KANNUR UNIVERSITY

(Abstract)

M.Sc Electronics Programme-Scheme, Syllabus, Unit wise Mark Distribution, Pattern of Question Papers and Model Question Papers (Ist & II nd Semester only) under Choice Based Credit and Semester System (in Outcome Based Education System-OBE) in Affiliated Colleges-Implemented with effect from 2023 Admission-Orders issued.

ACADEMIC C SECTION

ACAD C/ACAD C1/17667/2023 Dated: 24.08.2023

Read:-1. U.O No. Acad C2/429/2017 Dated 08.09.2020

2. U.O.No. Acad C1/21246/2019 Dated 07.12.2020

3. U.O. No. Acad/C1/21246/2019 Dated 16.02.2023.

4. U.O. No. Acad/C1/21246/2019 Dated 20.04.2023

5. Minutes ofthe meeting of the CSMC& Conveners of Adhoc committee held on 15.06.2023

6. Orders of the Vice Chancellor in the file No. Acad C1/21246/2019 Dated 05.08.2023.

7. U.O. No. Acad/C1/21246/2019 Dated 09.08.2023

8. The Minues of the meeting of the Ad hoc Committee for Electronics Programme held on 10.08.2023

9. Syllabus of M.Sc. Electonics Programme (I & II nd Semester) submitted by the Convenor, Ad hoc Committee for Electronics vide e-mail dated 22.08.2023

ORDER

1. A Curriculum Syllabus Monitoring Committee comprising the members of Syndicate was constituted for the Syllabus revision of U G& P G Programmes in Affiliated Colleges, vide paper read (1) above and as per the recommendation of this Committee in its meeting held on 20.11.2020, constitute a sub Committee to prepare the Regulation for PG programmes in Affiliated colleges vide paper read (2) above.

2. As the reconstitution of Board of Studies of the University is under the consideration of the Hon'ble Chancellor, and considering the exigency of the matter, Ad hoc Committees were constituted vide paper read (3) above and it has been modified vide paper read (4) above, to revise the Curriculum and Syllabus of PG Programmes in Affiliated Colleges w.e.f 2023-24 academic year.

3. The combined meeting of the Curriculum Syllabus Monitoring Committee & Conveners of Ad hoc committee held on 15.06.2023 at syndicate room discussed in detail the draft Regulation, prepared by the Curriculum Syllabus Monitoring Committee, for the PG programmes under Choice Based Credit and Semester System to be implemented in Affiliated Colleges w. e. f. 2023 admission and proposed the different phases of Syllabus revision process such as subject wise workshop, vide the paper read (5) above.

4. The revised Regulations for Post Graduate Programmes under Choice Based Credit and Semester System (In OBE-Out Come Based Education System) was approved by the Vice chancellor on 05.08.2023 and implemented w.e.f 2023 Admission vide Paper read (7) above.

5. Subsequently, as per the paper read (8) above, the Ad hoc Committee for Electronics programme finalized the Scheme, Syllabus, unit wise mark distribution, Pattern of Question Papers and Model question papers of M.Sc Electronics Programme (I^{st}& II^{nd} Semester) to be implemented

with effect from 2023 admission.

6. As per the paper read (9) above, the Convener, Ad hoc Committee for M.Sc Electronics programme submitted the finalized copy of Scheme, Syllabus, unit wise mark distribution, Pattern of Question Papers and Model question papers of M.Sc. Electronics programme(I st & II nd Semester) for implementation with effect from 2023 Admission.

7. The Vice Chancellor after considering the matter in detail and in exercise of the powers of the Academic Council conferred under section 11(1) Chapter III of Kannur University Act, 1996 and all other enabling provisions read together with ***accorded sanction to implement the Scheme, Syllabus, unit wise mark distribution, Pattern of Question Papers and Model question papers of M.Sc. Electronics Programme (Ist& IInd Semester) under Choice Based Credit Semester System (in OBE- Outcome Based Education System) in Affiliated Colleges under the University with effect from 2023 Admission, subject to report to the Academic Council.***

8. The Scheme, Syllabus, unit wise mark distribution, Pattern of Question Papers and Model question papers of M.Sc. Electronics Programme (Ist& IInd Semester) under Choice Based Credit and Semester System (in OBE- Outcome Based Education System) in Affiliated Colleges under the University with effect from 2023 Admission is uploaded in the University website.

9. Orders are issued accordingly.

Sd/-
Sajesh Kottambrath
Assistant Registrar1
For REGISTRAR

To:
1. Principals of Affiliated Colleges offering M.Sc. Electronics Programme
2. Convenor, Curriulum Syllabus Monitoring Committee.
3. Convenor, Adhoc Committee for Electronics.

Copy To:
1. The Examination Branch (Through PA to CE)
2. PS to VC/ PA to PVC/ PA to R/ PA to FO
3. DR/ AR 1(Acad) /Computer Programmer
4. Web Manager (for uploading on the website).
5. EG 1/EX C1(Exam), EP V Section
6. SF/DF/FC

KANNUR UNIVERSITY * CIVIL STATION P.O. KANNUR Pin-670 002 * THAVAKKARA *

Forwarded /.By Order

SECTION OFFICER

KANNUR UNIVERSITY

SYLLABUS FOR M.Sc ELECTRONICS UNDER CHOICE BASED CREDIT SEMESTER SYSTEM (CBCSS) FOR AFFILIATED COLLEGES

(OBE – Outcome Based Education)

2023 Admission onwards

(Semester I & II Only)

INDEX	
Topic	Page Number

PREFACE

The M.Sc Electronics syllabus is based on Outcome Based Education (OBE) system. The Programme Specific outcomes and course outcomes are stated clearly in the syllabus. Faculty members are requested to plan their courses to achieve these outcomes at the end of each semester. The Syllabus committee has taken extreme care to include latest developments in Electronics.

The project in the 4th semester is a 10 credit activity and hence at the end of the course we expect results that can be published in reputed journals and conference proceedings. The syllabus is designed with a view to cater the present day requirements of industry, R&D field, higher studies and entrepreneurship.

For more details of the programme please read Kannur University regulations for choice based credit and semester system for Post Graduate Programme in Affiliated Colleges -2023 (in OBE – Outcome Based Education – system).

The Committee acknowledge valuable contributions of external resource persons Smt. Dhanya Raj P., AP, Department of CSE, Government Engineering College Wayanad and Dr. Sajith K., AP, Department of ECE, Government Engineering College Wayanad.

Adhoc Committee Members:

1. Dr. Rohith K. Raj (Convener), Assistant Professor, Department of Electronics, Government College Mananthavady, Wayanad
2. Dr. Linesh J., Assistant Professor, Department of Electronics, Government College Mananthavady, Wayanad
3. Dr. Anish Kumar M.S., Assistant Professor, Department of Electronics, Government College Mananthavady, Wayanad
4. Dr. Sarin V.P., Assistant Professor, Department of Electronics, Government College Chittur, Palakkad
5. Dr. Amrutha K. Adiyodi, Assistant Professor, Department of Physics, PRNSS College Mattanur, Kannur
6. Mr. Deepu Joseph, Assistant Professor, Department of Physics, Nirmalagiri College, Kuthuparamba

Vision and Mission statements

Vision:

To establish a teaching, residential and affiliating University and to provide equitable and just access to quality higher education involving the generation, dissemination and a critical application of knowledge with special focus on the development of higher education in Kasargode and Kannur Revenue Districts and the Manandavady Taluk of Wayanad Revenue District.

