### UNIVERSITY OF MADRAS

**CHOICE BASED CREDIT SYSTEM**

**B.Sc. DEGREE COURSE IN ELECTRONICS AND COMMUNICATION SCIENCE**

**Revised Scheme of Examinations**

*(w.e.f.2013-14)*

**FIRST SEMESTER**

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<th>Exam Hrs.</th>
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Total Instructional Hours = 30
Total Credits = 24
## SECOND SEMESTER

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Total Instructional Hours = 30  
Total Credits = 24
## THIRD SEMESTER

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Examinations will be held in IV Semester

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### FIFTH SEMESTER

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Total Instructional Hours = 30  
Total Credits = 24

1. Theory of Robotics and Automation  
2. Industrial Electronics  
3. Microwave And Fiber Optic Communication Systems  
4. Mobile Communication  
5. Medical Electronics  
6. Consumer Electronics

**Overall Credits = 140**
APPENDIX – 25(S)
UNIVERSITY OF MADRAS
CHOICE BASED CREDIT SYSTEM

B.Sc. DEGREE COURSE IN ELECTRONICS
AND COMMUNICATION SCIENCE

REVISED SYLLABUS
(w.e.f.2013-14)

CORE 1 – BASIC CIRCUIT THEORY

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CREDITS: 4
SEMESTER: I

COURSE OBJECTIVES:

1. To apply circuit theorems to simplify and find solutions to electrical circuits.
2. To solve simple circuits using ohm’s law, Kirchhoff’s laws and the properties of the elements.
3. To build up basic problem solving skills through organizing available information and applying circuit laws.
4. To build up strong problem solving skills by effectively formulate a circuit problem into a mathematical problem using circuit laws and theorems.
5. To Simplify circuits using series and parallel equivalents and using Thevenin and Norton equivalents
6. To understand transient circuit response.

UNIT I

RESISTORS & CAPACITORS – Introduction to linear and non linear components (active and passive) - Types of resistors – Wire wound, Carbon composition , film type, Cermets’, fusible resistors – Resistor color coding – Power rating of resistors – Series and Parallel combinations of resistors


UNIT II


UNIT III


UNIT IV


UNIT V


TEXT BOOKS:

4. Murugeshan, R. Electricity & Magnetism by R. S. Chand & Company Ltd.

REFERENCE BOOKS:

1. Theraja V, Basic Electronics Solid state, S. Chand & Company Ltd.
2. Bernard Grob, Basic Electronics, McGraw-Hill Book Company

WEBSITES:

1. Khan academy.org
2. NPTEL
6. www.ocw.mit.edu
7. www.academic.earth

Note: There is no change in the non major elective papers.
CORE 2 – MAIN PRACTICALS - 1

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CREDITS: 4       SEMESTER: I

(At least Seven experiments should be done for the Examination)

1. Study of, CRO, Multimeter and other Testing devices (Study Purpose)
2. Testing of components
3. To verify Ohm’s Law using voltmeter & ammeter.
4. Study of Kirchoff’s law
5. Resistance in series & parallel.
7. Study of super position theorem
8. Verification of Thevenin’s Theorem.
10. Study of Series Resonance RLC Circuits.

REFERENCE BOOKS

2. Sugaraj Samuel R., Horsley Solomon, B.E.S. Practicals.

CORE 3 – BASIC ELECTRONICS

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CREDITS: 4       SEMESTER: II

COURSE OBJECTIVES:

1. To understand the use of diodes as power supply rectifiers.
2. To understand the operation of transistors as switching circuits.
3. To learn the tools and techniques of practical electronics and circuit design.
4. To understand the fundamentals of operation of the main semiconductor electronic devices.
5. To understand the fundamentals of special purpose diodes.
6. To familiarize the student with the analysis and design of basic transistor amplifier circuit.

UNIT I


UNIT II

SEMICONDUCTOR BASICS – Conductor – Semiconductor – Introduction to Intrinsic and Extrinsic semiconductor – P type and N type semiconductor – PN junction diode – V-I characteristics – Half wave, Full wave & Bridge rectifier – expression for efficiency and ripple factor - Construction of Basic logic gates using Diodes

UNIT III


UNIT IV


UNIT V


TEXT BOOKS
3. Theraja B.L., Basic Electronics Solid state, S. Chand & Company Ltd.
4. Albert Paul Malvino, Donald P. Leach, Digital principles and applications, McGraw-Hill

REFERENCE BOOKS
2. Sedha R.S., A TextBook of Applied Electronics, S. Chand & Company Ltd.

