - Desoldering practice
5. Testing of PCB
  - After soldering the component on given PCB testing the continuity and input / output result of given circuit.
6. Fault finding of electronic circuit
  - Fault finding procedure of different electronic circuits, Such as rectifier amplifier and digital circuit.

## 5. REFERENCES :

1. Data books for transistors Diodes & SCR
2. Data book for TTL and CMOS Ics

## 6. SUPPORT GROUP :

### POLYTECHNIC FACULTY :

1. Shri M.M.Dalchawal (Head of Power Electronics)
2. Shri J. V. Deshkar (Lect. In Power Electronics)
3. Shri K.J. Dhimer (Lect. In Power Electronics)
4. Smt. J.M.Patel (Lect. In Power Electronics)
- 5.

### CDC FACULTY :

1. Prof. D.K.Patel
2. Prof. A.K.Popat

**COURSE CODE : S-401**

**COURSE NAME : ENTREPRENEURSHIP DEVELOPMENT**

**1. RATIONALE :**

The emerging concept of self reliance at individual and national level - has significant impact on current developing economy. Future social expectations towards engineering professionals would be certainly as job creators and not as purely job seekers. Upgraded technological and changing economical environment has opened up wide horizons of business areas-including in service sectors too.

This course deals with the key concern areas of entrepreneurship development. Entrepreneurship is now not limited to manufacturing activities only. This encompasses service sectors also. The course is directed to help students to develop and shape their creativity and to understand peripheral influencing aspects. The content will certainly help students to think in a direction to establish an enterprise using fundamental know how. Risk Management and case studies have also been added in the course to create awareness.

**2. SCHEME OF STUDIES AND EXAMINATION :**

SR. NO.	CODE NO	NAME OF COURSE	L	P	Exam. Scheme			
					Th.	Pr.	T.W.	Total
1.	S-401	Entrepreneurship Development	3	–	100	–	–	100

**3. SCHEME OF TEACHING :**

TOPIC NO.	NAME OF TOPIC	LECT. HOURS
1.	Entrepreneurship development concept & scope	2
2.	Facilities planning	8
3.	SSI and its promotional agencies	4
4.	Managing critical resources	8
5.	Project planning and project report	6
6.	Managing enterprise	6
7.	Risk management	4
8.	Case studies	4
	<b>Total</b>	<b>42</b>

#### **4. OBJECTIVES :**

1. Explain entrepreneurship development
2. Select facilities for enterprise
3. Appraise with ISS and its promotional agencies.
4. Relate managing critical resources.
5. Prepare project report.
6. Communicate with government and non-government bodies.
7. Create awareness on risk management.
8. Analyse different case studies.

#### **5. TOPICS AND SUB-TOPICS :**

##### **TOPIC 1 : ENTREPRENEURSHIP DEVELOPMENT — CONCEPT & SCOPE**

Entrepreneurship development concept and need in context of changing global environment; scope in local and global market; Desirable qualities of entrepreneur; relativity importance; methods to cultivate, its role and need for success; Concept and importance of productivity, quality, cost consciousness and customers satisfaction & need analysis, Types of enterprise.

##### **TOPIC 2 : FACILITY PLANNING**

###### **Product (Physical and service both) selection :**

Concept and importance, sources including national/international publications, creativity and product selection; Competition-types and effect on product selection; product selection process; new idea mortality curve; product development stages.

###### **Process Selection :**

Concept and importance; forms of transformation; transformation cost; factors affecting process selection; technology life cycle; producibility-concept & importance; flexibility

###### **Facility location :**

Concept, steps in facility location, factors affecting selection of location;

###### **Facility layout and handling means :**

Importance, objectives, types,

###### **Capacity Planning :**

Concept, need, importance, base, method to assess/estimate capacity; flexibility in capacity planning-need.

### **TOPIC 3 : SSI AND ITS PROMOTIONAL AGENCIES**

SSI-definition, Government Policy—need and importance, Ancillary-Need and importance, Promotional Agencies—their role and types of promotions, various agencies.

### **TOPIC 4 : MANAGING CRITICAL RESOURCES**

7.M resources; Managing finance : terminology in finance management; concept of balance sheet and funds flow statement; managing working capital—its importance; sources of finance—types advantages and disadvantages; cost control & importance and methods.

#### **Managing human resource :**

Organisation structure-types and suitability; criteria for recruitment and selection; need for training and motivation; delegation of authority and span of control.

#### **Materials Management :**

Need, MRP, purchasing decisions and procedures; work controls and its importance; JIT—Concept, importance and application;

#### **Time Management :**

Importance, Managing delivery schedule opportunity cost—concept and application; Information Systems : need, importance, Communication channels and Media.

### **TOPIC 5 : PROJECT PLANNING AND PROJECT REPORT**

Meaning of project planning and report; feasibility study; steps in project planning project cost estimation; CVP relationship at different stages of operation; project execution; preparing and submitting project report; interpret a project report.

### **TOPIC 6 : MANAGING ENTREPRISE**

SWOT (strength, Weakness, opportunity and Threat) analysis—Meaning and importance; strategies to set and achieve goals; formal and non-formal aids, benefits to an enterprise including financial; source—types of aids/benefits; leadership importance; Dealing with Government/non Government bodies; Budgeting—need importance, Control and allocation, Marketing channels—need and selection criteria.

### **TOPIC 7. RISK MANAGEMENT :**

Introduction; Concept of risk, uncertainty and certainty ; Decision making under risk; Decision tree; Simulation; concept and application of sensitivity analysis; Decision making under uncertainty; Methods to deal with uncertainty.

### **TOPIC 8. CASE STUDIES**

Case studies of successful entrepreneur : important features; reasons for success; Analysing success criteria; (at least two) case studies of failed entrepreneur : importance analyse failure criteria; suggest steps which could have been followed to improve; (at least two).

## 6. INSTRUCTIONAL STRATEGIES :

Sr. No.	Objective No.	Instructional Strategy
1.	1	Input-cum-discussion video films, presentation by real life entrepreneurs.
2.	2	Input-cum discussion meeting entrepreneurs.
3.	3	Input-cum discussion lecture by SSI personnel.
4.	4	Input-cum discussion field visits; Input session by banks, video films.
5.	5	Input-cum-discussion study of project reports.
6.	6	Input-cum-discussion meeting with entrepreneurs.
7.	7	Input-cum-discussion success stories of entrepreneurs.
8.	8	Group discussion for successful and unsuccessful entrepreneurs.

## 7. REFERENCES :

1. Developing Entrepreneurship - Pareek & CO. Learning systems Delhi.
2. Entrepreneurship & Venture Management - Clifford and Bombak, Joseph R. Momanso.
3. Planning an Industrial unit - J. N. Vyas.
4. Small Industries management - Karmakar M.B.
5. Manual for the preparation of industrial feasibility studies - UNIDO
6. (a) Guidelines for industries  
Part - I - Policies & procedures - Ministry of industries Govt. of India.  
(b) Part - II - Scope and prospectus
7. New project opportunities series - I, II and III. - GITCO
8. Project profile for reserved Items - Vol, I, II & III - Development commissioner SSI, New Delhi.
9. Small scale industry Policy & Perceptive - Ministry of Industry Govt. of India.
10. Dialogue with the Entrepreneur - GSFC
11. Import-Export Policy for SSI - Govt. of India.
12. Creativity - Pradeep Khandwala

## 8. ASSESSMENT SCHEME

SR NO.	NAME OF TOPIC	PERCENTAGE WEIGHTAGE
1.	Entrepreneurship development concept & scope	05
2.	Facilities planning	20
3.	SSI and Its promotional agencies	10
4.	Managing critical resources	20
5.	Project planning and project report	15
6.	Managing enterprise	10
7.	Risk management	10
8.	Case studies	10
	<b>Total</b>	<b>100</b>

## 9. RESOURCE GROUP :

### (A) POLYTECHNIC FACULTY

1. Shri A.M.Talsania
2. Shri B.H.Shah
3. Shri D.S.Oza

### (B) CDC FACULTY

1. Prof. J.P.Patel
2. Shri H.B.Darji

### (C) TTTI FACULTY

1. Dr. M.K. Shrivastava
2. Ms. Shikha Lahiri

**COURSE CODE : SEC-402**

**NAME OF COURSE: MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING**

**1. RATIONALE:**

This course gives understanding of fundamentals of microprocessor, its architecture and working. It develops the programming skill of the 8085, which is useful for interfacing peripherals. It also gives an overview of microprocessor and its applications.

**2. SCHEME OF STUDIES AND EXAMINATION:**

Course Code	Name of Course	Teaching Scheme		Examination Scheme			
		L	P	Th.	Pr.	TW	Total
SEC-402	Microprocessor and Assembly Language Programming	3	2	100	50	25	175

**3. SCHEME OF TEACHING AND ASSESSMENT:**

SR NO	NAME OF TOPIC	L	P	Total	% Weightage
1	Microprocessor Architecture & Microprocessor system	8	4	12	24
2	8085 instruction and timing	4	2	6	10
3	8085 Instruction set	6	4	10	10
4	Programming techniques	10	12	22	30
5	Advance Microprocessor	4	4	8	8
6	Main memory system	7	2	9	10
7	Micro-controller	3	-	3	8
<b>Total</b>		<b>42</b>	<b>28</b>	<b>70</b>	<b>100</b>

**4. OBJECTIVES :**

The student should be able to :

1. Understand the functioning of the microprocessor thoroughly
2. Write programs in 8085 assembly language.
3. Know the salient features of the advanced microprocessor
4. Know the working of the micro-controller.

**5. TOPICS AND SUB-TOPICS:**

- 1. MICROPROCESSOR ARCHITECTURE & MICROPROCESSOR SYSTEM 8 Hrs,**
  - 1.1 Microprocessor Architecture and its operation: Microprocessor initiated operations and 8085 BUS organisation, Internal data operations and 8085 registers.
  - 1.2 Memory: Memory organisation, Memory map, Memory read and write.
  - 1.3 Microcomputer system
  - 1.4 8085 Microprocessor: Block diagram, Address and data bus, control and status signals, Power-supply and clock frequency, Interrupts and externally initiated operations, serial I/O ports, BUS timings, Flags.
- 2. 8085 INSTRUCTION AND TIMING 4 Hrs,**
  - 2.1 Instruction classification: Review of 8085 operations
  - 2.2 Instruction Formats: Single bytes, Two bytes and Three bytes instructions, Opcode format, Instruction Timings and operation status, simple programs.
- 3. 8085 INSTRUCTION SET 6 Hrs,**
  - 3.1 Data transfer instructions.
  - 3.2 Arithmetic Instructions.

- 3.3 Logical operations.
- 3.4 Branch operations.
- 3.5 Stack, I/O and Machine control Instructions.
- 3.6 Simple programs using 8086 Instructions.

**4. PROGRAMMING TECHNIQUES 10 Hrs,**

- 4.1 Looping, Counting and Indexing.
- 4.2 Logic operations
- 4.3 Counter and Timing delays.
- 4.4 Stack and Subroutines.
- 4.5 Code conversion, BCD Arithmetic and 16 Bit data operations.

**5. ADVANCE MICROPROCESSOR 4 Hrs,**

- 5.1 8086 /8088 Architecture
- 5.2 32 bit Microprocessor 80386: Introduction/ Architecture
- 5.3 The Intel Pentium processor: Internal block diagram
- 5.4 RISC processor: Introduction & features

**6. MAIN MEMORY SYSTEM 7 Hrs,**

- 6.1 Types of main memory
- 6.2 CPU read/write timing
- 6.3 SRAM and ROM interface requirement
- 6.4 Interfacing dynamic RAM
- 6.5 Troubleshooting the memory module

**7. MICRO-CONTROLLER 3 Hrs,**

- 7.1 Architecture and its operation
- 7.2 Memory organisation
- 7.3 Comparison between microprocessor and micro-controller
- 7.4 Applications

**6. LABORATORY EXPERIENCES: 28 Hrs,**

1. Study and use of microprocessor trainer kit.
2. Programming exercises using 8085 trainer kit, which covers the instruction set. Minimum 10 Programming exercise should be given.

**7. TERMWORK:**

Term work shall be consisting of prescribed course of practical laboratory work done and duly recorded and certified in the journal. Termwork is to be defended by oral.