Mission:

➢ To produce and disseminate new knowledge and to find novel avenues for application of such knowledge.

➢ To adopt critical pedagogic practices which uphold scientific temper, the uncompromised spirit of enquiry and the right to dissent.

➢ To uphold democratic, multicultural, secular, environmental and gender sensitive values as the foundational principles of higher education and to cater to the modern notions of equity, social justice and merit in all educational endeavours.

➢ To affiliate colleges and other institutions of higher learning and to monitor academic, ethical, administrative and infrastructural standards in such institutions.

➢ To build stronger community networks based on the values and principles of higher education and to ensure the region's intellectual integration with national vision and international standards.

➢ To associate with the local self-governing bodies and other statutory as well as non-governmental organizations for continuing education and also for building public awareness on important social, cultural and other policy issues.

Program Outcomes (POs)

Program outcomes can be defined as the objectives achieved at the end of any specialization or discipline. These attributes are mapped while a student is doing graduation and determined when they get a degree.

PO1. Advanced Knowledge and Skills: Postgraduate courses aim to provide students with in-depth knowledge and advanced skills related to their chosen field. The best outcome would be to acquire a comprehensive understanding of the subject matter and develop specialized expertise.

PO2. Research and Analytical Abilities: Postgraduate programs often emphasize research and analytical thinking. The ability to conduct independent research, analyze complex problems, and propose innovative solutions is highly valued.

PO3. Critical Thinking and Problem-Solving Skills: Developing critical thinking skills is crucial for postgraduate students. Being able to evaluate information critically, identify patterns, and solve problems creatively are important outcomes of these programs.

PO4. Effective Communication Skills: Strong communication skills, both written and verbal, are essential in various professional settings. Postgraduate programs should focus on enhancing communication abilities to effectively convey ideas, present research findings, and engage in academic discussions.

PO5. Ethical and Professional Standards: Graduates should uphold ethical and professional standards relevant to their field. Understanding and adhering to professional ethics and practices are important outcomes of postgraduate education.

PO6. Career Readiness: Postgraduate programs should equip students with the necessary skills and knowledge to succeed in their chosen careers. This includes practical skills, industry-specific knowledge, and an understanding of the job market and its requirements.

PO7. Networking and Collaboration: Building a professional network and collaborating with peers and experts in the field are valuable outcomes. These connections can lead to opportunities for research collaborations, internships, and employment prospects.

PO 8. Lifelong Learning: Postgraduate education should instill a passion for lifelong learning. The ability to adapt to new developments in the field, pursue further education, and stay updated with emerging trends is a desirable outcome.

Programme Specific Outcomes (PSOs) of M.Sc Electronics Programme

After the completion of this programme, the students should be able to:

PSO 1. Apply fundamentals of electronics in various domains of analog and digital systems.

PSO 2. Develop programming skills for Electronics problem solving

PSO 3. Identify research areas in Electronics, develop research aptitude and get exposure to ethical research practices

KANNUR UNIVERSITY

M.Sc Electronics Programme

CREDIT DISTRIBUTION STATEMENT

Semester	Course		Title of the course	Internal	External	Total	Hour/ Week	Credit
I	MSELE01C01		Microcontrollers	12	48	60	4	4
	MSELE01C02		Python Programming	12	48	60	4	4
	MSELE01C03		Digital System Design	12	48	60	5 (L-4, T-1)	4
	Elective-I	MSELE01E01	Digital Communication Techniques	12	48	60	4	4
		MSELE01E02	Medical Electronics					
		MSELE01E03	Programmable Logic Controller					
	MSELE01C04 *		Python programming & Embedded System Lab	0	0	0	8	0
			TOTAL			**240**	**25**	**16**
II	MSELE02C05		VLSI Design	12	48	60	4	4
	MSELE02C06		Advanced Digital Signal Processing	12	48	60	5 (L-4, T-1)	4
	MSELE02C07		Power Electronics	12	48	60	4	4
	Elective - II	MSELE02E04	Microwave Techniques and Devices	12	48	60	4	4
		MSELE02E05	Fundamentals of HDL					
		MSELE02E06	Embedded OS & RTOS					
		MSELE02E07	Automotive Electronics					
		MSELE02E08	Electronic Instrumentation					
	MSELE01&02C04		Python programming and Embedded System Lab	20	80	100	0	4
	MSELE02C08		Advanced Digital Signal Processing lab & Mini project	20	80	100	8	4
			TOTAL			**440**	**25**	**24**
III	MSELE03C09		Advanced Digital Image Processing	12	48	60	4	4
	MSELE03C10		Artificial Intelligence & Machine learning	12	48	60	4	4

	Elective-III	MSELE03E09	Industrial Electronics	12	48	60	4	4
		MSELE03E10	Modern Communication Systems					
		MSELE03E11	Microwave Integrated Circuits and Antennas					
	Open Elective	MSELE03O01	Software Development frameworks for Mobile Application	12	48	60	4	4
		MSELE03O02	Foundations of Data Science					
		MSELE03O03	Micro Electro Mechanical System (MEMS)					
	MSELE03C11**		Image Processing & Machine learning lab	0	0	0	8	0
	MSELE03C12**		Project	0	0	0	1	0
			TOTAL			**240**	**25**	**16**
IV	MSELE04C13		Internet of Things	12	48	60	5	5
	MSELE04C14		Advanced Microcontrollers	12	48	60	5	5
	MSELE03&04C11		Image Processing and Machine learning lab	20	80	100	0	4
	MSELE03&04C12		Project	20	80	100	15	10
			TOTAL			**320**	**25**	**24**
			Grand Total			**1240**	**100**	**80**

Note:

* Examination will be conducted in the Second Semester
** Examination will be conducted in the fourth semester

SEMESTER - I

MICROCONTROLLERS

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
1	MSELE01C01	4	0	0	4	3

Course Outcomes:

CO1: Describe the architecture and features of 8051 and PIC 16F877 Microcontroller
CO2: Explain the concepts of embedded programming.
CO3: Develop interfacing models according to applications.
CO4: Develop microcontroller based embedded application

Module I: Introduction to Microcontroller Architecture
Difference between microprocessor and microcontroller Introduction to the Microcontroller classification, Feature and block diagram of 8051 and explanation, Program Status Word (PSW), 8051. Overview of Instruction set, memory organization, Interrupt structure, timers and its modes. [10Hr]

Module II: Serial communication: concept of baud rate, Data transmission and reception using Serial port. Sample programs of data transfer, Delay using Timer (0&1) and interrupt, Data transmission and reception using Serial port. I/O Port Programming, All programs in C language.
Pin diagram and its functioning Port structure, IO Interfacing Requirements, Interfacing of: LEDS, Keys, 7-segment multiplexed display: All programs in C language [12Hr]

