SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Programme: B.Tech. Electronics and Communication Engineering, Vth Semester

Subject Category : **DC**	Subject Code: **EC-501**	Subject Name: **Digital Signal Processing**

Maximum Marks Allotted								Contact Hours			**Total Credits**
Theory				Practical			**Total Marks**				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Signals & Systems

Course Objective:

The objective of this course is to introduce the students with the concept of Processing Discrete Time Signals and System Realization.

Course Outcomes:

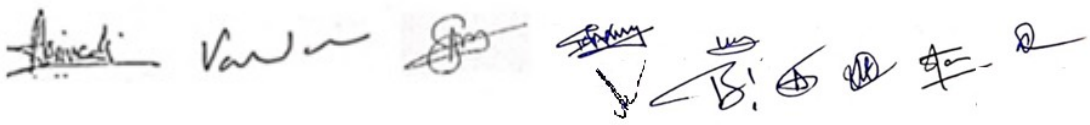
CO 1: Understand and demonstrate fundamentals of filtering and their concepts, filter specifications. (BL1, BL2, BL3)
CO 2: Analyse different FIR and IIR systems in time and frequency domain. (BL3, BL4)
CO 3: Design different FIR and IIR systems as per given specifications in frequency domain. (BL3, BL6)
CO 4: Evaluate performance of different FIR and IIR systems based on design method and coefficient quantization. (BL3, BL5)

UNITs	Descriptions	Hrs.	CO's
I	Relating the z-transform and DTFT, DTFT and DFT, DFS and DFT, System analysis using the DTFT, Spectral Leakage, Spectral spacing and zero padding, Filtering method based on DFT. FFT algorithms: Decimation in time (DIT) and Decimation in frequency (DIF), Comparison of DIT and DIF algorithms, Computation advantages of FFT Algorithms.	09	All CO's
II	Filter concepts: Gain, Phase delay, Group delay, minimum phase factor, Graphical view of filters frequency response, pole zero pattern of linear phase filters, Types of linear phase sequences, averaging filters, First and second order IIR filters, pole-zero placement and filter design.	09	All CO's
III	Filter specifications, the impulse invariance transformation, bilinear and matched Z-Transform. Design of high pass, band pass and band stop digital IIR filters. Spectral transformation of IIR filters, finite word length effects, effect of coefficient quantization.	09	All CO's
IV	Ideal filters, truncation and windowing, FIR filters and linear phase, Types of linear phase sequences for FIR filter design, window based, frequency sampling FIR differentiators and Hilbert transformers.	09	All CO's
V	Basic structures for FIR and IIR systems, Lattice structures, Number representation fixed and floating point, effects of coefficient quantization, effects of round off noise in digital filters, zero input limit cycle.	09	All CO's
Guest Lectures (if any)		03	
Total Hours		48	

Suggestive list of experiments:

1. Signal generation and manipulation.-CO2
2. Verification of sampling theorem (use interpolation function).-CO2
3. Linear and circular convolution of two given sequences, Commutative, distributive and associative property of convolution.-CO2
4. Auto and cross correlation of two sequences and verification of their properties-CO2
5. Solving a given difference equation.-CO2
6. Computation of N point DFT of a given sequence and to plot magnitude and phase spectrum (using DFT equation and verify it by built-in routine).-CO2
7. Verification of DFT properties (like Linearity and Parseval's theorem, etc.)-CO2
8. DFT computation of square pulse and Sinc function etc.-CO2
9. Design and implementation of Low pass and High pass FIR filter to meet the desired specifications (using

different window techniques) and test the filter with 10. An audio file. Plot the spectrum of audio signal before and after filtering.-CO4 11. Design and implementation of a digital IIR filter (Low pass and High pass) to meet given specification and test with an audio file. Plot the spectrum of audio signal before and after filtering. CO4 12. Obtain the Linear convolution of two sequences.-CO3 13. Compute Circular convolution of two sequences.-CO3 14. Compute the N-point DFT of a given sequence.-CO2 15. Determine the Impulse response of first order and second order system.-CO3 (a) 1Evalate performance of FIR using different window functions. -CO4 (b) 1Evalate performance of FIR based on coefficient quantization. -CO4 (c) 1Evalate performance of IIR. using different window functions.-CO4	
Modes of Evaluation and Rubric	
Final Exam, Mid Sem Exam, Quiz, Assignments, Practical, External/Internal Viva, Attendance	
Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	Mrs. Bharti Mehra



SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Programme: B.Tech. Electronics and Communication Engineering, Vth Semester

Subject Category: **DC**	Subject Code: **EC-502**	Subject Name: **Microprocessor & Microcontroller**

Maximum Marks Allotted								Contact Hours			**Total Credits**
Theory				Practical			**Total Marks**				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	-	2	4

Prerequisites:

Basic Electronics, Digital Circuit System

Course Objective:

1. To make students familiar with the basic blocks of 8 bit & 16 bit Microprocessors and 8-bit Microcontroller device in general.
2. To provide comprehensive knowledge of the architecture, features and interfacing with peripheral of Intel 8085/8086 microprocessor and Intel 8051 Microcontroller.
3. To use assembly and high-level languages to program the microprocessor and microcontroller and interface it to various applications.

