Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

New Arts, Commerce, and Science College, Ahmednagar (Autonomous)

(Affiliated to Savitribai Phule Pune University, Pune)

National Education Policy (NEP)
Choice Based Credit System (CBCS)

Programme Skeleton and Syllabus of
Electronic Science (Minor) - II Year

Implemented from

Academic Year 2023-24

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

New Arts, Commerce and Science College, Ahmednagar (Autonomous)

Board of Studies in Electronic Science

Sr. No.	Name	Designation
1.	Mr. D. K. Sonawane	Chairman
2.	Mrs. S. D. Shelke	Member
3.	Dr. D. S. Shelar	Member
4.	Dr. M. A. Shaikh	Member
5.	Miss. M. R. Markad	Member
6.	Dr. S. N. Helambe	Academic Council Nominee
7.	Mr. S. K. Shinde	Academic Council Nominee
8.	Dr. M. S. Zambare	Vice-Chancellor Nominee
9.	Mr. Bipinchandra Todmal	Alumni
10.	Mr. P. D. Nirmal	Industry Expert
11.	Prof. A. V. Mancharkar	Member (co-opt)
12.	Mrs. B. M. Danave	Member (co-opt)

1. Prologue/ Introduction of the programme: At least one page

The learning outcomes based curriculum framework for B.Sc. Electronic Science (minor) is intended to prepare a curriculum which enables the graduates to respond to the current needs of the industry and equip them with skills relevant for national and global standards. The framework will assist in maintaining international standards to ensure global competitiveness and facilitate student/graduate mobility after completion of B.Sc.

Minor discipline helps a student to gain a broader understanding beyond the major discipline. The minor is of 20 credits. Minor course is for each semesters of three years. The minor programme will consist of three-credit courses and four-credit courses. All three credit courses with practicals will comprise of theory classes (two credits) and practicals (one credits). All four credit courses with practicals will comprise of theory classes (two credits) and

practicals (two credits). For theory or tutorial classes, one credit indicates a one hour lecture per week while for practicals one credit indicates a two-hour session per week.

2. Programme Outcomes (POs)

Students enrolled in the minor program complete a curriculum that exposes and trains students

from different discipline in a full range of essential skills and abilities. They will have the opportunity to master the following objectives.

1. To get the knowledge of technological and practical aspects of electronic science.
2. To familiarize with the concepts of electronics technologies.
3. To enhance the programming skill in Electronics.
4. To get the practical skills required for electronics industries.
5. To develop the analytical abilities towards the use of electronics in real-world problems.
6. To familiarize with the current and recent technological developments.
7. Ability to use techniques, skills and modern technological/scientific/engineering software/tools for professional practices.

3. **Credit Distribution**: B.Sc. Electronic Science including Minor and OE and other courses.

	Type of Courses	III Yr	IV Yrs (Honours)	IV Yrs Research
Major Marathi	Discipline-Specific Courses (DSC)	46	74	66
	Discipline Specific Elective (DSE)	08	16	16
	Skill Enhancement Courses (SEC)	06	06	06
	Vocational Skill Courses (VSC)	08	08	08
	On-Job Training (OJT)	04	08	04
	Field Project (FP)	04	04	04
	Community Engagement and Service (CEP)	02	02	02
	Research project	00	00	12
	Research Methodology	00	04	04
	Indian Knowledge System	02	02	02
	Total (I, II and III Year)	80	124	124
Minor	Minor	20	20	20
Other Courses	Open Elective (OE)/ Multidisciplinary Courses	12	12	12
	Co-Curricular Courses	08	08	08
	Ability Enhancement Courses	08	08	08
	Value Education Courses	04	04	04
	Total	132	176	176

4. Programme Framework (Courses and Credits): B.Sc. Electronic Science (Minor)

Sr. No.	Year	Semester	Level	Course Type	Course Code	Title	Credits
1.	I	I	4.5	MNR-1	BS-ES101 T/P	Basics of Analog Electronics	03
2.	I	II	4.5	MNR-2	BS-ES102 T/P	Basics of Digital Electronics	03
3.	II	III	5.0	MNR-3	BS-ES201 T/P	Electronic Circuit Design	03
4.	II	IV	5.0	MNR-4	BS-ES202 T/P	Computer Organization	03
5.	III	V	5.5	MNR-5	BS-ES301 T/P	Digital Communication and Networking	04
6.	III	VI	5.5	MNR-6	BS-ES302 T/P	Internet of Things	04
							20

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

New Arts, Commerce and Science College, Ahmednagar
(Autonomous)
Syllabus
B.Sc. Electronic Science (Minor)

Title of the Course: Electronic Circuit Design								
Year: II				**Semester: III**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
MNR-3	BS-ES201 T/P	02	01	03	60	30	70	100

Learning Objectives:

1. To study basic principles of amplifiers and oscillators.
2. To understand the working of various analog circuits.
3. To develop analog circuit design skills.
4. To apply the knowledge of analog circuits in different applications.

Course Outcomes (Cos)

After completion of the course, the students will be able to –

1. Grasp basic and advanced amplifier concepts, including types and coupling effects.
2. Design and evaluate various classes of power amplifiers.
3. Understand and apply feedback systems in amplifiers.
4. Develop and analyze oscillator circuits.
5. Master differential amplifiers and operational amplifier applications.
6. Gain practical skills in analog circuit design.

Detailed Syllabus:

UNIT-1: Transistor Amplifiers **(8 hours)**

General classification of amplifiers: Small signal amplifier, Types of coupling: RC coupled, transformer coupled, Multi-stage RC coupled CE amplifier: Effect of coupling and bypass capacitors on frequency response (qualitative approach).

