

Shiksha Mandal's
Bajaj College of Science, Wardha
 (An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur)

SYLLABUS FOR B.Sc. (ELECTRONICS) PART III
*(Approved in BoS Meeting held on 11.03.2025 to be implemented from the academic
 Session 2025-26)*
B.Sc. PART III - SEMESTER V

Course Name: DSC-V Electronic Communication
Course code: UEL350T

Credits: 4

No. of Hrs.: 60

Course Objective and Course Outcome

SN	Course Objectives	Course Outcome
	Students will learn:	After successful completion of the course student will be able to:
1	Fundamentals of electronic communication and various modulation and demodulation techniques of communication.	Use of different modulation and demodulation techniques used in analog communication and identify and solve basic communication problems.
2	The concept and theory of propagation of signals and the various characteristics of different types of antennas.	Understand about various types of propagation signals. Analyze the radiation mechanisms of antennas and demonstrate knowledge of antennas in communication systems.
3	The Concepts of digital communication and various techniques used in digital communication	Understand the process of digital communication and to implement it.
4	The basic elements of digital, optical fiber system, FAX and cellular communication.	Understand the concept and operation of digital, optical fiber system, FAX and cellular communication

Unit-I: Introduction to Electronic communication, block diagram of communication system, Types of communication: analog, digital, simplex, duplex; baseband, modulated, concept of modulation, need for modulation, types of modulation (AM, FM, PM), AM Modulation, modulation index, mathematical equation, Power in AM. Application.

Unit-II: AM receivers Block diagram of Tuned Radio Frequency receiver and its working, Block diagram of AM super heterodyne receiver and its working, Characteristics of AM radio receiver- Sensitivity, selectivity, fidelity definitions, Image frequency and its rejection, Demodulation of AM signal, Diode detector, Need of AGC & its types – simple, delayed

Unit-III: Frequency Modulation, mathematical representation of FM & its meaning, direct FM Generation using FET, Concept of Pre-emphasis & De-emphasis FM receiver: Block diagram and explanation of FM Super heterodyne radio receiver, Balanced slope detector.

Unit-IV: Digital communication: Introduction, synchronous, asynchronous transmission, Shannon theorem, ASK, FSK, and PSK modulation.

Unit-V: Propagation modes of signals: ground waves, sky waves, Ionosphere and satellite; antenna fundamentals, basic principles and types.

Unit-VI: Fiber optic communication system, Advantages of FOC, concept of Fax, concept of cellular telephone, block diagram of cellular telephone, advantages

B.Sc. PART III - SEMESTER V

Course Name: DSC-V Electronic Communication Practical

Course code: UEL350P

Credits: 2 (4Prs.)

No. of Hrs.: 60

Students are expected to perform at least 5 experiments from section A and 5 experiments from section B.

List of Practical:

Section A:

1. Study of AM Transmitter
2. Study of AM Receiver
3. Study of FM Modulation
4. Study of FM Demodulation
5. Study of FM Receiver
6. Study of narrow band amplifier using op-amp/ Transistor
7. Wire impedance measurement

Section B:

1. ASK using op-Amp
2. FSK using op-Amp
3. Study of BPSK Modulator
4. Study of BPSK Demodulator
5. Study of DPSK Modulator
6. Study of DPSK Demodulator
7. IR Link study
8. Study of Optical fiber communication

Text Books:

- 1) Kennedy G.: Electronic communication system (Mc-Graw Hill)
- 2) Dennis Roddy & John Coolen: Electronic communication (PHI)
- 3) Communication Electronics, Principles and Application, Frenzel (Mc-Graw Hill)

Web Resources:

Students are advised to make use of the resources available on the internet. Some useful links related to electronics are given below.