Course Outcomes:

On successful completion of this course student should be able to:

CO1: Acquire and demonstrate fundamental knowledge of microprocessors and microcontroller interfacing and programming (BL1,BL2)

CO2: Understand the capabilities of microprocessor/microcontroller with the help of instruction set (BL3, BL4)

CO3: Develop instruction codes and write assembly codes /Embedded C language programming for problem solving (BL3, BL6)

CO4: Identify problems and Design real-world solutions with interfacing of hardware (BL3, BL5)

UNITs	Descriptions	Hrs.	CO's
I	Introduction of computer organization & Microprocessor- Architecture and function of general computer system, CISC, RISC, CPU, Memory, Input/output device, Address, Data and Control Buses. 8085/8086 Microprocessor: Architecture, Pin Diagram, Instruction set and various functional units. Memory Interfacing, I/O Mapped I/O and Memory Mapped I/O.	10	1,2,3
II	Introduction to 8-bit microcontroller: Overview of 8051 family, Architecture of 8051 microcontroller. Compare processor & controller, Data type and Assembler Directive, PSW, register banks and stack, Program counter and ROM space, memory, GPR and SFR.	09	1,2
III	8051 Programming: Addressing modes, Instruction sets, Arithmetic/Logical Instruction, Loop/Jump/Call, Bit manipulation instruction etc. Pin description of 8051, Power-on Reset circuits, Input & output Port Programming.	09	1,2,3
IV	On-chip peripheral device: Concepts of Timer/Counter and its Programming, an overview of serial communication and serial port programming, concepts of interrupt, type of interrupts, priority of interrupts, Introduction to embedded C. Elementary programming of 8051 in assembly and C.	09	1,2,3,4
V	8051 Real-world interfacing: LED and switch interface, Motor, 7-segment, LCD and keyboard interfaces. ADC, DAC, and sensor/actuator interfacing and Elementary programming.	08	1,2,3,4
Total Hours		45	

Suggestive list of experiments:

1. Study of 8051 simulation software. CO-2
2. Write an assembly language program for an 8051 Microcontroller to interface an LED. CO3
3. Write an assembly language program for an 8051 Microcontroller to interface a switch. CO3
4. Write an assembly language program for an 8051 Microcontroller to interface a 7-segment. CO3
5. Write an assembly language program for an 8051 Microcontroller to interface an LCD. CO3
6. Write an assembly language program for an 8051 Microcontroller to interface a Motor. CO3
7. Write an assembly language program for an 8051 Microcontroller to interface an ADC. CO3
8. Write an assembly language program for an 8051 Microcontroller to interface a DAC. CO3
9. Write an assembly language program for an 8051 Microcontroller to interface a KEYPAD. CO3
10. Write an assembly language program for an 8051 Microcontroller to interface an MEMORY. CO3
11. Write an assembly language program for an 8051 Microcontroller to on chip Timer. CO3

12. Write an assembly language program for an 8051 Microcontroller to interface serial communication port. CO3
Text Book- • Ramesh S Goankar, Microprocessor Architecture, Programming & Applications with the 8085, Penram International Publishing (India) Pvt. Ltd., Fourth Edition, 2002. • M Mazidi and J. G. Mazidi , 8051 Microcontroller and Embedded Systems using assembly and C, Pearson Education.
Reference Books- • Microprocessors and Microcontrollers: Architecture, Programming & Interfacing using 8085, 8086, and 8051 by Soumitra Kumar Mandal, Tata Mcgraw Hill Education • A K Ray & K M Bhurchandi, Advanced Microprocessor and Peripheral, Tata McGraw-Hill Publishing Company Limited. • Douglas V. Hall, Microprocessors and interfacing programming and hardware Gregg Division, McGraw-Hill, 1986 • A Nagoor Kani, Microprocessor and Microcontroller, CBS publishers
Modes of Evaluation and Rubric
Final Exam, Mid Sem Exam, Quiz, Assignments, Practical, External/Internal Viva, Attendance

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	Prof. Bharti Mehra

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Programme: B.Tech. Electronics and Communication Engineering, Vth Semester

Subject Category :**DC**	Subject Code: **EC-503**	Subject Name: **Microwave Theory and Techniques**

Maximum Marks Allotted								Contact Hours			**Total Credits**
Theory				Practical			**Total Marks**				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	30	20	10	150	3	-	2	4

Prerequisites:

- Electromagnetic Field Theory
- Antenna theory

Course Objective:

This course will introduce students to the concepts of Microwave theory and design. He will be able to understand the working of Microwave systems. Generation, detection and measurement of microwaves.

