Estd. 1962
"A++" Accredited by NAAC (2021)
With CGPA 3.52

SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA
PHONE:EPABX-2609000, www.unishivaji.ac.in, bos@unishivaji.ac.in
शिवाजी विद्यापीठ, कोल्हापूर -४१६००४,महाराष्ट्र
दूरध्वनी-ईपीएबीएक्स -२६०९०००, अभ्यासमंडळे विभाग दुरध्वनी ०२३१—२६०९०९४
०२३१—२६०९४८७

Ref.No.SU/BOS/Science/434 **Date: 15/07/2025**

To,

The Principal,
All Concerned Affiliated Colleges/Institutions
Shivaji University, Kolhapur.

Subject: Regarding revised syllabi of B.Sc. Part-II (Sem.III & IV) degree programme under the Faculty of Science and Technology as per NEP-2020 (2.0)

Ref: No.SU/BOS/Science/270 & 271 Date: 03/05/2025 Letter.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the syllabi, nature of question paper of B.Sc. Part-II (Sem.III & IV) degree programme under the Faculty of Science and Technology as per NEP-2020 (2.0).

B.Sc.Part-II (Sem. III & IV) as per NEP-2020 (2.0)			
1.	Botany	8.	Geology
2.	Statistics	9.	Zoology
3.	Mathematics	10.	Chemistry
4.	Microbiology	11.	Electronics
5.	Plant Protection	12.	Industrial Microbiology
6.	B.A./B.A.B.Ed. Geography	13.	Biotechnology(Voc/Opt)
7.	Biotechnology(Entire)		

This syllabus, nature of question and equivalence shall be implemented from the academic year 2025-2026 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in NEP-2020@suk(Online Syllabus)

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2025 & March/April 2026. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Dy Registrar
Dr. S. M. Kubal

Encl: As above

for Information and necessary action

Copy to:

1	Dean, Faculty of Science & Technology	6	Appointment Section A & B
2	Director, Board of Examinations and Evaluation	7	I.T.Cell /Computer Centre
3	Chairman, Respective Board of Studies	8	Eligibility Section
4	B.Sc.-M.Sc. Exam Section	9	Affiliation Section (T.1) (T.2)
5	Internal Quality Assurance Cell (IQAC Cell)	10	P.G. Seminar Section

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शिवाजी विद्यापीठ, कोल्हापूर -४१६००४,महाराष्ट्र
दूरध्वनी-ईपीएबीएक्स -२६०९०००, अभ्याससमंडळे विभाग दुरध्वनी ०२३१—२६०९०९४
०२३१—२६०९४८७

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B.Sc.Part-II (Sem. III & IV) as per NEP-2020 (2.0)			
1.	Botany	8.	Geology
2.	Physics	9.	Zoology
3.	Statistics	10.	Chemistry
4.	Mathematics	11.	Electronics
5.	Microbiology	12.	Drug Chemistry
6.	Plant Protection	13.	Industrial Microbiology
7.	Astrophysics and Space Science	14.	Sugar Technology (Entire)

This syllabus, nature of question and equivalence shall be implemented from the academic year 2025-2026 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in NEP-2020@suk(Online Syllabus)

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Yours faithfully,

By Registrar
Dr. S. M. Kubal

Encl: As above

for Information and necessary action

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Estd. 1962 NAAC 'A++' Grade

Faculty of Science and Technology
Syllabus For

B. Sc. Electronics
Part – II (Sem III & IV)

(To be implemented from June 2025 onwards)

SEMESTER III

B. Sc. II – Electronics
Semester- III
Electronics Paper- V (Major)
DSC IV – Sensors and Transducers (Total Marks 50)
Credits: 02 (Marks 50) Hours: 30

Course Outcome:

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

1. Students will be able to understand the working of sensors and transducers
2. Students can select the particular sensor according to application.

Unit	Contents	Hours Allotted
1	**Introduction to Sensors** Definition, types of sensors – contact and non-contact, active and passive sensors, based on electrical characteristics resistive, capacitive, inductive, current, voltage liner, non-linear sensors analogue sensor and digital sensors. Direct indirect measurement, output binary or continuous, Characteristics of sensors: Accuracy, precision, resolution, repeatability, hysteresis, sensitivity, stability, drift, response time, frequency response Industrial interfacing standards and communication protocols: industrial standard (4 to 20 ma 0 to 20 ma sensors and), international standard IEC specifications, packaging IP65 and IP68 sensor ratings, power supply requirements. communication protocol: RS232, RS485 SPI, IIC and one wire communication protocol. concept of smart sensors.	8
2	**Temperature Sensors:** Resistance vs. temperature characteristics for different materials, Thermistors – NTC and PTC, Thermocouples - thermoelectric effects, types of thermocouples (J type and K type), RTD, PT100, PT 100 two wire, three wire, four-wire, semiconductor-based temperature sensors, Pyrometric sensors- infrared temperature sensor, thermal imaging, **CASE STUDY and Application**: Digital temperature sensors LM35, AD590, DS18B20, DHT 11/DHT22 and infrared sensor module or similar type of sensors. Temperature measurement systems and Industrial, domestic, scientific etc. applications of temperature sensors	7
3	**Displace and Force Measurement** working principle measuring displacement, Capacitive and inductive transducers, Displacement Sensor (LVDT), eddy current, Ultrasonic Displacement Sensors, optical displacement sensors(Laser and IR), Pressure- definition and types of pressure, units of pressure, mechanical pressure measurement- Diaphragm Gauge, piezoresistive pressure sensors, inductive pressure sensors, capacitive pressure sensors, Force weight and torque: the relation between force weight and torque Strain Sensors – strain gauges, its principle, applications, types of strain gauges, Load cells, type of load cell, Piezo-electric sensors, Motion sensors. **Case study and Applications:** HC-SR04 or similar ultrasonic sensor for	7

