



**Bharathidasan University**  
**Tiuchirappalli – 620 024**

**B.S., (ELECTRONICS)**  
**FOUR YEAR B.S. PROGRAMME**  
**COURSE STRUCTURE & SYLLABUS**

## DEPARTMENT OF ELECTRONICS

### B.S – ELECTRONICS

#### COURSE PATTERN

SEM	PART	SUBJECT TITLE	Hrs/wk	Credits
<b>I</b>	I	Tamil –I/Hindi – I/French – I/Sanskrit – I	4	3
	II	General English – I	5	3
	III	<b>Electric Circuit Analysis</b>	5	4
	III	<b>Electronics Practical –I (Circuit Analysis Lab)</b>	3	3
	III	<b>Work shop Practice - I</b>	3	3
	III	Allied Mathematics – I	6	5
	IV	Value Education: Essentials of Ethics, Yoga and Stress Management #	2	2
	IV	Communicative English #	\$\$	
		Library	2	
	<b>Total for Semester I</b>	<b>30</b>		
<b>II</b>	I	Tamil –II/Hindi – II/French – II/Sanskrit – II	4	3
	II	General English – II	5	3
	III	<b>Electronic Devices</b>	5	4
	III	<b>Electronics Practical –II (Analog Circuits Lab - I)</b>	3	3
	III	<b>Work shop Practice –II</b>	3	3
	III	Allied Mathematics – II	6	5
	IV	Techniques of Social Analysis #	2	2
	IV	Computer Literacy #	2	2
		<b>Total for Semester II</b>	<b>30</b>	
<b>III</b>	I	Tamil –III/Hindi – III/French – III/Sanskrit – III	4	3
	II	General English – III	5	3
	III	<b>Electronic Circuits</b>	5	4
	III	<b>Electronics Practical –III (Analog Circuits Lab - II)</b>	3	3
	III	Allied Physics –I	4	3
	III	Allied Physics Practicals – I @	2	2
	IV	Environmental Studies #	4	1
	IV	Professional Ethics –I: Social Ethics (or)	2	
	IV	Professional Ethics –I: Religious Doctrine	(2)	1
		Library	1	
	<b>Total for Semester III</b>	<b>30</b>		
<b>IV</b>	I	Tamil –IV/Hindi – IV/French – IV/Sanskrit – IV	4	3
	II	General English – IV	5	3
	III	<b>Digital Electronics</b>	5	4
	III	<b>Electronics Practical –IV (Digital Circuits Lab)</b>	3	3
	III	Allied Physics –II	4	3
	III	Allied Physics Practicals – I	2	2
	IV	Professional Ethics –II: Social Ethics (or)	2	
	IV	Professional Ethics –II: Religious Doctrine	(2)	1
	IV	<b>Skill Based Elective – I: Programming in C (THEORY – 3 Hrs; PRACTICAL - 2 Hrs)</b>	5	4
		<b>Total for Semester IV</b>	<b>30</b>	

<b>V</b>	III	<b>Communication System</b>	<b>5</b>	<b>4</b>
	III	<b>Linear Integrated Circuits</b>	<b>5</b>	<b>4</b>
	III	<b>Microprocessor &amp; Microcontroller</b>	<b>5</b>	<b>4</b>
	III	<b>Electronics Practicals – V (LIC &amp; Communication Lab)</b>	<b>3</b>	<b>3</b>
	III	<b>Electronics Practicals – VI (Microprocessor Lab)</b>	<b>3</b>	<b>3</b>
	III	<b>*Core Elective – I</b>	<b>4</b>	<b>4</b>
	IV	<b>Skill Based Elective - II: Software for Embedded System (THEORY – 3 Hrs; PRACTICAL – 2 Hrs)</b>	<b>5</b>	<b>4</b>
		<b>Total for Semester V</b>	<b>30</b>	
<b>VI</b>	III	<b>Embedded System</b>	<b>5</b>	<b>4</b>
	III	<b>Signals and Systems</b>	<b>5</b>	<b>4</b>
	III	<b>Electronic Instrumentation</b>	<b>5</b>	<b>4</b>
	III	<b>VLSI Circuits</b>	<b>5</b>	<b>4</b>
	III	<b>Electronics Practical -VII (Micro controller Lab)</b>	<b>3</b>	<b>3</b>
	III	<b>Electronics Practicals – VIII (Embedded Lab)</b>	<b>3</b>	<b>3</b>
	III	<b>*Core Elective- II</b>	<b>4</b>	<b>4</b>
		<b>Total for Semester VI</b>	<b>30</b>	
<b>VII</b>	III	<b>Digital Signal Processing</b>	<b>5</b>	<b>4</b>
	III	<b>Principle of Management</b>	<b>5</b>	<b>4</b>
	III	<b>Medical Electronics</b>	<b>5</b>	<b>4</b>
	III	<b>Industrial Power Electronics</b>	<b>5</b>	<b>4</b>
	III	<b>*Core Elective – III</b>	<b>4</b>	<b>4</b>
	III	<b>Electronics Practical - IX (DSP Lab)</b>	<b>3</b>	<b>3</b>
	III	<b>Electronics Practical - X (VLSI Lab)</b>	<b>3</b>	<b>3</b>
		<b>Total for Semester VII</b>	<b>30</b>	
<b>VIII</b>	III	<b>Project Work (Off Campus)</b>		<b>6</b>

<b>Total credits for the Entire course</b>	<b>175</b>
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# - Examination Fully Internal

@ - Practical Examination in the following semester.

\$\$ - Outside class hours

\* - Core Elective Papers according to the Subject chosen.

### **Core Elective Papers:**

1. Data Communication and Networks
2. Real-time Operating Systems
3. Distributed Embedded Computing
4. Intelligent Embedded Systems
5. VHDL & Verilog Programming
6. Programmable Digital Signal Processor

## B.S., (ELECTRONICS) SYLLABUS

### முதலாம் ஆண்டு - முதற்பருவம். அறிவியல் தமிழ் I

ஒரு வாரத்திற்குரிய பயிற்று மணி நேரம் : 03  
தாளின் தரப்புள்ளிகள் : 03

#### நோக்கங்கள்:

1. அறிவியல் தமிழை மாணவருக்கு அறிமுகம் செய்தல்.
2. தாய்மொழிவழி அறிவியல் செய்தியை வெளிப்படுத்துவதன் தேவையை மாணவருக்கு அறிவுறுத்துதல்.
3. அறிவியல் கலைச்சொல்லாக்கத்தில் ஈடுபாடு ஏற்படுத்துதல்.
4. அறிவியல் கட்டுரை எழுதும் ஆற்றலை வழங்கல்.

#### அலகு: 1

அறிவியல் தமிழ் - வரையறை, அறிவியல் தமிழின் இன்றியமையாமை - தாய்மொழிக் கல்வியின் சிறப்பு - நடைமுறைச் சிக்கல்கள் - போதிய நூல்கள் இன்மை - சமுதாய மனப்பாங்கு - ஆசிரியர்கள், மாணவர்கள் - பெற்றோர்கள் - பயிற்றுமொழிக் கோட்பாடுகள்.

#### அலகு: 2

அறிவியல் தமிழ் வரலாறு - தோற்றமும் வளர்ச்சியும் - அறிவியல் தமிழ் பற்றிய கருத்துக்கள் - அறிவியல் தமிழாக்க முன் முயற்சிகள் - அறிவியல் இயக்கங்கள் - தமிழ் மொழிவழிக் கல்வி - பயன்கள் - தமிழ்வழிக் கல்வி - அறிவியல், தொழில்நுட்பம்.

#### அலகு: 3

கலைச்சொல் - வரையறை, கலைச்சொல்லாக்க நெறிமுறைகள் - ஒலிபெயர்ப்பு, மொழிபெயர்ப்பு, புதுச்சொற் படைப்பு - ஆட்சித்தமிழ் - சட்டத்தமிழ் - சட்டத்தமிழ்க் கலைச்சொற்கள் - அறிவியல் வாக்கிய அமைப்பு முறைகள் - கலைச்சொல் தரப்படுத்தம் - அறிவியல் கட்டுரைகள் எழுதுதல்.

#### அலகு: 4

அறிவியல் செய்திகளைச் சுவைபடவும் கவர்ச்சியாகவும் தரவல்ல வழிகள் - அறிவியல் இதழ்கள் - அறிவியலைப் பரப்புவதில் இதழ்களின் பங்கு.

#### அலகு: 5

தமிழில் அறிவியல் நூல்கள் - மொழிபெயர்ப்பு - நெறிமுறைகள் - கலைச்சொற் களஞ்சியங்கள், அகராதிகள், கலைச்சொல் தொகுதிகள் - அரசின் பொறுப்புகள் - அறிவியல் மனப்பான்மை.

**பார்வை நூல்கள் :**

**அலகு 1.**

அறிவியல் தமிழ் வரையறை: வா.செ. குழந்தைசாமி, அறிவியல் தமிழ், பக்.75-76.  
இராதா செல்லப்பன், கலைச்சொல்லாக்கம், பக்.9-11.

அறிவியல் தமிழின் இன்றியமையாமை: வா.செ. குழந்தைசாமி, பக்.58-59.  
தாய்மொழிக் கல்வியின் சிறப்பு: கோ. முத்துப்பிள்ளை, அரியணையில் அழகுதமிழ்.

**அலகு 2.**

அறிவியல் தமிழ் வரலாறு - தோற்றமும் வளர்ச்சியும் - அறிவியல் தமிழ் பற்றிய கருத்துக்கள் - அறிவியல் தமிழாக்க முன் முயற்சிகள்.

வா.செ. குழந்தைசாமி, பக்.78-83: பக்.66-74: இராதா செல்லப்பன், கலைச்சொல்லாக்கம் 99-126.

**அலகு 3**

கலைச்சொல் வரையறை, கலைச்சொல்லாக்க நெறிமுறைகள் - ஒலிபெயர்ப்பு - மொழிபெயர்ப்பு, புதுச்சொற் படைப்பு: இராதா செல்லப்பன், கலைச்சொல்லியல் பக்.60-64.

அறிவியல் வாக்கிய அமைப்பு முறைகள் - கலைச்சொல் தரப்படுத்தம், இராதா செல்லப்பன், கலைச்சொல்லியல், பக்.146-169. இராதா செல்லப்பன், கலைச்சொல்லாக்கம், பக்.45-52.

சட்டத்தமிழ்: கோ. சண்முகசுந்தரம், சட்டத்தமிழ்.

ஆட்சித்தமிழ்: இராமலிங்கனார் & முத்துப்பிள்ளை, ஆட்சித்தமிழ்.

**அலகு 4**

இரா. பாவேந்தன், தமிழில் அறிவியல் இதழ்கள்.

**அலகு 5**

இராம. சுந்தரம், பொருள் புதிது வளம் புதிது, பக்.120-122.

சு. லதா, தமிழில் அறிவியல் நூல்கள், அரசின் பொறுப்புகள் - அறிவியல் மனப்பாண்மை.

**சிறப்புப் பார்வை**

1. [www.tamilvu.org](http://www.tamilvu.org)

## முதலாம் ஆண்டு - முதற்பருவம்.

### பிறமொழி பயிலும் மாணவர்களுக்கு உரியது அடிப்படைத் தமிழ் - I

ஒரு வாரத்திற்குரிய பாட மணி நேரம் : 03  
தாளின் மதிப்பு : 03

#### நோக்கம்:

தமிழ்மொழியின் அடிப்படைகளை அறிந்துகொள்ளுதல். தமிழ் மொழியை எழுதவும் படிக்கவும் கற்றுக்கொள்ளுதல்.

#### அலகு 1:

எழுத்துக்கள் அறிமுகம் - எழுத்துக்களின் வகைப்பாடு, எண்ணிக்கை - உயிரெழுத்துக்கள் - மெய்யெழுத்துக்கள் - உயிர்மெய்யெழுத்துக்கள் - ஆய்த எழுத்து - இனஎழுத்துக்கள் - வடமொழி எழுத்துக்கள்.

#### அலகு 2:

எழுதும் பயிற்சி - தமிழ் எழுத்து வடிவங்களைக் காட்டி அவற்றை இனங்காணவும் வேறுபடுத்தி அறியவும் பயிற்சி தருதல் - ஒலிப்பு - பொருத்தமான எழுத்தைத் தேர்ந்தெடுக்கப் பரிசோதித்தல் - எழுத்துக்களை எழுதப் பயிற்றுவித்தல்.

#### அலகு 3:

சொற்கள் கற்றல் - கோடிட்ட இடங்களை நிரப்புவதன் மூலம் எழுத்துக்களையும் சொற்களையும் பயிற்றுவித்தல். வாசித்தல் - படம், ஒலிபெயர்ப்புச்சொல், இணையான ஆங்கிலச்சொல் முதலியவற்றைத் தந்து எழுத்துக்களையும் சொற்களையும் பயிற்றுவித்தல்.

#### அலகு 4:

சிறுதொடர் கற்றல் - எளிய தொடர்களை அறிமுகப்படுத்துதல் - சிறு தொடரின் உறுப்புக்களைக் கற்றுத்தருதல் - அவ்வுறுப்புக்களைத் தொடரில் இனங்காணச்செய்தல் - சிறு தொடர்களை எழுதும் பயிற்சி தருதல்.

#### அலகு 5:

மழலைப் பாடல்கள், அறநெறிக்கதைகள் - பாடல்களையும் கதைகளையும் பிழையின்றி வாசிக்கச் செய்தல் - பிழையின்றி எழுதச்செய்தல்.

குறிப்பு: தமிழ் இணையப் பல்கலைக்கழகச் சான்றிதழ்க் கல்வி பாடத்திட்டத்தில் உள்ள முதல் அலகான "அடிப்படைநிலை"யைப் பின்பற்றி இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

## **I Year – I Semester**

### **General English - I**

#### **Core Phonetics and Educated Indian English(EIE) Speech**

**EIE** is a close approximation to the speech of the native speakers of English of the socio-economic middle class or upper class of Southern London and is represented in the Radio and TV channels of the BBC. The Pronunciation and Speech of the Southern Londoners and the channel representatives are known respectively as Received Pronunciation and Southern Speech.

No teaching of a language is feasible if it is not grounded in a Normative Variety of the Target Language. Also, there is a long-standing tradition of the Indian educational institutions which from the primary through the secondary and the higher secondary to the university level have been consciously or unconsciously teaching a more or less pure or impure variety of the British Standard Speech in the wake of the pan-Indian experience of the British colonial linguo-cultural heritage. Hence it is easier for the Indian teachers to train and teach in EIE which is based on British Standard Speech rather than come up with an approximation say to American, Canadian or Australian Standard.

#### **Stage I**

Recognition, Production, and Transcription ---

Segmental Phonemes: Vowels, Semi-vowels, and Consonants (Broad transcription in terms of the notations and symbols of the International Phonetic Association as used in Daniel Jones' Dictionary or Oxford/Cambridge Advanced Learners Dictionary).

