M.Sc. Electronics (Course Structure)

M.Sc. Electronics: **4 Semester (2 Year Program)**

Semester-I			
Subject Code	**Subject**	**Credit**	**Marks**
CC-11	Analog and Digital Circuit Design	6	100
CC-12	Sensor and Transducers	6	100
PC-11	Lab 1: Analog and Digital Circuits	4	100
PC-12	Lab 2: Sensor and Transducers	4	100
	Internship/ Apprenticeship/ Seminar	2	100
Semester-II			
CC-21	Operational Amplifier and Linear Integrated Circuits	6	100
CC-22	Data Communication and Networking	6	100
PC-21	Lab 1: Operational Amplifier	4	100
PC-22	Lab 2: Data Communication	4	100
	VAC (EESC)	2	100
	Option-I (Only Course Work)		
Semester-III			
CC-31	Optical Fiber Communication System	6	100
CC-32	Embedded System and Applications	6	100
PC-31	Lab 1: Optical Fiber Communication System	4	100
PC-32	Lab 2: Embedded System	4	100
	Internship/ Apprenticeship/ Seminar	2	100
Semester-IV			
CC-41	Control System	6	100
CC-42	Programming with C & C++	6	100
PC-41	Lab 1: Minor Project	4	100
PC-42	Lab 2: C Programming	4	100
	VAC (EESC)	2	100

M.Sc. Electronics (Course Structure)

M.Sc. Electronics: **4 Semester (2 Year Program)**

Semester-I			
Subject Code	**Subject**	**Credit**	**Marks**
CC-11	Analog and Digital Circuit Design	6	100
CC-12	Sensor and Transducers	6	100
PC-11	Lab 1: Analog and Digital Circuits	4	100
PC-12	Lab 2: Sensor and Transducers	4	100
	Internship/ Apprenticeship/ Seminar	2	100
Semester-II			
CC-21	Operational Amplifier and Linear Integrated Circuits	6	100
CC-22	Data Communication and Networking	6	100
PC-21	Lab 1: Operational Amplifier	4	100
PC-22	Lab 2: Data Communication	4	100
	VAC (EESC)	2	100
Option-II (Course Work Research Work)			
Semester-III			
CC-31	Optical Fiber Communication System	6	100
CC-32	Embedded System and Applications	6	100
PC-31	Lab 1: Optical Fiber Communication System	4	100
PC-32	Lab 2: Embedded System	4	100
	Internship/ Apprenticeship/ Seminar	2	100
Semester-IV			
	Research Thesis/ Project/Patent	22	100

M.Sc. Electronics (Course Structure)

M.Sc. Electronics: **4 Semester (2 Year Program)**

Semester-I			
Subject Code	**Subject**	**Credit**	**Marks**
CC-11	Analog and Digital Circuit Design	6	100
CC-12	Sensor and Transducers	6	100
PC-11	Lab 1: Analog and Digital Circuits	4	100
PC-12	Lab 2: Sensor and Transducers	4	100
	Internship/ Apprenticeship/ Seminar	2	100
Semester-II			
CC-21	Operational Amplifier and Linear Integrated Circuits	6	100
CC-22	Data Communication and Networking	6	100
PC-21	Lab 1: Operational Amplifier	4	100
PC-22	Lab 2: Data Communication	4	100
	VAC (EESC)	2	100
Option-III (Only Research Work)			
Semester-III			
	Research Thesis/ Project/Patent	22	100
Semester-IV			
	Research Thesis/ Project/Patent	22	100

