**APPENDIX - AQ**

# MADURAI KAMARAJ UNIVERSITY
*(University with Potential for Excellence)*

## B.Sc. Electronics and Communication

## CHOICE BASED CREDIT SYSTEM

## REVISED SYLLABUS
(With effect from the academic year 2018-2019)

## 1. Introduction of the Programme

The Bachelor of Science in Electronics and Communications a full-time programme spread over 3 years and is divided into 6 semesters. The programme of study shall consist of 10core papers which are compulsory, 8allied papers, 6 skilled elective papers, 2 Non Major Elective papers and 9practicals. Each of these carries 100 marks. It has been developed to provide students the opportunity to be trained in recent development in Electronics and Communication. The course is designed to impart the students a vigorous training in Electronics and Communicationboth in theory and experiments. Our approach is a comprehensive one. It is believed that teachingstudents both how to ask and address questions.Thisprogramme has been designed to expose students' knowledge in Electronics and Communication to contemporary national and international problems. At the end of the course, students are expected to have state-of-the-art quantitative skills valued both in academia and in the corporate world. During the course time, one gets an in-depth knowledge about core subjects like Linear Integrated Circuits, Satellite communication, Mobile communication and Equipment servicing.

## 2. Eligibility for Admission

Candidates should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Examinations, Government of Tamil Nadu or any other Examination accepted by the Syndicate as equivalent thereto, with Mathematics, Physics and Chemistry as compulsory subjects.

    **2.1 Duration of the Course** : **3 Years**
    **2.2. Medium of Instruction** : **English**

## 3. Objectives of the Programme
- To offer knowledge, understanding and skills.
- To offer the knowledge to servicing the Electronics equipments
- To improve the employability of the studentsfocusing the needs of worlds various MNC's

**4. Outcome of the Programme**
- It serves as a basis to build a strong academic profile for further studies.
- On successful completion of this course, one can apply for the PG courses related to Electronics, Electronics communication and Computer Science.
- The degree holders can optemployment in various MNC's and industries.

**5. Core Subject Papers**

Core Subject papers shall consist of 12 papers as listed below.
1. Electronic Devices
2. Electronic Circuits
3. Digistal Electronics
4. Antennas and Wave propagation
5. Analog and Digital communication system
6. Microprocessor 8085 and interfacing
7. Microcontroller 8051
8. PC Hardware and Interfacing
9. Mobile communication
10. Fiber Optic Communication

**6. Subject Elective Papers**

**Allied Papers:** 8 papers as listed below
1. Applied Physics
2. Basic Mathematics
3. Programming in C and C++
4. Linear Integrated Circuits
5. Numerical Methods
6. Medical Electronics
7. Measurement Systems
8. Computer Networks

**Skilled Electives**: 6 papers as listed below
1. Fundamentals of Electricity
2. Electronic Measurement
3. Satellite Communication
4. Cellular Phone
5. Television System
6. Electronic Equipment and Servicing

**7. Non Major Electives**
1. Troubleshooting and maintenance of Home appliances
2. Fundamentals of Computing

**8. Unitization**

Each subject Paper shall consist of five units. One unit (preferably the $5^{th}$ Unit) will be handled by the students as a part of peer team teaching / learning process.

## 9. Pattern of Semester Examination

Three-year B.Sc., Electronics and Communication degree shall be having examinations of 10core papers which are compulsory, 8allied papers, 6 skilled elective papers, 2 Non Major Elective papers and 9 practical to be conducted in six semesters. Each semester shall consist of five examinations for five subjects. Odd semester examinations shall be conducted in the month of November. The even semester examinations shall be held in the month of April. Each paper shall carry 100 marks of which 25 marks for internal assessment and 75 marks for external examinations for all the theory papers. For practical's, 40 marks for internal, 60 marks for external. Practical examination will be conducted at the end of each year.

## 10. Scheme of Internal Assessment

The components of Internal Assessment marks shall be as follows, for theory.

| | | |
|---|---|---|
| Test | : | 10 Marks (Average of the best two tests) |
| Assignment | : | 5 Marks |
| Seminar/ Group Discussion | : | 5 Marks |
| Peer- team teaching | : | 5 Marks |
| **Total** | **:** | **25 Marks** |

For Practical, 40 marks for internal.

## 11. External Examinations

External examination for each Theory paper shall be conducted for 75 marks.
Section A:  10 Multiple choice questions (One question from each unit) (10 x 1 = 10 marks)
Section B:  5 Either / Or type questions (One question from Each Unit)     (5 x 7 =35 marks)
Section C:  3 Out of 5 questions.                                        (3 x 10=30 marks)
                                                          **Total :      75 Marks.**

For Practical's, 60 marks for external. Practical examination will be conducted at the end of year.

## 12. Question paper pattern

Internal Examination of each paper shall be for 10 marks having the following question pattern.

| | | | |
|---|---|---|---|
| Section A | : | 6 Objective type questions | (6 x 1=6 marks) |
| Section B | : | 2 questions (either or type) | (2 x 7=14 marks) |
| Section C | : | One out of 2 questions | (1 x 10=10 marks) |
| | | **Total  :  30 marks which shall be converted into 10 marks.** | |

External examination of each paper shall be for 75 marks having the following question paper pattern, for theory papers.

Section A: 10 Objective type questions (2 questions from Each unit) (10 x 1=10 marks)

Section B: 5 questions, either or type (one question from Each unit) (5 x 7=35 marks)

Section C: 3 out of 5 questions (one question from Each unit) (3 x10=30 marks)

**Total: 75 marks**

## 13. Scheme of Evaluation

Students shall be evaluated on the basis of internal tests, seminars, and assignments, peer-teaching and external examinations. Question paper setters shall be requested to prepare scheme of valuation for all the papers.

## 14. Passing Minimum

| | | |
|---|---|---|
| Total Passing Minimum | : | 40 Marks out of 100 Marks |
| Internal Assessment | : | No minimum pass mark out of 25 Marks |
| External Assessment | : | 27 Marks out of 75 Marks |

### 14.1. Classification

| Sl. No | Range of CCPA | Class |
|---|---|---|
| 1 | 40 & above but below 50 | III |
| 2 | 50 & above but below 60 | II |
| 3 | 60 & Above | I |

## 15. Model Question Paper

Maximum Time: 3 hrs                                                            Maximum Marks: 75

**Section A                    (10 x 1 = 10 Marks)**
**Answer All Questions**
All Multiple Choice Questions
Two Questions from each Unit
(Questions are numbered from 1 to 10)

**Section B                    (5 x 7 = 35 Marks)**
**Answer all the Questions**
(Either / Ortype: Either (a) or (b))
One question from each Unit
(Questions are numbered from 11 to 15)

**Section C                    (3 x 10 = 30 Marks)**
**Answer any three Questions**
One question from each Unit
(Questions are numbered from 16 to 20)

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**16. Teaching Methodology**

Methodology shall consist of stimulation of students' interest, presentation of teaching material, team formation and activities' determination, conduction of activities and discussions and assessments. For the sake of simplicity and easy understanding, the methods like problem solving, discussion, lab demonstration and lecture shall be adopted. The use of ICT shall be co-opted for the visual presentation of the lessons. One unit (mostly 5$^{th}$ unit will be handled by the students).

**17. Text Books**

The list of text books is given at the end of syllabus of each paper.

**18. Reference Books**

The list of reference books is given at the end of syllabus of each paper.

**19. Re-totaling and Revaluation Provision**

Students shall be provided the facility of applying for re-totaling the marks within 15 days after the publication of results on payment of a minimum fee fixed by the University and they shall be allowed to apply for revaluation of their papers within 15 days after the publication of results on payment of a fee to be fixed by the University.

**20. Transitory Provision (3+3)**

Syllabus revision shall be done once in 3 years and afterwards 3 years shall be under transitory provision.

**21. Subjects and paper related websites.**

The related websites for each paper shall be provided at the end of the syllabus wherever necessary.

