SRI VENKATESWARA UNIVERSITY: TIRUPATI

S.V.U COLLEGE OF SCIENCES

DEPARTMENT OF PHYSICS

Course

M.Sc. ELECTRONICS

Choice Based Credit System (CBCS)

Academic Year 2017 – 18

Vision

To inculcate certain specific enabling skill sets to prepare the students to take up challenges in any one or more functional domains viz. (i) Academics; (ii) Basic and Applied Research; (iii) Research & Development; (iv) Engineering & Technology and (v) Industry.

Mission

To bring out professionals having knowledge of basic laws of nature together with strong fundamentals in the core area of Electronic viz. Analog Integrated Circuits, Digital Integrated Circuits, Programming in C, Python, Matlab, Mathematical methods of Signal and System Analysis, Optical, wireless and satellite communications, Advanced Microprocessors and Microcomputers, Embedded controllers, Semiconductor Materials and Devices, Signal and Image Processing, VHDL, VLSI circuits, Industrial Electronics, Control Systems, Data Communications and Networking, Microwaves, etc.

PROGRAM EDUCATIONAL OBJECTIVES: At the end of the program, the students will beable to:

PEO1	Apply principles of basic scientific concepts in understanding, analysis, and prediction of physical systems.
PEO2	Develop human resource with specialization in theoretical and experimental Techniques required for career in academic, research and industry.
PEO3	Engage in lifelong learning and adapt to changing professional and societal needs.

PROGRAM OUTCOMES: At the end of the program, the student will be able to:

PO1	Apply the scientific knowledge to solve the complex physics problems.
PO2	Identify,formulate,andanalyzeadvancedscientificproblemsreachingsubstantiated Conclusions using first principles of mathematics, physical, and natural sciences.
PO3	Design solutions for advanced scientific problems and design system components or processes that meet the specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal consideration.
PO4	Use research-based knowledge and methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid Conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern scientific Tools to complex physics problems with an understanding of the limitations.
PO6	Applyreasoninginformedbythecontextualknowledgetoassesssocietal,health,safety,legalandculturalissues,andtheconsequentresponsibilitiesrelevanttothe Professional scientific practice.
PO7	Understand the impact of the scientific solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to the norms of scientific practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, And in multidisciplinary settings.
PO10	Communicate effectively on scientific activities with the Scientific/Engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective representations, and give And receive clear instructions.

PO11	Demonstrate knowledge and understanding of the scientific principles and apply These to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Recognize the need for, and have the preparation and ability to engage in independent And life-long learning in the broadest context of scientific and technological change.

PROGRAM SPECIFIC OUTCOMES: Attheend oftheprogram,thestudent willbeableto:

PSO1	Understandthebasicandadvancedconceptsofdifferentbranchesof Electronics.
PSO2	Performanddesignexperimentsintheareasofelectronics,Microcontrollers, Communications, Semiconductors Devices, and Programming.
PSO3	Applythe conceptsof electronics in specialized areasof VLSI technology, VHDL, Communications,etc.in industry,academia, research anddaytodaylife.

Semester – I

Sl. No	Components of Study	Course code	Title of the Paper	Instruction hours per week	Credits	Internal Assess-ment Marks	End Semester Exams Marks	Total Marks
1.	Core-Theory	ELE-101	Analog Integrated Circuits and Applications	6	4	20	80	100
2.	Core-Theory	ELE-102	Digital Integrated Circuits and Applications	6	4	20	80	100
3.	Compulsory Foundation	ELE-103 (a)	Programming in C with data structures	6	4	20	80	100
		ELE-103 (b)	Python Programming					
		ELE-103 (c)	Programming in Matlab					
4.	Elective Foundation	ELE-104 (a)	Mathematical Methods of Signal & System analysis	6	4	20	80	100
		ELE-104 (b)	Optical Communications					
		ELE-104 (c)	Wireless communications					
5.	Core-Practical	ELEP-105	Analog and Digital IC's (Lab)	6	4	20	80	100
6.	Core-Practical	ELEP-106	Programming in C (Lab)	6	4	20	80	100
			Total:	36	24	120	480	600

All Core papers are Mandatory
Compulsory Foundation – Choose one paper
Elective Foundation – Choose one paper

Semester – II

Sl. No	Components of Study	Course code	Title of the Paper	Instruction hours per week	Credits	Internal Assess-ment Marks	End Semester Exams Marks	Total Marks
1.	Core-Theory	ELE-201	Advanced Microprocessors and Microcomputers	6	4	20	80	100
2.	Core-Theory	ELE-202	Digital Communications	6	4	20	80	100
3.	Compulsory Foundation	ELE-203(a)	Semiconductor Materialsand Devices	6	4	20	80	100
		ELE-203(b)	Sensors and Transducers					
		ELE-203(c)	Atmospheric and Space Instrumentation Techniques					
4.	Elective Foundation	ELE-204 (a)	Control Systems	6	4	20	80	100
		ELE-204 (b)	Medical Instrumentation					
		ELE-204 (c)	Data Mining and Information Security					
5.	Core-Practical	ELEP-205	8086 Microprocessor (Lab)	6	4	20	80	100
6.	Core-Practical	ELEP-206	Digital Communications (Lab)	6	4	20	80	100
			Total:	36	24			600

All Core papers are Mandatory
Compulsory Foundation – Choose one paper
Elective Foundation – Choose one paper

Semester – III

Sl. No	Core/Elective	Course code	Title of the Paper	Instruction hours per week	Credits	Internal Assessment Marks	End Semester Exams Marks	Total Marks
1.	Core-Theory	ELE-301	Digital Signal Processing	6	4	20	80	100
2.	Core-Theory	ELE-302	Digital system Design-VHDL	6	4	20	80	100
3.	Generic Elective	ELE-303(a)	Microcontrollers and Applications	6	4	20	80	100
		ELE-303(b)	Computer organization					
		ELE-303(c)	Digital Image Processing					
4.	Core-Practical	ELEP-304	Digital Signal Processing (Lab)	6	4	20	80	100
5.	Skill Oriented Course	ELE-305	Peripheral interface controllers VHDL &Microcontrollers (Lab) (Hands on training)	6	4	10	90 (40+50)	100
6.	Open Elective	ELE-306 (a)	Microprocessors, PC Hardware and Interfacing	6	4	20	80	100
		ELE-306 (b)	Satellite Communications					
			Total:	36	24	110	490	600

All Core papers are Mandatory
Generic Elective - Choose one paper
Skill Oriented Course is Mandatory (10 marks for Internal, 40 marks for final theory, & 50 marks for Practicals)

Semester – IV

Sl. No	Core/Elective	Course code	Title of the Paper	Instruction hours per week	Credits	Internal Assessment Marks	End Semester Exams Marks	Total Marks
1.	Core-Theory	ELE-401	Advanced CommunicationSystems	6	4	20	80	100
2.	Core-Theory	ELE-402	Introduction to VLSI circuits	6	4	20	80	100
3.	Generic Elective	ELE-403(a)	Data Communications and Networking	6	4	20	80	100
		ELE-403(b)	Industrial Electronics					
		ELE-403 (c)	EMI and EMC					
4.	Core-Practical	ELEP-404P	Communication (Lab)	6	4	---	100	100
5.	**Multi Disciplinary Course/ Project work**	ELE-405	Internet of Things/ Project Work	6	4	20	80	100
6.	**Open Elective**	ELE-406 (a)	Embedded systems with PIC Microcontrollers	6	4	20	80	100
		ELE-406 (b)	Microwaves					
			Total:	36	24	80	520	600

All Core papers are Mandatory
Generic Elective - Choose one paper
MultiDisciplinary Course/Project is Mandatory

ELE-101	ANALOG INTEGRATED AND APPLICATIONS	L-5,T-1,P-0	4Credits

Pre-requisite: Understandingofgraduatelevel Electronics

Course Objectives: The aim and objective of the course on Analog Integrated Circuits and Applications is to train thestudents of M.Sc. in the Voltage Regulators and Signal generators, Nonlinear Circuits, Amplifiers, and Phase-Locked Loops, A-D and D-A Converters, Op. Amp. Applications used in the Industry.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	UnderstandthenecessityofAction, Voltage regulators and Signal generators.
CO2	Used' Nonlinear Circuits, Amplifiers, and Phase-Locked Loops in various applications.
CO3	DescribetheA-D and D-A Convertersin different applications.
CO4	ApplyessentialfeaturesofOp. Amp. Applications used in the Industry.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	1	1	-	2	2	-	1
CO2	3	2	2	2	-	1	1	-	2	2	1	2
CO3	3	3	2	-	2	1	1	-	2	2	-	-
CO4	3	2	3	2	-	1	1	-	2	2	1	-

ELE-101 ANALOG INTEGRATED CIRCUITS AND APPLICATIONS

UNIT-1 : Voltage Regulators and Signal generators

Linear regulators, Linear regulator applications, Switching regulators, Monolithic Switching Regulators, Sine, Triangular, Sawtooth wave form generators, Multivibrators, Monolithic timers, Monolithic waveform generators, V-F and F-V converters.

UNIT-II: Nonlinear Circuits, Amplifiers, and Phase-Locked Loops

Voltage comparators, Comparator applications, Schmitt Triggers, Precision Rectifiers, Analog Switches, Peak detectors, Sample- and Hold Amplifiers, Log/Antilog Amplifiers, Analog multipliers, Phase-Locked Loops, Monolithic PLLs.

UNIT-III : A-D and D-A Converters

Performance Specifications, D-A conversion Techniques – Weighted Resistor DACs, Voltage mode R-2R ladder DAC, Bipolar DACs, Multiplying DAC applications.

A-D conversion Techniques– DAC based A-D conversion, Successive-Approximation ADC, Flash Converters, Integrating Type Converters.

UNIT – IV: Op Amp Applications

Summing Amplifier, Voltage to current converter, Current to Voltage converter, Integrator, Differentiator, Instrumentation Amplifier. Active Filters- First order filters, Second order Filters, Higher Order Filters, Switched Capacitor Filters.Oscillators: Principles and types of Oscillators.

Books for study:

1. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", 3/e, TMH, 2002 (UNIT-I to UNIT-III)
2. Ramakanth A. Gayakwad, OP-Amps & Linear Integrated Circuits, PHI, 2nd Edition, 1991.
3. J. Michael Jacob, "Application and Design with Analog Integrated Circuits" 2/e, PHI, 1996.
4. D. Roy Choudhury and Shail Jain, "Linear Integrated Circuits", New Age International (P) Limited, 1991.
5. R.F. Coughlin and F.F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI, 1992.
6. D.K. Anvekar and B.S. Sonde, "Electronic Data Converters: Fundamentals & Applications", TMH, 1994.
7. A.D. Helfric and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 1996.

Model Question Paper

M.Sc. DEGREE EXAMINATION – APRIL/DECEMBER
First SEMESTER
Branch - Electronics
Paper 1- ELE-101: ANALOG INTEGRATED CIRCUITS AND APPLICATIONS
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. What is linear regulator? Mention its application.
2. Draw the circuit of voltage to frequency converter (V – F) and explain it s working.
3. Explain any one of the application of comparator with neat sketch.
4. Explain the principle of PLL with neat sketch.
5. Discuss the various performance specifications of DAC.
6. Explain how ADC can be realized using DAC.
7. What is an Oscillator ? Explain its Principle.
8. Explain the working of the Differentiator.

SECTION -B

Answer ALL questions. Each question carries 15 marks.
(Marks: 4 x 15 =60)

9. (a) Explain the working of sine wave generator with the help of relevant circuit and derive its frequency of oscillations.

(Or)

(b) Explain the working of a monolithic timer 555 IC with the help of its functional diagram.

10. (a) Construct and explain the working of logarithmic and antilogarithmic amplifiers.

(Or)

(b) Write about the working of peak detector and sample and hold amplifier.

11. (a) Discuss the working of successive approximation ADC.

(Or)

(b) Discuss the working of R -2R ladder DAC . Find the output voltage from a 50 bit ladder that had a digital input of 11011. Assume 0 = 0V and 1 = +10V.

12. (a) What is Instrumentation Amplifier ? Discuss the working.

(Or)

(b) What are the Active Filters? Explain the working of Higher order Filter.

(MandatoryCore)

ELE-102	Digital Integrated Circuits and Applications	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingofgraduatelevel Digital Electronics

Course Objectives: The aim and objective of the course on Digital Integrated Circuits and Applications is toexpose the students of M.Sc.class to the topics like Flip-Flops, Counters and Registers, IC Logic families, Semiconductor Memories, Digital Instruments so that they are equipped with the digital integrated circuits and applications in the present days.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Gainin-depthknowledge abouttheFlip-Flops, Counters and Registers and their symbolsused in digital integrated circuits and their function.
CO2	Differentiatevarious IC Logic families usedDigital circuits.
CO3	Understand the various semiconductor memories such as RAMs and ROMs, Programmable Logic devices and development software.
CO4	To explain the basic function of various digital instruments such as DVMs, MP based Ramp type DVM, Digital multimeters, Frequency meter, Phase meter, capacitance meter and their Automation.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	2	1	-	2	-	1	-
CO2	2	3	2	2	2	2	2	-	-	-	1	2
CO3	3	3	2	2	1	2	2	-	1	-	1	-
CO4	3	3	2	2	2	2	1	-	-	-	1	2

ELE-102 DIGITAL INTEGRATED CIRCUITS AND APPLICATIONS

UNIT – I :Flip-Flops, Counters and Registers

NAND and NOR gate latches, Clocked signals and Clocked flip-flops, Clocked S-C, J-K, and D-FFs, D-latches, asynchronous inputs, timing considerations, one shot.

Ripple counters, Counters with MOD numbers<2^N, Changing the MOD number, IC asynchronous counters, Asynchronous down counter, Propagation delay in ripple counters, Synchronous counters, Presettable counters, 74193 counter, Synchronous counter design, Shift register counter. IEEE/ANSI Symbols.

UNIT – II : IC Logic families

Digital IC terminology, TTL logic family, TTL series characteristics, Improved TTL series, TTL loading and fan-out, other TTL characteristics, Connecting TTL outputs together, tristate TTL, ECL family, MOS digital ICs & Characteristics, CMOS logic & characteristics, Bilateral switch, TTL driving CMOS and vice-versa, Low voltage technology.

UNIT – III : Semiconductor Memories

RAM architecture, Static RAM, Dynamic RAM (DRAM), DRAM structure, and operation, DRAM Read/Write cycles, DRAM refreshing, Expansion of word size and capacity.

Programmable Logic Devices- Basic idea, PLD architecture (PROM), PAL, PLAs, Applications of a programmable Logic Device – GAL 16V 8A, Programming PLDs, Development software.

UNIT – IV: Digital Instruments

Dual slope Integrating Type DVM, Integrating Type DVM, Continuous Balance DVM, 3-1/2 digit, Resolution and sensitivity of Digital meters, General specification of DVM, MP based Ramp type DVM, Digital multimeters, Digital Frequency meter, Digital measurement of time and frequency, Digital PH meter, Automation in Digital Instruments, Digital Phase meter, Digital capacitance meter, IEEE 488 Bus.

Books for study:

1. Ronald J.Tocci, "Digital Systems-Principles and Applications", 6/e, PHI, New Delhi, 1999.
2. H.S. Kalsi, "Electronic Instrumentation", TMH, 1995. (Unit-IV)
3. Herbert Taub and Donald Schilling, "Digital Integrated Electronics", McGraw Hill, 1985.
4. S.K. Bose, "Digital Systems", 2/e, New Age International (P) Limited, 1992.
5. D.K. Anvekar and B.S. Sonde, "Electronic Data Converters: Fundamentals & Applications", TMH, 1994.
6. A.P. Malvino and D.P. Leach, "Digital Principles and Applications", TMH, 1991.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
First SEMESTER
Branch - Electronics
Paper 2 –ELE-102: DIGITAL INTEGRATED CIRCUITS AND APPLICATIONS
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. What is combinational logic circuit? Explain the sum of product from simplification.
2. Construct a -4- bit parallel binary adder and explain its working.
3. Explain the working of JK –FF with relevant sketch.
4. Write about 4 – bit shift register counter.
5. Explain the working of Bilateral switch with a neat sketch.
6. Write down the characteristics of TTL series and ECL family.
7. Draw the structure of dynamic RAM and explain.
8. Write about PAL.

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 =60)

9. (a) Design and construct a 3 –bit full – adder and explain its working.

(Or)

(b) What is Karnaugh map? Explain looping pairs quads octets in a K- map with suitable examples.

10. (a) Construct a 4 –bit ripple counter and explain its working with neat sketch.

(Or)

(b) Mention the differences between synchronous and asynchronous counters.

(c) Construct mod -10 counter and explain its working with neat sketch.

11. (a) Write down the characteristics of CMOS.

(b) Discuss how TTL can drive the CMOS and Vice –Versa with relevant sketches.

(Or)

(c) Discuss THE COMPARATIVE STUDY AMONG TTL,ECL and CMOS.

(d) Explain the loading and fan – out in TTL.

12. (a) Discuss the architecture of PLD.

(Or)

(b) Distinguish between SRAM and DRAM.

(c) Explain the applications of PLDs.

