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) - II Year

Implemented from

Academic Year 2024-25

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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		BS-ES365P(A)	Practical Course – V	02

				DSE-04	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.	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.	Mrs. B. M. Danave	Member (co-opt)

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

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: Analog Circuit Design								
Year: II				**Semester: III**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-6	BS-ES231T	03	00	03	45	30	70	100

Learning Objectives:

1. To study the different small signal and power amplifiers.
2. To study the different op-amp based systems.
3. To study the multivibrators.
4. To study the voltage regulators.

Course Outcomes (Cos)

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

1. Design amplifier circuits.
2. Understand designing of power amplifiers.
3. Understand the concept of feedback.
4. Design op-amp based circuits.

Detailed Syllabus: Example

Unit I: Amplifiers (10)

Small signal amplifiers: AC and DC analysis, frequency response, gain bandwidth product. Single stage amplifier: designing, effect of coupling capacitor and bypass capacitor on frequency response (qualitative approach). Classification of amplifiers. Types of couplings. Design of two stage amplifier.

Distortion in amplifiers: Amplitude, Frequency, Phase.

Unit II: Power Amplifier (14)

Classification of power amplifiers on the basis of position of operating point: class-A, class-B, class-AB and class-C and their comparisons. Class A amplifier: Resistive load and Transformer coupled load, efficiency calculation.

Class B amplifier: push pull amplifier concept, Complimentary symmetry Class B push pull amplifier, crossover distortion, heat sinks. Class-AB push pull amplifier. Thermal runaway.

Single tuned amplifiers: Circuit diagram, Working and Frequency Response, Limitations of single tuned amplifier, Applications of tuned amplifiers in communication circuits.

Unit III: Feedback System **(05)**

Concept of feedback, positive and negative feedback. Types of feedback circuits: current shunt, current series, voltage shunt and voltage series. Effect of negative feedback: gain, bandwidth, input and output impedance.

Unit IV: Op-amp based Systems (Filter, Amplifier, Oscillator, Multivibrator) **(10)**

Filter: First order low pass and high pass butterworth filter.

Amplifier:

Op-amp circuits:- Schmitt trigger, Instrumentation amplifier, practical integrator and differentiator, Log and antilog amplifiers.

Oscillators:

Barkhausen's criterion, Wien bridge oscillator and Phase shift oscillator, Colpitts oscillator and Hartley oscillator.

Multivibrators: Block diagram, Astable, monostable and bistable multivibrator circuit, Applications of Astable, monostable and bistable multivibrators.

Unit V: IC Voltage Regulators **(06)**

Block diagram of Voltage Regulator, Concept of load and line regulation, Three terminal voltage regulators, Fixed and adjustable voltage regulators (78XX, 79XX), 723, LM317, LM337, Dual power supply.

Suggested Readings/Material:

1. Operational amplifiers and linear Integrated Circuits - Ramakant Gaikwad, PHP.
2. Operational amplifier - G. B. Clayton, ELBS.
3. Electronic devices and circuits - Boylested, PHP.
4. Principles of Electronics - B. L. Thereja, S. Chand and Company.

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: Digital Circuit Design								
Year: II				**Semester: III**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-7	BS-ES232T	03	00	03	45	30	70	100

Learning Objectives:

1. To study combinational logic circuits designing.
2. To design sequential logic circuits.
3. To understand different types of DAC and ADC.
4. To learn digital system design and their applications.

Course Outcomes (Cos)

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

1. Understand combinational logic circuits designing.
2. Design sequential logic circuits.
3. Understand different types of DAC, ADC and compare their performance parameters.
4. Analyze digital system design and their applications.

Detailed Syllabus:

Unit I: Combinational Logic Circuit Design (12)

Revision of K maps. Design of BCD to seven segment decoder: common anode and common cathode configuration. Concept of adder using look ahead carry generator. Priority encoder. Error detection and correction techniques: Hamming code, CRC. Magnitude comparator: 2 - bit and 4 - bit.

Unit II: Sequential Logic Circuit Design (12)

State table, state diagram, excitation table and transition table. Design of counters using state machines: asynchronous, synchronous, up, down, up-down, modulus and decade counters. Design of sequence generator, random sequence generator.

Unit III: Data Convertors (12)

Digital to Analog Converters: Weighted resistive network, R-2R ladder network and specifications of DAC,

Analog to Digital converters: Simultaneous conversion, counter type, successive approximation method, flash, single slope, dual slope and specifications of ADC. Specifications of DAC 0804, ADC 0808 and, ICL 7106.