WEBSITES

- Khan academy.org
- NPTEL
- http://www.electronicsteacher.com
- http://www.science-ebooks.com
- http://www.abcofelectronics.com
- www.ocw.mit.edu
- www.academic.earth

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CREDITS: 4  SEMESTER: II

(At least seven experiments should be done for the Examination)

2. Rectifier circuits – Half Wave, Center-tapped Full wave.
3. Bridge Rectifier.
6. Transistor as a switch.
7. Transistor Characteristics of CE Configuration.
8. Logic gates using Diodes.
9. Logic gates using Transistor.
10. Characteristics of UJT.
11. Characteristics of JFET

REFERENCE BOOKS

2. Sugaraj Samuel R., Horsley Solomon, B.E.S. Practicals.
CORE 5 – AMPLIFIERS AND OSCILLATORS

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<th>SUBJECT CODE:</th>
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CREDITS: 4  
SEMESTER: III

COURSE OBJECTIVES:

1. To understand the operations and the applications of the various classes of an Amplifier.
2. To study the operation of Push-Pull Amplifier.
3. To familiarize the student with the analysis and design of basic transistor amplifier circuits, feedback amplifiers, wave shaping and multi vibrator circuits.
4. To study the effect on Input Impedance and Frequency on Common Emitter Amplifier.
5. To study the operation of Hartley, Colpitts, RC Phase shift, crystal and Wien bridge oscillators.
6. To determine the operating characteristic of Unijunction Transistor Oscillator.

UNIT I


POWER AMPLIFIERS - Class A – Single ended amplifier - Class B Transformer coupled pushpull amplifier – Crossover distortion – Complementary Symmetry Class-B Push-Pull Amplifier - power dissipation and output power calculations.

UNIT II


UNIT III


UNIT IV


IC 555 timer - pin functions - internal architecture
UNIT V


IC 555 APPLICATIONS - Astable, Monostable and Schmitt trigger.

TEXT BOOKS:
3. Sedha, R.S. A TextBook of Applied Electronics, S. Chand & company Ltd.

REFERENCE BOOKS:

WEBSITES:
1. Khan academy.org
2. NPTEL
6. www.ocw.mit.edu
7. www.academic.earth

CORE 6 – MAIN PRACTICALS - III

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CREDITS: 4  SEMESTER: III

[At least 4 from experiments (1-8) and 4 from experiments (9-16)]

1. Single stage R-C Coupled Amplifier
2. Emitter Follower
3. FET Amplifier
4. Colpitt’s Oscillator
5. Hartley Oscillator
6. R-C phase Shift Oscillator
7. Relaxation Oscillator
8. IC Regulated Power Supply
9. OPAMP – Inverting and Non-inverting modes, Unity Follower
10. Operational Summing Amplifiers – Inverting and non-inverting modes.
11. OPAMP – Integrator and Differentiator
12. OPAMP – Square wave generator
13. OPAMP – Sine Wave Generator
14. Monostable multivibrators using IC 555 timer
15. Astable multivibrator using IC 555 timer

REFERENCE BOOKS

2. Sugaraj Samuel R., Horsley Solomon, B.E.S. Practicals.

CORE 7 – DIGITAL ELECTRONICS

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CREDITS: 4

SEMESTER: IV

COURSE OBJECTIVES:

1. To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
2. To perform decimal, octal, hexadecimal, and binary conversions.
3. To apply Boolean algebra to solve logic functions.
4. To implement simple logical operations using combinational and sequential logic circuits.
5. To identify and differentiate digital electronics applications.

UNIT I

NUMBER SYSTEMS AND CODES – Decimal, binary, octal, hex numbers, conversion from one to another – codes, BCD, excess 3, gray codes conversion from one to another – Error detection codes.
UNIT II

BOOLEAN ALGEBRA AND THEOREMS – Basic, Universal logic gates – Boolean Identities - Boolean theorems De Morgan’s Theorem – sum of products, products of sums expressions, simplification by Karnaugh Map method, simplification based on basic Boolean theorems – don’t care conditions.

UNIT III


UNIT IV


UNIT V

BLOCK DIAGRAM OF MEMORY DEVICE – ROM Organization - PROM Organization – PLA (Programmable Logic Array) – PAL (Programmable Array Logic) – Realization of functions using PROM

TEXT BOOKS


REFERENCE BOOKS


WEBSITES

1. Khan academy.org
2. NPTEL
5. www.ocw.mit.edu
CORE 8 - MAIN PRACTICAL - IV

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CREDITS: 4  SEMESTER: IV

(At least EIGHT experiments should be done for the Examination)

1. Universality of NAND & NOR gates.
2. Verification of Boolean laws using NAND gates (Associative, Commutative & Distributive Laws)
3. Verification of Boolean laws using NOR gates (Associative, Commutative & Distributive Laws)
5. 4-bit binary parallel adder and Subtractor IC 7483
6. Counter using IC 7473
7. Study of RS, D, T and JK Flip-Flops with IC’s.
8. Study of Encoder & Decoder.
9. Study of Multiplexer & De-Multiplexer.
12. Study of 7490 BCD Counter – MOD Counters.
13. BCD to Seven segment decoder 7447/7448.

