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

B.Sc. Electronic Science (Major)

Implemented from

Academic Year 2023-24

Credit Distribution: B.Sc. Electronic Science (Major) 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**

B. Sc. Programme Framework: Credit Distribution

Year	Semester	Level	Major											Minor	OE	CC	AEC	VEC	Total
			DSC		DSE		SEC		VSC		FP/OJT /IN/CEP		IKS						
I	I	4.5	T	P	T	P	T	P	T	P	T	P		T/ P	-	-	-	-	-
I	II	4.5	4	2	-	-	-	2	-	-	-	-	2	03	3	2	2	2	22
			6	-	-	-		2	-	2	-	-		03	3	2	2	2	22
Exit Option: Award of UG Certificate in Major with 44 credits and an additional 4 credit core NSQF course /Internship or Continue with Major and Minor																			
II	III	5.0	6	2	-	-		2	-	-	-	2		03	3	2	2	-	22
II	IV	5.0	6	2	-	-		-	-	2	-	2		03	3	2	2	-	22
Exit Option: Award of UG Diploma in Major with 88 credits and an additional 4 credit core NSQF course /Internship or Continue with major and minor																			
III	V	5.5	8	2	2	2	-	-	-	2		2		04	-	-	-	-	-	22
III	VI	5.5	6	2	2	2	-	-	-	2		4		04	-	-	-	-	-	22
Exit Option: Award of UG Degree in Major and Minor with 132 credits or continue with Major for a 4-year Degree																			
IV	VII	6.0	8	6	2	2	RM-4		-	-	-	-		-	-	-	-	-	-	-	22
IV	VIII	6.0	8	6	2	2	-	-	-	-	-	4		-	-	-	-	-	-	-	22
Four Year UG Degree(Honours) with Major and Minor with 176 credits																			

B. Sc. Programme Framework: Course Distribution

Year	Semester	Level	Major											Minor		OE	CC	AEC	VEC	Total
			DSC		DSE		SEC		VSC		FP/OJT /IN/CEP		IKS							
I	-	-	T	P	T	P	T	P	T	P	T	P		T	P	-	-	-	-	-
I	I	4.5	2	1	-	-	-	1	-	-	-	-	1	1		1	1	1	1	10
	II	4.5	2	-	-	-		1	-	1	-	-		1		1	1	1	1	09
Exit Option: Award of UG Certificate in Major with 44 credits and an additional 4 credit core NSQF course /Internship or Continue with major and minor																				
II	III	5.0	2	1	-	-		1	-	-	-	1		1		1	1	1	-	09
II	IV	5.0	2	1	-	-		-	-	1	-	1		1		1	1	1	-	09
Exit Option: Award of UG Diploma in Major with 88 credits and an \additional 4 credit core NSQF course /Internship or Continue with major and minor																				
III	V	5.5	2	1	1	1	-	-	-	1		1		1		-	-	-	-	08
III	VI	5.5	2	1	1	1	-	-	-	1		1		1		-	-	-	-	08
Exit Option: Award of UG Degree in Major and Minor with 132 credits or continue with Major for a 4-year Degree																				
IV	VII	6.0	3	3	1	1	0	1	-	-	-	-		-	-	-	-	-	-	09
IV	VIII	6.0	3	3	1	1	-	-	-	-	-	1		-	-	-	-	-	-	09
Four Year UG Degree(Honours) with Major and Minor with 176 credits																				

Programme Framework (Course Distribution): B.Sc. Electronic Science (Major)

Year	Semester	Level	Major											Total	
			DSC		DSE		SEC		VSC		FP/OJT /IN/CEP/PR		IKS		
			T	P	T	P	T	P	T	P	T	P	T	T	P/PR
I	I	4.5	2	1	-	-	-	1	-	-	-	-	01	03	02
I	II	4.5	2	-	-	-		1	-	1	-	-		02	02
II	III	5.0	2	1	-	-		1	-	-	-	1		02	03
II	IV	5.0	2	1	-	-		-	-	1	-	1		02	03
III	V	5.5	2	1	1	1	-	-	-	1		1		03	04
III	VI	5.5	2	1	1	1	-	-	-	1		1		03	04
B.Sc. Honours															
IV	VII	6.0	3	3	1	1	RM-1		-	-	-	-		05	04
IV	VIII	6.0	3	3	1	1	-	-	-	-	-	1		04	05

