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)

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.	Miss. M. R. Markad	Member
5.	Dr. M. A. Shaikh	Member
6.	Mr. G. V. Avhale	Member
7.	Miss. P. M. Gaikwad	Member
8.	Dr. S. N. Helambe	Academic Council Nominee
9.	Mr. S. K. Shinde	Academic Council Nominee
10.	Dr. M. S. Zambare	Vice-Chancellor Nominee
11.	Mr. Bipinchandra Todmal	Alumni
12.	Mr. P. D. Nirmal	Industry Expert
13.	Prof. A. V. Mancharkar	Member (co-opt)
14.	Mrs. B. M. Danave	Member (co-opt)

1. Prologue/ Introduction of the programme:

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

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

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: Basics of Analog Electronics								
Year: I				**Semester: I**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
MNR-1	BS-ES101 T/P	02	01	03	60	30	70	100

Learning Objectives:

This course offers the basic knowledge to students to It gives and their applications are discussed in detail.

1. To study passive and active electronic components.
2. To study the concept of electrical network theorems and semiconductor devices.
3. To analyze different electronic circuits and theorems.
4. To study and understand the applications of electronic devices.

Course Outcomes (Cos):

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

1. Understand difference between passive and active components.
2. Understand the basic laws, theorems and application of analog electronics.
3. Develop an understanding of the basic operation and characteristics of different type of diodes and familiarity with its working and applications.
4. Become familiar with construction, working and characteristics of BJT.

Detailed Syllabus:

Unit I: Electronic Components **(09)**

Introduction of Electronics, concept of Analog electronics, classification of components. Passive electronic components: resistors, capacitors, inductors, transformer, switches, cables and connectors, fuses (only basic concept, basic working and application is expected). Series and parallel combination of resistors, capacitors and inductors.

Unit II: Circuit Analysis and Network Theorems **(06)**

Basic Ohm's law, its application as voltage and current divider circuits, Kirchoff's voltage law, Kirchoff's current law, concept of Black box, Thevenin's theorem, Norton's theorem, Superposition theorem and Maximum power transfer theorem with suitable examples.

Charging-discharging of capacitor, AC applied to R, C and L, LCR series resonant circuit, RC low pass and high pass filter.

Unit III: Semiconductor Diodes and Applications (08)

Basics of Semiconductor, intrinsic and extrinsic semiconductor, P and N type semiconductors, formation of PN junction diode, forward and reverse bias characteristics. Types of diodes- Zener diode, Light Emitting Diode, Photo Diode, Varactor diode, Solar Cell (construction, working principle, characteristics, applications).

Rectifiers- half wave and full wave circuits, Zener diode as a voltage regulator, Opto-coupler concept. Basic block diagram of power supply.

Unit IV: Bipolar Junction Transistors and Applications (07)

Basics of Transistor (BJT), types, symbol, construction, working principle. Transistor configurations - CB, CC (only concept), CE configuration: input and output characteristics. The concept of biasing – fixed bias, potential divider bias. Transistor as a CE amplifier, concept of gain and bandwidth, transistor as a switch.

Suggested Readings/Material:

1. Electronic Devices and Circuit Theory - Robert L. Boylestad and Louis Nashelsky.
2. Electronic Devices and Circuits I – T.L.Floyd- PHI.
3. Integrated Electronics – Millmam and Halkias.
4. Electronic Devices and Circuits – Bogart.
5. Principals of Electronics - V.K. Mehta, S.Chand and Co.
6. A text book of electrical technology - B.L.Theraja, S.Chand.

Basics of Analog Electronics Practicals

Detailed Syllabus:

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

1. Identification of components (Passive and Active) and study of multimeter.
2. Study of Signal Generator and CRO.
3. To verify the Superposition theorem.
4. To verify Kirchhoff's voltage.
5. To verify Kirchhoff's current laws.
6. To verify Thevenin's theorems.

7. To verify Norton's Theorem.
8. To verify Maximum Power Transfer Theorem.
9. To study forward and reverse characteristics of diode.
10. To study diode rectifier circuits.
11. Zener diode as a voltage regulator.
12. To study transistor as a switch.
13. Study of Single stage RC coupled CE transistor Amplifier (Gain/ Bandwidth).
14. Study of solar cell.
15. Designing of a Low Pass RC Filter and study of its Frequency Response
16. Designing of a High Pass RC Filter and study of its Frequency Response
17. To study series resonance of LCR Circuit.

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(Autonomous)

Syllabus

B.Sc. Electronic Science (Minor)

Title of the Course: Basics of Digital Electronics								
Year: I				**Semester: I**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
MNR-2	BS-ES102 T/P	02	01	03	60	30	70	100

Learning Objectives:

1. To represent information in various number systems.
2. To convert data from one number system to another and do various arithmetic operations.
3. To study basic and derived logics gates and design of digital circuits.
4. To analyze logic systems and able to implement optimized combinational circuit using Karnaugh Map.

Course Outcomes (Cos):

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

1. Understand and represent numbers in powers of base and converting one from the other, carry out arithmetic operations.
2. Understand basic logic gates and concepts of Boolean algebra.
3. Understand K-map and reduce/simplify Boolean expressions.
4. Analyze and design combinational circuits.

Detailed Syllabus:

Unit I: Number System and Codes (08)

Decimal, Binary, Hexadecimal and Octal number systems, Interconversions, Binary addition and subtraction, Binary subtraction by complement methods, Binary Coded Decimal, Gray Code, Excess-3 code, ASCII code.

Unit II: Logic Gates and Boolean Algebra (10)

Symbol, Boolean equation and truth table of basic and derived gates, concept of universal gates. Laws and rules of Boolean algebra, Demorgan's theorems, logic simplification using Boolean

algebra, minterms, maxterms, Standard representation of logic functions (SOP and POS), conversion of SOP/POS expression to its standard SOP/POS form.

Unit III: Combinational Logic Design (12)

Karnaugh map, SOP Minimization using K-map, 3-bit binary to gray and gray to binary converter, Adder, binary subtractor, parallel adder/Subtractor, Multiplexers and Demultiplexers, Implementing logic functions with multiplexer, Encoder and Decoder, BCD to 7-segment decoder, Digital Comparator.

Suggested Readings/Material:

1. Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994).
2. M. Morris Mano Digital System Design, Pearson Education Asia.
3. Digital electronics - G. K. Kharate, Oxford University Press.
4. Modern Digital Electronics- R.P.Jain, Tata McGraw- Hill.

Basics of Digital Electronics Practicals

Detailed Syllabus:

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

1. Verification of logic gates by using digital ICs.
2. Realization of basic gates using discrete components.
3. Realization of basic gates using NAND/NOR gates.
4. To design a combinational logic circuit for a specified Truth Table using logic gate IC's.
5. Verification of De Morgan's theorems.
6. Study of half adder and full adder using logic gates.
7. Study of half subtractor and full subtractor using logic gates.
8. 4-bit binary parallel adder and subtractor using IC7483.
9. Design 3-bit binary to gray converter using logic gates.
10. Design 3-bit gray to binary converter using logic gates.
11. Design a 2:1 MUX and 1:2 DEMUX using gates.
12. Design a 4:1 MUX using gates.
13. Design a 1:4 DEMUX using gates.
14. Design Decimal to BCD Encoder.
15. BCD to Decimal Decoder.
16. Study of 1-bit digital comparator.
17. Digital Circuit simulation using Proteus/CircuitMod/Multisim software.