# I YEAR

| Subject | Title of the paper | Hours/ Week | Credits |
|---------|-------------------|-------------|---------|
| **SEMESTER-I** | | | |
| Core-1 | Electronic Devices | 4 | 4 |
| Allied-1-1 | Applied Physics | 4 | 4 |
| Skilled elective-1 | Fundamentals of Electricity | 2 | 2 |
| Skilled elective-2 | Electronic Measurements | 2 | 2 |
| Non Major Elective-1 | Troubleshooting and maintenance of Home appliances | 2 | 2 |
| Core Lab-1 | Electronic Devices and Circuits Lab | 2 | --- |
| Allied-1 Lab-1 | Applied Physics Lab | 2 | --- |
| **SEMESTER-II** | | | |
| Core-2 | Electronic Circuits | 4 | 4 |
| Allied-1-2 | Basic Mathematics | 4 | 4 |
| Skilled elective-3 | Satellite Communication | 2 | 2 |

| Skilled elective-4 | Cellular Phones | 2 | 2 |
|---|---|---|---|
| Non Major Elective-2 | Fundamentals of Computing | 2 | 2 |
| Core Lab-1 | Electronic Devices and Circuits Lab | 2 | 2 |
| Allied-1 Lab-1 | Applied Physics Lab | 2 | 1 |

# II YEAR

| Subject | Title of the paper | Hours/ Week | Credits |
|---|---|---|---|
| **SEMESTER-III** | | | |
| Core-3 | Digital Electronics | 4 | 4 |
| Allied-1-3 | Programming in C&C++ | 4 | 4 |
| Allied-2-1 | Linear Integrated Circuits | 4 | 4 |
| Core Lab-2 | Digital Electronics Lab | 2 | --- |
| Allied-1 Lab-2 | Computer programming C&C++ Lab | 2 | --- |
| Allied-2 Lab-1 | Linear IC Lab | 2 | --- |
| **SEMESTER-IV** | | | |
| Core-4 | Antennas and Wave Propagation | 4 | 4 |
| Allied-1-4 | Numerical Methods | 4 | 4 |
| Allied-2-2 | Medical Electronics | 4 | 4 |
| Core Lab-2 | Digital Electronics Lab | 2 | 2 |
| Allied-1 Lab-2 | Computer programming C& C++  Lab | 2 | 1 |
| Allied-2 Lab-1 | Linear IC Lab | 2 | 1 |

# III YEAR

| Subject | Title of the paper | Hours/ Week | Credits |
|---|---|---|---|
| **SEMESTER-V** | | | |
| Core-5 | Analog &Digital Communication Systems | 4 | 4 |
| Core-6 | Microprocessor 8085 and Interfacing | 4 | 4 |
| Core-7 | Microcontroller 8051 | 4 | 4 |
| Allied-2-3 | Measurement Systems | 4 | 4 |

| Skilled elective-5 | Television Systems | 2 | 2 |
|---|---|---|---|
| Core Lab-3 | Analog &Digital Communications Lab | 3 | --- |
| Core Lab-4 | Microprocessor and Microcontroller programming Lab | 3 | --- |
| --Core Lab-5 | Project Work | 2 | --- |
| Allied-2 Lab-2 | Transducer and Measurements Lab | 2 | --- |
| | **SEMESTER-VI** | | |
| Core-8 | PC Hardware & Interfacing | 4 | 4 |
| Core-9 | Mobile Communication | 4 | 4 |
| Core-10 | Fiber Optic Communication | 4 | 4 |
| Allied-2-4 | Computer Networks | 4 | 4 |
| Skilled elective-6 | Electronic Equipment and Servicing | 2 | 2 |
| Core Lab-3 | Analog &Digital Communications Lab | 3 | 5 |
| Core Lab-4 | Microprocessor and Microcontroller programming Lab | 3 | 5 |
| Core Lab-5 | Project Work | 2 | 5 |
| Allied-2 Lab-2 | Transducer and Measurements Lab | 2 | 1 |

## Semester 1/ Core 1
## ELECTRONIC DEVICES

**UNIT-I**                     **PN JUNCTION DIODE**

Theory of PN Junction diodes − V-I characteristics − static and dynamic resistance − Effect of temp on diodes − Diffusion Capacitance − Applications: clipper, clamper, voltage doubler − Avalanche and Zener breakdown mechanisms − Zener diode as a voltage regulator − Tunnel diode.

**UNIT-II**              **BIPOLAR JUNCTION AND TRANSISTORS**

Transistor types − Transistor action − current components − CB, CE, CC configurations current gain − Input and output characteristics − Transistor as a switch and an amplifier − comparison of amplifier configurations − Small signal low frequency hybrid model Analysis − Determination of h-parameter from characteristics − High frequency effects − Hybrid-pi model.

**UNIT-III**              **FIELD EFFECT TRANSISTORS**

Types-comparison of FET and BJT − Characteristics and principal of operation of JFET parameters − JFET as an amplifier − CS, CD, CG configuration − operation of MOSFET as a switch − as a variable resistor − UJT.

## UNIT-IV    TRANSISTOR AND FET BIASING AND PHOTO DEVICES

DC and AC load lines – operating point – Need for stabilizing the Q point – Bias stability – Fixed Bias – collector to Basic bias – Self Bias – Bias compensation – Methods of FET bearing – Introduction and theory of operation of photo electric devices – LED – photo tube – LDR – photo diode and transistor – solar cell – optocouplers – simple application.

## UNIT-V    INTEGRATED CIRCUIT FABRICATION

Manufacturing process –Silicon wafer preparation – oxide growth.  Photolithography, Epitaxy, Diffusion, Metallization – Construction of BJT – Monolithic diodes – Integrated Resistors – Monolithic capacitors, inductors – Thin and thick film technology.

### TEXT BOOKS:

1. S. Salivahanan, N. Sureskumar and A. Vallavaraj, "Electronic Devices and Circuits", TMH, 1998.
2. Millman and Halkias, "Eleectronic device and Circuits", McGraw Hill, V reprint, 1993.
3. Boylestsd. L. Robert and Nashalsky Louis, "Electronic devices and circuit theory", PHI, 1997.

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**Semester I / Allied_1(1)**
**APPLIED PHYSICS**

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### UNIT-I

Dia, Para and Ferro magnetic substances – Properties – Curie temperature. Relation between I and H.- Susceptibility, Determination of susceptibility of ferromagnetic materials- vibrating sample magnetometer, magnetic alloys. Ultrasonic production- detection and application.

### UNIT-II

Force on a straight conductor carrying current kept in a magnetic field – Moving coil ballistic galvanometer- theory and uses – coupling between current carrying coils- wattmeter- Moving iron metal – Electromagnetic Induction- Induced emf- self induction of a solenoid – mutual induction between pair of coils – coefficient of coupling.

### UNIT- III

Ohm's law- Kirchoff's law- Simple problem- Electric power- Power dissipation on resistance- Power formulae. Analysis of Series. Parallel and Series-Parallel circuits- Star delta network- superposition theorem- Thevenin's theorem and Norton Theorems- Millman theorem – Applications.

### UNIT-IV

Emf Induced in a coil rotating in a uniform magnetic field- mean, RMS and peak values of alternating currents and emf- power factor in the case of an AC circuit containing 1) resistance 2) inductance 3) capacitance 4) inductance and resistance- wattless current- A circuits having capacitance and resistance – AC circuits having inductance capacitance and resistance- series and parallel resonance circuits- Q factor- construction and working of transformers- skin effect- Tesla coil

**UNIT-V**

Production and distribution of three phase AC- Advantages of AC over DC- Dynamic Armature winding- Series wound, shunt wound and compound wound, dynamics and their characteristics DC motor- Principles of inductive motor- Microphones ad Loudspeakers

**REFERENCE BOOKS:**

1. Resnick and Halliday, Physics, Vol II., Wiley Eastern Ed. IV.
2. Seighal and Chopra, Electricity and Magnetism.
3. Brijlal and Subramaniam- Electricity and Magnetism

**Semester1 / Skilled Elective1**
**FUNDAMENTALS OF ELECTRICITY**

**UNIT-I**

Introduction – Charges and Fields – Coulombs Law – Electric Field – Electric Dipole – Lines of force – Electric Potential – Electric Intensity — Gauss's Law – Differential form of Gauss Law – Applications of Gauss Law.

**UNIT-II**

Coulombs Theorem – Potential Difference – Electric potential as line Integral of Electric Field — Electric Potential Energy – Electrical Images.

**UNIT–III**

Capacitors – Principle of Capacitor – Capacitance of a Spherical Capacitor- Outer and Inner sphere earthed – Capacitance of a Cylindrical and Parallel plate capacitor – Effect of Dielectric – Capacitors in Series and Parallel – Types of Capacitors.

**UNIT–IV**

Electrical Measurements – Carey Foster Bridge – Potentiometer – Measurement of Thermo EMF using Potentiometer – Peltier Effect – Demonstration of Peltier effect – Thomson effect – Thermodynamics of Thermocouple – Thermoelectric Diagrams – Uses.

**UNIT–V**

Three phase AC Generators – Distribution of three phase AC – AC Dynamo Generator – DC Dynamo – Field Excitation – DC Motor – Magnetic Properties of Materials – Properties of Diamagnetic Materials-Electron Theory of Magnetism – Langevin's Theory of Diamagnetism.

**TEXT BOOKS:**

1. Electricity and magnetism, R Murugeshan, S. Chand & Company Ltd, 1995.
2. Electricity & Magnetism, D.L.Sehgal, K.L.Chopra, N.K.Shegal.

**Semester I /Skilled Elective2**
**ELECTRONIC MEASUREMENTS**

**UNIT-I                              INDICATING INSTRUMENTS**
Review of Fundamental and derived units – Measurement errors – Standards of measurements – Ammeters, Voltmeters, Wattmeter and Energy meters – DVM - Digital microvolt meter.

**UNIT-II                      VOLTAGE, CURRENT AND POWER**
Measurement of direct current and voltage – methods of measuring alternating voltage and currents – Power measuring techniques – Bolometer method – Calorimeter method.