ELE-103(a)	**Programming in C with Data structures**	**L-5,T-1,P-6**	**4Credits**

Pre-requisite: Basicknowledgeabout Software fundaments

Course Objectives: The aimandobjective ofthe course on**Programming in C with Data structures**isto introduce thestudents of M.Sc. class to the fundamentals of C Language, Arrays, Structures, Unions and Bit Fields, Ques, Trees and their applications so that they can use the Computer Language in writing the programs for various applications.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understand the fundamentals of C Language such as Expressions and I/O Statements, Operators and control statements.
CO2	Explainthe arrays, User Define Functions,Pointers and their applications
CO3	Understand about Declaration of structure, Stack and Recursion and theirapplications.
CO4	Understand the Linked Lists, Trees, different Algorithms, and their Applications. They are able to write the programs in controlling devices.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	2	1	-	1	-	1	-

CO2	3	3	2	1	2	2	1	-	-	2	1	-
CO3	2	2	3	2	2	2	1	-	1	-	1	-
CO4	3	3	2	2	2	2	1	-		2	1	-

EL*E*-103(a) PROGRAMMING IN C WITH DATA STRUCTURES

UNIT – I: Fundamentals of C language

C character set – Identifiers and keywords – Constants – Variables – Data types – Declarations of variables Declaration of storage class – Defining symbolic constants Assignment statement

Operators: Arithmetic operators – Relational operators – Logic operators – Assignment operators – Increment and decrement operators – Conditional operators

Expressions and I/O Statements: Arithmetic expressions – Precedence of arithmetic operators Type converters in expressions – Mathematical (library) functions – Data input and output – The getchar and putchar functions – Scanf-Printif –Simple programs
Control Statements: If-Else statement – Switch statement – The ? Operator – GOTO –While, Do-while, FOR statements – BREAK and CONTINUE statements.

UNIT –II : Arrays

One dimensional and two dimensional arrays – Initialization Type declaration –Inputting and outputting of data for arrays – Programs of matrices addition, subtraction and multiplication

User Define Functions: The form of C functions- Return values and their types –Calling a function –Category of functions, Nesting of functions, Recursion, ANSI C functions – Function declaration, Scope and life time of variables in functions.

Pointers : Accessing the address of variable Declaration and Initialization of pointer variables, Accessing the value of the variable through its pointer-Pointer Expressions – Pointers and Arrays – Pointers and structures.

UNIT – III: Structures, Unions and Bit Fields

Declaration of structure, Initializing a structure, Functions and structures, Arrays of structures, Arrays within a structure, Structures within a structure, Pointers and structures, Unions, Bit Fields, Typedef, Enumerations.

The Stack- Representing stacks in C, Example: Infix, Postfix, and Prefix.
Recursion- Recursive definition and Processes, Recursion in C, The Towers of Hanoi Problem.

UNIT – IV: Queues and Lists

Linked Lists, Lists in C - Trees**-** Binary Trees, Binary Tree Representations, Example: The Huffman Algorithm, Representing Lists as Binary Trees, Trees and their Applications.

Books for study:

1. D. Ravichandran, “Programming in C”, New Age International (P) Limited, 1996.)
2. Y. Langsam, M.J. Augenstein and A.M. Tenenbaum, “Data Structures using C and C++” 2/e, Pearson Education, Inc., 1996.
3. Balaguruswamy, “Programming in ‘C’, TataMcGraw Hill.
4. R. Kruse, C.L. Tondo, and B. Leung, “Data Structures & Program Design in C” 2/e, Pearson Education, Inc., 1997.
5. T. Sudha and B. Poornima, “C programming with Data structures”, Anmol Publications Pvt. Ltd., 2005.

6. Byron Gottfried, Programming with 'C' , Tata McGraw Hill
7. Rajaraman ,Computer oriented numerical methods .
8. YeswanthKanetkar ,Let Us C .
9. K.R. Venugopal Prasad, Programming with C

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
First SEMESTER
Branch - Electronics
Paper 3- ELE-103(a): PROGRAMMING IN "C" WITH DATA STRUCTURES
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. Write down the examples for identifiers and keywords.
2. Explain Go To statement.
3. What is the concept of Recursion?
4. Explain the pointer variables.
5. Explain stacks used in C – language.
6. Write a C – program for 2X2 matrix addition.
7. Explain Binary tree.
8. Give some applications of trees.

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 =60)

9. (a) Explain arithmetic, relational, logical and assignment operators in "C".

(Or)

(b) Write a C –program to find the average of a set of 15 numbers by using while statement.
(C) Write a "C" program TO CONVERT Fahrenheit temperature to Celsius temperature.

10. (a) Write a program using pointers to compute the sum of 8 elements stored in an array.
(b) Write a program using pointers to determine the length of the character string.

(Or)

(C) Write a program for matrix multiplication.
(d) Writea programfor matrix Subtraction.

11. (a) What is meant by arrays of structures? And explain it.
(b) Write a program to store elements in a stack.

(Or)

(c)Write a program to read information for one person from the keyboard and print the same on the screen (struct person contain person name, date of joining and salary).
(d) Explain how structures defined.

12. (a) State and explain Huffman algorithm.
(b) With a suitable example, explain how lists are represented as Binary Trees .

(Or)

(c) Explain linked lists, Lists in C.

(d) Explain circular queue with suitable examples.

ELE-103(b)	Python Programming	L-5,T-1,P-0	4Credits

Pre-requisite: Understandingofgraduatelevel Programming Fundamentals.

CourseObjectives: Theaimandobjectiveofthecourseon**Python Programming**istofamiliarize the students of M.Sc. students with the fundamentals of Python Language, Object and Classes, Functions and Modules, I/O and Error Handling,etc.,sothattheycanusetheseinsolvingsimple and difficult problems.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understand the basics of Dynamic Types, Conventions, String Operations, Operators, Loop, Lists and functions.
CO2	Learn about Object and Classes in Python and comparewith anyother high-level language.
CO3	UseFunctions and Modulesin solving various problems.
CO4	Understand I/O and Error Handling in Python, solve the problems.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	1	-	1	2	-	1
CO2	3	3	3	1	2	1	-	-	3	2	-	1
CO3	3	3	3	2	2	1	1	-	1	2	-	1
CO4	3	3	3	-	-	2	-	-	2	2	-	1

ELE-103(b) Python Programming

UNIT – I:**Introduction to Python Programming Language:**

Introduction to Python Language,Strengths and Weaknesses, IDLE, Dynamic Types, Naming Conventions, String Values, String Operations, String Slices, String Operators, Numeric Data Types, Conversions, Control Flow and Syntax, Indenting, The if Statement, Relational Operators, Logical Operators, True or False,Bit Wise Operators,The while Loop, break and continue,The for Loop, Lists,Tuples,Sets,Dictionaries,Sorting Dictionaries,Copying Collections, In Functions.

UNIT –II :Object and Classes :

Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes.

UNIT –III : Functions and Modules :

Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword andOptional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function, Mapping Functions in a Dictionary, Lambda, Modules, Standard Modules – `sys`, Standard Modules – `math`, Standard Modules – `time`, The`dir`Function**.**

UNIT –IV :I/O and Error Handling In Python :

Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions.

Books for Study:

1. Mike, Dive into Python
2. Mark Lutz ,Learning Python, 4th Edition
3. Mark Lutz, Programming Python, 4th Edition

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

First SEMESTER
Branch - Electronics
Paper 3- ELE-103(b): Python PROGRAMMING
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. Write down theStrengths and Weaknesses of Python Language.
2. Explain Control Flow and Syntax.
3. What are the Classes in Python ?
4. Write a note on Inheritance.
5. Explain the Optional Parameters in Python.
6. Write a short note on the `dir`Function in Python.
7. Explain about Data Streams.
8. What are Run Time Errors ?

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 =60)

9. (a) Explain Relational, Logical, True or False and Bit Wise Operators in "Python".

(Or)

(b) Write about Dynamic Types, Naming Conventions, String Values and String Operations.

10. (a) What are the Principles of Object Orientation ? Discuss.

(Or)

(b) Writeabout File Organizationin Python.

(c) Discuss on Custom Exception Classes.

11. (a) Discuss on Variable Number of Arguments.

(b) Write about Passing Collections to a Function.

(Or)

(c)What are the Modulesin Python ? Discuss on Standard Modules – `sys`, – `math`, and –`time`.

12. (a) Write about Access Modes in Python.

(b) Discuss the Additional File Methods in Python.

(Or)

(c) What are the Handling IO Exceptions ? Explain.

(d) Explain about Exception Model in Python.

ELE-103(c)	**Programming in Matlab**	**L-3,T-1,P-2**	**4Credits**

Pre-requisite: Understandingofgraduate level electronics

CourseObjectives: Theaimandobjectiveofthecourseon Programming in Matlabistofamiliarize the M.Sc. students with the Mat lab Environment, Control Flow Instructions, Structured Data Types, Plotting in Mat lab,Handle Graphics for Manipulating Plots, Writing the programs in solving the problems for various applications.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Applybasicsknowledgeof various instructions in Matlab and script files.
CO2	Study and understanding of various control flow instructions.
CO3	Study and understanding of various Structured Data Types
CO4	AnalyzetheoutcomeofthePlotting in Mat lab,Handle Graphics for Manipulating Plots, Writing the programs in solving the problems for various applications.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	1	2	1	1
CO2	3	3	3	1	2	1	1	-	-	-	1	1
CO3	3	3	3	2	2	1	1	-	-	-	1	1
CO4	3	3	3	3	2	2	2	-	2	-	1	1

ELE-103(c) PROGRAMMING IN MATLAB

UNIT –I :Mat lab Environment

Defining Variables, Functions, Display Formats, Saving the Variables Stored in Memory, Predefined Variables, Complex Numbers, Matrices and Vectors, Strings, Input and Output Statements, Plotting in Mat lab, Mat Lab Help Facilities and Mat Lab Script Files.

UNIT –II:Control Flow

IF –END, IF – ELSE- END, ELSE IF, SWITCH –CASE, FOR Loops, WHILE Loops, General Structure of a Function, Scope of Variables, Passing Parameters, Global Variables, The RETURN Statement, Nar gin and nargout, Recursive Function.

UNIT-III : Structured Data Types

Introduction, Arrays in Mat lab, Addressing Arrays, Examples of Using Arrays, Designing Mat lab Functions to Handle Array Inputs, Dynamic Arrays, Cell Arrays, Structures

UNIT-IV : Plotting in Mat lab

Basic Two – Dimensional Plots, Line Styles, Markers, and Colors, Plot Color, Plotting Grid, The AXIS Command, Placing Text on a Plot, Modifying Text with Tex Commands, Obtaining Numerical values from a plot, Various Mat lab 2 –D Plot Types, Handle Graphics for Manipulating Plots.

Books for Study

1. Marc E. Herniter,Programming in MATLAB, Vikas Publishing House, 2001.
2. Paratap R: Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers, 2010.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
First SEMESTER
Branch - Electronics
Paper 3- ELE-103(c): PROGRAMMING IN MATLAB
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. Define a variable in MATLAB.
2. Explain Mat Lab Script File.
3. What is the concept of Recursive Function?
4. Explain thenargin and nargout variables.
5. Explainuse of Arrays in Matlab.
6. Write a note on structures in Matlab.
7. Explain how Placing Text on a Plot in Matlab ?
8. Write a note on basic two-dimensional plots.

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 =60)

9. (a) Explain Functions, Display Formats, and Predefined Variables in Matlab.

(Or)

(b) Write a program to plot the functions in Matlab using PLOT function

(i) sin(x) for $-10 \le x \le 10$ (ii) sin(x) cos(x) for $-10 \le x \le 10$

(iii) cos(x)sin(x) exp(x/10) for $-1 \le x \le 1$.

10. (a) Study the different methods for control flow available in MATLAB.

(Or)

(b) Write a MATLAB program that finds all perfect numbers 2 and n, where n is an integer entered by a user. A perfect number is one whose prime factors add to the number.

11. (a) Design Mat lab Functions to handle input parameters that are scalars or arrays.

(Or)

(b)Write a program that reads a text file and generates a histogram of lengths of the words contained in the file.

12. (a) Discuss how to handle Graphics for Manipulating Plots.

(Or)

(b) Explain how to Obtain Numerical values from a plot in Matlab.

ELE-104(a)	**Signals and System Analysis**	**L-5,T-1,P-0**	**4Credits**
Pre-requisite: Understandingof graduatelevels Mathematical analysis			
Course Objectives: The aim and objective of the course on Signals and System Analysis for the students of M.Sc. Electronics to equip them with the knowledge of Signals and Systems, Fourier Series Representation of Periodic Signals, Laplace and Z- Transforms for analysis.			
CourseOutcomes: At theend ofthecourse, thestudent willbe ableto			
CO1	Havethebasicknowledgeof different Continuous-Time and Discrete-Time Signalsand systems and their properties.		
CO2	Understand the *Fourier Series Representation of Periodic Signals*and their properties.		
CO3	Know the Properties, Analysis and Characterization of LTI systems using the Laplace transforms.		
CO4	Study the Properties of the Z- Transform, Analysis and Characterization of LTI systems using the z-transforms.		
Mappingof courseoutcomeswiththeprogramoutcomes			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	2	-	-	2	1	-	1
CO2	3	2	3	3	-	2	2	-	2	1	-	1
CO3	3	2	3	3	2	2	-	-	2	-	-	1
CO4	3	2	3	3	-	2	2	-	2	-	-	1

ELE-104 (a): SIGNALS& SYSTEM ANALYSIS

UNIT – I: Signals and Systems

Continuous-Time and Discrete-Time Signals, Transformations of the Independent Variable, Exponential and Sinusoidal Signals, The unit Impulse and Unit Step functions, Continuous-Time and Discrete-Time Systems, Basic System Properties.

Linear Time-Invariant Systems- Discrete-Time LTI systems, Continuous-Time LTI systems, Properties of Linear Time-Invariant Systems, Casual LTI Systems described by differential and difference equations.

UNIT – II: Fourier Series Representation of Periodic Signals

A Historical perspective, The response of LTI systems to complex exponentials, Fourier Series representation of Continuous-time periodic signals, Convergence of the Fourier series, Properties of Continuous-Time Fourier Series, Fourier Series representation of Discrete-Time periodic signals, Properties of Discrete-Time Fourier series.

Continuous-Time Fourier Transform- Representation of aperiodic signals: The Continuous-Time Fourier Transform, The Fourier Transform for Periodic signals, Properties of the Continuous-Time Fourier Transform, The Convolution property, The multiplication property.

UNIT – III: Laplace Transforms

Laplace Transform, the region of Convergence for Laplace Transforms, The inverse Laplace transform, Geometric evaluation of the Fourier Transform from the Pole-Zero plot, Properties of the Laplace Transform, Analysis and Characterization of LTI systems using the Laplace transform.

UNIT – IV: Z-transform

the Z-transform, The region of convergence for the Z-transform, The inverse Z-transform, Geometric evaluation of the Fourier Transform from the Pole-Zero plot, Properties of the Z- Transform, Analysis and Characterization of LTI systems using the z-transforms, System function algebra and block diagram representations, The Unilateral z-Transform.

Books for study:

1. A.V. Oppenheim, A.S. Willsky, “Signals & Systems”, 2/e, Pearson Education, Inc., 1997.
2. R.E. Ziemer, W.H. Tranter and D.R. Fannin, “Signals and Systems – Continuous and Discrete”, 4/e, Pearson Education, Inc., 2001.
3. Douglas K. Lindner, “Introduction to Signals and Systems”, McGraw-Hill, 1999.
4. Simon Haykin and Barry VanVeen, “Signals and Systems” John Wiley & Sons (Asia) Pte. Ltd., 2001.
5. B.P. Lathi, “Signal Processing & Linear Systems”, Oxford University Press, 1998.
6. P.RameshBabu, Signal and Systems, Scitech Publishers, 2018.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
FIRST SEMESTER
Branch - Electronics
Paper 4- ELE -104(a): SIGNALS & SYSTEM ANALYSIS
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. What is the difference between continuous – Time signal and Discrete – Time signal and how to obtain a discrete signal from continuous signal.
2. Explain the impulse response of an LTI system.
3. Write down the two properties of LTI system to represent signals and what is the output when the input X (t) is applied to an LTI system with impulse response of h (t).
4. What is the significance of parseval 's relation and give its relation for continuous – Time periodic signals.
5. Find the Laplace transforms of the given function.
   f(t) =4 cos (4t) – 9 sin (4t) + 2 cos (4t)
6. Find the inverse Laplace transform of the given function.
   F (s) = 6/S – 1 /S – 8 +4/S -2
7. Find the Z – transform of the sequence.
   x(n) = {2, -1,3,2,1,0,2,3, -1}
8. Write down the important properties of region of convergence for the –z transform.

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 =60)

9. (a) Explain the transformations of the independent variables with proper diagrams.

   (Or)

   (b) Describe the basic system properties.

10. (a) Explain the properties of the continuous Time Fourier Series.

    (Or)

    (b) Explain the properties of the continuous Time Fourier transform.

11 (a) Explain the properties of the Laplace Transform.

(Or)

(b) Find the inverse Laplace transform of

i) F (S) = 2s -5/s2 + 4s +8

ii) F (S) = 4s + 2/s2 + 6s +34

12 (a) Discuss the properties of the Z –Transforms.

(Or)

(b) Explain the relationship between the Z –Domain and the frequency domain withproper equation and diagrams.

PLE-104(b)	OpticalCommunications	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingof graduatelevelBasic Electronics

Course Objectives: The aim and objective of the course on OpticalCommunicationsforthestudentsofM.Sc. Electronics toequipthemwiththeknowledgeof Optical Communications.

CourseOutcomes: At theend ofthecourse, thestudent willbe ableto

CO1	understand optical fibers and waveguides used in communication system
CO2	Understand **Attenuation and wave propagation in Optical Fibers**.
CO3	Study different types sources and detectors used in Optical Communication system.
CO4	Differentiate losses in optical fiber link and state transmission characteristics of optical fiber

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	1	-	2	-	-	-
CO2	3	3	3	3	2	1	2	-	1	2	-	-
CO3	3	3	3	3	2	1	2	-	1	-	-	-
CO4	3	3	3	3	2	1	2	-	2	2	-	-

ELE-104 (b): OPTICAL COMMUNICATIONS

UNIT – I

Introduction, Measurement of Information, Channel Capacity, Communication System Architecture, Basic Optical Communication System, Advantage of Optical Communication System.

Step-index Fibers, Graded Index Fibers, Modes & Rays, Stab Wave guide.

UNIT – II

Attenuation in Optical Fibers: Introduction, Absorption, Scattering, Very Low Loss Materials, All Plastic & Polymer-Clad-Silica Fibers.

Wave Propagation:Wave propagation in Step-Index & Graded Index Fiber, Overall Fiber Dispersion-Single Mode Fibers, Multimode Fibers, Dispersion-Shifted Fiber, Dispersion, Flattened Fiber, Polarization.