Part A Introduction				
Program:PG		**Class : M.Sc.**	**Year: II (IIISEM.)**	**Session: 2025-26**
Subject: ELECTRONICS				
1	**Course Code**	CC31		
2	**Course Title**	**Optical Fiber Communication System (Paper-I)**		
3	**Course Type (Core Course/ Discipline Specific Elective/)**	**Core Course**		
4	**Pre-requisite (if any)**	**To study this course a student must have a Bachelor's degree with Electronics/ Physics as major or minor subject.**		
5	**Course Learning outcomes (CLO)**	**On successful completion of this course, the students will be able to:** **1. Understand the history and phenomenon of light transmission through optical Fiber.** **2. Explain the process of fabrication of optical cable.** **3. Describe basic principle of optical sources and detectors.** **4. Elucidate different types of joints, splicing techniques used.** **5. Demonstrate optical Fiber communication link**		
6	**Credit Value**	**6**		
7	**Total Marks**	Max. Marks: 40+60=100	Min. Passing Marks:16+24=40	

Part B- Content of the Course

Total No. of Lectures-Tutorials-Practical (in hours per week): 6 Lectures (in hours per week)

Unit	Topics	No. of Lectures (1 Hour Each)
I	Scientific contribution of Narendra Singh Kapany in the field of fiber optics, Contribution of C V Raman in development of LASER technology. Optical Fiber, types of optical fibre, Propagation of light in optical Fiber, basic structure and optical path of an Optical Fiber, Acceptance Angle, Numerical Aperture, Modes of Propagation, Attenuation in Optical Fiber, Absorption losses, Bending Losses, Radiation Losses, Pulse Dispersion, Materials Dispersion. **Activities:** 1. Prepare a chart describing fiber optic communication system. 2. Interconnect components in a fiber optic communication system and provide a tabulated summary of their specifications.	**18**
II	Fabrication of Optical Fiber cable: Preform fabrication, Fiber drawing, Fiber coating, spooling. Methods for Fiber fabrication, Outside Vapour Phase Oxidation, Vapour Phase Axial Deposition, Double crucible method, Modified Chemical Vapour deposition.	**18**

	Activities: 1. Students should prepare presentation on different methods of optical fiber fabrication. 2. Group Discussion on pros and cons of using optical fiber.	
III	Fiber sources and detectors: Light Emitting Diode (LED) as a source, Surface emitting and Edge emitting LED. LASER diode as optical source, Semiconductor diode LASER: Working, Construction, Photo diode, PIN Diode, photo transistor. **Activities:** 1. Construct a circuit using LED as transmitter and LDR as receiver and optical fiber as transmission medium. 2. Conduct a quick quiz with conceptual MCQs related to optical fiber.	**18**
IV	Optical fiber cable, fiber joints, splices, couplers and connectors, measurement in optical fibers, attenuation measurement, dispersion measurement, refractive index profile measurement. **Activities:** **1.** Organize Extempore on topics: Total internal reflection, types of optical fiber, optical sources, optical detectors. **2.** Prepare a question bank on numerical related to optical fiber,	**18**
V	Optical Fiber Communication System, transmission links, optical transmitters, repeaters and receivers. Analog links: Introduction, overview of analog links, CNR, multichannel transmission techniques, Digital links: Introduction, point–to–point links, System considerations. **Activities:** **1.** Ask students to draw a concept map including light propagation, attenuation, total internal reflection. **2.** Prepare a chart comparing optical fiber with other communication media.	**18**
Keywords/Tags: Numerical Aperture, Fabrication, LASER, Splicing, Communication.		

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. The Man Who Bent Light: Father of Fiber Optics: Father of Fiber Optics, Narinder Singh Kapany, Roli Books**.**
2. CV Raman. an illustrated story of a life, Dr. Tanu Shree Singh, DK Publishing Pvt Ltd.
3. Optical Fiber Communication: B. Keiser, MacGraw Hill.
4. Fiber Optics and LASER: A.K. Ghatak & Tyagarajan, Infinity Press.
5. Fiber Optic Communication: D. C. Agrawal, A. H. Wheeler Co.
6. Fiber Optic Communication Systems: Govind P. Agrawal, Wiley.

