SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar, Gujarat
(Reaccredited with 'A' Grade by NAAC (CGPA 3.25)
Syllabus with effect from the Academic Year 2022-2023

PROGRAMME STRUCTURE
MSc (Electronics) Semester: III

Programme Outcome (PO) - For MSc Electronics Programme	PO.1 The course begins with the foundation concepts of core electronics allied fields PO.2 The curriculum is designed to train the students in basic and advanced areas of Electronics by Keeping in mind the latest advances in the field. PO.3 The purpose of this course is to inculcate skills that are relevant for industry and cater to the requirements of the R & D Department and Industry. PO.4 This M.Sc. Program enables student to develop Speaking Presentation skills, they are encouraged to deliver seminars on a wide range of topics covering the different areas of Electronics.
Programme Specific Outcome (PSO) - For MSc Electronics Semester	PSO.1 M.SC. (Electronics) Program aims to develop specialized knowledge and skills both in the field of electronics for industrial automation and of the design of electronics systems. PSO.2 This course focuses on concepts relating to the Fabrication & Operation of semiconductor devices, measurement methodologies and the characteristics of sensors and instrumentation, embedded systems, VLSI Technology, Integrated Circuit manufacturing techniques, Optical Fiber communication systems, Computer Hardware etc. PSO.3 The main objective is to develop the ability and skills to understand, manage and promote technological innovation while adapting to the rapid changes typical of high technology sectors.

To Pass	At least 40% Marks in the University Examination in each paper and 40% Marks in the aggregate of University and Internal examination in each course of Theory, Practical & 40% Marks in Viva-voce.

Course Type	Course Code	Name of Course	Theory/ Practical	Credit	Exam Duration in Hrs	Component of Marks		
						Internal	External	Total
CORE COURSE	**PS03CELE51**	**Principles of Control Systems**	**T**	**4**	**3**	**30**	**70**	**100**
	PS03CELE52	**Digital and Microwave Communication Systems**	**T**	**4**	**3**	**30**	**70**	**100**
	PS03CELE53	**Computer Hardware & Networking**	**T**	**4**	**3**	**30**	**70**	**100**
	PS03CELE54	**Practical**	**P**	**4**	**3**	**30**	**70**	**100**
	PS03CELE55	**Project Work**	**P**	**4**	**3**	**30**	**70**	**100**
	PS03CELE56	**Comprehensive Viva**	**=**	**1**	**=**	**=**	**50**	**50**

ELECTIVE COURSE (Any One)	**PS03EELE51**	**Thin Film Technology**	**T**	**4**	**3**	**30**	**70**	**100**
	PS03EELE52	**Digital Signal Processing**	**T**	**4**	**3**	**30**	**70**	**100**
	PS03EELE53	**ARM Programming and Embedded Communication Protocols**	**T**	**4**	**3**	**30**	**70**	**100**
			Total Credits :	**25**			**Total Marks:**	**650**

Course Type	Course Code	Name Of Course	Theory/ Practical	Credit	Exam Duration in hrs	Component of Marks		
						Internal Total	External Total	Total
Core Course	PS01CELE51	Semiconductor Science and Devices	T	4	3	30	70	100
	PS01CELE52	Applications of ICs And Fuzzy Electronics	T	4	3	30	70	100
	PS01CELE53	8 Bit Microcontroller and Applications	T	4	3	30	70	100
	PS01CELE54	Practical	P	4	3	30	70	100
	PS01CELE55	Project Work	P	4	3	30	70	100
	PS01CELE56	Comprehensive Viva	=	1	=	=	50	50
Elective Courses	PS01EELE51	Analytical and Bio Medical Instruments	T	4	3	30	70	100
	PS01EELE52	Network Analysis	T	4	3	30	70	100

Master of Science (Electronics)

M.Sc.(Electronics) Semester III

Course Code	PS03CELE51	Title of the Course	Principles of Control Systems
Total Credits of the Course	4	Hours per Week	3+1=4 Hours

Course Objectives:	1. To introduce students the theory and practice of control systems. 2. To design feedback control systems and their Industrial applications. 3. To aware students about types of controllers used in industries. 3. To understand the stability criteria of process control systems.