#### **Stage II**

Words in isolation: Monosyllabic words and Polysyllabic words Word-stress: Primary, Secondary, and Tertiary Derivational Changes in words and Stress-shift.

#### **Stage III**

Nuclear/Tonic syllable and Sentence Stress Sentence Types (Statement, Question, Request, Order, and Exclamation) and Intonation Patterns (Rise, Fall, Rise-Fall and Fall-Rise) Normal Sentence Stress and Rhetorical Sentence Stress

#### **Remedial component vis-à-vis the difficulties and errors of Indian/Tamil learners:**

Voiced Vs Voiceless consonants

Certain consonantal clusters like /kw/, /scr/, /skl/, /shl/ etc

Lip rounding for the production of the semi-vowel /w/

Distinction between /v/ and /w/

Musical quality and duration of the vowels

Ignorance of Stress-Shift rules which follow conversion noun into verb, noun into adjective, adjective into noun etc

Inability to form an echo question by varying the intonation pattern without varying the syntactical type

**References:**

1. T.Balasubramanian, *A Textbook of English Phonetics and Speech for Indian Learners*
2. J.D.O'Connor, *Better English Pronunciation*
3. Daniel Jones, *English Pronouncing Dictionary*

**Unit II**

**Vocabulary**

**Functors or Structural Words:**

Pronouns, Proforms, Articles, Conjunctions

Auxiliaries: Modal and Non-Modal

Prepositions and Postpositions, Particles, Interjections and Expletives,

Cardinals, Ordinals, Quantifiers, Degree words, Frequency markers

Inflectional changes of number, gender, case, tense, and degrees of comparison through suffixes

Prepositions and Cases

**Lexemes or Full words:**

Nouns and Adjectives, Verbs and Adverbs

Derivational changes through prefixes and suffixes

Hyphenated and Unhyphenated Compounds and

Plus juncture

Portmanteau forms and Reduplicatives

Synonym, Antonym and Homonym

Homograph and Homophone

Doublets and Bilingualisms

Material Nouns

Greek, Latin and Technonyms

Technonyms as common words

Loan words in common educated use from

other Foreign Languages

Toponym, Patronym, Acronym and Abbreviation

Hyponym and Hyperonym

Idioms and Phrases, Collocations, Dead Metaphor and Cliché

Basolect: Colloquialisms, Slang, Cant, Argot,

Acrolect: Coinages, Nonce formations, Poeticisms etc.

Passive Vocabulary for Recognition and Active Vocabulary for Production

Restricted Vocabulary of the psychologically and culturally less evolved learners and extended vocabulary of the more advanced learners

### **Unit III**

#### **Syntax**

##### **Phrases/Groups/Clusters(strings without a finite verb):**

**Formal Types(based on parts of speech):** Nominal, Verbal,  
Adjectival, Adverbial, Prepositional, Infinitival, Participial.  
Labels, Titles, Headings, Appositional Phrases, and  
Bullet Points.

##### **Clauses(strings with a finite verb):**

###### **Formal Types:**

Noun Clauses, Complement Clauses,  
Adverbial Clauses(time,place,  
reason, manner,condition, contrast, concession)  
Relative Clauses: Restrictive/Defining and  
Non-restrictive and Non-defining

**Functional Types:** Structures of Subordination and Coordination  
Qualification and Modification, Complementation  
and Adjunction

###### **Sentence Types:**

Semantic Types – Statement, Request, Order,  
Question and Exclamation  
Structural Types - Basic patterns and variations  
Constructionally Homonymous sentence  
Sentence with introductory ‘there’  
Split sentence  
Inverted Sentence beginning with the negative particle

or adverb

Logical Types – Propositional sentence and

Relational sentences

Rhetorical Types – Balanced, Loose, Suspended

and Mixed sentences

**Transformations:**

Phrases and Clauses into Sentences,

Sentences into Phrases and Clauses

Active Voice into Passive Voice and vice versa

Direct Speech into Indirect Speech and vice versa

**Unit IV**

**Comprehension**

Exercises are given with passages graded according to length and complexity are made available in print or read out or played on the audio-cassette.

Types of Comprehension:

Local Comprehension and Global Comprehension

Listening Comprehension and Written Comprehension

Types of Reading: Vocal, Sub-vocal, Mental

Intensive Reading for Detail

Extensive Reading for Range

Scanning a paragraph or a cluster of sentences for  
the central idea/gist/sum and substance/essence

Recovery of the explicitly given topic sentence or/and

Reconstruction of the implicit topic sentence

Progressive reading from facts through ideas  
to arguments by the sifting of the linguistic  
evidence in the text

At the initial stage of the teaching of this unit the teacher prepares and supports the students for their exercise of written comprehension. He/She gives an exemplary oral reading of the passage by paying attention to its Sense group, Tone group and Breath group and leads the students to make sense of the passage not only with the text-specific questions but also with the pre-reading and post-reading questions raised respectively before and after the students go through the text. The teacher's role is expected to decrease in proportion to the progress made by the students gradually.

The students must be required to bring Oxford ALD or Cambridge ALD for all classes and particularly for those set apart for Comprehension. They may be permitted to use a Dictionary even in the examinations.

## **Unit V**

### **Composition**

#### **Stage I**

Exercises which involve the filling in the blanks with the key words withheld from the given exercise materials

#### **Stage II**

Exercises which involve reorganisation of the sentences jumbled up in the given passage

#### **Stage III**

Guided Paragraph Writing

Exercises which involve the students listening to a short presentation on a topic either by the teacher or the super-brilliant students, and jotting down points and structuring them as a paragraph to be evaluated by the teacher

#### **Stage IV**

Guided composition: The teacher gives the title, the sub-titles and the salient points which the students are required to develop and organise into a short essay of 200 words

#### **Stage V**

Controlled composition: The teacher gives the title and briefly indicates the key idea for the students to come up with the components of the key idea and the corresponding sub-titles, and thus produce a short essay

#### **Stage VI**

Free Composition: The teacher leaves the students free to choose a topic and do their thinking and writing entirely on their own. The topic may relate to any of the domains: personal, social, technical, literary, aesthetic, philosophic etc.

Before the students are given the writing tasks enumerated above they have to be re-trained and drilled in the correlations or convergences between Syntactical Structures and Discourse Functions. Here a summative refreshing of the students' memory about Syntax in Unit IV is in place. The Discourse functions of definition, description, classification, comparison and contrast, argumentation, analysis, explanation, narration etc have to be first shown and discussed by the teacher in regard to the select memorable/classic/quatable passages or even sentences of famous writers. Subsequently the students would be supplied with such additional passages for their own critical

appreciation and internalization. They may even be encouraged to imitate one or more authors with whom they feel a certain affinity.

**References:**

1. Freedman, Sarah, *Written Composition*.
2. Greenbaum, Sidney. *The Oxford English Grammar*. New York : OUP, 1996.
3. Leech, Geoffrey and Svartvik, Jan. *A Communicative Grammar of English*. Pearson-Education Asia Pte. Ltd. 2000.
4. MacCarthy, Michael, *English Vocabulary in Use*. CUP, 2002
5. Quirk, Randolf. *A University Grammar of English*, E.L.B.S.
6. Strumpf, Michael. *The Complete Grammar*. New Delhi : Goodwil Publishing House (Rs.125 /-)
7. Webster's Reference Library. *Students' Companion*. Scotland : Geddes & Grosset, 2002. (Rs.99/-)

## **I YEAR – I SEMESTER**

### **ELECTRIC CIRCUIT ANALYSIS**

#### **UNIT –I: DC CIRCUIT ANALYSIS**

Basic components and Electric circuits: Charge, Current, Voltage and Power, Voltage and Current sources, Ohm's Law; Voltage and Current Laws: Kirchoff's Current Law, Kirchoff's Voltage Law, The single node – pair circuits, Series and Parallel connected independent sources, Resistors in Series and Parallel, Voltage and Current Division; Basic Nodal and Mesh Analysis.

#### **UNIT – II: NETWORK THEOREMS**

Useful circuit analysis techniques: Linearity and Superposition, Thevenin and Norton Equivalent circuits, Reciprocity Theorem, Maximum Power Transfer Theorem, Delta Wye conversion.

#### **UNIT – III: SINUSOIDAL STEADY STATE ANALYSIS**

Sinusoidal Steady – State Analysis: Characteristics of sinusoids, The complex forcing function, The Phasor, Phasor relationship for R, L and C, Impedance and Admittance, Nodal and Mesh Analysis, Phasor Diagrams; AC Circuit Power Analysis: Instantaneous Power, Average Power, Apparent Power and Power factor, Complex Power.

#### **UNIT –IV: TRANSIENTS AND RESONANCE IN RLC CIRCUITS**

Basic RL and RC Circuits: The source – free RL Circuit, The source – free RC Circuit, the unit step function, Driven RL Circuit Driven RC Circuit; Frequency Response: Parallel resonance, Series Resonance.

#### **UNIT –V: COUPLED CIRCUITS, DUALITY AND TOPOLOGY**

Magnetically Coupled circuits: Mutual Inductance, The Linear Transformer, the Ideal Transformer; Duality; Introduction to network topology: Trees and General Nodal Analysis, Links and Loop Analysis

#### **BOOK FOR STUDY:**

1. William H. Hayt, Jr, Jack E. Kemmerly, Steven M. Durbin, "Engineering Circuit Analysis", 6<sup>th</sup> Edition New Delhi, Tata McGraw – Hill publishing company Ltd, 2002.

**REFERENCES:**

1. Umesh Sinha, "Circuit Theory", 4th edition, New Delhi: Satya Prakasan Publications, 1995.
2. Paranjothi S.R, "Electric Circuit Analysis", New Age International, 1995.
3. David E. Johnson, Johny R. Johnson, John L.Hilburn, "Electric Circuit Analysis", Second Edition, PHI

## **I YEAR – I SEMESTER**

### **ELECTRONICS PRACTICAL – I (Circuit Analysis Lab)**

#### **List of Experiments (Any Ten)**

1. Verification of Kirchoff's Law.
2. Verification of Thevenin's Theorem.
3. Verification of Norton's Theorem.
4. Verification of Superposition Theorem.
5. Verification of Compensation Theorem.
6. Verification of Reciprocity Theorem.
7. Verification of Maximum Power Transformation Theorem.
8. Verification of Nodal and Mesh Analysis.
9. Study of Series Resonance Circuit.
10. Study of Parallel Resonance Circuit.
11. Study of Wheatstone Bridge.
12. Study of Series RC, LC, RLC Circuit.
13. Frequency Response of Single Tuned Coupled Circuits.
14. Study of Star to Delta conversion.
15. Study of Delta to Star Conversion.

**I YEAR – I SEMESTER**  
**WORKSHOP PRACTICE – I**

**ALL TEN PRACTICALS**

1. Study of Multimeters.
2. Checking for Earth connection in the Electrical Appliances.
3. Preparation of Wiring diagrams.
4. Tube Light Wiring.
5. Staircase Wiring.
6. Simple Turning and Drilling Operations.
7. Cabinet Marking.
8. Cabinet Making.
9. Induction Coil Winding.
10. Fitting Switches, AC Pin Sockets and Indicator Lamp in Switch Box.

**I YEAR – I SEMESTER**  
**ALLIED MATHEMATICS – I**

**UNIT – I: DIFFERENTIAL AND INTEGRAL CALCULUS**

Successive differentiation – Leibnitz's theorem (no proof) – Maxima and minima – integration by parts – properties of definite integrals.

(Chapter 1.11,1.12,2)

**UNIT II: REDUCTION FORMULA**

Reduction formula for  $\cos nx$ ,  $\sin nx$ ,  $e^{ax}\cos nx$ ,  $e^{ax}\sin nx$ , and  $\tan nx$ . Evaluation of double and triple integrals (simple problems only).

(Chapter 1.13 & 5)

**UNIT III: DIFFERENTIAL EQUATIONS**

First order differential equations – Variable separable – Homogenous equation – Linear & Bernoulli's equation. Second order differential equations (linear) with constant co-efficients – homogenous linear equations with variable co-efficients.

**UNIT IV: ALGEBRA**

Eigen values and Eigen vectors of matrices: Problems – Cayley Hamilton theorem (No proof) and problems – Definition of vector space – Definition of linear independence of vectors – Examples in  $R^3$

(Chapter 8...6.4-8.6., Chapter 6.1.1-6.1.3, 6.3.5- 6.3.7)

**UNIT V: CONVERGENCE OF SERIES**

Concept of limit of a sequence – limit of a function – simple problems – convergence, divergence and oscillation of a series – geometric series – tests of convergence and divergence, comparison, ratio and root tests (without proof).

(Chapter 6(1-14))

**REFERENCES :**

1. Narayanan and T.K. Manickavasagam pillai ANCILLARY MATHS BOOK II & II EDN 1999 (RELEVANT PORTION FOR UNITS I, II and III)
2. S.Arumugam and others MODERN ALGEBRA ( For unit IV)
3. Dr.M.K.Venkataram HIGHER MATHEMATICS FOR ENGINEERING AND SCIENCE (For unit V)

## LANGUAGE FOR SCIENCE - II

முதலாம் ஆண்டு - இரண்டாம் பருவம்

### அறிவியல் தமிழ் II

ஒரு வாரத்திற்குரிய பாட மணி நேரம் : 03

தாளின் மதிப்பு : 03

#### நோக்கங்கள்:

1. தமிழ் இலக்கியத்தில் காணலாகும் அறிவியல் செய்திகளை மாணவர் அறியச் செய்தல்.
2. இலக்கியத்தில் உள்ள அறிவியல் செய்திகளை இனங்காணச் செய்தல்.

#### அலகு: 1

இலக்கியம் - அறிமுகம், பண்டைய தமிழரின் அறிவியல் வரலாறு - விளக்கம் - சங்க இலக்கியத்தில் அறிவியல் உண்மைகள், இயற்பியல், வேதியியல், உளவியல், உயிரியல், தாவரவியல் செய்திகள்.

#### அலகு: 2

இலக்கியங்களில் பொறியியல், தொழில்நுட்ப மருத்துவச் செய்திகள் - தொல்காப்பியம், சங்க இலக்கியம், பதினெண்கீழ்க்கணக்கு, சிலப்பதிகாரம், மணிமேகலை முதலான காப்பியங்கள், சித்தர் பாடல்கள் முதலானவற்றில் வெளிப்படும் கட்டிடக்கலை, நகரமைப்பு, பொறிநுட்ப வேளாண்மை, உலோகவியல், மருத்துவச்செய்திகள்.