**UNIT-III                          RLC MEASUREMENTS**
DC resistance – AC whetstone bridge – Wien bridge, Twin-T and Bridged, T null networks – Resistance and Q of resonant circuit – measurement of low value capacitance

**UNIT-IV             FREQUENCY AND PERIOD MEASUREMENTS**
Standards of frequency – Comparison method – Heterodyne frequency meter – Capacitor charge – discharge method – Digital Frequency meter.

**UNIT-V             WAVEFORM AND PHASE MEASUREMENTS**
Wave and distortion analyzers for audio frequency waves – Phase measurements using oscilloscope – Null balance method – Phase shift to pulse conversion method

**REFERENCE BOOKS:**
1.  Sawhney A.K., "A course in Electrical and Electronic Measurements and Instrumentation", DhanpatiRai& Sons, 11th edition, 1995.
2.  Kushmir E., "Radio Measurements" MIR Publishers, Moscow, 1978.
3.  Terman, F.E., and Petit J.M., "Electronic Measurements" McGraw Hill Book Co., 1984.
4.  Cooper W.D., "Electronic Instrumentation and Measurement Techniques", Prentice Hall India, 3rd Reprint 1995.

**Semester I / Non Major Elective - 1**
**TROUBLE SHOOTING AND MAINTANCE OF HOME APPLIANCES**

**UNIT-I                          ELECTRONIC COMPONENTS**
Introduction–Passive components–Transformer–Working principle–application–Active devices: Diode–Transistor– Analog IC–amplifier– oscillators and Digital ICs–logic gates–encoder–decoder.

**UNIT-II                          EQUIPMENTS FOR SERVICING**
Soldering Iron–Flux–lead–Zero defect soldering–Desoldering pump– soldering station–Basics of Multimeter–Measurement of current, voltage and resistance using multimeter–Checking transistors and diodes

## UNIT-III                            HEATING APPLIANCES

Heater types–working principle– Heating Rod–Iron Box–Iron box with steamer– Toasters–Geysers– Microwave Ovens– Oven –Disassembling and assembling procedure– Fault indicator–Testing and Troubleshooting methods.

## UNIT-IV                         MOTORISED APPLIANCES

Types of Motors–DC and AC motor– Fans– mixers– blenders–wet grinders– circuit connection- testing methods. Washing machine–Electrical connections–assembly—Electrical connection–Testing and Troubleshooting methods.

## UNIT-V                        REFRIGERATION APPLIANCES

Fridge– Electrical connection– Compressor–coolants–Automatic defrost circuits –Testing and troubleshooting of refrigerators–Air coolers and Air conditioners– Mounting and fixing of Air Conditioners–testing and troubleshooting methods.

**TEXT BOOK:**

1. Eric Kleinert, Troubleshooting and Repairing major appliances, McGraw Hill Professional, third edition, 2012.

### Semester I & II /Core Lab-1
### ELECTRONIC DEVICES AND CIRUITS

**Any 12 Experiments**
1. Characteristics of junction diode.
2. Characteristics of Zener diode.
3. RC Coupled amplifier
4. Feedback amplifier
5. Hartley oscillator
6. Colpitt oscillator
7. Characteristic of UJT
8. Characteristics of SCR and SCR Power control
9. JFET Characteristics
10. Op-amp characteristics
11. Op-amp amplifiers
12. Differential amplifier, Bridge amplifiers, Instrumentation amplifier
13. Waveform generators
14. Op-amp filters
15. Voltage Controlled Oscillator
16. Study of circuit analysis PSPICE
17. Simulation of DC circuits
18. Simulation of AC circuits
19. Half and full wave rectifiers
20. Dual power supply

**REFERENCE BOOK:**

1. Microelectronics Laboratory using software tools PSPICE,ORCAD,MULTISIM by Muhammad H.Rashid- CENGAGE Learning-2016

## Semester I & II / Allied 1 – Lab 1
## APPLIED PHYSICS LAB

**Any 12 Experiments**

1. Potentiometer – calibration of low range ammeter
2. Potentiometer – calibration of low range voltmeter
3. Series resonance circuit – resonance frequency, Q factor
4. Parallel resonance circuits – resonance frequency, Q factor
5. Determination of capacitance of a condenser sing LCR circuit
6. Determination of inductance of a coil sing LCR circuit
7. Determination of mutual inductance between two coils
8. Determination of the photovoltaic cell characteristics
9. Carey Foster Bridge-determination of specific resistance
10. Study of capacitor filters and ∏ filters
11. Low pass and High pass filters
12. Differentiating and Integrating circuits
13. Uses of CRO – Measurements of voltage, current, frequency, phase and delay times etc.,
14. Temperature coefficient of a thermistor

| Semester II /Core 2 |
| --- |
| ELECTRONIC CIRCUITS |

**UNIT-I                         POWER SUPPLIES**

Rectifiers – Half wave and full wave rectifiers – Average and RMS values – Ripple factor – Regulation – Rectification efficiency – Transformer utility factor – filters – inductor, capacitor, L-type, PI type – Ripple factor and regulation – Need for voltage regulation – series and shunt regulators – Comparison – Current limited and protection circuits.

**UNIT-II                        SMALL SIGNAL AMPLIFIERS**

General principle of operation – classification – RC Coupled amplifiers – Gain frequency response – Input, output impedance calculation. Transformer coupled amplifier – Equivalent circuit at low, medium and high frequencies – Analysis and frequency response.

**UNIT-III                       FEEDBACK AMPLIFIERS**

Basic concepts of feedback amplifiers – characteristics – Effect of negative feedback on gain, gain stability, distortion and bandwidth – voltage and current feedback circuits.

**UNIT-IV                       HARMONIC OSCILLATORS**

Barkhausen Criteria – Hartley, Clapp and Colpitt's oscillator – RC phase shift oscillator, Wein bridge oscillator – Frequency stability of oscillators – crystal oscillators.

**UNIT-V                        POWER AMPLIFIERS**

Classification – Class A, Class B, Class C single ended and push pull operation – complementary symmetry power amplifiers.

**REFERENCE BOOKS:**
1. S. Salivahanan, N. Sureshkumar and A. Vallavaraj, "Electronics Devices and circuits", TMH 1998.
2. Millman and Halkias – "Electronic Devices & Circuits", McGraw Hill, 1993.
3. Schilling and Belove "Electronic circuits & Integrated", McGraw Hill, 1989.
4. Mottershead A, "Electronic Devices & Circuits an Introduction", PHI 18<sup>th</sup> Reprint, 1996.
5. Boylested, L.Robert and Nahalsky Louis "Electronics devices and circuit theory", PHI, 1997.

| Semester II /Allied 1-2 |
|---|
| **BASIC MATHEMATICS** |

**UNIT- I**                                     **VECTORS**

Gradient of a Scalar Field- Line, Surface and Volume Integrals- Divergence of a Vector Function- Curl of a Vector Function and its Physical Significance- Important Vector Identities- Gauss Divergence Theorem- Deductions from Gauss Divergence Theorem- Stoke's Theorem- Deductions from Stoke's Theorem- Green's Theorem- Green's Theorem in a plane.

**UNIT- II**                                     **MATRICES**

Rank of a Matrix- Reduction of a non-zero matrix to normal form- The rank of a product- Vector as Matrices and Vector-spaces- Solutions of Linear Equations- Linear Transformations- Orthogonal and Unitary Transformations- Similarity Transformation- Eigen Values,Eigen-Vector;Characteristic Equation of a Matrix.

**UNIT- III**                             **COMPLEX NUMBERS**

Complex Numbers- Review of Algebraic Operations of Complex Numbers- Complex Conjugates- Modulus and Argument of a Complex Numbers- Graphical Representation on Argand Diagram and Trigonometric Form- Some Definitions Underlying Complex Analysis- Functions of Complex Variable- Limit, Continuity and Differentiability- Definition: Analytic Function- The Necessary and Sufficient Conditions for $f(z)$ to be Analytic: Cauchy-Riemann Differential Equations.

**UNIT- IV**                         **DIFFERENTIAL EQUATIONS**

Order and Degree of a Differential Equation- Solution of First Order Differential Equation by the Method of Separation of Variables- Linear Differential Equation of First Order and its Solution-- Solution of Second Order Differential Equation with constant coefficients - Method of Variation of Parameters- Singular Points of Differential Equations- Self Adjoint Differential Equation- Power Series Solution- Linear Independence of Solutions.

**UNIT – V**               **FOURIER TRANSFORMAND LAPLACE TRANSFORM**

Properties of Fourier Transform- Fourier Transform of a Derivative- Fourier sine and cosine Transform of Derivatives- Fourier Transform of functions of two or three variables- Finite Fourier Transforms- Simple Application of Fourier Transforms- Laplace Transform- Properties of Laplace Transforms- Laplace Transform of Derivatives of a Function- Laplace Transform of Integral- Laplace Transform of Some Special Functions.