Programme Framework (Credit Distribution): B.Sc. Electronic Science (Major)

Year	Semester	Level	Major											Total
			DSC		DSE		SEC		VSC		FP/OJT /IN/CEP/RP		IKS	
			T	P	T	P	T	P	T	P	T	P	T	
I	I	4.5	4	2	-	-	-	2	-	-	-	-	02	10
I	II	4.5	6	-	-	-		2	-	2	-	-		10
II	III	5.0	6	2	-	-		2	-	-	-	2		12
II	IV	5.0	6	2	-	-		-	-	2	-	2		12
III	V	5.5	8	2	2	2	-	-	-	2		2		18
III	VI	5.5	6	2	2	2	-	-	-	2		4		18
IV	VII	6.0	8	6	2	2	RM-4		-	-	-	-		22
IV	VIII	6.0	8	6	2	2	-	-	-	-	-	4		22

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

Sr. No.	Year	Semester	Level	Course Type	Course Code	Title	Credits
1.	I	I	4.5	DSC-1	BS-ES111T	Principles of Analog Electronics	02
2.	I	I	4.5	DSC-2	BS-ES112T	Principles of Digital Electronics	02
3.	I	I	4.5	DSC-3	BS-ES113P	Practical Course – I	02
4.	I	I	4.5	SEC-1	BS-ES114P	Practical Course – II	02
5.	I	I	4.5	IKS-1	BS-ES115T	Evolution of Electronics in India	02
6.	I	II	4.5	DSC-4	BS-ES121T	Analog Device Applications	03
7.	I	II	4.5	DSC-5	BS-ES122T	Digital Circuits and Computer Organization	03
8.	I	II	4.5	SEC-2	BS-ES123P	Practical Course – III	02
9.	I	II	4.5	VSC-1	BS-ES124P	Practical Course – IV	02
10	II	III	5.0	DSC-6	BS-ES231T	Analog Circuit Design	03
11	II	III	5.0	DSC-7	BS-ES232T	Digital System Design	03
12	II	III	5.0	DSC-8	BS-ES233P	Practical Course – I	02
13	II	III	5.0	SEC-3	BS-ES234P	Practical Course – II	02
14	II	III	5.0	FP-01	BS-ES235P	Field Project - I	02
15	II	IV	5.0	DSC-9	BS-ES241T	Communication Electronics	03
16	II	IV	5.0	DSC-10	BS-ES242T	Microcontroller Programming and Applications	03
17	II	IV	5.0	DSC-11	BS-ES243P	Practical Course – III	02
18	II	IV	5.0	VSC-2	BS-ES244P	Practical Course – IV	02
19	II	IV	5.0	CEP-01	BS-ES245P	Community Engagement and Service	02