Suggested equivalent online courses:
https://onlinecourses.nptel.ac.in/noc20_ee79/preview
https://www.coursera.org/articles/what-is-fiber-optic
https://www.classcentral.com/subject/fiber-optics
https://www.classcentral.com/course/swayam-fundamentals-of-optical-fiber-technology-6697

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks : 100
Continuous Comprehensive Evaluation (CCE) :40 Marks University Exam (UE): 60 Marks

Internal Assessment : Continuous Comprehensive Evaluation (CCE):**40**	Class Test Assignment/Presentation	**20** **20**
External Assessment : University Exam Section:**60** Time : **03:00 Hours**	**Section(A)** : Very Short Questions **Section (B) :** Short Questions **Section (C) :** Long Questions	**5X1=5** **5X4=20** **5X7=35** **Total=60**

Any remarks/ suggestions:

Part A Introduction				
Program:PG		**Class : M.Sc.**	**Year: II (IIISEM.)**	**Session: 2025-26**
Subject: ELECTRONICS				
1	**Course Code**	CC32		
2	**Course Title**	**Embedded System and Applications (Paper-II)**		
3	**Course Type (Core Course/ Discipline Specific Elective/)**	**Core Course**		
4	**Pre-requisite (if any)**	**To study this course a student must have a Bachelor's degree with Electronics/ Physics as major or minor subject.**		
5	**Course Learning outcomes (CLO)**	**On successful completion of this course, the students will be able to:** **1. Acquire knowledge about India's microprocessor different hardware's used in embedded system.** **2. Demonstrate 8051 microcontroller and its interfacing.** **3. Compare different types of 16-bit microcontrollers with their uses.** **4. Explain PIC microcontroller with its timer operation.** **5. Describe Programmable logic controller with its programming techniques.**		
6	**Credit Value**	**6**		
7	**Total Marks**	Max. Marks: 40+60=100	Min. Passing Marks:16+24=40	

Part B- Content of the Course

Total No. of Lectures-Tutorials-Practical (in hours per week): 6 Lectures (in hours per week)

Unit	Topics	No. of Lectures (1 Hour Each)
I	Contribution of Scientist Arpan Pal in development of embedded system. Role of Scientist Raj Reddy in the field of AI in India. Introduction to Embedded Systems: Overview of Embedded Systems, Features, Requirements and Applications, Recent Trends in the Embedded System Design, Common architectures for the Embedded System Design, Embedded Software design issues. Introduction to microcontrollers, Overview of Harvard architecture and Von Neumann architecture, RISC and CISC microcontrollers. **Activities:** 1. Use Arduino and construct a working model. 2. Prepare a chart displaying Architecture diagram of Shakti Microprocessor.	**18**
II	Introduction: 8051 architectures, features of 8051, basic assembly language programming concepts, instruction set, data transfer, logical operations, arithmetic operations, jump/call instructions, interrupt handler, addressing modes. Serial Peripheral Interface (SPI), Inter-Integrated Circuit (I2C), serial communication with other	**18**

	microcontrollers/devices using I2C, SPI, RS232 and USB. **Activities:** 1. Prepare a chart illustrating PIN diagram of 8051 Microcontroller. 2. Compare all interfacing devices like I2C, SPI, USB.	
III	Other Microcontrollers: Introduction to 16-bit micro-controllers, ATMEGA, PIC and ARM processors: General architecture and their limitations, clocking unit, Real Time Clock and Timers, Reset Circuitry and Watchdog Timer. **Activities:** 1. Open quiz on PIC and ARM microcontroller. 2. Peer Teaching: topics can be selected from any unit and should take a class for peer group.	**18**
IV	PIC16F887 Microcontroller: Core features, Architecture, pin diagram, memory organization- Program and data memory organization, I/O Ports, oscillator module, Timer modules (Timer 0, Timer 1 and Timer 2), comparator module, analog-to-digital converter (ADC) module, data EEPROM, Enhanced capture/compare/PWM module, EUSART, master synchronous serial port (MSSP) module, special features of the CPU, interrupts, addressing modes, instruction set. **Activities:** 1. Write a simple assembly language program to add 8-bit numbers. 2. Organise a group discussion on 8 bit and 16-bit microcontrollers.	**18**
V	Programmable Logic Controller: Basic functions of PLC, advantages over microcontroller, basic architecture, register basics, timer functions, counter function, ladder diagram, overview of PLC systems. **Activities:** 1. Solve a simple problem using Ladder logic Programming. 2. Draw architectural diagram of PLC.	**18**
Keywords/Tags: Embedded System, 8051, ARM processor, PIC microcontroller, PLC.		