Sample and hold circuit, Block diagram of Data Acquisition system

Unit IV: Digital System Design and Applications (9)

Event detection using OR gate, frequency measurement using AND gate, square wave generator using NOT gate, key debouncer circuit using NAND gate.

Case Studies: Totalizer, Digital clock, Auto-Parking, Two-digit bank token display.

Suggested Readings/Material:

1. Digital Design - Morris Mano, Prentice Hall of India.
2. Modern Digital Electronics - R. P. Jain, Tata McGraw Hill Education India.
3. Integrated Circuits - K. R. Botkar, Khanna Publications.
4. Digital Fundamentals - Thomas Floyd and Jain, Pearson Education International.
5. Digital Fundamentals - Thomas Floyd and Jain, Pearson Education International.
6. Manuals: National semiconductor, EXAR, Intersil, Signetics, Analog Devices.
7. Practical Digital IC's - Willams (TMH).

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

Syllabus

B.Sc. Electronic Science (Major)

Title of the Course: Practical Course – I								
Year: II					**Semester: III**			
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	**Allotted Marks**		
		Theory	Practical			CIE	ESE	**Total**
DSC-8	BS-ES233P	00	02	02	60	15	35	50

Learning Objectives:

1. To study the different small signal and power amplifiers.
2. To study the different op-amp based systems.
3. To study the multivibrators.
4. To study the voltage regulators.

Course Outcomes (Cos)

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

1. Design, build and test different analog circuits.
2. Understand designing of power amplifiers.
4. Use op-amp for different applications.

Detailed Syllabus:

GROUP A (Any 10)

1. Design, build and test integrator circuit using op-amp.
2. Design, build and test differentiator circuit using op-amp.
3. Design, build and test Wien bridge oscillator using op-amp.
4. Design, build and test Phase shift oscillator using op-amp.
5. Design, build and test Class-B Push pull amplifier.
6. Design, build and test first order Butterworth HPF.
7. Design, build and test first order Butterworth LPF.
8. Design, build and test Schmitt trigger.
9. Design, build and test two stage amplifier using transistors.
10. To design, build and test Log amplifier using Opamp.
11. To study gain bandwidth product of inverting/ non-inverting amplifier.

12. Study of an astable multivibrator.
13. Study of monostable multivibrator.
14. Designing of Fixed voltage power supply using IC regulators using 78 series and 79 series, 723 Voltage regulators.
15. Study of Class A, B and C Power Amplifier.
16. Study of the Colpitt's Oscillator.

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

Perform any one experiments from Group A (op-amp based) using circuit simulation software

LTSPICE / Proteus / any other simulation software. (Give preference to not performed experiment

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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: II				**Semester: III**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	**Allotted Marks**		
		Theory	Practical			CIE	ESE	**Total**
SEC-3	BS-ES234P	00	02	02	60	15	35	50

Learning Objectives:

1. To study combinational logic circuits designing.
2. To design sequential logic circuits.
3. To understand different types of DAC and ADC.
4. To learn digital system design and their applications.

Course Outcomes (Cos):

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

1. Understand practical aspects of designing digital systems.
2. Design and build combinational circuits using K-map.
3. Design and build sequential circuits using K-map.
4. Use of ADC and DAC circuits for different applications.

Detailed Syllabus:

GROUP A (Any 10)

1. Design, build and test 3-bit synchronous counter using flip flops.
2. Design, build and test Priority keyboard encoder using IC 74148.
3. Design, build and test hamming code error detection circuit.
4. Design, build and test 4-bit magnitude comparator.
5. Design, build and test DAC using R-2R ladder network.
6. Design, build and test ADC using IC 0808.
7. Design, build and test ADC using IC 7109.

8. Design, build and test event counter.

9. Design, build and test frequency counter.

10. Design, build and test square wave generator using logic gates.

11. Design, build decimal to BCD encoder using logic gates

12. Design, build and test 3-bit asynchronous counter using IC.

13. Design, build and test random sequence generator.

14. Design, build 4-bit parity generator/ checker.

15. Design, build and test 4 bit shift register and use as Ring Counter

16. Design build sample and hold circuit.

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

Perform any 2 experiments from Group A using circuit simulation software LTSPICE / CircuitMod / any other simulation software. (Give preference to not performed experiments).

