DUM DUM MOTIJHEEL COLLEGE

DEPARTMENT OF ELECTRONICS

B.Sc. ELECTRONICS (GENERAL) CBCS Syllabus

Issued by the West Bengal State University

With effect from 2018-19

Programme Specific Outcomes

- Demonstrate comprehensive knowledge of electronics fundamentals including analog circuits, digital circuits, integrated circuits, and microprocessor/microcontroller architecture.
- Apply skills in analysis, design, and troubleshooting of analog, digital, and mixed signal electronic circuits.
- Use tools and instruments for analysis and testing of electronic components, circuits, and systems.
- Design, simulate, assemble, and test circuits using components like transistors, operational amplifiers, logic gates, ADCs, DACs, and microcontrollers.
- Implement communication systems using modulation, transmission line, microwave, and antenna design concepts.
- Analyze and design printed circuit boards using fabrication and assembly methods.
- Employ state-of-the-art electronics simulation software to evaluate and improve circuits and systems.
- Investigate wireless systems including antennas, propagation, and wireless networking standards.
- Apply theoretical electronics concepts, analysis techniques, and tools in practical circuits, instruments, and products.
- Demonstrate relevance of electronics fundamentals in interdisciplinary contexts.
- Work effectively as an individual and as part of a team on electronics projects with appreciation of professional ethics.

DUM DUM MOTIJHEEL COLLEGE
Course Outcome or Learning Outcome
Three year B.A. /B.Sc. degree course
Under CBCS semester system
GENERAL COURSE IN ELECTRONICS
With effect from the session: 2018 – 2019

Course Name: Core Course-1

Course Code: ELSGCOR01T & ELSGCOR01P

Topic Name: Network Electronics and Analog Circuits

Course Objective:
- To expose the students semiconductor device, performance characteristics and their application.
- To expose different signal processing technique and characteristics

Course Outcomes:

At the end of the course, a student will be able to:
1. Illustrate working principles of different electronic circuits and their application in real life.
2. Define semiconductor device and different operating condition and their performance Parameter.
3. Choose proper semiconductor devices depending upon application considering economic and technological up-gradation.
4. Employ mathematical and graphical analysis considering different practical issues modeling of semiconductor device; analyze the performance parameter of the system.
5. Recognize different signal processing circuits and their use in industrial, real life, modern control system applications.
6. Use modeling/simulation parameters with standard equivalent circuit models to predict.
   correctly the expected performance of various general-purpose electronic circuits.

Course Name: Core Course-2

Course Code: ELSGCOR02T & ELSGCOR02P

Topic Name: Linear and Digital Integrated Circuits

Course Objectives:
- To understand the basic concepts of operational amplifier and its various applications.
- To understand the basics of PLL and its practical applications.
- To know about analog multlipliers.
- To know about various analog switches and different A/D and D/A convertors.
- To understand the concepts of switched capacitor filters,Voltage regulator and various amplifiers

Course Outcomes:
1. Learn about the basic concepts for the circuit configuration for the design of linear integrated circuits and develops skill to solve engineering problems
2. Develop skills to design simple circuits using OP-AMP.
3. Gain knowledge about various multiplier circuits, modulators and demodulators.
4. Gain knowledge about PLL.
5. Learn about various techniques to develop A/D and D/A convertors.
6. Develop skills to develop simple filter circuits and various amplifiers and can solve problems related to it.

Course Name: Core Course-3

Course Code: ELSGCOR03T & ELSGCOR03P

Topic Name: Communication Electronics

Course Objectives:
- To understand the basic principles and techniques used in analog and digital communications.
- To learn analog and digital modulation techniques.
- To understand Communication receiver and transmitter design.
- To know about baseband and bandpass communication techniques.
- To know about different line coding techniques
- To do noise analysis in various transmission environments.
- To enable the student to become familiar with satellites and satellite services.
- Study of satellite orbits and launching.
- Study of earth segment and space segment components
- Study of satellite access by various users.
- To understand the basic cellular system concepts.
- To have an insight into the various propagation models and the speech coders used in mobile communication.
- To understand the multiple access techniques and interference reduction techniques in mobile communication.

Course Outcomes:
1. Identify the basic elements of a communication system.
2. Analyze baseband signals in time domain and in frequency domain.
3. Compare and contrast various analog and digital modulation and demodulation techniques.
4. Evaluate the performance of modulation and demodulation techniques in various transmission environments.
5. Explain the importance of synchronisation in communication systems.
6. Define orbital mechanics and launch methodologies.
7. Describe satellite subsystems.
8. Design link power budget for satellites.
9. Compare competitive satellite services.
10. Explain satellite access techniques.
11. Discuss cellular radio concepts.
12. Identify various propagation effects.

13. To have knowledge of the mobile system specifications.
14. Classify multiple access techniques in mobile communication.
15. Outline cellular mobile communication standards.
16. Analyze various methodologies to improve the cellular capacity.

Course Name: Core Course-4

Course Code: ELSGCOR04T & ELSGCOR04P

Topic Name: Microprocessor and Microcontroller

Course Objectives:
- To introduce students with the architecture and operation of typical microprocessors and microcontrollers.
- To familiarize the students with the programming and interfacing of microprocessors and microcontrollers.
- To provide strong foundation for designing real world applications using microprocessor and microcontroller.