	distance measurement, IR sensors for distance measurement, inductive/ capacitive sensor, HX711 or similar interface with a loadcell for weight, force and pressure measurement. Industrial, domestic, scientific, etc. applications of displacement sensor	
4	**Level and Flow Measurement Sensors** Basic principles of level measurement, point level and continuous level measurement, mechanical- float type sensors, conductive capacitive, inductive/ magnetic level sensors, ultrasonic, optical, Hydrostatic pressure sensors, **Basic principle of flow meter**, Differential pressure flow meters, Variable area flow meter, Volumetric flow meter, Hotwire anemometer, Magnetic and ultrasonic flow meter, Rota meter, Hall effect transducer working and measurement techniques. Optical flowmeter **Case study and Applications:** HC-SR04 or similar ultrasonic sensor as level sensor, resistive level sensor, LDR as an optical sensor for level measurement, YF-S201 Water Flow Measurement Sensor or a similar sensor for flow measurement. Industrial, domestic, scientific, etc. applications of level and flow sensors	8

Reference Books

1. Sensors and Transducers by D. Patranabis**:** PHI Learning; 2nd edition
2. Sensors and Instrumentation by Dr. O.N. Pandey, Publisher: S.K. Kataria & Sons, Edition 1st 2013
3. Sensors and Instrumentation, by Dr J.P. Navani and sonal Sapara S. Chand & company New Delhi (1 January 2012)

B. Sc. II – Electronics
Semester- III
Electronics Paper- V (Minor)
DSC IV – Communication Electronics - I (Total Marks 50)
Credits: 02 (Marks 50) Hours: 30

Course Outcome:

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

1. Students will be able to understand the working Electronic Communication Systems.

2. Students will learn different types of analog modulations and satellite communication.

Unit	Contents	Hours Allotted
1	**Basics of Electronic Communication**: Communication systems means and modes, basic building blocks of electronic communication system. Working of TRAI for frequency allocation. Electromagnetic communication spectrum. Channels and base band signals, Definition of noise and its types, signal-to-noise (S/N) ratio.	7
2	**Basics of Amplitude Modulation-Demodulation:** Need for modulation, Basics of Amplitude Modulation (AM), modulation index. Amplitude Demodulation (diode detector). and Qualitative idea of Super heterodyne AM radio receiver.	7
3	**Basics of Frequency Modulation-Demodulation:** Basics of Frequency Modulation (FM) and Phase Modulation (PM), equivalence between FM and PM. Generation of FM using VCO, FM detector (Slope detector), and Qualitative idea of Super heterodyne FM radio receiver.	8
4	**Introduction to Communication and Navigation System:** **Satellite communication** Introduction, Need, Geosynchronous satellite orbits, geostationary satellite, advantages of geostationary satellite. Satellite visibility, transponders (C- Band), path loss, ground station, simplified block diagram of earth station. Uplink and down link.	8

Reference Books:

• Electronic Communications, D. Roddy and J. Coolen, Pearson Education India.
• Advanced Electronics Communication Systems- Tomasi, 6th edition, Prentice Hall.
• Electronic Communication systems, G. Kennedy, 3rd Edn., 1999, Tata McGraw Hill.

• Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill
• Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press

B. Sc. II – Electronics
Semester- III
Electronics Paper- VI (Major)
DSC VI – Modern Electronic Circuits (Total Marks 50)
Credits: 02 (Marks 50) Hours: 30

Course Outcome:

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

1. Understand the basic concepts, design as well as working of rectifiers and regulated power supply.
2. Understand the construction and working of Transistor applications: Amplifier and Multivibrator.

Unit	Contents	Hours Allotted
1	**Rectifiers and Regulated Power Supply** Block diagram of DC power supply, Half wave, full wave, bridge rectifiers and their performance parameters, study of filters, Types of filters (C, L and π) with circuits and waveforms. Regulators: Line and load regulation, Zener diode as voltage regulator, Fixed positive voltage regulators (78XX series), fixed negative voltage regulators(79XX series),Concept of dual power supply, variable voltage regulators (IC317), Transformer less power supply(bridge type).	8
2	**Amplifiers** Classification of amplifiers, Transistor as an amplifier, Transistor CE, CB and CC configuration, Designing of CE amplifier and study its characteristics, **Multistage amplifier**: Different coupling schemes: RC coupling, Transformer coupling and Direct coupling, designing of RC coupled and study its characteristics, **Power Amplifiers:** Class – A, B and C amplifiers, Class B Push-pull amplifier. Complementary symmetry push – pull amplifier. Types of distortions in power amplifiers. Concept of dual input dual output differential amplifier.Designing of Audio amplifier using LM386.	8
3	**Oscillators** Theory of feedback circuit, types of feedback, advantages and disadvantages of positive and negative feedback, Effects of negative feedback on gain, noise, bandwidth, distortion, input impedance and output impedance, Barkhausen criterion, RC oscillators: design of phase shift oscillator and Wien Bridge oscillator. LC oscillators: Hartley oscillator, Colpitt's oscillator, Crystal oscillator, RC and Crystal Oscillator using NOT gate, UJT as Relaxation oscillator. Design of 1Hz wave for digital clock using NOT gate.	7
4	**Multivibrators and Applications of IC555**	7

	Multivibrators, Design of Monostable, Astable and Bistable Multivibrator using transistor, Designing of Schmitt trigger circuit using transistor, Development of LED running light using Transistor, IC 555 : Introduction, Block diagram Applications:- Astable, Monostable and Bistable multivibrator using IC555, Flash lighting, sequential timer, Temperature to frequency converter, Cable tester.	
	Total	**30**

Reference Books:

1. A Textbook of Applied Electronics: R.S. Sedha, S.Chand Publications.
2. Electronic Devices and Circuits: Allen Mottershed.
3. Basic Electronics and linear circuits: Bhargava-Gupta, TMH.
4. Electric Circuits, S. A. Nasar, Schaum's outline series, Tata McGraw Hill(2004).
5. Electronic Devices and Circuits, David A. Bell, 5th Edition 2015, Oxford UniversityPress.
6. Electronic Circuits: Discreteand Integrated, D.L. Schilling and C.Belove, TMH.
7. J. Millman and C.C. Halkias, Integrated Electronics, Tata McGraw Hill(2001).