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. The SHAKTI-Man of India, *Mohit Pandey, Aim.*

2. Embedded Systems: A Journey with Arpan Pal, TCS Research's Distinguished Chief Scientist,

IEEE Computer Society.
3. Embedded System Design, Santanu Chattopadhyay, PHI Learning Pvt. Ltd.
4. The 8051 microcontrollers: Kenneth Ayala, Thomson Delmar Learning, New Delhi
5. Embedded System Design: F. Vahid & T. Gargivis, John Wiley and Sons
6. PIC Microcontroller and Embedded Systems: Using assembly and C: Muhammad Ali Mazidi,
7. PIC Microcontrollers, Milan Verle, mikro Elektronika

Suggested equivalent online courses:
https://www.coursera.org/learn/embedded-systems-using-c
https://onlinecourses.nptel.ac.in/noc25_cs41/preview
https://eicta.iitk.ac.in/product/embedded-system-course/
https://www.udemy.com/course/mastering-microcontroller-with-peripheral-driver-development
https://www.coursera.org/specializations/real-time-embedded-systems

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks : 100
Continuous Comprehensive Evaluation (CCE) :40 Marks University Exam (UE): 60 Marks

Internal Assessment : Continuous Comprehensive Evaluation (CCE):**40**	Class Test Assignment/Presentation	**20** **20**
External Assessment : University Exam Section:**60** Time : **03:00 Hours**	**Section(A)** : Very Short Questions **Section (B) :** Short Questions **Section (C) :** Long Questions	**5X1=5** **5X4=20** **5X7=35** **Total=60**

Any remarks/ suggestions:

Part A Introduction				
Program: PG 2 Year		**Class: M.Sc.**	**Year: II (III Sem.)**	**Session: 2025-26**
Subject: Electronics				
1	**Course Code**	PC31		
2	**Course Title**	**Optical Fiber Communication System (Lab-I)**		
3	**Course Type (Core Course/ Discipline Specific Elective/)**	**Practical Course**		
4	**Pre-requisite (if any)**	**-**		
5	**Course Learning outcomes (CLO)**	**On successful completion of this course, the students will be able to:** **1. Recognize the components and related experiment and accessories like CRO, signal generator required to perform the experiment.** **2. Perform experiments for understanding how light propagates through optical fiber.** **3. Understand how electrical signal is converted into digital.** **4. Measure Numerical Aperture of optical fiber.** **5. Prepare Laboratory Record of all the experiments performed.**		
6	**Credit Value**	**4**		
7	**Total Marks**	Max. Marks: 40+60=100	Min. Passing Marks:16+24=40	

Part B- Content of the Course

Total No. of Lectures-Tutorials-Practical (in hours per week): 2 hours per credit per week
L-T-P: 120 Hrs

Lab Experiments 1. Design and study of Fiber optic Analog/ Digital Link. 2. Study of Propagation Delay. 3. Measurement of propagation loss in optical fiber using optical power meter. 4. Study of Rise time and fall time distortions. 5. Study of bending loss in optical fiber. 6. Measurement of Numerical Aperture of optical fiber. 7. To obtain intensity modulation of analog signal using fiber optic cable. 8. Measurement of optical power using optical power meter. 9. Study of characteristic of E-O converter using optical power meter.	**120 Hrs**

Keywords/Tags:

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. **Optical Fiber Communications: Principles and Applications, T. L. Singal, Cambridge University Press.**
2. **Fiber Optic Communications, Joseph C. Palais, Pearson.**
3. **Optical Fiber Communication, P Chakrabarti, MacGraw Hill.**

