

# **CURRICULUM & SYLLABUS**

## **BACHELOR OF TECHNOLOGY in ELECTRONICS AND COMMUNICATION ENGINEERING**

**(for the students admitted in 2008-09 and afterwards)**



### **DEPARTMENT OF ECE**

**Faculty of Engineering and Technology, SRM University**

**SRM Nagar, Kattankulathur – 603203, Kancheepuram District, Tamilnadu**



## DEPARTMENT OF ECE

Faculty of Engineering and Technology, SRM University  
RM Nagar, Kattankulathur – 603203, Kancheepuram District, Tamilnadu

**B.TECH Electronics and Communication Engineering (Full Time)**  
**Curriculum & Syllabus**  
**(For the students admitted in 2008-2009 and afterwards)**

### SEMESTER – I

Code	Category	Course	L	T	P	C
<b>Theory</b>						
LE0101	G	<a href="#">English</a>	1	0	2	2
MA0101	B	<a href="#">Mathematics – I</a>	3	2	0	4
PH0101	B	<a href="#">Physics</a>	3	0	0	3
CY0101	B	<a href="#">Chemistry</a>	3	0	0	3
GE0101	E	<a href="#">Basic Engineering – I</a>	4	0	0	4
PD0101	G	<a href="#">Personality Development – I</a>	1	0	1	0
<b>Practical</b>						
GE0107	G	<a href="#">NSS/NCC/NSO/YOGA</a>	0	0	2	1
GE0105	B	<a href="#">Computer Literacy</a>	0	0	2	1
PH0103	B	<a href="#">Physics Laboratory</a>	0	0	2	1
CY0103	B	<a href="#">Chemistry Laboratory</a>	0	0	2	1
ME0120/ME0130	E	<a href="#">Workshop Practice</a> / <a href="#">Engineering Graphics</a>	0/1	0	4	2/3
<b>Total</b>			<b>14/15</b>	<b>2</b>	<b>16</b>	<b>22/23</b>
<b>Total Contact Hours</b>			<b>32/33</b>			

### SEMESTER – II

Code	Category	Course	L	T	P	C
<b>Theory</b>						
GE0108	G	<a href="#">Value Education</a>	1	0	0	1
MA0102	B	<a href="#">Mathematics – II</a>	3	2	0	4
PH0102	B	<a href="#">Materials Science</a>	2	0	2	3
GE0102	B	<a href="#">Biology for Engineers</a>	2	0	0	2
GE0104	B	<a href="#">Principles of Environmental Science</a>	2	0	0	2
GE0106	E	<a href="#">Basic Engineering – II</a>	4	0	0	4
EC0102	P	<a href="#">Electric Circuits</a>	2	2	0	3
PD0102	G	<a href="#">Personality Development – II</a>	1	0	1	0
<b>Practical</b>						
CS0140	B	<a href="#">Computer Practice</a>	1	0	2	2
ME0130/ME0120	E	<a href="#">Engineering Graphics</a> / <a href="#">Workshop Practice</a>	1/0	0	4	3/2
EC0122	P	<a href="#">Electric Circuits Lab</a>	0	0	2	1
<b>Total</b>			<b>18/17</b>	<b>4</b>	<b>12</b>	<b>25/24</b>
<b>Total Contact Hours</b>			<b>34/33</b>			

### SEMESTER – III

Code	Category	Course	L	T	P	C
<b>Theory</b>						
LE0201/ LE0203/LE0205	G	<a href="#">German / Japanese / French</a> Language Phase – I	2	0	0	2
MA0211	B	<a href="#">Mathematics – III</a>	3	2	0	4
EE0231	E	<a href="#">Electrical Engineering</a>	3	0	0	3
EC0201	P	<a href="#">Electromagnetic Theory &amp; Waveguides</a>	3	0	0	3
EC0203	E	<a href="#">Electron Devices</a>	3	0	0	3
EC0205	P	<a href="#">Digital Systems</a>	3	0	0	3
EC0207	P	<a href="#">Signals and Systems</a>	2	2	0	3
PD0201	G	<a href="#">Personality Development – III</a>	1	0	1	1

<b>Practical</b>						
EC0221	P	<a href="#">Electron Devices Lab</a>	0	0	3	2
EC0223	P	<a href="#">Digital System Lab</a>	0	0	3	2
<b>Total</b>			<b>19</b>	<b>4</b>	<b>8</b>	<b>26</b>
<b>Total Contact Hours</b>				<b>31</b>		

#### SEMESTER – IV

Code	Category	Course	L	T	P	C
<b>Theory</b>						
LE0202/ LE0204 /LE0206	G	<a href="#">German / Japanese / French Language Phase – II</a>	2	0	0	2
MA0232	B	<a href="#">Probability and Random Processes</a>	3	2	0	4
EC0204	P	<a href="#">Electronic Circuits</a>	2	2	0	3
EC0206	P	<a href="#">Linear Integrated Circuits</a>	3	0	0	3
EC0208	P	<a href="#">Transmission Lines and Networks</a>	3	0	0	3
EC0210	P	<a href="#">Communication Theory</a>	3	0	0	3
EC0212	P	<a href="#">Digital Signal Processing</a>	2	2	0	3
PD0202	G	<a href="#">Personality Development – IV</a>	1	0	1	1
<b>Practical</b>						
EC0222	P	<a href="#">Electronic Circuits Lab</a>	0	0	3	2
EC0224	P	<a href="#">Communication Lab – I</a>	0	0	3	2
EC0226	P	<a href="#">Comprehension –I<sup>#</sup></a>	0	2	0	1
<b>Total</b>			<b>18</b>	<b>8</b>	<b>8</b>	<b>27</b>
<b>Total Contact Hours</b>				<b>34</b>		

# Review of the core subjects studied up to the current semester

#### SEMESTER – V

Code	Category	Course	L	T	P	C
<b>Theory</b>						
MA0321	B	<a href="#">Discrete Mathematics</a>	3	0	0	3
EC0301	E	<a href="#">Electronic Measurements and Instrumentation</a>	3	0	0	3
EC0303	E	<a href="#">Control Systems</a>	3	0	0	3
EC0305	P	<a href="#">Antenna and Wave Propagation</a>	3	0	0	3
EC0307	P	<a href="#">Digital Communication</a>	3	0	0	3
EC0309	P	<a href="#">Microprocessors and Microcontrollers</a>	3	0	0	3
PD0301	G	<a href="#">Personality Development – V</a>	1	0	2	2
<b>Practical</b>						
EC0321	P	<a href="#">Processor Lab</a>	0	0	3	2
EC0323	P	<a href="#">Communication Lab – II</a>	0	0	3	2
EC0325	P	<a href="#">Industrial Training –I*</a>	0	0	2	1
<b>Total</b>			<b>19</b>	<b>0</b>	<b>10</b>	<b>25</b>
<b>Total Contact Hours</b>				<b>29</b>		

\* Training of min. 2 weeks has to be undergone by students in winter/summer vacation of the III/IV semester.

#### SEMESTER – VI

Code	Category	Course	L	T	P	C
<b>Theory</b>						
MB0302	G	<a href="#">Business Management for Engineers</a>	3	0	0	3
EC0302	P	<a href="#">Microwave and RF Design</a>	3	0	0	3
EC0304	P	<a href="#">Optical Communication and Networks</a>	3	0	0	3
EC0306	P	<a href="#">VLSI Devices and Design</a>	3	0	0	3
PD0302	G	<a href="#">Personality Development – VI</a>	1	0	2	2
<b>Practical</b>						
EC0322	P	<a href="#">Microwave &amp; Optical Commn. Lab</a>	0	0	3	2
EC0324	P	<a href="#">VLSI Design Lab</a>	0	0	3	2
EC0326	P	<a href="#">Comprehension – II<sup>#</sup></a>	0	2	0	1
EC0328	P	<a href="#">Computer Skills</a>	1	0	2	2
<b>Total</b>			<b>14</b>	<b>2</b>	<b>10</b>	<b>21</b>
<b>Total Contact Hours</b>				<b>26</b>		

# Review of the core subjects studied up to the current semester

**SEMESTER – VII**

Code	Category	Course	L	T	P	C
<b>Theory</b>						
EC0401	P	<a href="#">Computer Communication</a>	3	0	0	3
EC0403	P	<a href="#">Wireless Communication</a>	4	0	0	4
	P	<a href="#">Elective I</a>	3	0	0	3
	P	<a href="#">Elective II</a>	3	0	0	3
<b>Practical</b>						
EC0421	P	<a href="#">Network Simulation Lab</a>	0	0	3	2
EC0423	P	<a href="#">Industrial Training – II</a> **	0	0	2	1
EC0425	P	Seminar	0	0	2	1
<b>Total</b>			<b>13</b>	<b>0</b>	<b>7</b>	<b>17</b>
<b>Total Contact Hours</b>			<b>20</b>			

\*\* An industrial training of minimum two weeks has to be undergone by the student in the winter/summer vacation of the V/VI semester.

® Project title and the supervisor are to be identified by the students with in two weeks from the beginning of the VII semester. The student is expected to put in a minimum of 10 hours of work in their project in the VII Semester. The project progress in the VII and VIII semesters has to be periodically assessed for sessional marks.

**SEMESTER – VIII**

Code	Category	Course	L	T	P	C
<b>Theory</b>						
	P	<a href="#">Elective III</a>	3	0	0	3
	P	<a href="#">Elective IV</a>	3	0	0	3
<b>Practical</b>						
EC0422	P	Project Work	0	0	17	8
<b>Total</b>			<b>6</b>	<b>0</b>	<b>17</b>	<b>14</b>
<b>Total Contact Hours</b>			<b>23</b>			

**Summary Table**

Semester	I	II	III	IV	V	VI	VII	VIII	Total	%
Total	22	25	26	27	25	21	17	14	177	100
G	3	1	3	3	2	5	0	0	17	9.6
B	13	13	4	4	3	0	0	0	37	20.9
E	6	7	6	0	6	0	0	0	25	14.1
P	0	4	13	20	14	16	17	14	98	55.4

<b>TOTAL CREDITS TO BE EARNED FOR THE AWARD OF THE DEGREE:</b>	<b>177</b>
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**LIST OF ELECTIVES**

Code	Category	Course	L	T	P	C
<b>Communication Techniques</b>						
EC0010	P	<a href="#">TV and Video Systems</a>	3	0	0	3
EC0012	P	<a href="#">Satellite Communication and Broadcasting</a>	3	0	0	3
EC0013	P	<a href="#">Radar and Navigational Aids</a>	3	0	0	3
EC0015	P	<a href="#">Mobile Computing</a>	3	0	0	3
EC0016	P	<a href="#">Bluetooth Technology</a>	3	0	0	3
EC0017	P	<a href="#">Spread Spectrum Techniques</a>	3	0	0	3
EC0018	P	<a href="#">Communication Protocol</a>	3	0	0	3
TE0202	P	<a href="#">Information Theory and Coding</a>	3	0	0	3
TE0301	P	<a href="#">Communication Switching Techniques</a>	3	0	0	3
<b>Advanced Electronics</b>						
EC0030	P	<a href="#">Biomedical Instrumentation</a>	3	0	0	3
EC0031	P	<a href="#">Embedded Systems</a>	3	0	0	3
EC0032	P	<a href="#">Introduction to MEMS</a>	3	0	0	3
EC0033	P	<a href="#">ASIC Design</a>	3	0	0	3
EC0034	P	<a href="#">Introduction to Nanotechnology</a>	3	0	0	3
EC0035	P	<a href="#">Electromagnetic Interference and Electromagnetic Compatibility</a>	3	0	0	3
<b>Computer applications</b>						
EC0051	P	<a href="#">Data Structures and Algorithms</a>	3	0	0	3
EC0052	P	<a href="#">Digital Image Processing</a>	3	0	0	3
EC0053	P	<a href="#">Object Oriented Analysis and Design</a>	3	0	0	3
EC0054	P	<a href="#">Neural Network and Fuzzy Logic</a>	3	0	0	3
EC0055	P	<a href="#">Network Security</a>	3	0	0	3
EC0056	P	<a href="#">Scripting Languages and Web Technology</a>	3	0	0	3
<b>Management Sciences</b>						
MA0452	B	<a href="#">Operations Research</a>	3	0	0	3

**NOTE:**

All electives having odd numbers shall be offered only during odd semesters, others during even semesters.

## SEMESTER – I

LE0101	ENGLISH	L	T	P	C
	Prerequisite: Nil	1	0	2	2

### PURPOSE

To provide an adequate mastery of communicative English Language training primarily - reading and writing skills, secondarily listening and speaking skills.

### INSTRUCTIONAL OBJECTIVES

To provide language training to the engineering students which will enable them to understand and acquire knowledge in technical subjects.

### LISTENING

3

Listening Practice – Hints on Listening – Listening Practice

Note Taking: Note Taking Strategies

### SPEAKING

3

Definitions: Expressing Opinions (agreement / disagreement)-Offering Suggestions – Technical Definitions – Describing Objects – speaking practice.

Phonetics: Pronunciation-Phonetic Transcription-Stress-Intonation

### READING

3

Comprehension: Skimming-scanning-close reading-Comprehension – Transferring Information – Exercise – An unseen passage should be given and questions may be asked in the form of True or False statements, MCQ, short answers.

Transcoding : Interpreting tables, flow charts, pie chart, bar diagram, tree diagram, graphs.

### WRITING

3

Art of Writing: Writing Language – Rules for effective writing – Technical Essay Writing – Exercise

Report Writing: Technical Writing – Lab Report – Exercise

Letter Writing : Formal Letters – Letter to the Editor – Letter Inviting Dignitaries – Letter of Application

Curriculum Vitae – Placing an Order.

Dialogue Writing

### FOCUS ON AND COMMUNICATION AND “COMPUNICATION”

3

Communication : Basic Concepts – Process – Kinds – Routes – Forms – Factors – Barriers – Triangles  
Communication (Communicate through Computers – Power Point & Tele Conference).

### INTERNAL ASSESSMENT

Based on the submission of Assignments and test performance of the students marks will be awarded.

**PRACTICAL 30**  
**TOTAL 45**

### TEXT BOOKS

1. Abraham Benjamin Samuel ‘*Practical Communication Communicative English LSRW2000*’– SRMEC – June 2006 Revised Edition.
2. Staff of the Department of Humanities and Social Science, Anna University, “*English for Engineers / Technologist Vol.-I*”. Orient Longman, 1990.

### REFERENCE BOOKS

1. Herbert. A. J. “*The structure of Technical English*” Orient Longman 1995.
2. Pickett and Laster, ‘*Technical English, Writing, Reading and Speaking*’, New York Harper and Row Publications, 1997.
3. “*Interactive course in phonetics and spoken English*” published by Acoustics Engineers (ACEN) 2002.
4. Munter, Mary, “*Business Communication Strategy and Skill*”, Prentice Hall Inc.,New Jersey, 1987.

MA0101	MATHEMATICS -I	L	T	P	C
	Prerequisite: Nil	3	2	0	4

### PURPOSE

To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.

### INSTRUCTIONAL OBJECTIVES

At the end of the course, student should be able to apply advanced matrix knowledge to Engineering problems. To improve their ability in solving geometrical applications of differential calculus problems. To equip themselves familiar with the functions of several variables. To familiarize with the applications of differential equations. To expose to the concept of three dimensional analytical geometry.

### MATRICES

9

Characteristic equation – Eigen values and eigen vectors of a real matrix – Properties of eigen values – Cayley-Hamilton theorem – Orthogonal reduction of a symmetric matrix to diagonal form – Orthogonal matrices – Reduction of quadratic form to canonical form by orthogonal transformations.

### GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS

9

Curvature – Cartesian and polar coordinates – Circle of curvature – Involute and Evolute – Envelopes – Properties of envelopes.

### FUNCTIONS OF SEVERAL VARIABLES

9

Function of two variables – Partial derivatives – Total differential – Taylor's expansion – Maxima and Minima – Constrained Maxima and Minima by Lagrangean Multiplier method – Jacobians

### ORDINARY DIFFERENTIAL EQUATIONS

9

Simultaneous first order linear equations with constant coefficients – Linear equations of second order with constant and variable coefficients – Homogeneous equation of Euler type – Equations reducible to homogeneous form.

### THREE DIMENSIONAL ANALYTICAL GEOMETRY

9

Direction cosines and ratios – Angle between two lines – Equation of a plane – Equation of a straight line – Coplanar lines – Shortest distance between skew lines – Sphere – Tangent plane – Plane section of a sphere – Orthogonal spheres.

TUTORIAL 30

TOTAL 75

### TEXT BOOK

1. Grewal B.S, Higher Engg Maths, Khanna Publications, 38<sup>th</sup> Edition., Veerajan, T., *Engineering Mathematics*, Tata McGraw Hill Publishing Co., New Delhi,2000.
2. Dr.V.Ramamurthy & Dr. Sundarammal Kesavan," *Engineering Mathematics*" – Vol I & II Anuradha Publications, Revised Edition 2006.

### REFERENCE BOOKS

1. Kreyszig.E, "*Advanced Engineering Mathematics*", 8<sup>th</sup> edition, John Wiley & Sons. Singapore,2001.
2. Kandasamy P etal. "*Engineering Mathematics*", Vol.I (4<sup>th</sup> revised edition), S.Chand &Co., New Delhi,2000.
3. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., "*Advanced Mathematics for Engineering students*", Volume I (2<sup>nd</sup> edition), S.Viswanathan Printers and Publishers, 1992.
4. Venkataraman M.K., "*Engineering Mathematics*" – First Year (2<sup>nd</sup> edition), National Publishing Co., Chennai,2000.

<b>PH0101</b>	<b>PHYSICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### PURPOSE

The purpose of this course is to develop scientific temper and analytical capability through learning physical concepts and their applications in engineering and technology. Comprehension of some basic physical concepts will enable the students to logically solve engineering problems.

### INSTRUCTIONAL OBJECTIVES

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

1. Understand the general scientific concepts required for technology,
2. Apply the concepts in solving engineering problems,
3. Explain scientifically the new developments in engineering and technology, and
4. Get familiarized with the concepts, theories, and models behind many technological applications.

### PROPERTIES OF MATTER AND SOUND

9

**Properties of Matter:** Hooke's law – Twisting couple on a cylinder – Shafts – Torsion pendulum – Bending of beams – Bending moment – Uniform bending and non-uniform bending – I shape girder. **Sound:** Shock waves – Mach number (simple problems) – Ultrasonic production (magnetostriction and piezoelectric methods) and application – Acoustics of buildings – Sources and impacts of noise – Sound level meter – Control of noise pollution.

### ELECTROMAGNETISM AND MICROWAVES

9

**Electromagnetism:** Divergence, curl and gradient – Maxwell's equations – Wave equation for electromagnetic waves – Propagation in free space – Poynting vector – Rectangular and circular wave guides. **Microwaves:** Properties and applications – Generation by magnetron and reflex klystron oscillator – Traveling wave tube – Biological effects.

### OPTICS

9

**Photometry:** Principles and Lummer-Brodhun photometer. **Lasers:** Principles and characteristics – Types of lasers (CO<sub>2</sub>, excimer, NdYAG, GaAs, free electron) – Holographic mass storage. **Optical Fiber:** Principles – Physical structure and types – Optical fiber communication. **Photo elasticity:** Theory and applications.

### CRYSTAL PHYSICS AND CRYOGENICS

9

**Crystal Physics:** Crystal directions – Planes and Miller indices – Basic symmetry elements – Translational symmetry elements – Reciprocal lattice – Diamond and HCP crystal structure – Imperfections in crystals. **Cryogenics:** Methods of liquefaction of gases (cascade process, Linde's process, and adiabatic demagnetization process) – Measurement of cryogenic temperatures.

### ENERGY PHYSICS

9

Introduction to non-conventional energy sources – Solar cells – Thermoelectric power generators – Thermionic power generator – Magneto hydrodynamic power generator – Fuel cells (H<sub>2</sub>O<sub>2</sub>) – Solid state batteries (Lithium) – Low voltage and high voltage nuclear cells – Thermocouple based nuclear cell – Ultra capacitors.

**TOTAL** 45

### TEXT BOOKS

1. Arumugam, M., "Engineering Physics", 2<sup>nd</sup> edition, Anuradha Publishers, Kumbakonam, 2003.
2. Gaur and Gupta, "Engineering Physics", 7<sup>th</sup> edition, Dhandapani and Sons, New Delhi, 1997.
3. Thiruvadigal, J. D., Ponnusamy, S., Vasuhi, P. S. and Kumar, C., "Physics for Technologists", 5<sup>th</sup> edition, Vibrant Publication, Chennai, 2007.

### REFERENCE BOOKS

1. Vasudeva, A. S., "Modern Engineering Physics", revised edition, S. Chand and Company Ltd., New Delhi, 2004.
2. Vasudevan, D. N., "Fundamentals of Magnetism and Electricity", 11<sup>th</sup> edition, S. Chand and Company Ltd., New Delhi, 1983.
3. Nair, K. P. R., "Atoms, Molecules and Lasers", Narosa Publishing House, New Delhi, 2006.
4. Pillai, S. O., "Solid State Physics", 5<sup>th</sup> edition, New Age International (P) Ltd., New Delhi, 2004.
5. Khan, B. H., "Non-Conventional Energy Resource's", Mechanical Engineering Series, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.

CY0101	CHEMISTRY	L	T	P	C
	Prerequisite: Nil	3	0	0	3

### PURPOSE

To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

### INSTRUCTIONAL OBJECTIVES

The students should be conversant with

1. The role of applied chemistry in the field of engineering.
2. The knowledge of water quality parameters and the treatment of water.
3. The principles involved in corrosion and its inhibitions.
4. Important analytical techniques, instrumentation and the applications.
5. Knowledge with respect to the phase equilibria of different systems.

### TECHNOLOGY OF WATER

9

Water quality parameters: Physical, Chemical & Biological - Hardness of water – estimation of hardness (EDTA method & O. Hehner's method), Alkalinity – determination – disadvantages of using hard water in boilers: Scale, sludge formation – disadvantages – prevention – treatment: Internal conditioning – phosphate, calgon and carbonate conditioning methods – External: Zeolite, ion exchange methods - desalination – reverse osmosis and electrodialysis - domestic water treatment.

### CORROSION AND ITS CONTROL

9

Corrosion: Basic concepts – principles, mechanism of chemical, electrochemical corrosion – Pilling Bedworth rule – galvanic corrosion – differential aeration corrosion - pitting corrosion - stress corrosion - factors influencing corrosion.

Corrosion control: cathodic protection – sacrificial anodic method – corrosion inhibitor. Protective coatings: surface preparation for metallic coatings - electro plating and electroless Plating - chemical conversion coatings – anodizing, phosphating & chromate coating.

### PHASE EQUILIBRIA

9

Phase rule: Statement – explanation of the terms involved - one component system (water system only). Condensed phase rule - thermal analysis – two component systems: simple eutectic, Pb-Ag; Br, Cd - solid solution Cu-Ni and compound formation Mg-Zn - applications of eutectics.

### POLYMERS AND REINFORCED PLASTICS

9

Classification of polymers – types of polymerization reactions – mechanism of addition polymerization: free radical, ionic and ziegler – Natta - effect of structure on the properties of polymers – strength, plastic deformation, plastics elasticity and physical nature –Preparation and properties of important resins:- Polyethylene, PVC, PMMA, Polyester, Teflon Bakelite, Epoxy resins, compounding of plastics, moulding methods - injection, extrusion, compression and calendaring - reinforced plastics – FRP – Carbon, Graphite, Glass– applications.

### INSTRUMENTAL METHODS OF ANALYSIS

9

Basic principles, instrumentation of potentiometry, flame photometry – applications. Elementary theory – principle – instrumentation of UV – visible spectroscopy and atomic absorption spectroscopy and infrared spectroscopy.

**TOTAL 45**

### TEXT BOOKS

1. Jain.P.C and Monika Jain, “Engineering Chemistry”, Danpat Raj publishing company (P) Ltd, New Delhi – 2002.
2. Dara.S.S, “Text book of Engineering Chemistry”, S. Chand & Company Ltd, New Delhi 2003.
3. Willard H.A., Merit L.L and Dean J.A., “Instrumental methods of analysis” 6<sup>th</sup> Edition Van Nostrand, 1986.

### REFERENCE BOOKS

1. Kuriacose J.C. and Rajaram J. “Chemistry in Engineering and Technology”, Volume II, Tata McGraw Hill p.b. Co., 1988.
2. Jeyalakshmi.R & Ramar. P, “Engineering Chemistry”, 1<sup>st</sup> Edition, Devi Publications, Chennai 2006.
3. Kamaraj.P & Arthanareeswari. M, “Applied Chemistry”, 2<sup>nd</sup> Edition, Sudhandhira Publications, 2003.
4. Arivalagan. K, “Engineering Chemistry”, 1<sup>st</sup> Edition, Mass publications, 2007.
5. P.Kamatchi, “Applied Chemistry-I”, Ponnuswamy publications, Chennai.
6. Dr. Helen P Kavitha , “Engineering Chemistry – I” ILA Publications, 2002

<b>GE0101</b>	<b>BASIC ENGINEERING – I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

## PART-A CIVIL ENGINEERING

### PURPOSE

To get exposed to the glimpses of Civil Engineering topics that is essential for an Engineer.

### INSTRUCTIONAL OBJECTIVES

1. To know about different materials and their properties.
2. Engineering aspects related to buildings.
3. To know about importance of surveying.
4. To know about the transportation systems.
5. To get exposed to the rudiments of engineering, related to Dams, Water Supply, Transportation system and Sewage Disposal.

### BUILDING MATERIALS AND THEIR PROPERTIES

**10**

Introduction - Civil Engineering – Building Materials – Brick, Stone, Cement, Steel, Concrete, timber – Properties – Uses. Units – Stress, strain and three moduli of elasticity – factor of safety - Centre of Gravity and Moment of Inertia for rectangle and circular section – simple problems.

### BUILDINGS AND THEIR COMPONENTS

**10**

Buildings – Classification - Components of buildings and their functions Foundations - functions – classification of foundations – Bearing capacity Floorings – functions - Types - Cement Concrete flooring – Mosaic flooring - Marble flooring Roofs - Types – Requirements – Madras Terrace roof. Tall structure – types of structural systems.

### UTILITY AND SERVICES

**10**

Surveying - Objective – Principles – Classification – Instruments used for Surveying. Dams - Purpose – Selection of site – Classification – Gravity dam (cross-section details only) Transportation system - Classification – Roadway - components – classification of roads - Railway – Cross-section of permanent way-components parts and functions. Docks and Harbour – classification – Terminology Bridges –components of a bridge - types of bridges. Water supply - Sources - Standards of drinking water (BIS) – elementary treatment methods – RO System Sewage disposal – Septic tank – function and components.

**TOTAL            30**

### TEXT BOOKS

1. Raju K.V.B., Ravichandran P.T., “*Basics of Civil Engineering*”, Ayyappa Publications, Chennai, 2000.
2. Ramesh Babu, “*Civil Engineering*“, VRB Publishers, Chennai, 2000.

### REFERENCE BOOKS

1. Rangwala,S.C., “*Engineering Materials*”, Charotar Publishing House, Anand, 1980.
2. National Building Code of India, Part V, “*Building Materials*”, 2005
3. Surendra Singh, “*Building Materials*”, Vikas Publishing Company, New Delhi, 1996

## PART-B MECHANICAL ENGINEERING

### PURPOSE

To familiarize the students with the basics of Mechanical Engineering.

