Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Name of the Faculty: Science &Technology

(As per New Education Policy 2020)

Syllabus: Electronics

Name of the Course: B.Sc. I (Sem. I & II)

(Syllabus to be implemented from June 2024)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science & Technology
Nep 2020 Compliant Curriculum

B.Sc. (Electronics)
Program Preamble

B.Sc. I syllabus is designed to provide an insight into basic and fundamentals of electronic devices and circuits, both analog and digital. Hands-on these circuits and devices is inculcated in the practical syllabus. In the theory course of 50 + 50 = 100 marks, adequate knowledge of analog and digital circuit theory will be acquired by the students. Students taking admission at First Year B. Sc. Electronics has to complete two theory papers,one at each semester and a practical course for each semester. In the practical course of 50 marks there are many experiments for Practical, which include understanding and practical study of analog and digital circuits and devices. The details are mentioned in the syllabus.

The Bachelor of Science (BSc) in Electronics is a comprehensive and dynamic program designed to provide students with a deep understanding of the fundamental principles of Electronics, along with the practical skills required to apply this knowledge in various scientific and technological contexts. Aligned with the vision of the National Education Policy (NEP) 2020, the program offers a flexible, multidisciplinary, and learner-centric curriculum that encourages critical thinking, innovation, and holistic development. The B.Sc. Electronics program spans four years, with each year offering a progressively advanced curriculum designed to build a strong foundation in Electronics while allowing for specialization and interdisciplinary learning. The curriculum is structured around several key components:

1. **Major Courses:** These core courses form the backbone of the program, providing in-depth knowledge and understanding of essential Electronics concepts, theories, and methodologies. Students will engage with topics ranging from Digital Electronics, Analog Electronics, Transistorized circuits, OPAMP circuit, Microcprocessor 8088, Microcontroller 8051, Communication Systems, Power Electronics etc. ensuring a robust and comprehensive education in the discipline.
2. **Minor Courses:** Students have the opportunity to choose minor courses from related or distinct disciplines, promoting an interdisciplinary approach to learning. This flexibility allows students to complement their Electronics education with insights from fields such as Mathematics, Physics, Statistics, Computer Science, Chemistry etc. for enhancing their versatility and broadening their career prospects.
3. **Open Electives/Generic Electives:** The program encourages intellectual exploration beyond the core discipline by offering a wide range of elective courses. These electives enable students to pursue their interests in diverse subjects, fostering creativity, critical thinking, and a well-rounded educational experience.
4. **Vocational and Skill Enhancement Courses:** Practical skills and technical proficiency are integral to the program, with vocational and skill enhancement courses providing hands-on experience in areas such as Water and soil analysis, Fertilizer and food analysis. These courses are designed to prepare students for immediate employment and equip them with the tools necessary for career advancement in various scientific and technological fields.
5. **Ability Enhancement Courses (AEC), Indian Knowledge System (IKS), and Value Education Courses (VEC):** In alignment with NEP 2020, the program integrates courses that emphasize the Indian Knowledge System, ethical values, and life skills. These courses foster a deep appreciation for India's rich cultural heritage, while also developing essential communication and ethical decision-making skills that are vital for personal and professional growth.
6. **Field Projects/Internships/Apprenticeships/Community Engagement Projects/On-Job Training:** To bridge the gap between theoretical knowledge and real-world applications, the program includes opportunities for field projects, internships, apprenticeships, and community engagement. These experiences provide students with practical insights, problem-solving abilities, and exposure to professional environments, enhancing their readiness for careers in Electronics and related fields.
7. **Research Methodology and Research Projects:** Research is a critical component of the BSc Electronics program, with students acquiring skills in research methodology, data collection, analysis, and scientific inquiry. By engaging in independent research projects, students are encouraged to develop

innovative solutions to complex scientific problems, preparing them for advanced studies and research-oriented careers.

Multiple Entry and Multiple Exit Options

In accordance with the NEP 2020, the BSc Chemistry program incorporates a Multiple Entry and Multiple Exit framework, offering students the flexibility to enter or exit the program at various stages. This approach ensures that students can tailor their educational journey according to their personal and professional goals, with options to earn certificates, diplomas, or degrees based on the duration of study completed.

