Deccan Education Society's

Fergusson College (Autonomous), Pune

Program Specific Outcomes (PSOs) and Course Outcomes (COs) 2019-20

Department of Electronic Science

Programme: M.Sc. Electronic Science

PSO No.	Program Specific Outcomes (PSOs) Upon completion of this programme the student will be able to
PSO1	**Academic competence:** (i) Understand concepts and develop applications in the field of Semiconductor technology, Core electronics, Communication/ networking, Digital Electronics, Embedded systems and Automation. (ii) Demonstrate, classify, calculate and execute real world problems by experimenting a wide range of solutions to real world problems in the field of Electronics.
PSO2	**Personal and Professional Competence:** (i) Design and implement the laboratory based applications with capability of data gathering, data visualization, analysis with data interpretation. (ii) Prepare to collect and construct the data with the professional technical report writing skills along with precise presentation with effective communication skills and professional ethics.
PSO3	**Research Competence:** (i) Design and analyze the concepts and applications in the field of communication/ networking, automation, embedded systems and semiconductor technology. (ii) Work successfully in collaborative and multi-disciplinary environments upholding professional and ethical values or pursue higher studies or research.
PSO4	**Entrepreneurial and Social competence:** (i) Design techniques and provides creative, innovative and effective solutions to real world problems using hardware-software co-design tools for future smart electronics system (ii) Develop effective communication skills in writing and orally; demonstrate the ability to listen carefully and present complex disciplinary information in a clear and concise manner to different groups.

Course Outcomes (COs)
F.Y. M.Sc. Semester I

Title of the Course and Course Code	Semiconductor Devices and Technology (ELS4101)	Number of Credits : 04
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall Basic concept of the structure of solids, charge carriers and energy level.	1
CO2	Discuss basic idea of doping , p-n junction diode and its V-I characteristics using graphical and mathematical methods.	2
CO3	Illustrate and identify the fabrication methods of integrated circuits.	3
CO4	Explain the physical characteristics such as electronic structure and transport properties, and current-voltage characteristics of semiconductors.	4
CO5	Apply the knowledge of semiconductors to illustrate the functioning of basic electronic devices.	5
CO6	Specify and classify the semiconductor devices for special applications.	6
Title of the Course and Course Code	**Network Analysis (ELS4102)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the network functions with poles and zeros of network functions.	1
CO2	Identify and differentiate between continuous- and discrete-time signals and systems. Infer and evaluate transient response, Steady state response, network functions	2
CO3	Acquire and apply knowledge about the application of Fourier series, Fourier transform and Laplace transform in signal representation with analysis of linear time invariant systems. Apply computer mathematical and simulation programs to solve various real life multidisciplinary topics through circuit solution.	3
CO4	Analyse the circuit using Kirchhoff's law and Network simplification theorems.	4
CO5	Evaluate two-port network parameters	5
CO6	Perform and analyze the frequency response of electric circuits to obtain the correlation between time domain and frequency domain response specifications	6
Title of the Course and Course Code	**Analog and Digital Circuit Design (ELS4103)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**

CO1	Recall all basic concepts from analog and digital electronics.	1
CO2	Explain analog electronic systems using discrete components, ICs and design various electronic circuits.	2
CO3	Apply design analysis for analog and digital circuits	3
CO4	Analyze different analog and digital circuits	4
CO5	Test and validate designing of analog and digital circuits.	5
CO6	Design and develop the systems for real life problem using combinational and sequential circuits	6
Title of the Course and Course Code	**Instrumentation (ELS4104)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define the working principles of sensors/transducers for various fields.	1
CO2	Discuss applications of various transducers in industry.	2
CO3	Experiment the measurement principles of various physical parameters in the laboratory.	3
CO4	Relate the usage of various instrumentation standards.	4
CO5	Evaluate electrical measurement systems.	5
CO6	Specify and use various sensors/transducers in bio-medical and industrial applications.	6
Title of the Course and Course Code	**Electronic Science Practical - I (ELS4107)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Learn the advanced analysis facilities available in DSO, arbitrary function generators, Logic analyser to study the digital signals	1
CO2	Summarize analog/digital circuit analysis techniques and different signal conditioning circuits.	2
CO3	Experiment analog electronic circuits using discrete components and ICs.	3
CO4	Integrate different electronic devices to implement and build electronic applications	4
CO5	Evaluate different electronic circuits and review the analog and digital circuits.	5
CO6	Develop ability to design, build and test analog/digital application circuits	6
Title of the Course and	**Electronic Science Practical - II (ELS4108)**	**Number of Credits : 04**