Course Content		
Unit	Description	Weightage* (%)
1.	Introduction, Definition, Classification of Control Systems with examples, Characteristics of control systems, Open and Closed loop Systems, Single I/P - Single O/P systems, Multivariable system, Transfer Function, Impulse Response, Pole-Zero Plot, Rules for Block Diagram Reduction, Representation of Block Diagram, Signal Flow graph : Terminoligy, Property, Mathematical Modeling of Systems, Control Action & Controllers, ON/OFF, Proportional, Integral, Derivative and PID Controllers.	25
2.	Standard test Signals, Time Domain Analysis, Transient response design and Steady state error design, Analysis of Type 0,1 and 2 Systems, Time Response of higher order Systems, Frequency Domain Analysis, Conceptual Approach to Frequency Response, Relation between Transfer Function and Frequency Response, Co-relation between Time and Frequency Response Specifications.	25

3.	Response analysis of control system and stability criterion, Concept of Root Locus, Angle and Magnitude Condition, Construction Of Root Locus, Inverse Root Locus, Addition of Poles and Zeros on Root Locus, Stability of Control Systems : Routh-Hurwitz Criterion, Bode Plots and Stability Analysis of Systems.	25
4.	Polar Plots, Stability on Polar Plots, Nyquist Analysis, Stability from Nyquist Plot, Constant gain and Phase Loci : M and N Circles, Applications, Nichols Chart, Compensation of Control Systems, Types of Compensation, Phase-Lead, Phase-Lag, Phase-Lag-Lead Compensation, Feedback Compensation.	25

Teaching-Learning Methodology	Class room Teaching (Offline/Online), Use of Power point Presentation, Tutorial Problem Solving, Assignments, Group Discussion, Video Animation and Presentation, Experimental demonstration. Use of ICT Tools.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Learn design of different control mechanisms.

2.	Understand and design many control loops found in industries.
3.	Analyze the control strategy.
4.	Know the selection of suitable control system and its consequences.
5.	Identify choice and applications of control system in real time world.

Suggested References:

Sr. No.	References
1.	Principles of Control Systems S.C.Goyal and V.A.Bakshi (Technical Publications, Pune, INDIA)
2.	Automatic Control Systems Benjamin C. Kuo, (Prentice Hall of India Pvt. Ltd., New Delhi ,INDIA)
3.	Feedback Control Systems S.D.Bhide, S.Satyanarayan & N.A. Jalgaonkar (Technova Publications, Pune (INDIA)
4.	Modern Control Engineering Katsuhiko Ogata (Prentice Hall of India Pvt. Ltd., New Delhi , INDIA
5.	Control Systems Engineering I.J.Nagrath & M. Gopal, Wiley Eastern, New Delhi (INDIA)
6.	Control Engineering: Theory and Practice M.N.Bandyopadhyay (Prentice Hall of India Private Limited, New Delhi (INDIA)
7.	Control Systems Engineering Normal Nise (Wiely Publications)
8.	Modern Control Systems Richard Dorf, Robert H.Bishop (Addison Wesley Longman Inc., USA))
9.	Digital Control Systems

	Kuo (Oxford University Press , New York ,USA))
10.	Control Engineering an Introductory Course J.wilkie, M.Johnson, R.Katebi (Palgrave, USA)
11.	Process Control (Concepts, Dynamics & Applications) S K Singh (PHI learning Private Limited)
12.	Control Systems A. Anand kumar (Prentice-Hall India)
13.	Control Systems K.Padmanabhan (Wiley)
14.	Control Systems by R V Dukkipati
15.	Control System Engineering A. Nagoor Kani (RBA Publications)

On-line resources to be used if available as reference material
On-line Resources
1. http://www.tandfonline.com/doi/pdf/10.1080/00207216108937312
2. https://www.academia.edu/36199523/_Chapter1_Introduction_to_Control_Systems
3. https://www.slideserve.com/wyman/chapter-4-control-principles
4. https://slideplayer.com/slide/7708897/
5. On Line Video Lectures of course on Control Systems - NPTEL

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Master of Science (Electronics)
M.Sc. (Electronics) Semester III

Course Code	PS03CELE52	Title of the Course	Digital and Microwave Communication Systems
Total Credits of the Course	4	Hours per Week	3+1=4 Hours

Course Objectives:	1. To get the learner an understanding of various Digital Radio and Digital Transmission systems. 2. To help the learner develop an understanding of Time Division and Frequency Division Multiplexing techniques. 3. To provide an understanding of the Microwave and Satellite Communication Systems. 4. To help the learner understand about the Mobile Telephone Systems.