**8. REFERENCES:**

- |  |                               |                      |
|--|-------------------------------|----------------------|
| 1. Microprocessor Arch., Programming & Applications with 8085 and 8080 A | by R.S. Gaonkar               | -Willey Eastern Ltd. |
| 2. The 8080/85 Family:<br>Design, Programming & Interfacing              | by John Ufferbeck             | -PHI India.          |
| 3. Introduction to microprocessor  | by A.P. Mathur                | -TMH                 |
| 4. 8080 assembly language programming                                    | by Lance A. Leventhal         | -PHI publication     |
| 5. The 8086/8088 family:<br>Design, Gross & Interfacing                  | by John Uffenbeck             | -PHI India           |
| 6. Introduction to microprocessor  | by A.P Mathar                 |                      |
| 7. Advance microprocessor & peripherals                                  | by A.K.Ray<br>& K.M. Bhurchnd | -PHI                 |
| 8. The 80 × 86 IBM PC& Compatible computer                               | by Matidi & Matidi            |                      |
| 9. Microprocessor & its application                                      | by B.Ram                      |                      |

**COURSE CODE: SEC-403**

**COURSE NAME: ANTENNA AND WAVE PROPAGATION**

**1. RATIONALE:**

This course Antenna and wave propagation is necessary to understand the basic theory of electromagnetic waves traveling from transmitter to receiver. This course explains how antenna converts the electrical energy in the electromagnetic wave and vice versa. This course also explains the various types of transmitting and receiving antenna.

**2. SCHEME OF STUDIES AND EXAMINATION:**

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Sr.No.	Code No.	Course Name	L	P	Exam. Scheme			Total
					Th.	Pra.	T.W.	
1.	SEC-403	Antenna and wave Propagation	3	2	100	-	25	125

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**3. SCHEME OF TEACHING AND ASSESSMENT:**

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Sr.No.	Topics	Th.	Pra.	Total	%
					Weightage
1.	Principle of radiation	06	-	06	10
2.	Elementary radiator	06	04	10	15
3.	Wire Antenna	08	12	20	15
4.	Special Antenna	03	12	15	15
5.	Radio wave propagation by ground	08	-	08	15
6.	Sky wave propagation	08	-	08	20
7.	Special propagation	03	-	03	10
TOTAL		42	28	70	100

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**4. TOPICS AND SUBTOPICS:**

**1. PRINCIPLE OF RADIATION**

- 1.1 Physical concept of generation of E.M. wave
- 1.2 Radiation from a centre fed dipole.
- 1.3 Power radiated by elementary dipole using Ponting's vector method.
- 1.4 Radiation resistance.

**2. ELEMENTARY RADIATOR**

- 2.1 Hertzian dipole.
- 2.2 Radiation pattern.
- 2.3 Definition of isotropic radiator gain.
- 2.4 Beam width, Half wave, wave length and quarter wave length antenna, pattern effect of ground on antenna.
- 2.5 Antenna losses, Antenna efficiency.
- 2.6 Tower Antenna, Capacitive loaded antenna.
- 2.7 Effective length of antenna, Effect of antenna height.

**3. WIRE ANTENNA**

- 3.1 Resonant wire antenna, V-antenna, Rhombic antenna, Loop antenna, Yagi antenna.
- 3.2 Theory of array, Broadside array, endfire array, Binomial array.

**4. SPECIAL ANTENNA**

- 4.1 Helical Antenna, Log periodic Antenna.
- 4.2 Parabolic reflector, Lens antenna, Horn Antenna.

**5. RADIO WAVE PROPAGATION BY GROUND**

- 5.1 Reflection.
- 5.2 Reflection and diffraction of E M wave by ground Effect of earth surface. Earth constant.

**6. SKY WAVE PROPAGATION**

- 6.1 The Ionosphere and its layers. Ionospheric wave propagation.
- 6.2 Refraction and Reflection by sky wave, skip distance, critical frequency, maximum usable frequency, Virtual Heights, Fading, Effect of the Earth's magnetic field.

**7. SPECIAL PROPAGATION**

- 7.1 Space wave propagation, Effect of atmosphere on space wave, duct propagation, scattered propagation.

**5. LABORATORY EXPERIENCES:**

- 1. To study antenna parameters.
- 2. To design TV antenna.
- 3. To obtain polar diagram of vertical antenna.
- 4. To compare received field strength in different planes.
- 5. To obtain horizontal radiation pattern of horizontal dipole antenna.
- 6. To obtain radiation pattern of folded dipole antenna.
- 7. To obtain radiation pattern of yagi antenna.
- 8. To obtain radiation pattern of circular antenna.
- 9. To obtain directivity pattern of helical antenna.
- 10. To obtain directivity pattern of rectangular loop antenna.
- 11. To obtain directivity pattern of End-fire antenna.
- 12. To obtain directivity pattern of broad side array.

**6. REFERENCES:**

- 1. Electronic Communication System George Kennedy MGH
- 2. Electronic Communication System Sanjiv Gupta
- 3. Radiation & Propagation Sathuraman & Balkrishnan
- 4. Antenas John D. Krans
- 5. Antena Engineering P.K. Bandopadhyay

**7. SUPPORT GROUP:**

**Polytechnic Faculty:**

- |                    |      |              |
|--------------------|------|--------------|
| 1. Prof. J.G. Dave | 2. " | M.B. Patel   |
| 3. " L.C. Solanki  | 4. " | N.M. Santoki |
| 5. " V.D. Nayak    | 6. " | M.I.U. Memon |

**CDC Faculty:**

- |                       |                      |
|-----------------------|----------------------|
| 1. Prof. S.R. Mishra. | 2. Shri. K.D. Joshi. |
|-----------------------|----------------------|

**COURSE CODE : SEC-404**

**COURSE NAME : INDUSTRIAL ELECTRONICS**

**1. RATIONALE:**

The object of this course is to give broad base knowledge of industrial electronics system, circuits and equipment to the students. It encompasses the topics like Thyristor family, Polyphase Rectifiers, Inverters, Voltage regulator, Servomechanism, Synchronous servomechanism, R F heating, Timer, and Resistance voltage etc.

**2. SCHEME OF STUDIES AND EXAMINATIONS:**

Sr.No.	Code No.	Course Name	L	P	Exam. Scheme			
					Th.	Pra.	T.W.	Total
1.	SEC-404	Industrial Electronics	3	4	100	50	25	175

**3. SCHEME OF TEACHING AND ASSESMENT:**

SrNo.	Topics	Th.	Pr.	Topic	% Weightage
1.	Control Systems	05	04	09	10
2.	Thyristors	05	14	19	15
3.	Polyphase rectifier & inverters	10	12	22	20
4.	Solid State Control of DC and AC Motors	05	08	13	15
5.	Timers and Automatic Controllers	03	06	09	05
6.	RF Heating & resistance welding	05	04	09	15
7.	Biomedical Electronics	05	04	09	10
8.	Programmable logic controllers	04	04	08	10
<b>TOTAL</b>		<b>42</b>	<b>56</b>	<b>98</b>	<b>100</b>

**4. TOPICS AND SUBTOPICS:**

**1. CONTROL SYSTEM**

- 1.1 Introduction to automatic control system
- 1.2 Open loop control systems
- 1.3 Close loop control systems
- 1.4 Basic elements of a serve mechanism
- 1.5 Example on automatic control systems
- 1.6 System performance
- 1.7 Synchroes
- 1.8 Servo-Motor AC and DC
- 1.9 Stepper motors

**2. THYRISTORS**

- 2.1 Introduction
- 2.2 Thyristor construction
- 2.3 Principle of operation of an SCR
- 2.4 Two transistor analogy of SCR
- 2.5 Diac

- 2.6 Triac
- 2.7 Uni- Junction Transistor
- 2.8 Rectifier circuit using SCR
- 2.9 SCR as a static switch
- 2.10 Introduction of MCT for power control.

### **3. POLYPHASE RECTIFIER AND INVERTERS**

- 3.1 Advantages of polyphase Rectifiers.
- 3.2 Types of polyphase Rectifiers- Three phase half wave and full wave, Three phase half wave with interphase transformer using solid state devices.
- 3.3 Controlled Rectifiers.
  - 3.3.1. Principles of operation of controlled rectifiers.
- 3.4 Parallel, series & Bridge Invertors
- 3.5 DC & AC Choppers.
- 3.6 Single & three phase cycloconvertors.
- 3.7 Un-interrupted power supply (UPS).
- 3.8 Different methods of forced commutation.

### **4. SOLID STATE CONTROL OF A.C.& D.C. MOTORS**

- 4.1 Advantages of electronic control of Devices.
- 4.2 D.C. motor speed control
- 4.3 Speed control of D.C. shunt motors using thyristor
- 4.4 Over voltage protection of D.C. motors
- 4.5 Over load protection of D.C. motors
- 4.6 A.C. motor control
- 4.7 Speed control of a single phase induction motor
- 4.8 Speed control of a universal series motors

### **5. TIMERS AND AUTOMATIC CONTROLLERS**

- 5.1 Principles of R.C. timing circuit.
- 5.2 R.C. Timer using transistor or I.C., Sequential Timer.
- 5.3 S.C.R. Delay Timer.
- 5.4 Light Operated photo relay.

### **6. RF HEATING & RESISTANCE WELDING**

- 6.1 Resistance heating
- 6.2 Induction heating
- 6.3 Oscillator circuit using Induction heating
- 6.4 Electronics heaters used for Induction heating using transistor circuit
- 6.5 Advantages and applications of Induction heating
- 6.6 Di-electric heating
- 6.7 Advantages and applications of di-electric heating
- 6.8 Resistance welding
- 6.9 Electronic line contactors using Thyristors
- 6.10 Synchronous and non synchronous control using thyristors
- 6.11 Sequential timer used in welding control

### **7. BIO-MEDICAL ELECTRONICS**

- 7.1 Source of Bio-electric potential
- 7.2 Types of Bio-potential electrodes
- 7.3 Electrocardiography [E C G]
- 7.4 Electroencephalography [E E G]
- 7.5 Electromyography [E M G]
- 7.6 X-RAY, production and application
- 7.7 Ultrasonic generation and application

## 8. PROGRAMMABLE LOGIC CONTROLLERS

- 8.1 Programmable Logic Control [P L C]
- 8.2 Characteristics of PLC
- 8.3 Block diagram of PLC with description
- 8.4 Application of PLC
- 8.5 PLL (IC-565), circuits & its application.

## 5. LABORATORY EXPERIENCES:

1. To plot the V-I characteristics of a diode
2. To plot the characteristics curve of Uni Junction transistor (UJT)
3. To perform UJT as a relaxation oscillator
4. To plot the characteristics of TRIAC
5. To study the phase control using TRIAC
6. To plot the characteristics of SCR
7. To study of the forced commutation
8. To plot the characteristics of zener voltage regulator.
9. To plot the characteristics of synchros.
10. To perform the position control using synchro transmitter & synchro receiver.
11. To perform the error detector using synchro
12. To study the biomedical Instruments
13. To demonstrate the operation of the photo electric relay.
14. To demonstrate principle and working of D.C. motor controller using SCR.
15. To study the timer circuits using IC 555.
16. To study invertors circuit.

## 6. REFERENCES:

- |   |                                    |                    |
|---|------------------------------------|--------------------|
| 1. Industrial Electronics & control                             | S.K.Bhattacharya<br>S.Chatterjee.  | TTTT<br>Chandigarh |
| 2. Industrial Electronics                                       | R.P.Ajwalia                        | Atul prak.         |
| 3. Industrial Electronics                                       | G.K. Mithal                        | Khanna             |
| 4. Electronics Instrumentation in Medical Praticce              | R.S. Khanpur                       | Kothari            |
| 5. Bio-medical Insrumentation and Measurements (Second Edition) | Leslie Cromwell<br>(PHI)           |                    |
| 6. Electronics in Industry                                      | George M. Chute<br>Robert D. Chute |                    |
| 7. Power Electronics  | M.H. Rashid                        | PHI                |

## 7. RESOURCE GROUP:

### POTYTECHNIC FACULTY:

- |                       |      |            |
|-----------------------|------|------------|
| 1. Prof. J.G. Dave    | 2. " | M.B. Patel |
| 3. " A.H. Dhanarajani | 4. " | R.B. Shah  |

### CDC FACULTY:

- |                      |                     |
|----------------------|---------------------|
| 1. Prof. S.R. Mishra | 2. Shri. K.D. Joshi |
|----------------------|---------------------|

**COURSE CODE : SEC-405**

**NAME OF COURSE : COMMUNICATION ENGINEERING-II**

### 1. RATIONALE:

This course is very useful to the students of Electronics and communication engineering as it covers different types of Radio communication systems like SSB ,ISB, Digital communication and data communication. The importance of this course is very high in modern era of Telecommunication.