### INSTRUCTIONAL OBJECTIVES

To familiarize with

1. The basic machine elements
2. The Sources of Energy and Power Generation
3. The various manufacturing processes

### MACHINE ELEMENTS

10

**Springs:** Helical and leaf springs – Springs in series and parallel. **Cams:** Types of cams and followers – Cam profile. **Power Transmission:** Gears (terminology, spur, helical and bevel gears, gear trains). Belt drives (types). Chain drives. **Simple Problems.**

### ENERGY

10

**Sources:** Renewable and non-renewable (various types, characteristics, advantages/disadvantages). **Power Generation:** External and internal combustion engines - Hydro and nuclear power plants (layouts, element/component description, advantages, disadvantages, applications). **Simple Problems.**

### MANUFACTURING PROCESSES

10

**Sheet Metal Work:** Introduction – Equipments – Tools and accessories – Various processes (applications, advantages / disadvantages). **Welding:** Types – Equipments – Tools and accessories – Techniques employed (applications, advantages / disadvantages (gas and arc welding only)) – Gas cutting – Brazing and soldering. **Lathe Practice:** Types - Description of main components – Cutting tools – Work holding devices – Basic operations. **Simple Problems. Drilling Practice:** Introduction – Types – Description – Tools. **Simple Problems.**

**TOTAL 30**

### TEXT BOOKS

1. Kumar, T., Leenus Jesu Martin., and Murali, G., “*Basic Mechanical Engineering*”, Suma Publications, Chennai, 2007.
2. Prabhu, T. J., Jai Ganesh, V., Jebaraj, S., “*Basic Mechanical Engineering*”, Scitech Publications, Chennai, 2000.

### REFERENCE BOOKS

1. Hajra Choudhary, S.K. and Hajra Choudhary, A. K., “*Elements of Manufacturing Technology*”, Vols. I & II, Media Publishers, 1986.
2. Nag, P.K., “*Power Plant Engineering*”, Tata McGraw-Hill, New Delhi, 2006.
3. Palanichamy, M.S., “*Basic Civil & Mechanical Engineering*”, Tata McGraw-Hill, New Delhi 1991.
4. Nagpal G. R., “*Power Plant Engineering*”, Khanna Publisher, Delhi, 2004

<b>PD0101</b>	<b>PERSONALITY DEVELOPMENT - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>

### **PURPOSE**

The purpose of this course is to build confidence and inculcate various soft skills and to help students to identify and achieve their personal potential.

### **INSTRUCTIONAL OBJECTIVES**

1. To guide thought process.
2. To groom student's attitude.
3. To develop communication skill.
4. To build confidence.

### **METHODOLOGY**

The entire program is designed in such a way that every student will participate in the class room activities. The activities are planned to bring out the skills and talents of the students which they will be employing during various occasions in their real life.

1. Group activities + individual activities.
2. Collaborative learning.
3. Interactive sessions.
4. Ensure Participation
5. Empirical Learning

### **SYLLABUS CONTENTS**

Self-analysis SWOT - Time management - Creative chain story telling	6
Vocabulary games I – Attitude - Interpersonal skills	6
Motivation I - Vocabulary games II - Article review	6
Team building exercise - Critical thinking - Event Management	6
Business situation - Leadership Qualities – Review	6
<b>TOTAL</b>	<b>30</b>

### **SCHEME OF INSTRUCTION**

Marks allocated for regular participation in all oral activities in class

### **SCHEME OF EXAMINATION**

Complete internal evaluation on a regular Basis

<b>GE0107</b>	<b>NSS/NCC/NSO/YOGA</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

### **I. YOGA SYLLABUS**

<b>PRACTICE</b>		<b>LECTURE</b>
I	Meditation – Agnai, Asanas, Kiriyas, Bandas, Muthras	Benefits of Agnai Meditation
II	Meditation Santhi Physical Exercises (I & II)	Benefits of santhi Meditation
III	Kayakalpa Yoga Asanas, Kiriyas, Bandas, Muthras	Lecture & Practice
IV	Meditation Santhi Physical Exercises III & IV	Analysis of Thought
V	Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras	Benefits of Thuriyam
VI	Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras	Attitude
VII	Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras	Importance of Arutkappy & Blessings
VIII	Meditation Santhi Kayakalpa Asanas, Kiriyas, Bandas, Muthras	Benefits of Blessings
<b>Hours = 30</b>		

#### **TEXT BOOKS:**

1. Vedatri Maharshi , “*Yoga for Modern Age*”
2. Vedatri Maharshi, “*Simplified Physical Exercises*”

### **II. NATIONAL SPORTS ORGANISATION (NSO)**

Each student must select two of the following games and practice for two hours per week. An attendance of 80% is compulsory to earn the credits specified in the curriculum.

#### **List of games:**

1. Basket Ball
2. Football
3. Volley Ball
4. Ball Badminton
5. Cricket
6. Throw ball

### **III. NATIONAL CADET CORE (NCC)**

Any student enrolling as a member of National Cadet Core (NCC) will have to attend sixteen parades out of twenty parades each of four periods over a span of an academic year.

Attending eight parades in first semester will qualify a student to earn the credits specified in the curriculum.

### **IV. NATIONAL SERVICE SCHEME (NSS)**

A student enrolling as member of NSS will have to complete 60 hours of training / social service to be eligible to earn the credits specified in the curriculum.

<b>GE0105</b>	<b>COMPUTER LITERACY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**PURPOSE**

This Lab Course will enable the students to understand the basics of computer and to know the basics of MS-Office.

**INSTRUCTIONAL OBJECTIVES**

1. To learn the basics of computer.
2. To work on MS-Word, MS-Excel, MS-Power Point and MS-Access

**EXPERIMENTS TO IMPLEMENT**

**30**

1. Study experiment on evolution of computer programming languages.
2. Suggest some of the Network Topologies that can be incorporated in your campus. Justify your choice.
3. Experiments to demonstrate directory creation and file creation.
4. Create a document with all formatting effects.
5. Create a document with tables.
6. Create labels in MS word.
7. Create a document to send mails using mail merge option.
8. Create an Excel File to analyze the student’s performance. Create a chart for the above data to depict it diagrammatically.
9. Create Excel sheet to use built-in-function.
10. Create Excel sheet to maintain employee information and use this data to send mails using mail merge.
11. Create a Power Point presentation for your personal profile with varying animation effects with timer.
12. Consider student information system which stores student personal data, mark information and non academic details.
  - \* Use MS-Access to create Tables and execute SQL queries to do this following
  - \* Display all student records.
  - \* Display student details with respect to his identity.
  - \* Delete some records from the table.
  - \* Find total marks obtained by student in each list.

**TOTAL 30**

**TEXT BOOK**

1. “Introduction to Information Technology” ITL Education Solutions Ltd., Pearson 2<sup>nd</sup> Edition, 2006.

<b>PH0103</b>	<b>PHYSICS LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

### **PURPOSE**

The purpose of this course is to develop scientific temper and analytical capability among the engineering students.

### **INSTRUCTIONAL OBJECTIVES**

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

1. Understand scientific concepts in measurement of different physical variables
2. Develop the skill in arranging and handling different measuring instruments
3. Get familiarized with the errors in various measurements and planning / suggesting how these contributions may be made of the same order so as to make the error in the final result small.

### **LIST OF EXPERIMENTS**

**30**

1. Determination of Young's Modulus of the material – Uniform bending
2. Determination of Rigidity Modulus of the material – Torsion Pendulum
3. Determination of velocity of Ultrasonic waves in liquids
4. Determination of dispersive power of a prism using spectrometer
5. Determination of laser parameter – Divergence and wavelength for a given laser source – laser grating
6. Particle size determination using laser
7. Study of attenuation and propagation characteristics of optical fiber cable
8. Calibration of voltmeter using potentiometer.
9. Calibration of ammeter using potentiometer.
10. Construction and study of regulation properties of a given power supply using IC

**TOTAL 30**

### **REFERENCE BOOKS**

1. Chattopadhyay, D., Rakshit, P. C. and Saha, B., "*An Advanced Course in Practical Physics*", 2<sup>nd</sup> edition, Books & Allied Ltd., Calcutta, 1990.
2. Chauhan and Singh, "*Advanced Practical Physics*", revised edition, Pragati Prakashan, Meerut, 1985.
3. Thiruvadigal. J. D., Ponnusamy. S., Vasuhi. P. S. and Kumar. C., "*Hand Book of Practical Physics*", 5<sup>th</sup> edition, Vibrant Publication, Chennai, 2007.

<b>CY0103</b>	<b>CHEMISTRY LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**PURPOSE**

An integrated laboratory course consists of experiments from applied chemistry and is designed to illustrate the underlying principles of measurement techniques, synthesis, dynamics and chemical transformation.

**INSTRUCTIONAL OBJECTIVES**

Students should be able to understand the basic concept and its applications.

**LIST OF EXPERIMENTS**

**30**

1. Preparation of standard solutions.
2. Estimation of total hardness, permanent and temporary hardness by EDTA method.
3. Conductometric titration – determination of strength of an acid.
4. Estimation of iron by potentiometer – titration.
5. Determination of molecular weight of polymer by viscosity average – method.
6. Determination of dissolved oxygen in a water sample by Winkler's method
7. Determination of Na / K in water sample by Flame photometry.
8. Estimation of Copper in ore.
9. Estimation of nickel in steel.
10. Determination of total alkalinity and acidity of a water sample.

**TOTAL**

**30**

**REFERENCE**

1. Chemistry department manual, Edition, 2003.

<b>ME0120</b>	<b>WORKSHOP PRACTICE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**PURPOSE**

To provide the students with, hands on experience on different trades of engineering like fitting, carpentry, smithy, welding and sheet metal.

**INSTRUCTIONAL OBJECTIVES**

To familiarize with

1. The basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy.
2. The production of simple models in the above trades.

**LIST OF EXPERIMENTS**

**EMPHASIS TO BE LAID ON REAL LIFE APPLICATIONS WHEN FRAMING THE EXERCISES.**

<b>FITTING</b>	<b>12</b>
Tools & Equipments – Practice in Filing and Drilling. Making Vee Joints, Square, dovetail joints, Key Making.	
<b>CARPENTARY</b>	<b>12</b>
Tools and Equipments- Planning practice. Making Half Lap, dovetail, Mortise & Tenon joints, a mini model of a single door window frame.	
<b>SHEET METAL</b>	<b>12</b>
Tools and equipments - Fabrication of a small cabinet, Rectangular Hopper, etc.	
<b>WELDING</b>	<b>12</b>
Tools and equipments - Arc welding of butt joint, Lap Joint, Tee Fillet. Demonstration of Gas welding, TIG & MIG.	
<b>SMITHY</b>	<b>12</b>
Tools and Equipments –Making simple parts like hexagonal headed bolt, chisel.	
<b>TOTAL</b>	<b>60</b>

**TEXT BOOKS**

1. Gopal, T.V., Kumar, T., and Murali, G., “A first course on workshop practice – Theory, practice and work book”, Suma Publications, 2005.

**REFERENCE BOOKS**

1. Kannaiah,P. & Narayanan,K.C. “Manual on Workshop Practice”, Scitech Publications, Chennai, 1999.
2. Venkatachalapathy, V.S. “First year Engineering Workshop Practice”, Ramalinga Publications, Madurai, 1999.

<b>ME0130</b>	<b>ENGINEERING GRAPHICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>3</b>

(Only First Angle Projection is to be followed)

#### **PURPOSE**

1. To draw and interpret various projections of 1D, 2D and 3D objects.
2. To prepare and interpret the drawings of buildings.

#### **INSTRUCTIONAL OBJECTIVES**

To familiarize with

1. The construction of geometrical figures
2. The projection of 1D, 2D & 3D elements
3. Sectioning of solids and development of surfaces
4. Preparation and interpretation of building drawing

#### **FUNDAMENTALS OF ENGINEERING GRAPHICS**

**2**

Lettering, two dimensional geometrical constructions, conics, representation of three-dimensional objects – principles of projections – standard codes – projection of points.

#### **PROJECTION OF LINES AND SOLIDS**

**4**

Projection of straight lines, projection of solids – auxiliary projections

#### **SECTIONS AND DEVELOPMENTS**

**3**

Sections of solids and development of surfaces.

#### **PICTORIAL PROJECTIONS**

**4**

Conversion of projections: Orthographic projection, isometric projection of regular solids & combination of solids.

#### **BUILDING DRAWING**

**2**

Building Drawing – plan, elevation and section of single storied residential (or) office building with flat RCC roof and brick masonry walls having not more than 3 rooms (planning / designing is not expected in this course).

**PRACTICAL**      **60**  
**TOTAL**            **75**

#### **TEXT BOOKS**

1. Jeyapoovan, T., “*Engineering Drawing and Graphics using AutoCAD 2000*”, Vikas Publishing house Pvt Ltd, NewDelhi, 2005.
2. Narayanan, K.L & Kannaiah, P., “*Engineering Graphics*”, Scitech Publications, Chennai, 1999.

#### **REFERENCE BOOKS**

1. Bhatt, N.D., “*Elementary Engineering Drawing (First Angle Projection)*”, Charotar Publishing Co., Anand, 1999.
2. Venugopal, K. “*Engineering Drawing & Graphics*”, New Age international Pvt. Ltd., 2001.
3. Natarajan, K.V. “*Engineering Drawing & Graphics*”, Private Publication, Chennai, 1990.
4. Shah, M.B. and Rana, B.C., “*Engineering Drawing*”, Pearson Education (Singapore) Pvt. Ltd., Delhi – 110 092, 2005.

## II SEMESTER

GE0108	VALUE EDUCATION	L	T	P	C
	<b>Prerequisite: Nil</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>

### PURPOSE

To provide guiding principles and tools for the development of the whole person recognizing that the individual is comprised of Physical, Intellectual, Emotional and Spiritual dimensions.

### INSTRUCTIONAL OBJECTIVES

1. To help individuals think about and reflect on different values.
2. To deepen understanding, motivation and responsibility with regard to making personal and social choices and the practical implications of expressing them in relation to themselves, others, the community and the world at large.

To inspire individuals to choose their own personal, social, moral and spiritual values and be aware of practical methods for developing and deepening

### SYLLABUS CONTENTS

#### INTRODUCTION TO VALUE EDUCATION

**3**

Definition of values – Why values? – Need for Inculcation of values – Object of Value Education – Sources of Values – Types

- i) Personal values
- ii) Social values
- iii) Professional values
- iv) Moral and spiritual values
- v) Behavioral (common) values

**3**

#### PERSONAL VALUES

Definition of person – Self confidence – Self discipline – Self Assessment – Self restraint – Self motivation – Determination – Ambition – Contentment – Humility and Simplicity – Sympathy and Compassion – Gratitude - Forgiveness – Honesty – Courtesy.

#### SOCIAL VALUES

**3**

Definition of Society – Units of Society - Individual, family, different groups – Community – Social consciousness – Equality and Brotherhood – Dialogue – Tolerance – Sharing – Responsibility – Co-operation Freedom – Repentance and Magnanimity.

#### PROFESSIONAL VALUES

**3**

Definition – Competence – Confidence – Devotion to duty –Efficiency – Accountability – Respect for learning /learned – Willingness to learn-Open and balanced mind – Team spirit – Professional Ethic – Willingness for Discussion – Aims – Effort – Avoidance of Procrastination and slothfulness –Alertness.

#### BEHAVIORAL VALUES

**3**

Individual values and group values – Good manners at home and outside – Equality – Purity of thought, speech and action – Understanding the role of religion – Faith – Understanding the commonness of religions – respect for other faiths – unity in diversity – Living together – Tolerance – Non-violence – Truthfulness – Common aim – Unified effort towards peace – Patriotism.

**TOTAL**

**15**

#### REFERENCE BOOKS

1. Dr. S. Ignacimuthu S. J., Values for life, Better yourself Books, Bandra Mumbai-600 050 (1999).
2. Values(Collection of Essays)., Published by : Sri Ramakrishna Math., Chennai—4.,(1996)
3. Prof. R.P.Dhokalia., Eternal Human Values NCRT –Campus Sri Aurobindo Marg., New Delhi - 110011.
4. Swami Vivekananda., Education., Sri Ramakrishna Math., Chennai-4(1957)
5. Tirukural (English Translation by Dr.G.U.Pope).
6. The Bible
7. The Kuran
8. The Bagavath Geetha

<b>MA0102</b>	<b>MATHEMATICS II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>4</b>

(Common to all Branches of Engineering except BT, BP, BI, BMI, FPE, & GE)

### PURPOSE

To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.

### INSTRUCTIONAL OBJECTIVES

At the conclusion of the course, students should have understood Multiple Integrals, Laplace Transforms, Vector Calculus and Functions of a complex variable including contour integration and able to apply to all their Engineering problems.

### MULTIPLE INTEGRALS

9

Double integration in Cartesian and polar coordinates – Change of order of integration – Area as a double integral – Triple integration in Cartesian coordinates.

### LAPLACE TRANSFORMS

9

Transforms of simple functions – Basic operational properties – Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – periodic functions – Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients only.

### VECTOR CALCULUS

9

Gradient, divergence, curl – Solenoidal and irrotational fields – Vector identities (without proof) – Directional derivatives – Line, surface and volume integrals – Statements of Green's, Gauss divergence and Stroke's theorems only – Verification and applications to cubes and parallelepipeds only.

### ANALYTIC FUNCTIONS

9

Definition of Analytic Function – Cauchy Riemann equations – Properties of analytic functions - Determination of harmonic conjugate – Milne-Thomson's method – Conformal mappings:  $1/z$ ,  $az$  and  $az+b$  and bilinear transformation.

### COMPLEX INTEGRATION

9

Line integral – Cauchy's integral theorem (without proof) – Cauchy's integral formulae (with proof) – application of Cauchy's integral formulae – Taylor's and Laurent's expansions (statements only) – Singularities – Poles and Residues – Cauchy's residue theorem (with proof) - Evaluation of line integrals.

**TUTORIAL**      **30**  
**TOTAL**            **75**

### TEXT BOOK

1. Grewal B.S, *Higher Engg Maths*, Khanna Publications, 38<sup>th</sup> Edition.
2. Veerajan, T., *Engineering Mathematics*, Tata McGraw Hill Publishing Co., New Delhi, 2000.
3. Dr.V.Ramamurthy & Dr. Sundarammal Kesavan, *Engineering Mathematics – Vol I & II* Anuradha Publications, Revised Edition 2006.

### REFERENCE BOOKS

1. Kreyszig.E, *Advanced Engineering Mathematics*, 8<sup>th</sup> edition, John Wiley & Sons. Singapore,2001.
2. Kandasamy P et al. *Engineering Mathematics, Vol.I (4<sup>th</sup> revised edition)*, S.Chand &Co., New Delhi,2000.
3. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., *Advanced Mathematics for Engineering students, Volume I (2<sup>nd</sup> edition)*, S.Viswanathan Printers and Publishers, 1992.
4. Venkataraman M.K., *Engineering Mathematics – First Year (2<sup>nd</sup> edition)*, National Publishing Co., Chennai, 2000.

<b>PH0102</b>	<b>MATERIALS SCIENCE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>

### **PURPOSE**

The purpose of this course is to develop comprehension of the rapidly changing technological scenario and the requisite expertise for appropriate selection of materials for specific engineering applications.

### **INSTRUCTIONAL OBJECTIVES**

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

1. Understand electrical properties of materials,
2. Understand the properties and applications of semi conducting materials,
3. Understand general properties and applications of magnetic and dielectric materials,
4. Understand the behavior of materials on exposure to light,
5. Understand general properties and application of modern engineering and bio materials, and
6. Get familiarized with the concepts of Nano Science and Technology.

### **ELECTRONIC AND PHOTONIC MATERIALS**

**6**

**Electronic materials:** Importance of Classical and Quantum free electron theory of metals – Fermi energy and Fermi Dirac distribution function – Variation of Fermi level with temperature in intrinsic and extrinsic semiconductors – Hall effect – Dilute Magnetic Semiconductors (DMS) and their applications – High temperature Superconductivity. **Photonic materials:** LED and LCD materials – Photo conducting materials – Nonlinear optical materials (elementary ideas) and their applications.

### **MAGNETIC, DIELECTRIC AND MODERN ENGINEERING MATERIALS**

**6**

**Magnetic materials:** Ferrites and garnets – Magnetic bubbles and their applications – Giant Magneto Resistance (GMR) – Colossal Magneto Resistance (CMR).

**Dielectric materials:** Various polarization mechanisms in dielectrics (elementary ideas) and their frequency and temperature dependence – Dielectric loss – Piezo electric and ferro electric materials and their applications.

**Modern engineering materials:** Shape memory alloys – Metallic glasses – Advanced ceramics and composites.

### **BIO MATERIALS**

**6**

Classification of biomaterials – Comparison of properties of some common biomaterials – Effects of physiological fluid on the properties of biomaterials – Biological responses (extra and intra vascular system) – Metallic, Ceramic and Polymeric implant materials – Introduction to bio sensors and tissue engineering.

### **NANO MATERIALS AND NANOTECHNOLOGY**

**6**

Basic concepts of Nano science and technology – Quantum wire – Quantum well – Quantum dot – Properties and technological advantages of Nano materials – Carbon Nanotubes and applications – Material processing by Sol – Gel method, Chemical Vapour deposition and Physical Vapour deposition – Microwave Synthesis of materials – Principles of SEM, TEM and AFM .

### **MECHANICAL PROPERTIES OF MATERIALS**

**6**

Stress Strain diagram for different engineering materials – Engineering and true stress strain diagram – Ductile and brittle material – Tensile strength – Hardness – Impact strength – Fatigue – Creep – Fracture (Types and Ductile to brittle transition) – Factors affecting mechanical properties.

**PRACTICALS****30**

1. Band gap determination using Post office box.
2. Dielectric constant measurement.
3. Photoconductivity measurement.
4. Resistivity determination for a semiconductor wafer using Four probe method.
5. Determination of Hall coefficient and carrier type for a semiconductor material.
6. To trace the hysteresis loop for a magnetic material.
7. Magnetic susceptibility – Quincke’s method.
8. Determination of thermal conductivity – Lee’s Disc method
9. Visit to Nano Technology Laboratory (optional)

**TOTAL 60****TEXT BOOKS**

1. S.O. Kasap, *Principles of Electronic Materials and Devices*, Tata McGraw Hill Edition, New Delhi, 2002.
2. Van Vlack, L.H., *Material Science for Engineers*, 6<sup>th</sup> edition, Addison Wesley, 1985.
3. Thiruvadigal, J. D., Ponnusamy, S. and Vasuhi.P. S., *Materials Science*, 5<sup>th</sup> edition, Vibrant Publications, Chennai, 2007.

**REFERENCE BOOKS**

1. Rolf E. Hummel, *Electronic Properties of materials*, Narosa Publishing House, New Delhi, 1994.
2. Raghavan.V., *Materials Science & Engineering – A First Course*, 5<sup>th</sup> edition, Prentice Hall of India, New Delhi, 2005.
3. Khanna. O. P., *A Text Book of Material Science & Metallurgy*, Revised edition, Dhanpat Rai Publications, New Delhi, 2006.
4. Sujata V. Bhat, *Biomaterials*, 2<sup>nd</sup> edition, Narosa Publishing House, New Delhi, 2006.
5. Mick Wilson, Kamali Kannangara, Michells Simmons and Burkhard Raguse, *Nano Technology – Basic Science and Emerging Technologies*, 1<sup>st</sup> edition, Overseas Press, New Delhi, 2005.

<b>GE0102</b>	<b>BIOLOGY FOR ENGINEERS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

### **PURPOSE**

To provide a basic understanding of biological mechanisms from the perspective of engineers.

### **INSTRUCTIONAL OBJECTIVES**

To familiarize the students with the basic organization of organisms and subsequent building to a living being. With this knowledge, the student will be then imparted with an understanding about the machinery of the cell functions that is ultimately responsible for various daily activities. Nervous and immune systems will be taught as examples of this signaling machinery.

### **FROM ATOMS TO ORGANISMS**

**6**

The Cell: the Basic Unit of Life - Molecular Components of Cells - Expression of Genetic Information - Protein Structure and Function- Cell Metabolism - Cells Maintain Their Internal Environments - Cells Respond to Their External Environments - Cells Grow and Reproduce - Cells Differentiate

### **THE MOLECULAR DESIGN OF LIFE**

**6**

Biochemistry and the Genomic Revolution- . DNA Illustrates the Relation between Form and Function- Biochemical Unity Underlies Biological Diversity-. Chemical Bonds in Biochemistry -. Biochemistry and Human Biology-. Protein Synthesis Requires the Translation of Nucleotide Sequences Into Amino Acid Sequences-.2. Aminoacyl-Transfer RNA Synthetases Read the Genetic Code- A Ribosome Is a Ribonucleoprotein Particle (70S) Made of a Small (30S) and a Large (50S) Subunit-Protein Factors Play Key Roles in Protein Synthesis-. Eukaryotic Protein Synthesis Differs from Prokaryotic Protein Synthesis Primarily in Translation Initiation

### **CATALYTIC STRATEGIES**

**6**

Proteases: Facilitating a Difficult Reaction-. Making a Fast Reaction Faster: Carbonic Anhydrases-. Restriction Enzymes: Performing Highly Specific DNA-Cleavage Reactions- Nucleoside Monophosphate Kinases: Catalyzing Phosphoryl Group Exchange between Nucleotides Without Promoting Hydrolysis- metabolism-anabolism and catabolism-photosynthesis and carbon fixation- biological energy production.

### **MECHANOCHEMISTRY**

**6**

How Protein Motors Convert Chemical Energy into Mechanical Work- Brief Description of ATP Synthase Structure- The F1 Motor: A Power Stroke-A Pure Power Stroke- Coupling and Coordination of Motors- Measures of Efficiency- F1-Motor of ATP synthase- The Bacterial Flagellar Motor- Motor Driven by H<sub>+</sub> and Na<sub>+</sub> Ion Flux- Proton Motive Force, Sodium-motive Force, Ion Flux- Molecular Motor Directionality- Chimeric Kinesin Motors- Backwards Myosins- Chimeric Myosin Motors- Bidirectional Dyneins?

### **SENSORY AND IMMUNO SYSTEMS**

**6**

General Principles of Cell Signaling-Signaling via G-Protein-linked Cell-Surface Receptors-Signaling via Enzyme-linked Cell-Surface Receptors-Target-Cell Adaptation-The Logic of Intracellular Signaling: Lessons from Computer-based "Neural Networks"-The Cellular Basis of Immunity-The Functional Properties of Antibodies-The Fine Structure of Antibodies-The Generation of Antibody Diversity-T Cell Receptors and Subclasses-MHC Molecules and Antigen Presentation to T Cells- Cytotoxic T Cells-Helper T Cells and T Cell Activation-Selection of the T Cell Repertoire

**TOTAL 30**

### **TEXT BOOK**

1. J.M.Berg, J.L.Tymoczko and L.Sryer. Biochemistry, W.H. Freeman Publications.
2. STUDENT COMPANION to accompany Biochemistry, Fifth Edition -Richard I. Gumport
3. Frank H. Deis, Nancy Counts Gerber, Roger E. Koeppe, II Molecular motors

### **REFERENCE BOOKS**

1. Alberts, 2003 Molecular Biology of the cell
2. Lodish, 2004 Molecular cell biology

<b>GE0104</b>	<b>PRINCIPLES OF ENVIRONMENTAL SCIENCE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

### **PURPOSE**

The course provides the comprehensive knowledge in environmental science, environmental issues and the management.