Module III: PIC 16F877 Microcontroller Architecture : Comparison of PIC family, Criteria for Choosing Microcontroller, features, PIC 16F877 architecture with generalized block diagram. MCU, Program and Data memory organization, Bank selection using Bank Select Register, Pin out diagram, Reset operations, Watch Dog Timers, Configuration registers and oscillator options (CONFIG), Power down modes , Brief summary of Peripheral support, Overview of instruction set. [12Hr]

Peripheral Support in PIC 16F877 : Timers and its Programing , Interrupt Structure with SFR, use of timers with interrupts, CCP modes: Capture, Compare and PWM generation, Block diagram of in-built ADC with Control registers. [12Hr]

Module IV: Real Word Interfacing With PIC 16F877 : Port structure with programming, Interfacing of LED, LCD and Key board, DAC for generation of waveform: All programs in embedded C. Serial Port Programming interfacing with PIC 16F877 Basics of Serial Communication Protocol: Study of RS232, RS 485, I2C, SPI, MSSP structure (SPI & I2C), USART (Receiver and Transmitter): All programs in embedded C. [14Hr]

Text Books:
1. Mahumad Ali Mazadi, Janice Gillispie Mazadi, Rolin D McKinlay, "The 8051 Microcontroller & Embedded Systems (Using Assembly and C)", PHI, 2 nd Edition
2. Mahumad Ali Mazadi, Rolin D McKinlay and Danny Causey, "PIC Microcontroller & Embedded System", Pearson Education, 3 rd Edition
Reference Books:
1. Kenneth J. Ayala, 'The 8051 Microcontroller Architecture, Programming and Applications', Cengage Learning, 3 rd Edition
2. Ajay Deshmukh, "Microcontrollers Theory and Applications", TATA McGraw Hill, 4th Edition 3. Peatman, John B, "Design with PIC Microcontroller", Pearson Education PTE, 1 st Edition
4. Data Sheet of PIC 16F877 series

Continious Evaluation Mark Distribution	
Written Test	Assignment
6	6

Mark distribution

Unit	Mark
I	17
II	23
III	17
IV	19
Total Mark	76

Pattern of Question

Part	Total No. of Questions	Marks per Question	Questions to be answered	Total Mark
A	6	1	6	6
B	5	5	3	15
C	5	9	3	27
			Total	48

PYTHON PROGRAMMING

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
1	MSELE01C02	4	0	0	4	3

Course Outcomes:

CO 1 Illustrate the fundamentals of Python programming
CO 2 Describe the modules, package and library concepts of python Programming
CO 3 Explain the fundamentals of MicroPython programming
CO 4 Develop python and MicroPython programs

Module I : Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules Sequences - Strings, Lists, and Tuples, Mapping and Set [12Hr]

Module II: Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, Related Modules Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules [12Hr]

Module III : Modules, packages and Libraries in Python : Python Modules and Packages - Creating Modules and Packages , Libraries for Python - Library for Mathematical functionalities and Tools.
Networking Libraries, Numerical Plotting Library - GUI Libraries, for Python - Imaging Libraries for Python GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs WEB Programming: Introduction, Web Surfing with Python, Creating Simple Web Clients, Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API) [12Hr]

Module IV: Micropython for Embedded System : Introduction to Micropython, Micropython workflow, REPL, Command-Line Tools , Micropython IDE and programming , Circuit python , Micropython on Embedded hardware, Overview of Micropython Supported hardwares, Setting Up Micropython on Embedded development board , Creating and deploying Micropython Code, Interfacing sensors, actuators [12Hr]

Textbook

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
2.Nicholas H. Tollervey, Programming with MicroPython, O'Reilly Media, Inc., 2017

Reference Books

1. Gowrishankar S and Veena A, "Introduction to Python Programming", CRC Press, Taylor & Francis Group, 2019
2. Fabrizio Romano, "Learn Python Programming", Second Edition, Packt Publishing, 2018.
3. Marwan Alsabbagh, MicroPython Cookbook, Packt, 2019
4. Allen Downey, Think Python, Green Tea Press
5. Kenneth A. Lambert, Introduction to Python, Cengage
6.. Vamsi Kurama, Python Programming: A Modern Approach, Pearson
4. Mark Lutz, Learning Python, O'Really.

Continious Evaluation Mark Distribution	
Written Test	Assignment
6	6

Mark distribution

Unit	Mark
I	21
II	24
III	24
IV	7
Total Mark	76

Pattern of Question

Part	Total No. of Questions	Marks per Question	Questions to be answered	Total Mark
A	6	1	6	6
B	5	5	3	15
C	5	9	3	27
			Total	48

DIGITAL SYSTEM DESIGN

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
1	MSELE01C03	4	1	0	4	3

CO1: Identify Switching equations from truth table
CO2: Apply K-Map and Quine-McCluskey minimization technique for simplifying Boolean expressions
CO3: Analyze Combinational and Sequential Circuits
CO4: Explain the working of Programmable Logic Devices

Module-1: Definition of combinational logic, Canonical forms, Generation of switching equations from truth tables, Karnaugh maps-3,4,5 variables, Incompletely specified functions (Don't care terms) Simplifying Max term equations, Quine-McCluskey minimization technique, Quine-McCluskey using don't care terms, Reduced prime implicants Tables. [10Hr]

Module-2: Combinational Circuits – Analysis and Design Procedures - Binary Adder-Subtractor - Decimal Adder - Binary Multiplier - Magnitude Comparator - Decoders – Encoders – Multiplexers. Sequential Circuits - Storage Elements: Latches , Flip-Flops - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure - Registers and Counters [12Hr]

Module-3: Introduction to digital systems, Mealy and Moore models, State machine-state diagram, state table, transition table, excitation table and realization. Design and analysis of synchronous sequential circuits-construction of state diagrams, state reduction and state assignment techniques, Algorithmic state machines (ASM). Asynchronous sequential circuits- Fundamental and pulse mode sequential machines,analysis,flow tables, state assignment and design problems. [14Hr]

Module-4: Basic concepts, programmable logic devices- programmable array logic(PAL), programmable logic array(PLA),design examples, Complex PLD(CPLD),Field programmable gate arrays-types of FPGA, Configurable Logic blocks (CLB),Input/output block(IOB), Programmable Interconnect Points(PIP) [12Hr]

Books for Reference:

1. Abraham Kandel- Foundation of Digital Logic Design
2. N.N. Biswas- Logic design theory
3. John.M. Yarbrough- Digital Logic Applications and Design
4. M. Morris R. Mano, Michael D. Ciletti, —Digital Design: With an Introduction to the Verilog HDL, VHDL, and SystemVerilog, 6th Edition, Pearson Education, 2017.
5. Donald G. Givone, "Digital principles and Design", Tata McGraw Hill 2002.
6. Stephen Brown and Zvonk Vranesic, "Fundamentals of Digital Logic with VHDL Deisgn", Tata McGraw Hill, 2002