### 2. SCHEME OF STUDIES AND EXAMINATIONS:

SR. NO	COURSE CODE NO.	NAME OF COURSE	TEACHING SCHEME		EXAMINATION SCHEMES			
			L	P	TH.	PR.	TW	TOTAL
1.	SEC-405	COMMUNICATION ENGINEERING-II	3	2	100	50	25	175

### 3. SCHEME OF STUDIES AND ASSESSMENT:

Sr. No.	Topics	Th.	Pr.	Total	% Weightage
1	Single side band Technique	06	06	12	15
2	SSB Receiver and Communication Receiver	08	04	12	20
3	Digital Modulation	08	04	12	20
<b>4</b>	<b>DATA COMMUNICATION</b>	<b>06</b>	<b>06</b>	<b>12</b>	<b>15</b>
5	Fiber optic communication	06	04	10	15
6	Integrated services digital network	08	04	12	15
		42	28	70	100

### 4.TOPICS AND SUB-TOPICS

#### 1. SINGLE SIDEBAND TECHNIQUES

- 1.1 Evaluation and Description of SSB
- 1.2 Advantages and disadvantage of SSB
- 1.3 Suppression of carrier using FET balanced modulator
- 1.4 Suppression of unwanted sideband by
  - 1.4.1 Filter system
  - 1.4.2 The phase shift method
- 1.5 SSB transmitter using pilot carrier system
- 1.6 Vestigial sideband transmitter

## **2 SSB RECEIEVER AND COMMUNICATION RECEIEVER**

- 2.1 SSB detector
- 2.2 Block diagram single side (Pilot carrier) SSB and its working
- 2.3 Block diagram of independent sideband (ISB) SSB Receiver and its working
- 2.4 Block diagram of communication receive and function of each block
- 2.5 Extension of the super heterodyne principle
  - 2.5.1 Double conversion
  - 2.5.2 Squelch circuits
  - 2.5.3 Noise limiter
  - 2.5.4 Delayed AVC & Delayed Amplifier
  - 2.5.5 Automatic frequency control
  - 2.5.6 Diversify reception

## **3 DIGITAL MODULATION**

- 3.1 Pulse modulation Technique-PAM, PWM, PPM
- 3.2 Time division using pilot carrier system
- 3.3 Frequency division multiplexing
- 3.4 Code division multiplexing
- 3.5 Pulse code modulation
  - 3.5.1 Basic principles
  - 3.5.2 PCM communication system
  - 3.5.3 Advantages & disadvantages
  - 3.5.4 DPCM, ADPCM
- 3.6 Delta modulation and adaptive delta modulation

## **4 DATA COMMUNICATION-**

- 4.1 Coding Techniques
  - 4.1.1 RZ
  - 4.1.2 NRZ
  - 4.1.3 Bi Polar
  - 4.1.4 Manchester
  - 4.1.5 Differential Manchester
  - 4.1.6 HDB-3
- 4.2 Transmission Modes
- 4.3 Network Topology
- 4.4 Data communication system
- 4.5 Asynchronous and synchronous Transmission
- 4.6 RS232 & RS485 Interface
  - 4.6.1 Drivers/Terminators
  - 4.6.2 System status
- 4.7 Modems
  - 4.7.1 Low speed Modem
  - 4.7.2 Medium speed modem
  - 4.7.3 High speed modem (8 PSK)

- 4.8 Loop back testing
- 4.9 Protocol
  - 4.9.1 BiSYNC
  - 4.9.2 HDLC

## **5 FIBRE OPTIC COMMUNICATION**

- 5.1 Modulation Technique
- 5.2 Frequency
- 5.3 Fiber optic cables
  - 5.3.1 Reflection (basic principle)
  - 5.3.2 numerical Aperture
  - 5.3.3 gradal index cable
  - 5.3.4 single mode versus multimode
  - 5.3.5 pulse dispersion
  - 5.3.6 cable construction
  - 5.3.7 cable loss
- 5.4 Advantages/ disadvantages
- 5.5 Light sources
  - 5.5.1 LED
  - 5.5.2 LASER, Diode
- 5.6 light detectors
  - 5.6.1 PIN diodes
  - 5.6.2 Avalanche Diode
- 5.7 Optical receiver
- 5.8 System components

## **6 ISDN: INTEGRATED SERVICE DIGITAL NETWORK**

- 6.1 International IDN and ISDN Developments
- 6.2 Emerging Communication services
- 6.3 The ISDN Concept
- 6.4 Performance objective of ISDN
- 6.5 Introduction to Mobile radio
  - 6.5.1 Digital application to Mobile radio
  - 6.5.2 Propagation characteristics of land mobile radio

## **5 LABORATORY EXPERIENCES**

- 1 To study the communication receiver
- 2 To study and perform balanced modulator
- 3 To study and perform S.S.B. using filter method
- 4 To study and perform PAM
- 5 To study and perform PADM
- 6 To study and perform PWM
- 7 To study and perform PWDM
- 8 To study and perform PPM
- 9 To study and perform PPDM
- 10 To study the fiber optic communication system
- 11 To study and perform FSK modulation

- 12 To study and perform FSK demodulation
- 13 To study and perform TDM
- 14 To study and perform TDDM
- 15 To study and perform ASK modulation
- 16 To study and perform ASK demodulation
- 17 To study and perform Delta modulation
- 18 To study noise limiter circuit
- 19 To study of different types of MODEMS
- 20 Study of mobile radio
- 21 Study of Cellular phone

## 6 REFERENCES

- |   |  |                         |
|---|--|-------------------------|
| 1 | Electronic communication system  | George Kennedy          |
| 2 | Electronic communications modulation and Transmission prentice hall of India | Robert J. Schoenback    |
| 3 | Advanced digital communication prentice hall INC                             | Dr. Kamilo Fehar        |
| 4 | Electronic communication   | Sanjiv Gupta            |
| 5 | Electronic communication   | Dennis Reddy            |
| 6 | Electronic communication   | P.C.Rao&<br>D.V.Sutrawe |
| 7 | Principles of communication engineering                                      | AshokSingh              |

## 7 SUPPORT GROUP:

### 1 POLYTECHNIC FACULTY:

- 1. Prof. J.G.Dave
- 2. Prof. M.B.patel
- 3. Prof. A.H.Dhnarajani
- 4. Prof. H.N.Parikh

### 2 CDC FACULTY:

- 1. Prof, P.N.Patel
- 2. Prof. D.K.Patel
- 3. Prof. A.K.Popat

**COURSE CODE** : SEC-406  
**NAME OF COURSE** : TELEVISION ENGINEERING

## 1 RATIONALE

The course is aimed at providing study of basic principles of Television system and detail study of Colour TV transmission and reception. The course content consists of study of basic principles of TV system, generation and transmission of Colour signal, different section of Colour TV receiver and also there is an attempt to introduce new technology in TV system.

## 2 SCHEME OF STUDIES AND EXAMINATION :

Sr. No	Code No	Course	L	P	Examination Scheme			
					Th.	Pract.	T.W.	Total
1	SEC-406	Television Engineering	4	4	100	50	25	175

## 3 SCHEME OF TEACHING :

Topic No	Topic	Theory	Practical	Total	% Weightage
1	Essential of Television	8	4	12	15
2	TV Signal Transmission	8	4	12	15
3	TV Systems and Standards	4	6	10	10
4	PAL – D Colour Receiver	12	18	30	20
5	Sound and Power Supply Section	5	10	15	10
6	Colour Decoder and Sync Separator	6	4	10	10
7	Fault Finding Methods and Servicing	8	8	16	10
8	Advance TV	5	2	7	10
	TOTAL	56	56	112	100

## 4. TOPICS AND SUB TOPICS:-

### 1 ESSENTIAL OF TELEVISION SYSTEM

- 1.1 Introduction to Television
- 1.2 Simple Block Diagram of TV Transmission and Receiver
- 1.3 Scanning, Interlace Scanning
- 1.4 Picture resolution
- 1.5 Brightness, Contrast, Luminance, Hue, Saturation
- 1.6 Composite Video Signal
- 1.7 Camera Tube
- 1.8 Block Diagram of Colour Camera

### 2 TV SIGNAL TRANSMISSION & PROPAGATION AND COLOUR THEORY

- 2.1 TV Transmitting Antenna (Trunstile Array)
- 2.2 TV Receiver Antenna (Yagi – Uda Antenna)
- 2.3 Picture Signal Transmission, positive and negative modulation

- 2.4 Vestigial side band transmission and standard TV channel
- 2.5 Interference suffered by TV signals
- 2.6 Additive Colour Mixing, Compatibility
- 2.7 Luminance Signal (y), Colour difference signal, Encoding of Colour difference signal
- 2.8 Formation of Chroma Signal
- 2.9 Frequency interleaving

### **3 TV SYSTEMS AND STANDARDS**

- 3.1 Introduction
- 3.2 NTSC Colour System
- 3.3 625 line Monochrome System
- 3.4 PAL Colour System
- 3.5 SECAM Colour System
- 3.6 Television Standards
- 3.7 CATV System

### **4 PAL – D COLOUR RECEIVER**

- 4.1 Block Diagram of PAL – D Colour Receiver
- 4.2 Functions of TV tuner
- 4.3 Tuner Operation
- 4.4 VHF Tuner block diagram
- 4.5 Varactor tuned VHF Tuner
- 4.6 UHF Tuner Block diagram
- 4.7 Digital Tuning Techniques
- 4.8 Remote control of receiver functions (Transmitter and Receiver)
- 4.9 Basic principle of AFT
- 4.10 Vision IF Section summary and overall IF response curve of a Colour receiver
- 4.11 Advantage of AGC, Basic AGC Circuit, Keyed AGC Circuit and Delayed AGC Synchronous Detector Principles

### **5 SOUND AND POWER SUPPLY SECTION OF COLOUR TV RECEIVER**

- 5.1 Desired composition of Video signal
- 5.2 Gain and Bandwidth requirement of video Amp.
- 5.3 Block diagram of Y channel
- 5.4 Basic principles of FM detection
- 5.5 Block diagram of IC CA 3065
- 5.6 EHT generation
- 5.7 Switch Mode Power Supply (SMPS) for Television receivers, Merits and Demerits of SMPS

### **6 COLOUR DECODER, SYNC SEPARATION**

- 6.1 Block diagram of PAL – D decoder
- 6.2 COMP filter
- 6.3 U and V Demodulators
- 6.4 Block diagram of Sync separator
- 6.5 Controls in horizontal and vertical deflection circuit

## **7 FAULT FINDING METHODS AND RECEIVER ALIGNMENT AND SERVICING**

- 7.1 Common faults in tuner circuits
- 7.2 Common faults in IF subsystem
- 7.3 Common faults in Sound channel
- 7.4 Trouble shooting Video Amp. Circuit
- 7.5 Common fault in Sync Separator circuit
- 7.6 Common fault in Frame scan circuit
- 7.7 Fault finding in Power supplies
- 7.8 Colour receiver Alignment
- 7.9 Sweep Market Generator and Colour TV pattern generator
- 7.10 Servicing Colour receivers

## **8 ADVANCE TOPICS IN TV TECHNOLOGY**

- 8.1 Three Dimensional ( 3D) TV pictures
- 8.2 Digital Television
- 8.3 High Definition Television ( HD TV )
- 8.4 Flat Panel Display TV receivers
- 8.5 DTH ( Direct To Home) system

## **5. LABORATORY EXPERIMENTS**

- (1) To study Block diagram of TV transmitter
- (2) To study Block diagram of Colour TV receiver
- (3) To study various components of composite video signal
- (4) To study operation of Electronic Tuner
- (5) To observe various patterns of Colour Pattern Generator
- (6) To design Yagi - Uda Antenna for given channel
- (7) To locate and understand various operative and service controls of Colour TV receiver
- (8) To study Camera Tube
- (9) To understand AGC circuits
- (10) To understand VIF stage and observe input and output waveforms
- (11) To understand sound section and observe waveforms at various stages
- (12) To understand Sync separator circuit and observe input and output waveforms
- (13) To understand deflection section and observe input and output waveforms
- (14) To understand working of EHT section
- (15) To understand SMPS section and find out load and line regulation
- (16) To study various faults in Colour TV receiver
- (17) To understand PAL decoder section and to measure input and output voltages
- (18) To list out CCIR - B TV standards
- (19) To study PAL Coder
- (20) To study remote control transmitter and receiver

## **6. SUPPORT GROUP**

### **1 POLYTECHNIC FACULTY**

1 Prof. M B Patel                      2 Ms. L J Vora  
3 Mr M P Parmar

### **2 CDC Faculty:**

1 Shri K.D.Joshi  
2 Shri A.K.Popat

**COURSE CODE : SEC-501**  
**NAME OF COURSE : MICRO CONTROLLER**

**1. RATIONALE:**

The microprocessor has been with us for some Twenty Five years but it has limited applications, more complicated hardware, limited use with computer and more cost resulted in failure in market on other hand micro controller which is a true computer on a chip more simple in hardware, millions of application more general purpose device and capable of having several different functions depending on the wishes of the programmer. So now a day, use of micro controller is increasing in industries and therefore, it is necessary for the students to study this course.