20	III	V	5.5	DSC-12	BS-ES351T	Sensors and Process Control Systems	04
21	III	V	5.5	DSC-13	BS-ES352T	'C' Programming	04
22	III	V	5.5	DSC-14	BS-ES353P	Practical Course – I	02
23	III	V	5.5	DSE-01	BS-ES354T(A)	Fundamentals and Applications of PIC microcontrollers	02
					BS-ES354T(B)	Fundamentals and Applications of AVR microcontrollers	
24	III	V	5.5	DSE-02	BS-ES355P(A)	Practical Course – II	02
					BS-ES355P(B)	Practical Course – II	
25	III	V	5.5	VSC-3	BS-ES356P	Practical Course – III	02
26	III	V	5.5	FP-02	BS-ES357P	Field Project - II	02
27	III	VI	5.5	DSC-15	BS-ES361T	Digital System Design using Verilog	03
28	III	VI	5.5	DSC-16	BS-ES362T	PLC and its Applications	03
29	III	VI	5.5	DSC-17	BS-ES363P	Practical Course – IV	02
30	III	VI	5.5	DSE-03	BS-ES364T(A)	Embedded System Design	02
					BS-ES364T(B)	Electronic Design Automation Tools	
31	III	VI	5.5	DSE-04	BS-ES365P(A)	Practical Course – V	02
					BS-ES365P(B)	Practical Course – V	
32	III	VI	5.5	VSC-4	BS-ES366P	Practical Course – VI	02
33	III	VI	5.5	OJT-01	BS-ES367P	On Job Training - I	04
B.Sc. Electronic Science (Major with Honours)							
34	IV	VII	6.0	DSC-18	BS-ES471T	Modern Communication Technologies	03
35	IV	VII	6.0	DSC-19	BS-ES472T	Advanced Analog Circuit Design	03
36	IV	VII	6.0	DSC-20	BS-ES473T	Programming Raspberry Pi using Python	02
37	IV	VII	6.0	DSC-21	BS-ES474P	Practical Course – I	02
38	IV	VII	6.0	DSC-22	BS-ES475P	Practical Course – II	02
39	IV	VII	6.0	DSC-23	BS-ES476P	Practical Course – III	02
40	IV	VII	6.0	DSE-05	BS-ES477T(A)	Advanced Embedded System Design	02
					BS-ES477T(B)	C++ Programming and Data Structure	
41	IV	VII	6.0	DSE-06	BS-ES478P(A)	Practical Course – IV	02
					BS-ES478P(B)	Practical Course – IV	
42	IV	VII	6.0	RM-01	BS-ES479T/P	Research Methodology	04
43	IV	VIII	6.0	DSC-24	BS-ES481T	Electromagnetic Fields and Antennas	03

44	IV	VIII	6.0	DSC-25	BS-ES482T	Internet of Things	03
45	IV	VIII	6.0	DSC-26	BS-ES483T	Optical Fiber Communication	02
46	IV	VIII	6.0	DSC-27	BS-ES484P	Practical Course – V	02
47	IV	VIII	6.0	DSC-28	BS-ES485P	Practical Course – VI	02
48	IV	VIII	6.0	DSC-29	BS-ES486P	Practical Course – VII	02
49	IV	VIII	6.0	DSE-07	BS-ES487T(A)	Digital Image Processing	02
					BS-ES487T(B)	Artificial Intelligence	
50	IV	VIII	6.0	DSE-08	BS-ES488P(A)	Practical Course – VIII	02
					BS-ES488P(B)	Practical Course – VIII	
51	IV	VIII	6.0	OJT-02	BS-ES489P	On Job Training - II	04

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 Department of Electronic Science offers B.Sc. programme for 3 academic years and 6 semesters and B.Sc. (Honours) programme of 4 years and 8 semesters. For B.Sc. the minimum total number of credits requirements is 132 credits and for B.Sc. (Honours) the minimum total number of credits requirements is 176 credits. The overall credits divided into three groups i.e. major, minor and other courses. The students has to take major course as a specialization followed by minor course from other science department and other courses as per structure of credits distribution. In Major courses credits, for 3 year B.Sc. there are 46 Discipline-Specific Courses (DSC) at each semester and for 4 year B.Sc. (Honours) 74 Discipline-Specific Courses (DSC) at each semester, 8 Discipline-Specific Elective (DSE) at B.Sc. and 16 Discipline-Specific Elective (DSE) at B.Sc. (Honours), 6 Skill Enhancement Courses (SEC) at both B.Sc. and B.Sc. (Honours), 8 Vocational Skill Courses (VSC) at both B.Sc. and B.Sc. (Honours), 4 On-Job Training (OJT) at B.Sc. and 8 On-Job Training (OJT) at

B.Sc. (Honours), 02 Community Engagement and Service (CEP) at both B.Sc. and B.Sc. (Honours), 4 Research Methodology at B.Sc. (Honours) and 2 Indian Knowledge System (IKS) at both B.Sc. and B.Sc. (Honours). In Minor courses credits, 20 Minor at both B.Sc. and B.Sc. (Honours). In Other courses credits, 12 Open Elective (OE) / Multidisciplinary Courses, 8 Co-Curricular Courses (CC), 8 Ability Enhancement Courses (AEC), 4 Value Education Courses (VEC) at both B.Sc. and B.Sc. (Honours) will be taken from other science stream at first and second year of each semester,