- **Year 1:**
  Upon completion of the first year, students may exit with a **Certificate in Electronics**.
- **Year 2:**
  After two years, students may choose to exit with a **Diploma in Electronics**.
- **Year 3:**
  Completion of the third year qualifies students for a **BSc Degree in Electronics**.
- **Year 4:**
  The fourth year offers an advanced curriculum with a focus on research, allowing students to graduate with an **Honors Degree in Electronics**.

Eligibility for B.Sc. Electronics: The candidate passing the higher secondary examination conducted by the Maharashtra State Board of Higher Secondary Education, with science stream, MCVC with science subject, D. Pharm, Diploma Engineering, shall be allowed to enter the B.Sc. Part I course. OR An Examination of any other statutory university or an examining body recognized as equivalent thereto.

Repeater student will be allowed to take fresh admission to the same class with same subjects or different subjects.

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **Faculty of Science & Technology** **Nep 2020 Compliant Curriculum** **BSc (Electronics)** **Program Outcomes (PO)**

Students graduating from the Bachelor of Science in Chemistry program will be able to:

Major Courses:
- **PO1**: Demonstrate in-depth knowledge and understanding of core concepts, theories, and methodologies in the chosen major discipline.
- **PO2**: Apply disciplinary knowledge to solve complex problems, analyze data, and make informed decisions in professional and research contexts.

Minor Courses:
- **PO3**: Acquire complementary knowledge and skills from a related or distinct discipline, enhancing interdisciplinary understanding and versatility.

Open Electives/Generic Electives:
- **PO4**: Explore diverse subjects beyond the core discipline, fostering a broad-based education and cultivating critical thinking and creativity.

Vocational and Skill Enhancement Courses:
- **PO5**: Gain hands-on experience and technical proficiency in specific vocational areas, preparing for immediate career opportunities.

Ability Enhancement Courses (AEC), Indian Knowledge System (IKS), and Value Education Courses (VEC):
- **PO6**: Understand and appreciate the rich heritage of the Indian Knowledge System, integrating traditional wisdom with modern education.
- **PO7**: Develop ability enhancement skills like communication and life skills along with ethical values, social responsibility, and a strong sense of citizenship, contributing positively to society.

Field Projects/Internship/Apprenticeship/Community Engagement Projects/ On Job Training/ Internship/Apprenticeship:

- **PO8**: Apply theoretical knowledge to real-world situations through field projects, internships, community engagement and On job Training for gaining practical experience and problem-solving skills.

Research Methodology and Research Project:
- **PO9**: Acquire research skills, including data collection, analysis, and interpretation, fostering a scientific approach to problem-solving to develop independent research projects handling capabilities.

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **Faculty of Science & Technology** **Nep 2020 Compliant Curriculum** **BSc (Electronics)** **Program Specific Outcomes (PSOs)**

Students graduating from BSc (Electronics) will able to :

PSO1 (B.Sc. I). Understand basic principles of Analog and Digital Electronics.

PSO2 (B.Sc. II). Design Transistorised circuits like Amplifiers, Oscillators, Feedback, Waveshaping circuits, OPAMP basics and applications and Fundamentals of Microprocessor System.

PSO3 (B.Sc. III). Detail study of Linear Integrated Circuits, Microcontroller 8051 and Embedded Systems, Sensors and Transducers, Analog and Digital Communication System, Power Electronics etc.

PSO4 (B.Sc. IV) This is Specialization Specific Course involving a Project work etc.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

Three Majors in First Year structure as per NEP-2020 Approved in For AC Meeting on 18/04/2024

4- Year Multidisciplinary UG Program with DSC as a Major (4 -Year Bachelor of Science (Honors)/(Honors with Research))