### **INSTRUCTIONAL OBJECTIVES**

1. The importance of environmental education, ecosystem and ethics.
2. Knowledge with respect to biodiversity and its conservation.
3. To create awareness on the various environmental pollution aspects and issues.
4. To educate the ways and means to protect the environment.
5. Important environmental issues and protection

### **ENVIRONMENT AND ECOSYSTEMS**

**6**

Environmental education: definition - scope - objectives and importance. Concept of an ecosystem – types (terrestrial and aquatic ecosystems) – structure and function – ecological succession - food chains, food webs and ecological pyramids

### **BIODIVERSITY**

**6**

Introduction: definition - genetic, species and ecosystem diversity - value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - threats to biodiversity: habitat loss, poaching of wildlife - endangered and endemic species of India, Conservation of biodiversity: in-situ and ex-situ conservations.

### **POLLUTION AND WASTE MANAGEMENT**

**6**

Air and water pollution – classification of pollutants and their effects – control measures of air pollution. Waste water treatment (general) – primary, secondary & tertiary stages.  
Solid waste management: causes - effects of municipal waste, hazardous waste, bio medical waste - process of waste management.

### **CURRENT ENVIRONMENTAL ISSUES**

**6**

Environmental ethics -issues and possible solutions- population explosion, climatic change, ozone layer depletion, global warming, acid rain and green house effect.  
Sustainable development: definition, objectives and environmental dimensions of sustainable development- environmental audit for sustainable development.

### **ENVIRONMENTAL PROTECTION**

**6**

National and international concern for environment: Important environmental protection acts in India – water, air (prevention and control of pollution) act, wild life conservation and forest act – functions of central and state pollution control boards - international effort – key initiatives of Rio declaration, Vienna convention, Kyoto protocol and Johannesburg summit.

**TOTAL 30**

### **TEXT BOOKS**

1. Sharma.B.K. and Kaur, *Environmental Chemistry* Goel Publishing House, Meerut, 1994.
2. De.A.K., *Environmental Chemistry*, New Age International (p) Lt., , New Delhi, 1996.
3. Kurian Joseph & R. Nagendran, *Essential of Environmental Studies* Pearson Education, 2004.

### **REFERENCE BOOKS**

1. Dara S.S., *A Text Book of Environmental Chemistry and pollution contro*, S.Chand & Company Ltd., New Delhi, 2004.
2. Jeyalakshmi.R, *Principles of Environmental Science*, 1<sup>st</sup> Edition, Devi Publications, , Chennai 2006.
3. Kamaraj.P & Arthanareeswari.M, *Environmental Science – Challenges and Changes*, 1<sup>st</sup> Edition, Sudhandhira Publications, 2007.
4. Arivalagan.K, Ramar.P & Kamatchi.P, *Principles of Environmental Science*, 1<sup>st</sup> Edition, Suji Publications, 2007.

<b>GE0106</b>	<b>BASIC ENGINEERING – II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

### **PURPOSE**

This course provides comprehensive idea about circuit analysis, working principles of machines and common measuring instruments. It also provides fundamentals of electronic devices, transducers and integrated circuits.

### **INSTRUCTIONAL OBJECTIVES**

At the end of the course students will be able

1. To understand the basic concepts of magnetic circuits, AC & DC circuits.
2. To explain the working principle, construction, applications of DC & AC machines and measuring instruments.
3. To gain knowledge about the fundamentals of electric components, devices, transducers and integrated circuits.

## **PART A - ELECTRICAL ENGINEERING**

### **ELECTRICAL MACHINES**

**12**

Definition of mmf, flux and reluctance, leakage flux, fringing, magnetic materials and B-H relationship. Problems involving simple magnetic circuits, Faraday's laws, induced emfs and inductances, brief idea on Hysteresis and eddy currents. Working principle, construction and applications of DC machines and AC machines (1-phase transformers, 3-phase induction motors, single phase induction motors – split phase, capacitor start and capacitor start & run motors).

### **AC & DC CIRCUITS**

**10**

Circuit parameters, Ohms law, Kirchoff's law. Average and RMS values, concept of phasor representation. RLC series circuits and series resonance, RLC parallel circuits (includes simple problems in DC & AC circuits) Introduction to three phase systems – types of connections, relationship between line and phase values. (qualitative treatment only)

### **WIRING & LIGHTING**

**8**

Types of wiring, wiring accessories, staircase & corridor wiring, Working and characteristics of incandescent, fluorescent, SV & MV lamps. Basic principles of earthing, simple layout of generation, transmission & distribution of power.

**TOTAL 30**

### **TEXT BOOKS**

1. Muthusubramanian.R, Salivahanan.S, Muraleedharan.K.A, “Basic Electrical, Electronics and Computer Engineering”, Tata McGraw - Hill, 1999.
2. Mehta V K ,Principles of Electronics S Chand & Co,1980

### **REFERENCE BOOKS**

1. Kothari D P and Nagrath I J ,Basic Electrical Engineering , Tata McGraw Hill,1991
2. Mithal G K , Electronic Devices and Circuits, Khanna Publications,1997

## PART B - ELECTRONICS ENGINEERING

### ELECTRONIC COMPONENTS AND DEVICES

12

**Passive components:** Resistors- Inductors and Capacitors and their types.

**Semiconductor:** Energy band diagram- Intrinsic and Extrinsic semiconductors- PN junction diodes and Zener diodes – characteristics.

**Transistors:** PNP and NPN transistors – theory of operation – Transistor configurations – characteristics – comparison.

**Special semiconductor devices:** FET – SCR – LED – V I characteristics – applications.

**Rectifiers:** Half wave and full wave rectifier – capacitive filter – wave forms – ripple factor – regulation characteristics.

### TRANSDUCERS AND MEASURING INSTRUMENTS

9

**Transducers:** General features and classification of transducers, Resistive Transducers – Potentiometer, Unbonded strain gauge-Bonded strain gauge-Load cell, Inductive transducers – Differential output transducers – LVDT, Flow transducers, Temperature Transducers – Thermistors, Thermocouple and pyrometers.

**Measuring Instruments:** Basic principles and classification of instruments, Moving coil and Moving iron instruments, CRO – Principle of operation.

### DIGITAL ELECTRONICS & LINEAR ICs

9

**Digital Fundamentals:** Number systems – Boolean Theorems – DeMorgan’s Theorem - Logic gates – Implementation of Boolean Expression using Gates.

**Integrated Circuits:** IC fabrication – Monolithic Technique- Function of Operational Amplifier.

**TOTAL 30**

### TEXT BOOKS

1. Muthusubramanian.R, Salivahanan.S, Muraleedharan.K.A, “Basic Electrical, Electronics and Computer Engineering”, Tata McGraw - Hill, 1999.
2. Metha V.K, “Principles of Electronics”, S. Chand & Co., 1980.
3. Kalsi H S, “Electronics Instrumentation”, ISTE publication,1995

### REFERENCE BOOKS

1. Kothari D. P and Nagrath IJ, “Basic Electrical Engineering”, Tata McGraw- Hill, 1991.
2. Thomas L.Floyd “Electronic devices”, Addison Wesley Longman (Singapore) Pvt . Ltd., 5<sup>th</sup> Edition.

<b>EC0102</b>	<b>ELECTRIC CIRCUITS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>3</b>

### PURPOSE

To expose basic circuit concepts, circuit modeling and methods of circuit analysis in time domain and frequency domain for solving simple and multi dimensional circuits including coupled circuits and three phase circuits.

### INSTRUCTIONAL OBJECTIVES

1. To understand the concept of circuit elements lumped circuits, waveforms, circuit laws and network reduction.
2. To solve the electrical network using mesh and nodal analysis by applying network theorems.
3. To understand the concept of active, reactive and apparent powers, power factor and resonance in series and parallel circuits.
4. To know the basic concepts of coupled circuits, three phase loads and power measurement.
5. To analyze the transient response of series and parallel A.C. circuits and to solve problems in time domain using Laplace Transform.

### BASIC CIRCUIT CONCEPTS & LAWS:

**6**

Lumped Circuit elements, Ideal Sources (Dependent & Independent), Linear Passive elements –VI relationship of Circuit elements- Definitions: Node, Loop, Path & Branch. – Examples – Kirchoff’s Laws and Application (Both AC & DC) .

### NETWORK THEOREMS: (Both DC & AC Circuit Analysis)

**6**

Source Transformation Theorem – Duality Theorem – Linearity & Super Position Principle – Thevenin’s & Norton’s Theorem – Reciprocity Theorem – Compensation Theorem – Tellegen’s & Millman’s Theorem – Maximum Power Transfer theorem – Substitution Theorem – Star – Delta Theorem.

### BASIC CONCEPTS OF AC & RESONANCE

**6**

**AC Analysis:** Concept of Phasor & Complex impedance/Admittance- Analysis of Simple series and Parallel Circuits- Active Power, Reactive Power, Apparent Power (Volt Amperes), Power Factor and Energy Associated with these Circuits – Concept of complex power – Phasor Diagram, impedance Triangle & Power Triangle associated with these circuits

**Resonance:** Introduction- series resonance-parallel resonance- Definition: Q Factor-half power frequency-resonant frequency- Bandwidth-Mathematical Expression for Different types of Resonant circuit.

### MAGNETICALLY COUPLED & 3- PHASE CIRCUITS:

**6**

**Coupled Circuits:** Mutual inductance – Co-efficient of Coupling- Dot Convention- Energy Consideration – Analysis of Coupled Circuits

**3- Phase Circuits:** Poly phase System – Phase Sequence – Analysis of 3 Phase Balanced/Unbalanced Circuits- Power and Power factor Measurement

### TRANSIENT ANALYSIS

**6**

Basics – Source free and Forced Response of RL, RC and RLC Series Circuits- Forced Response of RL, RC & RLC Series circuits with Sinusoidal Excitation – Time Constant & Natural frequency of Oscillation – Laplace Transform Application to the Solution of RL, RC & RLC Transient Circuits.

**TUTORIAL 30**  
**TOTAL 60**

### TEXT BOOKS

1. William H.Hyde,Jr, J.E.Kemmerly & Steven M.Durban, “ *Engineering Circuit Analysis*” 6<sup>th</sup> edition, Mcgraw Hill,2002
2. A.Sudhakar & Shyanmugam S.Palli “ *Circuits & Network Analysis & Synthesis*”, 2<sup>nd</sup> Edition, Tata McGraw Hill, 1994
3. M.Arumugam & N.PremKumar, “ *Electric Circuit Theory*”, Khanna Publishers, New Delhi, 1991

### REFERENCES

1. M.L Soni & J.C. Gupta, “ *Electric Circuit Analysis*”, Dhanpat Rai & Sons , New Delhi, 1981
2. Joseph Edminster, “Electric Circuits” Schaum’s Outline Series, McGrawHill 2nd Edition.

<b>PD0102</b>	<b>PERSONALITY DEVELOPMENT - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>

### **PURPOSE**

The purpose of this course is to build confidence and inculcate various soft skills and to help students to identify and achieve their personal potential

### **INSTRUCTIONAL OBJECTIVES**

1. To guide thought process.
2. To groom student's attitude.
3. To develop communication skill.
4. To build confidence.

### **METHODOLOGY**

The entire program is designed in such a way that every student will participate in the class room activities. The activities are planned to bring out the skills and talents of the students which they will be employing during various occasions in their real life.

1. Group activities + individual activities.
2. Collaborative learning.
3. Interactive sessions.
4. Ensure Participation.
5. Empirical Learning

### **SYLLABUS CONTENT**

Puzzles I - Poster design/Caption/Slogan writing (Social issues) - Bone of contention I – debate	6
Bone of contention II - Puzzle II - Survey and Reporting (favorite channel, music, food)	6
Interpretation of Visuals of I & II - Vocabulary games III	6
Book Review - Quiz I - Presentation Skills I	6
Presentation Skills II - Analytical Thinking – Review	6
<b>TOTAL</b>	<b>30</b>

### **EVALUATION**

1. Activities assessed by both group and individual participation
2. Continuous assessment based on daily participation

### **SCHEME OF INSTRUCTION**

Marks allocated for regular participation in all oral activities in class

### **SCHEME OF EXAMINATION**

Complete internal evaluation on a regular Basis

CS0140	COMPUTER PRACTICE	L	T	P	C
	Prerequisite: Nil	1	0	2	2

**PURPOSE:**

To introduce programming languages, C and C++ as tools to solve problems and to provide hands on training.

**INSTRUCTIONAL OBJECTIVES:**

After completing the course, the students should be able to

1. Understand the program development life cycle
2. Design algorithms to solve simple problems using computers
3. Convert algorithms into C and C++ programs and execute

**PROGRAMMING FUNDAMENTALS**

**3**

Computer Basics; Program Development Life Cycle: Flow Chart, Algorithm, Compilation and Execution; Introduction to C Language: program structure, variables, keywords, data types; Input / Output functions: scanf, printf; simple programs.

**DECISION AND LOOP CONTROL STRUCTURE**

**3**

Logical operators; Decision statements: if/else, switch/case statements; Loop control statements – for, while, do/while.

**ARRAYS AND FUNCTIONS**

**3**

**Arrays:** Introduction to arrays; one dimensional arrays: declaration, reading and printing array elements, sorting and searching.

**Functions:** Definition; declaration of functions; return statement; recursion.

**INTRODUCTION TO OOP CONCEPTS**

**3**

OOP concepts: data hiding, encapsulation, inheritance, overloading, polymorphism; classes and objects; constructor and destructor; simple program in C++.

**INHERITANCE AND OVERLOADING**

**3**

Inheritance – single, multiple, multilevel; Overloading – Function overloading, Operator overloading.

**LIST OF EXERCISES**

**Note to the Instructors: Design exercise problems to demonstrate the use of C and C++ in the area of specialization.**

1. Programs to demonstrate the use of scanf ( ) and printf( ) functions
2. Programs to evaluate arithmetic expressions
3. Programs using conditional statements
4. Programs using for, while , do...while
5. Programs on arrays
6. Programs to perform matrix addition and multiplication
7. Programs to implement functions
8. Programs to illustrate recursion
9. Program to create classes and objects using C++
10. Program to implement Constructor and Destructor in C++
11. Program to implement single inheritance in C++
12. Program to implement Function overloading in C++
13. Program to implement Operator overloading in C++

**PRACTICAL  
TOTAL**

**30  
45**

**REFERENCE BOOKS**

1. Computer Practice Laboratory Manual, SRM University.
2. Kanetkar P.Yashwant, "Let us C", BPB publications, 2002.
3. Ashok N.Kamthane, "Programming with ANSI and Turbo C", Pearson Education, 2006.
4. Herbert Schildt, "The Complete Reference C++", Tata McGraw Hill, 2001, 3<sup>rd</sup> Edition.
5. Robert Lafore, "Object Oriented Programming in Microsoft C++", The Waite Group, Galgotia Publications Pvt. Ltd., 2002.

<b>ME0120</b>	<b>WORKSHOP PRACTICE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**PURPOSE**

To provide the students with, hands on experience on different trades of engineering like fitting, carpentry, smithy, welding and sheet metal.

**INSTRUCTIONAL OBJECTIVES**

To familiarize with

1. The basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy.
2. The production of simple models in the above trades.

**LIST OF EXPERIMENTS**

**EMPHASIS TO BE LAID ON REAL LIFE APPLICATIONS WHEN FRAMING THE EXERCISES.**

<b>FITTING</b>	<b>12</b>
Tools & Equipments – Practice in Filing and Drilling. Making Vee Joints, Square, dovetail joints, Key Making.	
<b>CARPENTARY</b>	<b>12</b>
Tools and Equipments- Planning practice. Making Half Lap, dovetail, Mortise & Tenon joints, a mini model of a single door window frame.	
<b>SHEET METAL</b>	<b>12</b>
Tools and equipments - Fabrication of a small cabinet, Rectangular Hopper, etc.	
<b>WELDING</b>	<b>12</b>
Tools and equipments - Arc welding of butt joint, Lap Joint, Tee Fillet. Demonstration of Gas welding, TIG & MIG.	
<b>SMITHY</b>	<b>12</b>
Tools and Equipments –Making simple parts like hexagonal headed bolt, chisel.	
<b>TOTAL</b>	<b>60</b>

**TEXT BOOKS**

1. Gopal, T.V., Kumar, T., and Murali, G., “A first course on workshop practice – Theory, practice and work book”, Suma Publications, 2005.

**REFERENCE BOOKS**

1. Kannaiah,P. & Narayanan,K.C. “Manual on Workshop Practice”, Scitech Publications, Chennai, 1999.
2. Venkatachalapathy, V.S. “First year Engineering Workshop Practice”, Ramalinga Publications, Madurai, 1999.

<b>ME0130</b>	<b>ENGINEERING GRAPHICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>3</b>

(Only First Angle Projection is to be followed)

#### **PURPOSE**

1. To draw and interpret various projections of 1D, 2D and 3D objects.
2. To prepare and interpret the drawings of buildings.

#### **INSTRUCTIONAL OBJECTIVES**

To familiarize with

1. The construction of geometrical figures
2. The projection of 1D, 2D & 3D elements
3. Sectioning of solids and development of surfaces
4. Preparation and interpretation of building drawing

#### **FUNDAMENTALS OF ENGINEERING GRAPHICS**

**2**

Lettering, two dimensional geometrical constructions, conics, representation of three-dimensional objects – principles of projections – standard codes – projection of points.

#### **PROJECTION OF LINES AND SOLIDS**

**4**

Projection of straight lines, projection of solids – auxiliary projections

#### **SECTIONS AND DEVELOPMENTS**

**3**

Sections of solids and development of surfaces.

#### **PICTORIAL PROJECTIONS**

**4**

Conversion of projections: Orthographic projection, isometric projection of regular solids & combination of solids.

#### **BUILDING DRAWING**

**2**

Building Drawing – plan, elevation and section of single storied residential (or) office building with flat RCC roof and brick masonry walls having not more than 3 rooms (planning / designing is not expected in this course).

**PRACTICAL**      **60**  
**TOTAL**            **75**

#### **TEXT BOOKS**

1. Jeyapoovan, T., “*Engineering Drawing and Graphics using AutoCAD 2000*”, Vikas Publishing house Pvt Ltd, NewDelhi, 2005.
2. Narayanan, K.L & Kannaiah, P., “*Engineering Graphics*”, Scitech Publications, Chennai, 1999.

#### **REFERENCE BOOKS**

1. Bhatt, N.D., “*Elementary Engineering Drawing (First Angle Projection)*”, Charotar Publishing Co., Anand, 1999.
2. Venugopal, K. “*Engineering Drawing & Graphics*”, New Age international Pvt. Ltd., 2001.
3. Natarajan, K.V. “*Engineering Drawing & Graphics*”, Private Publication, Chennai, 1990.
4. Shah, M.B. and Rana, B.C., “*Engineering Drawing*”, Pearson Education (Singapore) Pvt. Ltd., Delhi – 110 092, 2005.

<b>EC0122</b>	<b>ELECTRIC CIRCUITS LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**PURPOSE**

To inculcate strong practical skills on the fundamental theorems and transient circuit analysis.

**INSTRUCTIONAL OBJECTIVES**

1. To impart hands on experience in verification of circuit laws and theorems
2. To measure circuit parameters
3. To study circuit characteristics and simulation of time response

**LIST OF EXPERIMENTS**

**30**

1. Verification of Kirchoff's voltage and Current Laws
2. Verification of Superposition Theorem
3. Verification of Thevenin's Theorem
4. Verification of Maximum Power Transfer Theorem
5. Verification of Tellegen's or Norton's Theorem
6. Time domain response of RL Transient Circuit.
7. Time domain response of RC Transient Circuit.
8. Series RLC Resonance Circuits( Frequency response& Resonant frequency)
9. Parallel RLC Resonance Circuits( Frequency response & Resonant frequency)
10. Measurement of real power, reactive power, power factor and impedance of RC, RL and RLC circuits using voltmeters and ammeters.

**TOTAL 30**

**REFERENCE: LABORATORY MANUAL**

### SEMESTER III

LE0201	GERMAN LANGUAGE PHASE I	L	T	P	C
	Prerequisite: Nil	2	0	0	2

#### PURPOSE

Enabling the Engineering Students to one more Foreign Language, especially German, which is scientific and technical language. This may be useful in the field of employment opportunities as well as helping them to develop projects on browsing German websites.

#### INSTRUCTIONAL OBJECTIVES

Developing pronunciation so that they can read the text and e-mail during their employment, instructing them to write their own C V and developing a fundamental conversation with any German national

#### INTRODUCTION

10

German Language, Alphabets and Pronunciation.

#### THEMEN

Name, Land, Leute, Beruf, Familie geschwister, Einkaufen, Reisen, Zahlen, Haus, Freunden, Essen and Stadium, Fest, Zeit.

#### LISTENING

10

Listening to the cassette and pay special attention to the meaning and sounds. Listening Comprehension – Announcements / Airport / Station / General.

#### READING

10

Listening to the cassette and reading it allowed.

READING COMPRENSION BASICS / STATION / NEWS / NOTICE BOARDS.

**TOTAL 30**

#### GLOSSARY

Technical Words Lesson (1-5)

#### TEXT BOOK WITH CASSETTES

1. Grundkurs Deutsch
2. Momentnal (Max Mueller Bhavan – Goethe Institute, Germany).

#### SCHEME OF EVALUATION

Internal 50 = Listening – 10 Marks, Speaking – 20 Marks, Reading – 10 Marks and Writing = 10 Marks  
External 50 – 3 hours final written exam

<b>LE0203</b>	<b>JAPANESE LANGUAGE PHASE I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

**PURPOSE**

1. In view of globalization, learning Foreign Language by Engineering graduates enhances their employment opportunities.
2. Get awareness of understanding of International culture.
3. Widening the Linguistic Skills of the Students.

**INSTRUCTIONAL OBJECTIVES**

To learn the scripts of Japanese Languages namely Hiragana, Katakana and Kanji, Vocabularies etc. To learn basic grammar and acquire basic communication skills. To understand Japanese culture.

**SYLLABUS CONTENT**

Alphabets (Hiragana ), Self Introduction, Greetings, Classroom expressions, Numbers, Conversation.	8
Alphabets Hiragana (continued),Vocabularies. Counters .Time expression. Conversation	8
Katakana and related vocabulary. Kanjis –introduction. conversation.	8
Lesson-1 Watashiwa Nihonjin desu. Grammar,Marume &Sentence pattern.Marume. Conversation.	6
<b>TOTAL</b>	<b>30</b>

**TEXT BOOKS**

1. Nihongo Shoho I main Text sold in India by the Japanese Language Teachers Association Pune.
2. Hiragana and Katakana Work Book published by AOTS Japan
3. Grammar and Kotoba ( Work Book )
4. Japanese for Dummies.(Conversation) CD.

**SCHEME OF EVALUATION**

Internal 50 = Listening – 10 Marks, Speaking – 20 Marks, Reading – 10 Marks and Writing = 10 Marks  
 External 50 – 3 hours final written exam

<b>LE0205</b>	<b>FRENCH LANGUAGE PHASE I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

#### **PURPOSE**

1. As language skills are as valuable as technical skills knowledge of French enables the engineering graduates in career orientation.
2. As a second international global Lang after English there is a wider choice of job opportunities in the international employment market and also multinationals in India and an understanding of French culture thro language.

#### **INSTRUCTIONAL OBJECTIVE**

Characterized by the Roman script, grammar, vocabulary and colloquial expressions are taught which enables them to communicate effectively with any native speaker.

#### **INTRODUCTION AND PRONUNCIATION**

**8**

Introduction of the French Language, Alphabets and Pronunciation, Greetings (Wishing, Thanking and Bidding good bye), Introducing oneself & someone Presenter quelqu'un et se presenter - conversational French sentences based on the topics discussed above.

#### **VOCABULARY**

**6**

Numbers and Dates, Days, Months and Seasons, Time, Nouns, Professions and Nationalities. Conversational sentences on weather, time, and professions.

#### **GRAMMAR**

**5**

Basic Verbs (Avoir, Etre, Aller, Faire) – Conjugation – Present tense, Affirmative, Negative, Interrogative, Adjectives (Qualitative), Subject Pronouns and Disjunctive Pronouns.

#### **CONVERSATION AND LISTENING**

**6**

Conversational sentences on physical description and expressions with verbs like avoir, etre and faire

#### **GRAMMAR**

**5**

Prepositions ( a, de,dans, en, sur,sous, pour...),Contracted Articles, Question Tag (Qui, Quel, Ou, .....etc)

**TOTAL**

**30**

#### **TEXT BOOKS**

1. Panorama – Goyal Publishers
2. Apprenons le Francais I, Sarawathy publication.

#### **SCHEME OF EVALUATION**

Internal 50 = Listening – 10 Marks, Speaking – 20 Marks, Reading – 10 Marks and Writing = 10 Marks  
External 50 – 3 hours final written exam

<b>MA0211</b>	<b>MATHEMATICS – III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">MA0101</a>, <a href="#">MA0102</a></b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>4</b>

**PURPOSE**

To equip the students with the knowledge of slightly advanced topics of mathematics.

**INSTRUCTIONAL OBJECTIVES**

After the completion of the course, the students should be able to apply

2. The rudiments of Fourier series
3. The theory and problems of PDE
4. The applications of PDE to boundary value problems.
5. Fourier transforms and to their branches of engineering.

**FOURIER SERIES**

**9**

Dirichlet’s conditions – General Fourier series – Half range Sine and Cosine series – Parseval’s identity – Harmonic Analysis.

**PARTIAL DIFFERENTIAL EQUATIONS**

**9**

Formation – Solution of standard types of first order equations – Lagrange’s equation – Linear homogeneous partial differential equations of second and higher order with constant coefficients - Classification of second order linear partial differential equations.

**ONE DIMENSIONAL WAVE & HEAT EQUATION**

**9**

Boundary and initial value problems - Transverse vibrations of elastic string with fixed ends – Fourier series solutions – One dimensional heat equation - Steady and transient states – problems.

**TWO DIMENSIONAL HEAT EQUATION**

**9**

Two dimensional heat equation – Steady state heat flow equation – Laplace Equation Cartesian form – Laplace equation in polar form – heat flow in circular plates including annulus - Fourier series solution.

**FOURIER TRANSFORMS**

**9**

Statement of Fourier integral theorem – Fourier transform pairs – Fourier Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval’s identity.

**TUTORIAL 30**  
**TOTAL 75**

**TEXT BOOK**

1. Grewal B.S., “*Higher Engineering Mathematics*”36<sup>th</sup> edition, Khanna Publishers, 2002.

**REFERENCE BOOKS**

1. Kreyszig.E, “*Advanced Engineering Mathematics*”, 8<sup>th</sup> edition, John Wiley & Sons, Singapore, 2000.
2. Kandasamy P etal. “*Engineering Mathematics*”, Vol. II & Vol. III (4<sup>th</sup> revised edition), S.Chand & Co., New Delhi, 2000.
3. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., “*Advanced Mathematics for Engineering students*”, Volume II & III (2<sup>nd</sup> edition), S.Viswanathan Printers and Publishers, 1992.
4. Venkataraman M.K., “*Engineering Mathematics*” – Vol.III – A & B (13<sup>th</sup> edition), National Publishing Co., Chennai, 1998.