Course Content		
Unit	Description	Weightage* (%)
1.	Digital Communication Systems, Digital Radio-Amplitude Shift Keying (ASK), Frequency Shift Keying, (FSK), Phase Shift Keying (PSK), Binary Phase Shift Keying (BPSK), Quaternary Phase Shift Keying (QPSK), Quadrature Amplitude Modulation (QAM), Differential Phase Shift Keying (DPSK), Digital Transmission - PCM, Delta Modulation, Data Communication Hardware.	25
2.	Data Communication Codes, Error Detection and Correction, Multiplexing- Time- Division Multiplexing, T1 Digital Carrier System, Introduction to Codecs, Combo chip, Line Encoding, Frequency- Division Multiplexing- Composite Base Band Signal, Formation of Group, Super Group, Master Group.	25

3.	Microwave Communication- Simplified Microwave System, Microwave transmitter and receiver, Microwave repeaters, Diversity- frequency, space and polarization, Microwave System Gain, Free Space Path Loss, Fade Margin, Receiver Threshold, Noise Figure, Radar, Synthetic Aperture Radar	25
4.	Satellite Communication- Types of artificial satellites, geostationary satellites, Orbital Patterns, Look angles, Orbital spacing and frequency allocation, Satellite system, link models, Satellite system parameters Cellular Communication- The cellular concept and its implementation, Cellular carriers and frequencies-channel allocation and frequency reuse, Multiple Access technologies for cellular system, Mobile call termination, hand off.	25

Teaching-Learning Methodology	Classroom Teaching (Offline/Online), learning from online resources

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Get an understanding of various Digital Radio and Digital Transmission systems.
2.	Understand the systems of Time Division and Frequency Division Multiplexing

	techniques.
3.	Understand the concepts of Microwave and Satellite Communication Systems.
4.	Know about the Mobile Telephone Systems.

Suggested References:	
Sr. No.	References
1.	Wayne Tomasi (2014).Advanced Electronic Communication System (6th ed.).Prentice Hall International
2.	Dennis Roddy & John Coolen (1995) Electronic Communication.(4th ed.).Prentice Hall India
3.	George Kennedy, Bernard Davis, SRM Prasanna.(2017). Electronic Communication System. Mcgraw Hill Book Co.

On-line resources to be used if available as reference material
On-line Resources
1.Online Videos by NPTEL on Digital Communication
2.Online Videos by NPTEL on Microwave Communication
3.Online Videos by NPTEL on Satellite Communication
4.Online Videos by NPTEL on Mobile Communication

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Master of Science (Electronics)
M.Sc. (Electronics) Semester III

Course Code	PS03CELE53	Title of the Course	Computer Hardware and Networking
Total Credits of the Course	4	Hours per Week	3+1=4 Hours

Course Objectives:	1.To provide much needed knowledge of computer hardware and networking. 2. Enabling students to identify and rectify the onboard computer hardware, software and network related problems 3. The students will be able to understand the hardware specifications that are required to run Network operating system. 4.Upgrading of existing hardware/software as and when required, install/configure the application program and network related problems.