**REFERENCE BOOKS:**
1. Mathematical Physics with Classical Mechanics – SathyaPrakash (Sultan Chand & Sons Sixth Revised edition 2012).
2. Mathematical Physics – H.K.Dass, Dr. Rama verma -S.Chand& Company Pvt.Ltd.(Sixth Revised Edition, 2013)
3. Mathematical Physics- B.D. Gupta,4th edition Vikas Publishing company Ltd.2013
4. Mathematical Physics -S.L. Kakani, C. Hemarajani. 2nd Edition CBS Publishers &Distributors Pvt., LTD., 2010

| Semester II /Skilled Elective 3 |
| :---: |
| **SATELLITE COMMUNICATIONS** |

**UNIT-I** **INTRODUCTION**
Historical progress, Orbits of Satellites, Types – low, medium, geostationary – main characteristics – angle, shape and period – Ionosphere.

**UNIT-II** **SATELLITE LINKS**
General characteristics, delay, transponders, earth station, antenna and earth Coverage, altitude control.

**UNIT-III** **SATELLITE CONSTRUCTIONS**
Subsystems and functions, antennas, transponders, power supplies Command & telemetry, thrust and stabilization.

**UNIT-IV** **EARTH STATION**
General block schematics, transmitter and receivers, antenna.System& tracking – Multiplexing, space, time and frequency multiplexing.

**UNIT-V** **MULTIPLE ACCESS PRINCIPLE**
FDMA, spade system, TDMA – system concept of configuration - System timing, frame format basic principles of spread spectrum. Multiple access.

**REFERENCE BOOKS:**
1. J MARTIN, Communication Satellites(PH)
2. J JSpilker, Digital Communication by Satellites(PH)
3. R.M. Gagliardi, Satellite Communications-CBS
4. M.Mitra Satellite Communications

| Semester II / Skilled Elective 4 |
| :---: |
| **CELLULAR PHONES** |

**UNIT – I**
Working of a Telephone - Local Exchange - Initiating a call - Calling a Number - Making a Connection - Answering a Call - Conversation - Ending a Call - Hook Switch - Transmitter - Receiver - Ringer - Cellular Mobile Telephone System - Mobile Phone Service Area.

**UNIT - II**

GSM - CDMA - GPRS - EDGE - WCDMA - UMTS - HSDPA - Satellite Phones - GPS - Mobile Browsers - WAP.

**UNIT - III**

Types of: Wireless Options, Batteries, Memory Cards, Messaging, Ring Tones, Keypad Types, Display Types. Handset Form Factor - Mobile OS.

**UNIT - IV**

Hardware/Software Repairing - Various Locks - Installation of: UFS Driver, UFS Suite & Flashing Files - IMEI Number Detection - Mobile GSM Utility Codes (Any Five)

**UNIT V**

Ultrasonic Cleaner - Computer Connectors - SIM Card Reader - Memory Card Reader - Mobile Virus - Virus Prevention - Removing Virus - Health Hazards with Mobiles - SAR.

**TEXTBOOKS :**

1. Modern Mobile Phone Introduction & Servicing - ManaharLotia
   Unit - I
2. Modern Mobile Phone Repair Using Computer Software & Service Devices – ManaharLotia- Units I, IV & V
3. Modern Mobile Phone Unlocking & Utility Codes For GSM & CDMA Phones – ManaharLotia - Unit – IV.
4. Mobile Telephony - Digit Magazine - Supplement - Jan 2006 - Jasubhai Digital Media Publications. Unit II & III

**REFERENCE BOOKS:**

1. Blue Tooth Technology – CSR Prabhu& APrathapReddi – PHI
2. Mobile & Personal Communication Systems & Services - Raj Pandya - PHI

| Semester II / Non Major Elective 2 |
|---|
| **FUNDAMENTALS OF COMPUTING** |

**UNIT – I                    INTRODUCTION TO COMPUTERS**

Overview of Computers – Applications of Computers - Evolution of the Computers- Computer Generations – Classification of computers – Basic computer organization.

**UNIT -II                NUMBER SYSTEMS AND COMPUTER CODES**

 Decimal System -  Binary System -  Hexadecimal System – Octal System – 4-bit BCD systems – 8-bit BCD Systems – 16-bit Unicode - Conversion of Numbers.

**UNIT –III                    COMPUTER SOFTWARE**

Overview of Computer Software – Types of Computer software – System Management Programs – System Development Programs – Standard Application programs – Applications programs – Software Development Steps – Internet Terminologies – Internet Applications.

**UNIT -IV                    PROBLEM SOLVING**

Introduction – Planning the computer program – Problem solving – Structuring the logic – Application Software packages.

**UNIT –V**                               **OFFICE AUTOMATION**

Introduction to Office packages – MS Word – MS Excel – MS PowerPoint – MS Access.

**TEXT BOOK:**
1. Fundamentals of Computing by E.Balagurusamy, McGrawHill, Second Edition.
   Unit I: Chap1-1.1 to 1.8;
   Unit II: Chap 1-1.9 to 1.17;
   Unit III: Chap 2;
   Unit IV: Chap 3-3.1 to 3.5;
   Unit V: Chap 3-3.6 to 3.10

**REFERENCE BOOKS:**
1. Digital fundamentals – Floyd & Jain – Pearson Education
2. Introduction to computers – Norton – McGraw Hill
3. Computer fundamentals – B.Ram – New Age International
4. Computer fundamentals – Jaggi and Jain

| Semester III / Core 3 |
|---|
| DIGITAL ELECTRONICS |

**UNIT-I**                     **NUMBER SYSTEM AND BOOLEAN ALGEBRA**

Review of binary, octal, decimal and hexadecimal number systems − Presentation of signed numbers – Floating point number representation – Boolean algebra**:** Postulates and theorems – Canonical forms of logic operations – SOP − POS – Logic gates.

**UNIT-II**                     **COMBINATIONAL AND SEQUENTIAL LOGIC**

Standard representation of logic function – Simplifications through Karnaugh map implementation using standard logic gates – Encoders and Decoders – Multiplexers and Demultiplexers – Code converters – Implementation of combinational functions using multiplexers. – RS, JK, JK Master-slave, D and T flip flops – Level triggering and edge triggering – Excitation tables.

**UNIT-III**                             **ARITHMETIC CIRCUITS**

Half adder, full adder, parallel adder, serial adder/subtractor, binary adder/subtractor – BCD adder/subtractor – Carry look ahead adder, binary multiplier and divider.

**Counters and Registers:** Asynchronous and synchronous counter – Binary and BCD counter − UP/Down counter – Modulo counter – Shift register – Ring counter – Johnson counter – Timing wave forms.

**UNIT-IV**                                 **ADC and DAC**

**DAC:**Introduction –weighted resistance DAC –R-2R ladder network method DAC Parallel Voltage R2R ladder.

**ADC:**Successive approximation register –Dual slope –Parallel flash ADC –A/D converter using voltage to time conversion.

**UNIT-V**                                 **MEMORY DEVICES**

 Introduction – Temporary and permanent memory – ROM –PROM- EPROM – EEPROM – Read /write operation – Application – Comparison of semi conductor memories.

**REFERENCE BOOKS:**
1. S.Salivahanan and S.Arivazahagan. "Digital circuits and design", Vikas publishing house Ltd., 2000.
2. Tocci T.I "digital systems: principle and applications", sixth edition, PHI 1997.
3. Mano M.M, "Digital logic and complete design" PHI 1992.
4. Palmer, J.E and Periman, D.E, "Introduction to Digital systems" Schaum outline series                   McGraw Hill, 1993
5. Digital principles & Applications – Malvino Leach. 6th edition.
6. Floyd – Digital Electronics.
7. Digital Logic and computer Design –M.Moriss Mano.

| Semester III /Allied 1-3 |
|---|
| **PROGRAMMING IN C AND C++** |

**UNIT-I                    INTRODUCTION TO C**

Basic Structure of C program – Constants, variables and Datatypes –Operators and Expressions –Decision Making and Branching – Decision Making and Looping.

**UNIT-II                    ARRAYS AND FUNCTIONS**

Introduction – Array – One-Dimensional Arrays  – Two Dimensional Arrays - Multidimensional arrays – Character arrays and Strings –Declaring and Initializing String Variables – String-Handling Functions – User-Defined functions Pointers: Introduction – Understanding pointers – Declaring pointer variables – Initialization of pointer variables – Accessing a variable through its pointer- Array of pointers.

**UNIT-III                    STRUCTURE AND FILES**

Introduction –Defining a Structure – Declaring, Accessing Structure Variables- Array of structures – structures and Functions –  Unions – File Management in C –Command Line Arguments – Preprocessor – Macro Substitution.

**UNIT-IV                    INTRODUCTION TO C++**

Introduction -Structure of C++ program – Tokens – Keywords – Identifiers and constants – Basic Datatypes – Derived data types – user defined data type – operators – Scope resolution operator - type compatibility – symbolic constants – type cast operator - operator overloading – operator precedence – expressions and their types, manipulators, Functions in C++

**UNIT-V                    CLASSES AND OBJECTS**

Specifying a class– defining member functions – Arrays within a class – Array of objects – constructor – parameterized constructors– constructors with default arguments – Copy constructors – Destructors. Inheritance – Defining derived class – single inheritance – multilevel inheritance – multiple inheritance – hierarchical inheritance – hybrid inheritance – abstract classes- Polymorphism - Virtual functions.