#### அலகு: 3

சங்க இலக்கியம், சிலப்பதிகாரம், மணிமேகலை முதலான இலக்கியங்களில் வெளிப்படும் இசை, நடனம், ஓவியம், சிற்பம், ஒப்பனைக்கலை போன்ற நுண்கலைகள் பற்றிய செய்திகள்.

#### அலகு: 4

சங்கஇலக்கியம், திருக்குறள் முதலான பதினெண்கீழ்க்கணக்கு நூல்களில் ஆட்சியியல், அரசியல், மேலாண்மையியல் செய்திகள்.

#### அலகு: 5

இணையமும் தமிழும் - கணினியில் தமிழ் - தமிழ் மென்பொருள் - இணையத் தமிழ் வரலாறு, மின்ஆளுகை, தமிழ் வலைமனைகள், மின்குழு - இலக்கிய மின் பதிப்புகள் - பல்லாடகம் (Multimedia) - தமிழ் வழி மின்னஞ்சல்கள் - தமிழ் மின்னிதழ்கள்.

#### பார்வை நூல்கள்:

1. சு. தமிழ்வேலு, “சங்க இலக்கியங்களில் அறிவியல் கோட்பாடுகள்”, ச.இராமநாதன், இராமசுந்தரம் (ப.ஆ), அறிவியல்தமிழ், கரந்தைத் தமிழ்ச்சங்கம் மற்றும் தமிழ்ப் பல்கலைக்கழக வெளியீடு - 1995.
2. நெல்லை சு.முத்து, “பண்டைய அறிவியல் வரலாறு”, அறிவியல் தமிழ், கரந்தைத்தமிழ்ச்சங்கம் மற்றும் தமிழ்ப் பல்கலைக்கழக வெளியீடு - 1995.

3. மாத்தளை சோமு, வியக்க வைக்கும் தமிழர் அறிவியல், உதகம், (உலகத் தமிழாய்வுக் கழகம்), திருச்சி- சிட்னி - கோலாலம்பூர் - கொழும்பு - 2005.
4. நா. இராசகோபாலன், “சங்க இலக்கியங்களில் அறிவியல்”, மா.இராமலிங்கம்(தொ.ஆ), வேள்வி, பாரதிதாசன் பல்கலைக்கழகத் தமிழியல் துறை வெளியீடு.
5. விக்டர் ராஜமாணிக்கம், வே.சா.அருள்ராஜ், சங்க இலக்கியத்தில் காலங்கள்.
6. நெல்லை. சு.முத்து, அறிவியல் தமிழியல்.
7. முனைவர் வி.உண்ணாமலை, காலந்தோறும் அறிவியல்.
8. எஸ்.ஆர் பாலசுப்ரமணியம், சோழர் கலைப்பாணி.
9. முனைவர் கோ. தெய்வநாயகம், தமிழர் கட்டிடக்கலை.
10. ஆ.அ. வரகுணபாண்டியன், யாழ் நூல்.
11. டாக்டர் பெ. கிருஷ்ணன், நோயின்றி வாழ சித்த வைத்தியம்.
12. ஆதர் சுஜாதா, வீட்டுக்குள் வரும் உலகம்.
13. கா. அபிராமி, டிஷ்னெட் லிமினெட், 1998.
14. தகவல் தொழில் நுட்பம், தமிழ் புத்தகாலயா, 2001.
15. பதார்த்தகுணசிந்தாமணி.

## LANGUAGE FOR SCIENCE - II

முதலாம் ஆண்டு - இரண்டாம் பருவம்

பிறமொழி பயிலும் மாணவர்களுக்கு உரியது

### அடிப்படைத் தமிழ் - II

ஒரு வாரத்திற்குரிய பாட மணி நேரம் :03

தாளின் மதிப்பு :03

நோக்கம்:

இப் பாடத்திட்டத்தில் கீழே தடித்த எழுத்துக்களில் தரப்பட்டுள்ள பாடங்களின் வழியாகத் தமிழ் மொழியை எழுதவும், வாசிக்கவும் பழக்குதல்

அலகு: 1

**சந்தை** - மலர்கள், காய்கறிகள், பழங்கள் முதலியன குறித்த சொற்களை அறியச் செய்தல் - அவை தொடர்பான வாக்கியம் அமைக்கப் பழக்குதல். **எங்கள் குடும்பம்** - குடும்ப உறுப்பினர், குடும்ப உறவுமுறைகள் பற்றி அறியச் செய்தல் - தொடர்பான சொற்கள், தொடர்கள் முதலியவற்றை வாசிக்கவும் எழுதவும் பழக்குதல்.

அலகு: 2

**விருந்தோம்பல்** - உணவு பரிமாறும் முறை - உணவு வகைகள் முதலியன பற்றி விளக்கமாக அறியச் செய்தல் - **மழை** - ஆறு, குளம், கடல், வானம், மேகம், மலை, மழை, முதலியன பற்றி அறியச் செய்தல் இவை தொடர்பான சொற்கள், தொடர்கள் முதலியவற்றை வாசிக்கவும் எழுதவும் பழக்குதல்.

அலகு: 3

**பாரதியார்** - பாரதியார் பற்றிய வரலாறு, அவரது ஓரிரு கவிதைகள் பற்றி அறியச் செய்தல் - **கணைக்கால் இரும்பொறை** - இம்மன்னனின் தன்மான உணர்வினை நாடகத்தின் வழியாக உணர்த்துதல் இப்பாடங்கள் தொடர்பான சொற்கள், தொடர்களை வாசிக்கவும் எழுதவும் பழக்குதல்.

அலகு: 4

**மாமல்லபுரம்** - மாமல்லபுரம் அமைந்துள்ள இடம், மற்றும் கலைக்கோயில்கள் பற்றி விளக்குதல் - **பயணம்** - பேருந்தில் பயணம் செய்யும் முறையை விளக்க வைத்தல், வாசிக்கவும் எழுதவும் பழக்குதல்.

அலகு: 5

**வாழ்த்துப்பாடல்** - வாழ்த்து விளக்கம் - வாழ்த்துக்களின் வகைகள்: இறைவாழ்த்து: தாயுமானவரின் பராபரக்கண்ணி (அன்பைப் பெருக்கி). மொழிவாழ்த்து: பாரதியாரின் தமிழ்மொழி வாழ்த்து (வாழ்க நிரந்தரம் வாழ்க தமிழ்மொழி). **உரையாடல்:** குழந்தைகளும் கல்வியும்: குழந்தைகளும் கல்வியும் என்ற பொருளில் உரையாடல் நிகழ்த்தச் செய்தல், உரையாடலில் சிறிய சொற்றொடரைக் கையாளும் முறையைக் கற்பித்தல். **கடிதம்:** அன்னைக்குக் கடிதம் - அறிமுகம், கேட்டல், வாசித்தறிதல், கடிதம் எழுதுதல் பயிற்சி, மொழி அமைப்புக் கூறுகளைப் பயிற்றுவித்தல். **நேர்காணல்:** சதுரங்கச் சாதனையாளர் விஜயலட்சுமியிடம் நேர்காணல். **நாட்டுப்புறப்பாடல்:** அறிமுகம் - தாலாட்டுப்பாடல், நாட்டுவளம் கூறும் பாடல்.

**குறிப்பு:**

தமிழ் இணையப் பல்கலைக்கழகச் சான்றிதழ்க் கல்வி பாடத்திட்டத்தில் உள்ள இரண்டாம் அலகு மற்றும் மூன்றாம் அலகுகளான முறையே இடைநிலை, மேல்நிலை ஆகியவற்றைப் பின்பற்றி இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

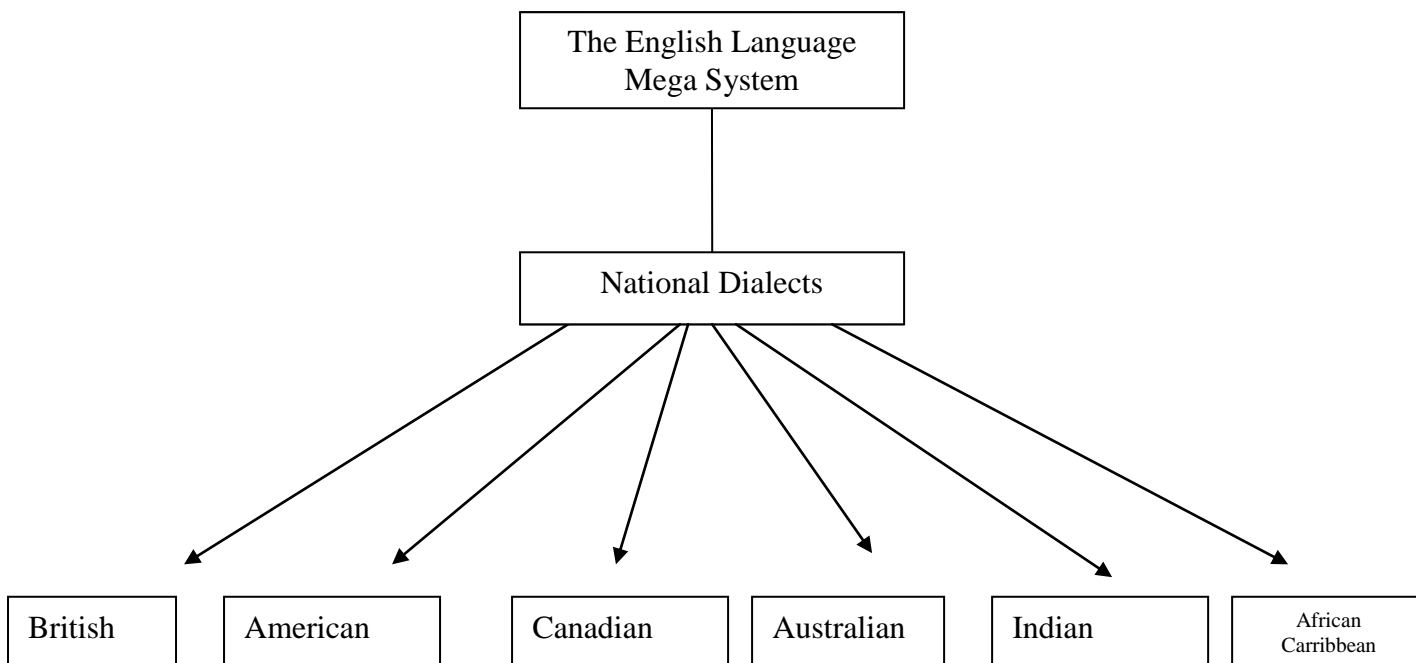
**I YEAR – II SEMESTER**  
**GENERAL ENGLISH - II**

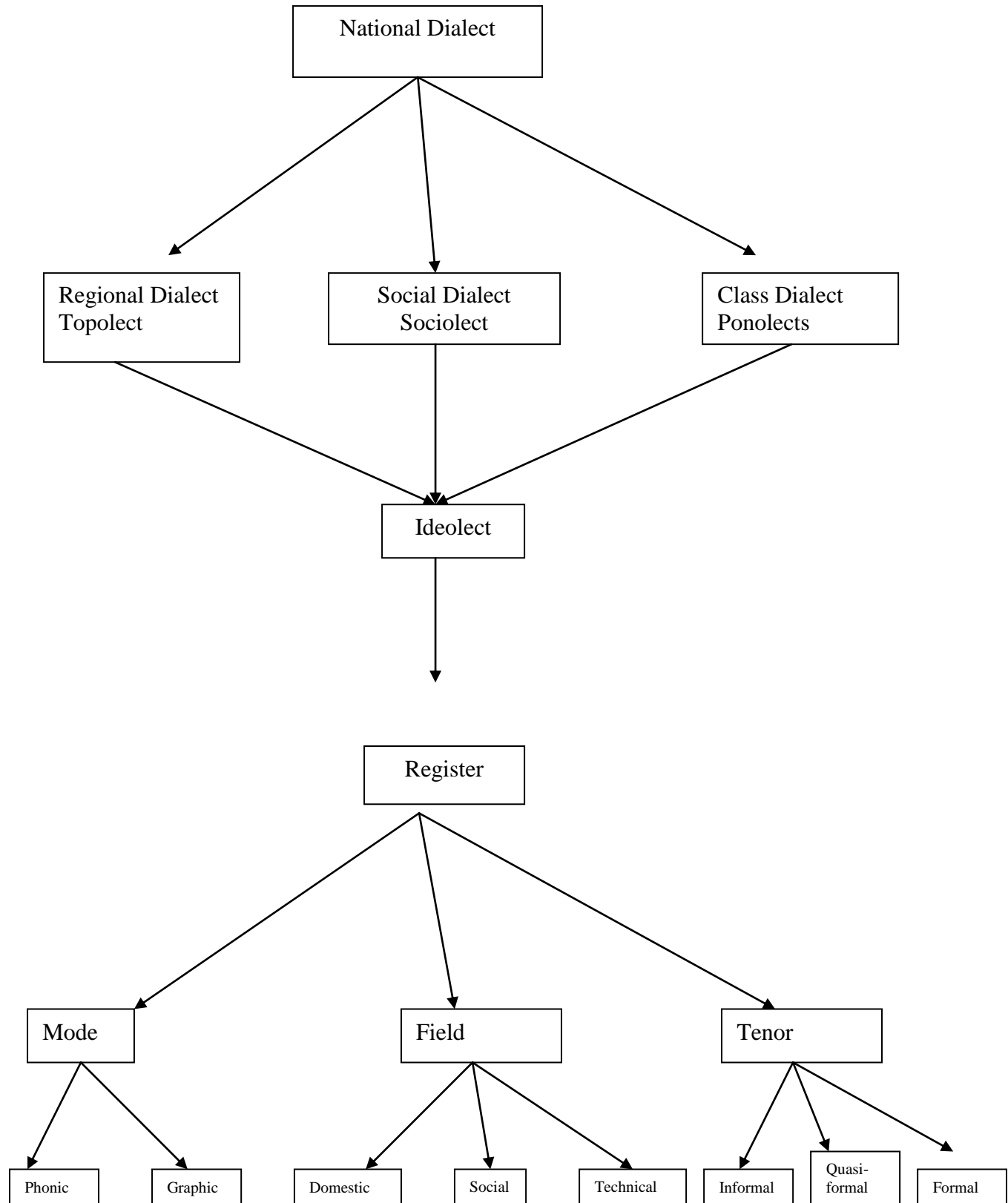
**Technical English for Power (TEP)**

**UNIT I**

Language is an abstraction. It exists in and through its several varieties. One can find a hundred and eight varieties in any Language. To know a language therefore means to know its standard common or general variety which is more or less an abstraction and along with it a special variety, that is a variety used for special purposes like technical English, Business English, journalese, legalese, institutionalese, officialese etc.