B. Sc. II – Electronics
Semester- III
Electronics Paper- VI (Minor)
DSC VI – Introduction to Microprocessor 8085 (Total Marks 50)

Credits: 02 (Marks 50) Hours: 30

Course Outcome:

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

1. Gain an understanding of microprocessor and microcontroller architecture and operation, including memory structure, interface, and internal 8085 components.
2. Utilize the 8085 microprocessors to create and run simple assembly language programs for data processing, arithmetic, and logical functions.

Unit	Contents	Hours Allotted
1	Introduction of Microprocessor 8085 : Memory : Types of memories (RAM,ROM,EPROM,EEPROM,FLASH), Memory map. Pin configuration of 8085.Architecture of 8085 Microprocessor. Clock and reset circuits. Demultiplexing of AD0-AD7. Instruction fetch and execution cycles.	08
2	Instruction Set of 8085 : Instruction format, Addressing modes, Classification of Instructions: Data Transfer, Arithmetic, Logical, Branch and Machine, Control instructions. Stack-related instructions	08
3.	Facilities in 8085: Stack and Stack pointer its use for CALL, RET, PUSH, POP instructions, Interrupts in 8085, serial data transfer, SIM and RIM Instructions.	07
4	Programming of 8085 : Programs of Addition (8 and 16 bit), Subtraction, Multiplication, Division, Block Transfer and Exchange, Masking, ascending and descending order, Time delay generation using register and register pair, Detection of odd and even numbers.	07

Reference Books:

• Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.

• Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata

B. Sc. II – Electronics
GROUP-A (Major)
DSC-I Electronics Practical

Course Outcome:

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

1. Students will be able to understand the working of sensors.
2. Students will be able to design the calibration and interfacing related to the sensors concept.

List of Practical

1. Study of PT100 as a temperature sensor
2. Study of Digital temperature sensors (LM35/DHT11/AD590 or similar)
3. Measurement of weight using a Load cell
4. Displacement measurement using a resistive sensor
5. Study of the thermistor as a temperature sensor
6. Displacement measurement using an IR sensor
7. Level measurement using a conductive sensor
8. Level measurement using an ultrasonic sensor
9. Flow measurement using YF-S201 or similar sensor

(Minimum six practical's to be performed above the group)

B. Sc. II – Electronics
GROUP-B (Major)
DSC-II Electronics Practical

Course Outcome:

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

1. Students will be able to understand the basics of communication.
2. Students will be able to build and analyse the electronics circuits

List of Practical

1. Design of voltage regulator circuit using Zener diode
2. Study of a full-wave rectifier
3. Design of dual power supply using 78XX and 79XX
4. Design of UJT relaxation oscillator
5. To study Variable voltage regulator using IC 317 or similar
6. Design of CE amplifier circuit
7. Design of an Astable multivibrator using IC 555
8. Design of Monostable Multivibrator using IC 555
9. Design of Phase shift oscillator.

(Minimum six practicals to be performed above the group)

B. Sc. II – Electronics
GROUP-A (Minor)
DSC-III Electronics Practical

Course Outcome:

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

1. Design and analyze amplitude and frequency modulation circuits, such as AM/FM transmitters, receivers, modulators, and detectors, to show that you comprehend analog communication techniques.
2. 2. Implement and troubleshoot analog modulation and demodulation systems using your practical understanding of electronic circuits, including transistors, op-amps, diodes, and VCOs.

List of Practical

1. To design an Amplitude Modulator using Transistor/ Op-amp
2. Study of Envelope Detector (Diode Detector) Circuit
3. To study the FM -Generator circuit
4. To study the AM Transmitter and Receiver
5. To study the FM Transmitter and Receiver
6. Generation of FM using Voltage Controlled Oscillator (VCO)
7. To study the FM –Detector (Slope Detector) circuit
8. Carrier Signal Generator.

(Minimum six practicals to be performed above the group)

B. Sc. II – Electronics
GROUP-B (Minor)
DSC-IV Electronics Practical

Course Outcome:

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

1. Show off your ability to use assembly language to program the 8085 microprocessors to carry out arithmetic, logical, and data transfer tasks.
2. Use your understanding of the instruction set and microprocessor architecture to implement, model, and debug a variety of tasks, including number analysis, stack handling, and block transfer.

List of Practical

1. Arithmetic operations using 8085(addition & Multiplication)
2. Arithmetic operations using 8085(subtraction & Division)
3. Logical instructions using 8085
4. Stack instructions using 8085
5. Study of the simulator of 8085
6. Block transfer using 8085
7. Block exchange using 8085
8. Finding out even/ odd numbers using 8085.

(Minimum six practicals to be performed above the group)

B. Sc. II – Electronics
SEC-I AVR Microcontroller Programming
Electronics Practical

Course Outcome:

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

1. Understand the basics of Arduino (AVR Microcontroller) programming
2. Understand the real-world interfacing with the AVR microcontroller using Arduino Board.

List of Practical

1. To study the basics of Arduino programming kits
2. LED interfacing with Arduino
3. Relay interfacing with Arduino
4. LCD interfacing with Arduino
5. LCD interfacing with Arduino using I^2C bus
6. Servo motor interfacing with Arduino
7. Development of a voltage measurement system
8. Development of a temperature measurement system
9. Development of rain sensor wiper
10. Development of flame sensor applications
11. Development of a sound detection system
12. Development of an obstacle avoidance system
13. Development of an RFID-based system
14. Development of a digital clock using Arduino
15. Development of the current measurement system
16. Development of a luxmeter using LDR

NOTE: A Minimum of 12 experiments needs to be performed

B. Sc. II – Electronics
Semester- III
Vocational Skill Course (Major)
VSC – Basic Repairing and Soldering Technique
(Total Marks 50) Credits: 02 (Marks 50) Hours: 30

1. Study of Soldering Components/Instruments.

2. Soldering and desoldering of electronics components on PCB.

3. Identification of various types of Printed Circuit Boards (PCB) and soldering Techniques.

4. Make the 5V Power Supply and test the result.

5. Identify the SMD Components and study the techniques of SMD Components Soldering.

6. Design a low-pass filter/high-pass filter using SMD components, a Resistor and a Capacitor, and observe the performance on a CRO.