**TEXT BOOKS**

1. Programming in Ansi C by E.Balagurusamy, McGraw Hill, Seventh Edition.
   Unit I: Chap 1,2,3,5,6 ;

Unit II: Chap 7,8,9,11 ;
Unit III: 10,12.
2. Object Oriented Programming with C++ by E.Balagurusamy , Tata McGraw hill 7e.
Unit IV: Chap 2-2.6, chap 3-3.2 to 3.10,3.14,3.15,3.18 to 3.20,3.23 and 3.24, chap 4
Unit V: chap 5-5.3 to 5.5,5.9,5.13, chap 6-6.2,6.3,6.5,6.7,6.11, chap 8.1 to 8.3,8.5 to
8.8,8.10, chap 9-9.5,9.7.

**REFERENCE BOOKS:**

1. C programming made easy by N.Rajaram 1998 scitech publications.
2. Computer science A structured programming approach using C-Behrouz
   A.Forouzan-3rdEdition- CENGAGE Learning.
3. A Workbook on C++-Sumit Mittu-2013- CENGAGE Learning.

| Semester III / Allied 2-1 |
| --- |
| LINEAR INTEGTATED CIRCUITS |

**UNIT-I                                OPERATIONAL AMPLIFIER**
Introduction-Internal structure-Parameters and Characteristics of practical &an ideal
operation amplifier – circuit schematic of op Amp 741 – Internal Block diagram.
Operational Amplifier Characteristics: Input bias and offset currents – Input and output
offset voltages –Thermal voltage drift- Offset response characteristics –CMRR-input &
output resistance-Stability – Limitations – Frequency response – Slew rate – Transfer
characteristics

**UNIT-II               LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS**
Inverting and non-inverting amplifiers –Summing amplifier –Instrumentation amplifier –
Voltage to current, Current to voltage converters –Rectifiers –Sample and hold-Log and
Antilog amplifiers-Differentiator-Integrator.

**UNIT-III      NON LINEAR APPLICATION OF OPERATIONAL AMPLIFIER**
Precision peak detector –Precision rectifiers –Precision clamper-Voltage limiters-
Comparators -Threshold Comparators -Zero crossing detector -Schmitt Trigger -Inverting
Schmitt Trigger-.-Non-inverting Schmitt Trigger
**UNIT-IV              WAVEFORM GENERATORS & VOLTAGE REGULATORS**
Square wave generator- Triangular wave generator- Saw tooth wave generator Using
UA741IC voltage regulators –Elements of voltage regulators
**UNIT-V                       SPECIAL FUNCTIONS IC'S**
555 Timer functional block diagram and description – Monostable and Astable operation –
Applications – VCO(NE566) voltage-Block diagram – PLL(NE565)-Block diagram-
Frequency multiplier-FSK Demodulator-9400-Block diagram-Voltage to frequency
conversion-Frequency to voltage conversion-LF398-Sample and Hold circuits -DAC-ADC.

**TEXT BOOKS:**

1. Linear Integrated Circuits- Muhammad H.Rashid-CENGAGE Learning-2014
   UNIT-I- 2.1to2.3;
   UNIT-III- 4.1 to 4.5;
   UNIT-IV- 4.6 to 4.8,4.16;
   UNIT-V- 4.9 to 4.15.
2. 'Linear Integrated Circuits',RoyChoudhury and Shail Jain ,New Age Int. Ltd.-3E-2009
   UNIT-II- 4.1 to 4.11

**REFERENCE BOOKS:**
1. "Op-Amps and linear integrated circuits",Gaykwad A.R, Prentice Hall of India,
Third edition, New Delhi, 1993.

| Semester III & IV / Core Lab-2 |
|---|
| **DIGITAL ELECTRONICS LAB** |

**Any 12 Experiments**
    1. Study of logic gates using Active and Passive components.
    2. Construction and testing of half adder and full adder.
    3. BCD to seven segment decoder.
    4. Study of encoder.
    5. Study of decoder.
    6. Study of multiplexers.
    7. Study of de-multiplexers.
    8. Study of R-S,J-K ,D-type flip flops.
    9. Study of digital IC's 74LS244, 74LS245, 74LS688.
    10. Shift register using flip flops (4 bit)
    11. Ring counter.
    12. Johnson counter.
    13. Modulus counter.
    14. Pulse generation using gate.
    15. Schmitt trigger using gates.
    16. Study of ADC
    17. Study of DAC

| Semester III & IV / Allied-1  Lab-2 |
|---|
| **COMPUTER PROGRAMMING C & C++ LAB** |

**Any 12 Experiments**
1. Write a c & c ++ program using formula like simple interest, sum of n natural numbers
2. Write a c & c ++ program using if… else statement to find biggest, smallest of 3 numbers
3. Write a c & c ++ program using for loop to find factorial of a number

4. Write a c & c ++ program to perform bit reversal operation for a given number
5. Write a c & c ++ program using do…while loop to generate Fibonacci series
6. Write a c ++ program using class for sorting of numbers.
7. Write a c++ program using function over loading to find area and circumference of a circle.
8. Write a c++ program using operator over loading to over load binary operator
9. Write a c++ program using friend function to find average of numbers
10. Write a c++ program using single inheritance to prepare student mark sheet
11. Write a c++ program using multiple inheritance to perform linear search
12. Write a c++ program using multi level inheritance to perform matrix addition
13. Write a c++ program using class to find a real root of the equation using bisection method.
14. Write a c++ program using class to find a real root of the equation using NR method
15. Write a c++ program to find the value of Y for known X by Lagrange interpolation
16. Write a c++ program to solve the system of equation by gauss elimination method
17. Write a c++ program to evaluate the integral using trapezoidal rule
18. Write a c++ program to evaluate the integral using Simpsons rule.
19. Write a c program to interface LED
20. Write a c program for simple I/O operation

| Semester III & IV / Allied-2  Lab-1 |
| --- |
| LINEAR INTEGRATED CIRCUITS LAB |

**Any 12 Experiments**
1. Op-amp characteristics – slew rate, CMRR
2. Op-amp operations – Amplifiers – inv, non-inv, summing.
3. Waveform generators – using op-amp,
4. Sinusoidal oscillators- using op-amp
5. Comparator.
6. Schmitt trigger.
7. Astablemultivibrator Using IC 555.
8. Monostablemultivibrator Using IC 555.
9. Bi-stable multivibrator Using IC 555.
10. Voltage controlled oscillator-566.
11. Phase locked loop using 565.
12. Timer using IC 555.
13. Differentiator & Integrator.
14. Sample & Hold circuit.
15. Low pass & High pass filter.
16. ADC – 0804 – 8 bit single channel.
17. DAC
18. Voltage to current convertor.
19. Current to voltage convertor.

| Semester IV /Core 4 |
|---|
| **ANTENNAS AND WAVE PROPAGATION** |

**UNIT-I        RADIATION PRINCIPLE AND ANTENNA TERMINOLOGIES**
Principle of radiation isotropic radiator-Antenna terminologies – reciprocity theorem-Friis formula.

**UNITII                    ANTENNA FUNDAMENTALS**
Radiations from an oscillaton dipole- short linear antennas Half wave dipole as a basic radiating element-folded unipole and dipole antenna shunt fed dipoles-antennas-loop antenna-Standing wave radiators.

**UNIT-III                        ANTENNA ARRAYS**
 Pattern multiplication-arrays of two driven antennas-Broadside arrays-end fire arrays-collinear arrays-parasitic arrays-linear arrays with 'n' isotropic point sources-stacked arrays-Traveling wave radiators.

**UNIT-IV                        ANTENNA PRACTICE**
Antenna for low frequencies-Beverage antenna- Antenna for Medium frequencies-tower antenna-effects of ground on antenna performance-ground systems-top loading-excitation methods-Antenna couplers- baluns-Resonant V-invertedV antenna –Rhombic arrays for MUSA-Diversity reception-Yagi antenna-comer reflector –Bioconical antenna-tunstile antenna-Helica antenna –parabolic reflector- Horn antenna-Lens antenna-Log periodic antenna.

**UNIT-V                        WAVE PROPAGATION**
Propagation in free space-propagation around the earth-surfacewave and its propagation-structure of the ionosphere-propagation of plane waves in an ionized medium-Determination of critical frequencies-maximum usable frequency-Effect of earth's magnetic field-ionosphere variations-fading-refractive index of troposphere-effect of surface irregularities-scatter propagation

**TEXT BOOK:**

1. Antenna & wave propagation- K.D.Prasad- III Reprint Edition 2012-13-Satyaprakashan.
   UNIT –I-Chap-4;          UNIT –II-Chap-5;
   UNIT –III-Chap-7;        UNIT –IV-Chap-8 & 9;        UNIT –V-Chap-11.