1. M.I.T. open course ware video lectures are available at <http://ocw.mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6-002Spring-2007/VideoLectures/index.htm>

2. www.electronics-tutorials.com
3. <http://electronics.howstuffworks.com>
4. www.science-ebooks.com/electronics
5. <http://computer.howstuffworks.com>
6. www.geocities.com/CapeCanaveral/1221/elec1.htm
7. <http://101science.com/eleclinks.htm>
8. www.electro-tech-online.com/blogs/gayan-soyza/23-useful-electroniclinks.html
9. www.discovercircuits.com/resources/tutorials.html
10. www.electronics-lab.com/
11. www.glolab.com/links/links.html

B.Sc. PART III - SEMESTER V
Course Name: DSC-VI Fundamentals of Microprocessor 8085
Course code: UEL355T

Credits: 4

No. of Hrs.: 60

Course Objective and Course Outcome

SN	Learning Objectives	Course Learning Outcomes
	Students will try to learn:	After successful completion of the course student will be able to:
1	To develop background and basic knowledge of 8085 microprocessor.	Draw and describe architecture of 8085 microprocessor.
2	To learn the importance of T state and corresponding machine cycle.	Understands the instruction cycle.
3	To learn the basic instructions of 8085	Understand the concept of microprocessor programming.
4	To learn the concept of stack and subroutine.	Write the subroutine for different tasks.
5	To know the concept of interfacing	Understand the different method of interfacing.
6	To know the different interfacing methods, DMA and basic knowledge of 8255 PPI and its interfacing to 8085 microprocessors.	Understand various interfacing schemes, DMA. Draw and describe architecture of 8255 PPI and its interfacing to 8085 microprocessors.

Unit I: Block diagram of Intel 8085, ALU, Timing and control unit, General purpose registers, Accumulator, PC, SP, IR, ID, Interrupt, Address and Data bus multiplexing

Unit II: Flags. Instruction Cycle: T-states, Fetch operation, Execute operation, Machine cycle.

Unit III: Addressing modes, instruction Set: Data transfer group, Arithmetic group, Logic group, Branch control group

Unit IV: I/O and machine control group, stack and subroutines, simple programs based on above instructions.

Unit V: Need for interfacing, modes of data transfer, synchronous and asynchronous, interrupt driven, DMA,

Unit VI: PPI 8255- Block diagram, modes of operation, control word formats.

B.Sc. PART III - SEMESTER V

Course Name: DSC-VI Fundamentals of Microprocessor 8085 Practical

Course code: UEL355P

Credits: 2 (4Prs.)

No. of Hrs.: 60

Students are expected to perform at least 5 experiments from section A and 5 experiments from section B.

Section A

1. Program for data transfer instruction,
2. Program for addition of 8-bit numbers (Hex and decimal),
3. Program for addition of 16-bit numbers (Hex and decimal),
4. Program for 8-bit subtraction,
5. Program for 8-bit multiplication,
6. Program for 1's and 2's complement of 8 bit numbers,
7. Program for masking of 4 MSB and LSB of a 8-bit numbers,
10. Program for arranging a series of numbers in ascending order,
11. Program for arranging a series of numbers in descending order,

Section B

1. Program to call a function in main program.
2. Program to understand the concept and use of stacks.
3. Program of subroutine for multiplication two numbers and its use.
4. Program to interface digital input using 8255 as input port.
5. Program to interface LED display as output port using 8255.
6. Programs on different modes of operations with 8255.
7. Program to display LED with delay using 8255.
8. Program to display digits in seven segment display using 8255. Programs on subroutines.
9. Programs to interface 8255.

REFERENCE BOOKS

1. Fundamentals of Microprocessor and Microcomputers, B.Ram, Dhanpat Rai publications
2. Microprocessor Architecture, programming and applications with 8085/8080A Ramesh S. Gaonkar, Wiley eastern ltd.

3. Introduction to Microprocessor, A. P. Mathur, Tata McGraw Hill,
4. Microprocessor and Interfacing, D. V. Hall, Tata McGraw Hill,
5. Introduction to Microprocessors, Vilas Ghodki and Satish Sharma

Web Resources

Students are advised to make use of the resources available on the internet. Some useful links related to electronics are given below.