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: Communication Electronics								
Year: II				**Semester: IV**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-9	BS-ES241T	03	00	03	45	30	70	100

Learning Objectives:

1. To understand different elements of communication systems.
2. To comprehend modulation and demodulation methods.
3. To realize frequency modulation and circuit for FM.
4. To understand the concept of digital communication.

Course Outcomes (Cos)

1. Understand different blocks in communication systems,
2. Comprehend the types of noise in communication systems and its different parameters
3. Understand need of modulation, modulation process and its methods.
4. Know the use of digital communication in different applications.

Detailed Syllabus:

Unit I: Introduction to Electronic Communication (06)

The importance of communication, The elements of communication system, Types of electronic communication, application of Simplex and Duplex communication, The electromagnetic Spectrum, Bandwidth.

Unit II: Amplitude modulation and circuits for AM (16)

Amplitude modulation principle, Amplitude modulation with digital signals, Modulation Index, Percentage of modulation, sideband and frequency domain, AM power distribution, single sideband communication.

Amplitude Modulator, PIN diode modulator, High level amplitude modulation, Amplitude demodulator- diode detector, Crystal radar receiver, balanced modulator.

Unit III: Frequency modulation and circuits for FM (14)

Frequency modulation principle, phase modulation, The Bandwidth of FM signal, percentage of modulation, Frequency modulation vs Amplitude modulation, Pre-emphasis and de-emphasis, Disadvantages of FM, FM with binary signals.

Frequency modulator-voltage variable capacitors, varacter modulator, voltage controlled oscillator, Frequency demodulator, Foster-seeley discriminator, Phase locked loop demodulator.

Unit IV: Introduction to digital communication (09)

Block diagram of digital communication system, advantages of digital communication system, bit rate, baud rate and bandwidth. Serial and parallel communication, concept of sampling, Sampling theorem, PCM concept of keying techniques: ASK, FSK, PSK

Block diagram of MODEM

Suggested Readings/Material:

1. Communication Electronics: Principles and applications - Louis E Frenzel, TMH Publications.
2. Electronics Communication System - Denis Roddy, John Coolen, PHI publication.
3. Electronic Communication Systems - Kennedy, George and Devis, Bernard, TMH.
4. Communication Systems: Analog and Digital – Singh R.P. and Sapre S.D., TMH.

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: Microcontroller Programming and Applications								
Year: II				**Semester: IV**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	**Allotted Marks**		
		Theory	Practical			CIE	ESE	**Total**
DSC-10	BS-ES242T	03	00	03	45	30	70	100

Learning Objectives:

1. Explain the difference between microprocessor and microcontrollers
2. Describe the architecture of 8 bit microcontroller
3. Use the instruction set and addressing modes of microcontroller
4. Develop assembly and C language programming skills
5. Interface various memory and I/O devices

Course Outcomes (Cos)

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

1. Understand the concept of embedded systems and its applications.
2. Design simple embedded systems.
3. Understand the assembly programming of 8051 microcontroller.
4. Interface different I/O devices to 8051.

Detailed Syllabus:

Unit I: Basics of 8051 Microcontrollers (12)

Microcontroller: History, introduction, classification, applications. Differences between microcontroller and microprocessor, criteria for choosing a microcontroller. The 8051 microcontrollers: introduction, family members, architecture, block diagram, internal RAM organization, SFRs (Program Counter, Data Pointer, A and B Registers, PSW, SP), pin configuration, I/O port structure and operation, oscillator and reset circuitry, programming connections.

Unit II: Assembly Programming of 8051 (08)

Assembly language instruction format, addressing modes. Different groups of Instructions: Data Transfer, Logical, Arithmetic, Jump and Call. Basic programs based on arithmetic, logical, code conversion, block data transfer operations.

Unit III: Microcontroller Programming in C (15)

C Data types for 8051, C Programs for Time Delays & I/O Operation, I/O Bit Manipulation, Arithmetic and Logical Operations, ASCII & BCD Data Conversion.

Timer programming - Timers and counters, delay generation using timer, waveform generation using timer. Embedded C programming for delay generation, waveform generation using timer and PWM based DC motor control.

Serial Port Programming: SFR used, different modes of operation, C programming for serial data transmission and reception.

Interrupt programming: SFR used, interrupt sources – Reset, timer, external and serial communication, SFR used and C programs.