7. Design a Monostable multivibrator circuit using SMD components, a Resistor, a Capacitor and an IC and observe the performance of the Circuit.

8. Design an Astable multivibrator circuit using SMD components, a Resistor, a Capacitor and an IC and observe the performance on a CRO.

9. Testing, fault finding and repairing of ceiling fan/Table fan.

10. Testing, fault finding and repairing of automatic electric iron/non-automatic electric iron.

11. Testing, fault finding and repairing of electric tube.

12. Testing, fault finding and repairing of LED bulbs.

13. Testing, fault finding and repairing of the adapter (charger).

14. Study of Switch and board connections.

15. Measure Current and Voltage of Bulbs, Tube and Calculate the Load Power.

16. Understand domestic wiring and layout.

NOTE: A Minimum of 12 experiments needs to be

B. Sc. II – Electronics
Semester- III
OPEN ELECTIVE III
COMPUTER LITERACY: MS OFFICE TOOLS-1
(Total Marks 50) Credits: 02 (Marks 50) Hours: 30

Course Outcome:

After completion of this course, the student will be able to:

1. Understand the use of DOS Commands.
2. Apply styles, templates, and formatting options to enhance document appearance.

List of Experiments:

1. Execute the following commands with their definition syntax and example.
   i) DIR
   ii) DIR/W
   iii) DIR/P
   iv) CLS
   v) DATE
   vi) TIME
   vii) MD
   viii) CD
   ix) RD
   x)RENAME

2. Create a news-paper document with at least 200 words,
   a. Use margins as, top:1.5, bottom:2, left:2, right:1 inches.
   b. Use heading “Gandhi Jayanti”, font size: 16, font color: red, font face Arial Black.

c. With first letter “dropped” (use drop cap option) of the first paragraph containing a picture at the right side
d. Use three columns from the second paragraph onwards till the half of the page.
e. Then use heading “Computer basics”
f. Create paragraph using two columns till the end of the page.

3. Create a flowchart using,
   a. Proper shapes like ellipse, arrows, rectangle, and parallelogram.
   b. Use grouping to group all the parts of the flowchart into one single object.

4. Create a table using table menu with,
   a. At least 5 columns and 10 rows.
   b. Merge the first row into one cell.
   c. Merge the second row into one cell, then split the second row into three cells.
   d. Use proper table border and color.
   e. Insert proper content into the table with proper text formatting.

5. Create a table using two columns,
   a. The left column contains all the short-cut keys and right side column contains the function of the short-cut keys.
   b. Insert a left column using layout option. Name the heading as Serial No.

6. Create two letters with the following conditions in Ms Word and find the difference.
   a. Write a personal letter to your friend using at least 100 words and two paragraphs. The date must be in top-right corner. Use “justify” text alignment and 1.5 line spacing for the body of the letter. Letter must contain proper salutation and closing.
   b. Use step by step mail-merge wizard to design a letter. (Mailing → step by step mail merge wizard→ letters → start from a template → select template → letters → select proper template→ create new document → OK)

7. Create a letter, which must be sent to multiple recipients.
   a. Use Mail-Merge to create the recipient list.
   b. Use excel sheet to enter the recipient.
   c. Start the mail merge using letter and directory format. State the difference.

8. Create a telephone directory
   i) The heading should be 16-point Arial Font in bold.
   ii) The rest of the document should use 10-point font size.
   iii) Other headings should use 10-point Courier New Font.
   iv) The footer should show the page number as well as the date last updated.

9. Design a time-table form for your college.
   i) The first line should mention the name of the college in 16-point Arial Font and should be bold
   ii) The second line should give the course name/teachers name and department in 14-point Arial.
   iii) Leave a gap of 12-points.
   iv) The rest of the document should use 10-point Times New Roman font.
   v) The footer should contain your specifications as the designer and date of creation.

10. Create the following one-page documents.
    i) Compose a note inviting friends to a get-together at your house, including a list of things to bring with them.
    ii) Design a certificate in landscape orientation with a border around the document.

11. Create the following document: A newsletter with a headline and 2 columns in portrait orientation, including at image least one surrounded by text.

12. Convert following text to a table, using comma as delimiter

    Type the following as shown (do not bold).
    Color, Style, Item
    Blue, A980, Van
    Red, X023, Car
    Green, YL724, Truck

    Name, Age, Sex
    Bob, 23, M
    Linda, 46, F
    Tom, 29, M

13. Prepare a grocery list having four columns (Serial number, the name of the product, quantity and price) for the month of April 2025.
    - Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
    - The headings of the columns should be in 12-point and bold.
    - The rest of the document should be in 10-point Times New Roman.
    - Leave a gap of 12-points after the title.

14. XYZ Publications plans to release a new book designed as per your syllabus. Design the first page of the book as per the given specifications.
    a) The title of the book should appear in bold using 20-point Arial font.
    b) The name of the author and his qualifications should be in the center of the page in 16-point Arial font.
    c) At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.
    d) The details of the offices of the publisher (only location) should appear in the footer.

15. Create the following one-page documents.
    a) Design a Garage Sale sign.
    b) Create an Attendance Sheet in MS-WORD.