The syllabus has been designed such that the knowledge of fundamental concepts, advanced technologies and specific practical skills will be developed among students. To understand advanced electronics technologies students should first understand the basic concepts of electronics. In the first year of the B.Sc. and B.Sc. (Honours) electronic science course, the basic concepts of analog and digital electronics with the required theoretical understanding and practical skills have been covered. During the second year of the B.Sc. and B.Sc. (Honours), students will learn about some designing aspects of analog and digital electronics with practical based on system design. In addition, the students will learn about communication electronics and the microcontroller programming which has large application areas. In the third year of the B.Sc. and B.Sc. (Honours) course, advanced concepts of the electronics field are covered, where the students will get knowledge about sensor transducers & process control systems, 'C' programming, advanced microcontrollers, advanced digital, Programmable Logic Control (PLC), will be covered which has great industrial weightage. Also perform project work and On-Job Training in the third year that improves their practical knowledge as well as allows them to express themselves. In the fourth year of B.Sc. (Honours) course, some more applied courses will teach like modern communication, advanced analog, programming Raspberry Pi using Python, advanced embedded system design, electromagnetic fields and antennas, Internet of Things, optical fiber communication, digital image processing or artificial intelligence and in addition to that Research Methodology course is introduce which will help for scientific temper at UG level.

Electronic Science is an important branch of science devoted to the design, implementation and analysis of electronic circuits and systems. Electronics technology has revolutionized various fields including communication, consumer appliances, medical, defense and so on. The advances in electronics technology make systems smaller, smarter and powerful. The designing-based approach has been used mostly in the syllabus that trains students to apply the acquired knowledge to design and analyze circuits for specific applications.

2. Programme Outcomes (POs):

Students enrolled in the program complete a curriculum that exposes and trains students in a full range of essential skills and abilities. They will have the opportunity to master the following objectives.

To get the knowledge of technological and practical aspects of electronic science.

i. To familiarize with the concepts of electronics technologies.
ii. To create the foundation for research and development in Electronics.
iii. To enhance the programming skill in Electronics.
iv. To get the practical skills required for electronics industries.
v. To develop the analytical abilities towards the use of electronics in real-world problems.
vi. To familiarize with the current and recent technological developments.
vii. To enrich knowledge through activities such as industrial visits, seminars, projects etc.

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

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

Title of the Course: Principles of Analog Electronics								
Year: I				**Semester: I**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-01	BS-ES111T	02	00	02	30	15	35	50

Learning Objectives:

1. To study the different electronic components.
2. To study Network theorems.
3. To study different semiconductor diodes.
4. To understand BJT configurations.

Course Outcomes (Cos):

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

1. Select proper electronic components as per the need of the application.
2. Simplify different electronic circuits using network theorems.
3. Understand the concept of semiconductor diodes
4. Compare different types of BJT configurations.

Detailed Syllabus:

Unit I: Electronic Components **(9)**

Introduction to electronics, applications of electronics, classification of components. Passive components: resistors, capacitors, inductors, relays, transformer, batteries, switches, cables and connectors, fuses (only basic concept, working, classification, specifications and application is expected), series and parallel combination of resistors, capacitors and inductors. (Qualitative analysis only).

Unit II: Basic Electrical Circuits and Circuit Theorems **(6)**

Ohm's law, voltage and current dividers, Kirchhoff's voltage law, Kirchhoff's current law, Thevenin's theorem, Norton's theorem, Superposition theorem and Maximum power transfer theorem. Numerical problems based on these network theorems.

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 Circuits (8)

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

Rectifiers (half and full wave), rectifier with capacitor-filter, Zener regulator, Block diagram of power supply.

Unit IV: Bipolar Junction Transistor (BJT) (7)

Bipolar Junction Transistor (BJT) types, symbol, construction, working principle, transistor configurations - CB, CC (only concept), CE configuration: input and output characteristics, the definition of α, β and Υ. 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 textbook of electrical technology - B. L. Theraja, S. Chand.