REFERENCE BOOKS

2. R. Sugaraj Samuel & Horsley Solomon, B.E.S. Practical.

CORE 9 - MICROPROCESSOR (INTEL 8085)

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CREDITS: 4  SEMESTER: V

COURSE OBJECTIVES:

1. To know the microprocessor as a programmable digital system element.
2. To illustrate some basic concepts of microprocessors through the use of assembly language programming.
3. To develop an in-depth understanding of the operation of microprocessors and machine language programming & interfacing techniques.
4. To design simple interfaces to Intel-8085.
5. To Comprehend the various peripheral interface circuits that are necessary for the operation of Intel-8085.

UNIT I


INSTRUCTION SET OF 8085 – Instruction classification – addressing modes

UNIT II

MEMORY– Instruction cycle – machine cycle – T-state -Timing diagrams for Opcode Fetch Cycle Memory Read, Memory Write, I/O Read, I/O Write, – Functional explanation for RAM, ROM, EPROM, EEPROM.

UNIT III

PROGRAMMING EXERCISES – addition & subtraction(16-bit), multiplication, division, largest, smallest, block transfer (all 8-bit data), Binary to BCD, BCD to Binary, Binary to ASCII, ASCII to Binary, BCD to ASCII, ASCII to BCD (all 8-bit data) - Stack & Subroutines Concept – time delay using single register & calculations – Debugging a program.

UNIT IV

INTERFACING MEMORY – 2K X 8, 4K X 8 ROM, RAM to 8085, Interfacing an I/O port in Memory Mapped I/O and I/O Mapped I/O – Difference between I/O mapped and Memory Mapped I/O.

UNIT V

MICROPROCESSOR APPLICATIONS – Programmable peripheral devices (8255, 8253) – Pin functions, Different Modes & Block Diagram - Keyboard and Display Interface 8279 (Architecture) - Simple temperature controller – Simple traffic light controller.

TEXT BOOKS

1. Ramesh S. Gaonakar, Microprocessor Architecture, Programming and Application with the 8085-Penram International Publishing, Mumbai.

REFERENCE BOOKS


WEBSITES:

- Khan academy.org
- NPTEL
- www.ocw.mit.edu
- www.academic.earth
COURSE OBJECTIVES:

1. To provide the basic knowledge about the fundamentals of antenna.
2. To describe the electromagnetic radiation with application to antenna theory and design.
3. To make the students understand the radio wave propagation phenomena in modern communication systems.
4. To understand the applications of the electromagnetic waves in free space.
5. To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver Picture tubes and Television Camera Tubes.
6. To study the various Color Television systems with a greater emphasis on television standards.
7. To study the advanced topics in digital television and High definition television.

UNIT I

FUNDAMENTALS OF ANTENNA – Antenna parameters – Gain and directivity – Efficiency – Effective length – Bandwidth – Beam width – Radiation resistance – Polarization – Grounded and ungrounded antenna’s – Effects of antenna height – Radiation Patterns

UNIT II


UNIT III


UNIT IV

UNIT V


ADVANCE TECHNIQUES – Introduction of CCD camera – HDTV – Digital TV – Video disc – Cable TV - VCR

TEXT BOOKS

1. Srinivasan. K.S., Analog Modulation & Systems
2. Srinivasan. K.S. Digital Communication

REFERNCE BOOKS:


WEBSITES:

1. Khan academy.org
2. NPTEL
4. www.ocw.mit.edu
5. www.academic.earth

CORE 11 - ELECTRICAL AND ELECTRONICS INSTRUMENTATION

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CREDITS: 4 SEMESTER: V

COURSE OBJECTIVES:

1. To introduce the basic concepts related to the operation of Electrical and Electronic Measuring Instruments.
2. To study the basics of design of analog and digital circuits used in electronic instrumentation.
3. To understand basic electronic instrument terminology.
4. To understand the proper application of electronic instruments.
UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V

TRANSUDCERS AND DISPLAY DEVICES – Strain gauge, Linear voltage differential transformer(LVDT), Resistance Thermometer – Photoelectric Transducer – LED, LCD – Seven Segment Display.

TEXT BOOKS


WEBSITES

- Khan academy.org
- NPTEL
- www.ocw.mit.edu
- www.academic.earth
CORE 12 - MAIN PRACTICALS - V

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CREDITS: 4  SEMESTER: V

(At least EIGHT experiments should be done for the Examination)

Programs using Intel 8085

1. Addition & Subtraction (8 & 16-bits)
2. Multiplication & Division (8 – bit)
3. Square and Square root
4. Largest & Smallest number in the given array.
5. Ascending & Descending order.
6. Binary to ASCII & ASCII to Binary, BCD to ASCII & ASCII to BCD.
7. Block Transfer of Data.
8. Waveform generation using DAC interface.

Communication

10. Frequency Modulation and detection.
11. Pulse Amplitude Modulation and detection.
12. Pulse Width Modulation and detection.
13. Pulse Position Modulation and detection.