**2. SCHEME OF STUDIES AND EXAMINATION:**

COURSE CODE	NAME OF COURSE	TEACHING SCHEME		EXAMINATION SCHEMES			
		L	P	TH.	PR.	TW	TOTAL
SEC-501	MICRO CONTROLLER	03	02	100	50	25	175

**3. SCHEME OF TEACHING AND ASSESSMENT:**

SR. NO	NAME OF TOPIC	TH HRS.	PRA HRS.	TOTAL HRS.	% WEIGHTAGE
1.	Microprocessor and micro controller	05	--	05	10
2.	8051 micro controller hardware	08	08	16	20
3.	Moving Data	10	06	16	25
4.	Logical arithmetic operations	08	12	20	20
5.	8051 micro controller design	05	02	07	10
6.	Applications	06	--	06	15
TOTAL		42	28	70	100

**4. OBJECTIVES:**

After studying this subject, student will able to

- ❖ Study design and maintain the micro controller circuits
- ❖ Programme for micro controllers for different operations and applications in industries
- ❖ Develop different use of micro controller.

## 5. TOPICS AND SUB-TOPICS:

### 1. MICROPROCESSORS AND MICRO CONTROLLERS

- 1.1 Microprocessors - general idea and block diagram
- 1.2 Micro controller
- 1.3 Block diagram of a micro controller
- 1.4 Introduction to micro controller
- 1.5 Operating principle
- 1.6 Comparison between microprocessor and micro controller

### 2. 8051 MICRO CONTROLLER HARDWARE

- 2.1 Introduction
- 2.2 8051 micro controller hardware
- 2.3 8051 block diagram
- 2.4 Function of each block
- 2.5 8051 Programming model
- 2.6 8051 DIP Pin assignment
- 2.7 8051 oscillator and clock
- 2.8 Ceramic resonator oscillator circuit
- 2.9 Program counter and data pointer
- 2.10 A and B CPU registers
- 2.11 Flags and the program status word PSW
- 2.12 Internal memory
- 2.13 Internal RAM
  - ❖ Internal RAM organization
- 2.14 Stack and stack pointer
- 2.15 Special function registers
- 2.16 Internal ROM
- 2.17 Input / output Pins Ports and circuits
  - ❖ Port 0 Pin configuration
  - ❖ Port 1 pin configuration
  - ❖ Port 2 pin configuration
  - ❖ Port 3 pin configuration
- 2.18 External memory
  - ❖ Connecting external memory
- 2.19 Counters and timer
  - ❖ TCON and TMOD function registers
  - ❖ TCON (Timer control) function registers
  - ❖ TMOD Time mode control Function Register
  - ❖ Timer counter interrupts
  - ❖ Timer mode 1, 2 & 3
- 2.20 Serial Data input / output
- 2.21 Interrupts
  - ❖ Introduction
  - ❖ Types of interrupts

### 3. MOVING DATA

- 3.1 Introduction
- 3.2 Addressing Modes
- 3.3 External Data Moves

- 3.4 Code memory Read-only Data Moves
- 3.5 Push and Pop opcodes
- 3.6 Data exchanges
- 3.7 Example programs

#### 4. LOGICAL ARITHMETIC OPERATIONS

- 4.1 Introduction
- 4.2 Byte level logical operation
- 4.3 Bit level logical operation
- 4.4 Rotate and swap operation
- 4.5 Flags
- 4.6 Incrementing and decrementing
- 4.7 Additions
- 4.8 Subtraction
- 4.9 Multiplications and division
- 4.10 Decimal arithmetic
- 4.11 Example programs
- 4.12 Jump and call program range
- 4.13 Calls and subroutines
- 4.14 Interrupts and returns

#### 5. 8051 MICRO CONTROLLER DESIGN

- 5.1 Introduction
- 5.2 Micro controller specifications
- 5.3 A micro controller design
  - ❖ External memory and memory space decoding
  - ❖ Reset and clock circuit
  - ❖ Expanding I/O
- 5.4 Timing Subroutines
- 5.5 Lookup table for 8051
- 5.6 Serial data transmission

#### 6. APPLICATIONS

- 6.1 Introduction
- 6.2 Interface keyboards to 8051 based micro controller
- 6.3 Interface LED & LCD display
- 6.4 Interface the micro controller system to A/D and D/A converters
- 6.5 8051 Data communications modes example programmes
- 6.6 Data acquisition systems

#### 6. SUGGESTIVE IMPLEMENTATION STRATEGIES:

Sr. No	Name of Topic	Treatment	Key Resources Required
1	Microprocessor and micro controller	1. Demonstration 2. Transparencies 3. Seminar	1. Handouts 2. Microprocessor kits 3. Software with PC
2	8051 micro controller hardware	1. Demonstration 2. Transparencies 3. Group Discussion	1. Handouts 2. Micro controller kit 8051 3. Magazines
3	Moving Data	1. Demonstration 2. Transparencies 3. Seminar	1. Software with PC 2. Handouts 3. Programming with C

<b>4</b>	Logical and arithmetic operations	1. Demonstration 2. Transparencies 3. Practice Work 4. Seminar	1. Software with PC 2. Handouts 3. Programming
<b>5</b>	8051 Micro controller Design	1. Seminar 2. Group Discussion 3. Demonstration	1. Magazine 2. Model 3. Reference Books
<b>6.</b>	Applications	1. Industrial Visit 2. Demonstration	1. Magazines 2. Handouts 3. Models

## **7. LABORATORY EXPERIENCES:**

1. 8051 Oscillator circuit and timing
2. Timer / counter control logic
3. External memory circuit
4. Interrupts circuits
5. Assembly language programming
6. Programming the 8051 - 8051 instruction syntax
7. Use commands to move data
8. Addition programming
9. Subtraction programming
10. Multiplication and division programming
11. Byte and bit logical operation
12. Interface LED display
13. A to D converter
14. D to A converter

## **8. REFERENCES:**

1. The 8051 Micro controller Architecture, Programming and Applications - Kenneth J. Ayala
2. Microprocessor and Micro controllers - B.P.Singh

## **9. SUPPORT GROUP:**

### **POLYTECHNIC FACULTY:**

1. Prof. M.M. Dalchawal
2. Prof. J. V. Deshkar
3. Prof. K.M. Dhimer
4. Smt. J.M. Patel

### **CDC FACULTY:**

1. Prof. D.K.Patel
2. Prof.A.K.Popat

**PROGRAMME : DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING**  
**COURSE CODE : SEC -502**  
**COURSE NAME : MOBILE COMMUNICATION**

**1. RATIONALE:**

The aim of this course is to impart knowledge and technical skill in the field of mobile communication to students of Diploma in Electronics and Communication Engineering. In the last decade there is tremendous growth in mobile industry. In depth knowledge of mobile communication is necessary for the students of Electronics and Communication Engineering.

**2. SCHEME OF STUDIES AND EXAMINATION**

COUSE CODE	COURSE NAME	TEACHING SCHEME		EXAMINATION SCHEME			
		L	P	TH.	PR.	T.W.	TOTAL
SEC-502	MOBILE COMMUNICATION	3	2	100	50	25	175

**3. SCHEME OF TEACHING AND ASSESSMENT**

TOPIC NO.	NAME OF TOPIC	L	P	TOTAL	% WEIGHTAGE
1	Fundamentals of mobile communication	3	2	5	05
2	Global system for mobile communication (GSM)	10	8	18	25
3	CDMA technology	10	4	14	25
4	Speech Coding, Channel Coding and Modulation	8	6	14	20
5	Mobile handset	8	8	16	20
6	Future trends	3	--	3	05
<b>Total</b>		<b>42</b>	<b>28</b>	<b>70</b>	<b>100</b>

**4. OBJECTIVES**

**After learning this course, the students should be able**

- 1 Understand cellular structure.
- 2 Understand cellular services.
- 3 Understand working of SIM card.
- 4 Understand the principles of GSM and CDMA Mobile Communication.
- 5 Understand basic aspects of spread spectrum technology.
- 6 Understand how speech is coded and compressed for mobile communication.
- 7 Get idea of channel coding.
- 8 Get idea of radio channels.
- 9 Get idea of device addressing.
- 10 Understand working of Mobile phone.

- 11 Know general faults occurs in the mobile handset.
- 12 Flash mobile handset with appropriate software.
- 13 Download ring tones, images and voice in mobile phone.
- 14 Use AT commands for the fault finding.
- 17 Deliver seminar on recent trends in mobile communication.

## **5. TOPICS AND SUB-TOPICS**

### **1. FUNDAMENTALS OF MOBILE COMMUNICATION**

- 1.1 Introduction
- 1.2 The cellular structure
  - 1.2.1 Basic Concepts
  - 1.2.2 Cluster
  - 1.2.3 Type of cells: Macro cell, Micro cell, Selective cell, Umbrella cell etc.
- 1.3 Cellular Services
  - 1.3.1 Voice Services
  - 1.3.2 Data Services
  - 1.3.3 Multicast Services
  - 1.3.4 Short Messaging Services
  - 1.3.5 Multimedia Messaging service (MMS)
  - 1.3.6 Location Based Services (LBS)
- 1.4 Subscriber Identity Module (SIM)

### **2. GLOBAL SYSTEM FOR MOBILE COMMUNICATION**

- 2.1 Architecture of GSM Network
  - 2.1.1 The Base Station Subsystem
    - 2.1.1.1 The Base Transceiver Station
    - 2.1.1.2 The Base Station Controller
  - 2.1.2 The Network and Switching Subsystem
    - 2.1.2.1 The Mobile services Switching Center (MSC)
    - 2.1.2.2 The Gateway Mobile services Switching Center
    - 2.1.2.3 Home Location Register (HLR)
    - 2.1.2.4 Visitor Location Register (VLR)
    - 2.1.2.5 The Authentication Center (AuC)
    - 2.1.2.6 The Equipment Identity Register (EIR)
    - 2.1.2.7 The GSM Inter-working Unit (GIWU)
  - 2.1.3 The Operation and Support Subsystem (OSS)
  - 2.1.4 Network databases
  - 2.1.5 Customized Applications for Mobile Network Enhanced Logic (CAMEL)
- 2.2 GSM Radio Interface
  - 2.2.1 Frequency allocation
  - 2.2.2 Multiple access scheme
    - 2.2.2.1 FDMA and TDMA
    - 2.2.2.2 Channel structure: Traffic channels (TCH) & Control channels
    - 2.2.2.3 Burst structure
    - 2.2.2.4 Frequency hopping

- 2.2.3 Cell Splitting and sectoring
- 2.2.4 RF Power Control
- 2.2.5 Mobile Assisted Handover (MAHO)
- 2.2.6 GSM Specifications
- 2.3 GSM System Operation
  - 2.3.1 Mobile Telephone Initialization
  - 2.3.2 Updating Location (Registration)
  - 2.3.3 System Access
  - 2.3.4 Making call from mobile phone (Control sequence)
  - 2.3.5 Receiving a Call on a Mobile Telephone (Control sequence)
  - 2.3.6 Transferring Calls Between Cell Sites (Handover)
- 2.4 Device Addressing
  - 2.4.1 Mobile Station ISDN (MSISDN)
  - 2.4.2 International Mobile Subscriber Identity (IMSI)
  - 2.4.3 International Mobile Equipment Identifier (IMEI)
  - 2.4.4 Temporary Mobile Station Identity (TMSI)