<b>EE0231</b>	<b>ELECTRICAL ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PURPOSE**

To give students a fair knowledge on the working of various electrical machines.

**INSTRUCTIONAL OBJECTIVES**

1. Analyze the performance of different types of electrical machines.
2. Appreciate the applications of them.
3. Design distributing systems

**DC MACHINES**

**9**

Constructional details of DC machine – working principle of DC generator – Types of Generators – EMF equation – No load and load characteristics.

Principle of operation of DC motors – Back emf – Torque equation – characteristics of shunt, series and compound motors – speed control & starters (Qualitative treatment only)

**TRANSFORMER**

**9**

Principle of operation – Constructional features of single phase transformers – Types of transformer – EMF equation – Transformer on No load and on load – Effects to resistance and leakage reactance of the windings – Equivalent circuit – Voltage regulation.

**Three Phase induction motor:** Construction – Principle of operation – Production of rotating magnetic field – Slip – Torque equation – Torque slip characteristics – Methods of speed control and starters (Qualitative treatment only).

**FRACTIONAL HORSE POWER MOTORS**

**9**

Construction and working principle of single phase motor – split phase, capacitor start & capacitor run motors – Universal motors.

**SYNCHRONOUS MACHINE**

**9**

Constructional features of synchronous generator – types – emf equation – brief idea of armature reaction – voltage regulation (EMF method only) – Phasor diagram.

**Synchronous Motor:** Working principle of synchronous motors – Types of excitation – Constant load variable excitation – Constant excitation variable load – Phasor diagram – Starting methods.

**ELECTRIC DISTRIBUTION SYSTEMS (Qualitative treatment only)**

**9**

Electric supply system – Distribution system wiring layout – Domestic, Commercial & Industrial – Protection of Electric installation against Over load, Short circuit & Earth fault – Earthing – necessity – Types of Earthing .

**TOTAL 45**

**TEXT BOOKS**

1. K.B. Raina, S.K. Bhattacharya, “*Electrical Design Estimating & Costing*”, New Age International (P) Ltd., 2001.
2. B.L.Theraja, A.K. Theraja, “*A text books of Electrical Technology – Vol.II, AC & DC Machines*”, Publication Division of Nirja Construction & Development Co. (P) Ltd., New Delhi, 1994.

**REFERENCE BOOKS**

1. S.L.Bhatia, “*Hand Book of Electrical Engineering*”, Khanna Publications, 1997.
2. S.K.Battacharya, “*Electrical Machines*”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1994.
3. Kosow, “*Electric Machinery and Transformer*”, Prentice Hall of India., 2<sup>nd</sup> Edition, 1991.
4. J.B.Gupta, “*Theory & Performance of Electrical Machines*”, Katsur Publishing House (Regd), 1994.

<b>EC0201</b>	<b>ELECTROMAGNETIC THEORY AND WAVEGUIDES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">MA0102</a></b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### PURPOSE

To enable the students, to have a fair knowledge about the theory and problems of electromagnetism and waveguides.

### INSTRUCTIONAL OBJECTIVES

1. Understand the basic concepts of electric field and magnetic field
2. Compare between field and circuit theory
3. Need for impedance matching and different impedance matching techniques
4. Different types of waveguides

### STATIC ELECTRIC FIELDS

**9**

Introduction to co-ordinate system-**Coulomb's law**: Electric field intensity-Field due to different types of charges-Electric Flux density. **Gauss law**: It's applications to symmetrical charge distributions- Concept of divergence. **Electric potential**: Potential field due to different types of charges-Potential gradient-The dipole-field due to dipole-Energy density in electrostatic field.

### STEADY MAGNETIC FIELDS

**9**

**Biot Savart Law**: Its applications. **Ampere's circuital law**: Its applications-Curl of magnetic field intensity-Magnetic flux and magnetic flux density-The scalar and vector magnetic potentials-Steady magnetic field laws.

### MAXWELLS EQUATIONS AND TIME VARYING FIELDS

**9**

**Maxwell's Equations**: For steady fields in point form and integral form-Faraday's law- displacement current-Maxwell's equations in point form and integral form for time-varying fields-Comparison of field and circuit theory. **Poynting Theorem**: Poynting vector

### GUIDED WAVES

**9**

**Waves between parallel planes**: Transverse electric waves-Transverse magnetic waves-characteristic of TE and TM waves-TEM waves. Velocity of propagation-Attenuation in parallel plane guides-Wave impedance

### WAVEGUIDE THEORY

**9**

**Rectangular wave guides**: TE waves and TM waves in Rectangular waveguides-Dominant mode-cutoff frequency in wave guides-Impossibility of TEM waves in waveguides. **Circular waveguides**: Wave impedance and characteristic impedance-Power flow in wave guides-Attenuation factor and Q of wave guides-Transmission line analogy for waveguides

**TOTAL 45**

### TEXT BOOKS

1. William H.Hayt,Jr and John A.Buck., "*Engineering Electromagnetics*", Tata McGraw-Hill Publishing Ltd, 7<sup>th</sup> edition 2006
2. G.S.N.Raju., "*Electromagnetic Field Theory and Transmission Lines*" Pearson Education, First Indian print 2005

### REFERENCE BOOKS

1. Matthew N. O. Sadiku., "*Elements of Electromagnetics*", Oxford University Press, 3<sup>rd</sup> edition, First Indian edition 2006
2. Gangadhar K.A , "*Field Theory*", Khanna Publications, 2000
3. Muthusubramanian R and Senthil Kumar N, "*Electromagnetic field theory*", Anuradha publications, 1999
4. Edward Jordan and KG Balmain, "*Electromagnetic Waves and Radiation Systems*", Pearson education, 2<sup>nd</sup> edition.

<b>EC0203</b>	<b>ELECTRON DEVICES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">GE0106</a></b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### PURPOSE

The purpose of this course is to provide a basis for understanding the characteristics, operation and limitations of semiconductor devices. This course brings together the quantum theory of solids, semiconductor material physics, and semiconductor device physics.

### INSTRUCTIONAL OBJECTIVES

1. To understand the operational characteristics of a Semiconductor in Equilibrium and Non-Equilibrium conditions.
2. To understand the working of PN junction diodes and special purpose diodes.
3. To understand the basic working physics of BJT and FET both in ideal and non-ideal conditions.

### ENERGY BANDS AND EXCESS CARRIERS IN SEMICONDUCTORS

**9**

**Energy bands and excess carriers in semiconductors:** Bonding forces and Energy Bands in Solids – Charge Carriers in Semiconductors – Carrier concentrations – Drift of Carriers in Electric and Magnetic Fields – Invariance of the Fermi level at Equilibrium.

**Excess carriers in semiconductors:** Optical Absorption – Luminescence – Carrier Lifetime and Photoconductivity – Diffusion of Carriers.

### SEMICONDUCTOR JUNCTIONS

**9**

**Junctions :** Equilibrium Conditions – Forward and Reverse Biased Junctions – Reverse Bias Breakdown – Transient and AC Conditions – Deviations from the Simple Theory – Metal-Semiconductor Junctions.

**Field Effect transistors:** Transistor Operation – The junction FET – The Metal-Semiconductor FET – The Metal-Insulator-Semiconductor FET – The MOS FET

### SOLID STATE DEVICES-I

**9**

**Bipolar Junction Transistors:** Fundamentals of BJT Operation – Amplification with BJT's – Minority Carrier Distributions and Terminal Currents – Generalized Biasing – Switching – Other Important Effects – Frequency Limitations of Transistors – Hetero junction Bipolar Transistors

**Opto-electronic devices:**

Photodiodes – Light Emitting Diodes – Lasers and Semiconductor Lasers

### SOLID STATE DEVICES-II

**9**

**Charge transfer devices:** Dynamic Effects in MOS Capacitors – The basic CCD – Improvements on the Basic Structure – Applications of CCD's.

**High-frequency and high-power devices:** Tunnel Diodes – IMPATT Diode – Gunn Diode – PNP Diode – SCR – IGBT – DIAC – TRIAC - UJT.

### POWER SUPPLIES

**9**

Half wave Rectification – Full wave Rectification – General filter consideration – Capacitor Filter – RC Filter – Discrete Transistor Voltage Regulation – IC Voltage Regulators – Practical Applications – SMPS.

**TOTAL 45**

### TEXT BOOKS

1. Ben G. Streetman and Sanjay Kumar Banerjee. *“Solid State Electronic Devices”*, 6<sup>th</sup> Edition, Pearson Education
2. Robert L. Boylestad and Louis Nashelsky, *“Electronic Devices and Circuit Theory”*, 9<sup>th</sup> Edition – Pearson Education, International Edition.

### REFERENCE BOOKS

1. Donald A. Neamen, *“Semiconductor Physics and Devices, 2<sup>nd</sup> Edition*, Irwin publishers.
2. S.M. Sze, *“Physics of Semiconductor Devices”*, 2<sup>nd</sup> edition, Wiley Eastern
3. Stanley G. Burns and Paul R. Bond, *“Principles of Electronics”* Circuits, Galgotia Publishers

EC0205	DIGITAL SYSTEMS	L	T	P	C
	Prerequisite: <a href="#">GE0106</a>	3	0	0	3

### PURPOSE

The purpose of this course is to develop a strong foundation in analysis and design of digital electronics.

### INSTRUCTIONAL OBJECTIVES

At the end of the course students should be able to

1. Understand concepts of combinational and sequential circuits
2. Analyze the synchronous and asynchronous logic circuits
3. Understand concepts of memory, programmable logic and digital integrated circuits.

### NUMBER SYSTEMS - BOOLEAN ALGEBRA AND LOGIC GATES

7

Number Systems - Boolean algebra – Canonical and standard forms. Digital logic gates – Integrated circuits. Map method – four and five variable map methods –Products of Sums Simplification - Don't care conditions .Quine -McCluskey Method.

### GATE LEVEL MINIMIZATION & COMBINATIONAL LOGIC

9

Two level implementation – NAND & NOR Implementations – EXOR Functions. Combinational Circuits – Analysis and design procedure – Binary adder - Subtractor – Decimal Adder – Binary Multiplier – Magnitude Comparator – Decoders – Encoders – Multiplexers.

### SYNCHRONOUS SEQUENTIAL LOGIC

9

Sequential circuits - Latches – Flip-Flops - Analysis of Clocked Sequential Circuits – State Reduction and Assignment – Design Procedure.  
Registers – Shift Registers – Ripple counters – Synchronous Counters – Other counters.

### AYSYNCHRONOUS SEQUENTIAL LOGIC AND MEMORY

11

Introduction – Analysis Procedure – Circuit with Latches – Design Procedure – Reduction of State and Flow Tables – Race-Free state Assignment.  
Memory – Introduction – Random-Access Memory – Memory Decoding – Read only memory.

### DIGITAL INTEGRATED CIRCUITS AND PROGRAMMABLE LOGIC

9

Introduction – Special Characteristics – Bipolar-Transistor Characteristics – RTL and DTL Circuits – TTL – ECL - MOS – CMOS – CMOS Transmission Gate Circuits – Programmable Logic Array – Programmable Array Logic - Sequential Programmable Devices.

**TOTAL 45**

### TEXT BOOKS

1. Morris Mano. M, “*Digital Design*“, Pearson education, Third Edition 2002.
2. Ronald J. Tocci, “*Digital System Principles and Applications*”, PHI ,Sixth Edition, 1997.

### REFERENCE BOOKS

1. Floyd, “*Digital Fundamentals*”, Universal Book Stall, New Delhi,1986.
2. Morris Mano. M, “*Digital Design*“, PHI, Second Edition.
3. Ronald J. Tocci, “*Digital System Principles and Applications*”, Pearson education 9<sup>th</sup> edition.

<b>EC0207</b>	<b>SIGNALS AND SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">MA0102</a></b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>3</b>

### PURPOSE

The purpose of this course is to introduce students to the fundamentals of signals and systems which are basic to Digital Signal Processing. The main objective of this subject is to help the students to mathematically analyze different types of signals and their associated systems.

### INSTRUCTIONAL OBJECTIVES

At the end of this course, the students will be able to understand the

1. Various classifications of both Continuous time and Discrete time Signals and Systems.
2. Spectral analysis of Periodic and Aperiodic Signals using Fourier series.
3. Analysis and characterization of the CT system through Laplace transform.
4. Analysis and characterization of the DT system through Z transform.

### CLASSIFICATION OF SIGNALS AND SYSTEMS

**6**

**Classification of Signals:** Continuous time signals - Discrete time signals – Periodic and Aperiodic signals – Even and odd signals – Energy and power signals –Deterministic and random signals –Complex exponential and Sinusoidal signals .Unit step, Unit ramp, Unit impulse – Representation of signals in terms of unit impulse .

**Classification of Systems:** Continuous time systems- Discrete time systems - Linear system – Time Invariant system – causal system – BIBO system – Systems with and without memory – LTI system.

### ANALYSIS OF CT SIGNALS

**6**

**Fourier series:** Representation of Continuous time Periodic signals – Properties of Continuous time Fourier series – Parseval’s relation –Frequency spectrum – Power density spectrum –Band limited signals – complex analytic signals.

**Fourier transform:** Representation of Continuous time signals- Properties of Continuous time Fourier transform – Energy density spectrum.

### LTI CT SYSTEM

**6**

**System modeling:** Differential equation – impulse response – Frequency response – Convolution – Analysis and characterization of LTI system using Fourier methods and Laplace transform.

### ANALYSIS OF DT SIGNALS AND SYSTEMS

**6**

Representation of sequences – Discrete time Fourier transform (DTFT) - Discrete Fourier transform (DFT) and its properties - System modeling in terms of difference equation- impulse response – Convolution sum - Frequency response.

### Z TRANSFORM

**6**

**Z transform:** Unilateral & Bilateral Z transforms – properties. **Inverse Z transform:** Power series expansion – Partial fraction. Analysis and characterization of DT system using Z transform.

**TUTORIAL 30**  
**TOTAL 60**

### TEXT BOOK

1. Simon Haykin and Barry Van Veen “*Signals and Systems*”, John Wiley & Sons In, 2001.
2. Alan V. Oppenheim et al, “*Signals and Systems*”, Pearson Education., 1997.

### REFERENCE BOOKS

1. John G. Proakis and Manolakis, “*Digital Signal Processing, Principles, Algorithms and Applications*”, Pearson Education, 3rd edition, 2002.
2. B.P. Lathi, “*Linear Systems & Signals*”, Oxford Press, Second Edition 2005.

<b>PD0201</b>	<b>PERSONALITY DEVELOPMENT - III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

### **PURPOSE**

The purpose of this course is to build confidence and inculcate various soft skills and to help students to identify and achieve their personal potential.

### **INSTRUCTIONAL OBJECTIVES**

1. To guide thought process.
2. To groom student's attitude.
3. To develop communication skill.
4. To build confidence.

### **METHODOLOGY**

The entire program is designed in such a way that every student will participate in the class room activities. The activities are planned to bring out the skills and talents of the students which they will be employing during various occasions in their real life.

1. Group activities + individual activities.
2. Collaborative learning.
3. Interactive sessions.
4. Ensure Participation.
5. Empirical Learning

### **SYLLABUS CONTENTS**

Goal Setting - Problem Solving - Emotional Quotient	6
Assertiveness - Stress Management - Quiz II	6
Lateral Thinking (Situational) - Team Work (Role Plays) Impromptu - Text Analysis	6
Business plan presentation I - Business plan presentation II - Chinese Whisper	6
Picture Perfect - Case Studies – Review	6

**TOTAL 30**

### **SCHEME OF INSTRUCTION**

Marks allocated for regular participation in all oral activities in class

### **SCHEME OF EXAMINATION**

Complete internal evaluation on a regular Basis

<b>EC0221</b>	<b>ELECTRON DEVICES LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">EC0122</a></b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**PURPOSE**

To verify practically, the fundamental characteristics of Electron Devices.

**INSTRUCTIONAL OBJECTIVES**

1. To study experimentally the characteristics of diodes, BJT's and FET's.
2. To verify practically, the response of various special purpose electron devices.

**LIST OF EXPERIMENTS**

**45**

1. Characteristics of PN junction and Zener diode.
2. Input, Output and Transfer characteristics of CE and CC Amplifier.
3. Characteristics of LDR, Photo-diode and Photo transistor.
4. Transfer characteristics of JFET.
5. Transfer characteristics of MOSFET ( with depletion and enhancement mode)
6. Characteristics of LED with three different wavelengths.
7. Half wave rectifier.
8. Full wave rectifier with 2 diodes.
9. Full wave rectifier with 4 diodes (Bridge rectifier).
10. Series voltage Regulator.
11. Shunt voltage Regulator.
12. Characteristics of Thermistor.

**TOTAL 45**

**REFERENCE: LABORATORY MANUAL**

<b>EC0223</b>	<b>DIGITAL SYSTEM LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**PURPOSE**

To understand, the logical behaviors of digital circuits and apply them in appropriate applications.

**INSTRUCTIONAL OBJECTIVES**

1. To verify operation of logic gates and flip-flops.
2. To design and construct digital circuits

**LIST OF EXPERIMENTS**

**45**

1. Study of Gates & Flip-flops.
2. Half Adder and Full Adder.
3. Magnitude Comparator (2-Bit).
4. Encoders and Decoders.
5. Multiplexer and Demultiplexer.
6. Code Converter.
7. Synchronous Counters.
8. Ripple Counter.
9. Mod – N Counter.
10. Shift Register – SISO & SIPO.

**TOTAL 45**

**REFERENCE: LABORATORY MANUAL**

## SEMESTER IV

LE0202	GERMAN LANGUAGE PHASE - II	L	T	P	C
	Prerequisite: <a href="#">LE0201</a>	2	0	0	2

### PURPOSE

Enabling the Engineering Students to one more Foreign Language, especially German, which is scientific and technical language. This may be useful in the field of employment opportunities as well as helping them to develop projects on browsing German websites.

### INSTRUCTIONAL OBJECTIVES

Developing pronunciation so that they can read the text and e-mail during their employment, instructing them to write their own C V and developing a fundamental conversation with any German national.

### SPEAKING

20

Dialogue – Questioning / Basic queries / Conversational with practical exposure.

### GRAMMATIK (WRITING)

10

Verben, Wortstellung, Nomen, Pronomen, Artikel, Nominativ, Akkusativ, Dativ, Adjective, Präsens, Perfect and Neben Satze.

**TOTAL 30**

### GLOSSARY

Technical words. Lesson (6-10)

### TEXT BOOK WITH CASSETTES

A. Grundkurs Deutsch

B. Mo`ntmal

(Prescribed by Max Mueller Bhavan – Goethe Institute, Germany).

### SCHEME OF EVALUATION

Internal 50 = Listening – 10 Marks, Speaking – 20 Marks, Reading – 10 Marks and Writing = 10 Marks

External 50 – 3 hours final written exam

<b>LE0204</b>	<b>JAPANESE LANGUAGE PHASE II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">LE0203</a></b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

#### **PURPOSE**

1. In view of globalization, learning Foreign Language by engineering graduates enhances their employment opportunities.
2. Get awareness of understanding of International culture.
3. Widening the Linguistic Skills of the Students.

#### **INSTRUCTIONAL OBJECTIVES**

To learn the scripts of Japanese Languages namely Hiragana, Katakana and Kanji, Vocabularies etc. To learn basic grammar and acquire basic communication skills. To understand Japanese culture.

#### **SYLLABUS CONTENT**

Lesson 2-{Korewa Tsukue desu } – Grammar, Sentence pattern, Marume. Conversation	8
Lesson 3 – [Kokoni denwa ga arimasu] - Grammar, Sentence pattern, Marume .Cognversation	7
Lesson 4– {Asokoni hito ga imasu} - Grammar, Sentence pattern, Marume .	9
Lesson 5– {Akairingo wa ikutsu arimasu ka}-Grammar, Sentence pattern, Marume . Conversation.	
Lesson 6– {Barano hana wa ippon ikura desu ka}- Grammar, Sentence pattern.Marume.Conversation	6
<b>TOTAL</b>	<b>30</b>

#### **TEXT BOOKS**

1. Nihongo Shoho Imain Text sold in India by the Japanese Language Teachers Association , Pune.
2. Hiragana and Katakana Work Book published by AOTS Japan
3. Grammar and Kotoba ( Work Book )
4. Japanese for Dummies.(Conversation) CD.

#### **SCHEME OF EVALUATION**

Internal 50 = Listening – 10 Marks, Speaking – 20 Marks, Reading – 10 Marks and Writing = 10 Marks  
External 50 – 3 hours final written exam

<b>LE0206</b>	<b>FRENCH LANGUAGE PHASE II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">LE0205</a></b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

#### **PURPOSE**

1. As language skills are as valuable as technical skills knowledge of French enables the engineering graduates in career orientation.
2. As a second international global Lang after English there is a wider choice of job opportunities in the international employment market and also multinationals in India and an understanding of French culture thro language.

#### **INSTRUCTIONAL OBJECTIVE**

Characterized by the Roman script, grammar, vocabulary and colloquial expressions are taught which enables them to communicate effectively with any native speaker

#### **SYLLABUS CONTENTS**

Sports (Ski, natation, tennis, Tour de France), Cuisine (French dishes), Cinema (Review of a film) – Articles on these topics and group discussion will be followed.	6
Possessive Adjectives, Demonstrative Adjectives, Past tense Passé Compose( Verbe Auxiliare: Etre et Avoir)	6
Culture and Civilization French Monuments (Tres celebres), French History (Jeanne d' Arc, Louis XIV, Prise de la Bastille), Culture and Civilisation (vin, fromage, mode, parfums)	6
Transport system, government and media in France – articles on these topics.	6
Comprehension and Grammar Comprehension passages and conversational sentences in different situations (at the restaurant, at the super market)	6
<b>TOTAL</b>	<b>30</b>

#### **TEXT BOOKS**

1. Panorama – Goyal Publishers
2. Apprenons le Francais II, Sarawathy Publications

#### **SCHEME OF EVALUATION**

Internal 50 = Listening – 10 Marks, Speaking – 20 Marks, Reading – 10 Marks and Writing = 10 Marks  
External 50 – 3 hours final written exam

<b>MA0232</b>	<b>PROBABILITY AND RANDOM PROCESSES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**PURPOSE**

To introduce the students to the idea of probability and random process, an important mathematical tool in signal processing.

**INSTRUCTIONAL OBJECTIVES**

At the end of the course, the students should be fully equipped with the knowledge of

1. Probability and Random variables
2. 2 – D Random variables
3. The concepts of Random process
4. The Correlation Functions and
5. The applications of Fourier Transforms like Spectral Density and others.

**PROBABILITY AND RANDOM VARIABLES:**

**9**

Probability theory – Random Variables – Moments – Moment generating function – Binomial, Poisson, Geometric, Exponential, Normal distributions, functions of Random Variables, Chebyshev inequality.

**TWO DIMENSIONAL RANDOM VARIABLES**

**9**

Two dimensional Random Variables – Marginal and conditional distributions – Transformation of Random Variables – central limit theorem – simple problems.

**RANDOM PROCESSES**

**9**

Classification of Random processes – Stationarity – WSS and SSS processes – Poisson Random process – Pure Birth process – Renewal Process – Markov Chain and transition probabilities.

**CORRELATION FUNCTIONS:**

**9**

Autocorrelation function and its properties – Cross Correlation function and its properties – Linear System with Random inputs.

**SPECTRAL DENSITY**

**9**

Power spectral Density Function – Properties – System in the form of convolution – Unit Impulse Response of the System – Einstein – Weiner-Khinchine Relationship – Cross Power Density Spectrum – Properties.

**TUTORIAL 15**

**TOTAL 60**

**TEXT BOOK**

1. T. Veerarajan, “*Probability, Statistics and Random Processes*”, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2004.

**REFERENCE BOOK**

1. Trivedi K S, “*Probability and Statistics with reliability, Queuing and Computer Science Applications*”, Prentice Hall of India, New Delhi, 1984

<b>EC0204</b>	<b>ELECTRONIC CIRCUITS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">EC0203</a></b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>3</b>

### PURPOSE

The purpose of this course is to introduce to the students the basics of biasing transistor circuits, feedback amplifiers, large signal amplifiers, tuned amplifiers, oscillators, wave shaping circuit using transistor & analyzing different electronic circuits.

### INSTRUCTIONAL OBJECTIVES

At the end of this course the students will learn and apply

- Operating point calculations and working of basic amplifiers.
- Working of different types of feedback amplifiers & oscillators.
- Frequency response and design of tuned amplifiers.
- Basic working & design of wave shaping circuits.

### BIASING METHODS AND SMALL SIGNAL MODELS (BJT, JFET, MOSFET) 6

DC & AC Load Lines-Operating Point-Q- Point variation-various Biasing Methods- Small signal equivalent - Calculation of voltage gain, current gain, power gain, input impedance and output impedance.

### TRANSISTOR AMPLIFIER AND ANALYSIS 6

Small Signal analysis of BJT, JFET and MOSFET amplifiers - Cascade amplifier- Cascode amplifier- Darlington Bootstrap amplifier- Differential amplifier.

### FEEDBACK AMPLIFIERS AND OSCILLATORS 6

Concept of feedback- Types of feedback- Analysis of voltage & current feedback amplifiers  
Barkhausen criterion for oscillation – mechanism for start of oscillation & stabilization of amplitude – Analysis of RC & LC oscillators.

### LARGE SIGNAL AND TUNED AMPLIFIERS 6

Class-A CE amplifier – Q point placement – Power calculation – Maximum dissipation Hyperbola – Transformer coupled Amplifier – Class-B push pull amplifier – Class-AB operation— Direct coupled push pull amplifier – Amplifier using complementary symmetry- Heat sink.  
Single Tuned Amplifiers – Double tuned & synchronously tuned amplifiers.

### FREQUENCY RESPONSE AND WAVE SHAPING CIRCUITS 6

Low frequency and High frequency response of BJT and FET amplifier. Nonlinear wave shaping circuits: Astable - Bistable - Monostable Multivibrators. Schmitt Trigger - Time Base Generators.

**TUTORIAL** **30**  
**TOTAL** **60**

### TEXT BOOKS

1. Robert I. Boylestad, Louis Nashelsky, " *Electronic Devices and circuit Theory*", Pearson, 1997.
2. G K Mithal, " *Electronic Devices & Circuits*", Khanna Publishers, 1993.

### REFERENCES

1. David A Bell, " *Electronic Devices and Circuits*", Prentice Hall of India, 1998.
2. Jacob Millman, Christos C Halkias, " *Electron Devices and Circuits*", Tata McGraw Hill, Edition 1991.
3. Donald L Schilling, Charles Belove, " *Electronic Circuits*", 3rd edition, 1989.
4. Stanley G. Burns , Paul R. Bond, " *Principles of Electronic Circuits* ", Galgottia publishers.

<b>EC0206</b>	<b>LINEAR INTEGRATED CIRCUITS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">EC0203</a></b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### PURPOSE

To enable the students to understand the fundamentals of integrated circuits and designing electronic circuits using it.