BOOKS FOR REFERENCE

2. Sugaraj Samuel R., Horsley Solomon, B.E.S. Practicals.
CORE 13 - MICROCONTROLLER

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CREDITS: 4        SEMESTER: VI

COURSE OBJECTIVES:

1. To Familiarize with different types of Microcontroller.
2. To know 8051 microcontroller in detail.
3. To learn Programming and Interfacing with 8051 microcontroller.
4. To develop an in-depth understanding of the operation of microcontrollers & interfacing techniques.
5. To Understand and use various IO devices such as keypads, stepper motor, A to D and
6. To learn D to A converters.

UNIT I


UNIT II

8051 INSTRUCTION SET - Addressing Modes – Logical operation: Byte level - Bit level – Rotate And Swap operation.

ARITHMETIC OPERATION Instructions affecting flags – Incrementing and Decrementing - Addition – Subtraction – Multiplication and Division – Example Program.

UNIT III


UNIT IV

INTERFACING – Keyboards – Displays - Stepper motor – ADC & DAC.

UNIT V

INTRODUCTION TO MICROCONTROLLERS – 6509 – PIC controllers - 6575 series – Introduction to Embedded Systems.
TEXT BOOKS

REFERENCE BOOKS

WEBSITES
1. Khan academy.org
2. NPTEL
6. www.ocw.mit.edu
7. www.academic.earth

CORE 14 - ADVANCED ELECTRONICS

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CREDITS: 4

SEMESTER: VI

COURSE OBJECTIVES:

1. To understand the fundamentals of optoelectronics and principles of the optoelectronic devices operation.
2. To be familiar with recent trends in optoelectronics.
3. To study the basic concepts of smart phones.
4. To understand the fundamental concepts of nanoelectronics.

UNIT I

UNIT II

MEMS – MEMS Definition – Materials for MEMS Manufacturing (Silicon, Polymers, Ceramics, Metals) - MEMS basic processes - Deposition processes, Patterning, Etching (Only Introductory Level) – Mentioning of Applications of MEMS.

UNIT III

Smart Phones – Symbian – Symbian- Android (operating system – Apple iPhone - Windows Phone - Palm OS - Bada operating system - Open-source development

UNIT IV

Nanoelectronics – Concept of 3D, 2D & 0D Nano Structures

UNIT V

Voice & Data communication - Wired/Wireless - Communication using IP networks, SDH, Routers.

TEXT BOOKS


WEBSITES:

- Khan academy.org
- NPTEL
- http://www.electronicsteacher.com
- http://www.science-ebooks.com
- http://www.abcofelectronics.com
- www.ocw.mit.edu
- www.academic.earth

CORE 15 - COMPUTER NETWORKS

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CREDITS: 4

SEMESTER: VI

COURSE OBJECTIVES:

- To learn the definition and basic terminology of Computer Networks.
- To learn the different types of Computer Networks.
To know the applications of Computer Networks in different fields.
To know about Multiplexing, transmission media and signals.
To learn the functioning of OSI model and to describe the responsibilities of each layer.
To know about the individual components and functioning of the Internet.
To learn about the hardware components used in the networking.

UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V

Repeaters, bridges, routers and gateways – Brief introduction to the transport layer, session layer, presentation layer and application layer-Basic concepts of Internet – WWW.

TEXT BOOKS

2. W. Stallings: Data and computer communication, Prentice Hall of India.

WEBSITES:

- Khan academy.org
- NPTEL
- http://www.electronicsteacher.com
- http://www.science-ebooks.com
- http://www abcofelectronics.com
- www.ocw.mit.edu
- www.academic.earth
COURSE OBJECTIVES:

- To acquire knowledge in differentiation and Integration.
- To apply mathematical skills in core topics like signal analysis
- To solve a given problem using appropriate mathematical techniques.
- To understand and recognize the practical applications of mathematics.
- To use mathematical tools in appropriate technological devices.

UNIT I

THEORY OF EQUATIONS - Polynomial equations with real coefficients, irrational roots, complex roots, symmetric functions of roots, transformation of equation by increasing or decreasing roots by a constant, reciprocal equations, Newton’s method to find a root approximately – simple problems.

UNIT II

MATRICES - Eigen values and Eigen-vectors, Cayley-Hamilton theorem (without proof) – verification Computation of inverse matrix using Cayley – Hamilton theorem

UNIT III

TRIGONOMETRY - Expansions of sinǿ, cosǿ, tanǿ expansions of sinnǿ, cosnǿ, tannǿ. Hyperbolic and inverse hyperbolic functions- Logarithms of complex numbers

UNIT IV

DIFFERENTIAL CALCULUS - nth derivatives, Leibnitz theorem (without proof) and applications, Jacobians, radius of Curvature and Curvature, Maxima and Minima of functions of two variables, – Simple problems.