Suggested equivalent online courses:

https://oc-iitr.vlabs.ac.in/
https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement/
https://vlab.amrita.edu/index.php?sub=59&brch=269&sim=1372&cnt=3055

Part D-Assessment and Evaluation

Suggested continuous Evaluation Methods:

Internal Assessment (A):	**40 Marks**
Lab Record/ Class Interaction/ Quiz	**15**
Attendance in the Lab.	**10**
Assignments (Technology Dissemination (e.g. training of common online citizen services or software tools to elderly persons/ Industrial Training (10 hours)/ mini project (including coding + project + demo + report))	**15**
External Assessment	**60 Marks**
Viva Voce Practical	**30**
Experiments	**30**
Total Marks (A+B)	**100 Marks**
Any remarks/ suggestions:	

Part A Introduction				
Program: PG 2 Year		**Class: M.Sc.**	**Year: II (III Sem.)**	**Session: 2025-26**
Subject: Electronics				
1	**Course Code**	PC32		
2	**Course Title**	**Embedded System (Lab-II)**		
3	**Course Type (Core Course/ Discipline Specific Elective/)**	**Practical Course**		
4	**Pre-requisite (if any)**	**-**		
5	**Course Learning outcomes (CLO)**	**On successful completion of this course, the students will be able to:** **1. Recognize the components and related experiment and accessories like CRO, signal generator required to perform the experiment.** **2. Acquire knowledge about fundamentals of microcontrollers and its operation** **3. Interface different input output devices with microcontroller.** **4. Develop Programming skills in embedded systems for various applications.** **5. Prepare Laboratory Record of all the experiments performed.**		
6	**Credit Value**	**4**		
7	**Total Marks**	Max. Marks: 40+60=100	Min. Passing Marks:16+24=40	

Part B- Content of the Course

Total No. of Lectures-Tutorials-Practical (in hours per week):2 hours per credit per week
L-T-P: 120 Hrs

Lab Experiments	
1. Study of Reset current using CRO on circuit Modifier. 2. Study of clock period on circuit modifier. 3. To generate square wave on LED pin j3 connector. 4. Write routine to display “Hello World” on LCD. 5. To study Light Sensor and its application as event counter. 6. To study scanning technique to scan key board matrix, seven segment display/ LED matrix. 7. Write a Program for displaying ANSHUMAN on 8-digit seven segment.	**120 Hrs**

Keywords/Tags:

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. **Embedded System Design Practical Approach Using Atmega 168pb Microcontroller, Abhiruchi Passi Umesh Dutta, Vikas Sharma, Evincepub Publishing.**
2. **Practical Aspects of Embedded System Design using Microcontrollers, Parab, Springer.**
3. **Programming Embedded Systems in C and C++, M Barr, O' Reilly.**

Suggested equivalent online courses:

http://vlabs.iitkgp.ac.in/rtes/
https://esd-coep.vlabs.ac.in/Objective.html
http://vlabs.iitkgp.ernet.in/rtes/index.html

Part D-Assessment and Evaluation

Suggested continuous Evaluation Methods:

Internal Assessment (A):	**40 Marks**
Lab Record/ Class Interaction/ Quiz	**15**
Attendance in the Lab.	**10**
Assignments (Technology Dissemination (e.g. training of common online citizen services or software tools to elderly persons/ Industrial Training (10 hours)/ mini project (including coding + project + demo + report))	**15**
External Assessment	**60 Marks**
Viva Voce Practical	**30**
Experiments	**30**
Total Marks (A+B)	**100 Marks**
Any remarks/ suggestions:	