Thus English may be found to be divisible into dialects, dialects found divisible into idiolects, idiolects found divisible into registers, and registers found divisible into actual uses. This phenomenon of the mega-system of Language splitting successfully into finer and finer sub-systems and micro-systems may be diagrammatized as follows:





## Unit II

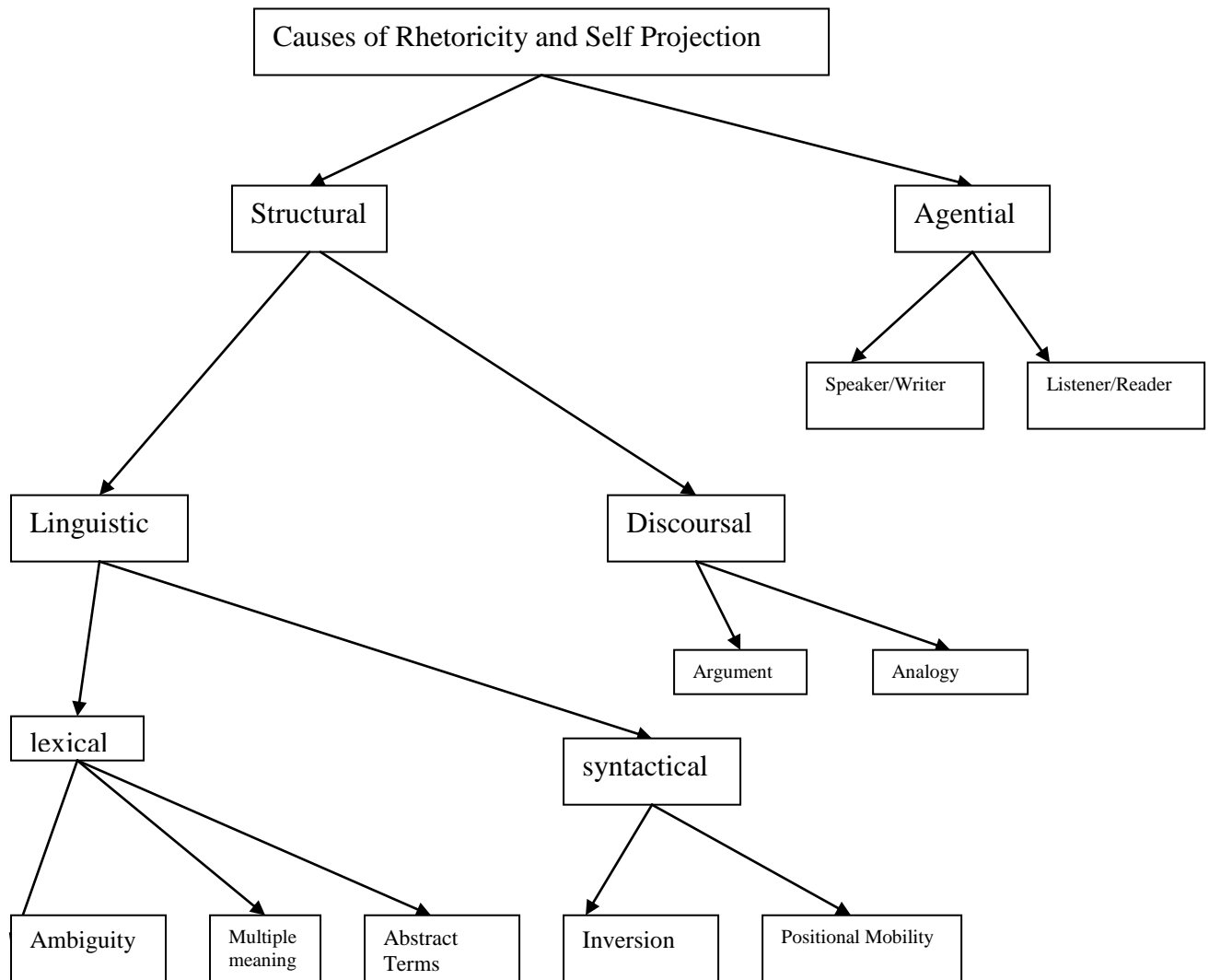
It is commonly assumed that technical English or technolect is exclusively objective. It is further assumed that the intelligibility of technical English is restricted to its initiates who are most probably technicians or scientists. The first assumption is called objectivism and the latter assumption may be called esotericism. And neither assumption is completely true.

As any variety or use of a language necessarily involves the exercise of formal and functional rules and thereby stylization, even technolect is not free from such stylization. Once language is stylized it cannot but function rhetorically. In so far as the rhetorical effects resulting from the structural and functional requirements of the technolect are directed and controlled intentionally by the speaker or the writer technolect either spoken or written is effective. But the control of rhetoricity is accompanied with the infusion of the subjective elements, however minimal into the so called objective technical language.

Apart from the in-built stylization and rhetoricity of all language including technical language the speaker or writer's communicational activity itself will intensify the rhetoricity as the activity cannot be purely or exclusively a transmission of facts or information. The act of speech or writing would in almost all cases marshal facts and information so as to construct arguments or express views which would be aimed either at persuading or at dissuading an individual or a group respectively to or from a course of action. In short, facts are almost never conveyed except with an admixture of subjective reactions so that corresponding subjective reactions are called forth on the part of the listener or the reader. Finally even if a particular speaker or writer could achieve technical communication in a zero degree of dependence on or complicity with factual error and emotional bias, the listener or the reader might be prone to interpret the marvel of total objectivity in an idiosyncratic if not subjective manner.

As for the second assumption that technolect is esoteric or of restricted intelligibility the tendency of the present-day technolectal practice is to strive towards the middle style which is a compromise between non-technical or public communication and technical communication. Examples of this kind of technolect which is more or less translucent may be found in the articles of newspapers and popular journals on topics relating to science and technology and also in the writings of popular science writing such as those of Bertrand Russell.

The various sources of rhetoricity and subjectivity may be diagrammatised as follows:



### Unit III

#### A lexico- Syntactic model of Technical English:

##### Lexical Components:

Numerals, quantifiers

Degree words, frequency markers

Material nouns

Technonyms specific to various disciplines and

Domains

Abbreviations of different kinds

Brand Names

**Syntactic Components:**

Propositional/predicative Sentence

Full passive sentence

Reduced passive with agent-deletion or instrument  
deletion

Quasi-passive

Discontinuous verb phrase

**Unit IV**

**Technical English in the Phonic Mode:**

**Graded activities and Exercises:**

Recitation

Guided imaginary Conversation

A guided short talk

Mock Interview

Guided group Discussion

Free group discussion

A free long oral presentation

**Unit V**

**Technical English**

**In the Graphic Mode:**

Project report

Preparation of tool-kit operation and maintenance  
folders and pamphlets manuals

**In the Electronic Mode:**

Cyberlectal terms

Verbal contractions

Spelling Contractions

Use of Phonetic spelling

Professional e-corespondances

**References :**

1. Second Language Writing. Ed. Barbara Kroll, CUP.
2. Composing in a Second Language. Sandra McKay. Newbury House, Cambridge.
3. Technical Writing. John Lennon
4. Technical Writing. Scot. Forfeman& Company.
5. Strengthen Your Writing. V.R.Narayanaswamy. Orint Longman
6. Reading and Writing: Theory and Practice. Ed. M.L.Tickoo. SEAMEO Regional Language Centre, Singapore.
7. Technical Communication. Meenakshi Raman and Sangeetha Sharma. OUP.

# **I YEAR – II SEMESTER**

## **ELECTRONIC DEVICES**

### **UNIT – I: Electron Ballistic and Intrinsic Semiconductor**

Force on charge in electric field – Motion of charge in uniform and time varying electric fields – Force on a moving charge in magnetic field – Calculation of cyclotron frequency – Calculation of Electrostatic and Magnetic deflection sensitivity.

Energy Band Structure of Conductors, Semiconductors and Insulators – Density distribution of available energy states in Semiconductors – Fermi - Dirac probability distribution function at different temperature – Thermal generation of carriers – calculation of electron and hole densities in Intrinsic Semiconductors – Intrinsic Concentration – Mass Action Law.

### **UNIT – II: Extrinsic Semiconductor and PN Junctions**

N and P type semiconductors and their energy band structure – Law of Electrical Neutrality – Calculation of Fermi Level, Free Electron and Hole Densities in Extrinsic Semiconductor – Mobility – Drift Current and Conductivity – Diffusion Current – Continuity Equation – Hall Effect – Band Structure of PN Junction – Current Component in a PN junction – Derivation of Diode Equation – Temperature Dependent of Diode Characteristics.

### **UNIT – III: Switching Characteristics of PN Junction and Special Diodes**

Calculation of Transition and Diffusion Capacitance – Varactor Diode – Charge Control Description of Diode – Switching Characteristics of Diode – Mechanism of Avalanche and Zener Break Down – Temperature Dependences of Break Down Voltages – Backward Diode- Tunneling Effect in Thin Barriers Tunnel Diode – Photo Diode – Light Emitting Diodes.

### **UNIT – IV: Bipolar Junction Transistors and Field Effect Transistors**

Construction of PNP and NPN transistors – BJT Current Components – Emitter to Collector and Base to Collector Current Gain – Base Width Modulation – CE and CB Characteristics – Eber's Moll Model - Transistor Switching Times – Construction and Characteristics of JFET - Relation between Pinch off Voltage and Drain Current – derivation. MOSFET's – Enhancements and Depletion type.

## **UNIT – V: Metal Semiconductor Contacts and Power Control Devices**

Metal Semiconductor Contacts – Energy Band Diagram of Metal Semiconductor Junction Schottky Diode and Ohmic Contacts. Power Control devices: Characteristics and equivalent circuit of UJT – Intrinsic stand off ratio. PNP diode – Two Transistor model, SCR, TRIAC, DIAC.

### **BOOK FOR STUDY:**

1. Jacob Milliman & Halkins, Satyabranta Jit, “Electronic Devices & Circuits”, TMH, 2<sup>nd</sup> Edition, 2003.

### **REFERENCES:**

1. S.Salivahanan, N.Sureshkumar and A.Vallavaraj, “Electornic Devices and Circuits”, TMH, 1998.
2. Donald A. Neaman, “Semiconductor Physics and Devices”, 3<sup>rd</sup> edition, TMH, 2002.

## **I YEAR – II SEMESTER**

### **ELECTRONICS PRACTICAL – II (Analog Circuits Lab - I)**

#### **List of Experiments (Any Ten)**

1. Diode Characteristics.
2. Zener Diode Characteristics.
3. Tunnel/Schottky Diode Characteristics.
4. LED and Photo Diode Characteristics.
5. SCR Characteristics.
6. TRIAC Characteristics.
7. DIAC Characteristics.
8. UJT Characteristics.
9. CB Characteristics.
10. CE Characteristics.
11. CG Characteristics.
12. CS Characteristics.

**I YEAR – II SEMESTER**  
**WORKSHOP PRACTICE – II**

**ALL TEN PRACTICALS**

1. Soldering simple circuits and checking continuity.
2. Assembling Electronic Components on a PCB (Component Placing).
3. De soldering the components from circuits using wicks and De soldering pumps.
4. Study of ELCB.
5. Study of MCP.
6. Study of CRO.
7. Study of AFO.
8. Study of LCR Meter.
9. Construction of Single Power Supply.
10. Construction of Dual Power Supply.

**I YEAR – II SEMESTER**  
**ALLIED MATHEMATICS – II**

**UNIT – I NUMERICAL METHODS**

Solution of simultaneous linear equations – Gauss Elimination = Gauss Seidal Methods – Numerical Solutions to O.D.E – Solution by Taylor's Methods – Euler's Method – Runge Kutta Method (4<sup>th</sup> Order) –(Chapter 4 section 4.2,Chapter 6 Section 6.2 and Chapter 11 section 11.6,11.10,11.14 and 11.16)

**UNIT – II PARTIAL DIFFERENTIAL EQUATIONS**

Formation of P.D.E by eliminating constants and function – General – Particular and Complete Integral – Lagrange's form of the linear first order equations (Chapter 6 Section 6.1-6.6)

**UNIT – III VECTORS**

Gradient, divergence and curl operations (No Proofs of theorem, only simple applications) – Theorems of Gauss, Green and Stokes without proof – Simple application only (Chapter – 1-4)

**UNIT – IV TRIGONOMETRY**

Expansion of functions  $\sin x, \cos x, \sin nx, \cos nx, \sin nx \cos nx$ , Infinite series of  $\sin q, \cos q, \tan q$ , Inverse Trigonometric functions – Hyperbolic functions – Inverse hyperbolic functions (Chapter 3 & 4)

**UNIT – V COMPLEX ANALYSIS**

Cauchy Reimann Condition (No Derivation) – Analytic function – (Concept of Complex Integration) – Singularities contour integration (Integral over the unit circle only)(Chapter 1, Sections 1.11 and chapter 5 section 1.3)

**REFERENCES :**

1. Venkatraman, M.K : Numerical methods and science and Engineering (For Unit 1)
2. Manickavasagam pillai, T.K & others: Ancillary Maths Book II & others – Viswanathan Printers & publish (For Unit II)
3. Manickavasagam pillai, T.K & others: Ancillary Maths Book III & others – Viswanathan Printers & publish (For Unit III & IV)
4. Narayanan and Manickavasagam pillai, Complex Analysis (For Unit V).

## **II YEAR – III SEMESTER**

### **ELECTRONIC CIRCUITS**

#### **UNIT – I: TRANSISTOR BIASING**

BJT – Need for Biasing – Fixed Bias Circuit, Load Line and Quiescent Point – Variation of Quiescent point due to  $h_{FE}$  - Variation within manufactures, Tolerance – Stability Factors – Different type of biasing circuits – Methods of stabilizing the Q point – Advantage of self bias - use of self bias circuit as constant current circuit – source self bias and voltage divider bias for FET – use of FET as voltage variable resistor.

#### **UNIT – II: MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS**

CE, CB and CC amplifiers – Small Signal equivalent - Mid band analysis of various types of single stage amplifiers to obtain gain, input impedance and output impedance - CS, CG and CD amplifiers – Definition of Cutoff Frequency and Band Width – Low Frequency Analysis Amplifiers to obtain Lower Cutoff Frequency (BJT) – High Frequency Analysis of BJT Amplifiers to obtain Upper cut off Frequency (BJT).

#### **UNIT – III: RECTIFIERS AND POWER SUPPLIES**

Half-wave - Full-wave and Bridge Rectifiers with Resistive Load - Analysis for  $V_{dc}$  and ripple voltage with C, CL, L-C and C-L-C filters - Voltage Multipliers Zener diode regulator - Electronically regulated d.c power supplies - Line regulation - output resistance and temperature coefficient - Switched mode power supplies - Power Control using SCR.

#### **UNIT – IV: FEEDBACK AMPLIFIERS**

Block diagram - Loop gain - Gain with feedback - Desensitivity of gain - Distortion and cut off frequencies with feedback - The four basic feedback topologies and the type of gain stabilized by each type of feedback - Input and Output resistances with feedback - Method of identifying feedback topology - feedback factor and basic amplifier configuration with loading effect of feedback network taken into account - Analysis of feedback amplifiers - Nyquist criterion for stability of feedback amplifiers.