Course Outcomes:

On successful completion of this course student should be able to:

CO 1: Understand the basic concept and principle of microwave transmission system, microwave network and components, solid-state vacuum tubes devices and measurement devices. (BL1, BL2)

CO 2: Analyse different microwave transmission line and network, characteristics of microwave devices using S-parameters. To establish the measurement bench set-up for measuring various microwave parameters. (BL3, BL4)

CO 3: Design different waveguides, resonators, port networks, couplers and isolators. — (BL3, BL6)

CO4 : Evaluate various microwave parameters by using different measurements and testing techniques (BL3, BL6)

UNITs	Descriptions	Hrs.	CO's
I	Microwave Transmission System: Introduction, Microwave spectrum, Uniform guide structures, rectangular wave guides, Circular Wave guides, Solution in terms of various modes, Properties of propagating and evanescent modes, Dominant modes, Normalized model voltages and currents, Power flow and energy storage in modes frequency range of operation for single mode working, effect of higher order modes, Strip line and micro strip lines general properties, Comparison of coaxial, Micro strip and rectangular wave guides in terms of band width, power handling capacity, economical consideration etc.	10	1,2,3,4
II	Microwave Networks and Component: Transmission line ports of microwave network, Scattering matrix, Properties of scattering matrix of reciprocal, Non reciprocal, Examples of two, three and four port networks, wave guide components like attenuator, Phase shifters and couplers, Flanges, Bends, Irises, Posts, Loads, Principle of operation and properties of E-plane, H-plane Tee junctions of wave guides, Hybrid T, Multi-hole directional coupler, Directional couplers, Microwave resonators- rectangular. Excitation of wave guide and resonators by couplers. Principles of operation of non-reciprocal devices, properties of ferrites and Isolators	9	1,2,3,4
III	Microwave Solid State Devices and Application: PIN diodes, Properties and applications, Microwave detector diodes, detection characteristics, Varactor diodes, parametric amplifier fundamentals, Manley-Rowe power relation, Frequency converters and harmonic generators using varactor diodes, Transferred electron devices, Gunn effect, Various modes of operation of Gunn oscillator, IMPATT, TRAPATT and BARITT diodes.	8	1,2,4
IV	Microwave Vacuum Tube Devices: Interaction of electron beam with electromagnetic field, power transfer condition. Principles of working of two cavityand Reflex Klystrons, arrival time curve and oscillation conditions in reflex klystrons, mode frequency characteristics. Effect of repeller voltage variation on power and frequency of output. Principle of working of magnetrons. Electro dynamics in planar and cylindrical magnetrons, Cutoff magnetic field, Resonant cavities in magnetron, Π-mode operation Mode separation techniques, Rising sun cavity and strapping. Principle of working of TWT amplifier. Slow wave structures, Approximate gain relationship in forward wave TWT.	9	1,2,4
V	Microwave Measurements: Square law detection, Broadband and tuned detectors. Wave-guide probes, Probe and detector mounts, Slotted line arrangement and VSWR meter, Measurement of wave-guide impedance at load port by slotted line, Microwave bench components and source modulation. Measurement of scattering matrix parameters, High, Medium and low-level power measurement techniques, Characteristics of bolometers, bolometer mounts, Power measurement bridges, Microwave frequency measurement techniques, calibrated resonators (transmission	9	1,2

	and absorption type). Network Analyser and its use in measurements.		
Guest Lectures (if any)			
Total Hours		45	

Suggestive list of experiments:
1) To determine the frequency and wavelength in rectangular waveguide workingon TE10 mode.-CO2 2) To determine the SWR and reflection coefficient.CO2 3) Study of VI characteristics of Gunn diode.CO1 4) Study of following characteristics of Gunn diode: (a) Output Power and frequency as a function of bias voltage.CO1 (b) Square wave modulation through Pin diodeCO1 5) Study of attenuator.CO1 6) Study of phase shifter.CO1 7) Measurement of dielectric constant (liquid and solid): (a) Low loss solid dielectrics.-CO2 (b) Liquid dielectrics or solutions.CO2 8) Study of voice Communication by using microwave test bench.-CO1 9) Study of PC to PC communication by using microwave test bench.CO1 10) Study of resonant cavity.CO1
Text Book- • Liao: Microwave Devices and Circuits, Pearson Education. • Kulkarni, "Microwave Engineering", DhanpatRai New Delhi • Pozar: Microwave Engineering, Wiley India
Reference Books- • Rao: Microwave Engineering, PHI Learning. • Collins: Foundations of Microwave Engineering, Wiley India. • Srivastava and Gupta: Microwave Devices and Circuits, PHI Learning. • Reich: Microwave Principles, East West Press. • Roy and Mitra: Microwave Semiconductor Devices, PHI learning.
Modes of Evaluation and Rubric
Final Exam, Mid Sem Exam, Quiz, Assignments, Practical, External/Internal Viva, Attendance

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	Dr. Sweety Jain

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Programme: B.Tech. Electronics and Communication Engineering, Vth Semester

Subject Category :**DE**	Subject Code: **EC 504**	Subject Name: **Elective-I (A) Wireless Communication**

Maximum Marks Allotted								Contact Hours			**Total Credits**
Theory				Practical			**Total Marks**				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	1	-	3

Prerequisites:

- Digital Communication.

Course Objective:

The student should be made to: Know the characteristic of wireless channel. Learn the various cellular architectures. Understand the concepts behind various digital signalling schemes for fading channels. Be familiar the various multipath mitigation techniques. Understand the various multiple antenna systems.