UNIT V

INTEGRAL CALCULUS - Integration of a rational function of the type. 
\[ \int \frac{px + q}{ax^n + bx + c} \, dx \]

Integrals of the type \[ \int \frac{px + q}{ax^n + bx + c} \, dx; \quad \int (dx) / (x + p ax^n + bx + c) \]
Rational functions of $\sin x$ and $\cos x$.

\[
\int \frac{dx}{a + bx} ; \quad \int \frac{dx}{a + b \sin x} ; \quad \int \frac{(a \cos x + b \sin x + c)/(p \cos x + q \sin x + r) \, dx}
\]

Evaluation of \( \int e^{ax} \cos bx \, dx; \quad \int e^{ax} \sin bx \, dx \)

Bernouill’s formula for integration by parts, Reduction Formula

**TEXT BOOKS**

- Vittal P. R., Allied Mathematics, (Margham Publications).
- Narayanan S., Ancillary mathematics, Viswanathan publishers.
- Singaravelu A., Allied Mathematics, Meenakshi Agency

**REFERENCES**

- Duraipandian P., Udayabaskaran S., Allied Maths volumes 1 and 2, Muhil publishers, Chennai.
- Dipak Chatterjee, Integral calculus and differential equations, Tata McGraw Hill publishers co Ltd.
- Kandasamy P., Thilagavathi K., Allied Mathematics, S.Chand and Co.

**WEBSITES**

- Khan academy.org
- NPTEL

**ALLIED I**

**Paper II - MATHEMATICS II**

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**CREDITS: 5**  
**SEMESTER: II**

**COURSE OBJECTIVES:**

- To acquire knowledge in differentiation and Integration.
- To apply mathematical skills in core topics like signal analysis.
- To solve a given problem using appropriate mathematical techniques.
• To understand and recognize the practical applications of mathematics.
• To use mathematical tools in appropriate technological devices.

UNIT I

FOURIER SERIES – Fourier series for functions in (0, 2\pi], (-\pi, \pi], Even - Odd functions, Half range cosine and sine series.

UNIT II

ORDINARY DIFFERENTIAL EQUATIONS – Second order differential equations with constant coefficients.

\[(a X^2 + b X+ c)y = \phi (x)\]

where \( \phi (x) = x^n, e^{ax}, x^m, e^{ax} \sin mx, e^{ax} \cos mx, \)

Second order differential equation with variable co efficient, Variation of Parameters.

UNIT III

PARTIAL DIFFERENTIAL EQUATIONS – Formation, complete integrals and general integrals, four standard types of Lagrange’s equations

UNIT IV

LAPLACE TRANSFORMS – Laplace transformations of standard functions and simple properties, inverse laplace transforms Application to solution linear differential equations or order 1 and 2 – simple problems.

UNIT V

VECTOR ANALYSIS – Scalar point functions, vector point functions, gradient, divergence, curl directional derivatives, normal to a surface. Line and surface integrals; Gauss, Stoke’s and Green’s theorems (without proof)-Simple problems.

TEXT BOOKS

• Vittal P. R., Allied Mathematics, (Margham Publications).
• Narayanan S., Ancillary mathematics, Viswanathan publishers.
• Singaravelu A., Allied Mathematics, Meenakshi Agency

REFERENCES

• Duraipandian P., Udayabaskaran S., Allied Maths volumes 1 and 2, Muhil publishers, Chennai.
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• Kandasamy P., Thilagavathi K., Allied Mathematics, S.Chand and Co.
WEBSITES

- Khan academy.org
- NPTEL

ALLIED II

Paper I - BASIC PHYSICS - I

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CREDITS: 3          SEMESTER: III

COURSE OBJECTIVES:

- Physics is a systematic study of the natural world, a discipline that measures reality through application of observation with logic and reason. In order to make use of such a discipline we need certain foundational information.
- To provide basic principles and fundamentals of Physics.
- To understand What is Physics and the different fields of Physics.
- To understand the fundamental laws and their applications in measuring many physical quantities.
- To prepare students for careers where Physics principles can be applied to the development of Technology.

UNIT – 1


UNIT – 2


UNIT – 3

SURFACE TENSION: Molecular theory of surface tension – Excess of pressure inside a soap bubble – surface tension by drop weight method - interfacial surface tension.

UNIT – 4


UNIT – 5


TEXT BOOKS

2. Dr.Dhanalakshmi, Dr.Sabesan -Allied Physics

REFERENCE BOOKS:

1. Narayanamoothy and others-Mechanics
3. Nelkon and Parker-Advanced level Physics
4. Weber, Manning and White-College Physics
5. Brijlal and Subramanyam-A text book of Sound

WEBSITES:

- Khan academy.org
- NPTEL
- www.ocw.mit.edu
- www.academic.earth
ALLIED II

Paper II - BASIC PHYSICS II

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CREDITS: 3  
SEMESTER: IV

COURSE OBJECTIVES:

- Physics is a systematic study of the natural world, a discipline that measures reality through application of observation with logic and reason. In order to make use of such a discipline we need certain foundational information.
- To provide basic principles and fundamentals of Physics.
- To understand What is Physics and the different fields of Physics.
- To understand the tools and methods that Physicists use range from balance scales to Ultrasonics, laser beam emitters.
- To understand the fundamental laws and their applications in measuring many physical quantities.
- To prepare students for careers where Physics principles can be applied to the development of Technology

UNIT – 1


UNIT – 2


UNIT 3

UNIT 4


UNIT 5


TEXT BOOKS

2. Mr. Kamalakkaman and Jayraman..Allied Physics
3. R. Murugeshan- Modern Physics, S.Chand & Co.

REFERENCE BOOKS

1. Thiagarajan-Laser Physics.
2. Gaur & Gupta- Engineering physics .
3. Dr. Arumugam-Bio Medical Instrumentation - Anuradha Publications.