Course Content		
Unit	Description	Weightage* (%)
1.	Microprocessor types & Specifications, Motherboard & BUS, PC Components features and system design, LAN & WAN, Host-Workstation and Server, Peer-to-peer and Client Server Architecture. Physical Topologies- BUS-Star-Ring-Mesh-Wireless, Selecting the right Topology.	25
2.	Physical Media- Coaxial Cable, Twisted Pair Cable, Fibre Optic Cable, Common Network Connectivity Devices, Network Interface Adapter – Hub – Switch- Router, Ethernet Frame Structure IEEE 802.3, Wireless Network, WLAN, WPAN, IEEE 802.11 Frame Structure, Wireless Antenna, Wireless Network Connectivity Devices, WiMAX, GAN.	25
3.	The OSI Reference Model, Networking Protocols – TCP/IP – IPX/SPX – NetBEUI, TCP/IP Protocol Stack, Understanding IPV4 and IPV6 Addressing, Configuring TCP/IP on	25

	Windows, TCP/IP Utilities.	
4.	Networking with Windows Operating System, Windows 20XX Operating System, Architecture, Workgroups, Domains and Active Directory, Installing Windows 20XX, Installing & Configuring DNS and Active Directory, Administering and Securing Active Directory Managing User Groups, Sharing – Securing and Accessing Files & Folders.	25

Teaching-Learning Methodology	Lectures, Seminars and tutorials, Independent study, Laboratory and practical learning, Field trips, Problem-based/enquiry-based learning, Projects, e-learning

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand basic concept & structure of Computer Hardware & Networking Components, Structured cabling of Network Nodes, Installation and Configuration of Network Operating System etc.
2.	Identify the existing configuration of the computers & peripherals. Upgrading the same as & when required.
3.	Apply their knowledge about computer peripherals to identify/rectify problems.

Suggested References:	
Sr. No.	References
1.	Computer Networks Andrew S. Tanenbaum, Prentice Hall of India Pvt. Ltd., New Delhi
2.	Upgrading and Repairing PCs Scott Mueller, Pearson Education Asia
3.	Troubleshooting, Maintaining & Repairing PCs Stephen J. Bigelow, Tata McGrew Hill Publishing Company Limited, New Delhi
4.	Computer Networks Protocols, Standards and Interfaces Uyless Black, Prentice Hall of India Pvt. Ltd., New Delhi
5.	Microsoft Windows Server Administration Essentials Tom Carpenter
6.	Installing, Configuring & Administering Windows 200X Professional Windows 200X Server, Windows 200X Networking Infrastructure Windows 2000 Directory Services Alan R. Carter, IDG Books India (P) Ltd.

On-line resources to be used if available as reference material
On-line Resources
https://oli.cmu.edu/courses/pc-hardware-open-free/
https://info.microsoft.com/ww-landing-ultimate-guide-to-windows-server-2019.html
https://www.ncertbooks.guru/computer-network-notes/

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Master of Science (Electronics)
M.Sc. (Electronics) Semester III

Course Code	PS03EELE51	Title of the Course	Thin Film Technology
Total Credits of the Course	4	Hours per Week	3+1 =4 Hours

Course Objectives:	1. Acquire the knowledge of thin film preparation by various techniques. 2. Analyse the behaviour of the thin films by different characterization methods 3. Apply the knowledge to develop a device.

Course Content		
Unit	Description	Weightage* (%)
1.	Thin Film Definition, Vacuum Quality Pressure Range, Thin Film Requirements, Physical Vapour Deposition(PVD), Morphology of PVD, Thermal Evaporation PVD, Vacuum Procedures, Flash Evaporation, Electron Beam PVD, Pulse Laser Deposition, Sputtering : DC - RF- Magnetron Sputtering, High Power Impulse Magnetron Sputtering(HIPIMS).	25
2.	Chemical Vapour Deposition, Kinetics of CVD, Choice of Chemical Reactions, Nucleation, CVD System, CVD Reactor Types by process, Vacuum Pumps: Introduction and Classification, Positive Displacement (Oil Sealed Rotary) Pump, Momentum Transfer (Diffusion and Turbo Molecular)Pump, Getter-Ion Pump. Entrapment (Cryo) Pump,	25
3.	Vacuum Gauge : Pirani Gauge, Cold Cathode Ionization (Penning) Gauge, Types of Boats, Substrate and Mask, Thin Film Characterization Techniques : Surface Profilometer, UV-Vis-IR Spectrophotometer, X-Ray Diffraction-Instrumentation.	25

4.	Electron Diffraction – Transmission Electron Microscopy, Electron Probe Micro Analyzer (EPMA/EDAX), Scanning Electron Microscopy, Thin Film Passive Devices- Resistor-Capacitor and their applications, Thin Film Active Devices – Diode- Transistor and their applications, Transparent Conducting Oxide Thin Films and its Applications.	25

Teaching-Learning Methodology	Lectures, Seminars and tutorials, Independent study, Laboratory and practical learning, Field trips, Problem-based/enquiry-based learning, Projects, e-learning

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Discuss the differences and similarities between different vacuum based deposition techniques
2.	Evaluate and use models for nucleating and growth of thin films,
3.	Asses the relation between deposition technique, film structure, and film properties, discuss typical thin film applications
4.	Develop thin film based devices for various applications.