16. Enter the following data into a table given on the page.

Sales person	Do	Truck	Puzzles
Amit	13	1423	1193
Shivi	14	3863	2934
Om	52	3247	5467

Ananya	21	1278	1928
Anupama	12	2528	1203
Maharshi	40	3079	2067

b) Create the following Charts/Graphs in MS-Word

1. Bar Chart/Graphs
2. Line Chart/Graphs
3. Pie Chart/Graphs

NOTE: A Minimum of 12 experiments needs to be performed

SEMESTER IV

B. Sc. II – Electronics
Semester- IV
Electronics Paper- VII (Major)
DSC VII – Modern Electronic Communication Systems (Total Marks 50)
Credits: 02 (Marks 50) Hours: 30

Course Outcome:

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

1. Students will develop a thorough understanding of the concepts, elements, and workings of electronic communication systems, including modulation, demodulation, transmission, and reception.
2. Knowledge of Signal Analysis and Processing: Students will gain knowledge of methods used in communication systems for signal analysis and processing, such as Fourier analysis, filtering, and noise reduction.

Unit	Contents	Hours Allotted
1	**Electronic Communication**: Introduction to communication, means and modes, Block diagram of an electronic communication system. Brief idea of frequency allocation for radio communication system in India (TRAI). Electromagnetic communication spectrum, band designations and usage. Channels and baseband signals, concept of Noise, signal-to-noise (S/N) ratio. Concept of antenna and its working principle.	07
2	**Analog Modulation I:** Need for modulation, Amplitude Modulation (AM) modulation index and frequency spectrum. Generation of AM (using Transistor), Concept of DSB & SSB and generation. Amplitude Demodulation (diode detector). AM Super heterodyne radio receiver.	07
3	**Analog Modulation II:** Frequency Modulation (FM) and Phase Modulation (PM), modulation index and frequency spectrum, equivalence between FM and PM. Generation of FM using VCO, FM detector (Slope detector) .	07
4.	**Analog Pulse Modulation**: Channel capacity, Sampling theorem, Basic Principles-PAM, PWM, PPM, modulation and detection technique for PAM only **Digital Pulse Modulation**: Need for Digital Modulation, Pulse Code Modulation, Digital Carrier Modulation Techniques, Sampling, Quantization and Encoding. Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK)	09

Reference Books:

1. Electronic Communications, D. Roddy and J. Coolen, Pearson Education India.
2. Advanced Electronics Communication Systems- Tomasi, 6th edition, Prentice Hall.
3. Electronic Communication systems, G. Kennedy, 3rd Edn., 1999, Tata McGraw Hill.
4. Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill
5. Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press

B. Sc. II – Electronics
Semester- IV
Electronics Paper- VII (Minor)
DSC VII – Communication Electronics - II (Total Marks 50)
Credits: 02 (Marks 50) Hours: 30

Course Outcome:

Unit	Contents	Hours Allotted
1	**Basics of Analog Pulse Modulation**: Basic Principles-Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, modulation Multiplexing- Time Division Multiplexing, Frequency Division Multiplexing.	7
2	**Basics of Digital Pulse Modulation**: Need for digital transmission, Pulse Code Modulation, Digital Carrier Modulation Techniques, Sampling, Quantization and Encoding. Concept of Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying(PSK).	7
3	**Mobile Telephony System** – Basic concept of mobile communication, frequency bands used in mobile communication, concept of cell sectoring and cell splitting, SIM number,IMEI number, need for data encryption, architecture (block diagram) of mobilecommunication network, idea of GSM, CDMA, TDMA and FDMA technologies, simplified block diagram of mobile phone handset, 2G, 3G and 4G concepts (qualitativeonly). GPS navigation system (qualitative idea only)	9
4	**Multiple Access Techniques and Wireless Communication** Concepts of SDMA, CDMA, TDMA and FDMA technologies, Bluetooth, Wi-Fi, RFID and GPS navigation system.	7

Reference Books:

• Electronic Communications, D. Roddy and J. Coolen, Pearson Education India.
• Advanced Electronics Communication Systems- Tomasi, 6th edition, Prentice Hall.
• Modern Digital and Analog Communication Systems, B.P. Lathi, 4th Edition, 2011, Oxford University Press.
• Electronic Communication systems, G. Kennedy, 3rd Edn., 1999, Tata McGraw Hill.
• Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill
• Communication Systems, S. Haykin, 2006, Wiley India
• Electronic Communication system, Blake, Cengage, 5th edition.
• Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press

B. Sc. II – Electronics
Semester- IV
Electronics Paper- VIII (Major)
DSC VIII – 8051 Microcontroller and Embedded System (Total Marks 50)
Credits: 02 (Marks 50) Hours: 30

Course Outcome:

1. Understand the basics of microprocessors, microcontrollers, 8051 architecture, and pin diagrams.
2. Understand the real-world interfacing of 8051 and an embedded system

Unit	Contents	Hours Allotted
1	**Introduction to 8051** Introduction, evolution of microprocessors, advantages and disadvantages of microprocessor, evolution of microcontrollers, advantages and disadvantages of microcontroller, Difference between microprocessor and microcontroller, Idea of RAM and ROM, Types of RAM and ROM, Memory organization and addressing, Overview of MCS51 family (89C51, 89C52, 89C2051, 8751, DS5000), Features of 8051, Pin diagram of 8051 microcontroller, architecture of 8051, RAM structure of 8051,SFR in 8051, PSW register, ROM Memory, stack and stack operation of 8051	**08**
2	**8051 Programming** Instruction set of 8051: data transfer, arithmetic, Logical, Jump, call, Single bit instructions, addressing modes of 8051, instructions, Assembly language programming: 8-bit addition, subtraction, multiplication and division, packed BCD to ASCII conversion, ASCII to packed BCD conversion	**07**
3	**Facilities in 8051:** Timers in 8051, Registers involved in 8051 timers, Time delay calculations in mode 1 and mode 2, programming timers in mode 1 and 2. Sources of interrupts in 8051, Registers involved in 8051 interrupts, External interrupts programming, interrupts priority. Programming external hardware interrupts	**07**
4	**Real world Interfacing with 8051** Architecture of embedded system, Minimum Circuit of 8051 (Clock and Reset circuit), sinking and sourcing capacity of 8051, Generate square wave on port and port pin, bit toggling, port toggling, Interfacing of LED, Switch, Relay, seven segment display, thumbwheel switch and Seven segment in Multiplex mode to display message “HELP”, (Use Assembly language programming)	**08**