Continious Evaluation Mark Distribution	
Written Test	Assignment
6	6

Mark distribution

Unit	Mark
I	15
II	24
III	24
IV	13
Total Mark	76

Pattern of Question

Part	Total No. of Questions	Marks per Question	Questions to be answered	Total Mark
A	6	1	6	6
B	5	5	3	15
C	5	9	3	27
			Total	48

DIGITAL COMMUNICATION TECHNIQUES

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
1	MSELE01E01	4	0	0	4	3

CO1: Explain basic concepts in Information theory
CO2: Explain various pulse Modulation techniques and digital modulation techniques
CO3: Solve Digital modulation problems
CO4: Summarize spread spectrum modulation

Module-1: : INFORMATION THEORY
Discrete massage, concept of amount of information, average information entropy, information rate, shanon's theorem, channel capacity of a gaussian channel, bandwidth - s/n trade off, switching techniques. [10Hr]

Module-2: PULSE MODULATION
Sampling theory, sample and hold circuits. Time division (TDM) and frequency division (FDM) multiplexing, pulse amplitude modulation (PAM), pulse width modulation(PWM),pulse position modulation(PPM),pulse code modulation-Quantization:
Uniform and Non-uniform Quantization, Compading Characteristics, Encoding, differential pulse code modulation (DPCM), Delta modulation (DM) ,inter symbol interference, correlative coding, eye pattern [14Hr]

Module-3:DIGITAL MODULATION TECHNIQUES
Digital Modulation formats, Coherent binary modulation techniques, Generation and Detection of Amplitude Shift Keying (ASK), frequency Shift keying (FSK), Phase Shift Keying(PSK) and Quadri Phase Shift Keying (QPSK),M-array PSK,Minimum shift keying(MSK), Non-coherent binary modulation techniques-DPSK [12Hr]

Module-4:SPREAD SPECTRUM MODULATION
Spread spectrum,pseudo noise sequence, Properties of PN codes, Theory of Spread Spectrum Modulation, Model of Spread Spectrum Digital Communication System, Direct-Sequence Spread Spectrum (DSSS), Frequency HopSpread-Spectrum (FHSS),applications-CDMA,Multipath suppression. [12Hr]

Books for Reference:

1. Simon Haykin, Digital Communication, John Wiley& Sons, 2005
2. Simon Haykin, Communication Systems, John Wiley& Sons , 2004
3. Taub & Schilling, Principles of Communication Systems, Tata Mc Graw Hill, 199
4. A.S.Tanenbaum,Computer networks.

Continious Evaluation Mark Distribution	
Written Test	Assignment
6	6

Mark distribution

Unit	Mark
I	5
II	28
III	28
IV	15
Total Mark	76

Pattern of Question

Part	Total No. of Questions	Marks per Question	Questions to be answered	Total Mark
A	6	1	6	6
B	5	5	3	15
C	5	9	3	27
			Total	48

MEDICAL ELECTRONICS

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
1	MSELE01E02	4	0	0	4	3

CO1: Classify different transducers in Medical Electronics
CO2: Explain the working of Medical Equipments
CO3: Explain the operation of advanced bio medical instruments
CO4: Identify the stages of a practical biomedical instrument

Module 1: ACTION POTENTIAL AND TRANSDUCERS
Electrical activity in cells, tissues, and nervous systems-transducers-types and characteristics physiological transducers- pressure transducers – transducers for body Temperature measurement-Pulse sensors – respiratory sensors [10Hr]

Module 2 :BIOPOTENTIAL RECORDERS
Characteristics of recoding system- electro cardio grapy (ECG) – electro encephalography(EEG) – electro myography (EMG) –electro retinography (ERG)- electroculography (EOG) [12Hr]

Module 3: SPECIALISED MEDICAL EQUIPMENTS
Digital thermometer –audio meter-X-ray machines –radiography and flowscopy –angiography – elements of bio –telemetry system - design of bio – telemetry system – radio telemetry system – pace makers – lung machine – kidney machine [12Hr]

Module 4:ADVANCED BIOMEDICAL INSTRUMENTATION
Computers in medicine – lasers in medicine – basic principles of endoscopes –nuclear imaging techniques – computer tomography (CT) , Scanning _ Ultrasonic imaging system-construction propagation and delay – magnetic resonance imaging (MRI). [14Hr]

Books for Reference:

1. Biomedical Instrumentation and Measurements- L. Cromwell, F.J.WeibellL and E.A. Pfeiffer
2. Biomedical Instrumentation – M.Arumugham- Anuradha Publication
3. Hand book of biomedical instruments –R.S.Khanddpur

Continious Evaluation Mark Distribution	
Written Test	Seminar
6	6

Mark distribution

Unit	Mark
I	19
II	14
III	19
IV	24
Total Mark	76

Pattern of Question

Part	Total No. of Questions	Marks per Question	Questions to be answered	Total Mark
A	6	1	6	6
B	5	5	3	15
C	5	9	3	27
			Total	48

PROGRAMMABLE LOGIC CONTROLLER

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
1	MSELE01E03	4	0	0	4	3

CO1: Explain the concepts of PLC
CO2: Illustrate Instructions of PLC
CO3: Develop Programmes for PLC
CO4: Model PLC based automation

Module-1:
Introduction to PLC - What is PLC, concept of PLC, Building blocks of PLC, Functions of various blocks, limitations of relays. Advantages of PLCs over electromagnetic relays. Different programming languages, PLC manufacturer etc. Working of PLC - Basic operation and principles of PLC - Scan Cycle - Memory structures, I/O structure - Programming terminal, power supply [12Hr]

Module-2:
Instruction Set - Basic instructions like latch, master control self holding relays. - Timer instruction like retentive timers, resetting of timers. - Counter instructions like up counter, down counter, resetting of counters. - Arithmetic Instructions (ADD,SUB,DIV,MUL etc.) - MOV instruction - RTC(Real Time Clock Function) - Watch Dog Timer - Comparison instructions like equal, not equal, greater, greater than equal, less than, less than equal. [12Hr]

Module-3:
Program Development – Safe Systems – Commissioning – Fault finding programs, Temperature control – Valve Sequencing – Conveyor Belt control – Control of a Process. Ladder Diagram Programming - Programming based on basic instructions, timer, counter, and comparison instructions using ladder program. Applications of PLCs - Object counter - On-off control - Car parking - Sequential starting of motors - Traffic light control - Motor in forward and reverse direction - Star-Delta, DOL Starters - Filling of Bottles - Room Automation [12Hr]

Module-4:
SCADA Systems – Hardware – Software – Open Systems and Communication standards – Fundamentals of SCADA – Communication Protocols. Remote Terminal Unit, MTU, HMI, PLCs as RTUs – Communication Architectures – SCADA Protocol: HDLC. [12Hr]

Books for Reference:

1. Programmable Logic Controller by Job Dan Otter; P.H. International, Inc, USA
2. Introduction to PLCs by Gary Dunning. McGraw Hill
3. Module on PLCs and their Applications by Rajesh Kumar, NITTTR Chandigarh
4. Programmable Logic Controller and Microcontrollers by Gurpreet Kaur and SK Sahdev by Uneek Publications, Jalandhar
5. W. Bolton, "Programmable Logic Controllers", Newnes - An imprint of Elsevier, 2015.
6. David Bailey, Edwin Right, "Practical SCADA for Industry", Newnes – (Elsevier), Mumbai, 2003.
7. Module on "Allen Bradlag PLC (SLC 500), Institution set-1, by Rajesh Kumar, NITTTR, Chandigarh
8. Module on "PLC Applications based on SLC 5/03" By Rajesh Kumar, NITTTR Chandigarh