### **3. CDMA TECHNOLOGY**

- 3.1 Introduction to spread spectrum technology
  - 3.1.1 What is spread spectrum?
  - 3.1.2 Criteria for spread spectrum system
  - 3.1.3 Applications of the spread spectrum technique
- 3.2 Advantage of CDMA technology
- 3.3 Direct sequence system
  - 3.3.1 Block diagram of direct sequence spread spectrum technique
  - 3.3.2 Spreading codes: Walsh codes and PN codes
- 3.4 Basic concepts of Frequency Hoping system
- 3.5 Basic concepts of Time hoping system
- 3.6. Power Control in CDMA
  - 3.6.1 Necessity of Power Control
  - 3.6.2 Reverse Link Power Control
  - 3.6.3 Forward Link Power Control
- 3.7 Handoffs in CDMA
- 3.8 Channel capacity
- 3.9 Call Processing in CDMA

### **4. SPEECH CODING, CHANNEL CODING AND MODULATION**

- 4.1 Speech coding
  - 4.1.1 Requirements from speech coders
  - 4.1.2 Overview of different types of speech coders
    - 4.1.3 The GSM Speech Codec
- 4.2 Channel coding
  - 4.2.1 Channel coding for the GSM data TCH channels
  - 4.2.2 Channel coding for the GSM speech channels
  - 4.2.3 Channel coding for the GSM control channels
- 4.3 Interleaving
  - 4.3.1 Interleaving for the GSM control channels
  - 4.3.2 Interleaving for the GSM speech channels
  - 4.3.3 Interleaving for the GSM data TCH channels

- 4.4 Burst assembling
- 4.5 Ciphering
- 4.6 Modulation
- 4.7 Diversity techniques and interleaving
- 4.8 Introduction to Equalization
- 4.9 Echo cancellation

## **5. MOBILE HANDSET**

- 5.1 General Block diagram of cell phone  
Antenna switcher, Dual band BPF, RF Processor, Local oscillator, Baseband processor (COBBA: Common baseband analog), User Interface driver, CPU, Key pad, Flash memory, Battery and DC-to-DC converter, SIM interface, Charging section, Dual band RF power amplifier, Microphone and earphone.
- 5.2 Block diagram of RF section
- 5.3 Block diagram of base-band section
- 5.4. SIM card Interface
- 5.5 General functions of CPU (DSP chip)
- 5.6 Charging control section
- 5.7 Different types of batteries
- 5.8 Power control operation
- 5.9 SIM card interface
- 5.10 Flash memory
- 5.11 Keyboard operation
- 5.12 General faults and fault-finding procedure
- 5.13 AT Commands used for fault-finding

## **6. FUTURE TRENDS**

- 6.1 Enhanced Data for Global Evolution (EDGE)
- 6.2 Wideband Code Division Multiple Access (WCDMA)
- 6.3 Fourth generation mobile

**Note:** Students must submit or present at least one report/seminar regarding advancements and new trends in the field of mobile communication as a part of term work.

## **6. LABORATORY EXPERIENCES**

1. To understand block diagram and working of GSM mobile phone
2. To understand function of charge control section
3. To understand function RF processing section
4. To flash mobile phone with appropriate software
5. To download ring tones, images and voice in mobile phone
6. To configure settings for GPRS services for mobile handset
7. To access internet using mobile handset
8. To understand various faults occurs in mobile handset
9. To understand general fault finding procedure in GSM mobile handset
10. To generate PN signal
11. To code digital message with Direct Sequence SS system
12. To understand frequency hoping system.
13. To install GPRS cable modem
14. To install bluetooth modem

15. To use AT commands for the fault finding
16. Field visit of Base Transceiver Station and Mobile Switching Centre.

## **7. REFERENCES**

- |  |                                       |
|--|---------------------------------------|
| 1 Mobile Communications                                    | Jochen Schiller Pearson Education     |
| 2 Introduction to GSM                                      | Lawrence Harte Althos Publishing      |
| 3 Modern Latest Mobile Phone Circuits<br>and Fault Finding | Manohar Lotia, BPB Publication        |
| 4 Spread spectrum CDMA                                     | Y. Steve Lee, McGraw Hill Publication |
| 5 Digital Communication and Spread spectrum                | Cooper, Tata-McGraw Hill Publication  |

## **8. SUPPORT GROUP**

### **1 POLYTECHNIC FACULTY**

- |                      |                      |
|----------------------|----------------------|
| 1 Prof. S.N. Sampat  | 2 Dr. C.H. Vithalani |
| 2 Prof. P.P. Gajjar  | 4 Shri G.J. Jebalia  |
| 5 Shri Dinesh Mavani | 6 Shri Jignesh Nakum |

### **2 CDC FACULTY**

- |                      |                    |
|----------------------|--------------------|
| 1 Prof. S. R. MISHRA | 2 Shri P. N. PATEL |
| 3 Shri S. V. JAGANI  |                    |

**COURSE CODE : SEC-503**  
**COURSE NAME : MICROWAVE ENGINEERING**

**1. RATIONALE:**

This course is designed to impart knowledge of Microwave Engg. This course includes Microwave components, Microwave tubes, Microwave measurements and Microwave semiconductor devices. The Satellite communication system topic is intended to create awareness of Space Science in the students.

**2. SCHEME OF STUDIES AND EXAMINATIONS:**

Sr.No.	Code No	Course Name	L	P	Exam Scheme			
					Th.	Pra.	T.W.	Total
1.	SEC-503	Microwave Engg.	3	2	100	50	25	175

**3. SCHEME OF TEACHING AND ASSESSMENT:**

SrNo.	Topics	Th.	Pr.	Total	% Weightage
1.	Transmission line	02	02	04	05
2.	Wave guides resonators and Microwave components	08	04	12	15
3.	Microwave Tube oscillators and Amplifier	12	02	14	25
4.	Microwaves Measurements	03	14	17	10
5.	Semiconductor Microwave Devices.	05	04	09	15
6.	Radar Systems	07	--	07	15
7.	Satellite communications Systems.	05	02	07	15
<b>TOTAL</b>		<b>42</b>	<b>28</b>	<b>70</b>	<b>100</b>

**4. TOPICS AND SUBTOPICS:**

**1. TRANSMISSION LINE**

- 1.1 Transmission line
  - 1.1.1 Lossless open and short circuited line
  - 1.1.2 Standing wave pattern
  - 1.1.3 Standing wave ratio
- 1.2 Matching
  - 1.2.1 Single stub matching
  - 1.2.2 Types of transmission lines

**2 WAVE GUIDES RESONATORS AND MICROWAVE COMPONENTS**

- 2.1 Rectangular wave fluids, Introduction ,Application and advantages.
  - 2.1.2 Reflection of waves from a Conducting Plane
  - 2.1.2 The parallel plane wave guide
  - 2.1.3 Rectangular wave guide, phase velocity, cut-off wavelength
  - 2.1.4 Phase and group velocity in wave guide
  - 2.1.5 Modes : The TE<sub>mn</sub> modes, The TM<sub>mn</sub> modes and field patterns.

- 2.1.6 Circular wave fluids.
- 2.2 Cavity Resonators :
  - 2.2.1 Operation, Types of cavity and applications
  - 2.2.2 Practical consideration : - coupling and tuning of cavities
- 2.3 Microwave Components
  - 2.3.1 Direction Couplers
  - 2.3.2 Isolators and circulators
  - 2.3.3 Duplexers
  - 2.3.4 STRIPLINE AND Microstrip ckts.
  - 2.3.5 Wave guide Accessories : Bands and Corners,  
: Multiport network,  
: Magic tee.

### **3. MICROWAVE TUBE OSCILLATORS AND AMPLIFIERS**

- 3.1 Frequency limitations of Vacuum tubes
- 3.2 Multicavity klystron, operation ,klystron amplifier oscillator and applications
- 3.3 Reflex klystron : operation Transit times and applications
- 3.4 Magnetrones : Constructional Features, frequency pulling and pushing Magnetrones applications
- 3.5 Traveling wave tubes : Construction, operation, practical consideration and applications
- 3.6 Backward wave oscillators

### **4. MICROWAVES MEASUREMENT**

- 4.1 Measurement of Power by Bolometer method Calorimeter method
- 4.2 Frequency and wavelength measurement
- 4.3 Attenuation Measurement
- 4.4 VSWR Measurement

### **5. SEMICONDUCTOR MICROWAVE DEVICES**

- 5.1 Transistor high freq. limitation
- 5.2 Varactor diode : Construction and operation
- 5.3 Parametric Amplifier : Principles , Mechanism of Amplification
- 5.4 Gunn effects and diodes :
  - 5.4.1 Gunn effect
  - 5.4.2 Gunn diodes, characteristic, oscillator, amplifier and applications
- 5.5 IMPATT diodes
- 5.6 TRAPATT diodes
- 5.7 PIN diodes
- 5.8 Fundamentals of Masers, Rudy Masers, solid state maser
- 5.9 Rudy Laser and C.W. Laser

### **6. RADAR SYSTEMS**

- 6.1 Basic Principles ,applications of radar and freq. use in radar
- 6.2 Radar range eq. , parameters influencing maximum range
- 6.3 Basic pulse radar system, block diagram and its working, Duplexers and display methods , Ascope and PPI
- 6.4 Moving Target Indicator
- 6.5 Doppler Radar
- 6.6 Freq. Modulated CW radar
- 6.7 Radar Antenna in scanning

### **7. SATELLITE COMMUNICATIONS SYSTEMS :**

- 7.1 Microwave link
- 7.2 General Principles ,synchronous and non-synchronous

- system , properties of radio systems
- 7.2.1 Ground Station and satellite equip.
- 7.2.2 Classification of Earth stations
- 7.2.3 Description of Earth stations
- 7.2.4 Tracking and Servo systems
- 7.3 Satellite space craft systems
- 7.4 INTELSAT system
- 7.5 Domestic Satellite system

**5. LABORATORY EXPERIENCES:**

1. To study different types of Microwave components.
2. To study the gunn power supply and V.S.W.R. meter.
3. TO set the Microwave bench for optimum operation.
4. To measure the guide wave length and to compute the free space wave length, microwave frequency, characteristic wave impedance of wave guide and the phase velocity.
5. To calibrate the variable attenuator and to plot the attenuation in db V/S micrometer screen reading in mm.
6. To measure VSWR for different types of load. (o.g. Matched load, Horn load and short load).
7. To measure the attenuation of a given attenuator.
8. To study the operation of a directional coupler.
9. To measure the coupling factor and the directivity of a directional coupler.
10. To measure the reflection co-efficient for different types of load (e.g. matched load, short load and Horn load)
11. To study the reflex klystron.
12. To measure the microwave frequency with the help of a wave meter.

**6. REFERENCES:**

- |    |                                   |                |
|----|-----------------------------------|----------------|
| 1. | Electronics Communications        | Sanjeev Gupta  |
|    | Khann Pub.                        |                |
| 2. | Electronics Communications System | George Kennedy |
|    | T.M.H. Pub.                       |                |
| 3. | Introduction to Micro waves       | A.H. Wheeler   |
|    | P.H.I. Pub.                       |                |

**7. RESOURCE GROUP:**

**POLYTECHNIC FACULTY:**

- |    |                 |    |   |             |
|----|-----------------|----|---|-------------|
| 1. | Prof. J.G. Dave | 3. | " | V.D. Nayak  |
| 2. | " L.C. Solanki  | 4. | " | M.I.U.Memin |

**CDC FACULTY:**

1. Prof. S.R. Mishra
2. Shri. K.D. Joshi

**COURSE CODE : SEC-504**

**COURSE NAME : TELECOMMUNICATION TECHNIQUES & APPLICATIONS**

### 1 RATIONALE :

The aim of this course is to impart knowledge of modern Telecommunication switching system and networks to the students of Diploma in Electronics And Communication Eng. Today's telecommunication networks is a complex interconnection of a variety of heterogeneous switching system.

This course aims to impart knowledge regarding Electronic space division switching speech in digitization and transmission, Time division switching, Traffic engg., Telephone net works, Data networks and Integrated services Digital network ( ISDN)

### 2 SCHEME OF STUDIES AND EXAMINATION

Course code	Course name	Teaching Scheme		Examination scheme			
		L	P	Th.	Pra	T.W.	Total
SEC-504	Telecommunication Techniques and applications	3	2	100	50	25	175

### 3 SCHEME OF TEACHING AND ASSESSMENT

Topic No.	Name of Topics	Th.	Pr	Total	% weightage
1	Introduction	2	--	2	5
2	Electronics space division switching	7	4	11	15
3	Speech digitization and Transmission	5	2	7	15
4	Time division switching	5	2	7	10
5	Traffic Engineering	3	2	5	10
6	Telephone networks	6	4	10	10
7	Data networks	4	4	8	10
8	Integrated services digital networks (ISDN)	10	10	20	20
Total		42	28	70	100

### 4 COURSE OBJECTIVES :

The students should be able to :

- 1 Understand telephone communication
- 2 Understand centralized stored program control.
- 3 Understand software Architecture of Telephone network.
- 4 Study application software of Telephone network.
- 5 Study enhance services of Telephone network.
- 6 Study speech digitization & Transmission.
- 7 Study Time division switching system.
- 8 Understand traffic engineering.