Course Outcomes:

At the end of the course, the student should be able to:

CO1: Acquire knowledge of wireless communication techniques, systems, processes and able to demonstrate. -(BL1, BL2, BL3)

CO2: Gain insights into various mobile radio propagation models and how the diversity can be exploited to improve performance. (BL3, BL4). (BL3, BL4)

CO3: Design and implement various signalling schemes for fading channels, compare multipath mitigation techniques and analyse their performance Design and implement systems with transmit/receive diversity and multiuser system -(BL3, BL6)

CO4: Understand the emerging trends in Wireless communication like OFDM, MIMO WiFi, WiMAX, Software Defined Radio (SDR). (BL3, BL5)

UNITs	Descriptions	Hrs.	CO's
I	WIRELESSCHANNELS: Introduction of Radio Wave Propagation, factor affecting propagation Large scale pathloss, Path loss models: Free Space and Two-Ray models - Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters Coherence bandwidth – Doppler spread & Coherence time, fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.	9	1,2
II	DIGITAL SIGNALING FOR FADING CHANNELS: Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels.	8	1,3
III	MULTIPATH MITIGATION TECHNIQUE: Equalization–Adaptive equalization, Linear and Non-Linear equalization, zero forcing and LMS Algorithms. Diversity–Micro and Macro diversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver.	10	1,2,3
IV	MULTIUSER AND MULTI CARRIER SYSTEM :- Conventional Multiple Access FDMA TDMA CDMA, Multi carrier system, OFDM principle – Cyclic prefix, Windowing, PAPR.OFDMA	8	3,4
V	INDRODUCTION TO MIMO SYSTEMS: Spatial multiplexing, System model-Pre-coding-Beam forming – transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels. RECENT TRENDS: Introduction to Wi-Fi, WiMAX, Software Defined Radio.	10	3,4
Guest Lectures (if any)			
Total Hours		45	

Text Book-

- Rappaport T. S., "Wireless communications", Second Edition, Pearson Education, 2010.

Reference Books-

- Andreas. F. Molisch, "Wireless Communications", John Wiley – India, 2006.
- David Tse and Pramod Viswanath, "Fundamentals of Wireless Communication", Cambridge University Press, 2005.
- Upena Dalal, "Wireless Communication", Oxford University Press, 2009.
- Van Nee, R. and Ramji Prasad, "OFDM for Wireless Multimedia Communications", Artech House, 2000.
- John G. Proakis, "Digital Communications", Edition 4th ed., McGraw-Hill, 2000.

Modes of Evaluation and Rubric

Final Exam, Mid Sem Exam, Quiz, Assignments, Practical, External/Internal Viva, Attendance

Recommendation by Board of studies on	12/06/2024
Approval by Academic council on	
Compiled and designed by	Dr. Neelesh Mehra

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Programme: B.Tech. Electronics and Communication Engineering, Vth Semester

Subject Code: **EC 504**	Sub. Category: **DE**	Subject Name: **Elective-I (B) Computer Architecture**

Maximum Marks Allotted								Contact Hours			**Total Credits**
Theory				Practical			**Total Marks**				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	1	-	4

Prerequisites:

Digital Logic Design

Course Objective:

The objective of this course is to make student understand the basic structure and operation of digital computer, hardware-software interface, and concepts of pipelining and different ways of communication with input output devices and standard I/O Interface. Also help to understand the concepts of memory.

Course Outcomes:

CO1. Gain basic understanding of operations and instruction set. Understand the working of processors and possible data hazards. Understand the concept of Parallelism and how it helps to improve the operation of system. (BL1, BL2)

CO2: Perform the arithmetic operations on a computer and analyse the result. Differentiate between different memories on the basis of performance and operating processes. (BL3, BL4)

CO3: Design and implement different sequential and combinational circuits using different computer architectures. (BL3, BL6)

UNITs	Descriptions	Hrs.	CO's
I	OVERVIEW & INSTRUCTIONS: Eight ideas, Components of a computer system, Technology, Performance, Power wall, Uni processors to multiprocessors; Instructions, operations and operands, representing instructions, Logical operations, control operations, Addressing and addressing modes.	08	1,2,3
II	ARITHMETIC OPERATIONS: ALU, Addition and subtraction, Multiplication, Division, Floating Point operations, Subword parallelism.	08	1,2,3
III	PROCESSOR AND CONTROL UNIT: Basic MIPS implementation, Building datapath, Control Implementation scheme, Pipelining, Pipeline datapath and control, Handling Data hazards & Control hazards, Exceptions.		1,2,3
IV	PARALLELISM: Instruction, level, parallelism, Parallel processing challenges, Flynn's classification, Hardware multithreading, Multi core processors	08	1,2,3
V	MEMORY AND I/O SYSTEMS: Memory hierarchy, Memory technologies, Cache basics, Measuring and improving cache performance, Virtual memory, TLBs, Input/output system, programmed I/O, DMA and interrupts, I/O processors.	08	1,2,3
Guest Lectures (if any)		-	
Total Hours		40	

Suggestive list of experiments: Nil

Text Book/ Reference Books-

1. David A. Patterson and John L. Hennessey, "Computer organization and design", Morgan Kauffman / Elsevier, Fifth edition, 2014.
2. V. Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organization", VIth edition, Mc Graw-Hill Inc, 2012.
3. William Stallings "Computer Organization and Architecture", Seventh Edition, Pearson Education, 2006.
4. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.
5. Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications", first edition, Tata McGraw Hill, New Delhi, 2005.
6. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata Mc Graw Hill, 1998.