Reference Books:

1. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A.Mazidi, J.G. Mazadi, and R.D. McKinlay, Pearson Education India.
2. The 8051 Microcontroller, Kemmeth Ayela Penram Publications 3rd Edition
3. Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill
4. Microprocessor and Microcontrollers, N. Senthil Kumar, 2010, Oxford University

B. Sc. II – Electronics
Semester- IV
Electronics Paper- VIII (Minor)
DSC VIII – AVR Microcontroller Programming and Applications (Total Marks 50)
Credits: 02 (Marks 50) Hours: 30

Course Outcome:

1. Understand the basics of microprocessors, microcontrollers, AVR architecture, and pin diagrams.
2. Understand the real-world interfacing with AVR and an embedded system

Unit	Contents	Hours Allotted
1	**Introduction to Microcontroller** Introduction, evolution of microcontrollers, advantages and disadvantages of microcontroller, Difference between microprocessor and microcontroller, Introduction to AVR Microcontroller, AVR Features. General Block diagram of AVR Microcontroller.	**08**
2	**Basics of Arduino Programming** Introduction to Arduino: Features of Arduino, Microcontrollers used in Arduino, Architecture, Pin configuration, Concept of digital and analog ports. Arduino Programming Basics: Basics of Cfor Arduino Programming, Data Types, Variables, Arrays, Operators (arithmetic, logical, relational, modulo and assignment) Statements: if-else and switch-case, Control structures: while and for Loop.	**08**
3	**Real world Interfacing with Arduino** Functions: setup(), loop(), analogRead(), and digitalRead() functions. Serial Port Communication. Arduino Uno Interfacing: LED blinking,	**08**

	buzzer, Push button, LDR, relay, LCD and LM35. Controlling Motors (DC and Servo).	
4	**Applications of Arduino** Intensity control of LED with Pulse Width Modulation using analogWrite(), Home Automation Using Arduino, Distance measurement using ultrasonic sensor, Temperature monitoring using LM35, Gate emulator	**06**

Reference Books:

1. The AVR microcontroller and embedded systems using Assembly and C, Muhamad ali Mazidi, Sarmad Naimi, Sepehr Naimi, PHI publications
2. Programming Arduino, Getting Started with Sketches 2ND edition, Simon Monk, McGraw-Hill Education. https://agsci.colostate.edu/wp-content/uploads/sites/95/2020/03/Programming- Arduino.pdf
3. Arduino-Based Embedded Systems: By Rajesh Singh, Anita Gehlot, Bhupendra Singh, and Sushabhan Choudhury.
https://api.pageplace.de/preview/DT0400.9781351669542_A31858991/preview-9781351669542_A31858991.pdf
4. Arduino Documentation, https://docs.arduino.cc/

B. Sc. II – Electronics
GROUP-C (Major)
DSC-III Electronics Practical

Course Outcome:

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

1. Recognise and use a variety of analogue and digital modulation techniques, including AM, FM, ASK, FSK, PSK, PAM, PWM, and PPM, with components such as logic circuits, transistors, op-amps, and IC555.
2. Using real-world circuit implementation, analyse and understand the behaviour of modulated and demodulated signals to support theoretical communication ideas.

List of practical

1. To design an Amplitude Modulator and Envelope Detector using Transistor/ Op-amp
2. To study the FM - FM-Generator circuit
3. To study Pulse Amplitude Modulation (PAM) using IC555
4. To study Pulse Width Modulation (PWM) using IC555
5. To study Pulse Position Modulation (PPM) using IC555
6. To study the ASK modulator
7. To study ASK Demodulator
8. To study the PSK modulator
9. To study the FSK modulator

(Minimum six practicals to be performed above the group)

B. Sc. II – Electronics
GROUP-D (Major)
DSC-IV Electronics Practical

Course Outcome:

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

1. Utilising the 8051 microcontroller and simulation tools, create and model assembly-level programs for logical, timer, and arithmetic operations.
2. To comprehend real-time embedded system applications, interface peripheral devices such as LEDs, seven-segment displays, relays, and thumbwheel switches with the 8051.

List of Practical

1. Arithmetic operation in 8051(Using Simulator)
2. Logical operation in 8051(Using Simulator)
3. Use one of the four ports of the 8051 for the O/P interface to eight LEDs. Simulate a binary counter (8-bit) on LEDs using timer mode 1.
4. Programming timers in mode 2.
5. Program to run a countdown from 9 to 0 in the seven-segment display.
6. To interface a seven-segment display with an 8051 microcontroller and display 'HELP' in the seven-segment display in multiplex mode.
7. To toggle '1234' as '4321' in the seven-segment display.
8. Relay interfacing to 8051(using hardware)
9. Thumbwheel switch and seven-segment interfacing to 8051.

(Minimum six practicals to be performed above the group)

B. Sc. II – Electronics
GROUP-C(Minor)
DSC-III Electronics Practical

Course Outcome:

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

1. Utilising IC555 timers and discrete components, comprehend and evaluate a variety of analogue and digital modulation techniques, including PAM, PWM, PPM, ASK, PSK, and FSK.
2. To learn how to effectively send numerous signals over a single communication channel, compare and study multiplexing techniques such as FDM and TDM.