UNIT-2: Power Amplifiers **(8 hours)**

Concept of small signal and large signal amplifiers: Gain, efficiency, and distortion. Classification of power amplifiers: class-A, class-B, class-AB, class-C. Class-A amplifier:

resistive load/transformer coupled load, efficiency calculation. Class B Push-pull amplifier: concept, complimentary symmetry class-B push-pull amplifier.

UNIT-3: Feedback Systems (7 hours)

Concept of negative and positive feedback and Barkhausen criterion. Types of feedback circuits: current shunt, current series, voltage shunt, and voltage series. Effect of negative feedback on gain, bandwidth, input and output impedance. Basic concepts of Oscillator circuits - Wien bridge, Phase Shift, Crystal.

UNIT-4: Differential Amplifiers and Operational Amplifier Applications (7 hours)

Concept and working of differential amplifier: Single-ended, double-ended configurations. Op-amp Applications: Inverting and Non-Inverting amplifier, Adder, Subtractor, Comparator.

Suggested Readings/Material:

1. Electronic Principles by Malvino A.P - TMH
2. Operational Amplifiers and Linear Integrated Circuits by Gaykawad R. - PHP
3. Operational Amplifier by Clayton G.B. - ELBS
4. Electronic Devices and Circuits by Millman, Halkias - McGrawHill
5. Electronic Devices and Circuits by Boylestead - PHP
6. Principles of Electronics by Meheta V.K. - S.Chand and Company
7. Principles of Electronics by B.L.Thereja - S.Chand and Company
8. Basic Electronic Devices and Circuits: R.Y. Borse 1st Edition 2012 - Adhayan Publishers and Distributors, New Delhi.

Practical Course for Electronic Circuit Design

Total Number of Practical Sessions: 12

(Any 12 (core) OR 10 (core) +2 (introductory))

Introductory Practicals:

1. Basic Electronics Components and Tools (1 hour)

- Introduction to basic electronics components (resistors, capacitors, transistors, op-amps).
- Familiarization with lab equipment (multimeter, oscilloscope, breadboard).

2. Basic Soldering and Circuit Assembly Techniques (1 hour)

- Practice soldering techniques.
- Assemble a simple circuit on a breadboard and a PCB.

Core Practicals:

1. Design and build a Wein Bridge Oscillator.
2. Construct a Phase Shift Oscillator.
3. Design and test two stage RC-coupled amplifier circuit.
4. Design and test comparator circuit.
5. Design and construct a low pass filter.
6. Build a high pass filter circuit.
7. Assemble a push-pull amplifier.
8. Implement negative feedback in an amplifier circuit.
9. Design and test Inverting Amplifier circuit
10. Design and test Non-inverting amplifier circuit.
11. Explore the characteristics of an operational amplifier.
12. Design and test RC-coupled Amplifier circuit.
13. Design and test adder circuit with help of op-amp.
14. Design and test subtractor circuit with help of op-amp.

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(Autonomous)
Syllabus
B.Sc. Electronic Science (Minor)

Title of the Course: Computer Organization								
Year: II				**Semester: IV**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
MNR-4	BS-ES202 T/P	02	01	03	60	30	70	100

Learning Objectives:

1. To get familiar digital sequential circuits.
2. To study Basic computer Organization.
3. To understand K-map and its implementation in digital circuit design.
4. To study Memory architecture.

Course Outcomes (Cos)

After completion of the course, the students will be able to –

1. Understand basic computer Organization.
2. Understand Memory architecture.
3. Able to use K-maps for digital circuit design.
4. Analyze and design sequential circuits.

Detailed Syllabus:

Unit I: Digital Circuit Design **(05)**

Design of Priority Encoder, Parity generator and Parity checker using K map.

Sequential circuits: RS Flip Flop using NAND gate, clocked RS, D Latch, J K, T

Unit II: Shift registers and Counters **(10)**

Shift registers: SISO, SIPO, PISO, PIPO shift registers, Ring Counter using D Flip flop.

Counters: Synchronous and Asynchronous type, 3-bit Up, Down and Up-Down counter, Concept of modulus Counters. Concept of excitation table, random sequence generator

Unit III: Basics of Computer System **(10)**

Basic Computer Organization, Concept of Address Bus, Data Bus, Control Bus. CPU: Block Diagram and Explanation of each block, Register based CPU organization, Concept of Stack & its organization. I/O organization: need of interface, block diagram of general I/O interface.

Unit IV: Memory Organization **(05)**

Memory, Types of Memories, Memory hierarchy, Memory parameter, Vertical and Horizontal Memory Expansion, Cache memory, Virtual Memory.

Suggested Readings/Material:

1. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education.
2. Digital Electronics: Jain R.P., Tata McGraw Hill.
3. Digital Logic and Computer Design: M. Morris Mano, Pearson Education.
4. Computer Organization and Architecture, William Stallings, Pearson, 10th Edi.Publishers and Distributors, New Delhi.

Practical Course for Computer Organization

The practical course consists of 12 experiments each of 2 hours duration.

1. Study of Priority Encoder.
2. Study of Parity Generator.
3. Study of Parity checker.
4. Verify the truth table of RS, JK FF using NAND gates
5. Verify the truth table of D, T FF using NAND gates
6. Study of Motherboard and CPU.
7. Study of asynchronous Up Counter.
8. Study of asynchronous Down Counter
9. Study of decade counter IC circuit configurations
10. Study of 4-bit SISO Shift register.
11. Study of Ring Counter
12. Study of random sequence generator for counting given sequence.
13. Study of read and write action of RAM (using IC 2112/4 or equivalent).
14. Study of Diode Matrix ROM
15. Study of Computer hardware system.
16. Study of Four bit ALU.
17. Assembling and Disassembling of Computer.

18. Study of different cables and connectors for interfacing various peripheral devices.
19. Simulation experiment using pSpice (any of the above experiment).