WEBSITES

• Khan academy.org
• NPTEL

ALLIED II Paper III - BASIC PHYSICS PRACTICAL

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CREDITS: 4 SEMESTER: IV

(At least Seven experiments should be done for the Examination)

1. Young’s Modulus by non-uniform bending – pin and microscope
2. Rigidity modulus by Torsional pendulum.
3. Surface tension and interfacial surface tension by drop weight.
5. Thermal conductivity of a bad conductor by Lee’s disc method
6. Melde’s string – frequency of a vibrator
7. Sonometer – determination of AC frequency
8. Spectrometer – i-d curve
9. Spectrometer – grating at normal incidence – determination of wavelength of mercury spectrum
10. Newton’s rings – Wavelength of sodium light

REFERENCE BOOKS
1. Srinivasan M.N. and Others, A text book of practical Physics, Sultan Chand and Sons, New Delhi
2. Srinivasan M.N., Allied Practical Physics, Sultan Chand and Sons, New Delhi
3. Sugaraj Samuel R., Horsley Solomon, B.E.S. Practicals

FOUNDATION COURSE 1– ELECTRICITY, MAGNETISM AND ELECTROMAGNETISM

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CREDITS: 3  SEMESTER: III

COURSE OBJECTIVES:

- To familiarize the student to the concepts, calculations pertaining to electric, magnetic and electromagnetic fields so that an in depth understanding of antennas, electronic devices, Waveguides is possible.
- To analyze fields and potentials due to static charges.
- To evaluate static magnetic fields.
- To understand how materials affect electric and magnetic fields.
- To understand the relation between the fields under time varying situations.
- To understand principles of propagation of uniform plane waves.

UNIT I

ELECTROSTATICS – Coulomb’s Law, Permittivity of free space - Relative permittivity - Electric intensity - Intensity due to a point charge - Electric potential - Relation between potential and intensity - Electric field and equipotential plots - Electric dipole - dipole moment - Normal electric Induction - Gauss theorem and Applications - Electric intensity due to a uniformly charged sphere, infinite cylinder and plane sheet of charge

UNIT II

DIELECTRICS – Dielectric polarization, Electric field in multiple dielectrics – boundary conditions, Poisson’s and Laplace’s equations – Capacitance-energy density – Dielectric strength Capacitance, computation of capacitance in simple cases (parallel plates); spherical and cylindrical capacitors containing dielectrics
UNIT III


UNIT IV

CURRENT ELECTRICITY – EMF and Internal resistance of a cell - Cells connected in series and in parallel - Carey-Foster bridge - Potentiometer - Calibration of ammeter, high and low range Voltmeter, comparison of resistances.

UNIT V

ELECTROMAGNETIC INDUCTION - Faraday’s and Lenz’s law; motional e.m.f.- Self Induction-Mutual Induction- calculation of self and mutual inductance in simple cases-inductances in series and parallel- reciprocity theorem LR, CR and LCR circuits- transient and sinusoidal emf cases

TEXT BOOKS

4. D.N. Vasudeva-Electricity and magnetism

BOOKS FOR REFERENCE

1. Sehgal and Chopra-Electricity & Magnetism

WEBSITES

- Khan academy.org
- NPTEL
- www.ocw.mit.edu
- www.academic.earth
FOUNDATION COURSE II - NUMERICAL METHODS

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<td>EXTERNAL: 75</td>
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</table>

CREDITS: 3  
SEMESTER: III

COURSE OBJECTIVES:

1. To identify and classify the numerical problem to be solved
2. To choose the most appropriate numerical method for its solution based on characteristics of the problem
3. To understand the characteristics of the method to correctly interpret the results
4. To understand the basic methods, algorithms and programming techniques to solve mathematical problems.

UNIT – I

INTERPOLATION – Newton’s Forward and Backward formulae – Dividend differences and their properties, Stirling’s and Bessel’s formulae – Langrange’s formula – simple problems.

UNIT – II

NUMERICAL INTEGRATION – General Quadrature formula – Trapizoidal rule, Simpson’s 1/3 rule, Euler-Maclaurin’s formula, Stirling’s formula for factorial n – Summation of series by Euler – Maclaurin’s formula.