#### **UNIT – V: OSCILLATORS**

Barkhausen Criterion - Mechanism for start of oscillation and stabilization of amplitude - Analysis of oscillator using cascade connection of one RC and one CR filters. RC phase shift oscillator - Wienbridge oscillator - twin-T oscillators - Analysis of LC oscillators – Colpitts – Hartley – Clapp - Miller and Pierce oscillators - Frequency range

of RC and LC oscillators - Quartz crystal construction - Electrical equivalent circuit of crystal - Crystal Oscillator circuits.

**BOOK FOR STUDY:**

1. Jacob Milliman & Halkins, satyebranta Jit, “Electronic Devices & Circuits”, TMH, 2<sup>nd</sup> Edition, 2003.

**REFERENCES:**

1. Robert L.Boylestad and Louis Nashelsky, “Electronic Devices & Circuits”, 8<sup>th</sup> edition, PHI, 2002.
2. Flyod, “Electronic Devices”, 6<sup>th</sup> edition, Pearson education, 2003.

## **II YEAR – III SEMESTER**

### **ELECTRONICS PRACTICAL – III (Analog Circuits Lab - II)**

#### **List of Experiments (Any Ten)**

1. Construct and Study of Fixed Bias.
2. Construct and Study of Self Bias ( BJT/JFET)
3. Construct and Study of Emitter Follower.
4. Construct and Study of Source Follower.
5. Construct and Study of Half-wave Rectifier with & without filter.
6. Construct and Study of Full-wave Rectifier with & without filter.
7. Construct and Study of Clippers and Clampers (Using Diodes).
8. Construct and Study of Series/Shunt Feedback Amplifiers.
9. Construct and Study Phase Shift Oscillator (Transistor).
10. Construct and Study Colpitt's Oscillator (Transistor).
11. Construct and Study Wien's Bridge Oscillator (Transistor).
12. Construct and Study Hartley's Oscillator (Transistor).

## **II YEAR – III SEMESTER**

### **ALLIED PHYSICS – I**

#### **UNIT – I: LASER AND FIBRE OPTICS**

Lasers: Introduction – Principle – Einstein's theory – Methods of achieving population inversion – Ruby Laser – He-Ne Laser – Applications. Fibre Optics: Introduction – Structure of Optical Fibres – Materials – Classifications – Preparation of fibres – Applications.

#### **UNIT – II : ATOMIC PHYSICS AND THERMAL PHYSICS**

Atomic Physics : Thomson's atom model – Rutherford Atom model – Bohr Atom Model – Sommerfeld and vector Atom model. Thermal Physics : Definitions – Specific heat determination – Newton's law of cooling – Cooling method – Thermal Conductivity – Rectilinear flow of heat through rod – Forbe's method – Lee's disc method.

#### **UNIT – III : ACOUSTICS AND ULTRASONICS**

Acoustics: Classification – Characteristics of musical sound – Transmission loss – Acoustics of buildings – sound absorbing materials – Acoustic design of an auditorium – sound insulation. Ultrasonic : Introduction – Classification – generation of ultrasonic waves – Ultrasonic velocity measurements – Applications.

#### **UNIT– IV: X RAYS, PHOTOELECTRIC EFFECT AND SUPERCONDUCTIVITY**

X rays – Generation – properties – origin – Mosley's law – Diffraction of X rays – Bragg's law – Applications – Photo electric effect: Experimental study – Salient features – Einstein's photo electric equations – Super conductors: Introduction – General properties – types of super conductors – Application – Solar Cells.

#### **UNIT – V: ELECTRONIC MATEERIALS**

Introduction - Classification – Electrical conduction in materials – Expression for electrical conductivity – Dielectric materials: Definitions – types of polarization – Internal fields – types of dielectric materials – Clausis – Mossoti relation – dielectric loss – dielectric breakdown – dielectric properties – Magnetic materials: Definition – types of magnetic materials – Hard and soft magnetic materials.

#### **REFERENCES :**

1. Rajendran V and Manickam A – Applied Physics for Engineers – Tata Mc Graw Hill, New Delhi 2<sup>nd</sup> Edition 1999.

## **II YEAR – IV SEMESTER**

### **DIGITAL ELECTRONICS**

#### **UNIT - I: NUMBER SYSTEMS**

Binary, Octal, Decimal, Hexa Decimal – Number base Conversion – complements – Signed binary Numbers – Binary Arithmetic – Binary Codes: Weighted – BCD – 2421 – Gray Code – Excess 3 code – ASCII – Error Detecting Code – Conversion from one Code to Another – Boolean Postulates and Laws – Demorgan’s Theorem – Principle of Duality – Boolean Expression – Boolean Functions – Minimization of Boolean Expressions - Sum of product(SOP) – Product of Sum (POS) – Minterm – Maxterm – Canonical Forms – Conversions between Canonical Forms – Karnaugh Map Minimization – don’t care Condition.

#### **UNIT – II: LOGIC GATES**

AND, OR, NOT, NAND, NOR, Exclusive – OR and Exclusive – NOR – Implementation of Logic Functions using gates, NAND – NOR Implementation – Multi Level Gate Implementation – Multi Output Gate Implementation. TTL and CMOS Logic and their Characteristics – Tri state Gates.

Combinational Circuits : Design Procedure – Adders – Subtractors – Serial Adder/ Subtractor – Parallel Adder/ Subtractor – Carry look ahead Adders – BCD Adder – Magnitude Adder – Multiplexer/Demultiplexer – Encoder/Decoder – Parity Checker – Code Converters. Implementation of Combinational Logic Using MUX,ROM,PAL and PLA.

#### **UNIT – III: SEQUENTIAL CIRCUIT**

Flip-flops SR, JK, T, D and Master slave – Characteristics table and equation – application table – edge triggering – level triggering – Realization of one flip flop using other flip flops- Asynchronous/Ripple sequential circuits – Moore and Mealy – design of synchronous counters: state diagram – state table – state minimization – state assignment – ASM – Excitation table and maps – circuit implementation – register – shift registers – universal shift register – shift counters – ring counters.

#### **UNIT - IV: ASYNCHRONOUS SEQUENTIAL CIRCUITS**

Design of fundamental mode and pulse mode circuits- primitive state/flow table – minimization of primitive state table – state assignment – excitation table – excitation map – cycles – races- hazards: static – dynamic – essential – hazards elimination.

## **UNIT -V: MEMORY DEVICES**

Classification of memories – RAM organization – write operation – read operation – memory cycle – timing wave forms- memory decoding – memory expansion – static RAM cell- Bipolar RAM cell – MOSFET RAM cell – dynamic RAM cell – ROM organization – PROM – EPROM – EEPROM – EAPROM – Programmable logic devices – Programmable Logic Array (PLA) – Programmable Array Logic (PAL) – field Programmable Gate Arrays(FPGA).

### **BOOKS FOR STUDY:**

1. M.Morris Mano, “Digital Design”, 3<sup>rd</sup> edition, Prentice Hall of India Pvt.LTd., Newdelhi, 2003 / Pearson Education (Singapore) Pvt.Ltd., New delhi, 2003 – (unit I, II, V)
2. John. M Yarbrough, “Digital Logic Applications and Design”, Thomson – Vikas publishing house, New Delhi, 2002.(Unit III, IV)

### **REFERENCES:**

1. R.P. Jain, “Modern Digital Electronics”,3<sup>rd</sup> edition, Tata McGraw- Hill publishing company limited, New Delhi, 2003
2. Thomas L. Floyd, “Digital Fundamentals, Pearson Education, Inc, New delhi,2003

## **II YEAR – IV SEMESTER**

### **ELECTRONICS PRACTICAL – IV (Digital Circuits Lab)**

List of Experiments (Any Ten)

1. Study of Logic Gates & Universal Gates.
2. Study of Multiplexer and Demultiplexer (Dedicated Chip).
3. Study of Encoder and Decoder (Dedicated Chip).
4. Study of BCD Adder & Subtractor (Dedicated Chip).
5. Study of Flip-Flops (SR, JK, D & T).
6. Construction and Verification of 4-bit Synchronous Counter.
7. Construction and Verification of 4-bit Asynchronous Counter.
8. Construction and Verification of 3-bit Up/Down Synchronous Counter.
9. Construction and Verification of 4-bit Modulo N-Counter.
10. Construction and Verification of Code Converters.
11. Implementation of Shift Registers using Flip-flops.
12. Design and implementation of 8-bit Odd/ Even Parity Generator/Checker.

## **II YEAR – IV SEMESTER**

### **ALLIED PHYSICS – II**

#### **UNIT – I: FUNDAMENTALS OF MAGNETIC PHENOMENA**

Coulomb's Law – Magnetic field and magnetic Intensity – Magnet in a uniform field and magnetic moment – Magnetic potential – Potential and Intensity at any point due to bar Magnet (dipole) – Oersted's experiment – Ampere's law – Magnetic field at a point on the axis of a circular coil carrying current and solenoid – Force experienced by a conductor carrying current – force between two conductors carrying current.

#### **UNIT – II: MEASURING INSTRUMENTS**

Tangent Galvanometer – Moving coil galvanometer – Moving coil Ballistic Galvanometer – Correction for damping in BG – Characteristics of Galvanometer – Figure of merit and Resistance of the galvanometer – Ammeter and Voltmeter – Determination of absolute capacity of a condenser.

#### **UNIT – III: ELECTRICAL MEASUREMENTS**

Kirchoff's law – Wheatstone bridge – Meter bridge – Post office box – Carey Foster's bridge – potentiometer – Determination of Internal resistance of a cell – calibration of ammeter and voltmeter – Determination of Resistance.

#### **UNIT – IV: ELECTROMAGNETIC INDUCTION**

Faraday's law – Lenz law – Fleming's right hand rule – Self Induction – Definition – units – Self inductance of a long solenoid – energy stored in an inductance – L by Rayleigh's method – Mutual Induction – Mutual inductance of a two solenoids – Determination of mutual inductance.

#### **UNIT–V:PRACTICAL APPLICATION OF ELECTROMAGNETIC INDUCTION**

Measurement of strong magnetic field (Search coil) – Eddy currents – ac generators – poly phase circuits – Single and Three Phase generators – distribution of three phase ac – dc generator – energy losses – dc motors – transformers.

#### **REFERENCES :**

1. A Text book of Electricity and Magnetism – Brijlal and N.Subramaniam, Ratan Prakashan Mandir, Twentieth Revised and Enlarged edition 2000.

**II YEAR – IV SEMESTER**  
**ALLIED: PHYSICS PRACTICAL - I**

**Any 16 of the following**

1. Spectrometer – Refractive index of a prism.
2. Spectrometer – Grating – Minimum Deviation – Wavelength.
3. Field along the axis of a coil – Field
4. Field along the axis of the coil – Moment of magnet – TAN A
5. Convex lens
6. Concave lens
7. P.O Box – Temperature coefficient – thermister.
8. Carey Foster's Bridge – R and n
9. Potentiometer – Ammeter Calibration
10. Potentiometer – Resistance of a coil of wire R and n.
11. BG – Figure of merit & Resistance of the Galvanometer
12. BG – Determination of C.
13. Conversion of Galvanometer into Voltmeter.
14. Conversion of Galvanometer into Ammeter.
15. Newton's law of cooling.
16. K – Forbe's Method.
17. Resonators.
18. Air wedge – Thickness of a wire.
19. Newton's Rings – Determination of R.
20. Sonometer – Frequency.

## **III YEAR – V SEMESTER**

### **COMMUNICATION SYSTEM**

#### **UNIT – I: AMPLITUDE MODULATION**

Modulation –Types of modulation (AM, FM and PM) – Mathematical expression for AM wave – Side frequencies – Modulation index – Power relationship – Component phasor of AM signal – Spectrum of AM wave.

Generation of AM waves – Linear modulation – Collector, base and emitter modulation – Square law modulator – Balanced Modulator – SSB-SC generation – VSB.

Demodulation of AM waves – Envelope and synchronous detector.

#### **UNIT – II: FREQUENCY AND PHASE MODULATION**

Angle modulation – Phase and frequency modulation – Mathematical representation of FM and PM – Frequency spectrum of FM – Bandwidth of FM : Bessel's identity – Carson's rule – Spectrum of Narrow Band and Wide Band FM. Generation of FM – Direct and Indirect method – Relationship between FM and PM – Pre-emphasis and de-emphasis in FM. Demodulation of FM waves – Slope detector – Balanced slope detector – Foster-Seeley discriminator – Ratio detector – Amplitude limiter.

#### **UNIT – III: TRANSMISSION LINES & TELEPHONE SYSTEMS**

Introduction – primary line constants – phase velocity and line wavelength – characteristic impedance – the propagation coefficient – phase and group velocities – standing waves – loss less lines at radio frequencies – voltage standing wave ratio – wire telephony – Telephone circuits – transmission bridges - the four wire terminating set – two wire repeaters – four wire transmission – public telephone network – electronic switching – trunk circuits – private telephone networks

#### **UNIT – IV: INFORMATION THEORY**

Uncertainty - Information and Entropy - Source coding theorem - Data Compaction - Discrete memory less channels - Mutual information - Channel capacity - Channel coding theorem – Differential Entropy – Mutual information for continuous ensembles – information capacity theorem – implication of the information capacity theorem – Rate distortion theory – compression of information.

## **UNIT – V: DIGITAL COMMUNICATION**

Sampling theory – pulse amplitude modulation – pulse code modulation – pulse frequency modulation – pulse time modulation – pulse position modulation – pulse width modulation – amplitude shift keying – frequency shift keying – phase shift keying – concepts of TDMA and FDMA.

### **BOOKS FOR STUDY:**

1. Kennedy and George Davis, “Electronic Communication Systems” 4<sup>th</sup> edition, 1999.
2. Dennis Roddy and John Coolen, “Electronic Communications” 4<sup>th</sup> editon, PHI, 1997.
3. Simon Haykin, “Communication Systems”, John Wiley & Sons, NY, 4<sup>th</sup> Edition, 2001.

### **REFERENCES:**

1. Taub and Schilling, “Principles of Communication”, Tata McGraw Hill, New Delhi, 1995.
2. Bruce Carlson et al, “Communication Systems”, MHI, 4<sup>th</sup> Edition, 2002

## **III YEAR – V SEMESTER**

### **LINEAR INTEGRATED CIRCUITS**

#### **UNIT-I: INTEGRATED CIRCUIT FABRICATION**

Classification – IC chip size and circuit complexity - Fundamentals of Monolithic IC technology - Basic planar process-Fabrication of a typical circuit - Active and Passive components for ICs - Fabrication of FET's - Thick and Thin film technology - Technology trends.