Course Outcomes:
1. Assess and solve basic binary math operations using the microprocessor and explain the microproce ssors and Microcontroller's internal architecture and its operation within the area of manufacturing and performance.
2. Apply knowledge and demonstrate programming proficiency using the various addressing modes an d data transfer instructions of the target microprocessor and microcontroller
3. Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) an d Microcontroller to meet specified performance requirements.
4. Analyze assembly language programs; select appropriate assemble into machine a cross assembler u tility of a microprocessor and microcontroller.
5. Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.
6. Evaluate assembly language programs and download the machine code that will provide solutions re al-world control problems.

Course Name: Discipline Specific Elective (DSE)

Course Code: ELSGDSE02T & ELSGDSE02P

Topic Name: Antenna Theory and Wireless Networks

Course Objectives:
- To develop understanding of various types of antenna radiation mechanism.
- To provide the knowledge of basic understanding of antenna operation through the application of Maxwell's equations.
- To provide the basic knowledge to calculate array factor of array antennas.
- To introduce the students various types of antennas and their performance Characteristics.
- To develop the students' ability to apply modern mathematical techniques to the solutions of antenna problems.

Course Outcomes:
1. Understand the radiation mechanism of EM waves by antennas and their radiation patterns.
2. Analyze the power radiated by different antennas and their radiation characteristics.
3. Interpret the relationships between antenna parameters.
4. Design and analyze different antennas and antenna arrays.
5. Understand the wave propagation mechanism at different frequencies.

Course Name: Discipline Specific Elective (DSE)

Course Code: ELSGDSE03T & ELSGDSE03P

Topic Name: Photonic Device and Power Electronics

Course Objectives:
- Understand the basic optoelectronics including electromagnetism.
- Light propagation in waveguides, light amplification and detection.
- Lasers, modulators, and detectors.
- To introduce students to the basic theory of power semiconductor devices and passive components, their practical applications in power electronics.
- To familiarize students to the principle of operation, design and synthesis of different power conversion circuits and their applications.
- To provide strong foundation for further study of power electronic circuits and systems.

Course Outcomes:
1. Define and explain the propagation of light in conducting and non-conducting media.
2. Define and explain the physics governing laser behaviour and light matter interaction.
3. Apply wave optics and diffraction theory to a range of problems.
4. Apply the principles of atomic physics to materials used in optics and photonics.
5. Calculate the properties of various lasers and the propagation of laser beams.
6. Calculate properties of and design modern optical fibers and photonic crystals.
7. Relate basic semiconductor physics to properties of power devices, and combine circuit mathematics and characteristics of linear and non-linear devices.
8. Describe basic operation and compare performance of various power semiconductor devices, passive components and switching circuits.
9. Design and Analyze power converter circuits and learn to select suitable power electronic devices by assessing the requirements of application fields.
10. Formulate and analyze a power electronic design at the system level and assess the performance.
11. Identify the critical areas in application levels and derive typical alternative solutions.
12. Select suitable power converters to control Electrical Motors and other industry grade apparatus.
13. Recognize the role power electronics play in the improvement of energy usage efficiency and the applications of power electronics in emerging areas.

Course Name: Skill Enhancement Course (SEC)

Course Code: ELSSSEC01M

Topic Name: Design and Fabrication of Printed Circuit Boards

Course Objectives:

- To know the need for PCB Design, steps involved in PCB Design and Fabrication Process.
- To design a schematic/layout PCB for analog circuits, digital circuits and mixed circuits.
- To design an integral part of electronic products by understanding the PCB design.
- To design an electronic printed circuit board for a specific application using industry standard software.

Course Outcomes:

1. Overview on PCB designing flowchart.
2. Introduction to the materials required for the fabrication of PCB's.
3. Simulations of PCB using any EDA tools.
4. PCB Designing and Analyzing practice (Hardware)
5. Development of PCB for any basic electronic circuit.
6. Analyze the fabrication process of printed circuit boards.
7. Make comprehensive use of technical knowledge gained from the course.

Course Name: Skill Enhancement Course (SEC)

Course Code: ELSSSEC02M

Topic Name: Robotics

Course Objectives:

- To understand the basic concepts associated with the design and functioning and applications of Robots.
- To provide an introduction to Robotics and Automation including robot classification, design and selection, analysis and applications in industry.
- To provide information on various types of end effectors, their design, interfacing and selection.
- To provide the details of operations for a variety of sensory devices that are used on robot , the meaning of sensing, classification of sensor, that measure position, velocity & acceleration of robot joint.
- To familiarize the basic concepts of transformations performed by robot.
- To perform kinematics and to gain knowledge on programming of robots.

Course Outcomes:

1. Upon completion of this course, the students can be able to apply basic engineering.
2. To learn about knowledge for the design of robotics.
3. Will understand robot kinematics and robot programming.
4. Will understand application of Robots.
5. Will understand basic components of robotics, classification of robots and their applications.
6. Will know on types of robot grippers, their usage and design considerations.
7. Will understand about various types of sensory devices their working and applications.
8. Can apply basic transformations related to the movement of manipulator.
9. Can design a robot mechanism to meet kinematics requirements and to write simple programs.