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

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

Title of the Course: Principles of Digital Electronics								
Year: I				**Semester: I**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-02	BS-ES112T	02	00	02	30	15	35	50

Learning Objectives:

1. To learn different number system and their interconversion.
2. To understand logic gates and their applications in Boolean algebra.
3. To comprehend arithmetic circuit design.
4. To know logic families in digital electronics.

Course Outcomes (Cos):

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

1. Solve problems based on inter-conversion of number systems.
2. Reduce the logical expression using Boolean algebra.
3. Minimize the logical equations using K-maps.
4. Use different arithmetic circuits.

Detailed Syllabus:

Unit I: Number Systems and Digital Codes **(10)**

Introduction to decimal, binary, octal and hexadecimal number systems and their inter-conversions, the concept of 1's and 2's complements, binary addition, binary subtraction using 1's and 2's complements. BCD code, Excess-3 code, Gray code and ASCII code. Gray to Binary and Binary to Gray conversion.

Unit II: Logic Gates and Boolean Algebra **(12)**

Logic gates: basic and derived (symbol, Boolean equation and truth table), concept of universal gates. Laws of Boolean Algebra, De-Morgan's theorems, simplification of logic equations using Boolean algebra, minterms, maxterms, Boolean expression in SOP and POS form, conversion of SOP/POS expression to its standard SOP/POS form, problems based on SOP (up

to 4 variables). Introduction to Karnaugh map,digital designing using K-map for 3-bit gray to binary and binary to gray conversion. Ex-OR gate as a 4-bit parity checker and generator.

Unit III: Arithmetic Circuits **(05)**

Introduction to Arithmetic circuits, half adder, full adder, half subtractor, full subtractor, four-bit parallel adder, universal adder / subtractor, digital comparator, introduction to ALU.

Unit IV: Logic Families **(03)**

Introduction of CMOS and TTL logic families. Parameters: voltage levels, propagation delay, noise margin, fan in, fan out, power dissipation. Comparison between CMOS and TTL logic families.

Suggested Readings/Material:

1. Digital Design - M. Morris Mano, PHI, New Delhi.
2. Digital Systems Principles and Applications - Ronald J. Tocci.
3. Digital electronics - G. K. Kharate, Oxford University Press.
4. Fundamentals of Digital Circuits - Anand Kumar.
5. Digital Principles and Applications - Malvino and Leach, TMG Hill Edition.

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New Arts, Commerce and Science College, Ahmednagar
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B.Sc. Electronic Science (Major)

Title of the Course: Practical Course - I								
Year: I				**Semester: I**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-03	BS-ES113P	00	02	02	60	15	35	50

Learning Objectives:

1. To identify and calculate values of electronic components.
2. How to use different laboratory instruments for measuring different parameters.
3. To use breadboard / tag-board for building small electronic circuits.

Course Outcomes (Cos):

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

1. Identify different electronic components and instruments.
2. Understand the operation of different laboratory instruments and used them for measuring different parameters.
3. Use breadboard / tag-board for building small electronic circuits.

Detailed Syllabus:

GROUP A (Any 10)

1. To verify the Superposition theorem.
2. To verify Kirchhoff's voltage and current laws.
3. To verify Thevenin's Theorem.
4. To verify Maximum Power Transfer Theorem.
5. To study forward and reverse characteristics of diode.
6. To study diode rectifier circuits.
7. To design Zener as a voltage regulator.
8. To study transistor as a switch.
9. Study of Single stage RC coupled CE transistor Amplifier (Gain/ Bandwidth).
10. Study of solar cells.
11. To verify Norton's Theorem.

12. To build and test Low pass and High pass RC filters.
13. To study series resonance of LCR Circuit.

GROUP B (Any 2)

1. Identification of components (Passive and Active) and study of multimeter -
    a. Minimum 10 different types of components are expected.
    b. Identification based on visual inspection / data sheets.
    c. Measure the various parameters using multimeter.
2. Study of Signal Generator and CRO -
    a. Study of front panel controls.
    b. Measurement of amplitude, frequency and phase of waveform.
3. Perform survey of following topics –
    a. Study of laboratory safety and precautionary measures.
    b. Study of e-waste management or any relevant topic of Electronics.