Part A Introduction				
Program:PG		**Class : M.Sc.**	**Year: II (IV SEM.)**	**Session: 2025-26**
Subject: ELECTRONICS				
1	**Course Code**	CC41		
2	**Course Title**	**Control System (Paper-I)**		
3	**Course Type (Core Course/ Discipline Specific Elective/)**	**Core Course**		
4	**Pre-requisite (if any)**	**To study this course a student must have a Bachelor's degree with Electronics/ Physics as major or minor subject.**		
5	**Course Learning outcomes (CLO)**	**On successful completion of this course, the students will be able to:** **1. Understand the basic principle of Control system with examples and contribution of scientists.** **2. Perform time response analysis of first and second order control system.** **3. Describe the concept of stability of a system and determine whether system is stable or not.** **4. Draw the root locus plot to analyse closed loop system.** **5. Explain the concept of bode plot and find frequency dependent stability of a system.**		
6	**Credit Value**	**6**		
7	**Total Marks**	Max. Marks: 40+60=100	Min. Passing Marks:16+24=40	

Part B- Content of the Course

Total No. of Lectures-Tutorials-Practical (in hours per week): 6 Lectures (in hours per week)

Unit	Topics	No. of Lectures (1 Hour Each)
I	Contribution of Dr. APJ Abdul Kalam in development of control system for missiles, contribution of Dr. K. Kasturi Rangan in development of control system for satellites and launch vehicles. Concepts of Control System, open and closed loop control system, examples of control system, feedback characteristics, servomechanism, block diagram algebra, transfer function, signal flow graph. **Activities:** 1. Construct a Bode plot to find stability of a system. 2. Prepare a poster of PI, PD, PID controllers.	**18**
II	Time Response Analysis: Time Response of First-Order System, Time Response of Second- Order System, Steady-state Errors and Error Constants, effect of adding zero to a system, design specification of second order systems, design consideration for higher order system, performance indices and robotic control system.	**18**

	Activities: 1. Organise a debate on stable system and marginally stable/ unstable system. 2. Class teaching: Students should select topic of choice from all units and take a class for peer group.	
III	Concept of the stability and algebraic criteria: The concept of stability, Necessary conditions for stability, Hurwitz Stability Criterion, Routh Stability Criterion, Relative Stability Analysis, More on the Routh Stability Criterion. **Activities:** 1. Solve numerical related on stability of a system using routh stability criterion. 2. Prepare a presentation on time and frequency response analysis of stability of a control system.	**18**
IV	The Root Locus Technique: The Root Locus Concept, Construction Root Loci, Root Contours, system with transportation lag, sensitivity of the roots of the characteristic equation. **Activities:** 1. Visit to an Electronic industry/ Research Laboratory (if possible)/ Prepare a poster to illustrate combinational / sequential circuit. 2. Group Discussion on topics related to control system.	**18**
V	Frequency Response Analysis: Introduction, correlation between time and frequency response, Polar plots, Bode plots, All pass and minimum phase systems, Log magnitude versus Phase plots. Nyquist Stability Criterion. **Activities:** 1. Give list of different types of control system like electric kettle, washing machine and ask students to differentiate whether it is open loop or closed loop system. 2. Student should create a visual map on topics: signal flow graph.	**18**
Keywords/Tags: Control system, time response, stability, root locus, Bode plot.		

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Missile man of India: Dr. APJ Abdul Kalam, Mayur Jethva, Kindle Edition
2. Space and Beyond: Professional Voyage of K. Kasturirangan, B. N. Suresh, Springer Verlag, Singapore.
3. Linear Control Systems: B. S. Manke, Khanna publishers.

4. Control System Engineering: I. J. Nagrath & M. Gopal, New Age International Publishers.
5. Introduction to Control system: Arun K. Ghosh, Rumi Ghosh, PHI Learning.
6. Control Systems Engineering: Norman S. Nise, EMEA Edition.