UNIT – III

SOLUTIONS OF TRANSCENDENTAL AND POLYNOMIAL EQUATIONS IN ONE VARIABLE –  


UNIT – IV


UNIT – V

TEXT BOOKS

3. James Blaine Scarborough, Numerical Mathematical Analysis, Published by Oxford and IBH

REFERENCE BOOKS


WEBSITES

1. Khan academy.org
2. NPTEL
3. www.ocw.mit.edu
4. www.academic.earth

FOUNDATION COURSE III - PRINCIPLES OF COMMUNICATION

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CREDITS: 3                SEMESTER: IV

COURSE OBJECTIVES:

1. To learn the basic principles of analog and digital communication systems.
2. To familiarize the student with modulation techniques.
3. To recognize and understand common modulation schemes for continuous wave modulation including amplitude modulation, frequency modulation, and phase modulation.
4. To recognize and understand common digital pulse modulation schemes including delta modulation and pulse-code modulation.
5. To understand the common analog pulse modulation schemes including pulse-amplitude modulation, pulse-width modulation, and pulse-position modulation.

UNIT I

INTRODUCTION TO FOURIER TRANSFORM - properties of Fourier Transform - Sampling theorem – Natural Sampling & Flat-top Sampling (Qualitative analysis)
UNIT II


AM TRANSMITTER – Block diagram of AM Transmitter – definition of low level & high level modulation – Superheterodyne receiver – General Characteristics of receiver.

UNIT III


FM TRANSMITTER – Direct method & Armstrong method – FM super heterodyne receiver – Pre-emphasis & De-emphasis – Comparison of AM & FM -

UNIT IV

ANALOG PULSE CODE MODULATION - Generation & Detection of PAM, PWM & PPM.

DIGITAL PULSE MODULATION & DEMODULATION – PCM – Quantizing & Coding – Generation & Demodulation of PCM – Companding & encoding – Applications of PCM – Basic Concept of DM & ADM.

UNIT V


TEXT BOOKS

1. Arokh Singh and Chhabra A.K., Principles of Communication Engineering – S. chand
2. Theraja . BL., Basic Electronics, S. chand

REFERENCE BOOKS

1. Venkatraman SK., Digital Communication, S. Chand
2. Roddy and Coolen, Communication electronics, PHI
3. Lathi B.P., Communication System, Wiley Eastern
5. Robert M. Gaghardi, Satellite Communication, CBS Publication
WEBSITES

1. Khan academy.org
2. NPTEL
5. www.ocw.mit.edu
6. www.academic.earth

FOUNDATION COURSE IV - PROGRAMMING IN ‘C’ & OOPS CONCEPT

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CREDITS: 3  SEMESTER: IV

COURSE OBJECTIVES:

1. To Understand how to use and manipulate variables and types to change the program state, including numeric, character, array and pointer types, as well as the use of structures and typedefs.
2. To understand the purpose and use of function libraries.
3. To understand the purpose of pointers for parameter passing, referencing and dereferencing, and linking data structures.
4. To understand object-oriented programming features in C++,
5. To understand the implementation of various data structures and algorithms in C++.

UNIT I


UNIT II


UNIT III

ARRAYS – Array definition – Processing arrays – Passing array to a function – Multidimensional arrays – Strings – Storage classes.
**POINTERS** – Pointer declaration – Pointers and arrays – Pointer operation – Passing pointers to a function – Passing function to a function.

**UNIT IV**


**DATA FILES** – Opening, closing, creating. Processing, data files – Register variables and bitwise operations – Command line parameters – C pre processors.

**UNIT V**

**LIMITATION OF PROCEDURAL LANGUAGE** – Characteristics of Object Oriented Language – Objects – Class – Inheritance – Reusability – Structure of C++ program – Polymorphism – Overloading – Applications of OOPS.

**TEXT BOOKS**


**REFERENCE BOOKS**


**WEBSITES**

1. Khan academy.org
2. NPTEL
3. [http://www.cprogramming.com](http://www.cprogramming.com)
4. [www.ocw.mit.edu](http://www.ocw.mit.edu)
5. [www.academic.earth](http://www.academic.earth)
ELECTIVE - THEORY OF ROBOTICS AND AUTOMATION

SUBJECT CODE: THEORY

MARKS: 100
INTERNAL: 25
EXTERNAL: 75

CREDITS: 4
SEMESTER: V or VI

UNIT I

UNIT I

UNIT III
GRIPPERS AND ROBOT DYNAMICS – Introduction - various types of grippers-design considerations.

UNIT IV

UNIT V

TEXT BOOKS:
REFERENCE BOOKS:


WEBSITES:

1. Khan academy.org
2. NPTEL
5. www.ocw.mit.edu
6. www.academic.earth

ELECTIVE - INDUSTRIAL ELECTRONICS

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CREDITS: 4       SEMESTER: VI

UNIT I


UNIT II


UNIT III


UNIT IV

UNIT V

APPLICATIONS IN INDUSTRY – Relays and their characteristics and applications – Generation , Detection and Application of Ultrasonic’s Application of LASER in industry.

