Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly known as West Bengal University of Technology)
Syllabus of B.Tech in Electronics and Computer Science
Effective from academic session 2023-2024

Semester-IV

Course Code: ES-EC401	**Category: Engineering Science Core**
Course Name: Electromagnetics and Antenna	**Semester:4**
L-T-P: 3-0-0	**Credit:3**
Total Lectures: 35	
Pre-Requisite: Knowledge of differential and Integral calculas	

Objectives:

1. To introduce the basic mathematical concepts related to electromagnetic vector fields

2. To impart knowledge on the concepts of Electromagnetic fields, electric potential, energy density and their applications. Magneto static fields, magnetic flux density, vector potential and its applications.

3. To know different methods of emf generation and Maxwell's equation, Electromagnetic Waves and characterizing parameters.

4. To develop understanding of various types of antenna radiation mechanism

Module No.	Description of Topics	Contact Hrs
1.	Introduction: Co-ordinate systems and transformation, Cartesian coordinates, Circular cylindrical coordinates, Spherical coordinates & their transformation. Differential length, area and volume in different coordinate systems. Solution of problems. Introduction to Vector calculus: DEL operator, Gradient of a scalar, Divergence of a vector & Divergence theorem, Curl of a vector & Strokes theorem, Laplacian of a scalar, Classification of vector fields, Helmholtz's theorem. Solution of problems.	8
2.	Scalar and Vector fields, Coulomb's Law and concept of Electric Field, Divergence, the Divergence Theorem and Gauss' Law, Concept of Electrostatic Potential, Poisson's Equation, Energy in the Field, Solution of Laplace's Equation and Poisson's Equation in 1-D Capacitance. Scalar and Vector fields, Coulomb's Law and concept of	8

	Electric Field, Divergence, the Divergence Theorem and Gauss' Law.	
3.	Force due to a Magnetic field, Force due to combined Electric and Magnetic fields, Biot-Savart Law, calculation of Magnetic Field for simple coil configurations, Ampere's Law, Magnetic flux, Stokes theorem, Magnetic materials, magnetic boundary conditions, Solution of problems. Electromagnetic fields: Faraday's law, Transformer and motional emf, Displacement current, Maxwell's equations, Time varying Potential, Time harmonic fields. Solution of problems.	6
4.	Electromagnetic wave propagation: Wave equation, Wave propagation in lossy dielectric, Plane waves in loss less dielectric, Plane wave in free space, Plane wave in good conductor, Skin effect, Skin depth, Power & Poynting vector, Reflection of a plane wave at normal incidence, reflection of a plane wave at oblique incidence, Polarization. Solution of problems.	4
5.	Transmission line: Concept of lump & distributed parameters, Line parameters, Transmission line equation & solutions, Physical significance of solutions, Propagation constants, Characteristic impedance, Wavelength, Velocity of propagation. Solution of problems.	4
6.	Introduction, basic antenna parameters, patterns, beam area, radiation intensity, beam efficiency, directivity and gain, antenna apertures, effective height, bandwidth, radiation, efficiency, antenna temperature and antenna field zones. Horn antennas, rectangular horn antennas, helical Antenna, Yagi-Uda array, corner reflectors, parabolic reflectors, log periodic antenna, lens antenna, antenna for special applications – sleeve antenna, turnstile antenna, omni- directional antennas, antennas for satellite antennas for ground penetrating radars, embedded antennas, ultra wide band antennas, plasma antenna, high-resolution data, intelligent antennas, antenna for remote sensing	5

Course Outcomes:

At the end of the course, students will demonstrate the ability

1. To understand the basic laws of electromagnetism.
2. To obtain the electric and magnetic fields for simple configurations under static conditions.
3. To analyze time varying electric and magnetic fields.
4. To understand Maxwell's equation in different forms and different media.
5. To understand the propagation of EM waves.
6. To understand the radiation mechanism of EM waves by different antennas and their radiation characteristics.

Text/References:

1. Principles and Applications of Electromagnetic Fields - Plonsey, R.and COllin, R.E., McGraw Hill. 1961.

2. Engineering Electromagnetics - William H. Hayt, Jr. Fifth Edition.TMH.1999

3. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication,

2014.

4. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd,

New Delhi, 2009.

5. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
6. Antennas and Wave Propagation by John Kraus and Ronald Marhefka

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Course Code: PC-ECS401	**Course Type: Professional core**
Course Name: Object oriented programming	**Semester: 4th**
L-T-P: 3-0-0	**Credit: 3**
Total Lectures: 30	

Course Objective:

1. To understand Object Oriented Programming concepts and basic characteristics of Java. **[BL2]**
2. To demonstrate the principles of inheritance, interfaces and packages. **[BL3]**
3. To describe exceptions, I/O streams and multithreading. **[BL2]**
4. To design simple Graphical User Interfaces. **[BL6]**

Object oriented concepts [5 L]
Concepts of object oriented programming language, Major and minor elements, Object, Class, relationships among objects, aggregation, links, relationships among classes-association, aggregation, using, instantiation, meta-class, grouping constructs.

Class & Object proprieties [10L]
Basic concepts of java programming – advantages of java, byte-code & JVM, data types, access specifiers – public, private, protected, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested & inner classes

Basic string handling concepts, concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input using BufferedReader & Scanner classes.

Reusability properties[6L]
Super class & subclasses including multilevel hierarchy, process of constructor calling in inheritance, use of super and final keywords with super() method, dynamic method dispatch, use of abstract classes & methods, interfaces. Creation of packages, importing packages, member access for packages.

Exception handling & Multithreading [5L]
Exception handling basics, different types of exception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes. Basics of

multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread synchronization, inter-thread communication, deadlocks for threads, suspending & resuming threads.

Applet Programming (using swing) [4L]

Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use of repaint(), getDocumentBase(), getCodeBase() methods, layout manager (basic concept), creation of buttons (JButton class only) & text fields.

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Microprocessor and Microcontrollers
Contact Hours: 3L/week
Credit Points: 3

Course Title: Microprocessor and Microcontrollers	Code: PC-ECS402
Type of Course: Theory	Course Designation: Compulsory
Semester: 4th	Contact Hours: 3L/week
Continuous Assessment: 25 Marks Attendance: 05 Marks	Final Exam: 70 Marks
Credit Points: 3	

COURSE OBJECTIVE:

1. To understand the architecture of typical microprocessors and microcontrollers.
2. To understand the Assembly language program.
3. To understand the interfacing of microprocessors with external devices.
4. To design a microprocessor-based system.

PRE-REQUISITE:

1. Basic compilation process.
2. Concept of Analog & Digital electronics (ES-EC301).
3. Computer Organization (PC-ECS302).

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UNIVERSITY SYLLABUS:

Unit	Content	Hrs/Unit
1	**Introduction to Microprocessor:** Microprocessor architecture and its operations, Memory, Input & output devices, 8-bit Microprocessor (8085 MPU)- architecture, Pins and signals, Timing Diagrams, Logic devices for interfacing, Memory interfacing, I/O Interfacing, Instruction -format and addressing modes – Assembly language programs, Stack, Subroutines, Counter & Delay, 8085 Interrupts.	14

2	**16-bit Microprocessors (8086):** Architecture, Pin Description, Physical address, segmentation, memory organization,	8
3	**Peripheral Devices and their interfacing with 8085:** 8255 programmable peripheral interface, 8251 USART, A/D and D/A converters.	4
4	**8051 Microcontroller:** Inside the Computer, Microcontrollers and Embedded Processors, Block Diagram of 8051, PSW and Flag Bits, 8051 Register Banks and Stack, Internal Memory Organization of 8051, IO Port usage in 8051, Types of Special Function Registers and their uses in 8051, Pins of 8051, Memory Address Decoding, 8051 Interfacing with External ROM and RAM. Instruction -format and addressing modes, 8051 assembly programming, I/O port programming, Programming 8051 Timers, Serial Port Programming, Interrupts Programming,	14

Textbook and Reference books:

1. Ramesh Gaonkar, “Microprocessor Architecture, Programming, and Applications with the 8085”,6th Edition, Penram International Publication (India) Pvt. Ltd.
2. N. Senthil Kumar, M. Saravanan, S. Jeevananthan, “Microprocessors and microcontrollers”, Oxford University Press.
3. A. K. Ray and K.M. Bhurchandani, “Advanced Microprocessors and Peripherals”, 3rd Edition, MC Graw Hill Education.
4. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, “The 8051 Microcontroller and Embedded Systems: Using Assembly and C”, Second Edition, Pearson Education, 2011.
5. Steve Furber, “ARM System –On –Chip architecture,” Addison Wesley, 2000.
6. Douglas Hall, “Microprocessors Interfacing”, Tata McGraw Hill, 1991.
7. Kenneth J. Ayala, “The 8051 Microcontroller”, Penram International Publishing, 1996.
8. D A Patterson and J H Hennessy, "Computer Organization and Design The hardware and software interface. Morgan Kaufman Publishers.
9. Soumitra Kumar Mandal, Microprocessor & Microcontroller Architecture, Programming & Interfacing using 8085, 8086, 8051, McGraw Hill Edu, 2013.