#### **UNIT-II: OP-AMP THEORY & APPLICATIONS**

Ideal Characteristics of an Op – Amp – Internal Architecture of op – Amp (741) - Differential amplifier - DC analysis - Bias & offset currents - Offset voltages - CMRR- AC analysis- Slew rate - Frequency response - Basic application- Inverting amplifier - Non-inverting amplifier - Summing amplifier – Subtractors – Integrator – Differentiator - V-I converter- I-V converter- Instrumentation amplifier.

#### **UNIT-III: COMPARATORS AND ITS APPLICATIONS**

Comparator- Op-amp as comparator- High-speed comparators- Comparator characteristics - Comparator applications -Schmitt trigger- Window detector- Peak detector- Clippers and Clampers-Positive and Negative clippers- Small-signal Half wave rectifiers- Positive and Negative clampers- Sample and Hold circuits.

#### **UNIT-IV: WAVEFORM GENERATORS AND FILTERS**

Oscillator- Phase shift oscillator- Wien's bridge oscillator- Square wave generator- Triangular wave- Saw tooth waveform generator - Active filter- first order Low- pass Butter worth filter- first order High-Pass Butter worth filter- Band pass filters- Band reject filter- IC voltage regulators (78XX series only).

#### **UNIT-V: TIMER AND D/A, A/D CONVERTERS**

555 Timer- Functional block diagram - Monostable Multivibrators, Astable Multivibrator - VCO- PLL- applications- D/A converters- binary weighted resistors method- R-2R ladder network method- A/D converters- Successive approximation A/D converter- Flash converter.

**BOOKS FOR STUDY:**

- 1) Ramakant A.Gayakwad, “Op-amps & Linear Integrated Circuits”,3<sup>rd</sup> edition, Prentice Hall India.
- 2) D.Roy Choudhury & Shail Jain, “Linear Integrated Circuits”,2000 Reprint, New Age International (P) Limited.

**REFERENCES:**

- 1) William D. Stanley, “Operational Amplifier with Linear Integrated Circuits” Pearson Education, 2004.

## **III YEAR – V SEMESTER**

### **MICROPROCESSOR & MICROCONTROLLER**

#### **UNIT - I: ARCHITECTURE & INSTRUCTION SET - 8085**

Intel 8085 Architecture -Instruction Cycle-Fetch operation Execute operation-Machine cycle and State-Instruction and Data flow-Timing Diagram-Timing diagram for opcode Fetch cycle Memory read-I/O Read-Memory write-I/O write

Instruction and Data formats-Addressing modes-Direct-Registers-Register indirect-Immediate and Implicit addressing-Status flags-Intel 8085 instructions-Data Transfer group-Arithmetic group-Logical group-Branch group-Stack, I/O and Machine control groups.

#### **UNIT - II: ASSEMBLY LANGUAGE PROGRAMMING - 8085**

Machine language-Assembly language-One pass and two pass assembler-Applications-stacks-subroutines- Data transfer and data manipulation programs-single byte and multi-byte arithmetic- Multiplication - Division - complement-shift-mask-Look-up table-larger-smaller-sorting-Array-manipulation-sum of series - Checksum Generation – CRC generation.

#### **UNIT – III: MICROCONTROLLER - 8051**

Pin description of 8051 - Architecture of 8051 - I/O - Pin designations and Programming - Bit manipulations - Program counter and RAM, FLAGS & PSW register - Register Bank and Stack - Addressing modes- Immediate, Register, Accessing memory using addressing modes, Unsigned, Signed Arithmetic instructions, Logical and compare instructions, rotate and Swap, Loop and Jump instructions, CALL instructions, Time delay and generation and calculation.

#### **UNIT – IV: ON CHIP PERIPHERALS - 8051**

Timer – Modes of timer – time delay using timer - 8051 Timer programming-application of timer - counter programming - counter applications - Interrupts in 8051-priorities - programming external interrupts - 8051 Serial communications - RS232 Interface - Modes of serial communication.

#### **UNIT-V: ASSEMBLY LANGUAGE PROGRAMMING - 8051**

Array Manipulation – Accessing RAM Memory – Accessing ROM Space - Interfacing an LCD - Interfacing ADC - Interfacing DAC - Interfacing Keyboard - Interfacing Stepper motor - Serial Programming - Temperature Monitor System – Interrupt Programming (Maskable and Non Maskable) - Concepts of emulator and simulator.

**BOOKS FOR STUDY:**

1. Ramesh S. Gaonkar, “Microprocessor Architecture, programming and Application with the 8085”, 4<sup>th</sup> Edition, Penram International Publishing India, 2002.
2. Muhammad Ali Mazidi, Janice Gillspie Mazidi, “The 8051 Microcontroller and Embedded systems”, 7<sup>th</sup> Indian reprint,2002, Pearson Education.

**REFERENCES:**

1. The 8051 Micro controller Architecture, Programming&Applications ( 2<sup>nd</sup> edition) by Kenneth J ayala
2. Mike Prediko, “Programming and Customizing Microcontroller” PHI,2002.

### **III YEAR – V SEMESTER**

#### **ELECTRONICS PRACTICAL–V (Communication & LIC Lab)**

##### **List of Experiments (Any Ten)**

1. Study of Amplitude Modulation and Demodulation.
2. Study of Frequency Modulation and Demodulation.
3. Study of Pulse Amplitude Modulation and Demodulation.
4. Study of Pulse Position Modulation and Demodulation.
5. Study of Pulse Width Modulation and Demodulation.
6. Study of Transmission Line Characteristics.
7. Construct and Analyze Inverting, Non-Inverting & Differential Amplifiers.
8. Construct and Analyze Integrator and differentiator.
9. Construct and Analyze Instrumentation Amplifier.
10. Construct and Analyze Active Filter (LPF & HPF).
11. Construct and Analyze DC Power Supply Using IC 7805 & 7905.
12. Construct and Analyze IC 555 in Astable and Monostable mode.

### **III YEAR – V SEMESTER**

#### **ELECTRONICS PRACTICAL – VI (Microprocessor Lab)**

##### **List of Experiments (Any Ten)**

1. Microprocessor 8085 - Programming I
2. Microprocessor 8085 - Programming II
3. Microprocessor 8085 - Programming III
4. Microprocessor Interfacing – Input and Output using 8255 PPI
5. Microprocessor Interfacing – Display.
6. Microprocessor 8085 - Programming IV
7. Microprocessor 8085 - Programming V
8. Microprocessor Interfacing – Traffic Controller.
9. Microprocessor Interfacing – Temperature Controller.
10. Microprocessor Interfacing – Stepper Motor Controller.
11. Microprocessor Interfacing – Keyboard.
12. Microprocessor Interrupt Programming.

Programming I: Data transfer and rotate operations.

Programming II: Arithmetic Operation (addition, subtraction, multiplication and division).

Programming III: Code conversion (Gray to Binary, Binary to BCD Binary to Gray, BCD to Binary etc).

Programming IV: Array manipulation (largest, smallest, sorting in ascending order and descending order).

Programming V: Using user routines in Monitor program (clear display, display the data in the address field & data field, delay subroutine, read keyboard etc).

## **III YEAR – VI SEMESTER**

### **EMBEDDED SYSTEMS**

#### **UNIT -I: INTRODUCTION TO EMBEDDED SYSTEMS**

Introduction- Application of embedded systems – DSP architecture – Communication interface standards – Development tools – Embedded system development process – Operating system – Kernel architecture – Evolution of RTOS – programming languages – structure of C compiler.

#### **UNIT -II: DEVICES AND BUSES FOR DEVICES NETWORK**

I/O Devices – Device I/O Types and Examples – Synchronous – Iso – Synchronous and Synchronous communication from serial Devices – Example of Internal serial Communication Devices – UART and HDLC – Parallel port Devices – sophisticated interfacing features in Device/Ports – Timer and counting Devices – 'I2C' – 'USB' – 'CAN' – and Advanced I/O Serial high speed buses – ISA – PCI – PCI – X – cPCI and Advanced buses

#### **UNIT -III: I/O PROGRAMMING & CONCURRENCE SOFTWARE**

The Intel I/O instructions – synchronization, transfer rate, and latency – polled waiting loops – interrupt driven I/O – DMA – comparison of methods – foreground/background systems – multithreaded programming – shared resources and critical section.

#### **UNIT -IV: SCHEDULING & SYSTEM INITIALISATION**

Thread states – pending threads – context switching – round robin scheduling – priority based scheduling – assigning priorities – deadlock – watchdog timers – recognizing shared objects – reentrant functions – read only data – coding practices to avoid – accessing shared memory.

#### **UNIT- V: CASE STUDY AND FUTURE TRENDS**

CRC test for memory – Serial communication with 8051 Micro controller – PC to PC communication - System on a Chip (SOC) – Smart cards and the cashless society- Security in embedded system.

**BOOKS FOR STUDY:**

1. Daniel W. Lewis, "Fundamentals of embedded software", Prentice Hall of India, New Delhi (2003)
2. Dream tech Software Team, "Programming for embedded systems", Wiley Publishing, New Delhi (2004).
3. Rajkamal, "Embedded Systems Architecture, Programming and Design", TMH, First Reprint, 2003.

**REFERENCES:**

1. Steve Heath, " Embedded Systems Design" 2<sup>nd</sup> Edition, 2003
2. David E. Simon " An Embedded Software Primer" , Pearson Education Asia, First Indian Reprint 2000.
3. Wayne Wolf, " Computer as Components; Principles of Embedded Computing Systems Design " – HarCourt India, Morgan Kaufman Publishers, First Indian Reprint 2001.

## **III YEAR – VI SEMESTER**

### **SIGNALS AND SYSTEMS**

#### **UNIT – I: SIGNAL AND SYSTEM**

Continuous-time and discrete time signals – Transformation of the Independent Variable – Exponential and sinusoidal signals – Unit impulse and Unit step Function – Continuous time and Discrete Time Systems – Basic System Properties – Problems.

#### **UNIT – II: LINEAR TIME INVARIANT SYSTEM**

Introduction – Discrete time Linear Time Invariant systems – The convolution sum – Representation of discrete time signals in terms of impulses – The discrete time unit impulse response and convolution sum representation of Linear Time Invariant systems – Continuous-time Linear Time Invariant systems – The convolution integral – Representation of continuous signals in terms of impulses – The continuous time unit impulse response and convolution integral – Properties of linear time invariant systems – Causal LTI Systems described by difference and differential Equation.

#### **UNIT – III: LAPLACE AND Z TRANSFORMS**

Laplace Transform – Region of Convergence for Laplace Transform – Inverse Laplace Transform – Geometric Evaluation of Fourier Transform from the poles zero plot – Properties of Laplace Transform.

Z transform – Region of Convergence for Z Transform - Inverse Z Transform – Geometric Evaluation of Fourier Transform from the poles zero plot – Properties of Z Transform.

#### **UNIT – IV: FOURIER SERIES REPRESENTATION OF PERIODIC SIGNALS**

The response of LTI systems to complex exponentials – Continuous time periodic signals – Convergence of Fourier series – Properties of CTFS. Discrete time periodic signals – Properties of DTFS – Fourier Series And LTI Systems - Filtering.

#### **UNIT – V: FOURIER TRANSFORM**

Continuous Time Fourier Transform (CTFT) for periodic signals – Properties – System characterization by linear constant coefficient differential equations. Discrete Time Fourier Transform (DTFT) for periodic signals – Properties – System characterization by linear constant coefficient differential equations.

**BOOKS FOR STUDY:**

1. Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab, "Signal and systems", PHI, 2nd Edition 2004.
2. S. Poornachandra, "Signals and System", Vijay Nicole Imprints Pvt. Ltd. 1st Edition 2004.

**REFERENCES:**

1. John G. Proakis and Dimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithm and Applications, 3<sup>rd</sup> Edition, PHI, 2000
2. M. J. Roberts, "Signals And Systems Analysis Using Transform method and MATLAB", TMH, 2003.

## **III YEAR – VI SEMESTER**

### **ELECTRONIC INSTRUMENTATION**

#### **UNIT-I: MEASUREMENTS**

Performance Characteristics- Static Characteristics- Error in measurement- types of error- sources of error- dynamic characteristics- statistical analysis- electrical standards - IEEE 488 Electrical Standard.

#### **UNIT-II: MEASUREMENTS OF ELECTRICAL QUANTITIES**

DC ammeter- Multirange ammeters- Ayrton shunt- basic meter as a DC voltmeter- DC voltmeter- multirange voltmeter- loading- Transistor voltmeter-micro voltmeter-AC voltmeter using rectifiers - series type ohmmeter- shunt type ohmmeter- multimeter- Oscilloscopes- basic principle- block diagram of oscilloscope- vertical amplifier- horizontal deflecting system- delay line in triggered sweep.

#### **UNIT-III: TRANSDUCERS**

Selecting a transducer- resistive transducer- strain gauges - thermistor- inductive transducer- differential transducer- LVDT- capacitive transducer- load cell- piezo transducer-photo electric transducers- photo voltaic cell- semiconductor photo diode- photo transducer- thermo electric transducers.

#### **UNIT-IV: MEASUREMENT OF NON- ELECTRICAL QUANTITY**

Measurement of Torque – Tachometers -stroboscope– Measurement of Vibrations – Measurement of flow – Measurement of Liquid Level – Measurement of Thickness – Measurement of pH value – Gas Analyser.

#### **UNIT-V: SIGNAL CONDITIONING CIRCUITS AND RECORDERS**

Signal conditioning – operational amplifier circuits used in Instrumentation – common mode signals – advantages of differential amplifier –charge amplifier – Instrumentation amplifier –AM and demodulation circuits for measurement system– AC Bridge – types of ADC. Log and Anti Log Amplifier –Strip chart recorders – XY recorders – UV recorders – magnetic tape recorders.

**BOOKS FOR STUDY:**

1. Kalsi. H.S, "Electronic instrumentation", NewDelhi, Tata McGraw Hill publishing Ltd, 1995.
2. A. K. Sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation", 2001, Dhanpat Rai & Co.

**REFERENCES:**

1. Albert D.Helbrick and William D.Cooper, "Modern Electronic Instrumentation and Measurement techniques", New Delhi: Prentice Hall of India, 1995.

## **III YEAR – VI SEMESTER**

### **VLSI CIRCUITS**

#### **UNIT – I: SEMICONDUCTOR DEVICES FOR VLSI TECHNOLOGY**

Basic MOS transistor – enhancement and depletion mode transistor action – NMOS fabrication – CMOS fabrication – BICMOS technology – pass transistor – Nmos, CMOS and BICMOS inverter – latch-up in CMOS & BICMOS circuits – gallium arsenide crystal structure – comparison of CMOS bipolar and GaS – metal semiconductor FET (MESFET).