### INSTRUCTIONAL OBJECTIVES

1. To design simple circuits like amplifiers using op-amps
2. To design waveform generating circuits
3. To design simple filter circuits for particular application
4. To gain knowledge in designing a stable voltage regulators

### INTRODUCTORY CONCEPTS AND FUNDAMENTALS

9

**Introduction to operational amplifier:** Op-amp symbol, terminals, packages and specifications-Block diagram Representation of op-amp-Op-amp input modes-Op-amp Data sheets and interpretation-Ideal op-amp and practical op-amp-Open loop and closed loop configurations of op-amp **Practical Limitations of op-amp circuits:**-Bias and offset currents / offset voltage-Frequency compensation and stability-Gain bandwidth product-Slew Rate-Drift-CMRR and PSRR **Basic op-amp circuits:** Inverting and Non-inverting voltage amplifiers-Voltage follower-Summing , scaling and averaging amplifiers-Differential amplifiers-AC amplifiers. **Internal Schematic of 741 op-amps**

### OP – AMP APPLICATIONS

9

**Linear Applications:** Instrumentation Amplifiers-V-to-I and I-to-V converters-Differentiators and Integrators. **Non-linear Applications:** Precision Rectifiers-Wave Shaping Circuits (Clipper and Clampers)-Log and Antilog Amplifiers-Analog voltage multiplier circuit and its applications-Operational Trans conductance amplifier (OTA)-Comparators and its applications-Sample and Hold circuit

### OSCILLATORS AND FREQUENCY GENERATORS

9

**Op-amp oscillators:** Positive feedback and the Barkhausen criterion-Wien Bridge and phase shift oscillators-Square / Triangle / Ramp function generators  
**Single Chip oscillators and Frequency generators:** Voltage controlled oscillator-555 Timer-555 Monostable operation and its applications-555 Astable operation and its applications-Phase Locked Loop-Operation of 565 PLL-Closed loop analysis of PLL-PLL applications

### ACTIVE FILTERS AND VOLTAGE REGULATOR

9

**Filter Fundamentals:** Filter types-Filter order and poles-Filter class or alignment (Butterworth, Bessel, Chebyshev and Elliptic or Cauer)  
**Realizing Practical Filters:** Sallen-Key LPF and HPF Realizations-BPF Realization-Notch Filter (Band Reject) Realization-State Variable Filters-All Pass Filters **Switched Capacitor Filters, Voltage Regulators-**Need for Regulation-Linear Regulators-Monolithic IC Regulators (78xx,79xx,LM 317,LM 337,723)-Switching Regulators

### DATA CONVERSION DEVICES

9

Advantages and disadvantages of working in the digital domain, **Digital to Analog Conversion:** DAC Specifications-DAC circuits-Weighted Resistor DAC-R-2R Ladder DAC-Inverted R-2R Ladder DAC-Monolithic DAC, **Analog to Digital conversion:** ADC specifications-ADC circuits-Ramp Type ADC-Successive Approximation ADC-Dual Slope ADC-Flash Type ADC-Tracking ADC-Monolithic ADC

**TOTAL 45**

### TEXT BOOKS

1. Roy Choudhury and Shail Jain, “ *Linear Integrated Circuits*”, Wiley Eastern Ltd,1995
2. Ramakant A.Gayakwad, “*Op-Amps and Linear Integrated Circuits*”, 4<sup>th</sup> edition, Pearson education.

### REFERENCE BOOKS

1. Coughlin & Driscoll, “*Operational-Amplifiers and Linear Integrated Circuits*”, 6<sup>th</sup> edition, Pearson education.
2. Sergio Franco, “*Design with operational amplifier and analog integrated circuits*”, McGraw Hill, 1997.

EC0208	TRANSMISSION LINES AND NETWORKS	L	T	P	C
	Prerequisite: <a href="#">EC0201</a>	3	0	0	3

### PURPOSE

To lay a strong foundation on the theory of transmission line and networks by highlighting their applications.

### INSTRUCTIONAL OBJECTIVES

1. To become familiar with propagation of signals through lines.
2. Calculation of various line parameters by conventional and graphical methods.
3. Need for impedance matching and different impedance matching techniques.
4. Design of different types of filters, equalizer and attenuators.

### TRANSMISSION LINE THEORY

9

General theory of Transmission lines - the transmission line – general solution - The infinite line – Wavelength, velocity of propagation – Waveform distortion – the distortionless line - Loading and different methods of loading – Line not terminated in  $Z_0$  – Reflection coefficient – calculation of current, voltage, power delivered and efficiency of transmission – Input and transfer impedance - Open and short circuited lines – reflection factor and reflection loss.

### HIGH FREQUENCY TRANSMISSION LINES

8

Transmission line equations at radio frequencies - Line of Zero dissipation – Voltage and current on the dissipationless line, Standing Waves, Nodes, Standing Wave Ratio – Input impedance of the dissipationless line - Open and short circuited lines - Power and impedance measurement on lines - Reflection losses – Measurement of VSWR and wavelength.

### IMPEDANCE MATCHING IN HIGH FREQUENCY LINES

9

**Impedance matching:** Quarter wave transformer – Impedance matching by stubs – Single stub and double stub matching – Smith chart – Solutions of problems using Smith chart – Single and double stub matching using Smith chart.

### PASSIVE FILTERS

9

Characteristic impedance of symmetrical networks – filter fundamentals. **Design of filters:** Constant K, Low Pass, High Pass, Band Pass, Band Elimination, m-derived sections and composite.

### ATTENUATORS AND EQUALIZERS

10

**Attenuators:** T,  $\pi$ , Lattice Attenuators, Bridged – T attenuator, L-Type Attenuator. **Equalizers:** inverse network, series, full series, shunt, full shunt, constant resistance T, constant resistance  $\pi$ , constant resistance lattice and bridged T network.

**TOTAL**

**45**

### TEXT BOOKS

1. John D.Ryder, “*Networks, Lines and Fields*”, PHI, 1991.
2. Sudhakar. A, Shyammohan S Palli, “*Circuits and Networks – Analysis and Synthesis*”, Tata McGraw Hill, 2<sup>nd</sup> Edition, 2002.

### REFERENCE BOOK

1. Umesh Sinha, “*Transmission Lines and Network*”, Satya Prakashan Publishing Company, New Delhi, 2001.

EC0210	COMMUNICATION THEORY	L	T	P	C
	Prerequisite: Nil	3	0	0	3

### PURPOSE

To study the basics of analog communication systems

### INSTRUCTIONAL OBJECTIVES

To learn and understand

1. Various Amplitude modulation and demodulation systems
2. Various Angle modulation and demodulation systems
3. Basics of Noise theory and performance of various receivers

### AMPLITUDE MODULATION SYSTEMS

9

Need for modulation-AM modulation systems-Modulation index-Phase diagram-Power relations-Efficiency-Spectrum diagram of AM, DSB-SC & SSB systems.

**Generation of AM Waves:** Square law modulator-Product Modulator-Switching Modulator. Detection of AM waves: Envelope detector-Coherent detector. FDM.

### ANGLE MODULATION

9

Frequency Modulation - Transmission Bandwidth of FM signals-Frequency spectrum-Phase Modulation-relationship between FM & PM- Narrow Band FM & Wide Band FM.

**Generation of FM Waves:** Direct method- Indirect method of FM generation.

**Detection of FM waves:** Ratio Detector-PLL FM demodulator- Super heterodyne Receiver

### NOISE THEORY

9

Sources of Noise-Shot Noise-Resistor Noise-Calculation of Noise in Linear systems-Noise bandwidth-Available Power-Noise temperature-Noise in two port networks-Noise figure-Measurement of Noise figure-Signal in presence of noise-Narrow Band noise

### NOISE PERFORMANCE OF AM & FM RECEIVERS

9

Noises in AM receiver threshold effect-Noise in FM receivers capture effect-FM threshold effect-Pre emphasis & De emphasis in FM.

### INFORMATION THEORY

9

Information & Entropy- Rate of information-Discrete memory less channel-Joint Entropy & Conditional Entropy-Mutual information-Channel Capacity-Shannon's Theorem-Continuous Channel-Shannon-Hartley Theorem-BW S/N Trade-off.

**TOTAL 45**

### TEXT BOOK

1. Simon Haykin, "Communication System", John Wiley & Sons, 4<sup>th</sup> Edition, 1991.
2. R. Singh & S.D. Spare, "Communication Systems, Analog & Digital", Tata Mc Graw Hill, 1995.

### REFERENCE BOOK

1. K. Sam Shanmugam, "Digital & Analog Communication System", John Wiley & Sons.
2. B.P. Lathi, "Modern Digital & Analog Communication", Prision Books Pvt Ltd., 1989

<b>EC0212</b>	<b>DIGITAL SIGNAL PROCESSING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite:</b> <a href="#">EC0207</a>	<b>2</b>	<b>2</b>	<b>0</b>	<b>3</b>

### PURPOSE

The purpose of this course is to introduce the concepts of Digital signal processing and DSP Processor. The mathematical analysis of FIR and IIR filter design and simulation using MATLAB are dealt with in detail.

### INSTRUCTIONAL OBJECTIVES

At the end of this course, the students will be able to understand the

1. Structures of Discrete time signals and systems
2. Frequency response and design of FIR and IIR filters.
3. Finite word length effect
4. DSP Processor- TMS320C5X.

### REVIEW OF DISCRETE TIME SIGNALS AND SYSTEMS

**6**

Overview of signals and systems- DFT-FFT using DIT and DIF algorithms - Realization of structures for discrete time systems – Direct form I & II, Cascade, Parallel forms – MATLAB programs for DFT and FFT.

### DESIGN AND IMPLEMENTATION OF IIR FILTERS

**6**

Design of analog filters using Butterworth and Chebyshev approximations – IIR digital filter design from analog filter using impulse invariance technique and bilinear transformations – Matlab programs IIR filters.

### DESIGN AND IMPLEMENTATION OF FIR FILTERS

**6**

Linear phase response- design techniques for FIR filters- Fourier series method and frequency sampling method –Design of Linear phase FIR filters using windows: Rectangular, Hanning and Hamming windows- Matlab programs FIR filters-FIR filter design using Decimation and Interpolation

### FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS

**6**

Fixed point arithmetic –effect of quantization of the input data due to Finite word length. Product round off – need for scaling – Zero input limit cycle oscillations - Limit cycle oscillations due to overflow of adders – Table look up implementation to avoid multiplications.

### PROCESSOR FUNDAMENTALS

**6**

**Architecture and features:** Features of DSP processors – DSP processor packaging(Embodiments) – Fixed point Vs floating point DSP processor data paths – Memory architecture of a DSP processor (Von Neumann – Harvard) – Addressing modes – pipelining – TMS320 family of DSPs (architecture of C5x).

**TUTORIAL 30**  
**TOTAL 60**

### TEXT BOOKS

1. John .G. Proakis and Dimitris C. Manolakis , “ *Digital Signal Processing Principles , Algorithms and Applications* , ” Pearson Education, Third edition 2006.
2. Sanjit Mitra, “*Digital Signal Processing “– A Computer based approach”*, Tata Mcgraw Hill, New Delhi, 2001

### REFERENCE BOOKS

1. B.Venkataramani, M.Bhaskar, “Digital Signal Processors, Architecture, Programming and Application“, Tata McGraw Hill, New Delhi, 2003.
2. M.H.Hayes, “*Digital Signal Processing*”, Tata McGraw Hill, New Delhi, 2003.

PD0202	PERSONALITY DEVELOPMENT - IV	L	T	P	C
	Prerequisite: Nil	0	0	2	1

### PURPOSE

The purpose of this course is to build confidence and inculcate various soft skills and to help students to identify and achieve their personal potential

### INSTRUCTIONAL OBJECTIVES

1. To guide thought process.
2. To groom student's attitude.
3. To develop communication skill.
4. To build confidence.

### METHODOLOGY

The entire program is designed in such a way that every student will participate in the class room activities. The activities are planned to bring out the skills and talents of the students which they will be employing during various occasions in their real life.

1. Group activities + individual activities.
2. Collaborative learning.
3. Interactive sessions.
4. Ensure Participation.
5. Empirical Learning

### SYLLABUS CONTENTS

Motivation II - Interpretation of Visuals of I & II	6
Humor in real life - Body language - Collage and poster designing and slogan writing	6
Brain Teasers – JAM - Current News Update I	6
Current News Update II - Enactment (SKIT –I) - Enactment (SKIT – II)	6
Survey and Reporting (heroes, sports persons etc.) - Quiz III – Review	6
<b>TOTAL</b>	<b>30</b>

### EVALUATION

1. Activities assessed by both group and individual participation
2. Continuous assessment based on daily participation

### SCHEME OF INSTRUCTION

Marks allocated for regular participation in all oral activities in class

### SCHEME OF EXAMINATION

Complete internal evaluation on a regular Basis

<b>EC0222</b>	<b>ELECTRONIC CIRCUITS LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**PURPOSE**

The purpose of the lab is to train the students to analyze electronic circuit and understand their functionality.

**INSTRUCTIONAL OBJECTIVES**

To study experimentally the working of amplifiers, regulators and analyze their behavior by plotting graphs.

**LIST OF EXPERIMENTS**

**45**

**Group 1: (Using only discrete components)**

1. Frequency response of RC coupled amplifier using BJT or FET.
2. Colpitts Oscillator.
3. Efficiency of Class-A or Class AB Amplifier.
4. Frequency response of Single Tuned Amplifier.
5. Frequency response of a BJT amplifier with and without feedback.

**Group 2: (Using IC 741 – IC 555 and any other equivalent IC's)**

1. Differential and Summing Amplifier.
2. Integrator and Differentiator.
3. Wein Bridge and RC Phase Shift oscillator.
4. Astable Multivibrator
5. Monostable Multivibrator
6. Bistable Multivibrator

**Group 3: Simulation experiments (Using PSPICE and LABVIEW )**

1. Active filters: Band pass filter and Notch filter.
2. Digital to Analog converter ( any one method)
3. Analog to Digital converter ( any one method)
4. Ramp Generator

**TOTAL**

**45**

**REFERENCE: LAB MANUAL**

<b>EC0224</b>	<b>COMMUNICATION LAB -I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**PURPOSE**

To help the students to design and implement communication circuits. To give hands on training on simulation software.

**INSTRUCTIONAL OBJECTIVES**

To carry out AM and FM modulation experiments using discrete electronic components. Software's like MATLAB and Pspice are used to simulate the circuit operations.

**LIST OF EXPERIMENTS**

**45**

**HARDWARE**

1. Amplitude Modulator
2. Envelope Detector
3. Frequency Modulator using VCO
4. Frequency Demodulation using PLL
5. PAM modulation and demodulation
6. Pre emphasis and De-emphasis
7. Analog Multiplexing

**SOFTWARE**

8. Amplitude Modulation using PSpice
9. Frequency Modulation using PSpice
10. PAM modulation using PSpice
11. PAM demodulation using PSpice
12. pre emphasis and de emphasis using PSpice
13. Amplitude Modulation using MATLAB
14. Frequency Modulation using MATLAB

**TOTAL 45**

**REFERENCE: LABORATORY MANUAL**

<b>EC0226</b>	<b>COMPREHENSION -1</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>1</b>

**PURPOSE**

To provide a complete review of Electronics and Communication engineering topics covered in the first four semesters, so that a comprehensive understanding is achieved. It will also help students to face job interviews and competitive examinations.

**INSTRUCTIONAL OBJECTIVES**

1. To provide overview of all Electronics & Communication engineering topics covered in the first four semesters.
2. To assess the overall knowledge level in the following topics of Electronics & Communication

**COMPREHENSION**

**30**

A. Review of the following topics

1. Overview of Semiconductor devices..
2. Basics of Electromagnetism and waveguides.
3. Analysis and design of digital circuits.
4. Analysis of signals and systems.
5. Analysis and design of Electronic circuits.
6. Overview of Linear Integrated Circuits.
7. Overview of Transmission Lines and Networks.
8. Overview of Communication Theory.
9. Overview of Digital Signal Processing.

B. Seminar/group discussion

Students shall have seminar/group discussion sessions on the topics listed under A above under the guidance of staff.

**TOTAL            30**

**(Evaluation is based on an end semester examination)**

## SEMESTER V

MA0321	DISCRETE MATHEMATICS	L	T	P	C
	Prerequisite: Nil	3	0	0	3

### MATHEMATICAL LOGIC

Propositions and Logical operators - Truth tables and propositions generated by a set - Equivalence and Implication - Tautologies - Laws of logic - Proofs in Propositional calculus - Direct proofs - Conditional conclusions - Indirect proofs - Propositions over a universe - Mathematical Induction - The existential and universal quantifiers - Predicate calculus including theory of inference.

### SET THEORY

Laws of Set theory - Partition of a set - Minsets - The duality principle - Relations - Graphs of relations - Hasse diagram - Matrices of relations - Closure operations on relations - Warshall's algorithm - Functions - Combinatorics.

### RECURRENCE RELATION & ALGEBRAIC SYSTEMS

Recurrence relations - Solving a recurrence relation - Recurrence relations obtained from solutions - Generating functions - Solution of a recurrence relation using generating functions - Closed form expression for generating function.

Groups - Cyclic groups and subgroups - Normal subgroups - Coding theory - Group codes.

### GRAPH THEORY

Basic concepts - Data structures for graphs - Connectivity - Traversals graph optimization - The traveling salesman problem and networks and the maximum flow problem - Trees - Spanning Trees - Rooted trees - Binary Trees - Kruskal's algorithm - Traversals of Binary trees.

### BOOLEAN ALGEBRA & FORMAL LANGUAGES

Boolean algebra - Posets - Lattices - Application of Boolean Algebra to switching theory. Languages - Recognition and generation - Phase structure grammars and languages - Finite state Machine - Recognition in regular languages

### TEXT BOOK

1. Lan Doerr and Kenneth Levasseur, "Applied Discrete Structures for Computer Science", Galgotia Publications (P) Ltd.(Unit I - Chapter 3 Section 3.1 - 3.8, Unit II - Chapter 2, Chapter 4 Section 4.2 - 4.5, Chapter 6 Section 6.1, 6.2, 6.4, 6.5, Chapter 7, Unit III - Chapter 8 Section 8.3, 8.4 Chapter 11 Section 11.25 Chapter 15 Section 15.1, 15.2, 15.4 15.5, UnitIV - Chapter 9, Section 9.1 - 9.5, Chapter 10 Section 10.1 - 10.5, Unit V - Chapter 13 Section 13.1-13.3, 13.7, Chapter 14 Section 14.2, 14.3)

### REFERENCE BOOKS

1. Tremblay J.P. and Manohar R., "Discrete Mathematical Structures with applications to Computer Science", Tata Mc Graw Hill Publishing Co., 2000
2. Venkataraman M.K., etal. "Discrete Mathematics", National Publishing Co.
3. Seymour Lipschutz, Marc Lars Lipson, "Discrete Mathematics", Mc Graw Hill Inc., 1992
4. Kolman and Busby, "Discrete Mathematical Structures for Computer Science", 1987
5. Iyengar N.Ch.S.N. etal," Discrete Mathematics", Vikas Publishing Ltd.
6. Sundaresan V. etal. "Discrete Mathematics", A.R. Publications
7. Solairaju etal. "Discrete Mathematics", Anuradha Publications

<b>EC0301</b>	<b>ELECTRONIC MEASUREMENTS &amp; INSTRUMENTATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">EC0206</a></b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **PURPOSE**

The purpose of this course is to introduce students to the various types of measurements made in electronics and the instruments used for measuring them. The main objective of this subject is to help students identify the different latest measurement techniques available for specific engineering applications.

### **INSTRUCTIONAL OBJECTIVES**

1. Understand the various measurement techniques available
2. Understand the basic working of instruments used for measurement
3. Understand the errors in measurements and their rectification

### **MEASUREMENTS AND ERRORS**

**9**

Accuracy-Precision-Significant Figures-Types of Errors-Statistical Analysis-Limiting Errors-Bridge Measurements (AC and DC bridges) - Analysis of Linear Systems-Time Domain Response-I Order response for Step Input-Ramp Input-Impulse Input- Bourdon Tube-Pressure Gauge-Measurement of Flow.

### **ELECTROMECHANICAL & DIGITAL INDICATING INSTRUMENTS**

**9**

PMMC Mechanism-DC Ammeters and Voltmeters-Series and Shunt Type Ohmmeter-Alternating Current Indicating Instruments (Moving Iron instruments, electro-dynamometer instrument)-D/A and A/D Converters-Digital Voltmeters-Vector Voltmeter-Guarding Techniques-Automation in Voltmeter.

### **SIGNAL GENERATION AND ANALYSIS**

**9**

Sine Wave Generator-Sweep Frequency Generator-Pulse and Square wave Generator-Function Generator-Analyzer-Wave Analyzer-Distortion Analyzer-Harmonic Distortion Analyzer-Spectrum Analyzer-Logic Analyzer.

### **OSCILLOSCOPES AND RECORDERS**

**9**

Simple CRO - Dual Beam-Dual Trace-Sampling Oscilloscope-Analog and Digital Storage Oscilloscope-Recorders-XY Recorder-Magnetic Recorders- Display Devices (LED, LCD, Alphanumeric displays).

### **COMPUTER CONTROLLED TEST SYSTEMS**

**9**

Testing an Audio Amplifier-Testing a Radio Receiver-Instruments used in Computer Controlled Instrumentation- Microprocessor based System and Measurement-Case Studies in Instrumentation-Electronic Weighing System-Digital Transducer.

**TOTAL 45**

### **TEXT BOOKS**

1. Albert.D. Helfrick and William. D. Cooper, “*Modern Electronic Instrumentation and Measurement Techniques*”, Pearson education.
2. H. S. Kalsi, “*Electronic Instrumentation*”, Tata McGraw Hill Publishing Company Ltd., 1995.

### **REFERENCE BOOKS**

1. Earnest .O Doebelin, “*Measurement Systems Application and Design*”, McGraw Hill International editions, 4<sup>th</sup> edition, 1990.
2. A.K.Sawhney, “*A Course in Electrical and Electronic Measurements and Instrumentation*”, Dhanapat Rai & Sons, 2000.
3. A.J.Bouwens, “*Digital Instrumentation*”, McGraw Hill, 1986.
4. Geroge C. Barney, “*Intelligent Instrumentation*”,IEEE, 1992.

<b>EC0303</b>	<b>CONTROL SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **PURPOSE**

To give an introduction to the analysis of linear control systems. This will permit an engineer to exploit time domain and frequency domain tools to design and study linear control systems.

### **INSTRUCTIONAL OBJECTIVES**

At the conclusion of this course, the students will be able to:

1. Describe what feedback control is and basic components of control systems.
2. Describe the various time domain and frequency domain tools for analysis and design of linear control systems.
3. Describe the methods to analyze the stability of systems from transfer function forms.

### **TRANSFER FUNCTIONS**

**9**

Introduction and classification of control systems-linear, nonlinear, time varying, time in-variant, continuous, discrete, SISO and MIMO systems – definitions. Transfer function – Mathematical modeling of mechanical (translation and rotational), Electrical systems- mechanical-electrical analogies– Block Diagram reduction technique and Signal flow graphs.

### **CONTROL SYSTEM COMPONENTS**

**9**

Transfer function of potentiometers, armature controlled and field controlled dc motor. –tacho generators -gear trains- controllers (On – Off, P, PI,PD, PID)

### **TRANSIENT AND STEADY STATE ANALYSIS**

**9**

Transient and steady state response-definitions-mathematical expression for standard test signals-type and order of systems-step, ramp and impulse response of first order and second order under damped systems - Step response of second order critically damped and over damped systems - Time domain specifications of second order under damped systems - Steady state error analysis.

### **STABILITY ANALYSIS**

**9**

Stability analysis – characteristic equation – location of roots in S-plane for stability -Routh’s stability criterion-relative stability analysis-root locus technique-construction of root loci for negative feed back systems.

### **FREQUENCY DOMAIN ANALYSIS**

**9**

Frequency response analysis-frequency domain specifications of second order systems-Bode plots and stability (gain and phase) margins- Need for compensation -Introduction to lead, lag, lead-lag compensating networks, minimum phase& non-minimum phase systems - polar plots-constant M and N circles-Nichols chart - Nyquist stability criterion

**TOTAL 45**

### **TEXT BOOKS**

1. Katsuhiko Ogata, “*Modern Control Engineering*” second edition, Prentice Hall of India Private Ltd, New Delhi, 1995.
2. Nagrath I J and Gopal .M. “*Control Systems Engineering*”, I edition,Wiley and sons, 1985.

### **REFERENCE BOOKS**

1. Benjamin C Kuo, “*Automatic Control System*”, 7<sup>th</sup> edition, Prentice Hall of India Private Ltd, New Delhi, 1993.
2. Gajic Z., Lelic M., “*Modern Control System Engineering*”, Prentice Hall of India Private Ltd, New Delhi, 1996.
3. Richard .C. Dorf and Robert.H.Bishop, “*Modern Control System Engineering*”, Addison Wesley, 1999.
4. Katsuhiko Ogata, “*Modern Control Engineering*” 4<sup>th</sup> edition, Pearson education.

<b>EC0305</b>	<b>ANTENNA AND WAVE PROPAGATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">EC0208</a></b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **PURPOSE**

The purpose of this course is to enable the students to the basics of antennas and various types of antenna arrays and its radiation patterns. The main objective of this subject is to help students to identify the different latest antennas available for specific communication.

### **INSTRUCTIONAL OBJECTIVES**

1. To study various antennas, arrays and radiation patterns of antennas.
2. To learn the basic working of antennas
3. To understand various techniques involved in various antenna parameter measurements.
4. To understand the propagation of radio waves in the atmosphere

### **ANTENNA FUNDAMENTALS AND VECTOR POTENTIALS**

**9**

Isotropic Radiation, Power density and Intensity, Gain, Directive gain, Directivity, Effective area, Reciprocity theorem, Antenna efficiency, Radiation resistance, Terminal impedance, Beam width and Bandwidth. Radiation from a small current element, Power radiated by a small current element and its radiation resistance, Half wave dipole, Radiation field of current distribution of center fed Dipole.

### **ANTENNA ARRAYS**

**9**

Various forms of antenna arrays – Broadside, End fire, Collinear, Parasitic arrays, Array of two point sources, Pattern Multiplication, Array of “N” sources – analysis of End fire and Broadside case, phased arrays, Binomial arrays.

### **SPECIAL PURPOSE ANTENNAS**

**9**

Traveling wave, Loop, Dipole and Folded dipole antennas, Horn antenna, Reflector antenna, Yagi- Uda antenna, Log periodic antenna, Helical and Micro strip antenna and applications of all types of antennas.

### **ANTENNA MEASUREMENTS**

**9**

Impedance, Gain, Radiation pattern, Beam width, Radiation resistance, Antenna efficiency, Directivity, Polarization and phase Measurements.

### **RADIO WAVE PROPAGATION**

**9**

Modes of propagation, Structure of atmosphere, Ionosphere layers, Mechanism of bending of waves, Effect of earths Magnetic field on Radio wave propagation. Virtual height, MUF, Skip distance, OWF, Ionosphere abnormalities, Multi-hop propagations, Space wave propagation, Super refraction.

**TOTAL 45**

### **TEXT BOOKS**

1. Constantine A.Balanis, “*Antenna Theory analysis and Design*”,II Edition,John wiley and Sons.
2. R.E.Collin, “*Antennas and Radio Wave Propagation*”, McGraw Hill International Editions, 1985.