Modes of Evaluation and Rubric

Final Exam, Mid Sem Exam, Quiz, Assignments, Practical, External/Internal Viva, Attendance

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	Mrs. Bharti Mehra

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Program: Electronics and Communication Engineering
Department : Electronics Engineering

Subject Catagory	DE-I	Subject Code	EC-504(C)	Subject Name	Power Electronics

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	20	10	150	3	1	-	4

Prerequisites:

- Basic Electrical Engg.
- Analog Electronics
- Network analysis.

Course Objective:

Study of this subject provides the following course objectives:

1. To impart knowledge about various power semiconductor devices.
2. Prepare the students to analyze and design different power converter circuits.
3. Prepare the students to apply power semiconductor devices in different Industrial and Home appliances..

Course Outcomes:

This course primarily contributes to EC program outcomes that develop students abilities to:

CO1- Acquire fundamental concepts of semiconductor switches.
CO2-Understand operation and applications of different power electronics converters
CO3-Identify basic requirements for power electronics based design application.
CO4-Comprehend operation of inverters, choppers, controllers and cycloconverters.
CO5-Apply power converters to develop commercial and industrial applications.

UNITs	Descriptions	Hrs.	CO's
I	**Power, Semiconductor Devices:** Classification of Power semiconductor devices, characteristics, construction, application and theory of operation of power diode, power transistor, thyristors. Device specifications and ratings, working of Diac, Triac, IGBT, GTO and other power semiconductor devices. Turn-on / turn-off methods and their circuits.		
II	**Rectifiers:** Review of uncontrolled rectification an its limitations, controlled rectifiers, half wave, Full wave configurations, multiphase rectification system, use of flywheel	8	1,2,3

	diode in controlled rectifier configurations for different types of load.		
III	**Inverters and Choppers**: Classification of inverters, Transistor inverters, Thyristor inverters, Voltage and Current Communicated inverters, PWM inverters, Principle of Chopper, Chopper classification and their working, Regulators.		
IV	**A. C. Voltage Controllers and Cycloconverters**: Classification and operation of a.c. voltage controllers and cycloconverters, their circuit analysis for different types of load.		
V	**Industrial Applications**: Solid-state switching circuits, Relays, Electronic Timer, Battery charger, Sawtooth generator, Applications in Industrial process control, Motor drive applications, Electronic regulators, etc., Induction heating, Dielectric Heating, Resistance welding and welding cycle.		
Guest Lectures (if any)			
Total Hours			

Text Book-

- Power electronics, converters, applications & design - Need Mohan et.al., Wiley
- Power Electronics - P.C.Sen, TMH
- Power Electronics: Devices, Circuits & MATLAB Simulations, Alok Jain, Penram Int. Publication.

Reference Books-

- Power Electronics Circuits, devices & applications - M.H. Rashid, PHI.
- Semiconductor Power Electronics- CM Pauddar

Modes of Evaluation and Rubric	
Quiz/Assignment, Mid Semester Exam, End Semester Exam, Attendance	
Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	Dr. Alok Jain

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Programme: B.Tech. Electronics and Communication Engineering, Vth Semester

Subject Category: **OE**	Subject Code: **OE 505**	Subject Name: **Open Elective-I (A) Signals and Systems**

Maximum Marks Allotted								Contact Hours			**Total Credits**
Theory				Practical			**Total Marks**				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Basic algebra, Differential equations, Trigonometry, Complex Arithmetic

Course Objective:

This course is introduces the fundamental concepts of signals and system. These concepts form the building blocks of modern digital signal processing, communication and control systems. Hence, a sound understanding of these concepts is necessary for all students of Electronics and Communication Engineering. The course will cover various basic tools of signal and system analysis such as signal classification, LTI systems, Properties of LTI Systems, Frequency Response, Laplace Transform, Z-Transform, Fourier Transform, Fourier Series, Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT), Cascade/ Parallel structures and their various practical applications. Various concepts such as convolution, impulse/ frequency response, causality, stability of systems will be especially emphasized. This course is suitable for all UG students who are looking to build the fundamental concepts of signals and systems as well as students preparing for their competitive exams.

Course Outcomes:

Upon completion of this course, the student will be able to-
CO1: Discriminate the nature of the given signals and systems.
CO2: Analyze Linear Time Invariant Systems (LTI) and its representation.
CO3: Analyze the discrete and continuous time signals and systems in frequency domain.
CO4: Understand the process of sampling and the effects of under sampling.
CO5: Compute the response of an LTI system in the time and frequency domains.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1		2		1			1			1
CO2	3	2	2		1							
CO3	3	3	2	3	1							
CO4	3	2	2	3								
CO5	3	2	1	3	1	1			1			1

Contents:

UNITs	Descriptions	Hrs.	CO's
I	Signals and systems in everyday life, Definition of signal and system, Classification of signals: Continuous time and Discrete-time signal, Elementary signals: The unit step, impulse, ramp exponential, sine, triangular etc., Operations on signals: Amplitude scaling, addition, multiplication, time scaling, time shifting, time folding, differentiation, and integration. Classification of systems, System representation and properties of systems.	8	1
II	Linear Time-Invariant Systems: Introduction, Convolution: impulse response representation for LTI systems, properties of the impulse response representation for LTI systems, differential and difference equation for LTI Systems, block diagram representations (direct form-I, direct form-II, cascade and parallel).	8	2
III	Fourier series and their properties; Application of Fourier series to LTI systems; Dirichlet's conditions; Fourier Transform & its properties; Applications of Fourier Transform to LTI systems; Magnitude and phase response; Parseval's theorem; Sampling theorem; Reconstruction of a signal from its samples; Aliasing and its effect in frequency domain, Basic concept of DTFT and DFT.	10	3, 4
IV	Introduction of Laplace transform; Region-of-convergence; Properties of Laplace transform; Inverse Laplace Transform, Applications of Laplace Transform in analysis of LTI systems, Unilateral Laplace transform & its applications to solve differential equations.	6	3,5
V	Z-transform: Basic principle of z-transform, definition, region of convergence, transfer functions, poles and zeros of systems and sequences, properties of z-transform, Inverse z-transform relationship between z-transform and Fourier transform, Unilateral z-transform	8	3,5

	& its applications to solve difference equations.		
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Basic operations on matrices
2. Generation of various signals and sequence
3. Operation on signals and sequences
4. Gibbs phenomenon
5. Fourier transforms and inverse Fourier transform
6. Properties of Fourier transforms
7. Laplace transforms
8. Z-transforms
9. Convolution between signals and sequences
10. Auto correlation and cross correlation
11. Spectral Analysis of sine wave.
12. Distribution and density functions of standard random variables

Text Books-

1. Signals and Systems, A Nagoor Kani, 2e, TMH, 2010.
2. Signals and Systems, A. Anand Kumar, 2e, PHI, 2012.
3. Signals and Systems, Tarun Kumar Rawat, Oxford University Press, 2010.
4. Signals and Systems, B. Kumar, New Age International Publishers, 2011.

Reference Books-

1. Signals and Systems, H P Hsu, Schaum's Outline Series, 2e, McGraw Hill, 2008.
2. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, 1998.
3. Signals and Systems, Simon Haykin, Barry van Veen, John Wiley and Sons (Asia) Private Limited, 1998.

Modes of Evaluation and Rubric

There will be continuous evaluation for during the semester for 40 sessional marks and 60 semester End term Marks. Subjects where laboratory work is prescribed, the practical marks are 50, out of which 30 marks will be awarded for viva voce and 20 marks for lab work. Out of 40 sessional marks, 20 shall be awarded for Mid semester, 20 marks to be awarded for day to day performance and Quiz/Assignments. For the 60 Marks, there will be a semester – End examination as per the norms of AICTE.

Recommendation by Board of studies on	Date:
Approval by Academic council on	Date:
Compiled and designed by	Name 1. **Dr. D. K. Shakya**
Checked and approved by	Name 1. Dr Ashutosh Datar

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Programme: B.Tech. Electronics and Communication Engineering, Vth Semester

Subject Category: **OE**	Subject Code: **OE-505**	Subject Name: **Open Elective-I (B)** **Microprocessor & Microcontroller**

Maximum Marks Allotted								Contact Hours			**Total Credits**
Theory				Practical			**Total Marks**				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

Basic Electronics, Digital Circuit System

Course Objective:

4. To make students familiar with the basic blocks of 8 bit & 16 bit Microprocessors and 8-bit Microcontroller device in general.
5. To provide comprehensive knowledge of the architecture, features and interfacing with peripheral of Intel 8085/8086 microprocessor and Intel 8051 Microcontroller.
6. To use assembly and high-level languages to program the microprocessor and microcontroller and interface it to various applications.

Course Outcomes:

On successful completion of this course student should be able to:

CO1: Acquire and demonstrate fundamental knowledge of microprocessors and microcontroller interfacing and programming (BL1,BL2)

CO2: Understand the capabilities of microprocessor/microcontroller with the help of instruction set (BL3, BL4)

CO3: Develop instruction codes and write assembly codes /Embedded C language programming for problem solving (BL3, BL6)

CO4: Identify problems and Design real-world solutions with interfacing of hardware (BL3, BL5)

UNITs	Descriptions	Hrs.	CO's
I	Introduction of computer organization & Microprocessor- Architecture and function of general computer system, CISC, RISC, CPU, Memory, Input/output device, Address, Data and Control Buses. 8085/8086 Microprocessor: Architecture, Pin Diagram, Instruction set and various functional units. Memory Interfacing, I/O Mapped I/O and Memory Mapped I/O.	10	1,2,3
II	Introduction to 8-bit microcontroller: Overview of 8051 family, Architecture of 8051 microcontroller. Compare processor & controller, Data type and Assembler Directive, PSW, register banks and stack, Program counter and ROM space, memory, GPR and SFR.	09	1,2
III	8051 Programming: Addressing modes, Instruction sets, Arithmetic/Logical Instruction, Loop/Jump/Call, Bit manipulation instruction etc. Pin description of 8051, Power-on Reset circuits, Input & output Port Programming.	09	1,2,3
IV	On-chip peripheral device: Concepts of Timer/Counter and its Programming, an overview of serial communication and serial port programming, concepts of interrupt, type of interrupts, priority of interrupts, Introduction to embedded C. Elementary programming of 8051 in assembly and C.	09	1,2,3,4
V	8051 Real-world interfacing: LED and switch interface, Motor, 7-segment, LCD and keyboard interfaces. ADC, DAC, and sensor/actuator interfacing and Elementary programming.	08	1,2,3,4
Total Hours		45	