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

Title of the Course: Practical Course - II								
Year: I				**Semester: I**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
SEC-01	BS-ES114P	00	02	02	60	15	35	50

Learning Objectives:

1. To understand logic gates and their applications in Boolean algebra.
2. To comprehend arithmetic circuit design.
3. To know digital circuit design for different applications.

Course Outcomes (Cos):

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

1. Understand the design and build of digital circuits using logic gates.
2. Use breadboard / tag-board for building small electronic circuits.
3. Use digital circuits for different applications.

Detailed Syllabus:

GROUP A (Any 10)

1. Verification of logic gates by using digital ICs.
2. Realization of basic gates using discrete components.
3. Realization of basic gates using universal logic gates.
4. Realization of universal gates using discrete components (NAND / NOR).
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. 3-bit binary to Gray conversion using logic gates.
10. 3-bit Gray to Binary conversion using logic gates.
11. Study of EX-OR gate as a 4-bit parity checker.

12. Study of EX-OR gate as a 4-bit parity generator.
13. Study of 2-bit digital comparator.

GROUP B (Perform any 1 following activity equivalent to 2 practical)

1. Circuit simulation software LTSPICE / CircuitMod etc. (Give preference to not performed experiments).
2. Perform survey of following topics –
   a. Study of laboratory safety and precautionary measures.
   b. Study of e-waste management or any relevant topic of Electronics.

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

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

Title of the Course: Evolution of Electronics in India								
Year: I				**Semester: I**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
IKS-1	BS-ES115T	02	00	02	30	15	35	50

Learning Objectives:

1. To learn about evolution of electronics technology in India.
2. To understand the problems faced by electronics industries in India.
3. To get knowledge of different sectors of Electronic Industry in India.

Course Outcomes (Cos):

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

1. Understand the role of electronics in India.

2. Comprehend the growth of Electronics technology in India.

3. Recognize the problems of electronics industries in India.

Detailed Syllabus:

Unit I: The Electronics Technology in India (15)

An Introduction to India, Industrial Development, Economy and Trade. An overview of Indian contributions to technology, Technological Innovations, India's Contribution to the World. The electronic development in India. The growth of various segments of the electronics industry: telecommunications, consumer electronics, computer hardware and software and medical electronic systems. The problems faced by the industries - power, transportation, communication networks and other environmental considerations. Electronics research institutes in India.

Unit II: Development of Electronics in India (15)

Economic Policy Changes in the Electronics Industry, Advent of Multinational Companies (MNCs), Growth of Consumers, Information for Investors. The Electronics Industry in India - Defense Electronics, Space Technology, Telecommunications, Electronics Development in

India, Personal Computers Industry, Printed Circuit Board Production and Assembly, Integrated Circuits Industry, Color TV Industry, Medical Electronics Industry, Process Control Industry, Information Technology Industry, Software Development in India. Public Sector Companies.

Suggested Readings/Material:

1. The Indian Electronics Industry - Dhiraj Bansal, Rajdeep Sharma.
2. Indian Contribution to science, compiled by Vijnana Bharati.
3. B.V. Subbarayappa, Science in India: A Historical Perspective, Rupa, New Delhi.

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Title of the Course: Analog Device Applications								
Year: I				**Semester: II**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-04	BS-ES121T	03	00	03	45	30	70	100

Learning Objectives:

1. To different semiconductor devices.
2. To study op-amp parameters and different applications of op-amp.
3. To understand the concept of multivibrator (IC-555).
4. To study sensors and actuators.

Course Outcomes (Cos):

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

1. Compare different semiconductor devices like UJT, JFET and MOSFET.
2. Understand the operation of op-amp and its various parameters.
3. Understand op-amp circuits and their usefulness in different applications.
4. Understand the use of sensors and actuators for different applications

Detailed Syllabus:

Unit I: UJT, FET's Basics and Applications (12)

Symbol, types, construction, working principle, I-V characteristics. Specification parameters: Uni-Junction Transistor (UJT), Junction Field Effect Transistor (JFET), Metal Oxide Semiconductor FET (MOSFET). Comparison of JFET and MOSFET.