**REFERENCE BOOK:**

1. Antennas for All Applications-John D. Kraus- III Edition-II Reprint-TMH-2003.

| Semester IV /Allied 1-4 |
|---|
| **NUMERICAL METHODS** |

**UNIT – I            ALGEBRAIC AND TRANSCENDENTAL EQUATIONS**
Errors in Numerical computation – Iteration method – bisection method – RegulaFalsi method – Newton-Raphson Method

**UNIT –II**                    **SIMULTANEOUS EQUATIONS**

Gauss Elimination method – calculation of inverse of matrix – Gauss-Seidal Iteration method-Relaxation Method.

**UNIT-III**                    **INTERPOLATION**

Newton's interpolation formula – central difference   interpolation formula – Lagrange's interpolation formula – Inverse interpolation.

**UNIT – IV**                 **NUMERICAL DIFFERENTIATION**

Newton's forward and back ward difference  formula – Numerical Integration : Trapezoidal rule – Simpson's rule. Eigen values and Eigen vectors of a matrix.

**UNIT –V**           **NUMERICAL SOLUTION OF DIFFERENTIAL EQUATION**

Euler's method- Taylor's series method – Range-Kutta method.

**TEXT BOOK:**

1. "Numerical methods", S.Arumugam, A.ThangapandiIssac,andA.Somasundaram-SCITECH Publications, Second edition.
   Unit I – Chap 3, 3.0 to 3.5;

   Unit II – Chap 4, 4.3,4.5,4.8 and 4.9;

   Unit III-Chap 7,7.1 to 7.3 and 7.6;

   Unit IV- Chap 8,8.1,8.2,8.5, chap 5;

   Unit V- Chap 10- 10.1,10.3,10.4

**REFERENCE BOOKS:**

1. Numerical methods a programming-based approach Arunkumarjalan,UtpalSarkar-Universities Press 2015
2. Numerical methods T.Veerajan and J.Ramchandran 2$^{nd}$ edition Tata Mc Graw Hill 2006.

| Semester IV /Allied 2-2 |
| --- |
| MEDICAL ELECTRONICS |

**UNIT-I**                    **BIOPOTENTIALS**

 Introduction-Cellular fluids, Tran's membrane potentials, R.M.P cell stimulations action potentials. Physiological transducers, Biosensors, Smart sensors

**UNIT-II**               **BIOELECTRIC SIGNALS AND ELECTRODES**

Origin of bioelectric signals –Components of Bio-Medical Instrument System Recording electrodes Skin contact – Impedance –Electrodes for ECR –EMG and EEG – Electrical conductivity of electrodes jellies creams microelectrodes-amplifiers

**UNIT-III      BIOMEDICAL      RECORDS      AND      PATIENTS      MONITORING SYSTEMS**

Block diagram and signal analysis of Phonocardiography – Electroencephalograph – Electromyography – Measurement of heart rate – Measurement of blood pressure – Measurement of temperature – Measurement of respiration rate – Apnoea detectors.

**UNIT-IV                      THERAPEUTIC EQUIPMENTS**
Cardiac pace maker- Cardiac defibrillators – Surgical diathermy – Microwave diathermy Ultrasonic therapy unit – Pain relief thro' electrical stimulation.

**UNIT-V                      MODERN IMAGING SYSTEMS**

Computer X ray machine –X ray computed tomography Basic NMR components – Echocardiography – Thermography equipments.

**TEXT BOOKS:**
1. . M.Arumugam, Bio-Medical Instrumentation-1992- Anuradha Agencies.
   Unit-I- Chap-1;
   Unit-II- Chap-2 & 3;
   Unit-III- Chap-4;
   Unit-IV- Chap-5 & 6;
   Unit-V- Chap-7 to 10.

**REFERENCE BOOKS:**
1. Principles of Medical Electronics and Biomedical Instrumentation-C.RajaRao& S K Guha- 2013-Universities Press.
2. L.Cromwell, F.J.Weibell and E.A.Pfeiffer, Bio-Medical Instrumentation and measurements, PHI, 1991.
3. R.Khandpur. Handbook of bio-medical instrumentation. TMH. 2nd edition 2003.
4. Medical Electronics – Tomskin& Webster.

| Semester V /Core 5 |
|---|
| **ANALOG & DIGITAL COMMUNICATION SYSTEMS** |

**UNIT-I                      MATHEMATICAL FOUNDATION OF COMMUNICATION**
Spectral density – Autocorrelation – Cross correlation – Transmission of signals linear systems – Random variables – Random process – Transmission of random process through a linear filter – Stationary process - Source of Noise - Noise Calculation – Filters - Types of filters.

**UNIT-II                      FUNDAMENTALS OF ANALOG COMMUNICATION**
Introduction to Communication Systems: Modulation – Types - Need for Modulation. Amplitude Modulation and demodulation - Evolution and Description of SSB Techniques – Frequency modulation and demodulation- Phase Modulation and demodulation –

Comparison of various Analog Communication System (AM – FM – PM) - The super heterodyne receivers.

**UNIT-III**                 **QUANTIZATION AND ENCODING**

Signal sampling, PCM generation and recovery using match filter – Analysis of uniform and non-uniform quantizers – Delta modulation and demodulation – Comparison of PCM and DM on the basic of speech signals.

**UNIT-IV**                 **DIGITAL DATA TRANSMISSION**

Concept of base band signaling - PAM generation and detection –. PPM modulation and demodulation- ASK, FSK, PSK, DPSK - Parity check codes –Convolutional codes.

**UNIT-V**                 **SYNCHRONIZATION**

Need for synchronization – Synchronization methods, Bit, Word, Frame synchronization – Synchronization using PN sequence.

**TEXT BOOKS**

      1.A. Bruce Carlson, Paul B.Crilly,"Introduction to communication systems",5th Edition      McGraw Hill.1989.

      2. Simon Haykin, "Communication systems", Willey Eastern, Fourth Edition, 1994.

      3. Sam Shanmugam, "Digital and Analog Communication System", Prentice Hall, 1997

**REFERENCE BOOKS**

      1. Leon W.Couch,"Digital and Analog Communication Systems", Prentice Hall, 1997.

      2. Analog Communication – John Kennedy.

      3. Lalit B.P "Modern digital and analog communication systems" Holt and Reinhart publishers 1995.

| Semester V /Core 6 |
|---|
| **MICROPROCESSOR 8085 AND INTERFACING** |

**UNIT-I**                 **ARCHITECTURE OF 8085 MICROPROCESSOR**

Functional block diagram –Pin diagram-Flags- Register, Instruction format, ALU, Bus systems – Timing and control signals Machine cycles.

**UNIT-II**                 **PIN & SIGNALS, TIMING & CONTROL SIGNAL**

Instruction formats – Addressing modes – Instruction set – Need for Assembly language – Interrupts.

**UNIT-III**                 **MEMORY INTERFACING**

I/O Interfacing, Peripherals I/O instruction – Device selection and data transfer input interfacing I/O using decoders – Direct memory access – Interfacing display: LED display – 7 segment LED display; interfacing memory, bus connection, memory time and wait states, DMA control

**UNIT-IV**                 **PROGRAMMABLE PERIPHERAL DEVICES**

Block diagram of 8255A and the modes, Simple input and output, BSR mode, programming the 8255A in mode 1, mode 2 – bidirectional data transfer. Block diagrams of 8253 – Programming 8253 –The 8253 as a counter – 8279 Keyboard/Display controller.

**UNIT-V**         **8251A PROGRAMMABLE COMMUNICATION INTERFACE**

Serial communication basic- Introduction to 8251A – Block and pin details – input signals – transmitter and receiver sections – initializing the 8251A – Synchronous, Asynchronous, USART, 8250UART.

**TEXT BOOK:**
1. Microprocessor Architecture Programming and application with 8085- RameshS.Gaonkar, 6$^{th}$ edition, PENRAM International publishing Pvt. Ltd, Reprint 2017.
   UNIT –I-chap-4;
   UNIT –II-chap-2 & 12;
   UNIT –III-chap-4.3,4.4,5.1 to5.4;
   UNIT –IV-chap-14 &15;
   UNIT –V-chap-16.

**REFERENCE BOOKS**::
1. Douglas V.Hall, "Microprocessor and interfacing programming and hardware",Mcgraw Hill Inc 1992.
2. A.P.Mathur, Introduction to Microprocessors, 3$^{rd}$ edition. TMH 2004.

| Semester V / Core 7 |
|---|
| **MICROCONTROLLER 8051** |

**UNIT-I**         **MICROPROCESSOR & MICROCONTROLLER**

Introduction to Microcontroller – Compare microprocessor and micro controller.-Types-Development systems of Microcontrollers.

**UNIT-II**         **NUMBERING SYSTEMS AND BINARY ARITHMETIC**

Introduction-Symbolic number system-Positional number system-Integer binary number-Fractional binary number-Number system notation-Binary Addition-Subtraction-Multiplication –Division-Binary Codes.