Suggestive list of experiments:

Text Book-

- Ramesh S Goankar, Microprocessor Architecture, Programming & Applications with the 8085, Penram International Publishing (India) Pvt. Ltd., Fourth Edition, 2002.
- M Mazidi and J. G. Mazidi , 8051 Microcontroller and Embedded Systems using assembly and C, Pearson Education.

Reference Books- • Microprocessors and Microcontrollers: Architecture, Programming & Interfacing using 8085, 8086, and 8051 by Soumitra Kumar Mandal, Tata Mcgraw Hill Education • A K Ray & K M Bhurchandi, Advanced Microprocessor and Peripheral, Tata McGraw-Hill Publishing Company Limited. • Douglas V. Hall, Microprocessors and interfacing programming and hardware Gregg Division, McGraw-Hill, 1986 • A Nagoor Kani, Microprocessor and Microcontroller, CBS publishers
Modes of Evaluation and Rubric
Final Exam, Mid Sem Exam, Quiz, Assignments, Practical, External/Internal Viva, Attendance

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	Prof. Bharti Mehra

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Programme: B.Tech. Electronics and Communication Engineering, Vth Semester

Subject Category :**OE**	Subject Code: **OE-505**	Subject Name: **Open Elective-I (C) CMOS Circuit Design**

Maximum Marks Allotted								Contact Hours			**Total Credits**
Theory				Practical			**Total Marks**				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	-	-	3

Prerequisites:

- Basic Physics
- Digital System Design
- Electronic Devices

Course Objective:

The objective of this course is to make student aware of VLSI technology, fabrication process used for designing IC components. To make student capable for analysing the performance of MOS based devices.

Course Outcomes:

On successful completion of this course student should be able to:

CO 1: Understand and demonstrate different IC technologies, fabrication process, design approaches, MOS transistor, inverters, dynamic logic circuits & HDL based design. — (BL1, BL2)

CO 2: Use MOS inverter as a switch —(BL2, BL3)

CO 3: Analyse MOSFET characteristics, logic circuits and Dynamic circuit techniques. -(BL3, BL4)

CO 4: Design and simulate logic circuits and systems using HDL— (BL3, BL6)

UNITs	Descriptions	Hrs.	CO's
I	*Introduction*: Introduction to IC Technology –MOS, PMOS, NMOS, CMOS & Bi-CMOS technologies. *CMOS Fabrication and Layout:* Fabrication Process, Layout Design rules, Gate Layout, Stick Diagrams. *VLSI Design Flow:* VLSI Design Consideration, Hierarchy, Concepts of Regularity, Modularity and Locality, VLSI Design Approaches, Methodologies and Classifications, VLSI Design Qualities.	08	1
II	*MOS Transistor:* The Metal Oxide Semiconductor (MOS) structure, The MOS System under external bias, Structure & Operation of MOS transistor, MOSFET Current-Voltage characteristics. MOSFET scaling effects, MOSFET capacitances.	07	1,2,3
III	*MOS inverter Static characteristics:* Introduction, Resistive load Inverter, Inverter with n-type MOSFET load, CMOS Inverter. *MOS inverters Switching characteristics and Interconnect Effects*: Delay-time definitions, Calculation of Delay times, Inverter design with delay constraints, Estimation of Interconnect Parasitic, Calculation of interconnect delay, Switching Power Dissipation of CMOS Inverters.	08	2,3
IV	*Combinational MOS & Dynamic Logic circuits*: Combinational Logic, NAND Gate, NOR Gate, Compound Gates, Transmission Gates, Tristate. Sequential MOS Logic circuits: Introduction, Behaviour of Bi-stable elements, The SR latch circuit, clocked latch & Flip-flop circuit, CMOS D-latch & Edge triggered flip-flop. *Dynamic Logic Circuits*: Introduction, Basic principles of pass transistor circuits, Voltage Bootstrapping, Synchronous Dynamic Circuit Techniques, CMOS Dynamic Circuit Techniques. High-performance Dynamic CMOS circuits.	10	1,2,3
V	*IC Fabrication & layout designing using EDA tools, VHDL based design:* HDL and its components, Language Fundamentals, Behavioural and RTL style of modelling, Data Flow style of description, Structural style, Test-Bench.	07	3,4
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

Text Book-

- Kang & Leblebici, CMOS Digital Integrated Circuits, Mcgraw Hill Publication 3e
- J. Bhaskar, A Vhdl Primer, Prentice Hall.

Reference Books-

- Neil H.E. Weste, David Harris, Ayan Banerjee: CmosVlsi Design, Third Edition,
- Pearson Education.
- Neil H.E. Weste, Kamran Eshraghian: Principle Of CmosVlsi Design, Pearson Education.