Continious Evaluation Mark Distribution	
Written Test	Seminar
6	6

Mark distribution

Unit	Mark
I	19
II	19
III	19
IV	19
Total Mark	76

Pattern of Question

Part	Total No. of Questions	Marks per Question	Questions to be answered	Total Mark
A	6	1	6	6
B	5	5	3	15
C	5	9	3	27
			Total	48

PYTHON PROGRAMMING AND EMBEDDED SYSTEM LAB

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
1 & 2	MSELE01&02C04	0	0	8	4	5

Note: External Examination is in 2nd semester

CO1: Develop Python programmes using List, Dictionary and Strings
CO2: Develop Python programmes to process data stored in files and databases
CO3: Develop embedded programmes for interfacing using PIC 16F877
CO4: Develop programmes for Arduino and Raspberry pi

Python Programming

1. Introduction to python programming and python datatypes
2. Python program to find the union of two lists
3. Python program to find the intersection of two lists.
4. Python program to remove the "i" th occurrence of the given word in a list where words repeat
5. Python program to count the occurrences of each word in a given string sentence.
6. Python program to check if a substring is present in a given string.
7. Python program to map two lists into a dictionary.
8. Python program to count the frequency of words appearing in a string using a dictionary.
9. Python program to create a dictionary with key as first character and value as words starting with that character.
10. Python program to find the length of a list using recursion.
11. Python program to read a file and capitalize the first letter of every word in the file.
12. Python program to read the contents of a file in reverse order.
13. Python program to create a class in which one method accepts a string from the user and another prints it.
14. Study the Implementation of Database, Structured Query Language and database connectivity.

Embedded System

1. Interfacing Switches and LEDs
2. Interfacing Seven Segment Display – Design Up and Down Counter (Decimal & Hex)
3. Interface a 16x2 LCD to PIC 16F877 microcontroller and display an English word and a Malayalam word.
4. Interfacing Hex Keypad - Interface a keypad to PIC 16F877 microcontroller and display a key switch being pressed in the board.
5. Interfacing DC motor with speed and direction control
6. Interfacing Stepper Motor.
7. Interface built-in DS1307 real time clock chip and display the time, day and date.
8. Use PIC 16F877 to perform Compare, Capture and PWM operations.
9. Familiarization with Arduino board and Raspberry Pi. Flashing sample programs and detection of output via LED and Console.

End Semester Evaluation:

There will be two questions for the lab examination (1 question from Python programming and 1 question from Embedded system)

Continious Evaluation Mark Distribution	
Lab involvement	Observation book with signature from the teacher
5	15

SEMESTER - II

VLSI DESIGN

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
2	MSELE02C05	4	0	0	4	3

CO1: Explain Electrical properties of MOS and CMOS circuits
CO2: Explain VLSI fabrication techniques
CO3: Illustrate basic layout design rules
CO4: Build ALU subsystems

Module-1:Overview of design methodology: VLSI design process - Architectural design - Logical design - Physical design - Layout styles - Full custom - Semicustom approaches. BASIC ELECTRICAL PROPERTIES OF MOS AND CMOS CIRCUITS : MOS transistor - Threshold voltage - Threshold voltage equations - MOS device equations - Basic DC equations- Second order effects - MOS models - Small signal AC characteristics - NMOS inverter - Depletion mode and enhancement mode pull ups – CMOS inverter - DC characteristics - Inverter delay - Pass transistor - Transmission gate -- Power consumption in CMOS gates – Static dissipation – Dynamic Dissipation. [10Hr]

Module-2:VLSI fabrication techniques : An overview of wafer fabrication – Wafer processing - Oxidation - Patterning - Diffusion - Ion implantation - Deposition – Silicon gate NMOS process - CMOS processes - NWell - PWell - Twintub - Silicon on insulator – CMOS process enhancements - Interconnect - Circuit elements- Latch up - Latchup prevention techniques. [12Hr]

Module-3:Layout Design Rules : Need for design rules - Mead Conway design rules for the silicon gate NMOS process - CMOS based design rules -Simple layout examples – Sheet resistance - Area capacitance - Wiring capacitance - Driving large capacitive loads. [12Hr]

Module-4:Logic design,Sub system and ALU: Switch logic - Pass transistor and transmission gate based design - Gate logic - Inverter - Two input NAND gate - NOR gate - Other forms of CMOS logic – Dynamic CMOS logic - Clocked CMOS logic - Precharged domino CMOS logic – Structured design - Simple combinational logic design examples - Parity generator - Multiplexers –Subsystem Design Process : General arrangement of a 4-bit arithmetic processor - Design of a 4bit shifter - Design of a ALU subsystem - Implementing ALU functions with an adder - Carry look ahead adders [14Hr]

Books for Reference:

1. Kamran Eshraghian, Douglas A Pucknell and Sholeh Eshraghian, "Essentials of VLSI Circuits and Systems,"Prentice Hall of India, New Delhi, 2005.
2. Neil H E West and Kamran Eshranghian, "Principles of CMOS VLSI Design: A system Perspective", Addision-Wesley, 2nd Edition, 2004.
3. Sung-Mo Kang and Yusuf Leblebici," CMOS Digital Integrated Circuits",Tata McGraw- Hill,3rd Edition, New Delhi,2008.
4. Jan M Rabaey, Chandrasekaran A and Nikolic B, "Digital Integrated Circuits,' Pearson Education,3rd Edition, 2004.
5. Amar Mukherjee, "Introduction to nMOS and CMOS VLSI System Design", Prentice Hall
6. WayneWolf," Modern VLSI Design: Systems on Chip Design" , Pearson Education Inc., 3nd Edition , Indian Reprint, 2007.