BOOKS


WEBSITES:

1. Khan academy.org
2. NPTEL
5. www.ocw.mit.edu
6. www.academic.earth

ELECTIVE - MICROWAVE AND FIBER OPTIC COMMUNICATION SYSTEMS

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CREDITS: 4

SEMESTER: V or VI

COURSE OBJECTIVES:

1. To study the principles of generation, transmission and application of microwaves.
2. To explore the optical communication systems techniques and compare with other methods of transmission.
3. To study the properties and design of Oscillator and amplifier.
4. To understand the concepts of multi-mode and single-mode.
5. To understand how fiber-optic communication systems work.
6. To understand the applications of Radar.
UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V


BOOKS FOR STUDY AND REFERENCE:


WEBSITES:

- Khan academy.org
- NPTEL
- http://www.electronicsteacher.com
- http://www.science-ebooks.com
- http://www.abcofelectronics.com
ELECTIVE - MOBILE COMMUNICATION

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CREDITS: 4

SEMESTER: V or VI

UNIT I

CELLULAR MOBILE RADIO SYSTEMS AND ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN
- Introduction to Cellular Mobile System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems, General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni directional Antenna system, Cell splitting, consideration of the components of Cellular system.

UNIT II

INTERFERENCE AND CELL COVERAGE FOR SIGNAL AND TRAFFIC – Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co channel interference-different types, Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

UNIT III

CELL SITE AND MOBILE ANTENNAS, FREQUENCY MANAGEMENT, CHANNEL ASSIGNMENT, HANDOFF – Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas, Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment, Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

UNIT IV

WIRELESS SYSTEMS AND STANDARDS AND DIGITAL CELLULAR NETWORKS – Second generation and Third generation Wireless Networks and Standards, WLL, Bluetooth, GSM, IS-95, DECT, GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

UNIT V

**BOOKS**


**WEBSITES:**

1. Khan academy.org
2. NPTEL
3. [http://www.electronicsteacher.com](http://www.electronicsteacher.com)
4. [http://www.abcofelectronics.com](http://www.abcofelectronics.com)
5. [www.ocw.mit.edu](http://www.ocw.mit.edu)
6. [www.academic.earth](http://www.academic.earth)

**ELECTIVE – MEDICAL ELECTRONICS**

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**CREDITS: 4**

**SEMESTER:** V or VI

**UNIT-1**

**BIO-AMPLIFIERS** : Bio potentials - bio - electricity, Necessity for special types of amplifiers for biological signal amplifications - different types of Bio-OP-AMPS.

**UNIT-2**

**BIO-POTENTIAL RECORDING** : ECG - EEG - EMG - ERG - Specific types of electrodes used - different lead systems - their waveforms.

**UNIT-3**

**MEASUREMENT OF BIOLOGICAL PARAMETERS** - Measurement of respiration rate - measurement of heart beat rate - measurement of temperature - measurement of blood pressure - patient monitoring set up - blood flow meters EM and plethysmographic technique.
UNIT-4

HIGH ENERGY RADIATION APPLICATIONS: Applications of X-ray and isotopes for diagnostics and therapeutic applications - application of Lasers in biological medium.

UNIT-5

HIGH FREQUENCY APPLICATIONS: Diathermy effect - Short wave diathermy - Ultrasound diathermy - Microwave diathermy.

BOOKS FOR STUDY AND REFERENCE

1. Clinical Engineering - Jacobster and Webster, PHI.

WEBSITES

1. Khan academy.org
2. NPTEL
5. www.ocw.mit.edu
6. www.academic.earth
ELECTIVE - CONSUMER ELECTRONICS

SUBJECT CODE: THEORY

MARKS: 100
INTERNAL: 25
EXTERNAL: 75

CREDITS: 4

SEMESTER: V or VI

UNIT-I

MICROWAVE OVENS – Microwaves (Range used in Microwaves Ovens) - Microwave oven block diagram - LCD timer with alarm – Single-Chip Controllers – Types of Microwave oven - Wiring and Safety instructions - Care and Cleaning.

UNIT-II

WASHING MACHINES – Electronic controller for washing machines - Washing machine hardware and software - Types of washing machines - Fuzzy logic washing machines - Features of washing machines.

UNIT-III

AIR CONDITIONERS AND REFRIGERATORS – Air Conditioning - Components of air conditioning systems - All water air conditioning systems - All air conditioning systems - Unitary and central air conditioning systems - Split air conditioners.

UNIT-IV


UNIT-V

DIGITAL ACCESS DEVICES – Digital computer - Internet access - Online ticket reservation - Functions and networks - Barcode Scanner and decoder - Electronic Fund Transfer - Automated Teller Machines (ATMs) - Set-Top boxes - Digital cable TV - Video on demand.

BOOKS


WEBSITES:

- Khan academy.org
- NPTEL

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