10. ARM System Developers Guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT,
Elsevier,2012.

Course Outcome:

After completion of this course, the learners will be able to

1. explain the architecture of 8085, 8086, 8051 and ARM processors.
2. do assembly language programming of 8086, 8051
3. interface different peripherals with 8086 and 8051
4. develop microprocessor/microcontroller-based systems.
5. compare microprocessor, microcontroller, PIC and ARM processors

Special Remarks:
The outcomes mentioned above are not limited. Institutes may redefine outcomes based on their program educational objective.

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Course Code: PC-ECS403	Category: Engineering science
Course Name: Communication Engineering	Semester: 4
L-T-P: 3-0-0	Credit: 3
Total Lectures: 36	
Pre-Requisite: Circuit Theory and Networks, Analog and Digital Electronic Circuits	

Course Objectives:

1. To understand the building blocks of communication systems.
2. To prepare a mathematical background for communication signal analysis.
3. To understand and analyze the signal flow in a communication system.
4. To analyze error performance of a communication system in presence of noise and other interferences.
5. To understand the concept of the spread spectrum communication system.

MODULE	DESCRIPTION OF TOPIC	HRS/UNIT
1	Basic elements of a communication system, Concept of transmitter and receiver, origin of noise and its effects in communication system, Concept and effects of SNR and its importance in system design. Linear (AM) modulation, Generation and demodulation of AM wave. Concept of DSBSC, SSBSC and brief discussion of VSBSC. Basic principle of nonlinear (FM, PM) modulation and their relations. Generation and demodulation of FM waves.	10
2	Sampling theorem, sampling rate, impulse sampling, natural & flat-top sampling, reconstruction of signal from samples, Concept of Aliasing and anti-aliasing filter. Quantization noise, Uniform quantization, non-uniform quantization, A-law and μ-law. A/D and D/A conversion techniques, Concept of Bit rate, Baud rate, M-ary encoding. Analog pulse modulation-PAM, PWM, PPM. Fundamentals of PCM, Block diagram of PCM, Linear and non-linear PCM, Basic concept of Delta modulation, Adaptive delta modulation. Introduction to DPCM. Different types of multiplexing: TDM, FDM.	8
	Basic concept of Digital communication, comparative study of digital communication and analog communication.	8

3	Encoding, coding efficiency, Line coding & its desirable properties, Different types of line coding: NRZ & RZ, AMI, Manchester coding and their spectra. Baseband pulse transmission, optimum filter, Matched filter and correlation filter, Inter Symbol Interference (ISI), Power Spectral Density (PSD) Eye pattern, Signal power in binary digital signal.	
4	Introduction to the digital modulation techniques- ASK. FSK, PSK, BPSK, QPSK, M-ary PSK and their comparisons. Basic concept of spread spectrum modulation and CDMA.	6
5	Introduction, Measurement of Information and its unit, Entropy, Mutual information, Information rate, Basic principle of error control & error correction coding.	4

Text book and Reference books:

1. Modern Digital and Analog Communication Systems, B.P. Lathi, Oxford University press
2. Communication Systems (Analog and Digital), Dr. Sanjay Sharma, S. K. Kataria & Sons
3. Analog Communication System, P. Chakrabarty, Dhanpat Rai & Co.
4. Principle of Digital Communication, P. Chakrabarty, Dhanpat Rai & Co.
5. Digital and Analog Communication Systems, Leon W Couch II, Pearson, Education Asia.
6. An Introduction to Analog and Digital Communication, Simon Haykin, Wiley India.
7. Principles of Communication Systems, Taub and Schilling, Tata McGraw-Hill Education

Course Outcomes (COs):

On completion of the course students will be able to	
CO-1	Analyze the performance of a baseband and passband communication system in terms of error rate and spectral efficiency.
CO-2	Perform the time and frequency domain analysis of the signals in a communication system.
CO-3	Select the blocks in the design of a communication system.
CO-4	Analyze performance of spread spectrum communication system.