Level/ Difficulty	Sem.	Faculty		Minor	Generic/ Open Elective GE/ OE	Vocational and Skill Enhancement Courses (SEC/VSC)	Ability Enhancement Course (AEC), IKS, VEC	Field Project/ RP/CC/Internship/Apprenticeship/ Community Engagement & Services	Credits	Cumulative Credits
		Major								
		DSC	DSE							
4.5 100-200	I	DSC1-1 (2+2)#	--		GE1/ OE1(2)	SEC1 (2)	L1-1(2) IKS (2) VEC1(2) (Indian Constitution And Democracy)	--	22	44 UG Certificate (44)
		DSC2-1 (2+2)#	--							
		DSC3-1 (2+2)#	--							
	II	DSC1-2 (2+2)#	--		GE2/ OE2(2)	SEC 2 (2)	L1-2(2) VEC2(2) (Environmental Studies)	CC1 (2)	22	
		DSC2-2 (2+2)#	--							
		DSC3-2 (2+2)#	--							
Exit option: Award of UG Certificate in Major with 44 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor										
5.0/200	III	DSC1-3 (2+1)	---	DSC2-3 (2+1)	GE3 / OE3(2)	VSC1 (2) (DSC1) VSC2(2) (DSC2)	L2-1 (2)	CC2 (2)	22	44 UG Diploma (88)
		DSC1-4 (2+1)	---	DSC-2-4 (2+1)						
	IV	DSC1-5 (2+1)	---	DSC2-5 (2+1)	GE4/ OE4 (2)	VSC3 (2) (DSC1) VSC4(2) (DSC2)	L2 -2(2)	FP1/CEP1(2)	22	
		DSC1-6 (2+1)	--	DSC2-6 (2+1)						
Exit option: Award of UG Diploma in Major with 88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major										

5.5/300	V	DSC1-7 (3+2) DSC1-8 (3+2) DSC1-9 (3+2)	DSE1-1 (2+1) or DSE1-2 (2+1)	----	----	VSC3 (2) (Hands on Training related to DSE)	IKS 2 (2) (related to major subject)	--	22	44 UG degree (132)
	VI	DSC1-10 (3+2) DSC1-11 (3+2) DSC1-12 (3+2)	DSE1-3 (2+1) or DSE1-4 (2+1)	----	---	VSC4 (2) (Hands on Training related to DSE)		FP2/CEP2/OJT1 (2)	22	
	Total Credits 3 Yrs	66-8#	6	12 +8# 20	08	16	16	08	132	
Exit option: Award of UG degree in Major with 132 Credits OR Continue with Major										
6.0/400	VII	DSC1-13 (4+2) DSC1-14 (4+2)	DSE1-5 (4+2)	Research Methodology (4)	------	----	----	---	22	44 UG Honours Degree in Main faculty (176)
	VIII	DSC1-15 (4+2) DSC1-16 (4+2)	DSE1-6 (4+2)		----	-----	----	OJT/In-house Project/ Internship/ Apprenticeship (4)	22	
	Total 4 Yrs	90-8#	18	16+8#	08	16	16	12	176	
Award of Bachelor of Science Honors., (B.Sc. Honors.) degree with Major and Minor (176 credits)										

6.0/400											

<table>
<tr><td colspan="12" align="center">OR</td></tr>
</table>

6.0/400	Sem	Major	DSE	Research Methodology				Research Project	Credits	Cumulative
	VII	DSC1-13 (4) / DSC1-14 (4)	DSE1-5 (4)	Research Methodology (4)	------	----	----	Research Project (6)	22	44 UG Honours with research Degree in Main faculty (176)
	VIII	DSC1-15 (4+2) / DSC1-16 (4+2)	DSE1-6 (4)		----	-----	----	Research Project (6)	22	
	Total 4 Yrs	86-8#	14	16+8#	08	16	16	20	176	

#Out of the three major courses in the first year, one major (comprising 4 credits for the 1st semester and 4 credits for the 2nd semester) will transition into a minor starting from the second year. Consequently, 8 credits will be reallocated from the major course credit count and added to the minor credit count, thereby meeting the requisite credit criteria for the minor as stipulated in the guidelines.

Structure as per NEP-2020

B. Sc. I (Electronics)

Level	Sem	Major		VSC/SEC	OE/GE	IKS	CC	Total Credits	Cumulative Credits
		T	P						
4.5	I	DSC1-1 2	2	SEC1-2	OE-1 /GE-1 (2)	L1- 2 IKS (General) 2 VEC 1-2 (Indian Constituency and Democracy	----	22	44
		2	2						
		2	2						
	II	DSC1-2 2	2	SEC2 -2	OE-2 /GE-2 (2)	L2-2 VEC- 2 (Environmental Studies)	CC2-2	22	
		2	2						
		2	2						