### 5 TOPICS & SUB-TOPICS

#### 1. INTRODUCTION

- 1.1 Evolution of Telecommunication
- 1.2 Simple Telephone communication

- 1.3 Basic of switching system
- 1.4 Major telecommunication networks

## **2. ELECTRONIC SPACE DIVISION SWITCHING**

- 2.1 Stored program control
- 2.2 Centralized SPC
- 2.3 Distributed SPC of level 1, 2, 3,
- 2.4 Software Architecture
- 2.5 Application software
- 2.6 Enhance Services
- 2.7 Two stage networks.
- 2.8 Three stage networks.
- 2.9 “n” – stage networks.

## **3. SPEECH DIGITISATION AND TRANSMISSION**

- 3.1 Sampling
- 3.2 Quantization and binary coding
- 3.3 Commanding
- 3.4 Differential coding
- 3.5 Vocoders
- 3.6 Line coding
- 3.7 Time division multiplexing

## **4 TIME DIVISION SWITCHING**

- 4.1 Basic time division space switching
- 4.2 Basic time division time switching
- 4.3 Time multiplexed space switching
- 4.4 Time multiplexed time switching
- 4.5 Combination switching
- 4.6 Three stage combination switching
- 4.7 “n” stage combination switching.

## **5 TRAFFIC ENGINEERING**

- 5.1 Network traffic load and parameters
- 5.2 Grade of service and blocking probability
- 5.3 Modeling switching system.

## **6 TELEPHONE NETWORKS.**

- 6.1 Subscriber loop system
- 6.2 Switching hierarchy and routing
- 6.3 Transmission plan
- 6.4 Numbering plan
- 6.5 Charging plan
- 6.6 Signaling technique
- 6.7 In channel signaling
- 6.8 Common channel signaling
- 6.9 Cellular mobile telephone

## **7 DATA NETWORKS**

- 7.1 Satellite based data network
- 7.2 Local Area network (LAN)
- 7.3 Metropolitan area network
- 7.4 Fiber optic network
- 7.5 Data network standards
- 7.6 Protocol stacks
- 7.7 Internet working.

## **8 INTEGRATED SERVICES DIGITAL NETWORKS (ISDN).**

- 8.1 Introduction of ISDN
- 8.2 Motivation for ISDN
- 8.3 New services
- 8.4 Network and protocol architecture.
- 8.5 Transmission channel
- 8.6 User network interface
- 8.7 Signaling
- 8.8 Numbering and addressing
- 8.9 Service characterization
- 8.10 Inter working
- 8.11 ISDN standards
- 8.12 Expert system in ISDN
- 8.13 Broad band ISDN
- 8.14 Voice data Integration.

## **6 LABORATORY EXPERIENCES**

- 1 To study various telecommunication networks system
- 2 To understand Electronic space division switching
- 3 To study application software and enhance services of telephone network
- 4 To study time division multiplexing
- 5 To study digitization of speech.
- 6 To study a typical telephone network
- 7 To study cellular mobile telephone
- 8 To study time division switching technique using time & space.
- 9 To study time multiplexed switching technique using time & space
- 10 To study combination switching
- 11 To study fiber optic network
- 12 To study standards of ISDN
- 13 To study typical Basic rate ISDN exchange
- 14 To study ISDN terminal adaptor
- 15 Protocol Analysis of Layer 1, layer 2, layer 3.

## 7 SUGGESTIVE INSTRUCTIONAL STRATEGIES

Sr. No	Name of Topic	Treatment	Key Resources required
1	Introduction	Study of Institute Intercom system	Inter come system
2	Electronics space division switching	Slide show	Slide projector
3	Speech digitasation and transmission	Transparency	OHP
4	Time division switching	Transparency	OHP
5	Traffic engineering	Group discussion	-----
6	Telephone networks	Visit of Electronic telephone exchange	-----
7	Data networks	Seminar	Hand outs
8	Integrated services digital networks (ISDN)	Visit of Electronic exchange	-----

## 8 REFERENCES :

- 1 Telecommunication switching system and networks Thiagarajan Viswanathan PHI
- 2 Special Edition using ISDN James Y Bryce PHI

## 9 SUPPORT GROUP

### 1 POLYTECHNIC FACULTY

- 1 Prof J. G. Dave
- 2 Prof M. B. Patel
- 3 Prof L. C. Solanki
- 4 Prof N. M. Santoki
- 5 Prof A. H. Dhanrajani

### 2 CDC FACULTY

- 1 Prof. K. D. Joshi

**COURSE CODE : SEC-505**  
**NAME OF COURSE : FIBRE OPTICS COMMUNICATION**

**1. RATIONALE:**

The aim of this course is to impart knowledge of fibre optics communication to students of Diploma in Electronics and Communication Engineering as it is widely used in the field of telecommunication, medicine and computer networking. The course contains principles of fibre optics, types of fibres, optical fibre cable, loss in fibre, fibre optic sources, detection modulation methods and applications.

**2. SCHEME OF STUDIES AND EXAMINATION:**

Course Code	Course Name	Teaching Scheme		Examination Scheme			
		L	P	Th.	Pra.	T.W.	Total
SEC-505	FIBRE OPTICS COMMUNICATION	3	2	100	50	25	175

**3. SCHEME OF TEACHING AND ASSESSMENT:**

Sr. NO.	Name of Topic	Th.	Pr.	Total	% Weightage
1.	Principles Of Fibre Optic Communication	10	4	14	20
2.	Losses In Fibre	04	4	8	15
3.	Fibre Optical Source Devices	06	6	12	15
4.	Optical Detectors And Connectors	06	6	12	15
5.	Modulation Methods And Optical Components	06	4	10	10
6.	Optical Communication System	06	2	08	15
7.	Fibre Optics – Applications	04	2	06	10
Total		42	28	70	100

**4. OBJECTIVES:**

The student will be able to

1. Understand the principle of fibre optic Communication
2. Study the advantages of fibre optics over conventional Coaxial Cable system
3. Understand the application of fibre optic Communication
4. Get acquainted with the latest trend in the filed of Optical Telecommunication

**5. TOPICS AND SUB-TOPICS:**

**1. PRINCIPLES OF FIBRE OPTIC COMMUNICATION**

- 1.1 Principles of fibre optic communication
- 1.2 Advantage of optical fibre communication
- 1.3 Elementary fibre optic communication system
- 1.4 Types of optical fibres

- 1.5 Acceptance Angle and Numerical aperture of optical fibre
- 1.6 Fibre bundles and cables
- 1.7 Fibre Strength
- 1.8 Modes
  - ❖ Single mode
  - ❖ Multi mode
- 1.9 Step Index Fibres
  - ❖ Step Index single mode
  - ❖ Step Index multi mode
- 1.10 Graded Index fibre
- 1.11 Fibre drawing process
  - ❖ Double crucible method
  - ❖ Modified Chemical vapour deposition method (MCVD)
  - ❖ Vapour axial deposition (VAD)
- 1.12 Fibre coating and Fibre Packaging
- 1.13 Spicing and joining of fibres
- 1.14 Optical and electrical band width.

## **2. LOSSES IN FIBRE**

- 2.1 Linear Scattering losses
  - ❖ Rayleigh Scattering Losses
  - ❖ Mie Scattering losses
- 2.2 Absorption Losses
- 2.3 Mode Coupling losses
- 2.4 Bending losses
- 2.5 Combined losses of fibres
- 2.6 Definition of Dispersion and Effect of Dispersion on pulse transmission.
- 2.7 Inter model Dispersion
- 2.8 Intra-model Dispersion
  - ❖ Material Dispersion
  - ❖ Wave guide Dispersion

## **3. FIBRE OPTICAL SOURCE DEVICES**

- 3.1 Introduction to fibre optical sources
- 3.2 Light emitting diodes
- 3.3 Semi conductor LASER Diodes
- 3.4 Noise of the LASER diodes
- 3.5 Gas LASER (He – Ne lasers)
- 3.6 Comparison of Sources
- 3.7 Source to fibre coupling

## **4. OPTICAL DETECTORS AND CONNECTORS**

- 4.1 P – N photo diode
- 4.2 P – I – N Diode
- 4.3 Avalanche photo diode
- 4.4 Photo transistor
- 4.5 Coupling of fibres to detectors
- 4.6 Photodetector's Quantum efficiency and responsivity

## **5. MODULATION METHODS AND OPTICAL COMPONENTS**

- 5.1 Intensity modulation
- 5.2 Analog method of LASER modulation
- 5.3 Pulse method of LASER modulation
- 5.4 Digital method of LASER modulation
- 5.5 Optical switches
- 5.6 Optical connectors
- 5.7 Optical Couplers
- 5.8 Introduction of Integrated optics

## **6. OPTICAL COMMUNICATION SYSTEM**

- 6.1 Optical transmission block diagram
- 6.2 Optical receiver block diagram
- 6.3 LED drive circuit
  - ❖ Analog drive circuit
  - ❖ Digital drive circuit
- 6.4 LASER Drive circuit
- 6.5 Optical receiver Pre amplifier circuit
- 6.6 Regenerative repeater
- 6.7 Optical Power budgeting

## **7. FIBRE OPTICS – APPLICATIONS**

- 7.1 Telecommunication
- 7.2 Military Application
- 7.3 Space Application
- 7.4 Optical Sensor system
- 7.5 Computer System Application
- 7.6 Medical application (Endoscopy)
- 7.7 Industrial Application

## **6. LABORATORY EXPERIENCES:**

- 1. Study of Optical fibre cable
- 2. Study of splicing and joining of fibres
- 3. To find N.A. of optical fibre
- 4. Characteristics of LED
- 5. Characteristics of LASER Diode
- 6. Study of losses
- 7. Characteristics of PN photo diode
- 8. Characteristics of PIN photo diode
- 9. Characteristics of APD photo diode
- 10. Characteristics of photo transistors
- 11. Study of Optical transmitter
- 12. Study of Optical receiver
- 13. Study of Application of fibre in telephony
- 14. Application of fibre in medicine (Endoscopy)
- 15. Application of fibre in computer system

## 7. SUGGESTIVE INSTRUCTIONAL STRATEGIES:

Sr. NO.	Name of Topic	Treatment	Key Resources Required
1.	Principles Of Fibre Optic Communication	Industrial Visits Demonstration	Video Cassettes Slides CBTs
2.	Losses In Fibre	Demonstration Study	Transparency
3.	Fibre Optical Source Devices	Demonstration Practicals	Laboratory Slides Cassettes
4.	Optical Detectors And Connectors	- do -	- do -
5.	Modulation Methods And Optical Components	Demonstration Field Visit Study	CBTs Transparencies
6.	Optical Communication System	Group Discussion Project Work	Slides CBTs Charts
7.	Fibre Optics – Applications	Demonstration Field visits	Cassettes Slides

## 8. REFERENCES:

1. Optical Fibre Communications - J. M. Senior (PHI)
2. Introduction to fibre optics - Heich
3. Fibre optic communication - D. C. Agrwal
4. Electronic Communication - Roody and Coolen
5. Electronic Communication systems - Kennedy
6. Optical Fibre Communication - Keiger

## 9. SUPPORT GROUPS:

### 1 POLYTECHNIC FACULTY

1. Prof. J. G. DAVE
2. Prof. M. B. PATEL
3. Prof. N. M. SANTOKI
4. Prof. A. H. DHANRAJANI

### 2 CDC FACULTY

1. Prof. K. D. JOSHI

**COURSE CODE : SEC-506**

**COURSE NAME : ELECTRONIC PROJECTS**

**1. RATIONALE :**

The aim of the Project is to develop the technical skills and practical knowhow in the students. The project consists of various stages like- selection of project, its layout, PCB drawing, itching, drilling of holes, mounting of components, and finally testing of circuits. Thus the students become familiar with the manufacturing process in the industry.

**2. SCHEME OF STUDIES AND EXAMINATION:**

Sr.No.	Code No.	Courses Name	L	P	Exam. Scheme			
					Th.	Pra.	T.W.	Total
1.	SEC-506	Electronic Projects	-	4	-	50	50	100

**3. SCHEME OF ASSESMENT AND EVALUATION OF STUDENT:**

At the end of the term, the student will be evaluated and assessed by both the external and internal examiners on the basis of :- Work done during semester for project, testing and working of project and over-all presentation by student.