1. M.I.T. open course ware video lectures are available at
2. <http://ocw.mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6-002Spring-2007/VideoLectures/index.htm>
3. www.electronics-tutorials.com
4. www.science-ebooks.com/electronics
5. <http://computer.howstu!works.com>
6. www.geocities.com/CapeCanaveral/1221/elec1.htm
7. <http://101science.com/eleclinks.htm>
8. www.electro-tech-online.com/blogs/gayan-soyza/23-useful-electroniclinks.html
9. www.discovercircuits.com/resources/tutorials.html
10. www.electronics-lab.com/
11. www.glolab.com/links/links.html etc

B.Sc. PART III - SEMESTER V

(Elective)

Course Name: DSE I Data Structures

Course code: UEL354T

Credits: 4

No. of Hrs.: 60

Course Objective and Course Outcome Framework

SN	Course Objectives	Course Outcomes
	Students will try to learn:	After successful completion of the course student will be able to:
1.	To understand the Lists, arrays and stacks.	Understand the fundamental of stacks, lists.
2.	To learn the recursion and its utility.	Use of recursion in different cases.
3.	To understand concept of queue and linked list.	Write algorithms based on queue and linked lists.
4.	To develop the logic for tree.	Understand the use of Tree.
5.	To understand the importance of sorting.	Write C programs for sorting using different techniques.
6.	To know the importance searching.	Understand the concept of searching.

Unit-I: Introduction: Lists: General Algorithm and operation on data structure. e.g. ADD, DELETE, MERGE, SORT, SEARCH. Arrays& Stacks: Definition and examples of arrays and stacks in C. Implementation infix, postfix & Prefix using stacks and arrays.

Unit-II: Recursion: Definition of recursion and processes, examples of recursion Translation from prefix to postfix simulation recursion.

Unit-III: Queues & linked list Definition of Queue and its representation as linked: single & double lists. Circular linked list, stack as a circular lists.

Unit-IV: Trees: Definition of trees & its family definition & representation in a diagrammatic mode. Binary representation of tree as a linked lists.

Unit-V: Sorting: Sequential sort, Binary sort, merge sort, selection sorts, Insertion sort and merging technique.

Unit VI: Searching: Binary Search, Sequentially searching, hashing, indexed search techniques.

REFERENCE BOOKS

1. Fundamentals of Microprocessor and Microcomputers, B. Ram, Dhanpat Rai publications
2. Classical Data Structures: D. Samantha. PHI, New Delhi.
3. Data Structure: LIPSCHUTZ SCHAUM OUTLINE SERIES
4. Data Structures Using C++: Y. Kanetkar
5. Data Structures Using C++: Tanenbaum
6. Data Structure (Algorithms & Programs) - Dr. Vishal M. Lichade, Sigma Solution Publication
7. Data Structures by Tremblay Sorenson

B.Sc. PART III - SEMESTER V

(Elective)

Course Name: DSE I Biomedical Instrumentation

Course code: UEL354T

Credits: 4

No. of Hrs.: 60

Course Objective and Course Outcome

SN	Course Objectives	Course Outcome
	By the end of this course, students will learn to:	After successful completion of the course, students will be able to:
1	Understand and explain the fundamentals of biomedical instrumentation systems, their sources of signals, and performance requirements.	Identify and classify biomedical signals and summarize their clinical significance.
2	Describe and analyze the origin of bioelectric signals and the principles of electrode design for physiological recordings.	Apply suitable electrodes for ECG, EEG, and EMG recordings and evaluate their performance.

3	Illustrate and interpret the working of biomedical recorders and their applications in clinical diagnosis.	Operate and interpret biomedical recorders such as ECG, EEG, EMG, and assess their diagnostic value.
4	Examine and evaluate the principles and components of MRI systems, including image reconstruction techniques and biological effects.	Analyse and compare MRI principles, components, and techniques, and evaluate their advantages and limitations.
5	Discuss and appreciate the design and applications of radiotherapy and telemetry systems in modern healthcare.	Demonstrate and justify the use of radiotherapy equipment and assess their role in medical treatment and telemedicine applications.

Unit I: Fundamentals of Biomedical Instrumentation: Sources of biomedical signals, Basic medical instrumentation system, Performance requirements of Medical Instrumentation System, Intelligent Medical Instrumentation System, biometrics.

Unit II: Bioelectric Signals and Electrodes: Origin of Bioelectric signals, Recording Electrodes, Silver-Silver Chloride Electrodes, Electrodes for ECG, EEG and EMG.

Unit III: Biomedical Recorders: Electrocardiograph (ECG), vector cardiograph (VCG), Phonocardiograph (PCG), Electroencephalograph (EEG), Electromyograph (EMG), cardiac pacemakers.