Suggested References:	
Sr. No.	References
1.	Thin Film Technology and Applications K.L.Chopra and L.K.Malhotra, Tata Mc-Graw Hill, N.Delhi, (India)
2.	Thin Film Device Applications K.L. Chopra and Indrajeet Kaur, IIT, New Delhi, India
3.	Active and Passive Thin Film devices J.J.Coutts., Acadamic Press,NY (USA)
4.	Hand Book of Thin Film Technology Leon I.Maissel and Reinhard Glang, McGraw Hill Book.,NY (USA)
5.	Vacuum Technology A. Roth

On-line Resources
https://www.coursera.org/lecture/high-throughput/vapor-deposition-of-thin-films-introductory-concepts-17I53
https://www.youtube.com/results?search_query=vacuum+pump
https://www.youtube.com/results?search_query=thin+film+deposition+techniques
https://www.youtube.com/results?search_query=scanning+electron+microscope+and+transmission+electron+microscope+

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Master of Science (Electronics)

M.Sc. (Electronics) Semester III

Course Code	PS03EELE52	Title of the Course	Digital Signal Processing
Total Credits of the Course	4	Hours per Week	3+1=4 Hours

Course Objective	1. To make students familiar with the most important methods in DSP, including digital filter design, transform-domain processing and importance of Signal Processors. 2. To make students aware about the meaning and implications of the properties of systems and signals

Course Content		
UNIT	Description	Weightage* (%)
1	Introduction, Classification of Signals, Singularity Functions, Classification of Systems, Transformation of Discrete Time Signals, Representations of Systems, Trigonometric Fourier Series, Complex Fourier Series, Parseval's Identity for Fourier Series, Power Spectrum of a Periodic Function.	25

2	Fourier Transform of Some Important Signals, Fourier Transform of Power and Energy Signals, Discrete-Time Fourier Transform (DTFT), Fast Fourier Transform (FFT), The Z-Transform, Properties of the Z-Transform, Inversion of the Z-Transform, The one-sided Z-Transform, Applications of Z Trasform.	25
3	Analysis of Linear Time-Invariant Systems in the Z-Domain, Finite Impulse Response (FIR) Filters; Magnitude Response and Phase Response of Digital Filters, Frequency Response of Linear Phase FIR Filters, Design Techniques for FIR Filters, Infinite Impulse Response(IIR), Design Techniques of IIR Filters.	25
4	Realization of Digital Linear Systems, Block diagram and Signal flow graph, Basic Structures for IIR Systems, Basic Structures for FIR Systems, Applications of Digital Signal Processing; Voice Processing, Application of Radar, Image Processing, Introduction to DSP Software.	25

Teaching-Learning Methodology	Traditional Classroom teaching with use of Multimedia facility in the classroom. Use of Computer Tool for live demonstration and problem / design based approach.

Evaluation Pattern		
Sr. No	Details of Evaluation	Weightage
1	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2	Internal Continuous Assessment in the form of Practical, Viva Voce, Quizzes, Seminars, Assignments, Attendance (as per CBCS R6.8.3)	15%
3	University Examination	70%

Course Outcome. Having completed this course, the learner will be able to	
1	Design, implementation, analysis and comparison of digital filters for processing of discrete time signals
2	Integrate computer-based tools for engineering applications
3	Employ signal processing strategies at multidisciplinary team activities.