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Course Code: PC-ECS404	**Category: Program Core**
Name: Operating Systems	**Semester:3**
L-T-P: 3-0-0	**Credit:3**
Total Lectures: 35	
Pre-Requisite: Computer Organization and Architecture	

COURSE OBJECTIVE:

- Explain the different types and structure of Operating Systems.
- Compare and contrast the performance of different CPU scheduling algorithms.
- Generate algorithmic solutions to process synchronization problems.
- Illustrate operating system concepts such as process management, deadlock handling, memory management, networked processes and file systems

COURSE OUTCOMES (COs)

On completion of the course students will be able to

Course Outcomes	**CO statement**
CO1	Demonstrate the concepts of Operating System.
CO2	Explain the processes and threads for multiprogramming and multi-threading.
CO3	Illustrate program, process, system call and scheduler.
CO4	Analyze the system model for process, thread, deadlock and memory management.
CO5	Identify the problems associated with resource management.
CO6	Combine existing algorithms for solving real life problems.

Unit	**Content**	**Hrs/Unit**
1	Introduction: Concept of Operating systems, Generations of Operating Systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.	3

2	Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, Priority, RR; Multiprocessor scheduling.	8
3	Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Producer - Consumer Problem, Reader's & Writer Problem, Dinning Philosopher Problem etc.	5
4	Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, and Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.	5
5	Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation– Fixed and variable partition– Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation Hardware support for paging, Protection and sharing, Disadvantages of paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO) and Least Recently used (LRU).	8
6	I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and	6

	performance. Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks	

RESOURCES:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.

2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

3. Operating System Concepts, Ekta Walia, Khanna Publishing House, New Delhi (AICTE Recommended Textbook– 2018)

4. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing

5. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley

6. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India

7. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

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Course Code: BS-BIO-401	**Category:** Engineering science
Course Name: Biology for Engineers	**Semester:4**
L-T-P: 2-0-0	**Credit:2**

Unit	content	Hrs
1	**Introduction:** Bring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Discuss how biological observations of 18th Century that lead to major discoveries. Examples from Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor.	4
2	**Classification:** Hierarchy of life forms at phenomenological level. A common thread weaves this hierarchy Classification. Discuss classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilisation -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitataacquatic or terrestrial (f) Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification.	6
3	**Genetics:** Mendel's laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring. Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Discuss about the single gene disorders in humans. Discuss the concept of complementation using humangenetics.	6
4	**Biomolecules:** Molecules of life. In this context discuss monomeric units and polymeric structures. Discuss about sugars, starch and	4

	cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids.	
5	**Enzymes:** Enzymology: How to monitor enzyme catalyzed reactions. How does an enzyme catalyzereactions. Enzyme classification. Mechanism of enzyme action. Discuss at least two examples. Enzyme kinetics and kinetic parameters. Why should we know these parameters to understand biology? RNA catalysis.	5
6	**Metabolism:** Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergoinc reactions. Concept of Keq and its relation to standard free energy. Spontaneity. ATP as an energy currency. This should include the breakdown of glucose to CO2 + H2O (GlycolysisandKrebs cycle) and synthesis of glucose from CO2 and H2O (Photosynthesis). Energy yielding and energy consuming reactions. Concept of Energy charge.	5
7	**Macromolecular analysis:** Proteins- structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements. **Microbiology:** Concept of single celled organisms. Concept of species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics.	8

References: 1) Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd

2) Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons

3) Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company

4) Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher

5) Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers

Course Outcomes: After studying the course, the student will be able to:

- Describe how biological observations of 18th Century and classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological

- Explain the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring.

- Summaries the all forms of life, classification of enzymes and distinguish between different mechanisms of enzyme action.

- Identify DNA as a genetic material in the molecular basis of information transfer and microorganisms.

- Analyse biological processes at the reductionistic level

- Apply thermodynamic principles to biological system

Laboratory:

Course Code: PC-ECS491	**Course Type: Laboratory**
Course Name: Object oriented programming lab	**Semester: 4th**
L-T-P: 0-0-2	**Credit: 1**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Total Lectures:	

Course Outcome:

1. Specify simple abstract data types and design implementations, using abstraction functions to document them.
2. Recognise features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
3. Name and apply some common object-oriented design patterns and give examples of their use.
4. Design applications with an event-driven graphical user interface.