### **REFERENCE BOOKS**

1. Robert S. Elliott, “*Antenna Hand Book*”, Joseph J. Carr, Galgotia Publication, New Delhi, 1995.
2. K.D. Prasad, “*Antenna and Wave Propagation*”, Tech India Publications, New Delhi, 1996.
3. John. D. Kraus, “*Antennas*”, McGraw Hill International Editions, 1988

<b>EC0307</b>	<b>DIGITAL COMMUNICATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">EC0210</a></b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **PURPOSE**

To provide a comprehensive coverage of digital communication systems. The key feature of digital communication systems is that it deals with discrete messages and the purposes are to add organization and structure to this field.

### **INSTRUCTIONAL OBJECTIVES**

To learn and understand

1. Pulse modulation and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of analog signals
2. Base band pulse transmission which deals with the transmission of pulse amplitude modulated signals in their base band form
3. Pass band data transmission methods

### **PULSE MODULATION**

**9**

Sampling Process-Aliasing-Natural Sampling-Flat Sampling-PAM-PWM-PPM-Bandwidth-Noise trade off-TDM

### **DIGITAL MODULATION SYSTEMS**

**9**

Quantization of Signals-Quantization error-PCM Systems-Noise Considerations in PCM system-Over all Signal-to-noise ratio for PCM system-Threshold effect-Channel Capacity-Virtues, Limitations & Modification of PCM system-PCM Signal Multiplexing- Differential PCM- Delta Modulation-Noise Considerations in Delta Modulation- SNR Calculations-Comparison of PCM, DPCM & DM

### **BASE BAND PULSE TRANSMISSION**

**9**

Matched filter receiver-Probability error of the Matched filter-Intersymbol interference-Nyquist criterion for distortion less base band transmission-Correlative coding-Base band M-ary PAM transmission-Eye pattern.

### **PASS BAND DATA TRANSMISSION**

**9**

Pass Band Transmission Model-Generation, Detection, Signal Space Diagram, Probability of Error of BFSK, BPSK, QPSK Schemes- Comparison of BFSK, BPSK & QPSK.

### **INTRODUCTION TO SPREAD SPECTRUM TECHNIQUES**

**9**

Introduction-Discrete Sequence Spread Spectrum technique-Use of Spread Spectrum with CDMA-Ranging Using Discrete Sequence Spread Spectrum-Frequency Hopping Spread Spectrum-Generation & Characteristics of PN Sequence-Acquisition of FH a Signal-Tracking of FH a signal-Acquisition of a DS Signal-Tracking of a DS signal

**TOTAL 45**

### **TEXT BOOK**

1. Simon Haykin, "*Communication Systems*", (3/e) John Wiley & Sons, 1998.
2. Taub & Schilling, "*Principle of Communication Systems*" (2/e).

### **REFERENCE BOOK**

1. John G. Proakis, "Digital Communication", McGraw Hill Inc 2001.
2. Bernard Sklar, "Digital Communication, Fundamentals and Application", Pearson Education Asia, 2<sup>nd</sup> Edition, 2001.

<b>EC0309</b>	<b>MICROPROCESSORS AND MICROCONTROLLERS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">EC0205</a></b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### PURPOSE

The purpose of this course is to introduce students about Microprocessors and Microcontrollers.

### INSTRUCTIONAL OBJECTIVES

1. Understand Microprocessor types and programming of them
2. Understand various interfacing circuits necessary for various applications
3. Understand various interfacing concepts
4. Understand basic concepts of micro controller

#### MICROPROCESSOR- 8086

**9**

Register Organization -Architecture-Signals-Memory Organization-Bus Operation-IO Addressing-Minimum Mode-Maximum Mode-Timing Diagram-Interrupts & Service Routines

#### PROGRAMMING OF 8086

**9**

Addressing Modes-Instruction Format-Instruction Set-Assembly language Programs in 8086

#### INTERFACING DEVICES

**9**

IO and Memory Interfacing concepts–Programmable Interval Timer (8254)– Programmable Interrupt Controller (8259A) – Programmable DMA Controller (8257) –Programmable communication Interface (8251)-Stepper Motor Interfacing

#### MICROCONTROLLER-8051

**9**

Register Set-Architecture of 8051 microcontroller- IO and Memory Addressing-Interrupts-Instruction Set-Addressing Modes.

#### PROGRAMMING OF 8051

**9**

Timer-Serial Communication-Interrupts Programming-Interfacing to External Memory-Interfacing to ADCs, Sensors.

**TOTAL 45**

### TEXT BOOKS

1. A.K.Ray and K.M.Bhurchandi, “Advanced *Microprocessors and Peripherals*”,Tata McGrawHill,2000.
2. Muhammad Ali Mazidi and Janice Gillispie Mazidi, “ *The 8051 – Microcontroller and Embedded systems*”,7th Edition, Pearson Education , 2004

### REFERENCE BOOKS

1. Douglas.V.Hall, “ *Microprocessor and Interfacing : Programming and Hardware*”, 2<sup>nd</sup> edition, McGraw Hill, 1991
2. Kenneth.J.Ayala, “*8051 Microcontroller Architecture,Programming and Applications*”.2<sup>nd</sup> edition, Thomson.

PD0301	PERSONALITY DEVELOPMENT - V	L	T	P	C
	Prerequisite: Nil	1	0	2	2

### PURPOSE

The purpose of this course is to build confidence and inculcate various soft skills and to help students to identify and achieve their personal potential

### INSTRUCTIONAL OBJECTIVES

At the end of the course the students will be able to

1. Acquire the important soft skills for employment
2. Take part in group discussions and job interviews confidently
3. Appear for placement aptitude tests confidently
4. Gain self confidence to face the placement process

### METHODOLOGY

The entire program is designed in such a way that every student will participate in the class room activities. The activities are planned to bring out the skills and talents of the students which they will be employing during various occasions in their real life.

1. Group activities + individual activities.
2. Collaborative learning.
3. Interactive sessions.
4. Ensure Participation.
5. Empirical Learning

### SYLLABUS CONTENTS

Syllogism - Binary Logic [cause & effect] - Assertive & Counter Argument - Simple Interest - Time & Work - Time & Distance 9

Upstream & Downstream Reasoning - Verbal Comprehension I - Verbal Comprehension II - Compound Interest Logarithms - Surds & Indices 9

Verbal Reasoning I - Verbal Reasoning II - Verbal Reasoning III – Percentage – Test – Averages 9

Deductive Reasoning I - Deductive Reasoning II - Language Usage I - Decimal Fractions - Profit & Loss – Probability 9

Language Usage II - Logic Games I - Logic Games II – Area - Pipes & Cisterns – Test 9

**TOTAL 45**

### SCHEME OF INSTRUCTION

Marks allocated for regular participation in all oral activities in class

### SCHEME OF EXAMINATION

Complete internal evaluation on a regular Basis

<b>EC0321</b>	<b>PROCESSOR LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**PURPOSE**

To make the students understand the basic programming of Microprocessor and DSP processor. Also, to introduce them to Microcontrollers and few interfacing circuits.

**INSTRUCTIONAL OBJECTIVES**

To understand and gain knowledge about

1. Microprocessor (8086)
2. Microcontroller (8051)
3. Interfacing circuits
4. DSP Processor

**LIST OF EXPERIMENTS**

**45**

**PART I-8086 MICROPROCESSOR**

1. 16 bit Addition , Subtraction, Multiplication and Division
2. Largest and Smallest number
3. Ascending and Descending numbers
4. Sum of Series

**PART II-INTERFACING**

5. Stepper Motor Interface
6. Programmable Timer Interface
7. A/D and D/A Converters
8. Programmable Interrupt Controller
9. Temperature Controller.

**PART III-8051 MICROCONTROLLER**

1. Addition , Subtraction, Multiplication and Division
2. One's and two's complement
3. Word Disassembly
4. Decimal to Hexa decimal Conversion

**PART IV –DSP PROCESSOR**

1. 8bit/16bit addition subtraction using immediate direct and indirect addressing modes.
2. 8bit/16bit Multiplication and division using immediate, direct and indirect addressing.
3. Linear evaluation
4. Wave form generation

**TOTAL 45**

**REFERENCE: LAB MANUAL**

<b>EC0323</b>	<b>COMMUNICATION LAB-II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**PURPOSE**

To help the students to experiment on digital communication systems using kits and to use software's to simulate them.

**INSTRUCTIONAL OBJECTIVES**

To carry out experiments on various digital communications modulation schemes using kits. MATLAB software is used to simulate the digital modulation techniques.

**LIST OF EXPERIMENTS**

**45**

**HARDWARE**

1. FSK Modulation and Demodulation.
2. PSK Modulation and Demodulation.
3. Pulse Code Modulation and Demodulation
4. Delta Modulation and Demodulation
5. Time Division Multiplexing
6. Data Formatting
7. Differential pulse code modulation and demodulation

**SOFTWARE –MATLAB**

8. FSK Modulation and Demodulation
9. PSK Modulation and Demodulation
10. QPSK
11. ASK Modulation and Demodulation
12. DPSK Modulation and Demodulation
13. Delta modulation and demodulation

**TOTAL 45**

**REFERENCE: LABORATORY MANUAL**

<b>EC0325</b>	<b>INDUSTRIAL TRAINING - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**PURPOSE**

To expose the students to the industrial working environment and make them industry ready.

**IMPLEMENTATION**

A minimum of 2 weeks in-plant training has to be undergone by the student after 3<sup>rd</sup> semester but before 5<sup>th</sup> semester. A certificate from the company to the effect that the student has undergone the training successfully is to be produced by the student. The student is required to present a report on the observations and knowledge gained during the training, which will be evaluated by a panel of senior faculty members.

## SEMESTER VI

MB0302	BUSINESS MANAGEMENT FOR ENGINEERS	L	T	P	C
	Prerequisite: Nil	3	0	0	3

### PURPOSE

To provide engineering students with the management skills to enable them to assess, evaluate and take key management decisions by the application of management concepts.

### INSTRUCTIONAL OBJECTIVES

At the end of the course, the students are expected to

1. Understand the various key concepts of micro economics.
2. Demonstrate the effect of time value of money and depreciation.
3. Apply the various project management techniques
4. Understand the various issues related to industrial safety.

Role and Importance of Economics for Engineers, Law of demand and supply, Break-even analysis, Pricing Policies. 8

Cost determination, Balance Sheet, Cost benefit analysis, Time Value of Money, Methods of Depreciation, Long Term and short term financing, Financial Institutions. 8

Management-Nature and functions, Project Management-Phases and Techniques, CPM, PERT, Human Aspects of Project Management-Issues and Problems, Managing-vs-leading a project. 10

Marketing Concepts, Marketing Mix, Product life cycle, Plant layout, Plant location, Material Handling, Productivity, Plant Maintenance and Industrial Safety. 10

Current Trends in financing, Role of Industrial Engineer and Applications of Industrial Engineering, Process of Project Management and the Future, Ethics and Project Management, E-Marketing-Ethical and legal issues. 9

**TOTAL 45**

### TEXT BOOKS

1. R. Pannerselvam, "*Engineering Economics*", PHI, 2001.
2. O.P. Khanna, "*Industrial Engineering and Management*", Dhanpat Rai and sons, 1992.

### REFERENCE BOOKS

1. Kotler, "*Marketing Management*", Pearson education, 12<sup>th</sup> edition.
2. Prasanna Chandra, "*Finance Sense for non-finance executives*", TMH.

<b>EC0302</b>	<b>MICROWAVE AND RF DESIGN</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">EC0204</a></b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PURPOSE**

To introduce the students, to the basics of microwave devices, microwave measurements and modeling of RF circuits used in communication systems.

**INSTRUCTIONAL OBJECTIVES**

To understand and gain complete knowledge about

1. Microwave devices such as Amplifiers, Oscillators
2. Microwave Measurements
3. RF Basic concepts
4. RF Filter Design
5. RF Amplifier Design

**MICROWAVE AMPLIFIERS AND OSCILLATORS**

**9**

Introduction to Microwave transmission- Applications and Limitations- Klystron Amplifiers-Reflex Klystron Oscillators-Magnetron Oscillators-TWT Amplifiers.

**MICROWAVE COMPONENTS**

**9**

Directional Coupler-E&H plane Tee- Magic Tee- Circulators- Isolators-Attenuators and Phase Shifters-Impedance Matching Techniques

**MICROWAVE DEVICES AND MEASUREMENTS**

**9**

Principles of Microwave transistor and FET- Gunn Oscillators- IMPATT, TRAPATT and BARITT devices- PIN diode and TUNNEL Diode.

**Microwave Measurements:** Power, Frequency, Impedance, VSWR.

**DESIGN OF RF FILTERS**

**9**

Introduction to RF Concepts-Basic Filter Configurations – LPF, HPF, BPF, BSF –Filter Design

**RF AMPLIFIER DESIGN & BASIC OSCILLATOR, MIXERMODEL**

**9**

Characteristics of Amplifier – Types – Amplifier Power Relations – Power Gain Definitions –Basic Oscillator & Mixer Model.

**TOTAL 45**

**TEXT BOOKS**

1. Samuel Y. Liao, “*Microwave Devices and Circuits*” ,3<sup>rd</sup> Edition, Pearson education.
2. Reinhold Ludwig, Pavel Bretchko , ‘*RF circuit design , theory and applications*’, Pearson Asia Education , Edition 2001.

**REFERENCE BOOKS**

1. R.E.Collin, “*Foundations for Microwave Engineering*”, 2nd Edition, Tata McGraw Hill, 1992.
2. D.Pozar, “*Microwave Engineering*”, John Wiley & Sons, New York, 1998.
3. Mathew M. Radmanesh , “*Radio Frequency and Microwave Electronics*”, Pearson Asia Education, Edition 2001.

<b>EC0304</b>	<b>OPTICAL COMMUNICATION AND NETWORKS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### PURPOSE

To introduce the students to various optical fiber modes, configurations and various signal degradation factors associated with optical fiber and to study about various optical sources and optical detectors and their use in the optical communication system.

### INSTRUCTIONAL OBJECTIVES

1. To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
2. To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors
3. To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes.
4. To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration.
5. To learn the fiber optical network components, variety of networking aspects, FDDI, SONET/SDH and operational principles WDM.

### INTRODUCTION OF OPTICAL FIBERS

9

Basic principles of optical fiber communications – Step Index and Graded Index fiber structure – Fiber Modes and Configurations – Mode theory for circular waveguides – Linearly Polarized modes – Single mode fibers.

### OPTICAL SOURCES AND RECEIVERS

9

**Optical Sources:** - Light source materials – LED –Structure – Quantum efficiency – Modulation. Laser Diode – Modes and threshold condition – Structures and Radiation Pattern – Modulation.

**Optical detectors:** – Physical principles – PIN and APD diodes – Photo detector noise – SNR – Detector response time.

### OPTICAL COMMUNICATION SYSTEMS AND DESIGN

9

**Transmitter module:** Signal formats – Electronic driving circuit – Modulation circuit.

**Receiver Module:** Optical front end – Quantizer – Decision circuit.

**Optical Link Design:** Point- to- point links – System considerations – Link Power budget – Rise time budget.

### NETWORK COMPONENTS

9

Principle and Operation of couplers, Isolators, Circulators, Fabry Perot Filters, Mach-Zehnder Interferometer, EDFA, Semiconductor Optical Amplifier and Transceivers.

### OPTICAL NETWORKS

9

Network Topologies - **FDDI Networks:** – Frame and Token formats – Network operation. **SONET/SDH:** – Optical specifications – SONET frame structure – SONET layers -SONET/SDH networks. Operational principles of WDM – Broadcast and Select WDM networks – Single hop networks – Wavelength routed networks – Optical CDMA.

**TOTAL 45**

### TEXT BOOKS

1. Gerd Keiser, “*Optical Fiber Communication*” McGraw –Hill International, Singapore, 3<sup>rd</sup> edition, 2000
2. Rajiv Ramaswami, Kumar N. Sivarajan, “*Optical Networks A practical perspective*”, 2<sup>nd</sup> edition, Elsevier, 2004

### REFERENCE BOOKS

1. Djafar K. Mynbaev, Lowell L. Scheiner, “*Fiber-Optic Communications Technology*”, 1st edition, Pearson Education, 2001.
2. John Powers, “*An Introduction to Fiber optic Systems*”, 2<sup>nd</sup> edition, Irwin-McGraw Hill, 1999.
3. J.Gowar, “*Optical Communication System*”, 2nd edition, Prentice Hall of India, 2001.

<b>EC0306</b>	<b>VLSI DEVICES AND DESIGN</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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	<b>Prerequisite:</b> <a href="#">EC0205</a>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
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### PURPOSE

To introduce the technology, design concepts, electrical Properties and modeling of Very Large Scale Integrated Circuits.

### INSTRUCTIONAL OBJECTIVES:

1. To learn the basic MOS Circuits.
2. To learn the MOS Process Technology
3. To learn the concepts of modeling a digital system using Hardware Description Language.

### INTRODUCTION TO MOS TECHNOLOGY

**9**

An overview of Silicon Semiconductor technology- NMOS fabrication. **CMOS fabrication:** n-well, p-well – Twin tub and SOI Process - Interconnects. **Circuit elements:** Resistors- Capacitors- Bipolar transistors. Latch up and prevention.

### MOS CIRCUIT DESIGN PROCESS

**9**

**Basic MOS transistors:** symbols, Enhancement mode - Depletion mode transistor operation - Threshold voltage derivation - body effect - Drain current Vs voltage derivation - channel length modulation. NMOS and CMOS inverter - Determination of pull up to pull down ratio - Design of logic gates - Stick diagrams.

### PRINCIPLES OF VHDL (ELEMENTARY TREATMENT ONLY)

**9**

Introduction to VHDL. **Language elements:** Identifiers - Data objects - Data types – Operators. Behavioral modeling - Dataflow modeling - Structural modeling – Examples - Sub programs and overloading - Package concepts.

### VERILOG HDL (ELEMENTARY TREATMENT ONLY)

**9**

Hierarchical modeling concepts- **Basic concepts:** Lexical conventions - Data types - Modules and ports. Gate level modeling - Dataflow modeling - Behavioral modeling - Functions - UDP concepts

### CMOS SUBSYSTEM DESIGN

**9**

Introduction - Design of **Adders:** carry look ahead - carry select - carry save. Parity generators. **Design of multipliers:** Array - Braun array – Baugh - Wooley Array - Wallace tree multiplier.

**TOTAL 45**

### TEXT BOOKS

1. Douglas A. Pucknell, “*Basic VLSI Systems and Circuits*”, 3<sup>rd</sup> edition, Prentice Hall of India, 1993
2. Samir Palnitkar, “*Verilog HDL – Guide to Digital Design and Synthesis*”, 3<sup>rd</sup> Edition, Pearson Education, 2003
3. J. Bhaskar, “*VHDL Primer*”, 1st edition, BSP, 2002

### REFERENCE BOOKS

1. Weste & Eshraghian, “*Principles of CMOS VLSI Design*”, 2<sup>nd</sup> edition, Addison Wesley, 1993.
2. E. Fabricious, “*Introduction to VLSI Design*”, 1st edition, McGraw Hill, 1990.
3. C. Roth, “*Digital Systems Design using VHDL*”, Thomson Learning, 2000

<b>PD0302</b>	<b>PERSONALITY DEVELOPMENT VI</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>2</b>

**PURPOSE**

The purpose of this course is to build confidence and inculcate various soft skills and to help students to identify and achieve their personal potential

**INSTRUCTIONAL OBJECTIVES**

At the end of the course the students will be able to

1. Acquire the important soft skills for employment
2. Take part in group discussions and job interviews confidently
3. Appear for placement aptitude tests confidently
4. Gain self confidence to face the placement process

**METHODOLOGY**

The entire program is designed in such a way that every student will participate in the class room activities. The activities are planned to bring out the skills and talents of the students which they will be employing during various occasions in their real life.

1. Group activities + individual activities.
2. Collaborative learning.
3. Interactive sessions.
4. Ensure Participation.
5. Empirical Learning

Self Introduction - Narration - Current News Update – Numbers - Height & Distance - Square & Cube Roots

Current Tech Update - Verbal Aptitude Test I - GD –I - Odd man out series - Permutation & Combination - Problems on ages

GD –II - Resume Writing - Mock Interview I / reading comprehension - Problems on trains – Allegation of Mixtures - Test

Mock Interview II / reading comprehension - Mock Interview III/ reading comprehension - GD – III - Ratio & Proportion - Clocks - H.C.F & L.C.M

GD – IV - Verbal Aptitude Test II – Review – Partnership – Puzzles - Test

**TOTAL 45**

**SCHEME OF INSTRUCTION**

Marks allocated for regular participation in all oral activities in class

**SCHEME OF EXAMINATION**

Complete internal evaluation on a regular Basis

<b>EC0322</b>	<b>MICROWAVE AND OPTICAL COMMUNICATION LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**PURPOSE**

To know and understand how communication is being established at microwave frequencies and using fiber in optical communication.

**INSTRUCTIONAL OBJECTIVES**

1. To have a detailed practical study on microwave equipments
2. To study the optical devices and to use in the appropriate application

**LIST OF EXPERIMENTS**

**45**

**MICROWAVE EXPERIMENTS**

1. Characteristics of Reflex Klystron
2. Study of power distribution in Directional coupler, E & H plane and Magic tee.
3. Wavelength and Frequency measurement.
4. Impedance measurement by slotted line method.
5. Gain and Radiation pattern of Horn antenna.
6. Design of Micro strip antenna.

**OPTICAL COMMUNICATION EXPERIMENTS**

1. D. C. Characteristics of LED and PIN photo diode.
2. D. C. Characteristics of Laser diode.
3. Measurement of Numerical aperture, Propagation and Bending Loss in fiber.
4. Fiber Optic Analog Link.
5. Fiber Optic Digital Link.

**SPICE SIMULATION**

1. Frequency response of RF amplifier.
2. Frequency response of IF amplifier.
3. Amplitude modulation

**TOTAL 45**

**REFERENCE: LABORATORY MANUAL.**

<b>EC0324</b>	<b>VLSI DESIGN LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**PURPOSE**

To know and understand VHDL and design circuits using it.

**INSTRUCTIONAL OBJECTIVES**

To gain expertise in design and development and simulation of digital circuits with VHDL.

**LIST OF EXPERIMENTS**

**45**

1. Design of Combinational Circuits
2. Design of Counters and Shift Registers
3. Design of Multipliers
4. Design of ALU
5. Design of RAM
6. Design of FIFO
7. Control Logic Design

**REFERENCE: LAB MANUAL**

**TOTAL 45**

<b>EC0326</b>	<b>COMPREHENSION – II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">EC0226</a></b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>1</b>

**PURPOSE**

To provide a review of Electronics and Communication engineering topics covered up to VI semester, so that a comprehensive understanding is achieved. It will also help students to face job interviews and competitive examinations.

**INSTRUCTIONAL OBJECTIVES**

1. To provide overview of all Electronics & Communication engineering topics covered up to VI semester.
2. To assess the overall knowledge level in the following topics of Electronics & Communication.

**COMPREHENSION**

**30**

A. Review of the following topics

1. Review of the subjects listed in comprehension I.
2. Basics of various measurement techniques and measuring instruments.
3. Analysis of Linear control systems.
4. Basics of antennas and various types of antenna arrays.
5. Overview of Digital communication systems.
6. Architecture and programming of microprocessor & microcontroller.
7. Overview of Microwave and RF design.
8. Overview of Optical communication and Networks.
9. Basics of VLSI devices and design.

B. Seminar/group discussion

Students shall have seminar/group discussion sessions on the topics listed under A above under the guidance of staff.

**TOTAL 30**

**(Evaluation is based on an end semester examination).**

<b>EC0328</b>	<b>COMPUTER SKILLS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>2</b>

**PURPOSE**

To acquire extramural knowledge on the computer implementation of various engineering solutions.

**IMPLEMENTATION**

The students are expected to undergo at least two computer courses from a list of courses provided from time to time by the departments of engineering and technology. Resources for conducting the courses will be found from in-house talents and outside professionals with expertise in the particular course. Certification will be done by both the university and the bodies notified for the purpose. The students are required to obtain a minimum grade for gaining the required credit.

**SEMESTER - VII**

<b>EC0401</b>	<b>COMPUTER COMMUNICATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PURPOSE**

It is very much required for an ECE graduate to know use of computers in communication as well as in network formation. The syllabus focuses on mode of data transfer, layer and protocols related to networks.

**INSTRUCTIONAL OBJECTIVES**

1. Understand about the functions and services of all 7 layers of OSI model
2. Get an idea of various network standards.

**DATA COMMUNICATION & NETWORKING BASICS**

**9**

Data transfer modes - Telephone system - Protocols & standards - Multiplexing - Circuit switching - Message & packet switching - Introduction to LAN, MAN & WAN - IEEE standards for LAN – Network topologies.

**OSI LOWER LAYERS**

**9**

Network models – OSI layer architecture – Issues in data traffic over network – Physical layer standards – Data link control & protocol – ARQ schemes – HDLC protocol.

**NETWORK LAYER**

**9**

Need for Internetworking – Addressing – Routing Issues – Internet protocol (IPV4/V6) – Congestion & flow control mechanism – TCP/IP model.

**OSI HIGHER LAYERS**

**9**

Transport layer – TCP & UDP – Session layer issues – Presentation layer – Application layer.

**APPLICATION & INTRODUCTION TO ISDN**

**9**

**Application layer:** Email – FTP – HTTP – Compression Techniques.  
Introduction to ISDN – Broadband ISDN Features – ATM Concept.

**TOTAL 45**

**TEXT BOOKS**

1. Behrouz A.Fehrouzan, “*Data communication & Networking*” Mc-Graw Hill, 3rd edition, 2004.
2. Andrew S.Tanenbaum, “*Computer Networks*”, 4th edition, Pearson education, 1999.

**REFERENCE BOOKS**

1. W.Stallings, “*Data & computer communication*”, 2<sup>nd</sup> Edition, NY Pearson, 1988.
2. Rarnier Handel , N.Huber , Schroder “*ATM Networks Concepts ,Protocols Applications* ” , Addison Welsey 1999

<b>EC0403</b>	<b>WIRELESS COMMUNICATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite:</b> <a href="#">EC0307</a>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**PURPOSE**

To introduce the students to the concepts of wireless systems, mobile systems.

**INSTRUCTIONAL OBJECTIVES**

To understand and gain complete knowledge about

1. Basic wireless , cellular concepts
2. Mobile Channels
3. Standards 1G,2G, 3G Basic system available

**STANDARDS AND CELLULAR CONCEPT**

**12**

Introduction - **Standards:** AMPS, GSM, CDMA (IS-95). Cellular Concept and Frequency Reuse, Overview of Multiple Access Schemes, Channel Assignment and Hand off, Interference and system capacity, Trunking and Erlang capacity calculations.

**MOBILE RADIO PROPAGATION**

**12**

Radio wave propagation issues in Personal wireless systems, Elementary treatment of Propagation Models, Multipath fading and base band impulse response models, Parameters of mobile multipath channels

**MODULATION AND SIGNAL PROCESSING**

**12**

**Digital modulation techniques for mobile communications:** BPSK, DPSK -  $\pi/4$  QPSK - OQPSK - GMSK. Equalization, Diversity -Rake receiver concepts–Speech coding (LPC, CELP).

**WIRELESS LAN STANDARD**

**12**

IEEE 802.11 Architecture and Services - IEEE 802.11 Medium Access Control- IEEE 802.11 Physical layer

**BLUETOOTH**

**12**

**Bluetooth:** Overview-Radio specifications-Base band specifications-Link Manager Specification-Logical Link Control and Adaptation Protocol.