**UNIT-III**         **8051 ARCHITECTURE**

Introduction-Hardware-Architecture –Pin diagram-SFR-Input /Output Pins –Ports-External Memory-Counters and Timers-Serial Data Input/Output-Interrupts

**UNIT-IV**         **PROGRAMMING 8051**

Basic assembly language programming concepts-Moving Data-Arithmetic operations-Logical operations – Jump, call and return operations – Rotate and swap operations – Delay operations – Serial port communication – Parallel port communication – Simple programs.

**UNIT-V**         **APPLICATIONS OF 8051**

Key boards-Displays-Pulse Measurements-D/A,A/D Conversions- programming 8051 inµVISION2 &keil "C".

**TEXTBOOKS:**

1. The 8051 Microcontroller–Kenneth Ayala 18th Indian Reprint 2014 CENGAGE Learning
   UNIT I- chap-1;
   UNIT II- chap-2;
   UNIT III- chap-3;
   UNIT IV- chap-4 to 8;
   UNIT V- chap-10 & 11.

**REFERENCE BOOKS:**

1. Microcontrollers and its applications- R.Theagarajan-2014-SCITECH Publications
2. The 8051 Micro controller and embedded system – Muhammad Ali Margi- 2nd edition.
3. The 8051 Microcontroller – Kenneth J.Ayala and DhananjayV.Garde – Indian edition  - Cengage learning 2010 copyrights.

| Semester V / Allied-23 |
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| **MEASUREMENT SYSTEMS** |

**UNIT-I                              BASIC CONCEPTS OF MEASUREMENT**

Generalized measurement system, Basic characteristics of measuring devices, noise,
Calibration. Classification of transducers, Dynamic characteristics of Measurement system,
Transfer function representation, Zeroth order, First order, Second order systems, Testing of
dynamic response.

**UNIT-II                              DISPLACEMENT MEASUREMENT**

Principle of Transduction,LVDT,Potentiometric, Digital Transducers, level measurements.
Strain measurement:Factors affecting strain measurements, types of strain gauges – Theory
and operation of resistance strain gauges, Types of electrical strain gauges – Gauging
techniques and other factors. Strain gauge circuits – Temperature compensation –
Applications.

**UNIT-III                              PRESSURE MEASUREMENT**

Diaphragms, Other elastic elements, Transduction methods, Force balance Transducers,
Solid state devices, piezoelectric pressure transducer, Vibrating element pressure sensors,
Pressure multiplexers, Calibration.
Flow Measurement:Head-type flow meter, Rota meter, Electromagnetic, Mechanical
Anemometer,Ultrasonic. Vortex flow meter - mass flow measurements.

**UNIT-IV                              TEMPERATURE MEASUREMENTS**

Mechanical Resistance type sensors, Platinum resistance thermometers, Thermistors,
Thermocouples, Solid-state sensors, Quartz thermometer, Radiation methods, Optical
pyrometers, Calibration.

**UNIT- V                              FORCE AND TORQUE MEASUREMENT**

Load cells, Digital Force Transducers, Force-Balance Devices. Hydraulic load cell,
Electronic Weight system, Torque measurement.

**TEXT BOOK:**

1. Instrumentation Devices and systems. C.Rangan, G.R.Sharma and V.S.V.Mani TMH, 23rd reprint 2009.
   UNIT-I-chap 1 to 3;
   UNIT-II-chap 4 & 5;
   UNIT-III-chap7 &8;
   UNIT-IV-chap9;
   UNIT-V-chap 10.

**REFERENCE BOOKS:**
1. E.Doebelin, Measurement systems, V Edn. TMH 2004.
2. Electronic instrumentation A.K.Sawney.

| Semester V / Skilled Elective 5 |
| --- |
| **TELEVISION SYSTEMS** |

**UNIT-I                                   TELEVISION PICTURE AND STANDARDS**
Geometric forms and aspect ratio of the picture – image continuity-Number of scanning lines –Interlaced Scanning- Picture resolution –Positive and Negative modulation – vestigial sideband signals – Standard Channel Bandwidth

**UNIT-II                                   CAMERA TUBES**
Basic Principles– Image orthicon – Vidicon – Plumbicon –Silicon diode array – solid state image scanners.

**UNIT-III                                   TELEVISION TRANSMITTERS**
Introduction– Television signal Propagation – Transmitting Antennas – Satellite Television – cable television – Cable signal distribution.

**UNIT-IV                                   TELEVISION RECEIVER**
Monochrome Receiver block diagram – receiving antennas – Balun and IF filters – RF tuners-VHF tuners – IF sub system – Video amplifier requirements –Sync separation-Frame Deflection Circuits –Line Deflection Circuits- EHT generation-picture tube.

**UNIT-V                                   COLOUR TELEVISION**
Nature of color- Color Receiver block diagram - computability with monochrome and viceversa –Three color theory-chromatic diagram-Luminance-Hue –Saturation-Colour TV Tubes- Automatic Degaussing circuit. Advance TV systems: Flat panel display- Plasma TV-3D TV –Extended definition TV.

**TEXT BOOK**

1. Television and Video Engineering, SalaiThillaiThilagam. J SCITECH publication 2015.
   Unit- I-1.1;
   Unit-II-1.2;

Unit- III-2.1&5.1;
Unit-IV-2.2 -2.9;
Unit –V-3.1-3.3&5.6

**REFERENCE BOOKS:**

1. Modem Television practice R. R. Gulati, Third Edition, New Age,Reprint:2008
2. Monochrome and color television R. R. Gulati, Reprint:1999

| Semester V & VI /Core Lab 3 |
| :---: |
| **ANALOG & DIGITAL COMMUNICATION LAB** |

**Any 12 Experiments**
1. Amplitude modulation and demodulation.
2. Frequency modulation and demodulation.
3. Cross-over network.
4. Band pass & Band stop filter.
5. Sampling and reconstruction of signals.
6. Pulse amplitude modulation.
7. Pulse code modulation.
8. Pulse position modulation.
9. Pulse width modulation.
10. Fiber optic communication.
11. Amplitude shift keying
12. Frequency shift keying
13. Experiments 1 using software (Representation of Basic wareforms)
14. Experiments 2 using software (High pass/ Low pass/Band pass/ Band stop)
15. Experiments 3 using software (Design of FIR filter)
16. Experiments 4 using software (Correlation of 2 signals (Auto Correlation))

| Semester V & VI / Core Lab 4 |
| :---: |
| **MICROPROCESSOR & MICROCONTROLLER LAB** |

**Any 12 Experiments**
1. 8-bit addition using 8085.
2. 8-bit subtraction using 8085.
3. 16-bit addition using 8085.
4. 16-bit subtraction using 8085.
5. 8-bit multiplication using 8085.
6. 16-bit multiplication using 8085.
7. 8-bit division using 8085.
8. 16-bit division using 8085.
9. Palindrome using 8085.
10. Simple I/O operation using 8085.
11. Traffic light controller using 8085.

12. Rolling display.
13. Seven-segment.
15. DAC interface- MUSIC generation.
16. 8-bit addition using 8051.
17. 8-bit subtraction using 8051.
18. 16-bit addition using 8051.
19. 16-bit subtraction using 8051.
20. 8-bit/16-bit multiplication using 8051.
21. 8-bit/16-bit division using 8051.
22. Stepper motor interface.
23. ADC interface.
24. DAC interface.

| Semester V & VI / Core Lab 5 |
| --- |
| **PROJECT** |

| Semester V & VI /Allied 2 Lab 2 |
| --- |
| **TRANSDUCER AND MEASUREMENT LAB** |

**Any 12 Experiments**
1.  Study of thermistor characteristics.
2.  Study of thermocouple characteristics.
3.  Study of IC temperature sensor (LM35)
4.  Study of load cell characteristics.
5.  Study of tacho generator characteristics.
6.  LDR and Opto-coupler characteristics.
7.  Study of Piezoelectric transducer.
8.  PLL- frequency multiplier.
9.  Study of UJT, IGBT devices.
10. Speed control of AC motor using TRIAC.
11. Design and Testing of FET input voltmeter.
12. Phase sensitive Detectors.
13. Speed control of DC motor using SCR.
14. Study of LVDT.

| Semester VI / Core 8 |
| --- |
| **PC HARDWARE AND INTERFACING** |

**UNIT-I          8086 FAMILY - 8086 BASED SYSTEM DESIGN**
System components – bus controller, clock generator, address decoding, and bus buffering and demultiplexing.

## UNIT-II                 HARDWARE ORGANIZATION OF IBM PC

Mother board components – chipset, Super I/O, system timer and RTC.

## UNIT-III                       MEMORY

Memory organization, Memory – map. Memory techniques – pipelining, Memorytypes,Memory Expansion.

## UNIT-IV                INTERFACING SERIAL PORT

Synchronous communication-data format-asynchronous communication-data format-RS232 standards – (MAX 232)-16650 programmable communication interface-calculating baud rate.

## UNIT-V                 INTERFACING PARALLEL PORT

Introduction- parallel port-SPP-EPP-ECP-stepper motor Interfacing- IC tester-water level indicator

**TEXT BOOK:**

1. Microprocessors, PC Hardware and interfacing- N.Mathivanan, PHI, 2015.
   UNIT-I- 3.3.1-3.3.4;
   UNIT-II- 6.2.1-6.2.4;
   UNIT-III-6.2.1-6.2.3 ;
   UNIT-IV-4.7-4.8.5, 10.12;
   UNIT-V- 10.1-10.2.