#### **UNIT – II: BASICS OF CIRCUIT DESIGN AND CONCEPTS**

MOS layer – stick diagram – design rules and layout diagram – symbolic diagram – concepts – sheet resistance – capacitance – delays – driving large capacitive loads – propagation delays – wiring capacitance

#### **UNIT – III: SCALING DESIGN AND TESTING FOR VLSI SYSTEM**

Scaling factor for device parameter – limitation of scaling – switch logic – gate logic – examples of structure design – clocked sequential circuits – real world VLSI design – test and test ability

#### **UNIT – IV : CLOCKING STRATEGY**

Clocked system – Latches and Registers – System Timing – Setup and Hold time – single phase memory Structures – Phase Locked Loop clock Techniques – Metastability and Synchronization failure – Single Phase Logic Structure – Two Phase Clocking - Two Phase memory structures - Two Phase Logic Structure – Four Phase Clocking - Four Phase memory structure - Four Phase Logic Structure – Recommended Clocking Approaches – Clock distribution.

#### **UNIT – V: CMOS SUBSYSTEM DESIGN**

Data Path operation – addition/ Subtraction – Parity Generator – Comparator – Zero/One Detector – Binary Counter – Boolean Operation – Multiplication – Shifter – Memory Element – Read/Write memory – RAM – Register Files – FIFO – LIFO – SIPO – Serial Access memory – Read only Memory – Content Addressable memory.

**BOOKS FOR STUDY:**

1. Douglas A. Pucknell & Kamran Eshraghian, "Basic VLSI Design" (3<sup>rd</sup> edition)  
Prentice hall of India pvt Ltd. New Delhi.
2. Neil H.E.Weste, "Principles of CMOS VLSI Design", TLW, Inc.,(New Delhi:  
Addison Wesley 1993)

**REFERENCES:**

1. Wayne Wolf," Modern VLSI Design ", Pearson Education, 2003.
2. M.J.Smith ,"Application Specific Integrated Circuits "Pearson  
Education ,1997.

### **III YEAR – VI SEMESTER**

#### **ELECTRONICS PRACTICAL – VII (Micro controller Lab)**

##### **List of Experiments (Any Ten)**

1. Microcontroller 8051 - Programming I
2. Microcontroller 8051 - Programming II
3. Microcontroller 8051 - Programming III
4. Microcontroller Interfacing – Input and Output using 8255 PPI
5. Microcontroller Interfacing – Display.
6. Microcontroller 8051 - Programming IV
7. Microcontroller 8051 - Programming V
8. Microcontroller Interfacing – Traffic Controller.
9. Microcontroller Interfacing – Temperature Controller.
10. Microcontroller Interfacing – Stepper Motor Controller.
11. Microcontroller Interfacing – Keyboard.
12. Microcontroller Interfacing - DAC.

Programming I: Data transfer and rotate operations.

Programming II: Arithmetic Operation (addition, subtraction, multiplication and division).

Programming III: Code conversion (Gray to Binary, Binary to BCD Binary to Gray, BCD to Binary etc).

Programming IV: Array manipulation (largest, smallest, sorting in ascending order and descending order).

Programming V: Using user routines in Monitor program (clear display, display the data in the address field & data field, delay subroutine, read keyboard etc).

### **III YEAR – VI SEMESTER**

#### **ELECTRONICS PRACTICAL – VIII (Embedded Lab)**

##### **List of Experiments (Any Ten)**

1. Study of  $\mu$  - Vision IDE to compile a program (ASM & 'C').
2. Study of  $\mu$  – Vision IDE to simulate a program (ASM & 'C').
3. Study of  $\mu$ C Flash (Microcontroller Programmer).
4. Developing a Firm-ware and burning a microcontroller (simple interfacing).
5. Developing a Firm-ware to demonstrate External Interrupts.
6. Developing a Firm-ware to demonstrate Timer Application.
7. Developing a Firm-ware to demonstrate Serial Communication.
8. Developing a Firm-ware to demonstrate Counter Application.
9. Developing a Firm-ware to interface I2C Devices.
10. Developing a Firm-ware to interface LCD.
11. Developing a Firm-ware to interface Keyboard.
12. Developing a Firm-ware to interface Printer.

## **IV YEAR – VII SEMESTER**

### **DIGITAL SIGNAL PROCESSING**

#### **UNIT – I: DISCRETE TRANSFORMS**

Introduction – Review of Z transform – Discrete Transforms : Discrete-Time Fourier transform (DTFT), Discrete convolutions – Linear, circular and sectioned convolution – Discrete Fourier Transform – Properties – Computational complexity of DFT – Frequency analysis of signals using DFT – Decimation-in-time, Fast Fourier Transform algorithm, Inverse FFT.

#### **UNIT – II: FINITE IMPULSE RESPONSE (FIR) FILTERS**

Symmetric and antisymmetric FIR filters – Design of Linear Phase FIR filters using rectangular, Hanning, Hamming and Blackman windows. Design of Linear phase FIR filters by frequency sampling method – Optimum equiripple linear phase FIR filter – Comparison of design methods for linear phase FIR filter.

#### **UNIT – III: INFINITE IMPULSE RESPONSE (IIR) FILTERS**

Characteristics of analog filters: Butterworth, Chebyshev and Elliptic types – IIR filter design by impulse invariance method – IIR filter by bilinear transformation – Frequency transformation in the analog and digital domain.

#### **UNIT – IV: IMPLEMENTATION OF DISCRETE-TIME SYSTEMS AND APPLICATIONS OF DSP**

Structures for the realization of discrete time systems – Representation of numbers – Quantisation of filter coefficients – Round-off effects in Digital filters. Applications of DSP (concepts only): DSP in speech processing, Image processing, RADAR and SONAR.

#### **UNIT – V: MULTIRATE DIGITAL SIGNAL PROCESSING**

Introduction – Decimation by a factor D – Interpolation by a factor I- sampling rate conversion by a rational factor I/D- Filter design and implementation for sampling rate conversion – sampling rate conversion for band pass signals – applications of multirate signal processing.

**BOOKS FOR STUDY:**

1. John G. Proakis, Dimitris G.Manolakis, “Digital Signal processing principles, Algorithm and Applications”, 2004,PHI, New Delhi.
2. Oppenheim and Schafer, “Discrete Time Signal Processing”, 2<sup>nd</sup> Edition, PHI, 1999.

**REFERENCES :**

1. Salivahanan .S, “Digital Signal Processing”, New Delhi: Tata McGraw Hill Publishing, 2003.

## **IV YEAR – VII SEMESTER**

### **PRINCIPLES OF MANAGEMENT**

#### **UNIT – I: HISTORICAL DEVELOPMENT**

Definition of Management – Science or Art – Management and Administration – Development of Management thought – Contribution of Taylor and Fayol – Functions of Management – Types of Business Organisation.

#### **UNIT – II: PLANNING**

Nature & Purpose – Steps involved in planning – Objectives – Setting Objectives – Process of Managing by Objectives – Strategies, Policies & Planning Premises – Forecasting – Decision-making.

#### **UNIT – III: ORGANISING**

Nature and Purpose – Formal and information organization – Organization Chart – Structure and Process – Departmentation by difference strategies – Line and staff authority – Benefits and Limitations – De-Centralization and Delegation of Authority – Staffing – Selection Process – Techniques – HRD – Managerial Effectiveness.

#### **UNIT – IV: DIRECTING**

Scope – Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment – Communication – Process Communication – Barriers and Breakdown – Effective Communication – Electronic media in Communication.

#### **UNIT – V: CONTORLLING**

System and process of Controlling – Requirements for effective control – The budget as control Technique – Information Technology in controlling – Use of computers in handling the information – Productivity – Problem and Management – Control of Overall Performance – Direct and Preventive Control – Reporting – The Global Environment – Globalization and Liberalization – International Management and Global theory of Management.

**BOOKS FOR STUDY:**

1. Harold Koontz & Heinz Weihrich, “ Essentials of Management”, Tata McGraw-Hill, 1998.
2. Joseph L Massie, “Essentials of Management”, Prentice Hall of India, Pearson, Fourth edition,2003.

**REFERENCES:**

1. Tripathy PC and Reddy PN, “Principles of Management”, Tata McGraw-Hill ,1999.

## **IV YEAR – VII SEMESTER**

### **MEDICAL ELECTRONICS**

#### **UNIT –I: BIOPOTENTIAL ELECTRODES AND TRANSDUCERS**

Introduction – Design of Medical instruments – Components of the biomedical instrument system – Electrodes – Transducers (Up to loading effect and sensitivity of Bridge).

#### **UNIT –II: BIOSIGNAL ACQUISITION**

Definition.–Isolation amplifiers – Medical preamplifier design – Biosignal analysis – Signal recovery and data acquisition – Pattern recognition.

#### **UNIT-III: BIO POTENTIAL RECORDERS AND PHYSIOLOGICAL ASSIST DEVICES**

Characteristics of the recording system – Electrocardiography (ECG) (Up to analysis of recorded signals)- Electromyography (EMG) – ElectroEncephaloGraphy (EEG)- pacemakers- Artificial heart valves-Defibrillators.

#### **UNIT –IV: OPERATION THEATRE AND SPECIALISED EQUIPMENT**

Anesthesia machine –Ventiliators - Gas analysers - Elements of intensive care monitoring - Blood cell counter – Audiometers - X-ray machine – Angiography.

#### **UNIT-V: BIOTELEMETRY AND ADVANCES IN BIOMEDICAL INSTRUMENTATION:**

Elements of biotelemetry system - Design of a biotelemetry system - Radio telemetry system - uses of bio-telemetry - computers in medicine - Endoscopes- Cryogenic surgery - Computer tomography - Digital subtraction angiographies - Biofeedback instrumentation.

#### **BOOK FOR STUDY:**

1. Dr.M.Arumugam, “Biomedical Instrumentation”, 2<sup>nd</sup> edition, Anuradha publications.

#### **REFERENCES:**

1. Khandpur,R.S. “Hand book of Bio-medical Instrumentation”.

## **IV YEAR – VII SEMESTER**

### **INDUSTRIAL POWER ELECTRONICS**

#### **UNIT - I: CONTROLLED RECTIFIERS**

Principle of Phase Control-Single-phase Half-wave circuit with RL load-Single-phase Half-wave circuit RL load and Freewheeling Diode-Single-phase Full-wave Converters-Single-phase Full-wave Mid-point Converter-Single-phase Full-wave Bridge Converter- Single-phase Full Converter- Single-phase Semi Converter-Three-phase Thyristor Converter Circuit-Three-phase Full Converter Circuit- Three-phase Semi Converter Circuit.

#### **UNIT - II: CHOPPERS**

Principle of Chopper Operation-Control Strategies-Constant Frequency System-Variable Frequency System-Step-up Choppers-Types of Chopper Circuits-First-quadrant-Second-quadrant-Two-quadrant Type A Chopper-Two-quadrant Type B Chopper-Four-quadrant Chopper-Steady State Time-domain Analysis of Type A Chopper.

#### **UNIT - III: INVERTERS**

Single-phase Voltage Source Inverter-Operating Principles-Single-phase Bridge Inverter-Steady-State Analysis of Single-phase Inverters-phase Inverter Output Voltage-Force Commutated Thyristor Inverter-Modified McMurray Half-Bridge Inverter-Modified McMurray Full-Bridge Inverter.

#### **UNIT - IV: SMPS AND HVDC**

Switched Mode Power Supply - Push-pull Converter - Half-bridge Converter-Full-bridge Converter - Uninterrupted Power Supply - High Voltage DE Transmission-Types of HVDC Link - Bipolar HVDC System - Control of HVDC Converter.

#### **UNIT – V: SOLID STATE RELAYS AND DRIVES**

Static Switches-Single-phase AC Switches-DC Switches-Design of Static Switches-Static Circuit Breaker-Static AC Circuit Breaker-Static DC Circuit Breaker-Solid State Relays-DC Drivers-Basic Performance Equation of DC Motor-Chopper Drivers-Power Control (or) Motor Control.

#### **BOOK FOR STUDY:**

1. Bimbra P.S, “Power Electronics”, Khanna Publishers, Delhi, Fourth Edition: 2006.

#### **REFERENCES:**

1. P.C.SEN, “Power Electronics”, 6<sup>th</sup> edition, New Delhi, Tata McGraw Hill,1993.

**IV YEAR – VII SEMESTER**  
**ELECTRONICS PRACTICAL – IX (DSP Lab)**

**List of Experiments (Any Ten)**

1. Generation of signals using MATLAB.
2. Demonstration of Linear & Circular Convolution of two sequences using MATLAB.
3. Sampling and Effect of Aliasing using MATLAB.
4. Calculation of FFT of a signal using MATLAB.
5. Stability Test of a system using MATLAB.
6. Demonstration of Discrete correlation using MATLAB.
7. Study of various addressing modes of P-DSP using simple program.
8. Sampling of input and display using P-DSP.
9. Perform 8-point DFT of a signal and display using P-DSP.
10. Perform FFT of a signal and display using P-DSP.
11. Perform IIR filter of a signal and display using P-DSP (Any Two Type).
12. Perform FIR filter of a signal and display using P-DSP (Any Two Type).

**IV YEAR – VII SEMESTER**  
**ELECTRONICS PRACTICAL – X (VLSI Lab)**

**List of Experiments (Any Ten)**

1. Study of Simulation using QUARTUS Tools.
2. Study of Synthesis using QUARTUS Tools.
3. Study of Implementation using QUARTUS Tools.
4. Study of Simulation using MODELSIM Tools.
5. Study of Synthesis using XILINX Tools.
6. Study of Implementation using XILINX Tools.
7. Demonstration of Architectural Design (VHDL).
8. Demonstration of Behavioral Design (VHDL).
9. Demonstration of Structural Design (VHDL).
10. Demonstration of Architectural Design (Verilog).
11. Demonstration of Behavioral Design (Verilog).
12. Demonstration of Structural Design (Verilog).

**IV YEAR – VIII SEMESTER**

**----- PROJECT WORK -----**

## **CORE ELECTIVE PAPERS**

### **DATA COMMUNICATION AND NETWORKS**

#### **UNIT – I: INTRODUCTION**

Introduction to Data Communication - Network- Protocols and standards  
Organizations - Line Configuration - Topology - Transmission Mode - Classification of  
Network- OSI Model - Layers of OSI Model.

#### **UNIT – II: TRANSMISSION TECHNIQUES**

Parallel and Serial Transmission - DTE/DCE/such as EIA -449, EIA-530, EIA-  
202 and x.21 interface - Interface standards - Modems - Guided Media - Unguided Media  
- performance - Types of Error - Error detection - Error Corrections.

#### **UNIT – III: SWITCHING TECHNIQUES**

Multiplexing - Types of Multiplexing - Multiplexing Application - Telephone  
system - Project 802. - Ethernet - Token Bus - Token Ring - FDDI - IEEE 802.6 - SMDS  
- Circuit Switching - Packet Switching - Message Switching - Connection Oriented and  
Connectionless Services.