S.No.	Course Type with course code	Paper Title	Credit
1.	Major DSC1-1 **G04-0105**	Electronics-I (Digital Fundamentals)	2
2.	Practical based on DSC1-1 **G04-0105-P**	Practical Lab – I	2
3.	Major DSC2-1	To be selected from Other than Electronics	2
4.	Practical based on DSC2-1	Practical Lab – I	2
5	Major DSC3-1	To be selected from Other than Electronics	2
6.	Practical based on DSC3-1	Practical Lab – I	2
7	GE-I/OE-I **G04-GE-OE-105**	Electronics-GE/OE-I (Basic Electronic Consumer Applications)	2
8.	SEC I **G04-SEC-105**	Electronics-SEC-I (Electronics Circuit Simulation With Proteus)	2
9.	IKS	General IKS	2

	GO4-IKS-105		
10.	AEC I **ENG-105**	English for Communication	2
11	VEC I **ICD GO4-ICD-105**	Indian Constitution and Democracy	2
		Total	**22**
12	Major DSC1 -2 **G04-0205**	Electronics-II (Basic Circuit Theory and Network Analysis)	2
13	Practical based on DSC1 -2 **G04-0205-P**	Practical Lab - II	2
14.	Major DSC2-2	To be selected from Other than Electronics	2
15	Practical based on DSC2-2	Practical Lab – II	2
16.	Major DSC3-2	To be selected from Other than Electronics	2
17	Practical based on DSC3-2	Practical Lab – II	2
18.	GE-II/ OE-II **G04-GE-OE-205**	Electronics-GE/OE-II (Basic Study of Domestic Electronic Appliances)	2
19	SEC II **G04-SEC-205**	Electronics-SEC-II (Introduction to Arduino Programming)	2
20	AEC II **ENG-205**	English for communication	2
21	VEC II **ENS24**	Environmental Studies	2
22	CC I **CES-201/ CC-201/ CC-202/ CC-203/ CC-204/ CC-205/ CC-206**	CC	2
		Total	**22**

Abbreviations:

OE: Generic/ Open Electives

FP: Field projects

VSEC: Vocational Skill and Skill Enhancement Courses

CC: Co-curricular Courses

SEC: Skill Enhancement Courses

RP: Research Project

AEC: Ability Enhancement Courses

IKS: Indian Knowledge System

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur
	First Year BSc (Electronics) Semester-I
	Vertical : DSC - I
	Course Code: G04-0105
	Course Name: Electronics-I (Digital Fundamentals)
*Teaching Scheme **Lectures:02 Hours/week, 02 Credits**	***Examination Scheme** **UA:30 Marks** **CA: 20 Marks**

Course Preamble: B.Sc. I syllabus is designed to provide an insight into basic and fundamentals of digital electronics. Hands-on these circuits and devices is inculcated in this syllabus. In the theory course of 50 marks adequate knowledge of digital fundamentals will be acquired by the students. In the practical course of 50 marks there are compulsory experiments for Practical I, which include understanding and practical study of digital circuits and devices. The details are mentioned in the syllabus.

	Course Objectives:
•	To understand the fundamentals of digital gates.
•	To acquire knowledge about different number systems used in digital world.
•	To understanding base of digital electronics i.e. Boolean Algebra.
•	To acquire knowledge of simple Digital Circuits i.e. half and full-adder, half and full - subtractor, binary adder/subtractor etc.
	Course Outcomes:
CO1:	Able to explain the basic and derived gates with their truth-tables
CO2:	Explain the concepts of various number systems like binary, octal, hexadecimal and decimal number system.
CO3:	Prove Boolean algebra using Boolean laws and rules
CO4:	Design simple digital circuits like half and full adder, half and full subtractor
CO5:	Design simple converters like binary to gray and gray to binary.
CO6:	Finally design a binary adder cum subtractor from the knowledge of basic gates, Boolean laws and rules, DeMorgan's theorems etc.
Unit 1:	**Number Systems, Binary Codes and Logic Gates** Hrs:(15) Weightage: 15 Marks
A.	Binary, Octal, Decimal, Hexadecimal number systems and their inter-conversions, 1's compliment, 2's compliment, Arithmetic operations, Signed binary numbers Hrs:(4) Weightage: 4 Marks
B.	8421 code, Excess-3 code, Gray code, ASCII code, Parity bit Hrs:(3) Weightage: 3 Marks