**REFERENCE BOOKS:**

1. Bary B. Brey, the Intel Microprocessors 8086/8088, 80186/80188, 80286,80386,80486, Pentium, and Pentium pro processors, PHI,1997.
2. D.V. Hall, microprocessors and interfacing: programming and hardware. McGraw Hill, 1999.
3. B.Govindarajulu, IBM PC and Clones: Hardware, and Maintenance, TMH. 1991.
4. S.J Bigelow, troubleshooting, maintaining and repairing Pc's, TMH, 1999.

| Semester VI /Core 9 |
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| **MOBILE COMMUNICATION** |

## UNIT-I           INTRODUCTION TO CELLULAR MOBILE SYSTEM

Why Cellular Mobile Telephone System – History of 800 MHZ Spectrum Allocation – Trunking Efficiency – A Basic Cellular System – Operation of Cellular Systems – Maximum Number of Calls Per Hour Per Cell – Maximum Number of Frequency Channels Per Cell – Concept of Frequency Reuse – Hand off Mechanism – Cell Splitting.

**UNIT-II**                    **CELLULAR ANTENNAS**

Equivalent Circuit of Antennas – The Gain and Pattern Relationship – Engineering Antenna pattern – Antennas at Cell Site – Unique situations of Cell Site Antennas- Mobile Antennas – Power Control – Functions of MTSO – Diversity Receiver.

**UNI-III**                    **HANDOFF AND DROPPED CALLS**

Value of implementing handoffs-initiation of handoff-Delaying a Handoff-Forced Handoff-Queuing of Handoffs-Mobile Assisted Handoff and soft Handoff-Cell _site Handoff Only-Intersystem Handoff.

**UNIT-IV**            **INTRODUCTION TO DIGITAL SYSTEMS**

Why Digital?-Introduction to Digital technology-ARQ Techniques-Digital Speech-Digital Mobile Telephony-Practical Multiple _Access Schemes.

**UNIT-V      DIGITAL   CELLULAR   SYSTEMS   &   INTELLIGENT   CELL CONCEPT**

Global system for mobile (GSM)- North American TDMA-CDMA-Miscellaneous Mobile Systems-Intelligent Cell Concepts– Power Delivery in Intelligent Cell – Processing Gain Intelligent Cells – Application of Intelligent Microcell Systems.

**TEXT BOOK:**

1. Mobile Cellular Telecommunications William C.Y.Lee-II Edition-2006-TMH
   UNIT-I-chap-1 & 2;
   UNIT-II-chap-5 & 6;
   UNIT-III-chap-9;
   UNIT-IV-chap-14;
   UNIT-V-chap-15 & 16.


**REFERENCE BOOKS:**

1. Wireless networked communications- Regis J Bates - TMH.
2. Mobile Communication -Jochen Schiller- II Edition – Pearson Education Ltd, New Delhi
3. Wireless Communications – Stalling – Pearson II Edition.
4. Mobile & Personal Communication Systems & Services - Raj Pandya – PHI


| Semester VI /Core 10 |
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| **FIBER OPTIC COMMUNICATION** |

**UNIT-I**            **OVERVIEW OF OPTICAL FIBER COMMUNICATIONS**

Introduction-Evolution of fiber optic systems-Elements of optical fiber transmission link Block diagrams of general communication system-comparison with other communication systems-different types of optical fiber applications.

**UNIT-II     OPTICAL     FIBER     STRUCTURES,     WAVEGUIDING     & FABRIUCATION**

Nature of light-Optical fiber modes and configuration-Single mode fibers-Graded –Index fiber-Fiber material-Fiber fabrication-Mechanical properties of fiber-Fiber optic cables-Total internal reflection –acceptance angle –numerical aperture.

## UNIT-III                    SIGNAL DEGRADATION IN OPTICAL FIBERS

Attenuation-Signal distortion in Optical wave guides-Pulse broadening in graded index wave guides-Mode coupling-design optimization of Single mode Fibers.

## UNIT-IV                         OPTICAL SOURCES

Light- Emitting Diodes-Laser Diodes-Light source Linearity-Modal,partition and Reflection noise-Reliability considerations-Power launching-Source to Fiber-Fiber to Fiber-LED Coupling to Single- Mode fibers-Fiber Splicing-Optical fiber connectors.

## UNIT-V                          OPTICAL DETECTION

Physical principles of Photodiodes-Photo detector noise-Detector Response time-Avalache Multiplication Noise-Structure for InGaAs APDs -Comparison of photo Detectors-Fundamentals of Receiver Operation-Digital receiver Performance-Pre-amplifier types-Analog Receivers.

## TEXT BOOK:

1. Optical Fiber Communications-Gerd Keiser-III-International Edition 2000- TMH
   Unit-I-Chap-1.1 to1.3;
   Unit-II-chap-2.1 to 2.10;
   Unit-III-3.1 to3.5;
   Unit-IV-4.1 to 4.6 & 5.1 to 5.6;
   Unit-V-6.1 to 6.7 & 7.1 to 7.5.

## REFERENCE BOOKS:

1. Fiber optic communication system D.C.Agarwal.
2. Optic fiber communication john M.Senior.
3. Fiber optic in telecommunication,N.Sharma.TMH.
4. An introduction to optical fiber, Allen H. Cherin, TMH.

| Semester VI /Allied2-4 |
|:---:|
| **COMPUTER NETWORKS** |

## UNIT-I

Introduction: Uses of computer Networks –Network Hardware –Network Software – Reference Models –Example Networks.

## UNIT-II

The Physical Layer: Guided Transmission Media –Wireless Transmission-Communication Satellites –Mobile telephone System- Network Topologies.

## UNIT-III

The Data Link Layer: Data Link Layer Design Issues –Error Detection and Correction – Elementary Data Link Protocols –Sliding Window Protocols-The Channel Allocation Problem –Multiple Access Protocols –ALOHA, CSMA, Collision free protocols.

## UNIT-IV

The Network Layer: Network Layer Design Issues-Routing Algorithms –Shortest path, Flooding, Hierarchical and Broadcast. The Transport Layer: The Transport Service, Elements of Transport Protocols.

## UNIT-V

The Application Layer: DNS- The Domain Name System –Electronic Mail –The World Wide Web – Multimedia.

## TEXT BOOKS:

1. Computer Networks by Andrew S. Tanenbhum 4<sup>th</sup> Edition, Prentice Hall of India, 2006.
   Unit I: Chap 1-1.1 to 1.5;
   Unit II: Chap 2- 2.2 to 2.4, 2.6;
   Unit III: Chap 3- 3.1 to 3.4 and Chap 4 - 4.1, 4.2.1 to 4.2.3;
   Unit IV: Chap 5 – 5.1, 5.2.2, 5.2.3 and 5.2.6,5.2.7 and Chap 6- 6.1,6.2
2. Data Communications and Networks by AchyutS.Godbole, Tata McGraw-Hill, New Delhi.
   Unit I: Chap 8-8.1 to 8.10;
   Unit V:  Chap 19-19.1,19.2, 20.1 to 20.3 ,21.1 to 21.3.

## REFERENCE BOOKS:
1. Computer Networks B.Poorna SCITECH Publications 2017.
2. Data Communications and Networking, Forouzan, Tata McGraw Hill,2003

| Semester VI /Skilled Elective 6 |
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| **ELECTRONIC EQUIPMENTS AND SERVICING** |

### UNIT-I                          ALIGNMENT AND SERVICING EQUIPMENTS
Multimeter- VTVM- Digital Multimeter- high voltage probe- RF and AF signal generator- Operation and application

### UNIT-II                          RECEIVER CIRCUIT AND ALIGNMENT
Camera- TV transmitter & receiver-2 band radio receiver circuit- Alignment BW TV circuit- alignment of color TV receiver.

**UNIT-III**  RECEIVER SERVICING

Trouble shooting procedure- Trouble shooting monochrome receiver- servicing of various functional blocks- trouble shooting color receiver servicing circuit modules- Safety precautions in TV servicing- Troubleshooting in 2 band radio receiver.


**UNIT-IV**  TEST FOR HUM, DISTORTION AND RESPONSE

Capacitor check- Square wave testing in Video amplifiers- square wave testing in audio amplifiers- Hum test for low level distortion.


**UNIT-V**  STEREO PRINCIPLES AND AUDIO, VIDEO RECORDER

Stereo and audio tape recorder/VCR- Principles – Alignment and troubleshooting.


**REFERENCE BOOKS:**
1. Gulati R.R., "Monochrome and Color Televisions", Eastern India (For Units I,II and III)
2. Vijay R.C., "Practical Transmitter Radio Servicing", Hindi PustakBhandor, Delhi.
3. Gordon JKing, Newnes Butterworth, "Servicing with Oscilloscopes" (For Units IV and V)