UNIT – III

Source & Detectors: Design & LED's for Optical Communication, Semiconductor Lasers for Optical Fiber Communication System, Semiconductor Photodiode Detectors, Avalanche Photodiode Detector & Photo multiplier Tubes

UNIT – IV

Optical Fiber Communication System: Telecommunication, Local Distribution Series, Computer Networks, Local Data Transmission & Telemetry, Digital Optical Fiber Communication System-First Generation, System-Second Generation Future System.Data Communication Networks – Network Topologies, Mac Protocols, Analog System.Advanced Multiplexing Strategies – Optical TDM, Sub carrier Multiplexing, WDM Network.

Books for study:

1. A. Yariv, Optical Electronics, SBS College Publishing, Newyork 1985
2. F. T. S. Yu ,Optical Information Processing, Wiley, Newyork, 1983
3. John M. Senior, Optical Fiber Communications, PHI, 2009.
4. Gerd Keiser, Optical Fiber Communications, McGraw-Hill Education, 2010

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
SECOND SEMESTER
Branch - Electronics
Paper 4- ELE -104(b): OPTICAL COMMUNICATIONS
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. What is Channel Capacity ? Explain.
2. State the Advantage of Optical Communication System.
3. What are Very Low Loss Materials?
4. Explain the effect of Polarization in wave propagation.
5. What are the optical sources ?
6. Explain the working Avalanche Photodiode.
7. What are the Computer Networks ? Discuss.
8. What are the Mac Protocols ?

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 =60)

9. (a) Discuss the Communication System Architecture.
   (b) Explain the Basic Optical Communication System.

   (Or)

   (c) Distinguish between Step-index Fibers and Graded Index Fibers.
   (d) Explain the working ofStab Wave guide.

10. (a)Discuss the attenuation effects in Plastic and Polymer-Clad-Silica Fibers.

(Or)

(b) Explain the Wave propagation in Step-Index Fiber.

(c) Discuss the wave propagation in Multimode Fibers.

11. (a) Distinguish between LEDs and Semiconductor Lasers.

(b) Design the Semiconductor Lasers for Optical Fiber Communication System.

(Or)

(c) What are the Semiconductor Photodiode Detectors ? Explain the working of Photo multiplier Tube.

12. (a) Discuss in detail about Digital Optical Fiber Communication System.

(Or)

(b) What are the Network Topologies ? Discuss the working of Optical TDM system.

ELE-104(c)	Wireless Communications	**L-3,T-1,P-2**	**4Credits**

Pre-requisite: Understandingof graduatelevelchemistryandphysics

Course Objectives: The aim and objective of the course on Wireless Communicationsis to familiarize the M.Sc. students with the basics of the recently emergingmobile technologies.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	understand the basics of digital modulation techniques
CO2	Understand various coding and error correction techniques
CO3	Know GSM mobile communication standards, its architecture, logical channels, advantages and limitations.
CO4	Familiarize with optical and satellite communication techniques

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	2	-	2	-	2	2	-	1
CO2	3	2	1	2	2	2	-	-	2	2	-	-
CO3	3	2	1	2	1	2	2	-	2	2	-	1
CO4	3	2	1	2	2	-	-	-	2	2	-1	-

ELE-104 (c): WIRELESS COMMUNICATIONS

Unit – I: Base band data transmission

Digital Modulation techniques: BPSK, QPSK, DPSK, QASK, BFSK, MSK, M-ary techniques. Base band binary data transmission system – Inter symbol interference – Nyquist pulse shaping criteria – line coding, pulse shaping, and scrambling techniques. Detection of error probability: Gaussian probability function – properties – error function complementary – error function.

Unit – II: Codes for error detection and correction

Parity check coding, Linear block codes, Cyclic codes, Convolutional codes. Encoding, Decoding of convolutional codes, State, Tree and Trellis diagrams. Maximum likelihood – Viterby algorithm, Sequential decoding Burst error correction - Interleaving techniques – Block and convolutional interleaving, Types of ARQ, Performance of ARQ. Comparison of coded and uncoded system.

Unit – III: Introduction to wireless communication

Global system for mobile (GSM): cellular concept, system design. Transmission system, Receiving system; frequency re-use; channel interference and system capacity. wireless networking: 1G, 2G, 3G wireless networks, traffic routing: wireless data service.

Unit – IV :Spread Spectrum Modulation

Introduction, Spread spectrum modulation; modulation performance in fading and multipath channel; multiple access techniques as applied to wireless communications.

Books for study:

1.B.P. Lathi, Modern Digital and Analog communication system, Oxford 3rd edition, 2018.
2. Bernard Sklar, Digital Communications Fundamentals and Applications, Pearson Education, 2009.
3. Wayne Tomoasi, Electronic communication Systems, Pearson Education, 2014.
4. Jochen H. Schiller, Mobile Communications, Pearson Education, 2010.
5. William C. Y. Lee,Wireless and Cellular Communications, McGraw-Hill, 2009.
6. Ramjee Prasad, OFDM for Wireless Communications Systems, Artech House, Universal Personal Communications, 2004.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

FIRST SEMESTER

Branch - Electronics

Paper 4: ELE-104 (c): WIRELESS COMMUNICATIONS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. Explain the QPSK modulation technique.
2. Give a note on error probability.
3. What are linear block codes?

4. Write a note on convolution interleaving technique.
5. Explain spread spectrum modulation.
6. Explain in brief the traffic routing.
7. Draw the block diagram of a communication satellite system.
8. What is G/T ratio? Explain.

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 = 60)

9. (a) Explain the principle of PSK generation and detection .Distinguish between PSK and DPSK.

(Or)

(b) State and explain Nyquist pulse shaping criteria

10. (a) Discuss the decoding of convolution codes with examples.

(Or)

(b) Draw the Trellis diagram for a convolution order. What are different types of ARO?

11. (a) With a neat block diagram explain the principle and working of a mobile communication system.

(Or)

(b) Explain 2g wireless network system what is wireless data services.

12. (a) Explain the multiple access format of satellite systems in India.

(Or)

(b) Give a detailed note on optical fibers.

ELE-201	**AdvancedMicroprocessorsand Microcomputers**	**L-3,T-1,P-2**	**4Credits**
Pre-requisite: Understandingof graduatelevel Electronics			
Course Objectives: **The aim and objective of the course on AdvancedMicroprocessorsand Microcomputers**is to familiarize thestudents of M.Sc. class to the basic aspects of microprocessors and different programming and interfacing techniques.			
CourseOutcomes: Attheend ofthecourse,the studentwill be able to			
CO1	Understanding of microprocessor architecture and evaluation		
CO2	Develop skill of writing programs in ALP for various applications of 8086 Microprocessor		
CO3	Interface various peripherals with 8086.		
CO4	Understanding interrupts and direct memory access		

Mappingofcourseoutcomeswiththeprogramoutcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	1	2	-	-
CO2	3	3	-	2	2	1	1	-	-	2	2	-
CO3	3	3	2	1	2	1	1	-	-	2	-	-
CO4	3	3	1	-	2	1	1	-	1	2	2	-

ELE-201: ADVANCED MICROPROCESSORS AND MICROCOMPUTERS

UNIT – I: Microprocessors and its Architecture

Internal 8086 microprocessor architecture, Real mode and protected modes of memory addressing, Memory paging.

Addressing modes- Data addressing modes, program memory-addressing modes, Stack-memory addressing modes.

Instruction Set- Data movement instructions, Arithmetic and logic instructions, Program control instructions, Assembler details.

UNIT – II: Programming the Microprocessor

Modular programming, using the keyboard and video display, Data conversions.

Hardware Specifications- Pin-outs and the pin functions, clock-generator (8284A), Bus buffering and latching, Bus timing, Ready and Wait state, Minimum mode versus maximum mode.

UNIT – III: Memory Interface

Memory devices, Address decoding, 8088 and 80188 (8-bit) memory interface, 8086, 80186, 80286 and 80386 (16-bit) memory interface.

Basic I/O Interface- Introduction to I/O interface, I/O port address decoding, 8255, 8279, 8254, ADC and DAC (excluding multiplexed display & keyboard display using 8255).

UNIT – IV: Interrupts

Basic interrupt processing, Hardware interrupts, expanding the interrupt structure, 8259A PIC.

Direct Memory Access- Basic DMA operation, 8237 DMA controller.

Bus Interface- PCI bus, **Advanced Microprocessors-** 80186, 80188 and 80286 Microprocessors;

Books for study:

1. B.B. Brey, "The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium pro processor architecture, programming, and interfacing", 4/e, PHI, 1999.
2. Douglas V.Hall, "Microprocessors and Interfacing, Programming and Hardware", 2/e, McGraw Hill International Edition, 1992.

3. Muhammad Ali Mazidi and Janice GillispieMazidi, “The 80x86 IBMPC and Compatible Computers (Volumes I & II)”, 2/e, Prentice-Hall, Inc., 1998.
4. Walter A. Triebel and Avatar Singh, “Software, Hardware and Applications”, PHI, 1995.
5. Yu Cheng Lin and Glenn A. Gibson, “Microcomputer systems: The 8086/8088 Family Architecture, Programming and Design”, PHI, 1992.
6. K.J. Ayala, “The 8086 Microprocessor: Programming & Interfacing the PC”, Penram International Publishing (India) Pvt. Ltd.,1995.
7. K.M. Bhurachandi and A.K. Ray, Advanced Microprocessors and Peripherals ,McGraw Hill, 2017.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
SECOND SEMESTER
Branch - Electronics
Paper 1- ELE-201: ADVANCED MICROPROCESSORS AND MICROCOMPUTERS
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Explain the program memory addressing modes of Microprocessor.
2. Write a brief note on assembler.
3. Distinguish between minimum mode and maximum modes of 8086 microprocessor.
4. Write about modular programming.
5. Format the control word of 8255 to make all ports are output ports.
6. Interface the DAC with 8086 up and explain its working.
7. Explain the concept of DMA date transfer technique.
8. Write a brief note on interrupts available in 8086 microprocessor.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9.(a) Draw the internal architecture of a microprocessor and explain each block in detail.

(Or)

(b)Explain data movement and logical instructions of microprocessor with suitable examples.

(c) Describe the memory paging.

10. (a)Write a brief note on 8284 A clock generator.

(b) Explain in detail bus buffering, Latching and timing.

(Or)

(c) Explain the pin functions of 8086 microprocessor.

(d) Write about data conversions with suitable examples.

11.(a) Draw the block diagram of 8254 and explain each block in detail.

(Or)

(b) Explain the interfacing of 8 –bit A/D converter to a µP with help of relevant sketch.

12. (a) Draw the block diagram of 8237 DMA controller and explain each block in detail.

(Or)

(b) Write about Advanced microprocessors

ELE- 202	Digital Communications	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingofgraduatelevel electronics

Course Objectives: The aim and objective of the course on Digital Communications is to expose the M.Sc. students to the basics of the Digital Modulation Techniques, Information theory and coding, Spread Spectrum modulation.

CourseOutcomes: At theend ofthe course, thestudent will be ableto

CO1	Understandthe electro statistics and magneto statistics and also the properties of propagation of electromagnetic radiation in different media
CO2	Know about the properties of laser beam and the working of different lasers and applications
CO3	Describe the fourier analysis in optics problems and to understand the concept of holography
CO4	Analyze the propagation of light in optical fibers and to know the various applications of optical fibers

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	2	1	1	-	**1**	1	**-**	-
CO2	3	2	2	1	2	1	-	-	**1**	1	**-**	-
CO3	3	3	3	-	2	1	2	-	**1**	1	-	-
CO4	3	2	3	2	3	-	2	-	**1**	1	-	-

ELE-202 DIGITAL COMMUNICATIONS

UNIT – I: Random Variables and Processes

Probability, Random variables, Cdf, Pdf, Relation between probability and probability density, Average value and variance of a random variable, The Gaussian Probability density, The error function, Mean and Variance of the sum of the random variables, Correlation between random variables, Central Limit theorem, Error probability, Random processes, Autocorrelation, The complementary Error Function.

UNIT-II: Digital -Modulation Techniques

BPSK, DPSK, QPSK, M-ary PSK, QASK, BFSK, M-ary FSK, MSK, Baseband signal receiver, Matched filter and probability of error, Coherent reception, Correlation, PSK, FSK, Non-coherent detection of FSK, Differential PSK, QPSK.

UNIT – III: Information Theory and Coding

Discrete messages, The concept of amount of information, Average information, Entropy, Information rate, Coding to increase average information per bit, Shannon's theorem, Capacity of a Gaussian channel, Efficiency of Orthogonal Signal transmission, Coding, Parity check bit coding for error detection, Coding for error detection and correction, Block codes, Block codes- coding and decoding, Convolutional Coding, Decode a Convolutional code, Probability of error of Convolutional codes.

UNIT – IV: Spread-spectrum modulation

Spread-spectrum overview, Pseudo-Noise sequences, Direct-sequence spread-spectrum systems, Frequency Hopping Systems, Synchronization.

Encryption and Decryption- Models, Goals, and Early Cipher Systems, The Secrecy of a Cipher System, Practical Security, Stream Encryption, Public Key Cryptosystems.

Books for study:

1. Taub and Schilling, "Principles of Communication Systems", 2/e, TMH, 1991. (UNITs I-III)
2. Bernard Sklar, "Digital Communications: Fundamentals and Applications", 2/e, Pearson Education, Inc., 2001 (UNIT - IV).
3. Simon Haykin, "Communication Systems", 3/e, John Wiley & Sons (Asia) Pte. Ltd., 1994.
4. Harold Kolimbiris, "Digital Communications Systems", Pearson Education, Inc., 2000.
5. K. Sam Shanmugam, "Digital and Analog Communications Systems", John Wiley & Sons (Asia) Pte. Ltd., 2000.
6. Gary M. Miller and Jeffrey S. Beasley, "Modern Electronic Communication", 7/e, PHI, 2003.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
SECOND SEMESTER
Branch - Electronics
Paper 2- ELE -202: DIGITAL COMMUNICATIONS
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. What is a sampling function? Where is it used?
2. State and explain the central limit theorem.
3. What is meant by quantization error? Explain.
4. Explain the M – ary FSK.
5. What is a discrete message? Explain with an example.
6. What are convolution codes? Explain them.
7. Explain what is meant by spread spectrum.
8. What is meant by encryption? Why is it used?

SECTION -B

Answer ALL questions. Each question carries 15 marks. (Marks: 4 x 15 =60)

9. (a) What is power spectral density? Explain its significance.

(b) Obtain an equation for auto correlation of a periodic function.

(Or)

(c) Obtain an equation for probability density.

(d) Explain how to obtain a correlation between random variables.

10. (a) Explain the method of multiplexing the PCM signals.

(b) With suitable diagrams, explain Adaptive Delta modulation.

(Or)

(c) Distinguish between BPSK and QPSK methods.

(d) What is a matched filter? Explain its working.

11. (a) Define the terms: i) Average information, ii) Entropy

(b) State and explain the Shannon, s theorem.

(Or)

(c) Explain the efficiency of orthogonal signal transmission.

(d) What are block codes? How are they coded and decoded?

12. (a) Write the equation for Pseudo – Noise and explain the terms.

(b) Explain with diagrams what is meant by frequency Hopping?

(Or)

(c) What is meant by early cipher system? Explain

(d) Write a note on public key cryptosystems.

ELE-203(a)	**Semiconductor Materials and devices**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite: Courseon semiconductor materials

CourseObjectives: Theaimandobjectiveofthecourseon**Semiconductor Materials and devices**is to expose the students of M.Sc. to experimental aspectsofdifferent semiconductor devise technologies, characterization and fabrication.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understandvariousexperimentaltechniquesforsemiconductor junctions and interfaces, I-V characteristics to understand the function of devices.
CO2	To understand the function of Solid State Microwave devices.
CO3	To understand the various Power semiconductor devices and their applications
CO4	To get familiarization with Optoelectronic Devices and their properties.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	2	-	1	1	1	-

CO2	3	2	1	3	2	1	-	-	1	1	-	1
CO3	3	2	1	2	3	2	1	-	2	2	-	-
CO4	3	2	1	3	3	1	1	-	-	2	2	2

ELE-203(a) SEMICONDUCTOR MATERIALS AND DEVICES

UNIT-I: Semiconductor Devices

Principle of operation, Fabrication methods and doping profiles, Analysis of the ideal diffusion transistor, Real transistors, Static I-V characteristics, Charge control equations, The diffusion transistor at high frequencies, the drift transistor, high frequency performance.

Junction and MOS Field Effect Transistors- Principle of operation, Static I-V characteristics of the idealized model, JFET structures, Semiconductor surfaces, C-V characteristics of the MOS capacitor, the Si-SiO_2 system, Basic structures and the operating principle of MOSFET, Current-Voltage characteristics.

UNIT-II: Solid State Microwave Devices

Varactor diodes, PIN diodes, Tunnel diodes, Transferred Electron Devices (TEDs) – GUNN diode, Avalanche Transit Time Devices – IMPATT diode, TRAPATT diode, BARITT diodes.

UNIT-III: Power Semiconductor Devices

Schockley diode, Thyristor, Light Activated Silicon Controlled Rectifier (LACSR), Silicon Controlled Switch, GTO, IGBT, MCT, ETO, RCT, DIAC, TRIAC.

UNIT-IV: Optoelectronic Devices

Solar Cells – Photovoltaic effect, GaAs solar cells, Thin film solar cells, Photo detectors, Photo diode, Avalanche photo diode, LEDs, LED materials and their structures, Semiconductor Lasers – p-n junction laser, Hetero junction laser, Laser diode materials, fabrication and structures.