List of practical

1. To study Pulse Amplitude Modulation (PAM) using IC555
2. To study Pulse Width Modulation (PWM) using IC555
3. To study Pulse Position Modulation (PPM) using IC555
4. To study the ASK modulator
5. To study the PSK modulator
6. To study the FSK modulator
7. Study of FDM
8. Study of TDM

(Minimum six practicals to be performed above the group)

B. Sc. II – Electronics
GROUP-D(Minor)
DSC-III Electronics Practical

Course Outcome:

After completion of this course, the student will be able to:

1. Recognise and put into practice how to interface different input/output devices with Arduino for real-time control and monitoring, including LEDs, pushbuttons, sensors, motors, and displays.
2. Create embedded programs with Arduino code to interact with peripheral devices such as Bluetooth, LCDs, and sensors, and control hardware components.

List of practical

1. To study and understand the Interfacing of an LED array to Arduino.
2. To Control an LED status using a push-button.
3. To switch an AC bulb or any high-voltage device on or off using Arduino.
4. To study and understand interfacing Bluetooth to Arduino.
5. To study and understand Interfacing LM35 to Arduino.
6. Seven segments display interfacing.
7. Servo motor interfacing to Arduino.
8. LCD interfacing with Arduino

(Minimum six practicals to be performed above the group)

B. Sc. II – Electronics
SEM IV
SEC-II Python Programming
Electronics Practical

Course Outcome:

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

1. Students will be able to understand the basics of Python programming
2. Students will be able to write and solve the problem using Python programming.

List of Practical

1. Introduction to the Python programming environment (input and output statements)
2. Data types, global and local variable declarations in Python
3. String manipulation using Python
4. Arithmetic operators in Python
5. Logical operators in Python
6. Concept of list and array in Python
7. Convert the given number or string into the binary, hexadecimal and octal numbers
8. Write a Program to convert the value of temperature in different scales
9. Write a program to calculate the value of current flowing through a resistance using Ohm's law.
10. Control statements in Python
11. Irrelevant statements in Python

12. Write a program to calculate the equivalent resistance of a parallel and series combination of resistance/ capacitor
13. Find the maximum and the minimum number from the array.
14. Use of Functions to calculate the voltage division and current division in electronics circuit.
15. Plotting Graphs for the array using Python.
16. Plot the graph for the diode characteristics.

NOTE: A Minimum of 12 experiments needs to be performed

B. Sc. II – Electronics
Semester- IV
OPEN ELECTIVE IV
COMPUTER LITERACY: MS OFFICE TOOLS-2
Credits: 02

Course Outcome:

After completion of this course, the student will be able to:

1. Understand the working and use of MS PowerPoint.

3. Create, edit, and format spreadsheets for data analysis and management using tools like MS Excel and PowerPoint

List of Experiments:

1. Create a student worksheet containing roll numbers, names and total marks. Open a document in Word and insert the excel worksheet using: -
   a) Copy/Paste
   b) Embedding
   c) Linking

2. The term wise marks for APS class of 20 students are stored in 3 separate sheets named term1, term2 and term3.
   Create 4^{th} worksheet that contains student names and their total and average marks for the entire year. Give proper headings using headers. Make the column headings bold and italic. The 4^{th} worksheet should contain college name as the first line. Make it bold, italic and center it.

3. Using a simple pendulum, plot I-T and I-T^2 graph.

I	T1	t2	t3	Mean(t)	T=t/20	T^2
70						
80						
90						
100						

4. Consider the following employee worksheet:-

Full Name (First Last)	Grade 1/2/3	Basic Salary	HRA	PF	GROSS	Net	VA Vehicle Allowance

5. In a meeting of a marketing department of an organization, it has been decided that price of selling an item is fixed at Rs 40. It was resolved to increases the sale of more items and getting the profit of Rs 40,000/. Use Goal Seek of find out how many items you will have to sell to meet your profit figure.
6. The following worksheet contains Names & sales for 10 salesmen.
   Calculate their bonus as per the following :

Sale	**Bonus**
0-30000	0
30000-40000	3000
40000-50000	4000
50000-60000	5000
60000-70000	6000
70000-80000	7000
80000 & above	8000

	A	B	C	D			H	I
1	NAME	SALE	BONUS				0	0
2	Deep	30000					**30000**	3000
3	Jayesh	40000					**40000**	4000
4	Yash	45000					**50000**	5000
5	Sara	48000					**60000**	6000
6	Gita	55000					**70000**	7000
7	Jinal	32000					**80000**	8000
8	Kavita	66000						
9	Minal	23000						
10	Naresh	43000						
11	Rima	37000						

7. A worksheet contains Roll Number, Marks in 2 subjects for 50 students in a class. Calculate Result and Grade using the following:

   A student is declared as PASS if he gets 40 or more in both the subjects , Otherwise FAIL.

   All FAILED students will be given Grade IV

For PASSED students Grade will be obtained as follows :

AVERAGE	GRADE
>=60	I
<60 but >=50	II
<50 but >=40	III

	A	B	C	D	E	F
1	ROLL	SUB1	SUB2	AVERAGE	RESULT	GRADE
:						
51						

8. The following worksheet contains Name & Sales of 10 salesmen .Calculate commission as per the following:

Sales	Commission
First 30,000	5%
Next 40,000	10%
Excess	15%

9. Create five Power point slides. Each slide should support different format. In these slides explain areas of applications of IT. Make slide transition time as 10 seconds.

10. Create five Power Point slides to give advantages/disadvantages of computer, application of computers and logical structure of computer.

11. Create five Power Point slides detailing the process of internal assessment. It should be a self-running demo.

12. Remove image background from Power Point slides.

13. Create your own simple graphic images using the shapes in PowerPoint.

14. Create a power-point presentation with minimum 5 slides
    a. Use custom animation option to animate the text; the text must move left to right one line at a time.
    b. Use proper transition for the slides.