**TOTAL 60**

**TEXT BOOKS**

1. Rappaport T.S, “*Wireless Communications: Principles and Practice*”, 2nd edition, Pearson education.
2. William Stallings, “ *Wireless Communication & Networking*”, Pearson Education Asia, 2004

**REFERENCE BOOKS**

1. Feher K. “*Wireless Digital Communications*”, Pearson education.
2. Lee W.C.Y, “*Mobile Communications Engineering: Theory & Applications*”, McGraw Hill, New York 2nd Edition, 1998.
3. Schiller, “*Mobile Communication*”, Pearson Education Asia Ltd., 2000.

<b>EC0421</b>	<b>NETWORK SIMULATION LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**PURPOSE**

To know and understand communication networks using NETSIM Software and LAN Trainer kit.

**INSTRUCTIONAL OBJECTIVES**

To study the communication networks characteristics and to analyze various MAC and routing layer Protocols.

**LIST OF EXPERIMENTS**

**45**

1. Ethernet LAN protocol. To create Scenario and study the performance of CSMA/CD protocol through simulation.
2. Token bus and Token Ring protocols. To create scenario and study the performance of token bus and token ring protocols through simulation.
3. Wireless LAN protocols. To create scenario and study the performance of network with CSMA/CA protocol and compare with CSMA/CD protocols.
4. Implementation and study of stop and wait protocol.
5. Implementation and study of Go back N and selective repeat protocols.
6. Implementation of distance vector routing algorithm.
7. Implementation of Link state routing algorithm.
8. Implementation of data encryption and decryption.
9. Transfer of files from PC to PC using windows/ UNIX socket processing.

**TOTAL 45**

**REFERENCE: LABORATORY MANUAL**

<b>EC0423</b>	<b>INDUSTRIAL TRAINING - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**PURPOSE**

To expose the students to the industrial working environment and make them industry ready.

**IMPLEMENTATION**

A minimum of 2 weeks in-plant training has to be undergone by the student after 5<sup>th</sup> semester but before 7<sup>th</sup> semester. A certificate from the company to the effect that the student has undergone the training successfully is to be produced by the student. The student is required to present a report on the observations and knowledge gained during the training, which will be evaluated by a panel of senior faculty members

## ELECTIVES

EC0010	TV AND VIDEO SYSTEMS	L	T	P	C
	Prerequisite: <a href="#">EC0210</a> , <a href="#">EC0204</a>	3	0	0	3

### PURPOSE

Television Technology has now become a vital tool to the information revolution that is sweeping across the countries of the world. The syllabus aims at a comprehensive coverage of Television Systems with all the new developments in Television Engineering

### INSTRUCTIONAL OBJECTIVES

1. To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver Picture Tubes and Television Camera Tubes
2. To study the principles of Monochrome Television Transmitter and Receiver systems.
3. To study the various Color Television systems with a greater emphasis on PAL system.
4. To study the advanced topics in Television systems and Video Engineering

### FUNDAMENTALS OF TELEVISION

9

Geometry form and Aspect Ratio - Image Continuity - Number of scanning lines - Interlaced scanning - Picture resolution - Camera tubes- Image orthicon – vidicon – plumbicon -silicon diode array vidicon -solid state image scanners- monochrome picture tubes- composite video signal-video signal dimension- horizontal sync. Composition- vertical sync. Details – functions of vertical pulse train – scanning sequence details. Picture signal transmission – positive and negative modulation – VSB transmission sound signal transmission – standard channel bandwidth.

### MONOCHROME TELEVISION TRANSMITTER AND RECEIVER

9

TV transmitter – TV signal propagation – Interference – TV transmission Antennas – Monochrome TV receiver – RF tuner – UHF, VHF tuner- Digital tuning techniques- AFT-IF subsystems - AGC – Noise cancellation- Video and sound inter carrier detection- vision IF subsystem- video amplifiers requirements and configurations - DC re-insertion - Video amplifier circuits- Sync separation – typical sync processing circuits- Deflection current waveform – Deflection Oscillators – Frame deflection circuits – requirements- Line Deflection circuits – EHT generation – Receiver Antennas.

### ESSENTIALS OF COLOUR TELEVISION

9

Compatibility – colour perception- Three colour theory- luminance, hue and saturation-colour television cameras- values of luminance and colour difference signals- colour television display tubes- delta – gun-precision – in-line and Trinitron colour picture tubes- purity and convergence- purity and static and dynamic convergence adjustments- pincushion correction techniques- automatic degaussing circuit- grey scale tracking – colour signal transmission- bandwidth- modulation of colour difference signals – weighting factors- Formation of chrominance signal.

### COLOUR TELEVISION SYSTEMS:

9

NTSC colour TV system- NTSC colour receiver- limitations of NTSC system – PAL colour TV system – cancellation of phase errors- PAL –D colour system- PAL coder – Pal-Decolour receiver- chromo signal amplifier- separation of U and V signals- colour burst separation – Burst phase Discriminator – ACC amplifier-Reference Oscillator- Ident and colour killer circuits- U and V demodulators- Colour signal matrixing – merits and demerits of the PAL system – SECAM system – merits and demerits of SECAM system.

### ADVANCED TELEVISION SYSTEMS

9

Satellite TV technology- Cable TV – VCR- Video Disc recording and playback- Tele Text broadcast receiver – digital television – Transmission and reception- projection Television – Flat panel display TV receiver – Stereo sound in TV – 3D TV – HDTV – Digital equipments for TV studios.

**TOTAL 45**

### TEXT BOOKS

1. R.R.Gulati, “ *Monochrome Television Practice, Principles, Technology and servicing* ”, Second edition, New age International Publishes, 2004
2. R.R.Gulati “*Monochrome and colour television* ”, New age International Publisher, 2003

### REFERENCES

1. A.M Dhake, “*Television and Video Engineering*”, Second edition, TMH, 2003.
2. S.P.Bali, “*Colour Television, Theory and Practice*”, TMH, 1994

EC0012	SATELLITE COMMUNICATION & BROADCASTING	L	T	P	C
	Prerequisite: <a href="#">EC0210</a>	3	0	0	3

### PURPOSE

The main objective of this course is to make the students understand the basic concept in the field of satellite communication. This subject gives the students an opportunity to know how to place a satellite in an orbit. The students are taught about the earth and space subsystems. The satellite services like broadcasting are dealt thoroughly. This will help the student to understand and appreciate the subject.

### INSTRUCTIONAL OBJECTIVES

At the end of this course students will gain knowledge in topics such as

1. Orbital aspects involved in satellite communication
2. Power budget calculation
3. Satellite system and services provided.

### SATELLITE ORBIT

9

**Satellite orbits:** Kepler's laws- Earth satellite orbiting satellite terms-Orbital elements – Orbital perturbations – Inclined Orbits- Sun synchronous orbit. **Constellation:** Geo stationary satellites- Non geostationary constellation- Launching of Geostationary satellites.

### LINK DESIGN

9

EIRP- Transmission Losses –Power Budget equation- System Noise Carrier to noise ratio –Uplink- Downlink – Effects of rain –Inter modulation Noise

### SPACE AND EARTH SEGMENT

9

**Space Segment:** Power Supply – Altitude control- Station keeping – Thermal Control- TT&C- Subsystems – Antenna subsystem –Transponders- Wideband Receiver.

**Earth Segment:** receive only home TV system- Community antenna TV system.

### SATELLITE ACCESS

9

Single Access- Pre assigned FDMA – Demand Assigned FDMA- SPADE system- TWT amplifier operation- Downlink analysis –TDMA- reference bursts-Preamble- Postamble- Carrier recovery-Network synchronization- Pre assigned TDMA –Assigned –CDMA introduction

### BROADCAST AND SERVICES

9

**Broadcast:** DBS - Orbital Spacings- Power ratings- Frequency and Polarization- Transponder Capacity- Bit rate-MPEG- Forward Error Correction. ODU-IDU-Downlink Analysis –Uplink –**Satellite Mobile services:** VSAT-GPS.

**TOTAL 45**

### TEXT BOOKS

1. Dennis Roddy, “*Satellite Communications*”, McGraw Hill Publications, 3<sup>rd</sup> Edition 2001.
2. M.Richaria, “*Satellite Communication Systems Design Principles*”, Pearson Publications, 2<sup>nd</sup> Edition 1999.

### REFERENCE BOOKS

1. Wilbur L.Prichard, Henry G. Suerhood, Ropert A. Nelson , “*Satellite Communication System Engineering*”, Pearson education ,2<sup>nd</sup> Edition,.
2. Pratt, Timothy, Charles W. Bostian, “*Satellite Communication*”, John Wiley and Sons, New York, 1986.

<b>EC0013</b>	<b>RADAR AND NAVIGATIONAL AIDS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PURPOSE**

Main objective of this course is to make the students understand the basic concept in the field of Radar and Navigational aids. Students are taught about different types of Radar Systems

**INSTRUCTIONAL OBJECTIVES**

1. Students will gain knowledge in the topics such as
2. Fundamentals of Radar
3. Different types of Radar and their working
4. Radar signal Detection techniques
5. Radar Navigation Techniques

**RADAR EQUATIONS**

**9**

RADAR Block Diagram & operation- RADAR Frequencies- RADAR Equation- Detection of signals in Noise- RADAR cross section of targets- RADAR cross section fluctuations- transmitter power- pulse repetition frequency- system losses and propagation effects.

**MTI AND PULSE DOPPLER RADAR**

**9**

Introduction to Doppler & MTI RADAR- Delay Line canceller- Moving Target Detector- Pulse Doppler RADAR- Non-Coherent MTE- CW RADAR- FMCW RADAR- Tracking RADAR- Monopulse Tracking – Conical Scan and Sequential Lobing.

**RADAR SIGNAL DETECTION AND PROPAGATION ON WAVES**

**9**

Detection criteria- automatic detection- constant false alarm rate receiver- information available from a RADAR- ambiguity diagram- pulse compression- introduction to clutter- surface clutter RADAR equation- anomalous propagation and diffraction.

**RADIO NAVIGATION**

**9**

Adcock directional finder- automatic directional finder- hyperbolic Systems of Navigation- Loren and Decca Navigation System- Tactical Air Navigation.

**RADAR TRANSMITTER AND RECEIVER**

**9**

Linear beam power tubes- Solid state RF power sources- solid state devices used in RADAR- Magnetron- crossed field amplifiers- other aspects of radar transmitter- RADAR Receiver- Receiver noise figure- super heterodyne receiver- dynamic range- RADAR Displays.

**TOTAL 45**

**TEXT BOOKS**

1. M.I. Skolnik, “*Introduction to RADAR systems*”, 3<sup>rd</sup> edition, McGraw Hill.
2. N.S. Nagaraja “*Elements of Electronic Navigation*”, Tata McGraw Hill, 1993.

**REFERENCE BOOKS**

1. Nadav Levanon, “*RADAR Principles*”, John Wiley and Sons, 1989.
2. Brookner, “*RADAR Technology*”, Artech Hons, 1986

<b>EC0015</b>	<b>MOBILE COMPUTING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PURPOSE**

To understand the fundamentals and various computational processing of mobile networks.

**INSTRUCTIONAL OBJECTIVE**

To study the specifications and functionalities of various protocols/standards of mobile networks.

**INTRODUCTION**

**9**

Introduction to Mobile Computing-Wireless transmission: Propagation, Modulation, Multiplexing, switching, Spread Spectrum and Error control coding.

**WIRELESS LAN**

**9**

Medium access Control and Physical layer specifications-IEEE 802.11- HIPERLAN-Bluetooth

**WIRELESS NETWORKING**

**9**

Satellite systems-Cellular networks-Cordless systems-Wireless Local Loop-IEEE 802.16

**MOBILE TCP/IP AND WAP**

**9**

TCP/IP protocol suite-Mobile IP-DHCP-Mobile transport layer-Wireless application protocol

**MOBILE ADHOC NETWORKS**

**9**

Characteristics-Performance issues-Routing algorithms; Proactive and Reactive, DSDV, AODV, DSR and Hierarchical algorithms.

**TOTAL 45**

**TEXT BOOKS**

1. Jochen Schiller, "*Mobile Communications*", Pearson Education, Second Edition 2002.
2. William Stallings, "*Wireless Communications and Networks*", Pearson Education 2002.

<b>EC0016</b>	<b>BLUETOOTH TECHNOLOGY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PURPOSE**

To Study the concepts of Bluetooth Technology.

**INSTRUCTIONAL OBJECTIVES**

The students will learn how Bluetooth devices operate in the frequency band where other devices operate including wireless LAN, microwave ovens, cordless telephones, wireless video cameras, and others.

**THE BLUETOOTH MODULE**

**9**

Introduction-overview - the Bluetooth module-antennas- base band - introduction-bluetooth device address – masters, slaves, and Pico nets-system timing-physical links-Bluetooth packet structure-logical channels- frequency hopping.

**THE LINK CONTROLLER**

**9**

The link controller-link control protocol-link controller operation-Pico net, scatter net operation-master/slave role switching-base band/link controller architectural overview -link manager-the host controller interface.

**THE BLUE TOOTH HOST**

**9**

The blue tooth host-logical link control and adaptation protocol –RFCOMM- the service discovery protocol – the wireless access protocol-OBEX and IrDA-telephony control protocol.

**CROSS LAYER FUNCTIONS**

**9**

Cross layer functions-Encryption and security-low power operations-controlling low power modes-hold mode-sniff mode-park mode-quality of service-managing Bluetooth devices.

**TEST AND QUALIFICATION**

**9**

Test and qualification- test mode-qualification and type approval-implementation – related standards and technologies.

**TOTAL 45**

**TEXT BOOK**

1. Jennifer Bray and Charles F Sturman, “*Bluetooth: Connect Without Cables*”, Pearson Education, 2002.

**REFERENCE BOOKS**

1. Jennifer Bray, Brain Senese, Gordon McNutt, Bill Munday, ”*Bluetooth Application Developer’s Guide*”, Syngress Media, 2001.
2. Micheal Mille, “*Discovering Bluetooth*”.
3. C S R Prabhu, P A Reddi, “*Bluetooth Technology and its applications with JAVA and J2ME*”, PHI, 2006

<b>EC0017</b>	<b>SPREAD SPECTRUM TECHNIQUES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **PURPOSE**

This course is intended to provide a comprehensive coverage of spread spectrum communication. The key feature of spread spectrum communication is that deals with discrete messages and the major purpose are to add organization and structure to this field.

### **INSTRUCTIONAL OBJECTIVES**

To understand and gain complete knowledge about

1. Direct Sequence Spread Spectrum
2. Frequency hopped Spread Spectrum
3. Commercial applications of Spread Spectrum
4. Different types of Spread Spectrum

### **INTRODUCTION**

**9**

Introduction-Application and advantages of spread spectrum (SS)-Classification of SS Pseudo noise sequences-Direct Sequence(DS) spread spectrum-Frequency hopping-Chirp-Hybrid Spectrum methods.

### **SPREAD SPECTRUM TECHNIQUES-TYPES**

**9**

Frequency hopped (FH) spread spectrum signals. Performance of FH Spread spectrum-Fast hopping versus slow hopping- DS versus FH. CDMA system based on FH spread spectrum signals-Other types of spread spectrum signals. Time hopping SS system.

### **SPREAD SPECTRUM TECHNIQUES-ANALYSIS**

**9**

Synchronization of SS systems - Acquisition. Tracking, Jamming consideration- Broad band –Partial- multiple tone-pulse-repeat band jamming blades system

### **CRYPTOGRAPHY**

**9**

Fundamental concepts of cryptosystems – authentication, digital signature. Key schedule – Encipherment , Decipherment , Stream cipher system. Public key –cryptosystem. Public key distribution system. RSA cryptosystem and authentication scheme. Protocols, Internetworking security mechanisms, Private and public key encryption.

### **APPLICATIONS**

**9**

Commercial application of SS – CDMA – Multi path channels – The FCC part 15 rules – Direct sequence CDMA – IS-95 CDMA digital cellular systems. SS applications in cellular. PCS and mobile communication

**TOTAL 45**

### **TEXT BOOKS**

1. Bernard Sklar , ‘*Digital Communication – Fundamentals and Application*’, Pearson Edition, 2001.
2. M.K.Simon,J.K Scholtz and B.K Levitt, ‘*Spread Spectrum Communications Vol-1,Vol-2,Vol- 3*’, Computer Science press inc, 1985.

### **REFERENCE BOOKS**

1. John G. Prokias , ‘*Digital Communications*’, McGraw Hill Inc,2001
2. Feher. K. ‘*Wireless Digital Communications*’, Pearson education.

<b>EC0018</b>	<b>COMMUNICATION PROTOCOLS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PURPOSE**

The course introduces the students to the emerging areas in Internetworking. This will enable the students to acquire a solid understanding of the different components involved in the seamless working of the Internet.

**INSTRUCTIONAL OBJECTIVES**

At the end of the course, the students will know about

1. Network technologies
2. Internet Addressing and Routing
3. Socket interface and Internet security.

**REVIEW OF UNDERLYING NETWORK TECHNOLOGIES**

**9**

Motivation for internetworking- Internet Services- Introduction to Wide Area and Local Area Networks- Ethernet Technology- FDDI- Arpanet technology- Internetworking concepts and Architecture model.

**INTERNET ADDRESSES**

**9**

Classful Addressing- Subnetting and Supernetting- ARP- ARP Packet format, Encapsulation & operation- ARP over ATM- Proxy ARP- RARP-ICMP –ICMP message types

**ROUTING**

**9**

IP data grams - Fragmentation – Packet format- Checksum- Intra and Interdomain Routing- Distance Vector Routing- Routing Information Protocol- Link state Routing- OSPF- Path vector Routing- Autonomous systems concepts- Border Gateway Protocol.

**CLIENT SERVER MODEL AND SOCKET INTERFACE**

**9**

The client server model- UDP echo server- Time and date service- RARP Server- Socket abstraction- Specifying local and destination addresses- Sending and Receiving data- Handling multiple services- Domain name system – Distribution of name space- DNS resolution – DNS messages and records.

**INTERNET SECURITY AND IPv6**

**9**

Protecting resources- Information policy- IPSec- Authentication Header- Transport layer and Application layer security- Firewalls- Packet filter firewall- Proxy firewall- IPv6-Features and packet format- Comparison between Ipv4 and Ipv6.

**TOTAL 45**

**TEXT BOOKS**

1. Douglas E. Comer, “*Internetworking with TCP/IP*”, Principles, Protocols and Architectures, Vol. I, 4<sup>th</sup> edition, Pearson Education.
2. Behrouz A. Forouzan, “*TCP/IP protocol suite*”, 3rd edition, Tata McGraw Hill.

**REFERENCE BOOKS**

1. Peterson (David. M.), ‘*TCP/IP Networking*’, Tata McGraw Hill, 1995.
2. Douglas E. Comer., ‘*Computer Networks and Internet*’, Addison Wesley, 2000

TE0202	INFORMATION THEORY AND CODING	L	T	P	C
	Prerequisite: <a href="#">MA0201</a>	3	0	0	3

### PURPOSE

The instructional objective of this subject is to introduce to the students the concept of source coding, the various coding techniques that are used for practical purposes. Fundamental concepts of coding theorem and the various types of error control codes and decoding techniques are also introduced.

### INSTRUCTIONAL OBJECTIVES

At the end of this course, the students will be able to understand and apply

1. Several Source Coding Techniques
2. Channel Coding Theorem & Various codes
3. Block Codes
4. Error Control Coding

### SOURCE CODING

9

**Mathematical model for information source:** - Mutual Information – Discrete Entropy-Definition and properties – Joint and conditional entropies – Entropy in the continuous case – Unique decipherability and instantaneous codes – Kraft inequality.

### NOISY CODING

9

Discrete memoryless channel – Classification of channels & channel capacity – Calculation of channel capacity – Decoding schemes – Fano’s inequality – Shannon’s fundamental theorem – Capacity of a band limited Gaussian channel.

### CHANNEL CODING

9

**Channel models:** Binary Symmetric channels – Information capacity theorem – Implication of the information capacity theorem – Information capacity of coloured noise channel – Rate distortion theory – Data compression.

### ERROR CONTROL CODING

9

**Linear block codes:** – Cyclic codes, BCH Codes, RS codes, Golay codes, Burst error correcting codes, Interleaved codes, **Convolutional codes :** Convolutional encoder, code tree, state diagram, trellis diagram – Turbo codes.

### DECODING OF CODES

9

Maximum likelihood decoding of convolutional codes - Sequential decoding of convolutional codes- Applications of Viterbi decoding.

**TOTAL 45**

### TEXT BOOKS

1. Simon Haykin, “Communication Systems“, John Wiley & Sons, Inc, Newyork, 4th Edition, 2006.
2. John G.Proakias, ” *Digital Communication* “Mcgraw Hill,Singapore, 4th Edition,2001.
3. Shu Lin & Daniel J. Costello, “*Error control coding Fundamentals and applications*”, Prentice hall, 1983.

### REFERENCE BOOKS

1. S.P.Eugene Xavier, “ *Statistical Theory of Communication* ”, 1997
2. Hwei P Hsu, ‘*Theory of Analog & Digital Communication*’, Pearson / Prentice Hall, New Jersey.

<b>TE0301</b>	<b>COMMUNICATION SWITCHING TECHNIQUES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">EC0210</a></b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **PURPOSE**

This course gives a clear idea about the Switching techniques and network services.

### **INSTRUCTIONAL OBJECTIVES**

1. To know about the basics of telephone system and data
2. Exposure to traffic and queuing systems theory
3. To learn about the switching networks and control of switching systems.

### **EVOLUTION OF TELECOMMUNICATIONS**

**9**

Telephone system-**Basics of switching systems:** Functions of switching systems- step by step and crossbar system –Network structures –Network services- regulations- standards

### **SIGNALLING**

**9**

**Signals for telephone system:** Customer line signaling – FDM carrier system- PCM signaling –Common Channel signaling – signaling system No. 7.

### **TRAFFIC ANALYSIS**

**9**

**Traffic Concepts:** Erlang- congestion- traffic measurement- lost call system- queuing system – grade of service. **Network organization:** Network management- routing plan- Numbering plan- Charging plan

### **SWITCHING NETWORKS**

**9**

**Types of Networks:** Single stage and multistage networks- time division switching- TST switching–STS-switching

### **CONTROL OF SWITCHING SYSTEMS**

**9**

**Practical Applications:** Call processing functions- Common control switching systems- Stored programmed control - ISDN- Broadband ISDN

**TOTAL 45**

### **TEXT BOOKS**

1. J.E.Flood, “*Telecommunication Switching traffic and Network*”, Pearson Education Limited, 2002
2. Thiagarajan Viswanathan, “*Telecommunication Networks and Systems*”, Prentice Hall of India Pvt Limited,2000

### **REFERENCE BOOKS**

1. Freeman C.Roger L., “*Fundamentals of Telecommunication*”, Pearson, 2000.
2. Marincole, “*Introduction to telecommunication*”, Pearson Education Limited,2002

<b>EC0030</b>	<b>BIO MEDICAL INSTRUMENTATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">EC0301</a></b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### PURPOSE

The purpose of this course is to introduce the students to the basics of Electro-physiology and its measurements, non-electrical parameters related to various systems of human body and their measurements, Electrodes and Transducers used in bio signal acquisition. Also student will get to know about various Medical Imaging techniques used for diagnosis along with other diagnostic and therapeutic devices.

### INSTRUCTIONAL OBJECTIVES

The students will be able

1. To understand the Origin of Bioelectric potential and their measurements using appropriate electrodes and Transducers.
2. To understand the Electro-physiology of various systems and recording of the bioelectric signals
3. To understand the working principles of various Imaging techniques
4. To understand the design aspects of various Assist and Therapeutic Devices

### BIOELECTRIC POTENTIALS, ELECTRODES AND TRANSDUCERS 9

Sources of Bioelectric potentials - Resting and Action potential - Propagation of Action potential  
Electrode theory- Equivalent Circuit- Types of electrodes.

**Physiological Transducers:** Inductive, Capacitive, Piezoelectric transducers and Thermistors. Biochemical Transducers- pH, pCO<sub>2</sub> and pO<sub>2</sub> electrodes.

### ELECTROPHYSIOLOGICAL MEASUREMENTS 9

Electrophysiology of Heart, Nervous System and Muscle Activity

**Bio-signals:** ECG - EEG, Evoked potential – EMG- ERG- Electrodes and Lead System, Typical waveforms and Signal characteristics

**Signal Conditioning circuits:** Design of low Noise Medical Amplifier, Isolation Amplifier, Protection Circuits and Electrical Safety.

### NON-ELECTRICAL PARAMETER MEASUREMENTS 9

Measurement of Blood Pressure, Blood Flow, Plethysmography, Cardiac Output, Heart Sounds- Lung Volumes and their measurements- Auto analyzer – Blood cell counters, Oxygen saturation of Blood

### MEDICAL IMAGING TECHNIQUES 9

X-ray machine – Computer Tomography – Angiography – Ultrasonography – Magnetic Resonance Imaging System – Nuclear Imaging Techniques – Thermography – Lasers in Medicine – Endoscopy

### TELEMETRY, ASSIST AND THERAPEUTIC DEVICES 9

Bio telemetry – Elements and Design of Bio telemetry system.

**Assist and Therapeutic devices:** Cardiac Pacemakers – Defibrillators – Artificial Heart Valves – Artificial Heart Lung machine – Artificial Kidney – Nerve and Muscle Stimulators – Respiratory therapy equipment – Patient Monitoring System

**TOTAL 45**

### TEXT BOOKS

1. Leslie Cromwell, Fred J. Weibell and Erich A. Pfeifer, “*Biomedical Instrumentation and Measurements*”, 2<sup>nd</sup> Edition, Pearson Education, 2006
2. M. Arumugam, “*Biomedical Instrumentation*”, 2<sup>nd</sup> edition, Anuradha Agencies Publications, 1997

### REFERENCE BOOKS

1. R.S. Khandpur, “*Handbook of Biomedical Instrumentation*”, 2<sup>nd</sup> edition, Tata McGraw Hill, 2006
2. John G. Webster, “*Medical Instrumentation Application and Design*”, 3<sup>rd</sup> edition, Wiley India, 2007.

<b>EC0031</b>	<b>EMBEDDED SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite:</b> <a href="#">EC0205</a> , <a href="#">EC0204</a>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### PURPOSE

The purpose of this course is to expose the concepts of embedded system principles – Operating System – RTOS – Software Development Tools.

### INSTRUCTIONAL OBJECTIVES

At the end of the course, student will know about

1. Embedded Hardware
2. Real-Time Operating System
3. Software Architecture
4. Development Tools and Debugging Techniques.
5. Controller Area Network

### INTRODUCTION: REVIEW OF EMBEDDED HARDWARE

**9**

**Hardware Fundamentals:** Terminology, Gates, Timing Diagram, Microprocessors, Buses - Direct Memory Access- Interrupts- Other Common Parts- Built-Ins on the Microprocessor- Conventions Used on Schematics - **Interrupts:** Microprocessor Architecture – Interrupts Basics- Shared-Data Problem- Interrupt Latency. Examples of Embedded System.

### REAL TIME OPERATING SYSTEMS

**9**

**Introduction:** Tasks and Task States, Task and Data, Semaphores and Shared Data - **More Operating System Services:** Message Queues- Mailboxes and Pipes – Timer Functions – Events – Memory Management – Interrupt Routines in an RTOS environment. Basic Design using a Real –Time Operating System.