**4. PROJECT WORK:**

The students should do following work.

1.	Selection of Project	10 Hrs.
2.	Circuit Design	06 Hrs.
3.	Tracing of circuit	04 Hrs.
4.	PCB Design	16 Hrs.
5.	PCB etching work	02 Hrs.
6.	Testing of components	02 Hrs.
7.	Soldering & Assembling work	06 Hrs.
8.	Testing of circuit	10 Hrs.
9.	Write up for Project	04 Hrs.
10.	Seminar Related with the assembled project work	06 Hrs.

**Project should be selected from following areas.**

1.	Amplifier circuits.	6.	S.M.P.S. circuits.
2.	A.M./F.M circuit.	7.	Timer circuits
3.	T.V. & it's section	8.	cable line amplifier
4.	M.P. based circuits	9.	communication circuits.
5.	Power supply Units.	10	Advertising lighting etc.

**Evaluations based on:**

1. Work done during semester for Project
2. Testing & working of Project.
3. Seminar presentation.

**5. RESOURCE GROUP:**

**POLYTECHNIC FACULTY**

1.	Prof. J.G. Dave	3.	"	L.C. Sholanki
2.	" M.B. Patel	4.	"	V.D. Nayak

**CDC FACULTY:**

1.	Prof. S.R. Mishra	2.	Shri. K.D. Joshi
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**COURSE CODE : SEC-507**  
**NAME OF COURSE : COMPUTER NETWORKS**

**1. RATIONALE :**

This course is specially designed for the students to understand the computer networks system i.e hardware and software. At the end of this course the students will be able to prepare computer system, install and test various connectors and cables, cards file servers, print servers etc. They will be able to install Internet and will be able to maintain network.

**2. SCHEME OF STUDIES & EXAMINATION :**

Course Code	Name of the Course	TEACHING SCHEME		EXAMINATION SCHEME			
		L	P	TH.	PR.	TW	TOTAL
SEC-507	COMPUTER NETWORKS	3	2	100	50	25	175

**3. SCHEME OF TEACHING AND ASSESSMENT :**

Sr. No.	NAME OF TOPIC	TH.	PR.	Total	% WEIGHTAGE
1	Introduction to computer networks	08	00	08	15
2	Components of LAN	08	06	14	25
3	Inter connection devices	10	08	18	25
4	Network administration	06	08	14	15
5	Network applications	10	06	16	20
	<b>TOTAL</b>	<b>42</b>	<b>28</b>	<b>70</b>	<b>100</b>

**4. OBJECTIVES :**

**The Students will be able to..**

1. Know network hardware and software.
2. Identify and apply various LAN components.
3. Understand various interconnection devices used in LAN.
4. Understand network administration.
5. Understand various securities and utilities available in LAN.

**5. 0 TOPICS & SUB-TOPICS:**

**1. Introduction to Computer network**

- 1.1 Use of computer networks
- 1.2 Network Hardware

- 1.3 Network Software.
- 1.4 Reference Models (Layer).
- 1.5 Example of Networks.
- 1.6 Example data communication services.
- 1.7 Network Standardization.

## **2. Components Of LAN**

- 2.1 Transmission Media
- 2.2 Servers
- 2.3 Connectors
- 2.4 NIC
- 2.5 Software for Networks

## **3. Interconnection Devices**

- 3.1 Repeater
- 3.2 Bridges.
- 3.3 Router
- 3.4 Gateway
- 3.5 Switches

## **4. Network Administration**

- 4.1 Installation of Network(H/W, S/w)
- 4.2 Maintenance of Network.

## **5. Network Applications**

- 5.1 Network Security
- 5.2 DNS Domain Name System.
- 5.3 Electronic Mail
- 5.4 File Transfer (FTP).
- 5.5 Internet.
  - ❖ components of Internet.
  - ❖ various tool of Internet .www,TELNET etc.
  - ❖ connection of Internet.

## **6.0 LABORATORY EXPERIENCES:**

- 1. Install & test various network connector, cables etc.
- 2. Install & test various network cards.
  - 2.1 Ethernet, FDDI
- 3. Prepare computer system for network.
- 4. Install network file server.
- 5. Install network print server.
- 6. Prepare workstation for remote booting.

7. Install and test active & passive hub.
8. Install Internet.
9. Use of Internet
  1. Surfing
  2. E-mail
10. Study of router, repeater & bridge.

## 7.0 SUGGESTIVE INSTRUCTIONAL STRATEGIES:

<b>SR. No.</b>	<b>Name of Topic</b>	<b>Treatment</b>	<b>Key Resources Required</b>
1.	<b>Introduction to computer networks</b>	CBT Transparency	Projector Computer/Network OHP
2.	<b>Components of LAN</b>	CBT Transparency	Projector Computer/Network OHP
3.	<b>Inter connection devices</b>	CBT Transparency	Projector Computer/Network OHP
4.	<b>Network administration</b>	CBT Transparency	Projector Computer/Network OHP
5.	<b>Network applications</b>	CBT Transparency	Projector Computer/Network OHP

## 8. REFERENCES :

- |     |                                    |                     |     |
|-----|------------------------------------|---------------------|-----|
| 01. | Computer Networks<br>(3rd edition) | Andrew S. Tanenbaum | PHI |
| 02. | Computer Networks and Internet.    | Comer and Droms     | PHI |

## 9. SUPPORTING GROUP :

### Polytechnic Faculty :

1. Prof. P. P. GAJJAR
2. Prof. A. A. DESAI
3. Prof. R. B. SHAH

### CDC Faculty :

1. Prof. K. D. JOSHI

**COURSE CODE : SEC-508**

**NAME OF COURSE: MICROPROCESSOR INTERFACING AND APPLICATIONS**

**1. RATIONALE:**

This course gives basic understanding of interfacing of peripherals, which are used with microprocessor. Focus of the course is on how to interface various input out put devices with programmable interfaces. This course will be usefull for those who want to develop microprocessor-based system.

**2. SCHEME OF STUDIES & EXAMINATION:**

Course Code	Name of Course	TEACHING SCHEME		EXAMINATION SCHEME			
		L	P	Th	Pra	T.W.	Total
SEC-508	MICROPROCESSOR INTERFACING & APPLICATIONS	3	2	100	50	25	175

**3. SEHEME OF TEACHING AND ASSESSMENT:**

SR. NO.	NAME OF TOPIC	Th	Pr.	Total	% WEIGHTAGE
1	Interfacing memory & I/O device	02	02	04	05
2	Interfacing Devices-I	10	10	20	25
3	Interfacing Devices-II	10	06	16	25
4	Interfacing Components	06	04	10	15
5	Interfacing standards & methods	07	00	07	15
6	Applications of microprocessor	07	06	13	15
Total		42	28	70	100

**4. OBJECTIVES:**

The Students will be able to

- ❖ Understand basic concepts of interfacing.
- ❖ Know various programmable peripheral devices used with microprocessor.
- ❖ Initialize and program different peripheral devices.
- ❖ Design microprocessor based system.
- ❖ Know the standards and methods used with microprocessor/computer interfacing.

## 5. TOPICS & SUB-TOPICS:

### 1. Interfacing Memory & I/O Devices:

- 1.1 Types of interfacing devices.
- 1.2 Address space partitioning
  - ❖ Memory devices
  - ❖ I/O Devices
- 1.3 Address decoding of I/O and Memory.
- 1.4 Memory System Design.
- 1.5 Data transfer schemes
  - ❖ Synchronous data transfer
  - ❖ Asynchronous data transfer
  - ❖ Interrupt driven data transfer
  - ❖ Direct Memory Access
  - ❖ Serial data transfer.

### 2. Interfacing Devices-I:

- 2.1 8212 non programmable I/O interface
- 2.2 8255 Programmable Peripheral Interface
  - ❖ Block Diagram
  - ❖ Interfacing
  - ❖ Mode-0
  - ❖ Mode-1
  - ❖ Mode-2
  - ❖ BSR Mode
  - ❖ Programs on mode 0, BSR mode & Mode 1
- 2.3 8259 Programmable Interrupt Controller
  - ❖ Block Diagram
  - ❖ Interfacing
  - ❖ Basic operation & operating modes
  - ❖ Programming ICW's & OCW's
  - ❖ Cascading of 8259
  - ❖ Programs on initializing 8259
- 2.4 8254 Programmable Interval Timer
  - ❖ Block diagram
  - ❖ Interfacing
  - ❖ Counter modes
  - ❖ Read back feature
  - ❖ Simple programs on counter & initializing of 8254.

### 3. Interfacing Devices-II:

- 3.1 8257 DMA Controller
  - ❖ Block Diagram of 8257
  - ❖ Interfacing & Operational overview
  - ❖ Initialization of 8257
  - ❖ Programs to Initialize 8257

### 3.2 8279 Keyboard & Display Controller

- ❖ Block Diagram of 8279
- ❖ Interfacing & Operational overview
- ❖ Various modes of operations
- ❖ Initialization of 8279
- ❖ Programs to initialize 8279

### 3.3 8251 USART

- ❖ Block Diagram of 8251.
- ❖ Initialization & modes of operation
- ❖ Programs to transfer data serially in synchronous/asynchronous mode

## 4. Interfacing Components

4.1 Interfacing of LED with microprocessor

4.2 Interfacing of transistor with microprocessor

4.3 Interfacing of Relay with microprocessor

4.4 Basic principles & Interfacing of ADC 0809 with microprocessor.

4.5 Basic principles & Interfacing of DAC MC1408 with microprocessor.

## 5. Interfacing Standards & Methods

5.1 RS-232 Standard Serial Interface

5.2 Centronix parallel Interface

5.3 IEEE 488 Interface

5.4 GPIB (Instrumentation Interface)

## 6. Application of microprocessor

6.1 Design & interfacing of Scanning Display.

6.2 Design & Interfacing of matrix keyboard

6.3 Temperature monitoring system

6.4 Speed control of DC-motor

6.5 Speed control of Stepper motor

## 6. LABORATORY EXPERIENCES:

01. Interfacing of 8255 in mode 0
02. Interfacing of LED with microprocessor.
03. Interfacing of 8255 in BSR mode.
04. Interfacing of Relay with microprocessor.
05. Interfacing of 8255 in mode 1
06. Interfacing ADC with microprocessor.
07. Interfacing DAC with microprocessor.
08. Interfacing of 8254 with microprocessor.
09. Interfacing of 8212 with microprocessor.
10. Interfacing of 8257 with microprocessor.

11. Interfacing of 8279 with microprocessor.
12. Interfacing of 8259 with microprocessor.
13. Interfacing of 8251 with microprocessor.
14. Application –I Traffic light control.
15. Application-II DC motor control.
16. Application – III Stepper motor control.

## 7. SUGGESTIVE INSTRUCTIONAL STRATEGIES:

SR. No.	Name of Topic	Treatment	Key Resources Required
01	Interfacing memory & I/O device	Video Film Transparency	Projector OHP
02	Interfacing Devices-I	Video Film Transparency	Projector OHP
03	Interfacing Devices-II	Video Film Transparency	Projector OHP
04	Interfacing Components	Video Film Transparency	Projector OHP
05	Interfacing standards & methods	Video Film Transparency	Projector OHP
06	Applications of microprocessor	Industrial Visit Project Demos Seminars	Books Relevant material

## 8. REFERENCES:

- |  |                   |       |
|--|-------------------|-------|
| 01. Microprocessor & Interfacing                             | - Douglas Hall    | - TMH |
| 02. Introduction to Microprocessor                           | - A.P.Mathur      | - TMH |
| 03. Microprocessor Architecture<br>Programming & Application | - Ramesh Ganonker | - PHI |

## 9. SUPPORT GROUP:

### Polytechnic Faculty

1. P.P.GAJJAR
2. A.A.DESAI
3. R.B.SHAH

### CDC Faculty

1. K.D.Joshi

**PROGRAMME** : DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING  
**COURSE CODE** : SEC - 509  
**COURSE NAME** : MEDICAL ELECTRONICS

### 1. RATIONALE

A large number of electronic equipments are being used in hospitals for patient care and diagnosis or carry out advanced surgeries. Electronic medical equipments are becoming increasingly complicated and computerized. With such technological advances, additional responsibilities are being placed on the electronics technician. This subject will enable the students to learn the basic principles of different instruments used in medical science. This subject is very important for the students to get job placement at hospitals or at any business that maintains or manufactures medical equipments.