Detailed Syllabus:

1. Assignments on class, constructor, overloading, inheritance, overriding
2. Assignments on wrapper class, arrays
3. Assignments on developing interfaces (multiple inheritance), extending interfaces
4. Assignments on creating and accessing packages
5. Assignments on exception handling
6. Assignments on multithreaded programming
7. Assignments on applet programming

Microprocessor and Microcontrollers Lab
Contact Hours: 3P/week
Credit Points: 1.5

Course Title: Microprocessor and Microcontrollers Lab	**Code: PC-ECS492**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 3rd	**Contact Hours: 3P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Credit Points: 1.5	

PRE-REQUISITE:

1. Basic compilation process.
2. Concept of Analog & Digital electronics (ES-EC301).
3. Computer Organization (PC-ECS302).

UNIVERSITY SYLLABUS:

Laboratory Experiments:	
1	a) Familiarization with 8085 & 8051 trainer kit components. b) Familiarization with 8085 & 8051 simulator on PC.
2	a) Study of prewritten programs using a basic instruction set (data transfer, Load/Store, Arithmetic, Logical) on the simulator. b) Assignments based on above
3	**Programming using Kit / Simulator for:** i)Table look-up ii) Copying a block of memory iii) Shifting a block of memory iv) Packing and unpacking of BCD numbers v) Addition of BCD numbers

	vi) Binary to ASCII conversion vii) String Matching etc.
4	Study of 8051 Microcontroller kit and writing programs for the following tasks using the kit a) Table look-up b) Basic arithmetic and logical operations c) Interfacing of keyboard and stepper motor through 8255.
5	**Interfacing with i/o modules:** a) ADC b) Speed control of mini DC motor using DAC c) Stepper motor d) Temperature sensor and display temperature e) Relay

Institute may develop experiments based on the theory taught in addition to experiments mentioned.

Text book and Reference books:

1. Ramesh Gaonkar, "Microprocessor Architecture, Programming, and Applications with
the 8085",6th Edition, Penram International Publication (India) Pvt. Ltd.
2. N. Senthil Kumar, M. Saravanan, S. Jeevananthan, "Microprocessors and microcontrollers", Oxford University Press.
3. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller
and Embedded Systems: Using Assembly and C", Second Edition, Pearson Education,
2011.
4. Kenneth J. Ayala, "The 8051 Microcontroller", Penram International Publishing, 1996.

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to

1. Use a flowchart or algorithm to develop the programming logic and notion.
2. Troubleshoot assembly language programs along with interactions between software and hardware.
3. Practice the interfacing of microprocessors with peripheral devices for various applications
4. Work effectively in a team

Special Remarks:

The outcomes mentioned above are not limited. Institutes may redefine outcomes based on their program educational objective.

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Course Name: Communication Engineering Lab	**Course Code: PC-ECS493**
Type of Course: Practical	Course Designation: Compulsory
Semester: 4	Contact Hours: 3P/Week
Continuous Assessment: 40 Marks	Final Exam: 60 marks
Writer: Course Coordinator	Credit: 1.5

Nos.	**Name of the Experiment**
1	Observation of modulation index in Amplitude modulation and construction of envelope for different values of modulation index.
2	Observation and generation of Double Side Band Suppressed Carrier (DSB-SC) signal.
3	Observation and generation of Single Side Band Suppressed Carrier (SSB-SC) signal.
4	Observation of Frequency Modulation & Demodulation and calculation of modulation index.
5	Generation of Time Division Multiplexing (TDM) & de multiplexing interlacing several sampled signals using PAM.
6	To interpret Pulse Amplitude Modulation (PAM) and demodulation for various modulating voltages.
7	Generation of Pulse Width Modulation (PWM) and demodulation for various modulating voltages.
8	To analyze a FSK modulation system and interpret the modulated and demodulated Waveforms.

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Course Objectives:

The course objectives are to enable the students to

1. Understand the fundamental concepts of communication systems.
2. Understand and compare different analog modulation schemes.
3. Understand and compare different digital modulation schemes.
4. Understand the design trade-offs and performance of communications systems.
5. Learn about practical communication systems.

Course Outcomes (COs):

On completion of the course students will be able to	
CO1	Learn signal and linear time invariant system properties.
CO2	Study, design, and build modulation systems examining trade-offs in different communication systems.
CO3	Perform experiments in converting analog information into digital data via sampling, quantization, and coding.
CO4	Choose necessary modulation technique for specific signal transmission.