15. Create a power-point presentation with minimum 10 slides.
    a. Use word art to write the heading for each slide.
    b. Insert at least one clip-art, one picture
    c. Insert at least one audio and one video
    d. Hide at least two slides

NOTE: A Minimum of 12 experiments needs to be performed

Marks Distribution of DSC (Major and Minor) Practical (LAB):

Semester III

Group	DCS (Group A) Practical I	DCS(Group B) Practical II	Journal	Project like Experiment	Seminar	Total
Marks	20	20	06	**02**	**02**	**50**

Marks Distribution of VSC-I Practical (LAB):

Group	VSC -I Practical I	Journal	Total
Marks	44	06	**50**

Marks Distribution of SEC-I Practical (LAB):

Group	SEC -II Practical I	Journal	Total
Marks	44	06	**50**

Marks Distribution of OE-III Practical (LAB):

Group	OE-II Practical I	Journal	Total
Marks	44	06	**50**

Semester IV

Group	DCS (Group C) Practical I	DCS(Group D) Practical II	Journal	Project like Experiment	Industrial visit	Total
Marks	20	20	06	**02**	**02**	**50**

Marks Distribution of SEC-II Practical (LAB):

Group	SEC -II Practical I	Journal	Total
Marks	44	06	**50**

Marks Distribution of OE-IV Practical (LAB):

Group	OE-IV Practical I	Journal	Total
Marks	44	06	**50**

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B. Sc. II – Electronics
Semester- IV
COMMUNITY ENGAGEMENT PROGRAM
Credits: 02

The student must study various societal changes related to the electronics industry. Fieldwork is an integral part of the community engagement program. Students are required to visit various places and maintain a journal or field diary to record their observations. Some of the field-based activities are as follows:

1. Energy audits.
2. Digital literacy.
3. Conduct the Electronics product market awareness.
4. E-Waste Collection and Awareness Drive.
5. Assistive Tech for the Elderly and Differently Abled.
6. Mobile Phone Usage and Impact Study.
7. Smart Home Technology Survey.
8. Home Automation and IoT Device Study.
9. Smart City Technology Survey.
10. Renewable Energy Technology Awareness.
11. Green Electronics Promotion.
12. Cyber Safety and Digital Hygiene Campaign.
13. Digital Tools for Agriculture.
14. Entrepreneurship development

The list is not limited to the topics mentioned above. Students should choose a topic related to the core subject of Electronics.

The Assessment pattern is internal and external.

Internal	External	Total
40	**10**	**50**

Internal continuous assessment

Concern field visits	Individual/ group project report journal submission	Presentation of field project findings
40%	**40%**	**20%**

BSc LEVEL 2 Exit Course

Credits: 04 (Marks 100) Hours: 60

8051 Microcontroller and Embedded Systems Design

Course Outcomes After successful completion of this course, the students will be able to :	
CO1	Understand different types of interrupts in 8051 programming.
CO2	Understand real-world interfacing of 8051 microcontrollers.
CO3	Understand different applications of 8051 microcontrollers.
CO4	Understand the basics of modern microcontrollers and their applications.

Unit	Contents	Hours Allotted
1	**UNIT 1.8051 Programming in C** Software development tools: text editor, assembler/compiler, simulator, IDEs, high level language simulator, Advantages and disadvantages Program in 8051-C & Assembly Language. Data types and time delay in 8051-C,I/O programming in 8051-C,Accessing SFR addresses in 8051- C, Logical operation in 8051 C. Data conversion programs in 8051 C. Accessing code ROM space in 8051 C, programming for Time delay generation(using timer), external interrupts (Level and edge triggering).	**08**
2	**UNIT 2 Serial communication in 8051.** Serial Port: Serial port of 8051, RS-232 standard and IC MAX–232, Concept of Baud rate, Baud rate in 8051, Baud rate doubling using crystal frequency and PCON register, SBUF, SCON registers, various modes of serial port, Importance of TI and RI flags, Interfacing of MAX232 to 8051, programming for data transmission and repletion in mode–1 in ALP/C	**07**
3.	**UNIT 3. Real World Interfacing of 8051** Interfacing LCD, solenoid switch, opto-coupler, thumb wheel switch, seven segment (multiplexing mode), DAC0808 and ADC0804. Speed Control of DC motor by PWM technique (Use ALP/C during programming), Hardware development tools: development boards, device programmer, in-circuit debugger, in-circuit emulators	**07**
4	**UNIT 4. Applications of 8051** i)Digital Voltmeter ii) Water level controller iii)Traffic Light controller iv) speed measurement of motor v) Gate Emulator (Logic Gate study using microcontroller) vi) Temperature monitoring using LM35, ADC0804,LCD vii) automatic basin control (using IR and solenoid switch) viii) motion detection	**08**

	system using PIR sensor ix) Automatic Street light control System (Use ALP/C during programming)	

Reference Books:

1. The 8051 Microcontroller -K. J. Ayala, (Penram International)
2. The 8051 Microcontroller and Embedded Systems, M. A. Mazadi,J. G. Mazadi,Pearson Education, Asia
3. Advanced PIC microcontroller projects in C from USB to ZigBee with the PIc18F seriesDogan Ibrahim, Newnes
4. *PIC microcontroller and Embedded Systems using assembly and C for PIC 18,* Muhammad AliMazadi et al. Pearson Education publication,1st Edition, Fourth Impression 2011(Indian Edition).
5. C and the 8051: Programming and Multitasking, Schultz, P T R Prentice-Hall, Inc.Embedded C, Michael J. Pont,

Practical:

1. Study of 8051 simulator – variables
2. Study of 8051 simulator – port toggle
3. 8051 microcontroller -Interfacing of a seven-segment display
4. DC motor interfacing with 8051
5. Arithmetic operations using 8051-C
6. Logical operations using 8051-C
7. Thumbwheel switch and seven-segment display interfacing with 8051.
8. Relay interfacing with 8051 using an optocoupler
9. 8051 microcontroller -Interfacing of PIR sensor
10. 8051 microcontroller -Interfacing of the IR sensor
11. Study of RFID and interfacing with 8051/Arduino
12. Interfacing of the LM 35 temperature sensor

NOTE: A Minimum of 8 experiments needs to be performed

Theory Paper

Internal	External	Total
10	40	50

Practical

Experiment	Journal	Total
44	6	50

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