Unit IV: Magnetic Resonance Imaging System: Principles of NMR Imaging System, Image Reconstruction Techniques, Basic NMR Components, Biological Effect of NMR Imaging, Advantages of NMR, Imaging System, principle of MRI.

Unit V: Radio-therapy Equipment: Use of high voltage X-ray Machines, Development of Betatron, Cobolt-60 Machine, Medical Linear Accelerator Machine, X-ray tomography, short wave, micro-wave and surgical diathermy

Unit VI: Biomedical Telemetry and Telemedicine: Wireless Telemetry, Single Channel Telemetry Systems, Multi-channel Wireless Telemetry Systems, Multi-patient Telemetry, Implantable Telemetry Systems, Transmission of Analog Physiological Signals Over Telephone, Telemedicine.

Text Books:

- 1) R. S. Khandpur: Biomedical Instrumentation
- 2) Cromwell, Leslie: Biomedical instrumentation and measurements

Web Resources:

Students are advised to make use of the resources available on the internet. Some useful links related to electronics are given below.

1. M.I.T. open course ware video lectures are available at <http://ocw.mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6-002Spring-2007/VideoLectures/index.htm>
2. www.electronics-tutorials.com
3. <http://electronics.howstuffworks.com>
4. www.science-ebooks.com/electronics

5. [http://computer.howstu! works.com](http://computer.howstu!works.com)
6. www.geocities.com/CapeCanaveral/1221/elec1.htm
7. [http://101 science.com/eleclinks.htm](http://101science.com/eleclinks.htm)
8. www.electro-tech-online.com/blogs/gayan-soyza/23-useful-electroniclinks.html
9. www.discovercircuits.com/resources/tutorials.html
10. www.electronics-lab.com/
11. www.glolab.com/links/links.html

B.Sc. PART III - SEMESTER V

Vocational Skill Course (VSC)

Course Name: **Consumer Product Design using Timer IC**

Course code: **UEL352P**

Credits: 2 (4 Pr)

No. of Hrs.: 60

Course description:

This course covers the design of various consumer products based on IC555. This would help the student to understand the fundamentals of need based electronic circuit design for consumers. This course may lead to develop skills of circuit design and employability. This course may also be helpful for start-ups in the field of electronics as an entrepreneur.

Course Objective and Course Outcome

SN	Course Objectives	Course Outcome
	Students will learn:	After successful completion of Biomedical Instrumentation students shall be able to:
1	Timer IC application	Describe the use of timer IC
2	Various consumer product design using IC555	Design the consumer products using IC
3	To use IC for user-based products	Develop and assemble user-based products using electronic components

Unit I: Construction, Principle of operation and working: Adjustable Delay On-Off Timer Circuit, Automatic Water Level Controller Circuit, Electronic Dog Whistle, Smoke Sensor System

Unit II: Construction, Principle of operation and working: Study and repair of hearing aid, Dome Lamp Dimmer, Light Sensor and Darkness Detector Circuit, Periodically On-Off Mosquito Repellent, Touch On-Off Sensor Switch Circuit

Unit III: Construction, Principle of operation and working: Water Pump Controller, Water Overflow Alarm, Auto Reset Proximity Detector, Wire Loop Breaking Alarm Signal for burglars, Hidden Active Cell Phone Detector

List of Practical:

1. Adjustable Delay On-Off Timer Circuit
2. Automatic Water Level Controller Circuit
3. Electronic Dog Whistle
4. Smoke Sensor System
5. Study and repair of hearing aid
6. Dome Lamp Dimmer
7. Light Sensor and Darkness Detector Circuit
8. Periodically On-Off Mosquito Repellent
9. Touch On-Off Sensor Switch Circuit
10. Water Pump Controller
11. Water Overflow Alarm
12. Auto Reset Proximity Detector
13. Wire Loop Breaking Alarm Signal for burglars
14. Hidden Active Cell Phone Detector

Reference Books:

1. Ramakant Gaikwad, Op-Amps and Linear Integrated Circuits
2. R.M. Marston, Timer-Generator Circuits Manual
3. D. Roy Choudhary, Linear Integrated Circuits

* * *