SARDAR PATEL UNIVERSITY
VALLABH VIDYANAGAR

SYLLABUS EFFECTIVE FROM: 2017-18

Syllabus for M.Sc. (Electronics)
Semester II

PS02CELE21: ELECTROMAGNETISM AND ANTENNA THEORY
TOTAL 100 MARKS (EXTERNAL – 70, INTERNAL-30)
University Examination – 3 Hours Duration

Outline:
This course entails the analysis, synthesis, physical interpretation and application of electric and magnetic fields. The content of this course gives a working knowledge of the basic concepts of electromagnetism and Antenna Thory.

UNIT-1
Electrostatics – Gauss's law, Poison and Laplace equations, Green's Theorem, Potential energy and energy density. Magnetostatics – Biot and Savart law, Ampere's Circuital law, Energy density in magnetic field. Maxwell's equations, Displacement current, Scalar and Vector Potential, Gauge transformations, Poynting's theorem,

UNIT-2
Propagation of Electromagnetic Waves in non- conducting medium and conducting medium,Transmission lines, Coaxial line, Twin wire line, Strip and Microstrip line, Standing wave, Reflection coefficient and Impedance, Smith Chart and its applications, Quarter and Half wavelength lines, Stubs and Baluns,

UNIT-3
Wave guides, Wave propagation in Rectangular and Circular wave – guides, Wave-guide modes, Wave guides coupling, Wave guide joints: T-Junctions and Hybrid Junctions, Isolators and circulators, Matching and attenuations.

UNIT-4
Antenna- The radiation mechanism, Elementary doublet, Resonant & non-resonant antenna, Antenna gain and directivity, Antenna impedance and efficiency, Dipole arrays, Folded Dipole and Yagi-Uda Antenna (VHF), Microwave Antennas: Antenna with parabolic reflectors, Horn antenna , Loop antenna and Logic periodic Antenna. Microwave tubes- Klystron, Reflex Klystron and magnetron, Traveling wave tubes, Tunnel Diode and Gunn devices- Modes of Gunn diodes. Microwave detectors-PIN and Schottky diodes.

Outcome:
Study of the course helps in understanding microwaves, antennas, electric machines, electromagnetic interference and Principles of Antenna Theory.

PS02CELE21: ELECTROMAGNETISM AND ANTENNA THEORY
BOOKS:

1. **Classical Electrodynamics**
   S.P.Puri (Tata McGraw Hill Publishing Co.Ltd., New Delhi, INDIA)
2. **Classical electrodynamics**
   J.D.Jackson (Willey Eastern Ltd., New Delhi, INDIA)
3. **Introduction to Electrodynamics**
   David J. Griffith (Prentice Hall of India Pvt. Ltd., New Delhi, INDIA)
4. **Electronics Communications Systems**
   George Kennedy (McGraw Hill International Edition.,N.Y., USA)
5. **Modern Microwave technology**
   Victor F. Velley (Prentice Hall Inc. N.Y., USA)
6. **Microwave Engineering and Applications**
   O.P.Gandhi (Maxwell Macmillan International Edition.)
7. **Electromagnetism (Theory and Applications)**
   Ashutosh Pramanik (Prentice Hall of India Pvt. Ltd. ,New Delhi, INDIA)

M.Sc. (ELECTRONICS)
SECOND SEMESTER
PS02CELE22: MICROPROCESSOR & REAL TIME SYSTEMS
TOTAL 100 MARKS (EXTERNAL – 70, INTERNAL-30)
University Examination – 3 Hours Duration

Outline:
The course intends to provide an overview of the x86 Architecture, Interfacing and Programming with the knowledge on Real time operating system

UNIT-1
Software Architecture of the 8086 microprocessor, Memory address space & data organization, Segment registers & memory segmentation, Dedicated & general use of memory, Instruction Pointer, Data Registers, Status Registers, Generating a memory address, The Stack, I/O address space, Addressing modes of 8086, Debug Program & Debug Commands. The 8086 Instruction set, Data Transfer, Arithmetic, Logic, Shift, Rotate, Flag Control, Compare & Jump Instructions, Subroutine & Subroutine handling Instructions, Loop & The Loop handling Instructions, String & The String handling Instructions, Examples.

UNIT-2
The 8086 Microprocessor, Minimum & Maximum mode systems, Minimum system mode interface, Maximum mode system interface, System clock, BUS cycle, Memory interface, hardware organization of the memory address space, Memory bus status code, Memory control signals, Read & Write bus cycles, Demultiplexing the address/data bus, Program & Data storage memory circuits.