Course Code		
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Outline and recall Verilog programming for CPLD/FPGA boards	1
CO2	Represent with DC and AC circuit analysis techniques using MATLAB/SCILAB.	2
CO3	Implement digital systems on CPLD/FPGA boards	3
CO4	Analyze complicated circuits using different network theorems and acquire skills of using MATLAB software for electrical circuit studies.	4
CO5	Develop expertise in design and development and simulation of digital circuits with Verilog.	5
CO6	Design making EDA/CAD software for creating schematic diagrams and PCB layout for Simple Analog/Digital circuits with testing and troubleshooting them	6
	F.Y. M.Sc. Semester II	
Title of the Course and Course Code	**Electromagnetic Theory and Applications (ELS4201)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall basics of Electromagnetics concepts	1
CO2	Explain basic concepts of electrostatics and magnetostatics	2
CO3	Classify Maxwell's equation in different forms.	3
CO4	Analyse the nature of electromagnetic wave propagation in guided medium	4
CO5	Test and examine the phenomena of wave propagation in different media and its interfaces	5
CO6	Design different antennas based on their characteristics for different applications	6
Title of the Course and Course Code	**Industrial Process Control (ELS4202)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify the different control systems in the real time applications.	1
CO2	Explain the basic elements of the process control system, PLC and SCADA.	2
CO3	Classify the operational modes of various process Controllers.	3
CO4	Explain appropriate sensors and actuators for a given automation system.	4
CO5	Select different control parameters for the optimal performance of the control system.	5
CO6	Develop the PLC program for discrete state process control.	6

Title of the Course and Course Code	**Embedded Systems (ELS4203)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the concept of embedded system, microcontroller, different components and software tools in embedded systems and their interactions.	1
CO2	Understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.	2
CO3	Apply and Analyze various real time algorithms in building embedded systems and their integrated peripherals using IDE programming tools in high level programming languages as C.	3
CO4	Analyze and develop embedded hardware and software development cycles and tools.	4
CO5	Evaluate and understand different concepts of sensors, memory interface, and types of communication protocols.	5
CO6	Design and develop programming skills in embedded systems for various applications.	6
Title of the Course and Course Code	**Power Electronics (ELS4204)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	List and outline protection and driver circuits of power devices	1
CO2	Identify and classify various power - devices, converters and applications.	1,2
CO3	Illustrate various applications of power converters for domestic, laboratory and industrial applications.	3
CO4	Explain the various types of power converters and their applications.	4
CO5	Determine the various performance parameters of power converters.	5
CO6	Design power converters as per given specifications.	6
Title of the Course and Course Code	**Electronic Science Practical – III (ELS4207)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**

CO1	Identify some modules related to industrial control automation using PLC hardware.	1
CO2	Articulate the basic concepts of the phenomena of reflection and transmission of electromagnetic fields.	2
CO3	Analyse and design power electronic circuits using discrete components and ICs.	3
CO4	Identify, integrate and demonstrate with interfacing hardware circuits for a real time embedded system application	3,4
CO5	Select different sensors and transducers and implement applications using them.	5
CO6	Design and develop various application of converter circuits, PLC based applications.	6
Title of the Course and Course Code	**Electronic Science Practical – IV (ELS4208)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	List and outline various microcontrollers interfacing concepts to develop embedded systems.	1
CO2	Summarize embedded C programming required to develop real time embedded systems using different microcontrollers.	2
CO3	Demonstrate and execute different embedded hardware applications.	3
CO4	Integrate and implement interface of various peripherals with AVR / PIC Microcontroller.	4
CO5	Test and validate the simulation results of various concepts related to Electromagnetics using software like MATLAB.	5
CO6	Design, develop and implement PLC programming.	6
	S.Y. M.Sc. Semester III	
Title of the Course and Course Code	**Electronic Communication (ELS5301)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe basic concept of communication system, types of noise affecting communication system, noise parameters and Understand the behavior of nature on Radio Wave propagation.	1
CO2	Identify and classify the structures of Optical fiber Technique and its types.	2
CO3	Illustrate various Digital Transmission Techniques.	3
CO4	Integrate various Modulation and Demodulation Techniques and the various radio receivers with their parameters.	4
CO5	Evaluate and test various Modulation and Demodulation Technique Circuits.	5
CO6	Design basic digital communication systems to solve a given	6