Continious Evaluation Mark Distribution	
Written Test	Assignment
6	6

Mark distribution

Unit	Mark
I	19
II	19
III	10
IV	28
Total Mark	76

Pattern of Question

Part	Total No. of Questions	Marks per Question	Questions to be answered	Total Mark
A	6	1	6	6
B	5	5	3	15
C	5	9	3	27
			Total	48

ADVANCED DIGITAL SIGNAL PROCESSING

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
2	MSELE02C06	4	1	0	4	3

CO1: Explain various signals and systems
CO2: Interpret signals in Frequency domain
CO3: Develop Digital Filters.
CO4: Explain the architecture of TMS320C6x

Module-1

Discrete Time Signals and Systems - Linear Time Invariant System, Static and Dynamic System, Causal and Non-causal System, Stable and Unstable Systems, FIR and IIR Systems, Impulse Response, Linear Convolution, Difference Equation and its relationship with system function, Impulse Response and frequency response, Z-transform - definition, properties and inverse Z-transforms. [12Hr]

Module-2:

Discrete Fourier Transform (DFT) - Properties, Discrete Hilbert Transforms, Fast Fourier Transforms (FFT) - DIT and DIF algorithms, Data shuffling and bit reversal, Digital filters - IIR filters, Impulse invariant method and bilinear transformation - FIR filters, Windowing, Effects of finite word length effects in digital filters - rounding and truncation error, Quantization effects, Coefficient Quantization and limit cycle oscillations. [14Hr]

Module-3:

Principles and properties of adaptive filters - FIR adaptive filters. Adaptive algorithms - steepest descent algorithm, the LMS algorithm - convergence. Applications of adaptive filtering - noise cancellation, channel equalization. [14Hr]

Module-4:

Introduction, TMS320C6x Architecture, Functional units, Linear and circular addressing modes, TMS320C6x instruction set. [8Hr]

Books for Reference:

1. Salivahanan-Digital signal processing,TMH publishing company.
2. John. G. Proakis and Dimitris C. Manolakis, "Digital Signal Processing Principles, Algorithms and Applications," Pearson Education, Third edition 2006
3. Ramesh Babu - Digital signal processing
4. L.R Rabiner and B gold- Theory and application of digital signal processing.
5. B Venkataramani, M Bhaskar -Digital Signal Processors: Architecture, Programming and Application 2 Edition
6. Monson H. Hayes, "Statistical digital signal processing and modeling", John Wiley and Sons Inc. New York, Indian reprint 2008.
7. Rulph Chassaing, "Digital Signal Processing and Applications with the C6713 and C6416 DSK", John Wiley & Sons, Inc., 2005
8. Mitra S. K., "Digital Signal Processing: A Computer Based Approach," McGraw-Hill Publishing Company, 1998.
9. Oppenheim A. V., Schafer R. W., "Discrete-Time Signal Processing," Prentice Hall India, 1996.
10. Chi-Tsong Chen, "Digital Signal Processing: Spectral Computation and Filter Design," Oxford University Press, 2001.
11. Lonnie C. Ludeman, "Fundamentals of Digital Signal Processing," John Wiley& Sons, NY, 1986.
12. R. E. Bogner, A. G. Constantinidis, (Editors), "Introduction to Digital Filtering," John Wiley & Sons, NY, 1975.
13. Emmanuel C. Ifeacher, Barry W. Jervis, "Digital Signal Processing: A Practical Approach," 2nd edn., Pearson Education, 2004.
14. Boaz Porat, "A Course in Digital Signal Processing," Prentice Hall Inc, 1998.

Continious Evaluation Mark Distribution	
Written Test	Assignment
6	6

Mark distribution

Unit	Mark
I	21
II	25
III	15
IV	15
Total Mark	76

Pattern of Question

Part	Total No. of Questions	Marks per Question	Questions to be answered	Total Mark
A	6	1	6	6
B	5	5	3	15
C	5	9	3	27
			Total	48

POWER ELECTRONICS

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
2	MSELE02C07	4	0	0	4	3

CO1: Explain the operation of power electronic devices
CO2: Compare thyristor commutation techniques
CO3: Explain DC Choppers
CO4: Explain the operation of Inverters and Power supplies

Module 1: Theory and Operation of SCR, UJT and TRIAC
Characteristics- design of relaxation oscillator using UJT- UJT in SCR and TRIAC triggering circuits – PUTs- SILCON bilateral switch- speed control of DC shunt motor using Thyristors – single phase half wave speed control system- reversible control system. [8Hr]

Module 2 : Thyristor Commutation techniques
Introduction – natural commutation- forced commutation – self commutation – impulse commutation – response- pulse commutation – external pulse commutation – load side commutation and line side commutation- complementary commutation . Controlled rectifiers introduction – principle of phase controlled converter – single phase semi converter – single phase series converter. [12Hr]

Module 3 : DC Choppers
Introduction – principle of step down operation – step down with RL load – principle of step up operation- switch mode regulator – buck regulator – boost regulator – buck- Boost regulator – CUK regulator. [14Hr]

Module 4 : Inverters and Power Supplies
Introduction – principle of operation – single phase bridge inverters – three phase inverters – voltage control of single phase inverters. Introduction to power supply- AC and DC power supply – switched mode DC power supplies – resonant DC power supplies – Bidirectional power supplies- AC power supplies [14Hr]

Books for Reference:

1. M.H . Rashid- Power Electronics – Circuits, Devices and Applications, Prentice Hall
2. SEN- Power Electronics.Mc Graw Hill

Continious Evaluation Mark Distribution	
Written Test	Seminar
6	6

Mark distribution

Unit	Mark
I	20
II	21
III	15
IV	20
Total Mark	76

Pattern of Question

Part	Total No. of Questions	Marks per Question	Questions to be answered	Total Mark
A	6	1	6	6
B	5	5	3	15
C	5	9	3	27
			Total	48

MICROWAVE TECHNIQUES AND DEVICES

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
2	MSELE02E04	4	0	0	4	3

CO1: Solve transmission line problems
CO2: Explain microwave transmission lines
CO3: Identify different microwave components
CO4: Explain operation of microwave solid state devices

Module 1: Introduction-Frequency range, significance, applications; Guided waves- TE,TM,TEM waves, velocities of propagation; Transmission line theory: lumped element circuit model, transmission line parameters, transmission line equations, characteristic impedance, input impedance of lossless line, short circuited and open circuited ,lines, standing waves, reflection coefficient, VSWR , Smith chart and its applications [12Hr]

Module 2: Wave guides- rectangular wave guides: TE,TM waves, dominant and degenerate modes, impossibility of TEM waves in wave guides; Excitation of modes in rectangular waveguides, Planar transmission lines: strip lines, micro strip lines slot lines and coplanar lines.
Scattering matrix- Concept of N port scattering matrix representation- properties of s matrix, Micro wave passive devices- Tee junction, E-plane Tee, H-plane Tee, Magic Tee [12Hr]

Module 3: Microwave measurements and application – measurement of power, VSWR, frequency, wavelength, insertion loss, impedance and attenuation; Basic concept of network analyzer and Anechoic chamber; Applications- ISM applications, micro wave radiation hazards. [12Hr]

.