UNIT-3
Input & Output interface, I/O data transfers, Input & Output Instructions, Input & output bus cycles, Eight byte wide output Ports, Interfacing 8255A parallel ports at even & odd boundaries, Types of interrupts, Interrupt address pointer table, Masking of interrupts, External hardware interrupt interface & sequence, Software interrupts, Nonmaskable interrupts, Reset, Internal interrupt functions.

UNIT-4
Real Time OS, Fundamentals of RTOS, RTOS Vs General OS, Task Scheduling, Fixed Time Switching, Inter-task Communication & Synchronization, Dynamic Memory Allocation, Application of RTOS, Survey of Software Architecture of Embedded Systems, RTOS Architecture. Programmable System on Chip (PSoC), Characteristics of PSoC, System Overview, PSoC CPU, Frequency Generator, Microcontroller Power Consumption, Reset, Digital & Analog I/O, Accessing Programmable Digital Blocks, LED – LCD- ADC interface using PSoC.

Outcome:
Study of the course helps in understanding of x86 architecture, programming and interfacing along with overview of Realtime OS and PSoC.

PS02CELE22: MICROPROCESSOR & REAL TIME SYSTEMS

BOOKS:

1. **16-bit and 32-bit Microprocessors Architecture, Software and Interfacing Techniques**
   Avtar Singh and Walter A. Trible , (Printice Hall, Englewood Cliff, N.J.,USA)
2. **The 8088 Microprocessor Programming, Interfacing, Software, Hardware & Applications**
   Avtar Singh and Walter A. Trible, (Printice Hall, Englewood Cliff, N.J.,USA)
3. **The 8086 and 8088 Microprocessors Programming, Interfacing, Software, Hardware & Applications (Fourth Edition)**
   Walter A. Trible and Avtar Singh, (Printice Hall of India Pvt. Ltd., New Delhi, INDIA)
4. **Real-Time Concepts for Embedded Systems**
   Qing Li and Carolyn Yao, (CMP Books)
5. **Designer Guide to the Cypress PSoC**
   Robert Ashby, (Elsevier Inc.)
6. **Microprocessor & Microcomputer based system design**
   Mohamed Rafiquzzaman, (Universal Book Stall, New Delhi, INDIA)
7. **The Intel Microprocessors 8086/8088, 80186, 80286, 80386, and 80486 Architecutre, Programming and Interfacing**
   Barry B. Brey, (Printice-Hall of India Pvt. Ltd., New Delhi, INDIA)
8. **The 8086 Book**
   Russell Rector & George Alexy, (Osborne/McGraw Hill, Berkeley, USA)

M.Sc. (ELECTRONICS)
SECOND SEMESTER
PS02CELE23: PROGRAMMING IN C/C++
TOTAL 100 MARKS (EXTERNAL – 70, INTERNAL-30)
University Examination – 3 Hours Duration

Outline:

This is an introductory subject to high-level procedural programming using C programming language. Students learn basic programming concepts. Students go through the complete development cycle, incorporating analysis of complex problems, programming solution design, implementation in C, debugging and testing.

UNIT-1

Program Design and Coding, Introduction to C language, constants, Variable and data types and storage classes, operators and their precedence, expression, Managing Input and Output. Decision Making and Branching- if- statement if-else statement, if-else if statement, Decision Making and looping - while loop, do – while loop.

UNIT-2

Arrays – one, two and multidimensional array, Handling of character Array (String). User defined functions – Types of User defined function, Nesting of function, Recursion, User derived data types – Structure and Union, structure and functions, Pointer, File Management in C, Command line argument.

UNIT-3

C – Preprocessor – Preprocessor directives, Graphics, Programming in C – Resolution of screen, Aspect ratio, Display modes, Pixel, Drawing various objects, Animation, Dynamic memory allocation in C.

UNIT-4

Assembly level programming via C, Interrupts, Parallel and Serial I/O ports, Interfacing Mouse, Interfacing I/O port for Analog to Digital converter and Digital to Analog converter using C. Introduction to object oriented programming, The C++ Class and methods in C++, console I/O, Stack as an example in C++.

Outcome:

Upon successful completion of this subject the student will be able to:

1. Design, develop and test programs in C programming language to solve problems related to collecting, processing and storing data.
2. Identify and explain the use and workings of programming tools (such as compilers, linkers and debuggers), standard libraries and operating system functions to support program execution.