#### **UNIT – IV: COMMUNICATION LAYERS**

Analog and Digital Network - Access to ISDN - ISDN Layers - Broadband ISDN  
- X.25 Layers - Packet Layer Protocol - ATM - ATM Topology - ATM Protocol.

#### **UNIT – V: NETWORK DEVICES**

Repeaters - Bridges - Routers - Gateway - Routing algorithms - TCP/IP Network  
Transport and application Layers of TCP/IP Word Wide Web

#### **BOOKS FOR STUDY:**

1. Behrouz., Forouzan, “Data Communication and Networking”, TMH 1999.
2. Jean Walrand, “Communication Networks (A first Course)”, WCB/McGraw-Hill  
1996.

#### **REFERENCES:**

1. Stallings .W, “Data and Computer Communications”, PHI.

# **REAL TIME OPERATING SYSTEMS**

## **UNIT – I: REVIEW OF OPERATING SYSTEMS**

Basic principles – system calls - files – processes – design and implementation of processes - communication between processes – operating system structures

## **UNIT – II: DISTRIBUTED OPERATING SYSTEMS**

Topology – network types – communication – RPC – Client server model – distributed file systems - design strategies

## **UNIT – III: REAL TIME MODELS AND LANGUAGES**

Event based – process based and graph based models – petrinet models – real time languages – RTOS tasks – RT scheduling – interrupt processing – synchronization control blocks – memory requirements

## **UNIT – IV: REAL TIME KERNEL**

Principles – design issues – Polled loop systems - RTOS porting to a target – comparison and study of various RTOS like QNX – VX Works – PSOS – C Executive - case studies.

## **UNIT – V: RTOS APPLICATION DOMAINS**

RTOS for Image processing – Embedded RTOS for voice over IP – RTOS for fault tolerant applications – RTOS for control systems

### **BOOKS FOR STUDY:**

1. Herma K., “Real Time systems – Design for distributed Embedded Applications”, Kluwer Academic, 1997.
2. Charles Crowley, “Operating System – A design oriented approach” McGraw-Hill, 1997.
3. R.J.A. Buhr, D.L.Bailey, “An Introduction to Real-Time Systems”, PHI, 1999.

### **REFERENCES:**

1. C.M.Krishna, Kang G. Shin, “Real Time Systems”, McGraw Hill, 1997
2. Raymond J.A.Buhr, Donald L. Bailey; “An Introduction to Real Time Systems”, PHI 1999.

## **DISTRIBUTED EMBEDDED COMPUTING**

### **UNIT – I: THE HARDWARE INFRASTRUCTURE**

Broad Band Transmission facilities – Open Interconnection standards – Local Area Networks - Wide Area Networks - Network management – Network Security- Cluster computers.

### **UNIT – II: SOFTWARE ARCHITECTURE**

Client – server Architecture – challenges – Design methodology - intranets and group ware – Hardware and software for Intranet – Group and features - Network as a computer – the Internet – IP addressing – Internet security - Open systems - concepts and reliability.

### **UNIT – III: INTERNET CONCEPTS**

Capabilities and limitations of the Internet - Interfacing Internet server applications to corporate databases HTML and XML Web page design and the use of active components.

### **UNIT – IV: DISTRIBUTED COMPUTING USING JAVA**

IO streaming - Object serialization – Networking – Threading – RMI – multicasting – distributed databases – embedded java concepts – case studies.

### **UNIT – V: EMBEDDED COMPUTING ARCHITECTURE**

Synthesis of the information technologies of distributed embedded systems analog/digital co-design - optimizing functional distribution in complex system design - validation and fast prototyping of multiprocessor system-on-chip - a new dynamic scheduling algorithm for real-time multiprocessor systems.

### **BOOKS FOR STUDY:**

1. Dietel & Dietel, “JAVA how to program”, Prentice Hall 1999
2. Sape Mullender, “Distributed Systems”, Addison-Wesley, 1993
2. George Coulouris and Jean Dollimore, “Distributed Systems – concepts and design”, Addison – Wesley 1988

### **BOOKS FOR REFERENCES:**

1. Bernd Kleinjohann, “Architecture and Design of Distributed Embedded Systems”, C-Lab, Universität Paderborn, Germany, Kluwer Academic Publishers, Boston, April 2001, 248 pp. 20

# **INTELLIGENT EMBEDDED SYSTEMS**

## **UNIT – I: INTRODUCTION**

Overview of agent based intelligent inhabited environments such as intelligent buildings - Introduction to the embedded-internet, embedded-agents and intelligent inhabited environments using examples from notable work - topologies for intelligent inhabited environments - brief review of control methods - behaviour based embedded-agents - Agent and system intelligence (e.g. reactivity versus and deliberation).

## **UNIT – II: EMBEDDED-AGENT DESIGN**

Embedded-agent design criteria & issues-consideration of various solutions, in particular behaviour based methods, which are the prime focus of this course behaviour based agent (BBA) mechanisms for implementing reactive functionality in embedded-agents - knowledge representation in embedded-agents - behaviour based agent (BBA) mechanisms for implementing deliberative functionality in embedded-agents.

## **UNIT – III: MULTI EMBEDDED-AGENTS**

Overview of multi embedded-agents infrastructures including network standards for intelligent buildings - embedded-agent co-ordination mechanisms and benchmarks embedded-agent

## **UNIT – IV: HUMAN-MACHINE ISSUES**

HMI interfacing issues in intelligent inhabited environments and their relationship to cognitive disappearance - individuality commercial service issues - technical design consequences arising from social issues such as privacy and Asimov-like rules

## **UNIT – V: HIGH – END APPLICATIONS**

Case studies self-directed deep space probes - robotic soccer teams - underwater submarines - acrobatic helicopters and mobile robots.

### **BOOKS FOR STUDY:**

1. ARKIN, R.C., “Behaviour-based Robotics”, The MIT Press, 1998.
2. RZEVSKI, G., “Mechatronics: Designing Intelligent Machines”, Butterworth-Heinmann, 1995.

### **REFERENCES:**

1. STEELS, L. and BROOKS, R., “The Artificial Life Route to Artificial Intelligence”, Building Embodied Situated Agents, Lawrence Erlbaum, 1995.

# **VHDL AND VERILOG PROGRAMING**

## **Unit – I: INTRODUCTION TO VHDL**

VHDL Terms – Hardware in VHDL – Entity – Behavioral Modeling – transport versus Inertial Delay – simulation Deltas – Drivers- Generics – Sequential processing – Process statement – Signal Assignment – versus – Variable Assignment – Sequential Statement – IF – CASE – LOOP – NEXT – EXIT – ASSERT – WAIT – Passive Process.

## **Unit – II: DATA TYPES SUBPROGRAMS AND PACKAGES**

Object types – signal – variables – constants - Data types – scalar types – composite types – incomplete types - File types – File type – caveats – subtypes – subprograms – Function – Conversion Function - Resolution Function – Procedures – Packages – Package declaration – Deferred Constants – sub program declaration – Package body.

## **Unit – III: PREDEFINED ATTRIBUTES & CONFIGURATION**

Value Kind Attributes – Function Kind Attributes – 'EVENT' – 'LAST VALUE' – LAST EVENT - ACTIVE - LAST ACTIVE – Attribute – DELAYED – STABLE – QUIET - TRANSCATION – Default Configuration – Component configuration – Mapping Library Entities – Generics in Configurations – Generic Value specification in Architecture - Generic Specification in Configuration – board socket chip Analogy – Block Configuration – Architecture configurations.

## **Unit – IV: SYNTHESIS AND DESIGN FLOW**

Register Transfer Level Description – Constraints – Attributes – Technology Library – Synthesis – Simple gate – concurrent assignment – IF Control Flow Statements – Case Control Flow Statements – Simple Sequential Statements – Asynchronous Reset – Asynchronous Preset and Clear – State Machine Example – RTL Simulation – VHDL Synthesis – Functional Gate -level Verification – Place and Route – Post Layout Timing Simulation – Static Timing.

## **Unit – V: SPECIFICATION USING VERILOG HDL**

Basic concepts: VLSI Design Flow – Identifiers – Gate Primitives – Value set – Ports – Gate Delays – Structural gate Level and Switch level modeling – Design Hierarchies – Behavioral and RTL modeling – Operators – Timing Control – Procedural Assignments – Conditional Statements – Data Flow Modeling and RTL – Structural Gate

Level Description of Decoder – Equality Detector – comparator – Priority Encoder - D-Latch – D FF – Half Adder and Full Adder – Ripple Carry Adder.

**BOOKS FOR STUDY:**

1. Douglas L. Perry, “VHDL programming by example”, (4<sup>th</sup> edition). Tata McGraw hill New Delhi.
2. Samir Palnitkar, “Verilog – HDL Guide to Digital Design and synthesis”, 3<sup>rd</sup> Edition Pearson Education, 2003

**REFERENCES :**

1. C.Roth, “Digital system Design using VHDL”, Thomson Learning, 2000.
2. J.Bhaskar, “Verilog HDL primer”, BSP,2002.

# **PROGRAMMABLE DIGITAL SIGNAL PROCESSOR**

## **UNIT – I: ARCHITECTURE OF FIXED POINT PDSP’S**

Multiplier and multiplier Accumulator (MAC)- Modified bus structure and memory access schemes – multiple access memory - multi ported memory – VLIW architecture – pipelining – special addressing modes in PDSP’s – on-chip peripheral – Architecture of TMS 320 C5X.

## **UNIT – II: ASSEMBLY LANGUAGE INSTRUCTION AND PROGRAMMING**

Syntax – Addressing modes – Load / Store Instruction – Addition/Subtraction Instruction –MOVE Instruction –Multiplication Instruction –NORM Instruction- Program control instruction –Peripheral Control –Program for familiarization of the addressing modes - Program for familiarization of the Arithmetic instruction – Real time signal processing program.

## **UNIT III: ARCHITECTURE OF FLOATING POINT PDSP’S**

Introduction – Overview of TMS 320C3X devices – Internal Architecture –CPU – CPU register file-Memory organization –cache memory – peripheral –data format – Addressing Modes –Groups of Addressing Modes-assembly language Instruction.

## **UNIT IV: PROGRAMMING FLOATING POINT PDSP’S**

Program for addressing Modes –Generation and finding the sum of series – Convolution of two sequences – Processing Real time Signal –Serial port –Capture and display of sine wave

## **UNIT V: MATLAB**

Desk top tools – Command Window –Launch Pad –Help Browser –work space browser –Editor/Debugger – Matrices – Expression – Working with Matrices – Basic plotting –Flow Control – Data structures – Scripts and function – Example programs.

## **BOOK FOR STUDY:**

1. B.Venkataramani & M.Bhaskar , “Digital signal processors, Architecture, Programming and Applications”, TATA McGraw Hill, First Reprint 2003,New Delhi

## **REFERENCES:**

1. Data Sheet of TMS320C5X, [www.ti.com](http://www.ti.com).
2. Data Sheet of TMS320C3X, [www.ti.com](http://www.ti.com).

**SKILL BASED ELECTIVE:  
PROGRAMMING IN C LANGUAGE**

**UNIT - I DATA TYPES, OPERATORS & CONTROL STATEMENTS**

Introduction to C –character set – constants- variables-keywords–operators– operator precedence-evaluating expressions – first C programs – console I/O functions.

If statement-if else statement-for statement-while statement-do while statement-switch case statement- go to, break and continue statements

**UNIT - II ARRAYS, STRUCTURE AND STRINGS**

Arrays – manipulating arrays – multidimensional arrays – strings – standard library string functions – structures – manipulating structures – array of structures – features of structures

**UNIT - III POINTERS**

Pointers – declaration – pointers in array – array of pointers to strings – limitation of array of pointers to strings – pointers in structure

**UNIT - IV FUNCTIONS**

Function - use of function – passing values between functions - scope rule of functions – function call by value – function call by reference – passing array elements to a function – passing an entire array to function – recursion

**UNIT - V PROGRAMMING**

Exchange of Data between two locations (Data got through Keyboard) – Reversing the given String – Print all the ASCII value from 0 – 255 using While Statement – Get a float and int data and product value to be printed in main function (use functions) – find positive, odd, even and negative number entered in an Array – program to store the data in a file with the records of Last updated Date.

**BOOK FOR STUDY:**

1. Yashavant Kanetkar, “Let us C”, 6<sup>th</sup> edition, BPB publications.

**REFERENCES:**

1. Byron S. Gottfried, “Theory and Problems of Programming with C”, Schaum’s Outline Series, TMH, 1996.
2. Balagurusamy .E, “Programming in ANSI C”, (TMH, New Delhi).

# **SOFTWARE TECHNOLOGY FOR EMBEDDED SYSTEMS**

## **UNIT – I: LOW LEVEL PROGRAMMING IN C**

Primitive data types – Functions – recursive functions – Pointers - Structures – Unions – Dynamic memory allocations – File handling – Linked lists

## **UNIT – II: C AND ASSEMBLY**

Programming in Assembly – Register usage conventions – typical use of addressing options – instruction sequencing – procedure call and return – parameter passing – retrieving parameters – everything in pass by value – temporary variables.

## **UNIT – III: OBJECT-ORIENTED ANALYSIS AND DESIGN**

Connecting the Object Model with the Use Case Model. Key Strategies for Object-Identification - Underline the Noun Strategy. Identify the Casual Objects - Identify Services (Passive Contributors) - Identify Real-World Items - Identify Physical Devices - Identify Key Concepts - Identify Transactions - Identify Persistent Information - Identify Visual Elements. Identify Control Elements - Apply Scenarios.

## **UNIT – IV: UNIFIED MODELLING LANGUAGE**

Object State Behaviour - UML State charts - Role of Scenarios in the Definition of Behaviour - Timing Diagrams - Sequence Diagrams - Event Hierarchies - Types and Strategies of Operations - Architectural Design in UML Concurrency Design - Representing Tasks - System Task Diagram - Concurrent State Diagrams - Threads. Mechanistic Design - Simple Patterns.

## **UNIT – V: CASE STUDIES**

Multi threaded applications – assembling embedded applications – polled waiting loop and interrupt driven I/O – preemptive kernels and shared resources - system timer – scheduling – client server computing.

### **BOOKS FOR STUDY:**

1. Bruce Powel Douglas, “Real-Time UML, Second Edition: Developing Efficient Objects for Embedded Systems (The Addison-Wesley Object Technology Series)”, 2 edition (October 29, 1999), Addison-Wesley.
2. Hassan Gomma, “Designing Concurrent, Distributed, and Real-Time applications with UML”.

### **REFERENCES:**

1. Daniel W. Lewis, “Fundamentals of Embedded Software where C and Assembly meet”, PHI 2002.