Applications: UJT as a Relaxation oscillator, JFET as voltage variable resistor, MOSFET as a switch.

Unit II: Operational Amplifier and its Applications (12)

Block diagram, symbol, characteristics of ideal and practical op-amp. The concept of virtual ground, positive feedback and negative feedback. Differential and common mode gain, CMRR. Applications: inverting amplifier, non-inverting amplifier, voltage follower, comparator,

Schmitt Trigger, adder, subtractor, integrator and differentiator. Voltage to current converters with ground load and floating load), Voltage Controlled Oscillator (VCO) or V to F Converter.

Unit III: IC 555 and its applications **(07)**

Introduction, block diagram, pin diagram, features. Applications: astable multivibrator, monostable multivibrator and bistable multivibrator.

Unit IV: Sensors and Actuators **(14)**

Basic instrumentation system. Sensors: Definition, active and passive sensors. Specifications of sensors: accuracy, range, linearity, sensitivity, resolution, reproducibility. Temperature sensor (thermistor, LM-35), optical sensor (LDR), Passive Infrared sensor (PIR), PIR Sensor intruder detection system, tilt sensor, ultrasonic sensor, Ultrasonic liquid and solid level detector, Linear variable differential transformer (LVDT).

Actuators: Definition, DC motor, stepper motor.

Suggested Readings/Material:

1. Sensors and Transducers - Prof A.D. Shaligram.
2. Op Amp and Linear Integrated Circuits - Ramakant Gaykwad.
3. Linear Integrated Circuits - Roy Choudary.
4. Micro Electronics - Jacob Millan, McGrawHill.
5. Sensors and Transducers - D. Patranabis, PHI publication.
6. Electronic Devices and Circuits: An Introduction - Allan Mottershead, Prentice Hall.

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Title of the Course: Digital Circuits and Computer Organization								
Year: I				**Semester: II**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-05	BS-ES122T	03	00	03	45	30	70	100

Learning Objectives:

1. To understand design of combinational circuit and their different types.
2. To comprehend design of sequential circuit and their different types.
3. To learn organization of digital computer.
4. To enhance the knowledge of computer system.

Course Outcomes (Cos):

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

1. Understand the concept and working of combinational circuits.
2. Comprehend the concept and working of sequential circuits.
3. Understand the different components of computer system.
4. Understand the I/O organization and memory architecture.

Detailed Syllabus:

Unit I: Combinational Circuits **(08)**

Introduction, Multiplexer (2:1, 4:1), demultiplexer (1:2, 1:4) and their applications. Concept of code converters. Encoders: decimal to BCD/binary, hexadecimal to binary, 3x4 matrix keyboard encoder and priority encoder. Decoders: BCD to decimal and BCD to seven segment decoder.

Unit II: Sequential Circuits **(12)**

Introduction, Flip flops: RS, clocked RS, JK, D and T. Race around condition, Master-slave JK. Counters: asynchronous and synchronous, binary counter, up, down, up-down counter, modulus counters, decade counter.

Shift registers: SISO, SIPO, PISO, PIPO shift registers, ring counter, universal 4-bit shift register.

Unit III: Introduction to Computer System (10)

Introduction, features, characteristics of computers, block diagram of computer. Types of computers: Minicomputers, Microcomputers, Mainframe computers, Super computers, Laptops and Tablets. Basic anatomy of computer: input and output, control unit, ALU and memory, working of computer. Software: definition, features. Types of software: system software, application software. Types of computer languages: low level, machine level, assembly level, high level.

Unit IV: Computer Organization (15)

CPU organization: block diagram of CPU, function of CPU. System buses: address, data, control. General register-based CPU organization, flags, ALU. Concept of CISC and RISC. Concept of pipelining. Overview of super-scalar technology.

Memory organization: definition, memory architecture, memory hierarchy, types of memories, data read/write process. Role of cache memory. Concept of virtual memory. Memory management unit.

I/O organization: need of interface, block diagram of general I/O interface. Direct memory access and DMA controller. Interrupt and interrupt controllers.