Suggested equivalent online courses:
https://www.udemy.com/course/control-systems-engineering-from-scratch
https://www.coursera.org/learn/modeling-feedback-systems
https://onlinecourses.nptel.ac.in/noc19_de04/preview
https://www.classcentral.com/subject/control-systems

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks : 100
Continuous Comprehensive Evaluation (CCE) :40 Marks University Exam (UE): 60 Marks

Internal Assessment : Continuous Comprehensive Evaluation (CCE):**40**	Class Test Assignment/Presentation	**20** **20**
External Assessment : University Exam Section:**60** Time : **03:00 Hours**	**Section(A)** : Very Short Questions **Section (B) :** Short Questions **Section (C) :** Long Questions	**5X1=5** **5X4=20** **5X7=35** **Total=60**

Any remarks/ suggestions:

Part A Introduction				
Program: PG 2 Year		**Class: M.Sc.**	**Year: II (IV SEM.)**	**Session: 2025-26**
Subject: ELECTRONICS				
1	**Course Code**	CC42		
2	**Course Title**	**Programming with C & C++ (Paper-II)**		
3	**Course Type (Core Course/ Discipline Specific Elective/)**	**Core Course**		
4	**Pre-requisite (if any)**	**To study this course a student must have a Bachelor's degree with Electronics/ Physics as major or minor subject.**		
5	**Course Learning outcomes (CLO)**	**On successful completion of this course, the students will be able to:** **1. Understand basic concepts of C Language.** **2. Use of different operators in Programming.** **3. Describe the concept of decision making.** **4. Explain arrays and strings and create programs using them** **5. Demonstrate basic concepts of Object-Oriented Programming.**		
6	**Credit Value**	**6**		
7	**Total Marks**	Max. Marks: 40+60=100	Min. Passing Marks:16+24=40	

Part B- Content of the Course

Total No. of Lectures-Tutorials-Practical (in hours per week): 6 Lectures (in hours per week)

Unit	Topics	No. of Lectures (1 Hour Each)
I	Role of Prof. Rangaswamy Narsimhan in development of first Indian computer, Contribution of Ms. Sudha Murti in development of technology. C Programming Language: Introduction, Importance of C, Character set, Tokens, keywords, identifier, constants, basic data types, variables: declaration & assigning values. Structure of C program. **Activities:** Prepare a chart to demonstrate evolution of different programming languages. Organize a group discussion on open-source software's, Artificial Intelligence system.	**18**
II	Arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, conditional operators, bit wise operators, expressions and evaluation of expressions, type cast operator, implicit conversions, precedence of operators. Arrays-concepts, declaration, accessing elements, storing elements, two-dimensional and multi-dimensional arrays. Input output statement and library functions (math and string related functions).	**18**

	Activities: 1. Extempore on different topics related to programming like: Compiler, debugging. 2. Prepare a chart comparing C and C++ Languages	
III	Decision making, branching & looping: Decision making, branching and looping: if, if-else, else-if, switch statement, break, for loop, while loop and do loop. Functions: Defining functions, function arguments and passing, returning values from functions. **Activities:** 1. Give short code and ask students to predict the output without executing the code. 2. Give students buggy code and ask them to identify and correct the errors.	**18**
IV	Structures: defining and declaring a structure variable, accessing structure members, initializing a structure, copying and comparing structure variables, array of structures, arrays within structures, structures within structures, structures and functions. Pointers. **Activities:** 1. Write a simple program in C language without any error. 2. Prepare a chart for data types in C language: Primary Secondary and user friendly.	**18**
V	Object Oriented Programming (OOP), basic concepts of OOP, Introduction to C++, Applications of C++, Structure of C++ Program, C++ character set, Tokens, C++ Data types, Variables, A simple C++ Program. Comparing C with C++. **Activities:** 1. Give students a basic C program and ask them to recreate it using C++'s classes and OOP features.	**18**

Keywords/Tags: Programming language, operators, looping, structures, object oriented programming.

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Rangaswamy Narasimhan - A Lifestory, Pioneer in Digital Computation and Cognitive Science; Visionary Leader, Imeuswe.
2. Sudha Murty: All you need to know about the philanthropist, author, symbol of "Nari Shakti", Story Board 18.
3. Object Oriented Programming with C++: E. Balaguruswamy, MacGraw Hills.
4. Programming with C++, D. Ravichandran, McGraw Hill Education.