Module 4: Solid state micro wave devices- PIN diode, varactor diode, Tunnel diode, Gunn diode and Avalanche transit time devices- Basic principle of operation of parametric amplifiers, Manley-Rowe power relations, Negative resistance amplifier, Micro wave tubes- high frequency limitations-structure and principle of operation of two cavity Klystron, reflex Klystron, TWT, Magnetron. [12Hr]

Books for Reference:

1. Microwave engineering, David M Pozar, John Wiley, 2003
2. Microwave devices and circuits, Samuel Y Liao, Pearson Education, 2003
3. Microwave engineering – Annapurna Das and Sisir K Das Tata McGraw Hill, 2009

Continious Evaluation Mark Distribution	
Written Test	Seminar
6	6

Mark distribution

Unit	Mark
I	19
II	19
III	19
IV	19
Total Mark	76

Pattern of Question

Part	Total No. of Questions	Marks per Question	Questions to be answered	Total Mark
A	6	1	6	6
B	5	5	3	15
C	5	9	3	27
			Total	48

FUNDAMENTALS OF HDL

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
2	MSELE02E05	4	0	0	4	3

CO 1:Explain the language constructs and programming fundamentals of VHDL and Verilog
CO 2:Illustrate gate level, dataflow, behavioural and structural modelling using VHDL and Verilog
CO 3:Explain Structural Descriptions of IC Using VHDL and Verilog
CO 4:Develop Combinational and Sequential Logic circuits using VHDL and Verilog

Module-1 :
Introduction: Why HDL , A Brief History of HDL, Structure of HDL Module, Operators, Data types, Types of Descriptions, simulation and synthesis, Brief comparison of VHDL and Verilog [12Hr]
Module-2 :
Data –Flow Descriptions: Highlights of Data-Flow Descriptions, Structure of Data-Flow Description, Data Type – Vectors. Behavioral Descriptions: Behavioral Description highlights, structure of HDL behavioral Description, The VHDL variable –Assignment Statement, sequential statements. [12Hr]
Module-3:
Structural Descriptions: Highlights of structural Description, Organization of the structural Descriptions, Binding, state Machines, Generate, Generic, and Parameter statements.
Procedures, Tasks, and Functions: Highlights of Procedures, tasks, and Functions, Procedures and tasks, Functions. Advanced HDL Descriptions: File Processing, Examples of File Processing [12Hr]
Module-4:
Mixed –Language Descriptions: Highlights of Mixed-Language Description, How to invoke One language from the Other, Mixed-language Description Examples, Limitations of Mixed-Language Description. [12Hr]

TEXT BOOKS:
1. HDL Programming (VHDL and Verilog)- Nazeih M.Botros- John Weily India Pvt. Ltd. 2008.
REFERENCE BOOKS:
1. Fundamentals of HDL – Cyril P.R. Pearson/Sanguin 2010.
2. VHDL -Douglas perry-Tata McGraw-Hill.
3. A Verilog HDL Primer- J.Bhaskar – BS Publications
4. Circuit Design with VHDL-Volnei A.Pedroni-PHI

Continious Evaluation Mark Distribution	
Written Test	Seminar
6	6

Mark distribution

Unit	Mark
I	9
II	24
III	28
IV	15
Total Mark	76

Pattern of Question

Part	Total No. of Questions	Marks per Question	Questions to be answered	Total Mark
A	6	1	6	6
B	5	5	3	15
C	5	9	3	27
			Total	48

EMBEDDED OS AND RTOS

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
2	MSELE02E06	4	0	0	4	3

CO 1: Explain Embedded OS (Linux) fundamentals
CO 2: Describe the basics of Real-Time Operating System concepts
CO 3: Extend linux for Embedded system.
CO 4: Classify RTOS for Embedded Applications

Module-1 : Introduction to Embedded Linux : Overview of Linux OS, Directory structures, basic Linux shell commands, Overview of Systems Calls, Classification of system Calls, Inter Process Communication , Multithreading and Thread Management [8Hr]

Module-2 : Embedded Linux Driver Development : Linux Kernel Module Programming, Character device driver development, USB device driver development , Block, Network and PCI device driver development [13Hr]

Module-3 : Building and Customisation of Linux for Embedded systems : Linux booting procedure, Bootloader, hypervisor, opensbi, qemu, Linux build tools - Buildroot and Yocto [13Hr]

Module-4 : RTOS for Embedded Applications : Basics of RTOS: Real-time concepts, Hard Real time and Soft Real-time, Differences between General Purpose OS & RTOS, Basic architecture of an RTOS Scheduling Systems , RTOS Issues – Selecting a Real Time Operating System, FreeRTOS, Thread creation & Management, Inter thread Communication, Mutual Exclusion, MbedOS , Other real time OS (VxWorks, Azure RTOS, SAFERTOS etc.) [14Hr]

Reference Books

1. GNU/LINUX Application Programming, Jones, M Tims
2. SreekrishnanVenkateswaran Essential Linux Device Drivers, Prentice Hall 2008
3. Embedded/Real Time Systems Concepts, Design and Programming Black Book, Prasad, KVK
4. Software Design for Real-Time Systems: Cooling, J E Proceedings of 17the IEEE Real-Time Systems Symposium December 4-6, 1996 Washington, DC: IEEE Computer Society
5. FreeRTOS Reference Manual

Continious Evaluation Mark Distribution	
Written Test	Seminar
6	6

Mark distribution

Unit	Mark
I	19
II	19
III	19
IV	19
Total Mark	76

Pattern of Question

Part	Total No. of Questions	Marks per Question	Questions to be answered	Total Mark
A	6	1	6	6
B	5	5	3	15
C	5	9	3	27
			Total	48

AUTOMOTIVE ELECTRONICS

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
2	MSELE02E07	4	0	0	4	3

CO1: Explain the fundamentals of Automotive Electronics
CO2: Identify sensors used in automobiles
CO3: Describe Automotive Networking Protocols
CO4: Explain the diagnostic controls in automotives

Module-1:

Automotive Fundamentals Overview – Evolution of Automotive Electronics, Automobile Physical Configuration, Survey of Major Automotive Systems, The Engine – Engine Block, Cylinder Head, Four Stroke Cycle, Engine Control, Ignition System – Spark plug, High voltage circuit and distribution, Spark pulse generation, Ignition Timing, Steering System . The Basics of Electronic Engine Control – Motivation for Electronic Engine Control – Exhaust Emissions, Fuel Economy, Concept of an Electronic Engine control system, Definition of General terms, Definition of Engine performance terms, spark timing and EGR on performance, Electronic Ignition. [12Hr]

Module-2:

Automotive Sensors – Automotive Control System applications of Sensors and Actuators -Variables to be measured, Airflow rate sensor, Strain Gauge MAP sensor, Engine Crankshaft Angular Position Sensor, Hall effect Position Sensor, Shielded Field Sensor, Optical Crankshaft Position Sensor, Throttle Angle Sensor (TAS), Engine Coolant Temperature (ECT) Sensor, Exhaust Gas Oxygen (O2/EGO) Lambda Sensors, Piezoelectric Knock Sensor. Automotive Engine Control Actuators – Solenoid, Fuel Injector, EGR Actuator. [12Hr]

Module-3:

Automotive Networking -Bus Systems – Classification, Applications in the vehicle, Coupling of networks, Examples of networked vehicles, Buses – CAN Bus, LIN Bus, MOST Bus, Flex Ray, Diagnostic Interfaces. Vehicle Motion Control – Typical Cruise Control System, Digital Cruise Control System, Digital Speed Sensor, Throttle Actuator, Digital Cruise Control configuration, Cruise Control Electronics (Digital only), Antilock Brake System (ABS) [12Hr]

Module-4:

Automotive Diagnostics-Timing Light, Engine Analyzer, On-board diagnostics, Off-board diagnostics, Expert Systems, Occupant Protection Systems – Accelerometer based Air Bag systems. Future Automotive Electronic Systems – Alternative Fuel Engines, Electric and Hybrid vehicles, Fuel cell powered cars, Collision Avoidance Radar warning Systems, Low tyre pressure warning system, Heads Up display, Speech Synthesis, Navigation – Navigation Sensors – Radio Navigation, Signpost navigation, dead reckoning navigation, Advanced Cruise Control, Stability Augmentation, Automatic driving Control. [12Hr]

Books for Reference:

1. William B. Ribbens, Understanding Automotive Electronics, 6th Edition, Elsevier Publishing.
2. Robert Bosch Gmbh (Ed) Bosch Automotive Electronics and Automotive Electronics Systems and Components, Networking and Hybrid Drive, 5th edition, John Wiley& Sons Inc., 2007

Continious Evaluation Mark Distribution	
Written Test	Seminar
6	6

Mark distribution

Unit	Mark
I	19
II	19
III	19
IV	19
Total Mark	76

Pattern of Question

Part	Total No. of Questions	Marks per Question	Questions to be answered	Total Mark
A	6	1	6	6
B	5	5	3	15
C	5	9	3	27
			Total	48

ELECTRONIC INSTRUMENTATION

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
2	MSELE02E08	4	0	0	4	3

CO1: Identify transducers in Electronic instruments
CO2: Explain the working of signal processing and conditioning circuits
CO3: Develop a system for temperature control
CO4: Explain the operation of General purpose Electronic instruments

Module-1:Building blocks of Instrumentation System and Transducers Block diagram of instrumentation system- performance characteristics of instruments – accuracy, precision, sensitivity, linearity, resolution, hysteresis, errors. Electrical transducersclassification- basic requirement of a transducer – displacement transducer- variable resistor, variable inductance – RVDT-LVDT- Variable capacitance – Hall effect- digital- piezo electric , pressure and temperature transducers- flow meter and photosensitive transducers. [12Hr]

Module-2: Signal Processing and Conditioning- Transducer bridges – instrumentation amplifier – isolation amplifier – logarithmic amplifier – ,voltage and current amplifier – integrator and differentiator. Phase sensitive detector- peak detector – sample and hold circuit- RMS count-comparator linearization- V to F , F to V convertors – filters. [12Hr]

Module-3: Data Acquisition
Single channel, multi channel data conversion- A/D, D/A convertors – multiplexers- PID controller-application of micro controllers: temperature control – control of petrol engine. Firing angle control of SCR- atmospheric data acquisition. [12Hr]

Module-4: General purpose Electronic Instruments
XY recorders- stripe chart recorder- signal generator – pulse generator – CRO- Digital voltmeters and multimeters - electronic counters- AC millivoltmeters- wave analyzers and spectrum analyzers - frequency synthesizers – lock in amplifiers – frequency response analyzer phase meter. [12Hr]

Books for Reference:

1. C.S . Rangan, G.R Sharma and V.S.V Mani- Instrumentation – Devices and systems TMH 1983
2. W.D. Cooper, A.D Helfix- Electronic instrumentation and measuring techniques PHI 1988
3. D. Patranabis- Principles of industrial instrumentation
4. A.K sawney, Dhanpath Rai and sons- Electrical and electronic measurements and instrumentation.

Continious Evaluation Mark Distribution	
Written Test	Seminar
6	6

Mark distribution

Unit	Mark
I	19
II	19
III	19
IV	19
Total Mark	76

Pattern of Question

Part	Total No. of Questions	Marks per Question	Questions to be answered	Total Mark
A	6	1	6	6
B	5	5	3	15
C	5	9	3	27
			Total	48

ADVANCED DIGITAL SIGNAL PROCESSING LAB & MINI PROJECT

Semester	Course Code	Hours per Week			Credit	Exam Hrs
		L	T	P		
2	MSELE02C08	0	0	8	4	5

CO1: Implement signal processing algorithms
CO2: Develop programmes for digital filters
CO3: Develop solutions for real world problems keeping professional ethics
CO4: Demonstrate documentation & presentation skill

ADVANCED DIGITAL SIGNAL PROCESSING LAB

Experiments.

1. Waveform generation -Square, Triangular and Trapezoidal.
2. Generation of linear convolution without using built in functions
3. Generation of circular convolution without using built in functions
4. Verification of Convolution Theorem-comparison Circular and Linear Convolutions.
5. Compute the Discrete Fourier Transform and IDFT with and without built in functions
6. Implementation of Linear convolution using DFT (Overlap-add and Overlap-Save methods)
7. Implementation of Decimation-in-time radix-2 FFT algorithm
8. Implementation of Decimation-in-frequency radix-2 FFT algorithm
9. Implementation of IIR digital filter using Butterworth method and bilinear transformation
10. Implementation of IIR digital filter using Chebyshev (Type I and II) method
11. Implementation of FIR digital filter using window (Rectangular, Hamming, Hanning, Bartlett) methods
12. Implementation of FIR digital filter using frequency sampling method
13. Verification of Sampling Theorem

Continious Evaluation Mark Distribution	
Lab involvement	Observation book with signature from the teacher
2	8

MINI PROJECT

Guidelines:

1. The mini project is an individual activity and should assign a project guide for each student.
2. Evaluation committee comprises of project guide and two other members from the Department.
3. Continious Evaluation comprises of following components:
    a) Interim presentation
    b) Final presentation

Deliverables:

1. Project Report
2. Working prototype/Simulation Result
3. Presentation of the project

Continious Evaluation Mark Distribution	
Project Report	Viva
4	6

End Semester Evaluation Format

Part	Cognitive Level	No. of Questions	Questions to be answered	Approximate time to answer a question	Total time in earch Part	Total Mark
A	Remembering, Understanding	6	6	4 minutes	24 minutes	6
B	Creating	5	3	20 minutes	60 minutes	15
C	Applying, Analysing, Evaluating	5	3	30 minutes	90 minutes	27
			Total		174	48

Sample Question Paper

First Semester M.Sc Electronics Degree Examination

MSELE01E02 Medical Electronics

Time : 3 Hours Maximum Marks:48

Section-A (Answer All, Each carries 1 mark)

1) Explain resting and action potential
2) What is electro encephalography
3) Explain the audio sensing mechanism in human ear
4) What is Angiography
5) Explain the basic principle of endoscope
6) Explain the characteristics of Ruby laser

Section -B (Answer any 3, Each carries 5 marks)

7) Design the block diagram of a practical Digital thermometer for Maximum temperature reading 150°C and discuss each section in detail
8) Develop ECG waveform of a patient with heart problem and comment on each section of the signal in detail
9) Discuss the design aspects of an isolation amplifier for ECG Machine
10) Discuss the design aspects and working of various pacemakers in medical electronics
11) Design a radio telemetry system working with a carrier frequency fc= 433 MHz

Section -C (Answer any 3, Each carries 9 marks)

12) Develop a blockdiagram for a CT Machine
13) Apply the basic principles of Ultrasonic waves and transducer array and explain the operation of an Ultrasound imaging system
14) Apply the basic principle involved in laser generation and explain the operation of Ruby laser system
15) Develop a block diagram for X-Ray machine
16) Develop a blockdiagram for Magnetic Resonance Imaging system