PS02CELE23: PROGRAMMING IN C/C++

BOOKS:

1. **Programming in ANSI C**
   E Balaguruswami, (BPB Publications, New Delhi, INDIA)
2. **Teach Yourself C**
   Charles Siegel, (BPB Publication, New Delhi, INDIA)
3. **The Spirit of C**
   Henry Mullish and Herbert L. Cooper, (Jaico Publishing House, New Delhi, INDIA)

M.Sc. (ELECTRONICS)
SECOND SEMESTER
PS02EELE21: INDUSTRIAL ELECTRONICS
TOTAL 100 MARKS (EXTERNAL – 70, INTERNAL-30)
University Examination – 3 Hours Duration

Outline:
This course covers Theory and operating characteristics different types of power semi-conductor devices and their switching characteristics. Also allows the understanding of operation, characteristics and performance parameters of controlled rectifiers. Introduces the basic concept of PLC and its application.

UNIT-1
Power Semiconductor Switches, Power diodes, Thyristors, Controllable Switches Power MOSFET, Gate-Turn-off Thyristor, Insulated Gate Bi-Polar Transistors, and MOS Controlled Thyristors

UNIT-2
SMPS converters, Three-phase Rectifiers, Three-phase controlled rectifiers, Inverters, Cyclo converter. Synch-Servo Control mechanism, Stepper Motor Types, Operation modes, Excitation Modes, Modes of Damping, Stepper motor control, Applications.

UNIT-3
Automatic Weighing system, Carbon dioxide controller for a carburizing furnace, control of relative humidity in a Textile moistening process and warehouse, Induction Heating, Theory and effect of frequency and source voltage on Induction Heating, Choice of Frequency for Induction heating, Dielectric Heating.

UNIT-4
Sequential Process Control, Relay Based system, Ladder Logic Diagram, Programmable logic controller, Operational Procedures, PC ladder instruction –Address and Registers, Timers and counters.

Outcome:
By the end of this course, the student will learn about the latest electronic devices available in industry**.** In addition students are able to acquire the complete understand of PLC system and Ladder programming.

BOOKS:

1. **Power Electronics**
   M.S.Jamil Asghar, (Prentice Hall Of India Pvt. Ltd. New Delhi, INDIA)
2. **Power Electronics**
   Ned Mohan, Tore.M.Undel and William P. Robbins, (John Wiley & Sons, N.Y, USA)
3. **Industrial Electronics and Control**
   Biswanath Paul, (Prentice Hall of India, New Delhi, INDIA)
4. **Industrial Electronics (4th Edition)**
   James Humphries, Leslie Sheets, (Delmar Publishers Inc.,N.Y., USA)
5. **Industrial Solid State Electronics Devices and system (2nd Edition)**
   Timothy J.Maloney, (Prentice Hall International, N.Y., USA)

M.Sc. (ELECTRONICS)
SECOND SEMESTER
PS02EELE22: ADVANCED ELECTRONIC SCIENCE & DEVICES
TOTAL 100 MARKS (EXTERNAL – 70, INTERNAL-30)
University Examination – 3 Hours Duration

Outline:
This course includes the advanced topics of power electronics such as some of the latest devices their control and applications.

UNIT-1
Review of scattering mechanisms and conduction process in semiconductors, High-field transport and breakdown phenomena, Boltzmann transport equation and Monte Carlo simulation, Field-effect devices and their structures with working mechanisms, Submicron MOSFET.

UNIT-2
Fowler-Nordheim tunneling, SOI MOSFET, MESFET, Permeable base transistor (PBT), Modulation doping, GaAs-MODFET, Band structure and device behavior, Current-Voltage characteristics, Carrier transport in MODFET, Quantum Hall-effect.

UNIT-3
Potential effect devices, BJT limitations, Hetero structures and types, Silicon based HBTs, GaAs based HBTs, Hetero junction LEDs and LASERs, Hot electron transistors, Nanoelectronics and Quantum Hetero structures, Quantum wells, Quantum wires, Quantum dots

UNIT-4
Super lattices, Lattice mismatched interfaces, strained layer super lattices, Nanoelectronics and Quantum effect devices, Resonant tunneling diode, Resonant tunneling transistor, Optical devices based on quantum and nanostructures.

Outcome:
Upon completion of the course students will gain the knowledge and understanding of various advanced electronic devices and their applications.

BOOKS:

1. **Fundamentals of Semiconductor Theory and Device Physics**
   Shyh Wang, (Prentice Hall International Inc. N.J., USA)
2. **Semiconductor Optoelectronic Devices**
   P.Bhattacharya, (Prentice Hall of India, New Delhi, INDIA)
3. **Physics of Semiconductors and their Hetero structures**
   J. Singh, (Mc-Graw Hill, N.Y.,USA)
4. **High Speed Semiconductor Devices**
   S. M. Sze, (John Wiley & Sons Inc., N.Y., USA)
5. **Low dimensional Semiconductors: Materials, Physics, Technology & Devices**
   M. J. Kelly, (Clarendon Press, Oxford, USA)