	communications problem and Identify source coding and channel coding schemes for a given communication link.	
Title of the Course and Course Code	**Embedded System Design with ARM (ELS5302)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall the concept of embedded system, microcontroller, different components of microcontroller and their architecture.	1
CO2	Explain the features of embedded systems, architecture of ARM7, instruction set, development tools and its applications.	2
CO3	Use the programming skills for development of embedded systems for various applications.	3
CO4	Explain the architectural features of microcontrollers (LPC2148) along with the hardware and interfacing peripheral devices.	4
CO5	Compare the differences between various scheduling algorithms such as table-driven and priority preemptive schedulers	5
CO6	Design real time embedded systems/application using the concept of RTOS	6
Title of the Course and Course Code	**Data Communication and WSN (ELS5303)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall the types of networks, network configurations and network topologies.	1
CO2	Discuss network communication using the layered concept, Open System Interconnect (OSI) and the Internet Model. Explain the concept of wireless sensor networks with applications.	2
CO3	Use the working principles of LAN and implement the concepts behind physical and logical addressing, subnetting and supernetting.	3
CO4	Integrate responsibilities of physical to data link layer and identify relevant data transmission techniques and media. Compare different types of networking devices, backbone networks and Internet Protocol (IP) addressing.	4
CO5	Compare and select transmission media based on transmission impairments and channel capacity.	4,5
CO6	Integrate the various applications of front end using the application layer protocols like HTTP, SMTP, FTP.	6
Title of the Course and Course Code	**Internet of Things (ELS5304)**	**Number of Credits : 04**

On completion of the course, the students will be able to:		Bloom's Cognitive level
CO1	Outline different wireless sensor network technologies	1
CO2	Explain and explore basic Python programming concepts required for development of IoT applications.	2
CO3	Illustrate fundamentals of IoT protocols, security mechanisms and implementation of secure infrastructure for IoT.	3
CO4	Categorize IoT systems including basic design strategy, process modelling and build embedded IoT system examples.	4
CO5	Evaluate the use of different embedded processors in IoT application development.	5
CO6	Design and develop real world applications of IOT.	6
Title of the Course and Course Code	**Electronic Science Practical Course – V (ELS5307)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall and design communication electronic circuits using discrete components and ICs.	1
CO2	Outline the advanced analysis facilities available in DSO and arbitrary function generators.	2
CO3	Operate various analog and digital circuits using software like SCILAB/MATLAB.	3
CO4	Identify, compare and study various wired, wireless, networking hardware components/ devices.	4
CO5	Test and validate the use of hardware and software tools for Advanced Embedded systems.	5
CO6	Develop ability to design, build and test application circuits	6
Title of the Course and Course Code	**Electronic Science Practical Course – VI (ELS5308)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Outline different platforms to develop WSN and IoT applications	1
CO2	Demonstrate and summarize different IoT communication protocols	2
CO3	Demonstrate the advanced peripherals to ARM based microcontroller.	3
CO4	Analyze and develop PLC ladder programs for simple industrial applications.	4
CO5	Test and validate various automation systems for industrial applications.	5
CO6	Develop the program for functions, strings, List, Tuples Dictionaries, object oriented programs and file handling in Python.	6

	S.Y. M.Sc. Semester IV	
Title of the Course and Course Code	**Electronic Science Project (ELS5405)**	**Number of Credits : 08**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Report and practice the team building, communication and management skills of the students.	1
CO2	Outline the various skills required to develop given task in various levels and implement the project intended solution for project based learning.	2
CO3	Solve problems in new situations by applying acquired knowledge for the project undertaken.	3
CO4	Categorize facts, techniques and rules in a different way of the project undertaken.	4
CO5	Measure, test and validate collected data, samples, results etc.	5
CO6	Compile and prepare project report, alternative hypothesis based on criteria of the result outcome, invent or develop a product.	6