5. C The Complete Reference - H.Sohildt, TMH.
6. Let us C - Y.Kanetkar, BPB Publications.
7. The 'C' programming language - B.W.Kernighan, D.M.Ritchie, PHI.

Suggested equivalent online courses:
https://www.coursera.org/specializations/coding-for-everyone
https://www.udemy.com/course/c-and-c-programming
https://www.codecademy.com/learn/learn-c-plus-plus
https://www.geeksforgeeks.org/best-cpp-courses

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks : 100
Continuous Comprehensive Evaluation (CCE) :40 Marks University Exam (UE): 60 Marks

Internal Assessment : Continuous Comprehensive Evaluation (CCE):**40**	Class Test Assignment/Presentation	**20** **20**
External Assessment : University Exam Section:**60** Time : **03:00 Hours**	**Section(A)** : Very Short Questions **Section (B) :** Short Questions **Section (C) :** Long Questions	**5X1=5** **5X4=20** **5X7=35** **Total=60**

Any remarks/ suggestions:

Part A Introduction

Program: PG 2 Year	**Class: M.Sc.**	**Year: II (IV Sem.)**	**Session: 2025-26**
Subject: Electronics			

1	**Course Code**	**PC41**
2	**Course Title**	**Minor Project (Lab-I)**
3	**Course Type (Core Course/ Discipline Specific Elective/)**	**Practical Course**

Part A Introduction

Program: PG 2 Year	Class: M.Sc.	Year: II (IV Sem.)	Session: 2025-26

Subject: Electronics

1	Course Code	PC42	
2	Course Title	Programming with C & C++ (Lab-II)	
3	Course Type (Core Course/ Discipline Specific Elective/)	Core Course	
4	Pre-requisite (if any)	-	
5	Course Learning outcomes (CLO)	On successful completion of this course, the students will be able to: 1. Recognize the components and related experiment and accessories like CRO, signal generator required to perform the experiment. 2. Apply object-oriented programming concepts using class and objects. 3. Differentiate structure-oriented programming and object-oriented programming. 4. Able to write, compile and debug programs in C++ language. 5. Prepare Laboratory Record of all the experiments performed.	
6	Credit Value	4	
7	Total Marks	Max. Marks: 40+60=100	Min. Passing Marks:16+24=40

Part B- Content of the Course

Total No. of Lectures-Tutorials-Practical (in hours per week):2 hours per credit per week
L-T-P: 120 Hrs

Lab Experiments	
1. Write a C Program to print “Hello World” on the Screen. 2. Write a C Program to convert Fahrenheit to Celsius. 3. Write a C Program to find the largest number among 3 numbers. 4. Write a C Program to enter 10 values and do sum and average of them using do-while loop. 5. Write a C Program to find out sum of first 100 integer numbers. 6. Write a C Program to sort N integer numbers in ascending orders. 7. Write a C Program to add two 3x3 matrix. 8. Write a C Program to reverse the string.	**120 Hrs**

Keywords/Tags:

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. **Practical C++ Programming, Steve Oualline, O'Reilly Media.**
2. **Thinking In C++, Bruce Eckel,Chuck Allison, Pearson.**
3. **Programming With C & C++, SIA, SIA Publishers & Distributors Pvt Ltd.**

Suggested equivalent online courses:

https://cse02-iiith.vlabs.ac.in/
https://www.vlab.co.in/broad-area-computer-science-and-engineering
https://labex.io/free-labs/cpp

Part D-Assessment and Evaluation

Suggested continuous Evaluation Methods:

Internal Assessment (A):	**40 Marks**
Lab Record/ Class Interaction/ Quiz	**15**
Attendance in the Lab.	**10**
Assignments (Technology Dissemination (e.g. training of common online citizen services or software tools to elderly persons/ Industrial Training (10 hours)/ mini project (including coding + project + demo + report))	**15**
External Assessment	**60 Marks**
Viva Voce Practical	**30**
Experiments	**30**
Total Marks (A+B)	**100 Marks**
Any remarks/ suggestions:	