Suggested Readings/Material:

1. Digital Systems - Principles and Applications - Ronald J. Tocci, PHI. New Delhi.
2. Digital electronics - G. K. Kharate, Oxford University Press.
3. Digital Fundamentals - Floyd T.M., Jain R.P., Pearson Education.
4. Digital Electronics - Jain R.P., Tata McGraw Hill.
5. Digital Logic and Computer Design - M. Morris Mano, Pearson Education.
6. Computer Organization and Architecture - William Stallings, Pearson.
7. Computer organization-V. Carl, Zvonko G., Safwat G.Zaky, McGraw-Hill, international ed
8. Computer Fundamental by P.K. Sinha Chapters: 1-5, 7-10, 12, 14-16.
9. Computer for Beginner by V.P. Jaggi and S. Jain. Chapters: 1, 2, 3, 5, 7

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Title of the Course: Practical Course - III								
Year: I				**Semester: II**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
SEC-02	BS-ES123P	00	02	02	60	15	35	50

Learning Objectives:

1. To study and build different op-amp applications.
2. To study IC 555 for building different applications.
3. To study simulation software for analyzing different electronic circuits.

Course Outcomes (Cos):

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

1. Use OPAMP & IC 555 for building different applications.
2. Use simulation software for analyzing different electronic circuits.
3. Use breadboard / tag-board for building small electronic circuits.

Detailed Syllabus:

GROUP A (Any 10)

1. Use of OPAMP as a comparator.
2. Build and test Inverting amplifiers using OPAMP.
3. Build and test adder and subtractor circuits using OPAMP.
4. Build and test integrator and differentiator using OPAMP.
5. Design and build Astable multivibrator using IC 555.
6. Design and build monostable multivibrator using IC 555.
7. Study of UJT as a Relaxation oscillator.
8. To study temperature sensor LM 35.
9. Use of LDR to control light intensity.
10. Study of FET characteristics.
11. Study of LVDT.
12. V to I converters by using OP-AMP.

13. Build and test non-inverting amplifiers using OPAMP.
14. Smith Trigger
15. VCO

GROUP B (Perform any 1 following activity equivalent to 2 practical)

1. Circuit simulation software LTSPICE / CircuitMod etc. (Give preference to not performed experiments).
2. Perform survey of following topics –
   a. Study of laboratory safety and precautionary measures.
   b. Study of e-waste management or any relevant topic of Electronics.

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Title of the Course: Practical Course - IV								
Year: I				**Semester: II**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
VSC-01	BS-ES124P	00	02	02	60	15	35	50

Learning Objectives:

1. To understand implementation of combinational circuit and their different types.
2. To comprehend implementation of sequential circuit and their different types.
3. To learn computer hardware by studying motherboard, CPU and peripheral devices.

Course Outcomes (Cos):

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

1. Understand the concept and working of different combinational circuits.
2. Comprehend the concept and working of different sequential circuits.
3. Understand the different components of computer system.

Detailed Syllabus:

GROUP A (Any 10)

1. Study of RS, JK and D flip flops.
2. Study of multiplexer and demultiplexer (4:1 & 1:4).
3. Study of BCD to seven segment decoder using IC 7447.
4. Study of Decimal to BCD/Binary encoder.
5. Study of asynchronous up and down counter.
6. Study of decade counter using IC 7490.
7. Study of 4-bit SISO and SIPO shift register.
8. Study of Shift Register using IC 7485.
9. Study of Priority encoder.
10. Study of read and write action of RAM (using IC 2112/4 or equivalent).
11. Study of diode matrix ROM.
12. Study of computer hardware system.

13. Study of ALU using IC 74181.
14. Study of Motherboard and CPU.
15. Study of peripheral devices.

GROUP B (Perform any 1 following activity equivalent to 2 practical)

1. Circuit simulation software LTSPICE / CircuitMod etc. (Give preference to not performed experiments).
2. Perform survey of following topics –
   a. Study of laboratory safety and precautionary measures.
   b. Study of e-waste management or any relevant topic of Electronics.
3. Assembling and Disassembling of computer system.