Books for study:

1. M.S. Tyagi, "Introduction to Semiconductor Materials and Devices", John Wiley & Sons (Asia) Pte. Ltd., 2000. (UNIT-I& UNIT-IV)
2. M. Kulkarni, "Microwave and Radar Engineering", Umesh Publications, 3/e, 2003. (UNIT – II)
3. Alok Jain, "Power Electronics and Its Applications", Penram International Publishing (India) Pvt. Ltd., 2002. (UNIT-III)
4. Samuel Y. Liao, "Microwave Devices and Circuits", 3/e, PHI, 1998.
5. Ben G. Streetman and Sanjay Banerjee, "Solid State Electronic Devices", Pearson Education, Inc., 2000.
6. S.M. Sze, "Physics of Semiconductor Devices", 2/e, John Wiley & Sons (Asia) Pte. Ltd., 2004.
7. Jasprit Singh, "Semiconductor Devices: Basic Principles" John Wiley & Sons (Asia) Pte. Ltd., 2004.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

SECOND SEMESTER

Branch - Electronics

Paper 3 ELE- 203(a): SEMICONDUCTOR MATERIALS AND DEVICES

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. What is Photovoltaic effect ? Explain.
2. What is LED ? Explain it's structure.
3. What is tunnel diode ? Explain it's Characteristics.
4. What is PIN diode ? Explainit's I-V characteristics.
5. What is Light Activated Silicon Controlled Rectifier ?
6. Write a note on Schockley diode.
7. What are the regions of operation of a Transistor ?
8. Explain the Current-Voltage characteristics of MOSFET.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Distinguish between Photo diodeand Avalanche photo diode. Explain their working.

(Or)

(b)What are the Laser diode materials ? Explain the fabrication and structures.

10. (a) What is IMPATT diode ? Explain it's principle of operation.

(Or)

(b) What areTransferred Electron Devices (TEDs)? Explain thePrinciple of working of GUNN diode.

11. (a) What is TRIAC ? Explain it's operation.

(Or)

(b)What is GTO ? Explain it's structure and working.

12. (a) Discuss the Analysis of the ideal diffusion transistor

(Or)

(b)What is JFET ? Explain it's principle of operation.

ELE-203(b)	**SensorsandTransducers**	**L-3,T-1,P-2**	**4Credits**
Pre-requisite: Understandingofgraduatelevel electronics/physics			

CourseObjectives: Theaimandobjectiveofthecourseon**SensorsandTransducers** istofamiliarize the students of M.Sc. with the various electronic sensors used in the industry and to understand the working principles of the sensors so that they can design and use them in industry or in real time applications.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Applybasicsknowledgeofsensors and transducersinunderstanding the measurement systems.
CO2	Study and understanding of various types of Displacement and Strain Transducers
CO3	Study and understanding of various types of Pressure transducers
CO4	Study and understanding of Opto -Electronic Transducers

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	1	2	1	1
CO2	3	3	3	1	2	1	1	-	-	-	1	1
CO3	3	3	3	2	2	1	1	-	-	-	1	1
CO4	3	3	3	3	2	2	2	-	2	-	1	1

ELE- 203(b) SENSORS AND TRANSDUCERS

UNIT-I

Definition of a transducer/sensor, Role of a transducer in a generalized measurement system, Classification of transducers, Characteristics of transducers. Significant parameters of a transducer.

Temperature sensors: Temperature scales, Mechanical temperature sensors, Resistance type temperature sensors,Platinum resistance thermometer, Thermisters, Thermocouples.,Solid state sensors, Quartz thermometer, Radiation type sensors - Optical pyrometers, Calibration of thermometers

UNIT-II

Displacement and Strain Transducers: Displacement transducers - Variable resistance, inductance and capacitance. Linear voltage differential Transformer (LVDT) Strain -Definition, Principle of working of strain gauges, Gauge factor, Types of strain gauges, Materials for strain gauges. Temperature compensation.

UNIT-III

Pressure transducers: Manometers, Elastic transducers - Diaphragms, Bellows, Bourdon or helical tubes, Electrical pressure transducers - Variable resistance, inductance and capacitance. Piezoelectric pressure transducer, Vibrating element pressure sensors, Pressure calibration.

UNIT-IV

Opto -Electronic Transducers: Photoemission tube, Photomultiplier tube, Photoconductive cell, Photovoltaic cell (solar cell). Photodiode, Photo-transistor, Photo FET, Light emitting diode, Liquid crystal display, Optoelectronic couplers. Laser diode

Books for study:

1. B.C. Nakra and K.K. Chaudary, Instrumentation Measurement Analysis, Mc Graw Hill, 3/e.
2. C. **Rangan**,. G **Sarma**,. V.S.V. **Mani**, Instrumentation - Devices and Systems, TMH, New Delhi 2017.
3. A.K, Sawhney, A course in Electrical and Electronic Measurements and Instrumentation, DhanpatRai Publishers, 2012.
4. Willard, Merritt, Dean and Settle,Instrumental Methods of Analysis,CBS Publishers & Distributors, 2004.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
SECOND SEMESTER
Branch - Electronics
Paper 2- ELE- 203(b): SENSORS AND TRANSDUCERS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks
(Marks: 4 x 5 = 20)

1. What is a sensor ? Explain it's role.
2. Write the Significant parameters of a transducer.
3. Distinguish between displacement and strain gauge transducers.
4. What is a gauge factor ? Explain.
5. What are the different types Pressure transducers ?
6. Write a note on Electrical pressure transducers .
7. What is Photoconductive cell ?
8. Write a brief note on laser diode.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9.(a) Discuss the Classification of transducers. Explain Characteristics of transducers.

(Or)

(b)What is a temperature sensor ? Explain the working of Optical pyrometer.

10.(a) What are the types of strain gauges ? Discuss the materials used for strain gauges.

(Or)

(b) What is LVDT ? Explain thePrinciple of working of LVDT.

11.(a) What are the Elastic pressure transducers ? How to measure the pressure using helical tubes with a neat sketch.

(Or)

(b)Describe the working of Piezoelectric pressure transducer.

12. (a) Distinguish between Photoemission tube and Photomultiplier tube. Explain their working.

(Or)

(b) Describe the working of Photo-transistor andPhoto FET. What are their advantages ?

ELE-203(c)	Atmospheric and space instrumentation techniques	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingof graduatelevel electronics/physics

Course Objectives: The aim and objective of the course on**Atmospheric and space instrumentation techniques**is to familiarize thestudents of M.Sc. class to the basic aspects of atmospheric instrumentation techniques and their use for measurement of atmospheric parameters.

CourseOutcomes: Attheend ofthecourse,the studentwill be able to

CO1	Understanding of Dynamics atmospheric structure
CO2	Understand the various elements in the atmosphere.
CO3	Understanding of various Ground Based Instruments for the Measurement of atmospheric elements.
CO4	Enrich the measurement techniques such as Radars.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	1	2	-	-
CO2	3	3	-	2	2	1	1	-	-	2	2	-
CO3	3	3	2	1	2	1	1	-	-	2	-	-
CO4	3	3	1	-	2	1	1	-	1	2	2	-

ELE-203 (c) ATMOSPHERIC AND SPACE INSTRUMENTATION TECHNIQUES

UNIT – I

Evolution of the planetary Atmosphere, Structure, Composition, Chemistry and Dynamics of the earth's atmosphere.

UNIT – II

Automatic weather station, temperature, humidity, radiation and wind measurements, lightning detector. Measurements of aerosols and trace gases: microtops, aerosol sample collection, ion chromatography,0_3,CO,NO_x and SO_2 measurements, CH4 measurements with Flame lonisation Detector.

UNIT – III

Ground Based Instruments for the Measurement of Temperature, Pressure, Humidity, Wind Speed & Direction, Rainfall Rate Ground Based (Remote Sensing type) – Meteorological Radars, Clear Air Radars, Lidar&Sodar –Air Bone Instruments- Radiosonde,RawinSonde, Rocket Sonde –Satellite Instrumentation (Space Borne Instrument).

UNIT – IV

Radar Meteorology: Basic Meteorology – Radar – Principles and Technology – Propagation Scattering and Attenuation of Microwaves in the lower Atmosphere –Weather Radar Signal Processing and Display – Phenomena Observed by Weather Radar – Operational Weather Radar –Observation of Precipitating Systems – Estimation of Precipitation.

Books for study:

1.WMO: Guide to Instruments and Methods of Observation, WMO No 8,2018
2. Heard D: Analytical Techniques for Atmospheric Measurement, 1st edition,2006
3. Paratap R: Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers, 2010
4. https://www.wmo.int/pages/prog/www/IMOP/CIMO -Guide.html

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
SECOND SEMESTER
Branch - Electronics
Paper 3: ELE-203 (c) ATMOSPHERIC AND SPACE INSTRUMENTATION TECHNIQUES
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Write a note onplanetary Atmosphere.
2. Briefly discuss on structure of Atmosphere.
3. What are the trace gases in the atmosphere ?
4. What are the atmospheric parameters ?
5. What is a Lidar ? Mention it's uses.
6. What are the applications of Sodar ?
7. What is Radar? Explain it's principle.
8. Write a short not on Propagation of Microwaves in the lower Atmosphere.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9.(a) **Discus** on Dynamics of the earth's atmosphere.

(Or)

(b) Explain theComposition of the earth's atmosphere.

10.(a) Discuss the working of Automatic weather station.

(Or)

(b) What is Flame ionization Detector ? Discuss the measurement of CH_4 using Flame ionisation detector.

11. (a) Explain the working of Radiosonde. Discuss its applications.

(Or)

(b) Explain the working of Rocket Sonde ? Explain it's uses.

12. (a) Discuss working of Operational Weather Radar.

(Or)

(b) Discuss on Weather Radar Signal Processing system.

ELE-204(a)	**Control Systems**	**L-5,T-1,P-0**	**4Credits**
Pre-requisite:Understandingofgraduatelevel electronics			
Course Objectives: The aim and objective of the course on **Control Systems**is to equiptheM.Sc.Studentswiththe signals for controlling the systems in real life.			
CourseOutcomes: At theend ofthecourse,the studentwillable to			
CO1	Understand the basics and applications of**open loop and closed loop ,Mathematical modelling of dynamic systems**.		
CO2	Know the *Transient and steady-state response analyses*in control systems.		
CO3	Understanding of Root Locus analysis.		
CO4	Design the control systems using frequency response.		
Mappingofcourseoutcomeswiththeprogramoutcomes			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	2	-	1	1
CO2	3	3	2	2	-1	-	1	-	2	-	1	-
CO3	3	3	2	-	1	1	1-	-	2	-	1	-
CO4	3	3	2	2	2	1	1	-	2	-	1	2

ELE-204(a) CONTROL SYSTEMS

UNIT – I: Introduction to Control Systems

Examples of Control Systems, Closed-loop control versus Open-loop control.

Mathematical modeling of dynamic systems- Transfer function and impulse-response function, automatic control systems, modeling in state space, State-space representation of dynamic systems, Electrical and Electronic systems, Signal flow graphs.

UNIT – II: Transient and steady-state response analyses

First-order and second-order systems, Routhe's stability criterion, Effects of Integral and derivative control actions on system performance, Steady-state errors in unity-feedback control systems.

UNIT – III: Root-Locus analysis

Root-Locus plots, General rules for constructing Root Loci, Positive-feedback Systems.

Control systems design by the Root-Locus method- Preliminary design considerations, Lead and Lag compensations, Lag-Lead compensation.

Frequency–Response analysis- Bode diagrams, Polar plots, Log-Magnitude-versus-Phase plots, Nyquist stability criterion, Stability analysis, Relative stability.

UNIT –I V: Control System Design by Frequency Response

Lead compensation, Lag Compensation, Lead-Lag Compensation.

PID Controls- Tuning rules for PID controllers, Modifications of PID control schemes, Two degrees of freedom control, Zero placement approach to improve Response characteristics.

Books for study:

1. K. Ogata, "Modern Control Engineering", 4/e, PHI, 2003.
2. D. Roy Choudhury, "Modern Control Engineering", PHI, 2005.
3. B.C. Kuo, "Automatic Control Systems", 7/e, PHI, 1995.
4. I J Nagrath, and Dr. M Gopal, Control Systems, New Age International (P) Ltd., Publishers 2008.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

SECOND SEMESTER

Branch - Electronics

Paper 4- ELE-204 (a): CONTROL SYSTEMS
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Give certain examples for control systems.
2. Explain the significance of signal flow graphs.
3. Compare the transient and steady – state responses.
4. Explain the sources of steady – state responses.
5. Explain the method of sketching the root locus graph.
6. How is that Bode diagram different from polar plot?
7. What is meant by compensation in control system?
8. What are the methods for improving response characteristics?

SECTION -B

Answer ALL questions. Each question carries 15 marks.(Marks: 4 x 15 =60)

9. (a) Compare the features of closed – loop and open - loop control systems.
   (b) with a neat diagram explain a closed – loop control system.

   (Or)

   (c) What is impulse response ? Explain with an example.
   (d) What is a dynamic system? Explain with an example the state – space representation of a dynamic system.
10. (a) Explain the transient response in a first – order system.
    (b) Explain with example the effect of integral on a considered system performance.

    (Or)

    (C) State and explain Routhe'S Stability criterion.
    (d) Assume a unity feedback system and explain the steady – State errors.

11. (a) Explain the general rules for constructing Root Ioci
    (b) Discuss the theory behind lag compensation techniques based on the Root – Locus approach.

    (Or)

    (c) Compare the log – Magnitude with phase – plots.
    (d) State Nyquist stability criterion. Explain relative stability with example.
12. (a) Explain Lead – Lag compensation in the light of frequency response.
    (b)Discuss the Ziegler – Nicholas rules for tuning PID controllers.

    (Or)

    (c) Explain what is meant by set – point kick?
    (d) With an example, explain the Zero – placement approach to improve response characteristics.

ELE-204(b)	**Bio-Medical Instrumentation**	**L-5,T-1,P-0**	**4Credits**
Pre-requisite:Understandingofgraduatelevel electronics			

Course Objectives: The aim and objective of the course on Bio-Medical Instrumentation is to equiptheM.Sc.StudentswiththeBio Signal Acquisition and Recording, Physiological Assist Devices, Bio Telemetry, advanced bio-medical instruments.

CourseOutcomes: At theend ofthecourse,the studentwillable to

CO1	Understanding of Bio-signal analysis and recording.
CO2	**Understanding of Physiological Assist Devices such as** Pacemakers, Defibrillators, Nerve and Muscle Stimulators, Heart Lung Machine, Kidney Machine and **Special Equipment**.
CO3	Use of Biotelemetry and **Operation Theatre Equipment**
CO4	Understanding of safety and **Advanced Biomedical Instrumentation techniques.**

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	2	1	-	-
CO2	3	3	2	2	2	1	1	-	2	1	-	-
CO3	3	3	2	2	2	1	1	-	2	1	-	-
CO4	3	3	2	2	2	1	1	-	2	1	-	-

ELE-204(b) BIO-MEDICAL INSTRUMENTATION

UNIT-I

Human Physiological Systems, Bio Potentials and Electrodes: Introduction, Cells and their Structure, Transport of ions Through Cell Membrane, Resting and Action Potentials, Bioelectric Potentials, Physiological Systems of Human Body, Electrodes Biomedical Instrumentation System.

Bio Signal Acquisition and Recording:Physiological Signal Amplifiers, Isolation Amplifiers, Pre Amplifiers, Line Driving Amplifiers, Characteristics of Recording System, Electrocardiography (ECG), Electroencephalography (EEG), Electromyography (EMG), Electro- Retinography (ERG), Electro Oculography (EOG), Accuracy in Recording

UNIT - II

Physiological Assist Devices: Introduction, Pacemakers, Defibrillators, Nerve and Muscle Stimulators, Heart Lung Machine, Kidney Machine.

Special Equipment: Blood Cell Counter, Audiometer, Digital Thermometer, X Ray. Machine, Radiography and Fluoroscopy, Image Intensifies, Angiography.

UNIT - III

Bio Telemetry: Elements of Biotelemetry Systems, Design of aBiotelemetry System, Radio telemetry System, Uses of Biotelemetry.

Operation Theatre Equipment: Introduction, Surgical Diathermy Ventillators, Anaesthesia Machine, Cardiac Output Measurement, Pulmonary Function Analyzer, Oxymeters.

UNIT-IV

Safety Instrumentation:Radiation Safety Instrumentation: Dosimeters, Radiation Alarm, Physiological Effects due to 50 Hz Frequency, Micro Shock and Macro Shock, Hospital Architecture.

Advanced Biomedical Instrumentation: Lasers in Biomedical Instrumentation, Endoscopes, Cryogenic Surgery, Computer Tomography Scanner (CT), Applications, Thermography, Applications, Ultrasonic Image Forming Systems, Applications, Magnetic Resonance Imaging (MRI), PositronEmission Tomography.

Books for study:

1. Biomedical Instrumentation and Measurement by Harry E. Thomas
2. Hand book of Biomedical Instrumentation by R.S. Khandpur
3. Biomedical Instrumentation & Measurements by Leslie Cromwell, Fred J. Waibell, Erich A.Pfeiffer
4. Hand Book of Bio medical Engineering by Jacob Klime
5. Bio Medical Electronics by Joseph Duboy
6. Transducers for Bio medical Measurements by Richards SC Cobbold
7. Bio medical Instrumentation by M. Arumugam
8. Biomedical Instruments, Theory and Practice by Welkowitz and Dentsch
9. Biological Engineering by Schwan
10. Biomedical Engineering systems by Clines and Mulism

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
SECOND SEMESTER
Branch - Electronics
Paper 4: ELE-204(b) MEDICAL INSTRUMENTATION
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. What are Bioelectric Potentials ?
2. WriteCharacteristics of Recording System.
3. Write a short note on Pacemakers.
4. What is purpose of Blood Cell Counter?
5. What are the elements of Biotelemetry Systems ?
6. Write a note on Oxymeter.
7. Distinguish between Micro Shock and Macro Shock.
8. What are the applications of Computer Tomography Scanner (CT) ?

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Discuss on Biomedical Instrumentation System.

(Or)

(b)Discuss on Electrocardiography (ECG)and Electromyography (EMG).

10. (a) Explain the working of Heart Lung Machine.

(Or)

(b) Discuss on Radiography and Angiography.

11. (a) Design of aBiotelemetry System.