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Course Name: Advanced Skill and Personality Development Lab	**Course Code: HM-HU481**
	Semester:4
L-T-P: 0-0-2	Credit:1
Total Lectures: 42	

Pre-Requisite: Students are expected to have basic English proficiency, critical thinking skills, and a willingness to improve communication abilities through active participation and collaboration.

Objective:

This course aims to equip students with effective communication skills through listening, speaking, reading, and writing modules. It focuses on enhancing self-development, ethical practices, and interview readiness while preparing students for competitive examinations and professional challenges. The curriculum emphasises to enable students to progress from understanding and applying concepts to analyzing, evaluating, and creating solutions for real-world challenges in communication and career development.

Detailed Course Outlines: Introductory lecture is to be given to the students so that they get a clear idea of the syllabus and understand the need for having such a practice lab in the first place **(3 hours)**

MODULE	**DESCRIPTION OF TOPIC**	**HRS/UNIT**
1	Listening Skills: Listening comprehensions with audio exercises using the Language Lab PA system. Audios & Videos related to current affairs will be shown from sources like British Council, BBC, NDTV, TOEFL, IELTS etc to hone the listening skills of students so that they may identify important points and effective strategies in preparation for their speaking skills.	5
	Speaking Skills: Prerequisite for Speaking Activities: Mastering Linguistic, Paralinguistic features,	

2	Pronunciation, Body Language Voice modulation Stress, Intonation, Pitch & Accent of connected speech. Public Speaking- Various topics in current affairs, lateral thinking through One Minute Speech, Debate, Group Discussion, Conversation Practice Sessions: (To be done as real life interactions) 1. One Minute Speech: Students will be taught to organize their thoughts and ideas and present them in a coherent manner in front of an audience on any given topic. While giving the speech they will be taught to demonstrate correct body language, voice modulation and appropriate pronunciation 2.Debate: a) Introduction to Debate Format - Students will learn the structure of debates, including proposition and opposition teams, rebuttals, and conclusions. b) Topic Selection and Research - Students will be guided on selecting topics, conducting research, and gathering evidence. c) Argument Development - Focus on framing logical arguments and counterarguments. d) Practice Sessions - Mock debates will allow students to rehearse their arguments and responses. e) Feedback and Assessment - Evaluating performance based on clarity, reasoning, teamwork, and delivery. 3. Group Discussion: The students are made to understand proper language, etiquette and strategies for group discussion. Audio -Visual aids as pre-requisite for group discussion will be used to hone listening skills. After wards the class is divided into groups and the students have to discuss on given topic. a) Teaching Strategies of Group Discussion b) Introducing Different Models & Topics of Group Discussion c) Exploring Live /Recorded GD Sessions for mending students' attitude/approach & for taking remedial measure	12

	4. Mock Interview: Students are taught the strategies of a successful interview. They then have to face rigorous practices of mock-interviews. a) Training students to face Job Interviews confidently and successfully b) Arranging Mock Interviews and Practice Sessions for integrating Listening Skill with Speaking Skill in a formal situation for effective communication	
3	Reading Skills: News Paper Reading: Students are advised to how to read current affairs from leading newspapers, comprehend and summaries the news articles and express their opinion in their own words. This activity will help the students immensely to speak during one minute speech and group discussion.	5
4	Self-Development and Assessment- Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity	6
5	Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory.	5
6	Writing Skills: Resume Writing: Students will be taught how to write a professional resume for campus placement & future career.	3
7	Competitive Examination: a) Making the students aware of Provincial /National/International Competitive Examinations b) Strategies/Tactics for success in Competitive Examinations c) SWOT Analysis and its Application in fixing Target	6

Text book and Reference books:

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New

York, 2004

2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN

0312406843)

3. Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House

4. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.

5. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.

6. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN:

07828357-4)

7. Adrian Duff et. al. (ed.): Cambridge Skills for Fluency

A) Speaking (Levels 1-4 Audio Cassettes/Handbooks)

B) Listening (Levels 1-4 Audio Cassettes/Handbooks)

Cambridge University Press 1998

8. Mark Hancock: English Pronunciation in Use

9. Audio Cassettes/CD'S OUP 2004

10. YouTube, Wikipedia, .edu sites and other Internet sources.

On completion of the course students will be able to	
CO-1	**Understand** and **Identify** key points and strategies in audio and video content related to current affairs to enhance comprehension and prepare for effective communication.
CO-2	**Apply** linguistic and paralinguistic techniques, including pronunciation, voice modulation, stress, and intonation, to deliver structured speeches and confidently participate in debates, group discussions, and mock interviews.
CO-3	**Develop** confidence in public speaking through activities such as debates, group discussions, and mock interviews, effectively presenting arguments

	and ideas in professional and social contexts.
CO-4	**Analyze** and **interpret** information from newspapers and articles on current affairs students to **summarize** key points and express opinions in a coherent and organized manner during group discussions and speaking exercises.
CO-5	**Assess** personal skills, **formulate** career goals, and **apply** strategies for time management, creativity, and problem-solving to support personal and professional development.
CO-6	**Demonstrate** appropriate business ethics, etiquette, and formal communication skills through professional email and telephone interactions, emphasizing clarity and professionalism and D**evelop** professional resumes while **practicing** interview strategies through mock sessions to ensure career readiness and success in campus placements, competitive examinations and future career opportunities.

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly known as West Bengal University of Technology)
Syllabus of B.Tech in Electronics and Computer Science
Effective from academic session 2023-2024

Course Code: MC-ES401	**Category: Mandatory Activity/Course**
Name: Indian Constitution	**Semester:4**
L-T-P: 1-0-0	**Credit: 0**
Total Lectures: 30	
Pre-Requisite: NIL	
COURSE OUTCOMES (COs)	
On completion of the course students will be able to	

Course Outcomes	**CO statement**
CO1	Understand and infer the significance of the constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution.
CO2	Outline the importance of fundamental rights as well as fundamental duties.
CO3	Relate the functioning of Union, State and Local Governments in the Indian federal system.
CO4	Explain the procedure and effects of emergency, composition and activities of election commission and amendment procedure

Unit	**Content**	**Hrs./Unit**
1	**Introduction to Constitution:** Meaning and importance of the Constitution, salient features of Indian Constitution. Preamble of the Constitution. Fundamental rights- meaning and limitations. Directive principles of state policy and Fundamental duties -their enforcement and their relevance.	5
2	**Union Government Union Executive-** President, Vice-president, Prime Minister, Council of Ministers. Union Legislature Parliament and Parliamentary proceedings. Union Judiciary-Supreme Court of India – composition and powers and functions.	6

3	**State and Local Governments:** State Executive- Governor, Chief Minister, Council of Ministers. State Legislature-State Legislative Assembly and State Legislative Council. State Judiciary-High court. Local Government-Panchayati raj system with special reference to 73rd and Urban Local Self Govt. with special reference to74thAmendment.	5
4	**Election provisions, Emergency provisions, Amendment of the constitution:** Election Commission of India-composition, powers and functions and electoral process. Types of emergency-grounds, procedure, duration and effects. Amendment of the constitution- meaning, procedure and limitations.	6
5	**HUMAN RIGHTS:** Functioning of different human rights organizations in the country and the National Human Rights Commission in India, Relationship between Human Rights and Fundamental freedom. NHRC and its working, other organizations working for the cause, Relationship between Human Rights and fundamental freedom, addressing rights of women, children, disabled and tribals. Comparing diverse issues of tribals, refugees and prisoners. Challenges faced by legal academicians, activists and NGOs in effective implementation of Human Rights and laws. Various perspectives and role of Media, Laws safeguarding Human Rights and its implementation.	8

COURSE OBJECTIVE:

- Course Outcome: After completion of this course, the learners will be able to

1. Different features of Indian constitution.
2. Power and functioning of Union, state and local self-government.
3. Structure, jurisdiction and function of Indian Judiciary.
4. Functioning of local administration starting from block to Municipal Corporation.
5. Study and learn in detail about NHRC and Human Rights

Textbooks

1. M.V.Pylee, “Introduction to the Constitution of India”, 4th Edition, Vikas publication, 2005.

2. Durga Das Basu (DD Basu), “Introduction to the constitution of India”, (Student Edition), 21tst edition, Prentice-Hall EEE, 2008.

3. Indian polity, M, Laxmikanth, MC Graw Hill education, 5th Edition.

Reference Book

1. Merunandan, “Multiple Choice Questions on Constitution of India”, 2nd Edition, Meraga publication, 2007.