### 2. SCHEME OF STUDIES AND EXAMINATION

COUSE CODE	COURSE NAME	TEACHING SCHEME		EXAMINATION SCHEME			
		L	P	TH.	PR.	T.W.	TOTAL
SEC-509	MEDICAL ELECTRONICS	3	2	100	50	25	175

### 3. SCHEME OF TEACHING AND ASSESSMENT

TONI C NO.	NAME OF TOPIC	L	P	TOTAL	% WEIGHTAGE
1.	Biometric systems	4	2	6	10
2.	Bio-electric Sensors and Amplifiers	8	6	14	20
3.	Patient Monitoring Systems	6	4	10	10
4.	Bio Medical Recorders	6	4	10	20
5.	Medical imaging systems	8	6	14	20
6.	Advanced topics	6	2	8	10
7.	Safety Aspects of Medical Instruments	4	4	8	10
<b>Total</b>		<b>42</b>	<b>28</b>	<b>70</b>	<b>100</b>

### 4. OBJECTIVES

**After learning this course, the students should be able**

- 1 Biomedical signals and transducers.
- 2 Biomedical amplifiers.
- 3 Measurements of various physiological parameters.
- 4 Testing of bio medical measurements.
- 5 Medical imaging systems.
- 6 Finding proper instrument for an application.
- 7 Safety aspects of medical instruments.

### 5. TOPICS AND SUB-TOPICS

#### 1. BIOMETRIC SYSTEMS

- 1.1 Factors to be considered for designing medical instrumentation systems
- 1.2 Components of man-instrument system
- 1.3 Problems in measuring a living system
- 1.4 Personnel Identification and Authentication
- 1.5 Physiological signals: electrical potentials generated in the heart, brain & muscle

## **2. BIO-ELECTRIC SENSORS AND AMPLIFIERS**

- 2.1 Transducers: passive and active transducers, biomedical transducers : pressure , displacement, surface strain, velocity, temperature, light, magnetic field, pulse sensor, respiration sensor
- 2.2 biochemical transducers: reference electrode, pH electrode, blood gas electrode, specific ion electrode
- 2.3 Bio electrodes: Electrode tissue interface, contact impedance, Types of lectrodes, biopotential electrodes: microelectrodes, needle electrodes, skin surface electrodes, Electrodes used for ECG , EEG
- 2.4 Bioelectric amplifiers and their properties.
- 2.5 Chopper stabilized amplifiers.
- 2.6 Isolation amplifiers, optically coupled isolation amplifiers.
- 2.7 Input guarding & shielding

## **3. PATIENT MONITORING SYSTEMS**

- 3.1 Heart rate measurement
- 3.2 Pulse rate measurement
- 3.3 Respiration rate measurement
- 3.4 Blood pressure measurement
- 3.5 Principle of defibrillator and pace mark

## **4. BIO MEDICAL RECORDERS**

- 4.1 ECG Machine: Block diagram description, lead system, preamplifier and application
- 4.2 EEG Machine: Block diagram description, preamplifier and application
- 4.3 EMG Machine: Block diagram description and application
- 4.4 Ultrasonic fetal monitors, flow monitors

## **5. MEDICAL IMAGING SYSTEMS**

- 5.1 X-ray: principle, working and application
- 5.2 Ultrasonics: principle, working and application
- 5.3 CT: principle, working and application
- 5.4 Computerized Axial Tomography (CAT) technique
- 5.5 MRI: principle, working and application
- 5.6 PET: principle, working and application

## **6. ADVANCED TOPICS**

- 6.1 Endo illumination and endoscopy using fiber optics technique.
- 6.2 Bio telemetry principle and applications
- 6.3 Telemedicine
- 6.4 Laser and its applications in medicine
- 6.5 Implantable circuits

## **7. SAFETY ASPECTS OF MEDICAL INSTRUMENTS**

- 7.1 Physiological effects of electric current
- 7.2 Shock hazard from equipment
- 7.3 Accident prevention methods: grounding, double insulation, protection by low voltage, ground fault circuit interrupter, isolated power distribution systems

## 6. LABORATORY EXPERIENCES

- 1 Demonstration of Bio-Medical Electrodes
- 2 Measure Heart Rate Of A Human Being
- 3 Study Of ECG Machine
- 4 Study Of EEG Machine
- 5 Study Of X-Ray Machine
- 6 Measure Blood Pressure Of Human Being
- 7 Study Of applications of laser in surgery
- 8 Study Of MRI
- 9 Study Of Computed Axial Tomo Graphy M/C
- 10 Demonstrate Ultrasonic Foetal Monitor
- 11 Measure The Temp. Of Human Body
- 12 Study of implantable circuits
- 13 Demonstrate The Patient Safety And Electrical Hazards.

### TERM WORK:

- \* The term work shall consist of prescribed course of practical/laboratory work done duly recorded and certified in the journal. The term work shall be defended by oral/viva.
- \* Students must submit or present at least one report/seminar regarding advancements and new trends in the field of medical electronics as a part of term work.

## 7. REFERENCES

1. Handbook of biomedical Instrumentation by RS Khandpur- TMH, New Delhi
2. Modern Electronics Equipment by RS Khandpur, TMH, New Delhi
3. Biomedical Instrumentation by Cromwell, Weibell, Pfeiffer

## 8. SUPPORT GROUP

### 1 POLYTECHNIC FACULTY

1. Prof. P. P. Gajjar
2. Dr. C. H. Vithalani
3. Prof. S. N. Sampat

### 2 CDC FACULTY

- 1 Prof. S. R. MISHRA
- 2 Shri P. N. PATEL
- 3 Shri S. V. JAGANI

**PROGRAMME : DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING**  
**COURSE CODE : SEC - 510**  
**COURSE NAME : VLSI TECHNOLOGY**

**1. RATIONALE**

This course gives basic understanding of very large scale integration technology ,which are used in today's IC fabrication Methodology. Focus of the course is on MOSFET transistor , complementary MOS transistor and different combinational and sequential circuit.

This will also give brief idea on FPGA, PLD and chip design technique. This course is very useful for those who wants to develop their own chip or who wants to work on VLSI design and modify available routine Integrated circuits.

**2. SCHEME OF STUDIES AND EXAMINATION**

COUSE CODE	COURSE NAME	TEACHING SCHEME		EXAMINATION SCHEME			
		L	P	TH.	PR.	T.W.	TOTAL
SEC-510	VLSI TECHNOLOGY	3	2	100	50	25	175

**3. SCHEME OF TEACHING AND ASSESSMENT**

TOPIC NO.	NAME OF TOPIC	L	P	TOTAL	%WEIGHTAGE
1.	Introduction to VLSI design	02	02	04	06
2.	MOS Transistor	10	06	16	20
3.	MOS Inverter	12	08	20	20
4.	Combinational MOS circuits	06	02	08	15
5.	Sequential MOS circuits	06	04	10	15
6.	FPGA	02	02	04	08
7.	CAD systems and algorithms	02	02	04	08
8.	Chip I/P and O/P circuits	02	02	04	08
	<b>TOTAL</b>	<b>42</b>	<b>28</b>	<b>70</b>	<b>100</b>

**4. OBJECTIVES**

**After learning this course, the students should be able**

- 1 Understand basic concept of VLSI Technology.
- 2 Know various CMOS Transistor Circuits.
- 3 Understand VLSI chip design criteria.
- 4 Study about FPGA and PLD.
- 5 Design simple VLSI chip.
- 6 Study CAD systems.

## **5. TOPICS AND SUBTOPICS**

### **1. INTRODUCTION TO VLSI DESIGN**

- 1.1 Overview of VLSI design Methodologies
- 1.2 VLSI Design Flow
- 1.3 Design Hierarchy
- 1.4 Concepts of Regularity, Modularity, and locality
- 1.5 VLSI Design Styles
- 1.6 Design Quality

### **2. MOS TRANSISTOR**

- 2.1 The MOS structure
- 2.2 The MOS system under external bias
- 2.3 Structure and operation of MOSFET transistor
- 2.4 MOSFET current-voltage Characteristics
- 2.5 MOSFET scaling and small geometry effects
- 2.6 MOSFET capacitances

### **3. MOS INVERTERS**

- 3.1 Introduction
- 3.2 Resistive load Inverter
- 3.3 Inverter with n-type MOSFET Load
  - 3.3.1 Enhancement load NMOS
  - 3.3.2 Depletion Load
- 3.4 CMOS Inverter
  - 3.4.1 circuit operation and description
- 3.5 Cascaded CMOS Inverter stages
- 3.6 Delay time definition
- 3.7 CMOS ring oscillator
- 3.8 Switching power dissipation of CMOS Inverter

### **4. COMBINATIONAL MOS CIRCUIT**

- 4.1 MOS logic circuits with depletion NMOS load
- 4.2 CMOS logic circuits
- 4.3 Complex logic circuit

### **5. SEQUENTIAL MOS CIRCUIT**

- 5.1 Behavior of bistable element
- 5.2 SR latch circuit
- 5.3 clocked latch and Flip-Flop circuit

### **6. FPGA**

- 6.1 Types of FPGA
- 6.2 FPGA structure
- 6.3 Signal Delay in FPGA

## **7. CAD SYSTEMS AND ALGORITHMS**

- 7.1 CAD systems
- 7.2 Simulation
- 7.3 Timing Analysis and optimization
- 7.4 Logic Synthesis
- 7.5 Test generation

## **8. CHIP I/P AND O/P CIRCUITS**

- 8.1 Introduction
- 8.2 On chip clock generation and distribution

## **6. LABORATORY EXPERIENCES**

1. To obtain characteristics of MOSFET.
2. Introduction to VHDL .
3. To implement all the logic gates using VHDL.
4. To implement different Flip-Flop using VHDL.
5. To implement 8:1 Multiplexer using VHDL.
6. To implement 4:16 decoder/Encoder using VHDL.
7. To implement 4 bit adder/subtractor using VHDL.
8. To implement 4 bit adder for carry look ahead concept.
9. To implement 4 bit universal counter, up/down counter, asynchronous counter using VHDL.
10. To implement 4 bit shift register with left/right shift control.
11. To implement 4 bit magnitude comparator.
12. To obtain characteristics of MOSFET with resistive load using PSPICE/Multisim.
13. To obtain characteristics of MOSFET with Enhancement load.
14. To obtain characteristics of CMOS inverter
15. Design of memory decoder system for microprocessor/micro controller.  
(e.g for 1 MB Memory size use 64KB devices in your design)

## **7. REFERENCES**

- |   |               |                             |
|---|---------------|-----------------------------|
| 1. CMOS DIGITAL INTEGRATED CIRCUITS     | Sung Mo Kang  | TMH edition                 |
| 2. Modern VLSI design system on silicon | Wayne wolf    | Pearson edition             |
| 3. Basic VLSI design                    | Pucknell      | PHI 3 <sup>rd</sup> edition |
| 4. VHDL design                          | J Bhaskar     | Pearson Edition             |
| 5. VHDL form Programmable Logic         | Kevin Skahill | Addision – wesley 1996      |

## **8. SUPPORT GROUP**

### **1 POLYTECHNIC FACULTY**

- |                       |                       |
|-----------------------|-----------------------|
| 1. PROF. M.B.PATEL    | 2. SHRI M.Y.KANTHARIA |
| 3. SHRI K.J.PITHADIYA | 4. SHRI M.S.SHAH      |
| 5. SHRI P.A.KHER      |                       |

### **2 CDC FACULTY**

- |   |                    |   |                  |
|---|--------------------|---|------------------|
| 1 | Prof. S. R. MISHRA | 2 | Shri P. N. PATEL |
| 3 | Shri S. V. JAGANI  |   |                  |

**COURSE CODE : SEC – 601**  
**COURSE NAME : INDUSTRIAL TRAINING**

**SCHEME OF STUDIES AND EXAMINATION :**

Sr No.	Code No.	Course Name	Teaching Scheme		Exam Scheme			
			L	P	Th.	Pra.	T.W.	Total
1.	SEC-601	INDUSTRIAL TRAINING	0	0	-	100	50	150

1. Students should be placed in the organization / industry, which is oriented in the field of electronics and computer, manufacturing, marketing, servicing, maintenance & R & D.
2. Industrial practice and term work should be evaluated periodically.
3. Industrial follow up work should be done at least once in the semester at Industry / Organization.
4. Student should prepare the Project report of the Industrial Practice and defend this in the oral / viva examination at the end of semester by internal as well as External Examiner.