(Or)

(b)Discuss the working of Pulmonary Function Analyzer.

12. (a) What is Magnetic Resonance Imaging (MRI) ? Explain its functioning and uses.

(Or)

(b) Describe the Hospital Architecture.

ELE-204(c)	**Data Mining and Information Security**	**L-5,T-1,P-0**	**4Credits**

Pre-requisite: Courseonelectronics/Statistics

CourseObjectives: Theaimandobjectiveofthecourseon Data Mining and Information Security is to expose the students of M.Sc. students to theoretical and experimental aspectsof Data mining and analysis, network security, Cryptographytechniques.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understand Data warehousing components
CO2	Understanding of Data mining metrics, data mining tasks, and exploratory Data Analysis.
CO3	KnowledgeabouttheSecurity Trendsand different algorithms.
CO4	Applytheknowledgeof Cryptographytechniquesfor Digital Signatures and Authentication Protocols.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	-	-	-	-	1	1	-
CO2	3	2	2	3	2	-	-	-	1	-	1	-

CO3	3	2	1	2	3	-	1	-	2	2	-	-
CO4	3	2	1	3	3	1	1	-	2	-	2	-

ELE-204(c): DATA MINING AND INFORMATION SECURITY

UNIT-I

Data warehousing components: Introduction, Access tools, Data Marts, Data Mining data warehousing, Industry, Methodology. Classical Techniques, Statistics, Neighborhoods, clustering, The classics, Nearest Neighbor, Tree Network and Rules, Neural Network – Rule Induction.

UNIT-II

Basic Data Mining Taks, classification, regression, time series analysis, prediction, clustering, summarization, association rules, sequence discovery. Data mining versus knowledge discovery in data bases. The development of data mining issues. Data mining metrics, social implications of data mining, data mining from a data base perspective. Exploratory Data Analysis.

UNIT-III

Security Trends-The OSI architecture-Security Attacks-Security Services –Security Mechanisms- A Model for Network Security Classical Encryption Techniques,Symmetric Cipher Model, Substitution Techniques Transportation Techniques, Rotor Machines –Steganography. Public-Key Encryption and Hash Functions Introduction to Number TheoryPrime Numbers – Fermat's and Euler's Theorems, Testing for Primality – The Chinese Remainder Theorem, Discrete Logarithms.

UNIT-IV

Public-key Cryptography and RSA: Principles of Public-Key Cryptosystems, The RSA Algorithm, Digital Signatures and Authentication Protocols**:** Digital Signatures, Authentication Protocols-Digital Signature Standard Authentication Applications **:**Kerberos-X.509 Authentication Service, Public Key Infrastructure .

Books for study:

1. Margaret H. Dunham, Data Mining – Introductory and Advanced Topics, Pearson Education, 2006.
2. John W Tuekey), Exploratory Data Analysis, Addison-Wesley, 1997.
3. Edward R. Tufte, Visual Display of Quantitative Information, Graphics Press USA, 2001.
4. William Stallings, Cryptography and Network Security: Principles and Practices,7/e, Pearson Education, 2017.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
SECOND SEMESTER
Branch - Electronics
Paper 4:ELE-204(c): DATA MINING AND INFORMATION SECURITY

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. What is Data Mining? Explain.
2. Explain clustering.
3. Distinguish between Data mining and knowledge discovery in data bases.
4. What are the social implications of data mining ?
5. Write a short note on the OSI architecture.
6. Write a note onHash Functions.
7. Briefly discuss on Public Key Infrastructure
8. Explain the RSA Algorithm.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Discuss Data warehousing Components.

(Or)

(b)ExplainClassical Techniques. Discuss on Tree Network and Rules.

10. (a) Discuss the development of data mining issues.

(Or)

(b) Discuss on Exploratory Data Analysis.

11. (a)Discuss on Model for Network Security Classical Encryption Techniques.

(Or)

(b)Explain Fermat's and Euler's Theorems.

12. (a) Discuss the Principles of Public-Key Cryptosystems.

(Or)

(b)Write about Digital Signature Standard Authentication Applications.

ELE-301	Digital Signal Processing	L-5,T-1,P-0	4Credits
Pre-requisite: Basicknowledgeof Signals			
Course Objectives: The aim and objective of the course on **Digital Signal Processing**is to introducethe students of M.Sc. class to the formal structure of the subject and to equip them with thetechniques of Sampling of Continuous-Time signals, Structures for Discrete-time systems,Discrete Fourier Transform,Architecture of TMS320C5X processorso thattheycan			

usethesein various branches of Electronics as per their requirement.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understandtheneedfor Sampling of Continuous-Time signals anditsbasicprinciples.
CO2	Understand the need of Structures for Discrete-time systems
CO3	Understandthe need of Discrete Fourier Transform methods in solving problems
CO4	Understanding the Architecture of TMS320C5X processor, assembly language instructions and its importance.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	2	1	-	2	1	-	-
CO2	3	2	2	2	2	2	1	-	-	2	2	-
CO3	3	2	2	2	2	2	1	-	-	-	-	-
CO4	3	2	2	2	2	2	2	-	2	2	-	1

ELE-301: DIGITAL SIGNAL PROCESSING

UNIT – I: Sampling of Continuous-Time signals

Periodic sampling, Frequency-domain representation of sampling, Reconstruction of a band limited signal from its samples, Discrete-Time processing of continuous-time signals, Continuous-Time processing of discrete-time signals, Changing the sampling rate using discrete-time processing, Multirate signal processing, Digital processing of analog signals.

UNIT – II: Structures for Discrete-time systems

Block diagram representation of linear constant-coefficient difference equations, Signal flow graph representation of linear constant- coefficient difference equations, Basic structures for IIR systems, Basic network structures for FIR systems, Overview of finite-precision numerical effects, The effects of coefficient quantization.

Filter design techniques- Design of discrete-time IIR filters from Continuous-time filters, Design of FIR filters by windowing, Examples of FIR filter design by the Kaiser Window method, Optimum approximations of FIR filters.

UNIT – III: The Discrete Fourier Transform

Representation of periodic sequences: the discrete Fourier series, The Fourier transform of periodic signals, Sampling the Fourier transform, Fourier representation of Finite-domain sequences: The discrete Fourier transform, Linear convolution using the discrete Fourier transform.

Computation of the Discrete Fourier Transform- Efficient computation of the discrete Fourier transform, The Goertzed Algorithm, Decimation-in-time FFT algorithms, Decimation-in-frequency FFT algorithms, Practical considerations, The Chirp Transform algorithm.

UNIT – IV: Architecture of TMS320C5X

Bus structure, Central Arithmetic Logic Unit(CALU), Auxiliary Register ALU, Index Register, Auxiliary Register Compare Register, Block Move Address Register, Block Repeat Registers, Parallel Logic Unit, Memory-Mapped Registers, Program Controllers.

TMS320C5X Assembly Language Instructions- Assembly Language Syntax, Addressing modes, Load/Store instructions, Addition/Subtraction instructions, Move instructions, Multiplication instructions, The NORM instruction, Program control instructions, Peripheral control.

Books for study:

1. Alan V. Oppenheim, Ronald W. Shafer and John R. Buck, "Discrete-Time Signal Processing", 2/e, Pearson Education, Inc., 2000. (UNIT- I to UNIT-III)
2. B. Venkataramani and M. Bhaskar, "Digital Signal Processors: Architecture, Programming and Applications", TMH, 2002. (UNIT-IV)
3. Sanjit K. Mitra, "Digital Signal Processing: A Computer Based Approach", TMH, 1998.
4. Johnny R. Johnson, "Introduction to Digital Signal Processing", PHI, 2000.
5. John G. Proakis, Dimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithms and Applications" 3/e, PHI, 2000.
6. Boaz Porat, "A Course in Digital Signal Processing", John Wiley & Sons (Asia) Pte. Ltd., 1997.
7. D.J. Defatta, J.G. Luca and W.S. Hodgkiss, "Digital Signal Processing: A System Design Approach", John Wiley & Sons (Asia) Pte. Ltd., 1995.
8. Texas Instruments TMS 320C5X User's Guide, 1997.
9. P. Ramesh Babu, Digital Signal Processing,6/e, Scitech Publications (India) Pvt Ltd , 2015.
10. A.NagurKani, Digital Signal Processing, 2/e, Tata McGraw-Hill Education India, 2012.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

THIRD SEMESTER

Branch - Electronics

Paper-1: ELE-301: DIGITAL SIGNAL PROCESSING

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Explain the Digital Processing of analog signals with the help of relevant sketch.
2. What is sampling? Describe the sampling theorem.
3. Compare FIR and IIR filters.
4. Describe the block diagram representation of linear constant – coefficient difference equations.
5. Write about Goertzed Algorithm.
6. Compute the 4 – point DFT of a given sequence x (n) = {1,1,0,0}.
7. Explain the addressing modes of TMS320C5X DSP with suitable examples.
8. Write about assembly language syntax of TMS320C5X DSP.

SECTION –B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) What is multirate signal processing?

   (b) Explain the interpolation and decimation process of sampling rate of conversion with an example.

   (Or)

   (c) Write about reconstruction of a band limited signal from its samples.

   (d) Explain the discrete time processing of continuous time signal and vice –versa with the help of relevant sketches.

10. (a) Explain the steps to design FIR Filter using windows.

    (b) Discuss the design procedure of FIR Filter using Kaiser window method.

    (Or)

    (c) Write about the Basic structure of IIR system.

    (d) Discuss the design procedure of IIR Filter by using Bilinear Transformation (BLT).

11. (a) Determine the DFT of the following sequence using DIF –FFT algorithm. X(n) = {1, 1, 1, 0, 0, 1, 1, 1}.

    (Or)

    (b) Write about practical considerations in FFT implementation.

    (c) Explain the linear convolution using DFT with suitable example.

12. (a) Draw the architecture of TMS320C5X DSP and explain briefly each block in it.

    (Or)

    (b) Discuss the following instructions with suitable examples:

    (i) Load/store instructions. (ii) Move instructions and

    (iii) Multiplication instructions

ELE -302	**Digital system design – VHDL**	**L-5,T-1,P-0**	**4Credits**
Pre-requisite: Courseon graduate level electronics			

CourseObjectives: Theaimandobjectiveofthecourseon Digital System Design – VHDL is to expose the students of M.Sc. to experimental aspectsofVerlog Hardware Descriptive language and Model simulation.	
CourseOutcomes: At theend ofthe course, thestudent willbe ableto	
CO1	Understandvarious**Basic Language Elements**and model analysis.
CO2	Understand Data flow and structural modeling.
CO3	Apply the knowledge **Subprograms, Overloading, Packages and Libraries**for various applications
CO4	To get familiarization with Advanced features for Model simulation

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	2	-	1	1	1	-
CO2	3	2	1	3	2	1	-	-	1	1	-	1
CO3	3	2	1	2	3	2	1	-	2	2	-	-
CO4	3	2	1	3	3	1	1	-	-	2	2	2

ELE-302: DIGITAL SYSTEM DESIGN – VHDL

UNIT – I

Basic terminology, Entity declaration, Architecture body, Configuration declaration, Package declaration, Package body, Model analysis, Simulation.

Basic Language Elements- Identifiers, Data objects, Data types, Operators.Entity declaration, Architecture body, Process statement, Variable assignment statement, Signal assignment statement, Wait statement, If statement, Case statement, Null statement, Loop statement, Exit statement, Next statement, Assertion statement, Report statement, other sequential statements, Multiple processes, Postponed processes.

UNIT –II: Data Flow Modelling

Concurrent signal assignment statement, Concurrent versus sequential signal assignment, Delta delay revisited, Multiple drivers, Conditional signal assignment statement, selected signal assignment statement, The unaffected value block statement, concurrent assertion statement, Value of a signal.

Structural Modeling- Component declaration, Component instantiation, Resolving signal values.

UNIT – III

Generics, Configuration specification, Configuration declaration, Default binding rules, Conversion functions, Direct instantiation, Incremental binding.

Subprograms and Overloading- Subprograms - Subprogram overloading, Operator overloading, Signatures, Default values for parameters.

Packages and Libraries- Package declaration, Package body, Design file, Order of analysis, Implicit visibility, Explicit visibility.

UNIT – IV: Advanced Features

Entity statements, Generate statements, Aliases, Qualified expressions, Type conversions, Guarded signals, Attributes, Aggregate targets, More on block statements, Shared variables, Groups, More on ports.

Model Simulation- Simulation – Writing a Test Bench, Dumping results into a text file – Reading vectors from a text file – A test bench example – Initializing a memory.

Book s for study:

1. J. Bhasker, "VHDL primer", 3/e, Addison Wesley Longman (Singapore) Pte.Ltd., 2000.
2. ZainalabedinNavabi, "VHDL– Analysis and Modeling of Digital Systems", McGraw-Hill International Editions, 1998.
3. Joseph Pick,"VHDL – Techniques, Experiments, and Caveats", McGraw-Hill International, 96.
4. John P. Uyemura, "Introduction to VLSI circuits and Systems", John Wiley & Sons (Asia) Pte. Ltd., 2003.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
THIRD SEMESTER
Branch - Electronics
Paper 2-ELE-302: DIGITAL SYSTEM DESIGN -VHDL
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Define Entity declaration with suitable example.
2. Explain the concept of simulation.
3. Explain If statement with suitable example.
4. Explain Delta delay revisited.
5. Explain default binding rules.
6. Write a VHDL code for logic AND gate.
7. Write VHDL code for half adder.
8. Explain the concept of Shared variables.

SECTION -B

Answer ALL questions. Each question carries 15 Marks

(Marks: 4 x 15 =60)

9. (a) Explain configuration declaration, package declaration, and package body with proper examples.

   (Or)

   (b) Explain the basic language elements Identifiers, data objects, data types and Operators.
10. (a) Describe process statement in VHDL with suitable example.

(b) Explain sequential statement with suitable example.

(Or)

(c) Describe loop statement, exit statement, next statement with proper examples.

11. (a) Write a VHDL code for D – flip flop and J.K. flip flop.

(Or)

(b)Write a VHDL code for S –R flip flop

(c) Explain design file and orders of analysis.

12. (a) Describe generate statements, Aliases and qualified expressions with examples.

(Or)

(b) Write a VHDL code for 4- bit shift register.

ELE-303(a)	Microcontrollers and Applications	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingof graduatelevel basic processors

Course Objectives: The aim and objective of the course on Microcontrollers and Applications forthestudentsofM.Sc. electronics istoequipthemwiththeknowledgeof microcontrollers and other processors used in the industry.

CourseOutcomes: At theend ofthecourse, thestudent willbe ableto

CO1	Understand about the basic functions and structure of Microcontrollers such as 8051.
CO2	Get familiarized with 8051 controllers
CO3	understand about the basic Atmel microcontrollers and programming
CO4	Understanding of PIC 16F8XXflash microcontrollers and their interfacing with I/O devices for industrial applications

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	1	-	-	2	1	1	-
CO2	3	2	3	3	2	1	2	-	2	-	1	-
CO3	3	2	3	3	2	-	-	-	2	1	1	-
CO4	3	2	3	3	2	1	2	-	2	1	1	-

ELE-303(a) MICROCONTROLLERS AND APPLICATIONS

UNIT - I :**Introduction to Microcontrollers**

Microcontrollers and Microprocessors, Embedded versus External Memory Devices, 8-bit and 16-bit Microcontrollers, CISC & RISC processors.

8051 Microcontrollers– MCS-51 architecture, Registers in MCS-51, 8051 pin description, pin connections, Parallel I/O ports and Memory organization.

UNIT – II: 8051 addressing modes, instructions and programming

8051 addressing modes, Instruction Set, Assembly language Programming tools, Development Systems and Tools.

MCS—51 Interrupts, Timer/Counters, and Serial communications- Interrupts in MCS-51, Timers and Counters, Serial Communication.

UNIT - III :**Design with Atmel Microcontrollers**

Atmel Microcontrollers, Architectural overview of Atmel 89C51 and Atmel 89C2051, Pin description of 89C51, and 89C2051, Using Flash Memory devices ATMEL 89CXX and 89C20XX, Power saving options.

Applications- Waveform generation- Sine, Square, Pulse, Ramp, Staircase, Pulse Width Measurement, Frequency Counter.

UNIT – IV: **PIC 16F8XX Flash Microcontrollers**

Pin diagram of 16F8XX, STATUS Register, OPTION_REG Register, Power Control Register, PIC 16F8XX program memory, data memory, Data EEPROM and Flash Program EEPROM, Interrupts in 16F877, I/O ports and Timers.

Interfacing and Industrial Applications of Microcontrollers- Interfacing of Keyboard, 7-segment LED, LCD, ADC, and DAC, Optical Rotary shaft encoder, LVDT, Angular speed measurement, Digital thermometer, load cell.

Books for Study:

1. Ajay V. Deshmukh, "Microcontrollers: Theory and Applications", Tata Mc Graw-Hill, New Delhi, 2005.
2. M.A. Mazidi and J.G. Mazidi, "The 8051 Microcontrollers and Embedded Systems", Pearson Education, Inc., 2002.
3. K.J. Ayala, "The 8051 Microcontroller Architecture, Programming & Applications", 2/e, Penram International Publishing (India) Pvt. Ltd.,1996.
4. John B. Peatman, "Designing with PIC Microcontrollers", Pearson Education, Inc., 1998.
5. MykePredko, "Programming and Customizing the 8051 Microcontroller", TMH, 1999.
6. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, Pearson Education, 2009.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
THIRD SEMESTER
Branch - Electronics
Paper 3- ELE -303(a): MICROCONTROLLERS AND APPLICATIONS
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. What is meant by a processor? Draw the functional block diagram of a microprocessor and explain.

2. What is meant by n – bit processor? Draw the block diagram of a microprocessor and explain each functional block.
3. What are the different development software tools required for the designing of any application?
4. Discuss the addressing modes of 8051 microcontroller with examples?
5. Explain the Pin description of 89C51?
6. Explain sine wave generation mechanism using AT89C51 Microcontroller?
7. Explain the I/O Ports of PICI6F877 With their corresponding port configuration registers?
8. Explain the Interfacing of key board with PICI6F8XX microcontroller?