Suggested References:	
Sr. No.	References
1	Signals and Systems Simon Haykins and Barry Vankeen John Wiley & Sons, N.Y. (U.S.A)
2	Signals and Systems : Continuous and Discrete Rodger E. Ziemer, William A. Tranter and D. Ronald Fannin Max Well Macmillan Int. (U.S.A)
3	Digital Signal Processing Alan. V. Oppenheim and Ronald. W. Schafer Prentice Hall of India, New Delhi (INDIA)

4	Theory and Applications of Digital Signal Processing Lawrence R. Rabiner and Bernard Gold Prentice Hall of India, New Delhi (INDIA)
5	Introduction to Digital Signal Processing Johnny R. Johnson Prentice Hall of India, New Delhi (INDIA)
6	Digital Signal Processing John G. Proakis and Dimitris G. Manolakis Prentice Hall of India, New Delhi (INDIA)

On-line resources to be used if available as reference material
On line resources.
1. www.cl.cam.ac.uk/teaching/0809/DSP/slides-2up.**pdf**
2. www.tutorialspoint.com/digital_signal_processing/...
3.ONLINE Video Lectures on Digital Signal Processing -NPTEL

Master of Science (Electronics)

M.Sc. (Electronics) Semester III

Course Code	PS03EELE53	Title of the Course	ARM Programming and Embedded Communication Protocols
Total Credits of the Course	4	Hours per Week	3+1=4 Hours

Course Objective	1. To understand the basics of embedded system 2. To understand the architecture, assembly language an interfacing of different 8-bit microcontrollers 3. To learn embedded C programming 4. To learn software techniques to embed codes in to the systems 5. To learn communication standards and protocols ARM Programming

Course Content		
UNIT	Description	Weightage* %
1	ARM instruction set , Thumb instruction set • ARM memory interface: Cycle Types, Address Timing, Data Transfer Size, Instruction Fetch, Memory Management, Locked Operations, Stretching Access Times, The ARM Data Bus, The External Data Bus.	25

2	ARM Debug Interface: Debug Systems, Debug Interface Signals, Scan Chains and JTAG Interface, Reset, Pull-up Resistors, Instruction Register, Public Instructions, Test Data Registers, ARM7TDMI Core Clocks, Determining the Core and System State, The PC's Behavior During Debug, Priorities / Exceptions, Scan Interface Timing, Debug Timing. Embedded Communication Protocols:	25
3	Inter-Integrated Circuit (I2C) BUS: I2C bus specification, general characteristics, bus signals, Address mechanism, Extensions to the standard-mode I2C-bus specification, Applications. System Management Bus (SMBus): Introduction, General characteristics, Physical Layer, data link layer, Network layer, differences between SMBus and I2C, Device addressing.	25
4	Controller Area Network (CAN): Specifications, basic concepts, Frame types, bus signals, Error handling, Addressing. Serial peripheral interface (SPI): Introduction, Specifications, master slave configuration, applications.	25

Teaching-Learning Methodology	Traditional Classroom teaching with use of Multimedia facility in the classroom. Use of Computer Tool for live demonstration and problem / design based approach.

Evaluation Pattern		
Sr. No	Details of Evaluation	Weightage
1	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2	Internal Continuous Assessment in the form of Practical, Viva Voce, Quizzes, Seminars, Assignments, Attendance (as per CBCS R6.8.3)	15%
3	University Examination	70%

Course Outcome. Having completed this course, the learner will be able to	
1	Upon Completion of the course students will have basic concepts of ARM Architecture, interfacing and programming along with study and implementation of various communication protocols

Suggested References:	
Sr. No.	References
1	Real-Time Embedded Multithreading : Using ThreadX® and ARM®, Edward L. Lamie, CMPbooks.
2	ARM System Developer's Guide : Designing and Optimizing System Software (The Morgan Kaufmann Series in Computer Architecture and Design), Andrew Sloss, Dominic Symes, Chris Wright.
3	ARM Architecture Reference ARM System-on-Chip Architecture (2nd Edition), Steve Furber, Addison-Wesley Manual (2nd Edition), David Seal. Addison-Wesley

On-line resources to be used if available as reference material
On line resources.
1. gurusaiprasanth.files.wordpress.com/2015/09/...
2. www.csie.ntu.edu.tw/.../lec08_ARMasm_4up.pdf