Unit IV: Interfacing I/O devices and Case studies (10)

I/O device interfacing: LED, push button, buzzer, seven segment display, DC and stepper motor. Interfacing LCD – pin configurations, commands, programming for display message. Serial port programming - Send data to smartphone using Bluetooth module HC05 and control devices using smartphone. Interfacing ADC – pin configurations, programming for monitoring temperature using LM35 sensor. Waveform generation using DAC - square wave, Sawtooth, triangular and staircase. Case studies: Traffic Light controller and event counter.

Suggested Readings/Material:

1. The 8051 Microcontroller and Embedded Systems using Assembly and C - M.A.Mazidi, J.G. Mazidi, R.D. Mckinlay. Pearson Education.

2. The 8051 Microcontroller Architecture, Programming and application - Kenneth J.Ayala, Penram International.

3. Embedded System Design: A Unified Hardware/Software. Approach - Frank Vahid and Tony Givargis.

4. The 8051 Microcontroller and Embedded Systems using Assembly and C - Kenneth J. Ayala, Dhananjay V. Gadre.

5. Microcontrollers [Theory and Applications] Deshmukh - Ajay V. TMH.

6. Microcontrollers: Principles and Applications – Ajit Pal.

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

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

Syllabus

B.Sc. Electronics Science (Major)

Title of the Course: Practical course - III								
Year: II					**Semester: IV**			
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	**Allotted Marks**		
		Theory	Practical			CIE	ESE	**Total**
DSC-11	BS-ES243P	00	02	02	60	15	35	50

Learning Objectives:

1. To understand different elements of communication systems.
2. To comprehend modulation and demodulation methods.
3. To realize frequency modulation and circuit for FM.
4. To understand the concept of digital communication.

Course Outcomes (Cos)

1. Describe and explain the techniques of generation of AM/ FM and demodulation
2. Design FSK generation using standard IC XR 2206 referring data manuals
3. Describe and explain the TDM/ FDM generation technique
4. Demonstrate PPM/PWM/PAM and PCM techniques using standard circuits in data manuals

Practical based on Electronic communication (Any 10)

1. Design, build and test Amplitude modulator using transistor.
2. Design, build and test FM generation using VCO / IC 8038 / varactor diode.
3. Design, build and test Frequency Shift Keying (FSK).
4. Design, build and test Phase Shift Keying (PSK).
5. Design, build and test Time division multiplexing.
6. Design, build and test Frequency division multiplexing.
7. Design, build and test balance modulator and demodulator using IC 1408.
8. Design, build and test PPM / PWM.
9. Design, build and test PAM.
10. Demonstration of PCM.
11. Design build and test FM Receiver.

12. Design build and test FM Transmitter.
13. Design, build and test audio amplifier.
14. Design, build and test of two stage amplifier using transistor.
15. Design, build and test Astable multivibrator using opamp

Activity: (Any 1)

1. Generation & detection of analog and pulse modulation techniques by using MATLAB
2. Survey report on different types of Electronics communication media.

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: Practical Course – IV								
Year: II				**Semester: IV**				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
VSC-2	BS-ES244P	00	02	02	60	15	35	50

Course Outcomes (Cos)

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

1. Simulate and debug assembly programs of 8051.
2. Write and execute embedded C programs for 8051.
3. Use the 8051 target board and different software development tools used.
4. Interface different I/O device to the 8051.

Detailed Syllabus:

The practical course consists of 11 experiments and 1 activity equivalent to 1 experiments.

1. To get familiarize with 8051 target board, understand the use of software development tools and perform necessary installation procedure and perform basic exercises on arithmetic, logical and data transfer operation.
2. Programs on code conversion: dec-hex, hex-dec / ASCII – HEX, HEX – ASCII / BCD – seven segment.
3. LED array interfacing (display 3 different patterns on LED).
4. To read push-button switch and display its status on LED.
5. Seven segments display interfacing.
6. Stepper motor interfacing (Clockwise and anticlockwise rotation).
7. DC motor interfacing (Clockwise and anticlockwise rotation).
8. Event counter (use opto-interruptor or IR pair).
9. Traffic light controller.
10. Send data using Bluetooth module HC05.
11. Control devices using smartphone.
12. LCD interfacing.

13. Interfacing LM35 to 8051 using ADC.
14. DAC interfacing for waveform generation.
15. Delay generation using Timer.
16. Interrupt programming – External / Timer.

Activity

Perform any one experiment using circuit simulation software Proteus / any other simulation software. (Give preference to not performed experiments).