SECTION -B

Answer ALL questions. Each question carries 15 marks.(Marks: 4 x 15 =60)

9. (a) Explain the Architecture of the 8051 microcontroller and explain each of its functional units ? (b) Explain the memory organization of the 8051 microcontroller?

(Or)

(c) Enumerate the differences between micro controller and microprocessors V.r.t embedded versus external memory devices.

(d) Explain the CISC and RISC processors characteristics with examples?

10. (a)What is meant by the serial communication? What are the different modes of serial Communication? What are the advantages of serial communication?

(b) Explain the RS -232 Protocol Standard ?

(Or)

(c) Explain the concepts of Timers and Counters in microcontroller?

(d) Explain in detail the TMOD and TCON registers of 8051 microcontrollers?

11. (a) Explain the Architecture of ATMEL 89C2051 microcontroller ?

(b) Explain selecting criteria of a microcontroller for designing of any application?

(Or)

(c) What is meant by the PWM? How a PWM can be generated by microcontrollers? Give its applications?

(d) Construct and explain the working of Ramp and Stair case wave from generators in detail?

12. (a) Draw and explain the pin diagram of PIC 16F8XX microcontrollers?

(b) Explain the STATUS REGISTER and OPTION REGISTER of PIC 16 F8XX microcontrollers?

(Or)

(c) Draw and explain the interfacing of LCD with PICI16F8XX microcontrollers?

(d) Differentiate between the LCD and Graphical LCD and write their applications?

ELE-303(b)	**Computer Organization**	L-5,T-1,P-0	4Credits
Pre-requisite: Understandingof graduatelevelElectronics/Computer Science			
Course Objectives: The aim and objective of the course on **Computer Organization**forthestudentsofM.Sc. Electronics istoequipthemwiththeknowledgeof Basic Structure of Computers, Mircrooperations and Pipeline Processing.			
CourseOutcomes: At theend ofthecourse, thestudent willbe ableto			

CO1	Understand basics of structures of Computers.
CO2	Know Register Transfer language and micro operations
CO3	Understand Microprogrammed control, Computer Arithmetic and Memory system.
CO4	Input-OutputOrganization, Pipeline and Vector Processing.

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	2	1	1	-	2	1	-	-
CO2	3	2	-	3	2	1	2	-	2	1	-	-
CO3	3	2	-	3	2	1	2	-	2	1	-	-
CO4	3	2	-	3	2	1	2	-	2	1	-	-

ELE-303(b): COMPUTER ORGANIZATION

UNIT-I

BASIC STRUCTURE OF COMPUTERS: Computer Types, Functional unit, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data Representation, Fixed Point Representation, Floating – Point Representation, Error Detection codes.

UNIT-II

REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer language, Register Transfer Bus and memory transfers, Arithmetic Mircrooperatiaons, logic micro operations, shift micro operations, Arithmetic logic shift unit, Instruction codes, Computer Registers, Computer instructions– Instruction cycle Memory – Reference Instructions, Input – Output and Interrupt. STACK organization. Instruction formats, Addressing modes, DATA Transfer and manipulation, Program control, Reduced Instruction set computer.

UNIT –III

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, microprogram example, design of control unit, Hard wired control, Microprogrammed control.

COMPUTER ARITHMETIC : Addition, subtraction, multiplication and Division Algorithms Floating – point Arithmetic operations, Decimal Arithmetic unit, Decimal Arithmetic operations.

THE MEMORY SYSTEM : Basic concepts, semiconductor RAM memories, Read-only memories, Cache memories performance considerations, Virtual memories secondary storage, Introduction to RAID.

UNIT-IV

INPUT-OUTPUT ORGANIZATION: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access, Input –Output Processor (IOP) Serial communication; Introduction to peripheral component Interconnect (PCI) bus, Introduction to standard serial communication protocols like RS232, USB, IEEE1394.

PIPELINE AND VECTOR PROCESSING : Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

Books for study:

1. Computer Organization – Carl Hamacher, ZvonksVranesic, SafeaZaky, 5/e, McGraw Hill.
2. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI.
3. Computer Organization and Architecture – William Stallings 6/e, Pearson/PHI.
4. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.
5. Fundamentals or Computer Organization and Design, – SivaraamaDandamudi, Springer Int.
6. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, 4/e, Elsevier
7. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
THIRD SEMESTER
Branch - Electronics
Paper 3-ELE-303(b): COMPUTER ORGANISATION
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 marks. (Marks: 4 x 5 = 20)

1. What are computer types ?
2. What are Basic operational concepts ?
3. Write a note on Register Transfer Bus.
4. What are the logic micro operations?
5. Explain the concept of address sequencing .
6. Explain the Decimal Arithmetic operations.
7. What are the Peripheral Devices ?
8. Explain the concept of pipelining.

SECTION -B

Answer ALL questions. Each question carries 15 marks.(Marks: 4 x 15 =60)

9. (a) Discuss on Data Representation.
   (b) Explain the functions of system software.
   (Or)
   (c) Explain the performance of multiprocessors.
   (d) What is a subroutine? How is it serviced?

10. (a) What are the addressing modes ? Explain.
    (b) Discuss on Reduced Instruction set computer.
    (Or)
    (c) Describe the Stack Organization in computer systems.
    (d) With the help of neat sketch, Discuss the Arithmetic logic shift unit.
11. (a) Explain the design of control unit.
    (b) Distinguish betweenHard wired control and Microprogrammed control.
    (Or)
    (c) Discuss the basic concepts of memory system.
    (d) Discuss on Read-only memories.
12. (a) Explain the peripheral component Interconnect (PCI) bus.
    (b) Distinguish between RS232 and IEEE1394communication protocols.
    (Or)
    (c) Distinguish between pipelineprocessing and vector processing.
    (d) Write about Array Processors.

ELE-303(c)	Digital Image Processing	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingof graduatelevel electronics

Course Objectives: The aim and objective of the course on Digital Image Processingfor the studentsofM.Sc. Electronics is toequipthemwiththeknowledgeofimage processing systems and applications.

CourseOutcomes: At theend ofthecourse, thestudent willbe ableto

CO1	understand about the Fundamentals of Image Processing
CO2	Get familiarized with Image enhancement.
CO3	Understand about the Image Segmentation and Feature Analysis.
CO4	Understand about the Multi Resolution Analysis and Compressions.

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	1	-	-	2	1	1	-
CO2	3	2	3	3	2	1	2	-	2	-	1	-
CO3	3	2	3	3	2	-	-	-	2	1	1	-
CO4	3	2	3	3	2	1	2	-	2	1	1	-

ELE-303(c): DIGITAL IMAGE PROCESSING

Unit-I: Fundamentals of Image Processing

Introduction – Steps in image processing systems – Image acquisition – Sampling and Quantization – Pixel relationships – Color fundamentals and models, File formats, Image operations – Arithmetic, Geometric and Morphological.

Unit-II: Image Enhancement

Spatial Domain: Gray level Transformations – Histogram processing – Spatial filtering smoothing and sharpening. Frequency Domain: Filtering in frequency domain – DFT, FFT, DCT – Smoothing and sharpening filters –Homomorphic Filtering.

Unit-III: Image Segmentation and Feature Analysis

Detection of Discontinuities – Edge operators – Edge linking and Boundary Detection – Thresholding – Region based segmentation – Morphological Watersheds – Motion Segmentation, Feature Analysis and Extraction.

Unit-IV: Multi Resolution Analysis and Compressions

Multi Resolution Analysis: Image Pyramids – Multi resolution expansion – Wavelet Transforms. Image compression: Fundamentals – Models – Elements of Information Theory – Error free compression – Lossy Compression –Compression Standards.

Applications of Image Processing:Image classification – Image recognition – Image understanding – Video motion analysis – Image fusion –Steganography – Digital compositing – Mosaics – Colour Image Processing.

Books for Study

1. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, 2nd Edition, Pearson Education, 2003.
2. Anil K. Jain, Fundamentals of Digital Image Processing, Pearson Education, 2003.
3. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing, Analysis and Machine Vision, 2ndEdition, Thomson Learning, 2001

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER

THIRD SEMESTER

Branch - Electronics

Paper-1: ELE-303 (c): DIGITAL IMAGE PROCESSING

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any four questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Write the file format in image Processing.
2. What are Pixel relationships ?
3. Distinguish between DFT and DCT.
4. Write a short note on Homomorphic filtering.
5. What are the Edge operators ?
6. What are the differences between Region based segmentation and motion segmentation ?
7. What are the Image Pyramids ?
8. Write a note on Image Classification.

SECTION –B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) What are the steps in image processing system? Explain.

(Or)

(b) Explain the image operations.

.

10. (a) Explain the Gray level Transformations.

(Or)

(b) Explain the function of smoothing and sharpening.

11. (a) Discuss on Edge linking and Boundary detection.

(Or)

(b) Discuss on Morphological water sheds.

12. (a) What are the applications of image processing? Explain.

(Or)

(b) Discuss the elements of information Theory.

ELE-305	**Peripheral interface controllers**	**L-2, T-0, P-0**	**4credits**

Pre-requisite: Understandingof graduatelevel Electronics

Course Objectives: The aim and objective of the course on **Peripheral interface controllers**forthestudentsofM.Sc. Electronics istoequipthemwiththeknowledge PIC microcontrollers used in the industry.

CourseOutcomes: At theend ofthecourse, thestudent willbe ableto

CO1	understand about the basics of **Assembler and Assembler Programs**
CO2	Get familiarized with PIC microcontrollers and interfacing I/O devices.

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	1	-	-	2	1	1	-
CO2	3	2	3	3	2	1	2	-	2	-	1	-

ELE-305: PERIPHERAL INTERFACE CONTROLLERS

Unit - I: Assembler and Assembler Programs

Basic idea – PIC 16 series instruction set and ALU – Assemblers and Assembler format – creating simple programs – Adopting a development environment – Building structured programs – Flow control: Branching and Subroutines – Generating time delays and intervals – Logical instruction – Arithmetic instructions.

Unit - II: PIC Microcontroller PIC 16F873A

Block diagram and CPU – Memory and memory maps – Interrupts – Oscillator, Reset and Power supply – Parallel ports.

PIC 16F87XA Timer 0 and Timer 1 – 16F87XA Timer 2, Comparator and PR2 register – capture/Compare/PWM (CCP) Module – Pulse width modulation – ADC module.

Interface: LED displays – Liquid crystal displays –Sensors –Actuators.

Books for Study

1. Designing Embedded Systems with PIC Microcontrollers: Principles and Applications by Tim Wilmshurst, First Edition, Newnes – ElsevierPublishers, 2007.

2.PIC Microcontroller and Embedded Systems by Muhammad Ali Mazidi, Rolind D. Mckinlayznd Danny Causey, Pearson Education, 2011.

Model Question Paper

M.Sc DEGREE EXAMINATION APRIL/DECEMBER

Branch-ELECTRONICS

Paper 4-ELE-305: Peripheral interface controllers

(Under NEP w.e.f.2021-2022)

Time: 3 Hours Max. Marks :40

SECTION – A

Answer any Two questions. Each question carries 5 marks. (Marks: 2 × **5=10**)

1. What is an assembler? Discuss the assembler format.
2. What are the main ideas of computer programming?
3. Write about the registers file structure of a PIC16F873 A microcontroller.
4. List various I/O ports available in 16F873 A and Explain briefly.

SECTION – B

Answer any **TWO** questions. Each question carries 15 marks. (Marks: **2 × 15=30**)

5. (a) Draw the block diagram of PIC 16 series ALU. Explain.

(or)

(b) Explain how building structured programs can be constructed.

6. (a) Draw and explain the architecture of PIC 16F873 A microcontroller.

(or)

(b) Write a detailed note on the memory organization of PIC 16F873 A.

ELE-306(a)	**Microprocessors, PC hardware and interfacing**	L-3,T-1,P-2	4Credits
Pre-requisite: Understandingofgraduatelevelspectroscopy			
Course Objectives: The aim and objective of the course on **Microprocessors, PC hardware and interfacing** forthestudentsofM.Sc. Electronics is toequipthemwiththeknowledgeofAtomic,Rotational,Vibrational,Raman, andElectronicspectra.			
CourseOutcomes: At theend ofthecourse, thestudent willbe ableto			

CO1	Havethebasicknowledgeof8086 Based system design and peripheral interfaces
CO2	Understand the Motherboard of IBM PC
CO3	Understand with Peripherals
CO4	Understand about I/O Serial and Parallel ports.

Mappingof courseoutcomeswiththe program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	1	1	-	2	1	-	
CO2	3	2	3	3	2	1	2	-	2	1	1	-
CO3	3	2	3	3	2	1	2	-	2	1	-	-
CO4	3	2	-	3	2	1	2	-	2	1	-	-

ELE-306(a) MICROPROCESSORS, PC HARDWARE AND INTERFACING

UNIT-I: 8086 Based system design and peripheral interfaces

Pins and signals, Basic system components, interfacing memory, interfacing I/O devices, interfacing data converters, interfacing stepper motor, interrupts, direct memory access, parallel I/O methods, programmable peripheral interface (8255A), priority interrupt controller (8259A), direct memory access controller(8237), programmable interval timer (8254), serial I/O.

UNIT- II :The Motherboard of IBM PC

Motherboard Components, Microprocessor, Support Chips, Memory, Support Functions, I/O buses, System Resources, Interrupt Requests, DMA Channels, I/O Addresses, Utilization of System Resources, ROM BIOS Services, Drives: Principles of Magnetic Storage, Floppy Disk Drive, Hard Disk Drive, IDE Interface, CD – ROM Drive

UNIT- III :Peripherals

Video Display System: CRT Display, Video Adapter, Graphics Accelerators, LCD Monitor, Video Programming, Keyboard, Mouse, Printer, I/O Buses:ISA Bus, MCA bus, EISA Bus, Local Buses, VL Bus, PCI Bus, AGP.

UNIT-IV: PARALLEL AND SERIAL PORTS

Parallel Port: Standard Parallel port, IEEE1824 standard, Enhanced Parallel port, Enhanced Capabilities Port, Serial Port: Pins and Signals of Serial port, BIOS serial port services, UART, Universal Serial Bus: Features of USB, USB system, USB Transfer, USB controller.

Books for Study

1. Microprocessors, PC Hardware and Interfacing by N. Mathivanan, PHI.
2. B.B. Brey, "The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium pro processor architecture, programming, and interfacing", 4/e, PHI, 1999.
3. Douglas V.Hall, "Microprocessors and Interfacing, Programming and Hardware", 2/e, McGraw Hill International Edition, 1992.
4. Muhammad Ali Mazidi and Janice GillispieMazidi, "The 80x86 IBMPC and Compatible Computers (Volumes I & II)", 2/e, Prentice-Hall, Inc., 1998.
5. Walter A. Triebel and Avatar Singh, "Software, Hardware and Applications", PHI, 1995.
6. Yu Cheng Lin and Glenn A. Gibson, "Microcomputer systems: The 8086/8088 Family Architecture, Programming and Design", PHI, 1992.
7. K.J. Ayala, "The 8086 Microprocessor: Programming & Interfacing the PC", Penram International Publishing (India) Pvt. Ltd.,1995.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
THIRD SEMESTER
Branch - Electronics
Paper 6: ELE-306(a) MICROPROCESSORS, PC HARDWARE AND INTERFACING
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Write a note on Bus cycles.
2. What are the modes of operation of 8254 IC ?
3. List the different types of connectors found on modern motherboards.
4. Write a note on IDE Interface.
5. What are the video display standards ?
6. What are the functions of a keyboard controller in a PC ?
7. What is IEEE1824 standard ?
8. List the important features of USB .

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) What is a stepper motor ? Explain the interfacing of stepper motor with 8086 Microprocessor.

(Or)

(b) Discuss on Parallel I/O methods.

10. (a) Discuss the functions of mother board components.

(Or)

(b) Explain the working of Floppy Disk Drive.

11. (a) Discuss on CRT display systems and CRT interfacing.

(Or)

(b) What is an EISA bus ? List it's features, Pins and signals.

12. (a) Describe the Intel 8x931 USB peripheral Controller.

(Or)

(b) Discuss on Standard Parallel Port.

ELE-306(b)	Satellite Communications	L-5,T-1,P-0	4Credits

Pre-requisite: Graduate level Electronics

Course Objectives: The aim and objective of the course on Satellite Communicationsis tofamiliarize the students of M.Sc. to the various aspects related to**Satellite Communication**sothattheycanpursuethisemergingresearchfieldascareer.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understanding the basics of Satellite Communication
CO2	AcquireknowledgeofMultiple Access Techniques
CO3	Understand theSatellite Orbits and Inclination.
CO4	Understanding of Satellite systems, Indian satellites and applications

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	1	2	-	1	2	1	-
CO2	3	2	2	2	3	2	2	-	1	2	-	-
CO3	3	3	-	2	3	2	2	-	1	2	1	-
CO4	3	2	3	2	3	2	2	-	1	2	-	-

ELE-306(b) :SATELLITE COMMUNICATIONS

UNIT- I : Principles of Satellite Communication

Synchronous Satellites, International Regulation and Frequency CoordinationSatellite Frequency Allocations and Band Spectrum, General and Technical Characteristics of a Satellite Communication System Advantages of Satellite Communication, Advent of Digital Satellite Communication, Modem and

Codec, General Link Design Equations, System Noise Temperature, C/N and G/T ratio, Atmospheric and Ionospheric Effects on Link Design, Uplink Design, Complete Link Design, Interference Effects on Complete Link Design, Earth Station Parameters.