• J. P. Uyemura: Chip Design For Submicron VLSI, Cengage Learning. • Philip E. Allen And Douglas R Holberg: Cmos Analog Circuit Design, Oxford • Carver Mead And Lynn Conway: Introduction To Vlsi Systems, Bs Publication. • J. P. Uyemura: Introduction To Vlsi Circuits And Systems, Wiley. • Vlsi Technology – S.M. Sze, 2nd Edition, Tmh, 2003. • Angsuman Sarkar, VLSI Design and EDA Tools 2e, Scitech Publications	
Modes of Evaluation and Rubric	
Final Exam, Mid Sem Exam, Quiz, Assignments, Practical, External/Internal Viva, Attendance	
Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	Prof. Niraj Kumar

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (Engineering College), VIDISHA M.P.

(An Autonomous Institute Affiliated to RGPV Bhopal)

Programme: B.Tech. Electronics and Communication Engineering, Vth Semester

Semester/Year : V/III			Program: B.Tech.								
Subject Category: **DLC**		Subject Code: **EC506**			Subject Name: **Simulation Lab – II (LabVIEW)**						
Maximum Marks Allotted								Contact Hours			**Total Credits**
Theory				Practical			**Total Marks**				
ES	MS	Assignment	Quiz	ES	LW	Quiz		L	T	P	
-	-	-	-	30	10	10	50	-	-	4	2

Prerequisites:

Basic Mathematics, Digital Logic Design, Network Analysis, Signal and System, Digital Signal Processing

Course Objective:

The objective of this course is to introduce the fundamental concepts of virtual instrumentation and to develop basic VI programs. The objective of this course is twofold. First one is to familiarize the students with LabVIEW environment, its uses and implementation methodologies. Second one is to educate students on implementation of in area of signal, image, and automation and control industry using LabVIEW software.

Course Outcomes:

Upon completion of this course, the student will be able to-

CO1: Understand of Virtual Instrumentation.
CO2: Understand Basic Concept of graphical programming.
CO3: Understand difference between Virtual Instruments and Traditional Instruments.
CO4: Analyze and design different type of VI programs and data acquisition.
CO5: Demonstrate the use of LabVIEW for signal processing, image processing etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1		2	1	1			1			1
CO2	3	2	2		1							
CO3	3	3	1	1	1							
CO4	3	2	3	3	1	1						
CO5	3	2	3	3	1	1			1		1	1

Contents:

Module	Descriptions	Hrs.	CO's
I	Introduction to Virtual Instrumentation and LabVIEW, Evolution or history of Virtual Instrumentation, Drawbacks of Recent Approaches, Conventional Virtual Instrumentation versus Traditional Instruments, Advantages and Applications of LabVIEW	04	1
II	Programming Techniques: Block diagram and Architecture of Virtual Instruments, VIS, Arrays, Clusters, and Graphs.	04	2
III	Sub VIS, Loops & Charts, Case & Sequence structures, Feedback Nodes, Formula Nodes,	06	3,4
IV	Local and Global Variable, String, State Machines, File Input/output and String Handling.	04	4,5
V	Advanced analysis tools such as Fourier transforms, Power spectrum, Correlation methods, Windowing and filtering and their applications in signal and image processing	06	5
Guest Lectures (if any)			
Total Hours		24	

Suggestive **list of experiments:**

1. Basic Arithmetic Operations and Mathematical Expression.
2. Boolean Indicators, Logic Gates and Boolean Operations (OR, AND and NOT)
3. Conversions of Radian to Degree and Degree to Radian.
4. Binary to Decimal Conversion and vice versa.
5. Array and Various Array Operations.
6. Sum of 'N' Numbers using Loops (For and While)
7. Factorial of a Give Number Using While Loop
8. Case Structure
9. Sorting Even Numbers using While Loop in an Array
10. Design and implements Half adder and Full adder
11. Bundle and Unbundle Cluster
12. Formula Node and Application using Formula Node
13. Design Seven Segment display
14. Design Water Tank Problem
15. Simulation of Signals and Spectral Analysis
16. Sampling, Aliasing, Quantization and Reconstruction

Text Books-

1. S. Gupta and J. John, *Virtual Instrumentation using LabVIEW*, Tata McGraw-Hill Publishing Company Limited, 2010.
2. Jovitha Jerome, *Virtual Instrumentation Using Labview*, Prentice Hall of India, 2010

Reference Books-

1. Bruce Mihura, *LabVIEW for Data Acquisition*, Prentice Hall of India, 2013
2. R Bitter, T Mohiuddin, M Nawrocki, *LabVIEW: Advanced Programming Techniques*, CRC Press, 2007

Modes of Evaluation and Rubric

Laboratory work is prescribed; the practical marks are 50, out of which 30 marks will be awarded for viva voce, 10 marks for lab work and 10 marks for Quiz.

Recommendation by Board of studies on	Date:
Approval by Academic council on	Date:
Compiled and designed by	Name 1.**Dr. D.K.Shakya**
Checked and approved by	Name 1. Dr Ashutosh Datar