### SOFTWARE ARCHITECTURES AND DEVELOPMENT TOOL

**9**

**Software Architectures:** Round-Robin, Round-Robin with Interrupts, Function-Queue-Scheduling -Real-Time Operating System Architecture. - **Development Tools:** Host and Target Machines, Linker/Locators for Embedded Software. Debugging Techniques.

### CAN NETWORK OVERVIEW

**9**

Controller Area Network – Underlying Technology CAN Overview – Selecting a CAN Controller – CAN development tools.

### CAN NETWORK IMPLEMENTATION

**9**

Implementing CAN open Communication layout and requirements – Comparison of implementation methods – Micro CAN open – CAN open source code – Conformance test – Entire design life cycle.

**TOTAL 45**

### TEXT BOOKS

1. David E Simon, “*An Embedded Software Primer*”, Pearson Education Asia, 2001.
2. Glaf P.Feiffer, Andrew Ayre and Christian Keyold, “*Embedded networking with CAN and CAN open*”, Embedded System Academy 2005.

### REFERENCE BOOKS

1. Burns, Alan and Wellings, Andy, “*Real-Time Systems and Programming Languages*”, Harlow: Addison-Wesley-Longman
2. Raymond J.A.Bhur and Donald L.Bialek, “*An Introduction to Real Time Systems: Design to Networking with C/C++*”, Prentice Hall Inc, NewJersey.

<b>EC0032</b>	<b>INTRODUCTION TO MEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">EC0204</a></b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PURPOSE**

This course is offered to students to gain basic knowledge on overview of MEMS (Micro electro Mechanical System) and various fabrication techniques. This enables them to design, analysis, fabrication and testing the MEMS based components.

**INSTRUCTIONAL OBJECTIVES**

1. Introduction to MEMS and micro fabrication
2. To study the essential material properties
3. To study various sensing and transduction technique
4. To know various fabrication and machining process of MEMS
5. To know about the polymer and optical MEMS

**INTRODUCTION TO MEMS AND MICROFABRICATION**

**9**

History of MEMS Development, Characteristics of MEMS-miniaturization - micro electronics integration - Mass fabrication with precision.

Micro fabrication - microelectronics fabrication process- silicon based MEMS processes- new material and fabrication processing- points of consideration for processing.

**ELECTRICAL AND MECHANICAL PROPERTIES OF MEMS MATERIALS**

**9**

Conductivity of semiconductors, crystal plane and orientation, stress and strain – definition – relationship between tensile stress and strain- mechanical properties of silicon and thin films, Flexural beam bending analysis under single loading condition- Types of beam- deflection of beam-longitudinal strain under pure bending-spring constant, torsional deflection, intrinsic stress, resonance and quality factor.

**SENSING AND ACTUATION**

**9**

Electrostatic sensing and actuation-parallel plate capacitor – Application-Inertial, pressure and tactile sensor-parallel plate actuator- comb drive.

Thermal sensing and Actuators-thermal sensors-Actuators- Applications- Inertial, Flow and Infrared sensors.

Piezoresistive sensors- piezoresistive sensor material- stress in flexural cantilever and membrane- Application-Inertial, pressure, flow and tactile sensor.

Piezoelectric sensing and actuation- piezoelectric material properties-quartz-PZT-PVDF –ZnO- Application-Inertial, Acoustic, tactile, flow-surface elastic waves

Magnetic actuation- Micro magnetic actuation principle- deposition of magnetic materials-Design and fabrication of magnetic coil.

**BULK AND SURFACE MICROMACHINING**

**9**

Anisotropic wet etching, Dry etching of silicon, Deep reactive ion etching (DRIE), Isotropic wet etching, Basic surface micromachining process- structural and sacrificial material, stiction and antistiction methods, Foundry process.

**POLYMER AND OPTICAL MEMS**

**9**

Polymers in MEMS- polyimide-SU-8 liquid crystal polymer(LCP)-PDMS-PMMA-Parylene- Fluorocarbon, Application-Acceleration, pressure, flow and tactile sensors. Optical MEMS-passive MEMS optical components-lenses-mirrors-Actuation for active optical MEMS.

**TOTAL 45**

**TEXT BOOKS**

1. Chang Liu, “*Foundations of MEMS*”, Pearson International Edition, 2006.

**REFERENCE BOOKS**

1. Gaberiel M.Rebiz, “*RF MEMS Theory,Design and Technology*”, John Wiley & Sons,2003
2. Charles P.Poole, Frank J.Owens, “*Introduction to nanotechnology*” John Wiley & sons, 2003.
3. Julian W.Gardner, Vijay K Varadhan, “*Microsensors, MEMS and Smart devices*”, John Wiley & sons, 2001.

<b>EC0033</b>	<b>ASIC DESIGN</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite:</b> <a href="#">EC0306</a> , <a href="#">EC0204</a>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **PURPOSE**

The purpose of this course is to introduce the students the basics of designing and using ASIC's. The operation of tools used in the design is also explained.

### **INSTRUCTIONAL OBJECTIVES**

1. To give basic knowledge of ASIC internals.
2. To impart knowledge on ASIC types and tools used in the design.
3. To give basic understanding of tools used.

### **INTRODUCTION TO ASICs**

**9**

Introduction to ASICs – CMOS logic – ASIC library design.

### **PROGRAMMABLE ASICs**

**9**

Programmable ASICs - Logic cells – I/O cells – Interconnects – Low level design entry: Schematic entry.

### **SIMULATION AND SYNTHESIS**

**9**

Logic synthesis: A comparator MUX, Inside a logic synthesizer, VHDL and logic synthesis, FSM synthesis, memory synthesis - Simulation: Types of simulation – logic systems – how logic simulation works.

### **ASIC TESTING**

**9**

Boundary scan test – Faults – Fault simulation – Automatic test pattern generation – Built in self test.

### **ASIC CONSTURCTION**

**9**

System partitioning – power dissipation – partitioning methods – floor planning and placement: Floor planning, placement – Routing: Global routing, detailed routing, special routing.

**TOTAL 45**

### **TEXT BOOKS**

1. M.J.S.Smith, “*Application Specific Integrated Circuits*”, Addison Wesley Longman Inc. 1996. (Pearson Education Reprint 2006).
2. M. Sarafzadeh, C.K. Wong, “*An Introduction to VLSI Physical Design*”, McGraw Hill International Edition, 1995.

### **REFERENCE BOOKS**

1. Wolf Wayne, “*FPGA based system design*”, Pearson Education, 2005.
2. Design manuals of Altera, Xilinx and Actel
3. Jan M. Rabaey. Anantha Chandrakasan. Borivoje Nikolic, “*Digital Integrated Circuits*”, Second Edition

<b>EC0034</b>	<b>INTRODUCTION TO NANOTECHNOLOGY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PURPOSE**

To introduce to the students, the various opportunities in the emerging field of nano electronics and nano technologies.

**INSTRUCTIONAL OBJECTIVES**

The objective of this course is to make students familiar with the important concepts applicable to small electronic devices, their fabrication, characterization and application.

**LIMITATIONS OF CMOS**

**9**

Fundamentals of MOSFET devices - Scaling of CMOS – Limitations – Alternative concepts in materials – **Structures of MOS devices:** SOI MOSFET, FINFETS, Dual Gate MOSFET, Ferro electric FETs.

**MICRO AND NANO FABRICATION**

**9**

Optical Lithography – Electron beam Lithography – Atomic Lithography – Molecular beam epitaxy - Nano lithography.

**CHARACTERIZATION EQUIPMENTS**

**9**

Principles of Electron Microscopes – Scanning Electron Microscope – Transmission Electron Microscope - Atomic Force Microscope – Scanning Tunneling Microscope.

**NANO DEVICES – I**

**9**

Resonant tunneling diodes – Single electron devices – Josephson junction – Single Flux Quantum logic – Molecular electronics.

**NANO DEVICES – II**

**9**

**Quantum computing:** principles – Qubits – Carbon nanotubes (CNT) : Characteristics, CNTFET, Application of CNT - Spintronics: Principle, Spin valves, Magnetic Tunnel Junctions, SpinFETs, MRAM.

**TOTAL 45**

**TEXT BOOK**

1. Rainer Waser (Ed.), “*Nano electronics and information technology*”, Wiley- VCH., Edition II, 2005.

**REFERENCE BOOKS**

1. Thomas Heinzel , “*A Microscopic Electronics in Solid State Nanostructure*” , Wiley- VCH.
2. Mick Wilson, Kamali Kannangara, Geoff Smith , Michelle Simmons, Burkhard Raguse “*Nanotechnology – (Basic Science and Emerging Technologies)*”, Overseas Press.
3. Mark Ratner, Daniel Ratner , “*Nanotechnology : A Gentle introduction to the Next Big idea*”, Pearson education., 2003.

<b>EC0035</b>	<b>ELECTROMAGNETIC INTERFERENCE AND ELECTROMAGNETIC COMPATIBILITY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PURPOSE**

The purpose of this course is to expose the students to the basics and fundamentals of Electromagnetic Interference and Compatibility in System Design.

**INSTRUCTIONAL OBJECTIVES**

At the end of the course, the students will know about

1. EMI Environment
2. EMI Coupling and Measurements
3. EMI control techniques and standards

**EMI ENVIRONMENT**

**9**

Concepts of EMI and EMC and Definitions, Sources of EMI – Celestial Electromagnetic noise- Lightning Discharge-Electrostatic Discharge- Electromagnetic Pulse-Electromagnetic emissions-Noise from relays and Switches-Nonlinearities in Circuits

**EMI COUPLING PRINCIPLES**

**9**

Capacitive coupling - Inductive coupling- Common Impedance Ground Coupling- Ground Loop coupling- Transients in power supply lines- Radiation coupling-Conduction coupling-Common – mode and Differential-mode interferences- Conducted EM noise on power supply lines

**EMI MEASUREMENTS**

**9**

Open Area test site measurements-Measurement precautions – Open -Area test site- Anechoic Chamber-TEM-Reverberating TEM-GTEM cell – Comparisons

**EMI CONTROL TECHNIQUES**

**9**

EMC Technology- Grounding-Shielding-Electrical Bonding-Power line filter-CM filter – DM filter- EMI suppression Cables- EMC Connectors -Isolation transformer

**EMI / EMC STANDARDS**

**9**

Introduction- Standards for EMI/EMC- MIL-STD-461/462-IEEE/ANSI standard-CISPR/IEC standard- FCC regulations-British standards-VDE standards-Euro norms-Performance standards-some comparisons.

**TOTAL 45**

**TEXT BOOKS**

1. Prasad Kodali – “*Engineering Electromagnetic Compatibility –Principles, Measurements, and Technologies*”, IEEE press.
2. Henry W. Ott – “*Noise Reduction Techniques in Electronic Systems*”- 2<sup>nd</sup> Edition-John Wiley & Sons.

**REFERENCE BOOKS**

1. Bernharo Q’Keiser, ‘*Principles of Electromagnetic Compatibility*’, Artech house, 3<sup>rd</sup> edition, 1986

EC0051	DATA STRUCTURES AND ALGORITHMS	L	T	P	C
	Prerequisite: Nil	3	0	0	3

### PURPOSE

The purpose of this course is to impart knowledge on various data structure concepts and algorithm principles

### INSTRUCTIONAL OBJECTIVES

At the end of the course, student should be able to understand

1. Several data structure concepts like stacks, queues, linked list, trees and graphs
2. Various sorting methods
3. Algorithm principles like Dynamic programming, Divide & conquer and Back tracking

### STACKS, QUEUES & LINKED LIST

9

**Stacks:** Array representation of stacks – Arithmetic expressions- Quick sort using stack- Towers of Hanoi problem- **Queues:** : Array representation of Queues- Deque, Priority Queue, Circular Queue – **List:** Representation of Linked List- Traversing a Linked List- Insertion- Deletion- Doubly Linked List- Circular Linked List

### TREES & GRAPHS

9

Binary tree- Representation – Traversing – Threaded Binary tree- Binary Search tree- Insertion deletion into a binary search tree- Heap sort- Huffman’s Algorithm- General Trees - **Graph-** Representation of Graph- Shortest path – Operation on Graphs- Traversing a Graph

### SORTING

9

Sorting - Insertion sort – Selection sort- Bubble sort - Quick sort - Merge sort - Heap sort - Sorting on several keys - External sorting.

### ANALYSIS OF ALGORITHM; DIVIDE & CONQUER

9

Introduction- Algorithms and Complexity – Asymptotic Notation- Orders-Analyzing Control Structures- Average Case Analysis – Worst Case Analysis- Binary Search – Finding Maximum and Minimum – Merge Sort – Quick Sort Greedy Method – General Method – Knapsack Problem – Minimum Spanning Tree Algorithm – Single Source Shortest Path Algorithm.

### DYNAMIC PROGRAMMING & BACKTRACKING

9

General Method–Multistage Graph – All Pairs Shortest Path Algorithm – 0/1 Knapsack Problem – Traveling Salesman Problem - Basic search techniques and traversal techniques –bi-connected components – Depth First Search – Breadth First Search.  
8-Queens Problem- Sum of Subsets – Graph Coloring- Hamiltonian Cycle-Knapsack Problem – Branch and Bound Method – 0/1 Knapsack Problems – Traveling Salesman Problem

**TOTAL 45**

### TEXT BOOKS

1. Aho, Hopcroft, Ullman, “*Data Structures and algorithms*”, Pearson Education, 1983
2. E.Horowitz, Sahni & Sanguthevar Rajasekaran, “*Fundamentals of Computer Algorithms*”, Galgotia Publications, 1985.

### REFERENCE BOOKS

1. Seymour Lipschutz, “*Theory and Problems of Data Structures*”, 1986.
2. S.E.Goodman , S.T.Hedetniemi , “*Introduction to the Design and Analysis of Algorithms*”, McGraw Hill.
3. Sara Baase , “*Computer Algorithms - Introduction to design and analysis*”, Addison wesley , 1991

<b>EC0052</b>	<b>DIGITAL IMAGE PROCESSING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: <a href="#">EC0212</a></b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### PURPOSE

The purpose of this course is to introduce the basic concept and methodologies for digital image processing.

### OBJECTIVES

The students undergoing this course will be able to know

1. The fundamental of image processing.
2. Various transforms used in image processing.
3. About the various techniques of image enhancement, reconstruction, compression and segmentation.

### DIGITAL IMAGE FUNDAMENTALS

9

Introduction-Elements of Digital Image Processing system- Visual perception and properties of human eye-image representation-A simple image model-Some basic relationship between pixels-Image geometry.

### IMAGE TRANSFORMS

9

Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform–FFT– Separable Image Transforms -Walsh – Hadamard – Discrete Cosine Transform, Haar, –KL transforms.

### IMAGE ENHANCEMENT

9

Image Enhancement b-Histogram Modeling-equalization and modification. Image smoothing-Image Sharpening-Spatial Filtering-Homomorphic Filtering for image enhancement.

### IMAGE RESTORATION

9

Model of Image Degradation/restoration process –Inverse filtering -Least mean square(wiener) filtering – Constrained least mean square restoration – Singular value decomposition-Recursive filtering.

### IMAGE COMPRESSION AND SEGMENTATION

9

Fundamentals -Image compression models- **Lossless compression:** Variable length coding-LZW coding. **Lossy Compression:** Transform coding-Wavelet coding.

**Image Segmentation:** Detection of discontinuities-Edge linking and boundary detection-thresholding-Region oriented segmentation and Texture.

**TOTAL 45**

### TEXT BOOKS

1. Rafael C Gonzalez, Richard E Woods, “*Digital Image Processing*”- 2nd Edition, Pearson Education 2003.
2. A.K. Jain, “*Fundamentals of Digital Image Processing*”. Pearson education.

### REFERENCES

1. William K Pratt, “*Digital Image Processing*”, John Willey (2001).
2. Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, “*Image Processing Analysis and Machine Vision*” – Thompson learning, 1999.
3. S. Chanda, Dutta Magumdar – “*Digital Image Processing and Applications*”, Prentice Hall of India, 2000.

<b>EC0053</b>	<b>OBJECT ORIENTED ANALYSIS AND DESIGN</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **PURPOSE**

This course separates and makes explicit the decisions that make up an object oriented analysis and design. We show how to use the UML notations most effectively both to discuss designs with colleagues, and in documents.

### **INSTRUCTIONAL OBJECTIVES**

To provide the students with sufficient knowledge for

1. Understanding Object Basics, Classes and Objects, Inheritance
2. Gaining enough competence in object-oriented analysis and design (OOAD) to tackle a complete object oriented project
3. Using UML, a common language for requirements, designs, and component interfaces
4. Using different approaches for identifying classes, design process

### **OBJECT ORIENTED DESIGN FUNDAMENTALS 9**

The object model - Classes and Objects - Complexity - Classification - Notation - Process - Pragmatics - Binary and entity relationship - Object types - Object state - OOSD life cycle.

### **OBJECT ORIENTED ANALYSIS 9**

Overview of object oriented analysis - Shaler/Mellor, Coad/Yourdon, Rumbaugh, Booch - UML – Use case - Conceptual model - Behaviour - Class - Analysis patterns - Overview - Diagrams – Aggregation

### **OBJECT ORIENTED DESIGN METHODS 9**

UML - Diagrams - Collaboration - Sequence - Class - Design patterns and frameworks - Comparison with other design methods

### **MANAGING OBJECT ORIENTED DEVELOPMENT 9**

Managing analysis and design - Evaluation testing - Coding - Maintenance – Metrics

### **CASE STUDIES IN OBJECT ORIENTED DEVELOPMENT 9**

Design of foundation class libraries - Object Oriented databases - Client/Server computing - Middleware

**TOTAL 45**

### **TEXT BOOKS**

1. “*The Unified Modeling Language User Guide*”, Grady Booch, James Rumbaugh, Ivar Jacobson, Addison - Wesley Long man, 1999.
2. Ali Bahrami, “*Object Oriented System Development*”, McGraw Hill International Edition, 1999.

### **REFERENCE BOOKS**

1. Craig Larman, , “*Applying UML and patterns*” , Addison Wesley, 2000.
2. Fowler, “*Analysis Patterns*”, Addison Wesley, 1996.
3. Erich Gamma, “*Design Patterns*”, Addison Wesley, 1994

<b>EC0054</b>	<b>NEURAL NETWORK AND FUZZY LOGIC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **PURPOSE**

This course provides a way to study the Artificial Neural Networks and Fuzzy Logic concepts

### **INSTRUCTIONAL OBJECTIVES**

1. To learn the various architectures of building an ANN and its applications
2. Advanced methods of representing information in ANN like self organizing networks , associative and competitive learning
3. Fundamentals of Crisp sets , Fuzzy sets and Fuzzy Relations

### **INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS**

**9**

Neuro-physiology - General Processing Element - ADALINE - LMS learning rule – MADALINE – XOR Problem – MLP - Back Propagation Network - updation of output and hidden layer weights - application of BPN –.

### **ASSOCIATIVE MEMORY & CPN**

**9**

Associative memory - Bi-directional Associative Memory – Hopfield memory - traveling sales man problem Annealing, Boltzmann machine - learning – application - Counter Propagation network –architecture – training – Applications.

### **SELF ORGANIZING MAP & ART**

**9**

Self-organizing map - learning algorithm - feature map classifier – applications - architecture of Adaptive Resonance Theory - pattern matching in ART network.

### **CRISP SETS AND FUZZY SETS**

**9**

Introduction – crisp sets an overview – the notion of fuzzy sets –Basic concepts of fuzzy sets – classical logic an overview – Fuzzy logic- Operations on fuzzy sets - fuzzy complement – fuzzy union – fuzzy intersection – combinations of operations – general aggregation operations

### **FUZZY RELATIONS**

**9**

Crisp and fuzzy relations – binary relations – binary relations on a single set– equivalence and similarity relations – Compatibility or tolerance relations– orderings – morphisms-fuzzy relation equations.

**TOTAL 45**

### **TEXT BOOKS**

1. Freeman J.A. and Skapura B.M., “*Neural Networks, Algorithms Applications and Programming Techniques*”, Addison-Wesely, 1990.
2. George J Klir and Tina A Folger, ” *Fuzzy sets, uncertainty and information*”, Prentice Hall of India

### **REFERENCE BOOKS**

1. Laurene Fausett, “*Fundamentals of Neural Networks: Architecture, Algorithms and Applications*”, Pearson Education, 1994.
2. H.J. Zimmerman, “*Fuzzy set theory and its Applications*”, Allied Publishers Ltd.

<b>EC0055</b>	<b>NETWORK SECURITY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PURPOSE**

To study various aspects of Network Security, Attacks, Services and Mechanisms.

**INSTRUCTIONAL OBJECTIVES**

1. To deal with various Encryption, Authentication and Digital Signature Algorithms.
2. To deal with different general purpose and application specific security Protocols and Techniques.

**INTRODUCTION**

Security Services, Mechanisms and attacks – Network Security Model-Classical Encryption Techniques-Steganography – Data Encryption Standard (DES)

**9**

**ADVANCED BLOCK CIPHERS**

Block cipher modes operation-IDEA, BlowFish, RC5, CAST-128-Characteristics of advanced symmetric Block ciphers-Key Distribution.

**9**

**PUBLIC KEY CRYPTOSYSTEMS & MESSAGE AUTHENTICATION**

Principle-RSA algorithm-Diffie Hellmen Key Exchange-Message Authentication codes-MAC-HASH function-Principle of MD5, SHA-1 and HMAC algorithms-Digital Signature algorithm

**9**

**NETWORK SECURITY**

Kerbros-X.509 Public key certificate format-PGP-IPSec-SSL-SET

**9**

**SYSTEM SECURITY**

Intrusion Detection>Password management-Malicious software-Viruses and countermeasures-Firewall Types and Configurations

**9**

**TOTAL 45**

**TEXT BOOKS**

1. William Stallings, “*Cryptography and Network Security*”, 3<sup>rd</sup> Edition, Pearson Education, New Delhi, 2003.

**REFERENCE BOOKS**

1. Charlie Kaufman, Radio Perlman and Mike Speciner, “*Network Security*”, 2<sup>nd</sup> Edition, Prentice Hall of India, New Delhi, 2003.
2. Othmar Kvas, “*Internet Security*”, International Thomson Publishing Inc.1997

<b>EC0056</b>	<b>SCRIPTING LANGUAGES AND WEB TECHNOLOGY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Prerequisite: Nil</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PURPOSE**

Uses of web sites and portals have become common for knowledge sharing and business. The course focuses on the fundamentals of CGI, Networking, Web Applications

**INSTRUCTIONAL OBJECTIVES**

This course introduces the students to

1. Basic web concept and Internet protocols.
2. CGI Concepts & CGI Programming
3. Networking principles & RMI
4. Study of DHTML, XML
5. Study of On-Line web application & Internet Concepts

**INTRODUCTION**

**9**

Internet Principles - Basic Web Concepts - Client/Server model - Retrieving data from Internet - HTML and Scripting Languages - Standard Generalized Markup Language - Next Generation Internet - Protocols and applications.

**COMMON GATEWAY INTERFACE PROGRAMMING**

**9**

HTML forms - CGI Concepts - HTML tags Emulation - Server-Browser communication - E-mail generation - CGI Client side Applets - CGI Server Side Applets - Authorization and security.

**SOCKET PROGRAMMING**

**9**

Streaming - Networking principles - sockets - protocol handlers - content handlers - multicasting – Remote Method Invocation - activation - Serialization - Marshal streams.

**SERVER SIDE PROGRAMMING**

**9**

Dynamic web content - cascading style sheets - XML - Structuring Data - VRML - Server side includes - communication - Active and Java Server Pages - Firewalls - proxy servers

**ON-LINE APPLICATIONS**

**9**

XML with HTML- Simple applications - On-line databases - monitoring user events - plug-ins - database connectivity - Internet Information Systems - EDI application in business - Internet commerce - Customization of Internet commerce.

**TOTAL 45**

**TEXT BOOKS**

1. Jason Hunter, William Crawford, “*Java Servlet Programming*”, O’ Reilly Publications, 1999.
2. Ravi Kalakota and Andrew B Whinston, “*Frontiers of Electronic Commerce*”, Addison Wesley, 1996.
3. Eric Ladd, Jim O’ Donnel, “*Using HTML 4, XML and Java*”, Prentice Hall of India, QUE, 1999.

**REFERENCE BOOKS**

1. Jeffy Dwight, Michael Erwin and Robert Niles, “*Using CGI*”, Prentice Hall of India – QUE, 1999.
2. Scot Johnson, Keith Ballinger, Davis Chapman, “*Using Active server Pages*”, Prentice Hall of India, 1999.

MA0452	OPERATIONS RESEARCH	L	T	P	C
	Prerequisite: Nil	3	0	0	3

### PURPOSE

To introduce managerial skill for budding engineers

### INSTRUCTIONAL OBJECTIVES

1. To equip the students with scheduling and network analysis
2. To make the students aware of replacement policy and game theory
3. To introduce the topic of inventory control
4. To make students aware of the problems of linear programming

### RESOURCE SCHEDULING AND NETWORK ANALYSIS

9

Problem of sequencing – Sequencing n jobs through 2 machines and 3 machines, 2 jobs through m machines. PERT and CPM –Critical path calculation – Probability and cost consideration.

### REPLACEMENT AND GAME THEORY

9

Replacement Models – Replacement of items that deteriorate with time – Equipment that fails suddenly. Two person zero sum games – Pure strategies and saddle point – Mixed strategies – 2 x n and m x 2 games – Method of dominance – Numerical and graphical solutions.

### INVENTORY CONTROL

9

Inventory models – Deterministic models – Economic ordering quantity, Reorder level, optimum cost – Instantaneous and Non-instantaneous receipt of goods with or without shortages.

### LINEAR PROGRAMMING

9

Introduction to Linear Programming – Formulation of the problem – Graphical method – Simplex method – Artificial variable techniques - Primal-dual problems – Dual Simplex method.

### ADVANCED LINEAR PROGRAMMING PROBLEMS

9

Integer programming problem - Cutting plane algorithm – Transportation models - Vogel’s Approximation method – MODI method – Unbalanced transportation problem – Degeneracy in transportation models – Assignment models – Traveling salesman problem-Dynamic Programming problem.

**TOTAL 45**

### TEXT BOOK

1. Kanti Swarup, Gupta P.K., and Man Mohan, “*Operations Research*” Sultan Chand & Sons, 1994.

### REFERENCE BOOKS

1. Gupta P.K., and Hira D.S., “*Operations Research*”, S.Chand & Sons, 2000.
2. Sundaresan.V, Ganapathy Subramanian.K.S. and Ganesan.K, “*Resource Management Techniques*”, A.R. Publications,2002
3. Taha H.A., “*Operations Research – An introduction*”, 7<sup>th</sup> edition, PHI, 2002.
4. Sharma S.D., “*Operations Research*”, Kedarnath Ramnath & Co., Meerut,1994.
5. Billy B. Gillet, “*Introduction to Operations Research*” – TMH Publishing Co.
6. Gupta P.K., and Manmohan, “*Operations Research and Quantitative Analysis*” – S.Chand & Co., New Delhi.
7. Hamblin S., and Stevens Jr., “*Operations Research*”, Mc Graw Hill Co.
8. Taha H.A., “*Operations Research – An introduction*”, 8<sup>th</sup> edition, Taha H.A., “*Operations Research – An introduction*”, 7<sup>th</sup> edition, PHI, 2002.