UNIT- II: Multiple Access Techniques

Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), Demand Assignment TDMA (DATDMA), Process Gain and Jam Margin, Direct Sequence Spread Spectrum Techniques, PN Sequency, DS –CDMA, Frequency Hopping Spread Spectrum Communication System (FM-SS), Frequency Hopping Spread Spectrum Code Division Multiple Access (FH-SS CDMA), Synchronization, Application of Spread Spectrum Techniques, Hybrid Systems

UNIT- III: Satellite Orbits and Inclination

Introduction, Synchronous Orbit, Orbital Parameters, Satellite Location With Respect to the Earth, Look Angles, Earth Coverage and Slant Range, Eclipse Effects, Satellite Placement in Geostationary Orbit, Station Keeping, Satellite Stabilization, Earth Station Design Requirement, Earth Station Subsystems, Monitoring and Control, Frequency Coordination, Small Earth Station, Very Small Aperture Terminals (VSATs), Mobile and Transport Earth Stations.

UNIT IV: Satellite systems, Indian satellites and applications

Types of satellite systems, Characteristics of satellite systems, Satellite system infrastructures, Call setup, INSAT satellites, IRS satellite program.

Introduction to Satellite Applications, Satellite Application–Different Areas, Satellite Television, Telephone Services via Satellite, Data Communication Services, Satellites for Earth Observation, Satellites for Weather Forecast, Satellites for Scientific Studies, Satellites for Military Applications.

Books for Study:

1. Dr. D.C. Agrawal “Satellite communications”, 5/e, Khanna Publishers, 2002. (UNIT-V)
2. Wayne Tomasi, “Electronic Communication Systems: Fundamentals through Advanced”, 4/e, Pearson Education, Inc., 2001.
3. M.Richharia, “Satellite Communications Systems”, 2/e, Macmillan Press Ltd., 1999.
4. Partt, Bostian and Allnutt, “Satellite Communications”, 2/e, John Wiley & Sons, 2003.
5. MonojitMitra, Satellite Communication, PHI, 2010.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
THIRD SEMESTER
Branch - Electronics
Paper 2-ELE-306(b):SATELLITE COMMUNICATIONS
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks (Marks: 4 x 5 = 20)

1. What are the advantages of Satellite Communication ?

2. What are the satellite earth station parameters ?
3. Write a short note on Hybrid Systems.
4. Distinguish between TDMA and DATDMA.
5. What is Synchronous Orbit ?
6. Write a note on Frequency Coordination.
7. What are the Types of satellite systems
8. Write a note on IRS satellite program.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) What are synchronous satellites ? Discuss on Frequency Allocations and Band Spectrum .

(Or)

(b) Derive General Link Design Equations. Explain.

10. (a) What are Multiple Access Techniques ? Explain Code Division Multiple Access (CDMA).

(Or)

(b) What isSynchronization ? Discuss the application of SpreadSpectrumTechniques.

11. (a) What are Orbital Parameters ? How to find the Satellite Location with Respect to the Earth.

(Or)

(b)Discuss on Satellite Placement in Geostationary Orbit.

12. (a) Discuss the Characteristics of satellite systems. What are the INSAT satellites.

(Or)

(b) Discuss Satellite Applications in different Areas.

ELE- 401	**Advanced Communication Systems**	**L-5,T-1,P-0**	**4Credits**
Pre-requisite: Preliminarycourseof Communication systems			
CourseObjectives: Theaimandobjectiveofthecourseon**Advanced Communication Systems**is tointroduce the M.Sc. students to equip him/her with the Cellular Concept, Mobile Radio propagation and channel coding, Multiple Radio Access, Multiple Division Techniques, Optical and Satellite communications			
CourseOutcomes: At theend ofthe course, thestudent willbe ableto			
CO1	Understand the Cellular concept.		
CO2	Understand the Mobile Radio propagation and channel coding		
CO3	Understand the Multiple Radio Access, Multiple Division Techniques, Channel Allocation.		

CO4	Know theOptical, Satellite communications and their applications.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	1	1	1	-	2	1	2	-
CO2	3	2	3	-	1	1	1	-	2	1	2	-
CO3	3	2	2	2	1	1	1	-	2	1	2	-
CO4	3	3	2	2	1	1	1	-	2	1	2	-

ELE-401: ADVANCED COMMUNICATION SYSTEMS

UNIT – I : Cellular Concept

History of cellular systems, Characteristic and fundamentals of cellular systems, cellular system infrastructure, cell area, signal strength and cell parameters, capacity of a cell, frequency reuse, Co-channel interference, Cell splitting and sectoring.

UNIT – II: Mobile Radio propagation and channel coding

Types of radio waves, propagation mechanisms, Free-space propagation, Pathloss, Slow and Fast Fading, Doppler effect, Delay spread, Inter symbol interference, co-channel Interference, Coherence Bandwidth, Linear Block codes, Cyclic and Convolutional codes, Interleaves, Turbo codes, ARQ Techniques.

UNIT –III: Multiple Radio Access, Multiple Division Techniques, Channel Allocation

Multiple Radio Access Protocols, Contention-based protocols, Concepts and models of FDMA, TDMA, and CDMA, Modulation Techniques, Static versus Dynamic allocation, Fixed channel allocation schemes, Dynamic and other channel allocation schemes, Allocation in specialized system structure, Channel modeling, Modeling for handoff calls.

UNIT - IV :**Optical and Satellite communications**

History of optical fibers, Optical fibers versus Metallic cable Facilities, Electromagnetic spectrum, Optical fiber communications system block diagram, Fiber types, Light propagation, Propagation of light through an optical fiber, Optical fiber configurations, Acceptance angle and Acceptance cone, Losses in optical fiber cables, Optical fiber system link budget.

Satellite systems, Indian satellites and applications- Types of satellite systems, Characteristics of satellite systems, Satellite system infrastructures, Call setup, INSAT satellites, IRS satellite program, Satellite applications.

Books for Study:

1. Dharma PrakashAgrawal and Quing-An Zeng, “Introduction to wireless and Mobile Systems” Vikas Publishing House Pvt. Ltd., 2003.(UNIT–I to UNIT–III).
2. Wayne Tomasi, “Electronic Communication Systems: Fundamentals through Advanced”, 4/e, Pearson Education, Inc., 2001. (UNIT –IV)
3. Dr. D.C. Agrawal “Satellite communications”, 5/e, Khanna Publishers, 2002. (UNIT-IV).

4. William Stallings, “Wireless Communications and Networking”, PHI, 2003,
5. M.Richharia, “Satellite Communications Systems”, 2/e, Macmillan Press Ltd., 1999.
6. Partt, Bostian and Allnutt, “Satellite Communications”, 2/e, John Wiley & Sons, 2003.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
FOURTH SEMESTER
Branch - Electronics
Paper 1 –ELE -401: ADVANCED COMMUNICATIONS SYSTEMS
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4x5 =20)

1. Write a brief note on history of cellular system.
2. Explain the cell splitting and sectoring
3. Describe the slow and fast fading. What is Doppler effect? Write briefly.
4. Explain the ARQ techniques.
5. Write about contention based protocols.
6. Describe the modelling for handoff calls.
7. Write about Electromagnetic spectrum.
8. Explain the satellite applications.

SECTION -B

Answer ALL questions. Each question carries 15 Marks.(Marks: 4 x 15 =60)

9. (a) Describe the characteristics and fundamentals of cellular systems and cellular system Infrastructure.

(Or)

(b) Write about
(i) Capacity of a cell (ii) Frequency reuse
(iii) Co – channel interference

10. (a) Derive an expression for the free space propagation loss. What is inter Symbol Interference? Explain.

(Or)

(b) Describe the convolution codes used in date transmission with suitable diagrams.

11. (a) Describe the models of FDMA, TDMA and CDMA modulation techniques.

(Or)

(b) Describe the fixed channel allocation schemes and dynamic and other channel allocation scheme.

12. (a) Describe the propagation of light through an optical fiber and optical fiber configurations.

(Or)

(b) Describe the characteristics of satellite systems and satellite system infrastructure.

ELE-402	**Introduction to VLSI Circuits**	**L-5,T-1,P-0**	**4Credits**
Pre-requisite:Understandingofgraduatelevel Semiconductor materials			

Course Objectives: The aim and objective of the course is to equipthe students of M.Sc.withthe**Introduction to VLSI Circuits** thathe/sheneedsforunderstandingtheoreticaltreatmentindifferentcoursestaughtinthisclassandfordeveloping astrongbackgroundif he/she chooses to pursueresearch inphysics asacareer.	
CourseOutcomes: At theend ofthecourse,the studentwillable to	
CO1	Demonstrate a clear understanding of CMOS fabrication flow and technology scaling.
CO2	Analyze CMOS based logic circuit
CO3	Realize logic circuits with different design styles
CO4	Analysis of CMOS Logic Circuits and Designing High-speed CMOS Logic Networks.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	1	1	-	2	1	-	-
CO2	3	3	2	2	2	1	1	-	2	1	-	-
CO3	3	3	2	2	2	1	1	-	2	1	-	-
CO4	3	3	2	2	2	1	1	-	2	1	-	-

ELE-402: INTRODUCTION TO VLSI CIRCUITS

UNIT - I :An Overview of VLSI and Logic Design with MOSFETs

Complexity and Design, Basic concepts, Ideal switches and Boolean operations, MOSFETs as switches, Basic logics gates in CMOS, Complex logic gates in CMOS, Transmission Gate circuits, Clocking and data flow control.

UNIT – II: Physical Structure and Fabrication of CMOS ICs

Integrated Circuit layers, MOSFETs, CMOS layers, Designing FET arrays, Overview of silicon processing, Material growth and deposition, Lithography, The CMOS process flow, Design rules.

UNIT - III :Elements of Physical Design and Electrical Characteristics of MOSFETs

Basic concepts, Layout of basic structures, Cell concepts, FET sizing and the unit transistor, Physical design of logic gates, Design hierarchies, MOS physics, nFET current-voltage equations, FET RC model, pFET characteristics, Modeling of small MOSFETs.

UNIT – IV: Analysis of CMOS logic gates

DC characteristics of the CMOS inverter, Inverter switching characteristics, Power dissipation, DC characteristics: NAND and NOR gates, NAND and NOR transient response, Analysis of complex logic gates, Gate design for transient performance, Transmission gates and pass transistors.

Designing High-speed CMOS Logic Networks- Gate delays, Driving Large capacitive loads, Logical effort, BiCMOS drivers.

Books for Study:

1. John P. Uyemura, "Introduction to VLSI circuits and Systems", John Wiley & Sons (Asia) Pte. Ltd., 2003.

2. S.K. Ghandhi, "VLSI Fabrication principles", 2/e, John Wiley & Sons (Asia) Pte. Ltd., 2003.

3.S.M. Sze, "VLSI Technology", 2/e, McGraw-Hill, 1988.

4.N.H.E. Weste and K. Eshraghian, "Principles of CMOS VLSI design", Pearson Education, Inc., 1999.

5.Yuan Taur and T.H. Ning, "Fundamentals of Modern VLSI devices", Cambridge University Press, 1998.

6.R.L. Geiger, P.E. Allen and N.R. Strader, "VLSI design Techniques for Analog and Digital Circuits", McGraw-Hill, 1990.

7.Douglas A. Pucknell and Kamran Eshraghian, Basic VLSI Design, PHI, 1995.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
FOURTH SEMESTER
Branch - Electronics
Paper 2 –ELE -402: INTRODUCTION TO VLSI CIRCUITS
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Explain the overview of Design steps involved in the fabrication of VLSI circuits.
2. Explain the Design and applications of Transmission Gate circuits.
3. What is a MOSFET? Explain the working of MOSFET?
4. Explain the concept of Lithography.
5. Write a note on FET sizing and unit Transistors.
6. Explain in detail the FET RC model.
7. Write a brief note on power dissipation.
8. Give the over view of Bi – CMOS drivers.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Explain MOSFETs as switches with a neat diagram.

(Or)

(b) Draw a neat sketch and explain basic logic gates in CMOS.

10. (a) Discuss briefly the concept of CMOS layers in detail.

(Or)

(b) Explain the overview of materials growth and their deposition in VLSI Technology.

11. (a) Write briefly on layout basic structured sequences.

(Or)

(b) Explain briefly the n – FET current and voltage equation with a neat diagram.

12. (a) Draw a neat diagram and explain briefly the DC characteristics of the CMOS inverter.

(Or)

(b) Discuss briefly the Designing of High Speed CMOS logic Networks.

ELE-403(a)	**Data Communications and Networking**	L-3,T-1,P-2	4Credits

Pre-requisite: Understandingofgraduatelevelelectronics/Networking.

Course Objectives: The aim and objective of the course on **Data Communications and Networking** is to expose the M.Sc. students to the Basic concepts Networking, Multiplexing, Data Link Protocols, LAN, ISDN, SONET used in the Communication electronics.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understand the basic conceptsnetworks and Transmission of digital data.
CO2	Know the different types of Multiplexing and Data link protocols.
CO3	Understand the various types of local area networks.
CO4	Understand the ISDN, ATM, SONET and related frames and protocols.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2	1	1	-	-	3	-	1
CO2	3	2	1	1	1	1	-	-	-	3	-	1
CO3	3	2	2	1	2	1	-	-	-	3	-	1
CO4	3	2	1	1	1	2	-	-	-	3	-	1

ELE-403 (a) DATA COMMUNICATIONS AND NETWORKING

UNIT – I: Basic concepts

Line configuration, Topology, Transmission mode, Categories of networks.

OSI Model: Functions of the layers, TCP/IP protocol suite

Transmission of digital data: Interfaces and modems, digital data transmission, DTE-DCE interface, other interface standards, modems, 56K modem, cable modem.

UNIT –II: Multiplexing

FDM, WDM, TDM, Multiplexing applications: Telephone system, DSL, FTTC.
Data link control: Line discipline, Flow control, Error control.

Data link protocols: Asynchronous and synchronous protocols, Character-oriented and bit-oriented protocols, Link access procedures.

UNIT – III: LAN

Project 802, Ethernet, Token bus, Token ring, FDDI.

Switching: Circuit switching, Packet switching, Message switching.

PPP: PPP layers, LCP, Authentication, NCP.

UNIT – IV: ISDN

Services, Subscriber access to the ISDN, ISDN layers, Broad band ISDN.

X.25: X.25 layers, Other protocols related to X.25.

Frame Relay: Operation, Layers, Congestion control, Leaky Bucket algorithm, Traffic control, other features.

ATM: Design goals, ATM architecture, Switching, Switching fabrics, ATM layers, Service classes, ATM applications.

SONET/SDH: Physical configuration, SONET layers, SONET frame.

Books for study:

1. Behrousz A. Forouzan, “Data Communications and Networking”, 2/e, TMH, 2000.
2. William Stallings, “Data and Computer Communications”, 5/e, PHI, 2000.
3. Andrew S. Tanenbaum, “Computer Networks”, PHI, 3/e, 1999.
4. Leon-Garcia &IndraWidjaja, “Communication Networks”, TMH, 2000.
5. Douglas E. Commer, “Computer Networks and Internets”, Addison Wesley Longman (Singapore) Pte.Ltd., 2/e,2000.
6. Uyless Black, “Computer Networks”, PHI, 2/e, 1999.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
FOURTH SEMESTER
Branch - Electronics
Paper 3 – ELE -403(a): DATA COMMUNICATIONS AND NETWORKING
(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. Write about categories of networks.
2. Explain the working of 56K modem.
3. Write about FDM and TDM.
4. Explain the link access procedure.
5. Explain the FDDI working.
6. Discuss about NCP.
7. Explain the other protocols related to X.25.
8. Explain the ATM design goals.

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Describe OSI model and explain the functions of the each layer.

(Or)

(b) Discuss about digital data transmission concepts and explain the DTE –DCE Interface.

10. (a) Discuss about the data link control procedures. Write about.
    (i) Flow control.
    (ii) Line control and error control schemes.

(Or)

(b) Describe the asynchronous and synchronous data link protocols.

11. (a) Discuss about circuit switching, packet switching and message switching.

(Or)

(b) Describe point to point protocol in computer networking . What is the use of link control protocol.

12. (a) Describe the operator of frame relay and its layers and congestion control.

(Or)

(b) Describe the physical configuration of SONET/SDH and its layers.

ELE-403(b)	**Industrial Electronics**	**L-3,T-1,P-2**	**4Credits**
Pre-requisite: Understandingof graduatelevel electronics			
CourseObjectives: The aimandobjectiveofthecourseon**Industrial Electronics** is to expose the M.Sc.students to the basics of Solid state devices, Power and optoelectronic devices, I/O devices and Robots.			
CourseOutcomes: Atthe end ofthecourse, thestudent willbeable to			
CO1	UnderstandtheSolid State Devices Used in Industrial Logic Circuits.		
CO2	Know the use of Solid state Devices in Power electronics.		

CO3	Understand input and output devices such as sensors and drives.
CO4	Know the Types of robotsand their function in the Industry.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	1	-	1	2	-	2	3	-	-
CO2	2	2	1	2	1	1	1	-	1	-	-	-
CO3	3	2	-	2	1	1	2	-	1	3	-	-
CO4	2	2	-	2	1	1	2	-	1	-	-	-

ELE-403(b): INDUSTRIAL ELECTRONICS

UNIT- I: Solid State Devices Used in Industrial Logic Circuits

Introduction, relay logic, typical logic circuits, relay logic used to control a pneumatic cylinder, using relay logic to determine robot program for inserting studs into taillights for automobiles, solid state devices used for logic, solid state logic blocks,solid state logic equivalent to the cougar taillight assembly circuit, connecting inputs to solid state logic devices, outputs for logic circuits, solid state relays, comparison of solid state logic and relay logic, solid state and relay logic circuits to control part bins for robotic automated workcells.

UNIT- II: Power electronics

Silicon controlled rectifiers (SCRs), TRIACs, power transistors, insulated –gate bipolar transistors, junction field –effect transistors (J –FETs), solid –state devices used for firing circuits, unijunction transistor (UJT), programmable unijunction transistors, using a DIAC to provide a pulse for thyristors, other solid state devices used as triggers, light –activated solid state devices, photoelectronics, lasers, and fiber optics, optoelectronic devices, optoisolators and optointerupters, optodevices used for displays.

UNIT- III:Input and Output Devices

Temperature sensors, pressure sensors, flow sensors, density and viscosity sensors, level sensors, position sensors, motion sensors, PH sensors, humidity sensors, solenoid valves, proportional valves, relays, contactors, and motor starters, variable frequency drives, dc drives, stepper motors, linear stepper motors, servomotors.

UNIT- IV: Robots and others motion control systems

Types of robots, types of robot control, types of robot programs, computer numerical control (CNC) machines, basic parts of a robot system, other types of robot actuators, input and output signals for robots, input circuits for robot signals, output circuits for robot signals, input and output modules, data communications for industrial electronics, network architectures, data formats, protocols and standards, parts and media of the physical layer, typical network topologies

Books for study:

1. Thomas E. Kissel,Industrial Electronics, 3/e, PHI, 2003.

2. A.K, Sawhney, A course in Electrical and Electronic Measurements and Instrumentation, DhanpatRai Publishers, 2012.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
FOURTH SEMESTER
Branch - Electronics
Paper 3- ELE-403(b): INDUSTRIAL ELECTRONICS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. What is generic Programmable logic controller?
2. Mention the Classification of PLCS.
3. Explain how an SCR is turned on by its gate?
4. Write a note on high Voltage bipolar Transistor.
5. What is a sensor? Discuss its function.
6. Mention the applications of Flow seniors.
7. What are the types of Robots?
8. What are the types of network Topologies?

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Describe the four basic parts of any Programmable controller.

(or)

(b) Explain the counter Operation in PLC.

10. (a) Explain the operation of a TRAIC and its characteristics.

(Or)

(b)What is inverter? Explain The Operation of PWM Inverter.

11. (a) What are the different types of Pressure sensors ? Explain the working of Bourdon tube Pressure sensor?

(Or)

(b) What is a Motion sensor ? Discuss the working of ac accelerometer?

12. (a) Discuss the basic parts of a Robot system.?

(Or)

(b) Explain the parts and media of the Physical layer?

ELE-403 (c)	EMI & EMC	L-3,T-1,P-2	4Credits

Pre-requisite: graduate levelcoursein Physics/Electronics.	
Course Objectives: The main objective of the course on **EMI & EMC**isto introduce the basic conceptsof EMI environment, Standards, Specifications of EMI, Grounding and Shielding techniques applicable in the Industry.	
CourseOutcomes: At theend ofthe course, thestudent will be ableto	
CO1	Understanding of EMI Environment.
CO2	Know the Specifications, Standards, Limits of EMI.
CO3	Know the Grounding principles and Bonding guidelines.
CO4	Understanding the theory of Shielding, Need of Gaskets and their properties, Basic Filter Component Characteristics and guidelines.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	**3**	2	3	1	2	-	3	2	3	-
CO3	3	3	3	-	3	1	-	-	3	-	3	-
CO3	3	2	-	2	2	1	1	-	1	2	1	-
CO4	3	3	-	3	-	1	1	-	3	-	3	-

ELE-403 (c) EMI & EMC

Unit-I: EMI Environment

Sources of EMI, conducted and radiated EMI, Transient EMI, EMI – EMC definitions and unit parameters. EMI Coupling Principles conducted Radiated and Transient Coupling, Common impedance Ground Coupling, Radiated Common Mode and Ground loop coupling, Radiated Differential mode coupling, near field cable to cable to coupling, Power mains and power supply coupling.

Unit-II: EMI Specification / Standards / Limits

Units of specification, Civilian standards, Military standards. EMI Measurement Open area test site (OATS) – OATS measurements – Measurement of RE, RS, and Test site – Antennas – Measurement precautions – TEM cell – Measurements using TEM cell – Reverberating chamber.

Unit-III: Grounding Technique and Bonding

Grounding Principles – Precautions – Measurement of ground resistance – System grounding for EMC – Single-Point, Multi-Point and Hybrid Grounds, Bonding Shape and material for bond strap – Guidelines for good bonds.

Unit-IV: Shielding and Electrical Gaskets and Filtering

Transmission Line Theory of Shielding, Absorption Loss, Reflection Loss, Shielding Effectiveness, Shielding Materials, Apertures in Shielded Walls, Waveguide below Cut-off, The Need for Gaskets, Common Gaskets Material Use, Properties and Characteristics of RF Gaskets, Common-Mode and Differential-Mode Filtering, Basic Filter Component Characteristics, Filtering Guidelines.

Books for Study

1. Henry W. Ott, Noise Reduction Techniques in Electronic System.
2. V.P. Kodali, Engineering EMC Principles, Measurements and Technologies.
   Bernhard Keiser, Principles of Electromagnetic Compatibility.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
FOURTH SEMESTER
Branch - Electronics
Paper 3- ELE-403(c): EMI & EMC

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. What are the sources of EMI ?
2. Write a short note on near field cable to cable coupling.
3. What are the Military Standards of EMI ?
4. Write a short note on Reverberating Chamber.
5. What are the grounding principles ?
6. Write a short note on material bond strap.
7. What are the basic filter component Characteristics?
8. What are the filtering guidelines ?

SECTION -B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Discuss on EMI Coupling Principles.

   (or)

   (b) Explain the radiated common mode and radiated differential mode couplings.

10. (a) Discuss the open area test site (OATS) measurements.

    (Or)

    (b)What is Antenna ? Explain the measurement precautions.

11. (a) Discuss the measurement og ground resistance.

    (Or)

    (b) Explain the guidelines for good bonds.

12. (a) Explain the Transmission line theory of Shielding.

(Or)

(b) What is the importance of Gaskets ?Explain the properties and characteristics of RF Gaskets.

ELE-405	Internet of Things	L-3,T-1,P-0	4Credits

Pre-requisite: Understandingof graduatelevel electronics/computer science

Course Objectives: The aim and objective of the course on **Internet of Things** is to familiarize the M.Sc. students with the basics and Characteristics of IoT, IoT development boards, Wireless Technologies, data handling and analysis, Applications of IoT.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understanding of the basics and Characteristics of IoT, IoT development boards.
CO2	Know the Wireless Technologies.
CO3	Know the data handling and analysis of the data.
CO4	The use of IoT for Automation, Management, Logistics, Agriculture, Health and Lifestyle, Industry.

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	2	1	2	-	2	-	-	-
CO2	3	2	1	2	2	2	2	-	2	-	1	2
CO3	3	2	1	2	1	2	2	-	2	-	-	2
CO4	3	3	1	2	2	2	2	-	2	-	1	-

ELE- 405: INTERNET OF THINGS

UNIT-I

Definitions & Characteristics of IoT, IoTArchitectures,Physical & Logical Design of IoT, Enabling Technologies in IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT frameworks, IoT and M2M.

IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, WirelessSensorsNetworks : The node, Connecting nodes, Networking Nodes, WSN and IoT.

UNIT- II

Wireless Technologies For IoT : WPAN Technologies for Iot : IEEE 802.15.4 , Zigbee , HART , NFC,Z –Wave, BLE , Bacnet, Modbus. IP Based Protocols For Iot : IPv6,6LowPAN,RPL,REST,AMPQ,CoAP, MQTT.Edge connectivity and protocols.

UNIT- III

Date Handling & Analytics: Introduction, Bigdata, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop. Introduction to data Analytics, Types of Data analytics, Local Analytics, Cloud analytics and applications, Edge/Fog Computing

UNIT- IV

Applications of IoT:Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

Books for Study

1. Olivier Hersent, David Boswarthick, and Omar Elloumi, “The Internet of Things:Key Applications and Protocols” WileyPublications.
2. VijayaMadisetti and ArshdeepBahga, “Internet of Things (A Hands – on Approach)” 1st Edition, VPT,2014.
3. Daniel Minoli, “Building the Internet of Things with IPV6 and MIPv6: The Evolving World of M2M Communications” ISBN: 978 -1 -118 -47347 -4, Willy Publications.
4. Pethuru Raj and Anupama C. Raman, “Internet of Things: Enabling Technologies, Platforms, and Use Cases” CRC Press.

Model Question Paper

M.Sc. DEGREE EXAMINATION - APRIL/DECEMBER
FOURTH SEMESTER
Branch - Electronics
Paper 3- ELE-405: INTERNET OF THINGS

(Under NEP w.e.f.2021-2022)

Time: 3 hours Max Marks: 80

SECTION -A

Answer any FOUR questions. Each question carries 5 Marks. (Marks: 4 x 5 = 20)

1. What are the characteristics of IOT?
2. Write a short note on Arduino IDE.
3. What is Zigbee ? Explain.
4. Write a note on Edge protocols.
5. What are the characteristics of Big data ?
6. Write a Short note on Edge/Fog Computing
7. What is the IOT design Ethics ?
8. Write a short note on Industrial IOT.

SECTION –B

Answer ALL questions. Each question carries 15 Marks. (Marks: 4 x 15 =60)

9. (a) Describe the IOT Architecture.

(or)

(b) Discuss RFID Principles and Components.

10. (a) Discuss on WPAN Technologies for IOT.

(or)

(b) Explain the IP based protocols for IOT.

11. (a) Discuss on Data Handling Technologies.

(or)

(b) What are the types of data analytics? Discuss.

12. (a) What are the applications of IOT? Explain.

(or)

(b) Discuss on IOT in Environmental Protection.

ELE-406(a)	**Embedded Systems with PIC Microcontrollers**	**L-3,T-1,P-2**	**4Credits**
Pre-requisite: Understandingof graduatelevel microprocessors.			
Course Objectives: The aim and objective of the course on **Embedded Systems with PIC Microcontrollers**is thestudentsofM.Sc.toequipthemwiththeknowledgeof microcontrollers and other processors used in the industry.			
CourseOutcomes: At theend ofthecourse, thestudent willbe ableto			
CO1	understand about the basic functions and structure of embedded systems		

CO2	Get familiarized with Embedded system Design Tools and Hardware
CO3	understand about the basic programming concepts of embedded systems
CO4	know about the applications of PIC microcontrollers

Mappingof courseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	2	1	-	-	2	1	1	-
CO2	3	2	3	3	2	1	2	-	2	-	1	-
CO3	3	2	3	3	2	-	-	-	2	1	1	-
CO4	3	2	3	3	2	1	2	-	2	1	1	-

ELE-406(a): EMBEDDED SYSTEMS WITH PIC MICROCONTROLLERS

Unit - I: Introduction to Embedded Systems

Embedded systems in today's world – examples of Embedded systems – Microprocessors and Microcontrollers – Microchip and PIC microcontroller – Introduction to PIC microcontrollers using the 12 series.

Architecture of 16F84A – Memory organization – in 16F84A – Timing generation – Power-up and Reset functions in 16F84A.

Unit - II: Hardware Details of 16F84A

Parallel ports: Basic idea – Technical challenge – connecting to the parallel port – Parallel ports of PIC16F84A – Clock oscillator – Power supply – Interrupts – Timers and counters – watch dog timer – Sleep mode.

Unit - III: Assembler and Assembler Programs

Basic idea – PIC 16 series instruction set and ALU – Assemblers and Assembler format – creating simple programs – Adopting a development environment – Building structured programs – Flow control: Branching and Subroutines – Generating time delays and intervals – Logical instruction – Arithmetic instructions.

Unit - IV: PIC Microcontroller PIC 16F873A

Block diagram and CPU – Memory and memory maps – Interrupts – Oscillator, Reset and Power supply – Parallel ports.

PIC 16F87XA Timer 0 and Timer 1 – 16F87XA Timer 2, Comparator and PR2 register – capture/Compare/PWM (CCP) Module – Pulse width modulation – ADC module.

Interface: LED displays – Liquid crystal displays –Sensors –Actuators.

Books for Study

1. Tim Wilmshurst, Designing Embedded Systems with PIC Microcontrollers: Principles and Applications, First Edition, Newnes – Elsevier Publishers, 2007.

2. Ramesh Gaonkar, Fundamentals of Microcontrollers and applications in Embedded Systems, Penram International Publishing (India) Pvt. Ltd., 2007.

3. Ajay V. Deshmukh, Microcontrollers: Theory and Applications, Tata Mc Graw- Hill, New Delhi, 2005.

4. John B. Peatman,Designing with PIC Microcontrollers , Pearson EducationInc.,1998.

5. Mahammad Ali Mazidi and Janice GillispieMazidi, The 8051 Microcontroller and Embedded systems, Pearson Education Asia, Pvt. Ltd., 2000.

Model Question Paper

M.Sc DEGREE EXAMINATION APRIL/DECEMBER

Branch-ELECTRONICS

Paper 4-ELE-406(a): EMBEDDED SYSTEMS WITH PIC MICROCONTROLLERS

(Under NEP w.e.f.2021-2022)

Time: 3 Hours Max. Marks : 80

SECTION – A

Answer any four questions. Each question carries 5 marks. (Marks: **4 × 5=20**)

1. Mention the difference between Microcontrollers and Microprocessors.
2. Write a note on concept of PIPELINED in instructions execution of PIC 16F84A.
3. Discuss the Option Register in 16F84A PIC microcontroller.
4. Discuss the concept of Sleep Mode in 16F84A PIC microcontroller
5. What is an assembler? Discuss the assembler format.
6. What are the main ideas of computer programming?
7. Write about the registers file structure of a PIC16F873 A microcontroller.
8. List various I/O ports available in 16F873 A and Explain briefly.

SECTION – B

Answer any **FOUR** questions. Each question carries 15 marks. (Marks: **4 × 15=60**)

9. (a) Draw the internal architecture of PIC 16F84A microcontroller and explain its working briefly.

(or)

(b) Discuss the memory organization in PIC 16F84A microcontroller.

10. (a) Discuss the Parallel Ports in PIC 16F84A microcontroller.

(or)

(b) Discuss the Timer 0 module of PIC 16F84A microcontroller.

11. (a) Draw the block diagram of PIC 16 series ALU. Explain.

(or)

(b) Explain how building structured programs can be constructed.

12. (a) Draw and explain the architecture of PIC 16F873 A microcontroller.

(or)

(b) Write a detailed note on the memory organization of PIC 16F873 A.

ELE-406 (b)	**Microwaves**	**L-3,T-1,P-2**	**4Credits**

Pre-requisite Graduate level coursein Electronics/Physics

Course Objectives: The main objective of the course on **Microwaves** is to introduce the basics of Electromagnetic Theory, Transmission Line theory, waveguides and Antennas.The students also exposed to various industrial applications of Microwaves.

CourseOutcomes: At theend ofthe course, thestudent willbe ableto

CO1	Understanding of Electromagnetic Theory
CO2	Understanding of Transmission line theory
CO3	Know different types of Waveguides.
CO4	Use of various types of antennas.

Mappingofcourseoutcomeswiththeprogramoutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	3	-	2	-	3	1	-	-
CO3	2	3	3	3	3	1	-	-	3	2	-	-
CO3	2	2	2	2	2	-	1	-	1	1	-	-
CO4	3	3	3	3	3	-	-	-	3	3	-	-

ELE-406(b): MICROWAVES

UNIT – I: Electromagnetic Theory

Maxwell's equations, Fields in media and boundary conditions, the wave equation and the basic plane wave solutions, General plane wave solutions, Energy and power, Plane wave reflection from media interface, Oblique incidence at a dielectric interface, The reciprocity theorem, Image theory, Uniqueness theorem.

UNIT – II: Transmission Line theory

The lumped element circuit model for a transmission line, Field analysis of transmission lines, Terminated lossless line, Smith chart, Quarter wave transformer, Generator and load mismatches, Lossy transmission lines.

UNIT –III: Transmission lines and waveguides

General solutions for TEM, TE and TM waves, Parallel plate waveguide, Rectangular waveguide, circular waveguide, Co-axial line, Surface waves on a grounded dielectric slab, Strip line, Microstrip. Matching with lumped elements, Single stub tuning, Double stub tuning, The quarter wave transformer, Theory of small reflections, Binomial multisection matching transformers.

UNIT – IV: Antennas

Types of antennas, Hertz and Marconi antennas, Yagi-Uda antenna, Rhombus antenna, Reflector antenna, Lens antenna, Horn antenna, Helical antenna, Log periodic antenna, Phased array antenna, Microstrip antenna.

Books for Study:

1. David M. Pozar, "Microwave Engineering", 2/e, John Wiley & Sons (Asia) Pte. Ltd, 1999.
2. A.K. Maini, "Microwaves and Radar: Principles and Applications", 2/e, Khanna Publishers, 2001.
3. M. Kulkarni, "Microwave and Radar Engineering", Umesh Publications, 3/e, 2003.
4. Samuel Y. Liao, "Microwave Devices and Circuits", 3/e, PHI, 1998.
5. Wayne Tomasi, "Electronic Communication Systems: Fundamentals through Advanced", 4/e, Pearson Education, Inc., 2001.
6. Gary M. Miller and Jeffrey S. Beasley, "Modern Electronic Communication", 7/e, PHI, 2003.

Model Question Paper

M.Sc DEGREE EXAMINATION APRIL/DECEMBER

Branch-ELECTRONICS

Paper 4- ELE-406(b): MICROWAVES

(Under NEP w.e.f.2021-2022)

Time: 3 Hours **Max. Marks : 80**

SECTION – A

Answer any four questions. Each question carries 5 marks. (Marks: **4 × 5=20**)

1. What are the Maxwell's equations ?

2. Write a note on Image theory.

3. What is Smith chart ?

4. What are Lossy transmission lines ?

5. What is Microstrip ?

6. Distinguish between Rectangular waveguideand circular waveguide.

7. Write about quarter wave transformer.

8. What are the Types of antennas ?

SECTION – B

Answer any **FOUR** questions. Each question carries 15 marks. (Marks: **4 × 15=60**)

9. (a) Write the wave equation and discuss the basic plane wave solutions.

(or)

(b) Discuss on (i)The reciprocity theorem (ii) Uniqueness theorem.

10. (a) Explain the lumped element circuit model for a transmission line.

(or)

(b) What is Generator ?Discusson load mismatches.

11. (a) Discuss the Surface waves on a grounded dielectric slab.

(or)

(b) Discuss the General solutions for TEM and TM waves.

12. (a) Discuss the working of Traveling Wave Tubes (TWT) and write it's applications.

(or)

(b) What is antenna ? Describe the Helical antenna and it's working.