C.	Logic Gates: OR, AND, NOT, NAND, NOR, Ex-OR,, Positive and Negative logic, De Morgan's Theorems, Universality of NAND and NOR gates, Study of ICs 7400, 7402, 7404, 7408, 7432, 7486 Hrs:(8) Weightage: 8 Marks
Unit 2:	**Boolean algebra and Arithmetic Circuits** Hrs:(15) Weightage: 15 Marks
A.	Rules and laws of Boolean algebra, Simplification of Boolean expression using Boolean algebra, Karnaugh maps: K- maps for two, three and four variables, Use of K-map for reduction of Boolean expressions, Design the Half adder, Full adder circuits using K map. Hrs:(8) Weightage: 8 Marks
B.	Half and Full subtractor circuits, Exclusive OR gate as a Controlled inverter, Binary to Gray and Gray to Binary converter, Parity checker, 4-bit Binary Adder cum Subtractor Hrs:(7) Weightage: 7 Marks
	Reference books:
1.	Digital Fundamentals by Floyd, Pearson Education
2.	Digital Principles & Applications by A.P. Malvino & D.P. Leach (TMH, New Delhi)
3.	Modern Digital Electronics by R.P. Jain
4.	Digital Systems: Principles and Applications by Ronald J Tocci, Neat S. Widerman, PEA
5.	Digital Electronics, Circuits & Systems by V. K. Puri, TMH, New Delhi.

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur
	First Year B. Sc. (Electronics) Semester-I
	Vertical : DSC 1.1 (Practicals)
	Course Code: G04-0105P
	Course Name: Electronics-I-Practical Lab-I

*Teaching Scheme	***Examination Scheme**
Practical:04Hours/week, 02Credit	**UA:30 Marks** **CA: 20 Marks**

Course Preamble: Electronics-I practical is one of the core courses in the Electronics curriculum. This course provides an in-depth understanding of the fundamental concepts in Digital Electronics. By combining theoretical knowledge with hands on practicals will helps students to develop practical skills in designing and optimizing the concepts in Digital Electronics.

	Course Objectives:
●	To verify the truth tables of Basic Gates and derived gates.
●	To verify the Demorgan's theorems
●	To verify Boolean Equations and simplify them.
●	To verify the truth tables of Half and Full adders, Half and Full subtractors
●	To verify the Binary to Gray and Gray to Binary code conversion.
	Course Outcomes:
	On successful completion of this practical course student will be able to:
●	Understand the basic concepts in digital electronics
●	correlate theoretical concepts with experiments.
●	develop awareness of verifying the practical results with theoretical.
●	develop basic skills of using digital instruments
●	understand the theoretical principles of basic Practical Electronics.
	List of Experiments
Sr. No.	**Name of the Practical**
1.	Study of Basic Gates
2.	Study De Morgan's Theorems
3.	Study of Universal Gates
4.	Study Half and Full Adder

5.	Study Half and full Subtractor
6.	4-bit Parallel Binary Adder/Subtractor
7.	4-bit Binary to Gray converter/Gray to Binary converter

Reference Books:

1.	Digital Electronics: A Practical Approach by Kate Timberlake ISBN-10:- 978-1639891544, States Academic Press
2.	Digital Electronics Practical by K. Kolanchinathan, Sri Krishna Publications
3.	Digital Electronics - A Comprehensive Lab Manual by Cherry Bhargava, BS Publications
4.	Digital Electronics - Theory and Experiments by Virendra Kumar , 2nd Edition ISBN-13:- 978-8122438925, New Age International (P) Ltd., Publishers
5.	Digital Electronics - Handbook for LAB Work by Kiran Dewangan, Tanuja Kashyap, Dr. Naveen Kumar Devangan and Dr. Amar Kumar Dey ISBN :- 978-1-80433-983-1, Rubicon publications
6.	Practical Design of Digital Circuits by Ian Kampel, ISBN-13:- 978-0408011839, A Newness Technical Book
7.	A Practical Approach to Analog and Digital Electronics by K. G. Raval, ISBN-13:- 978-9350303689, Oxford Book Company
8.	Beginning Digital Electronics through Projects by Andrew Singmin, ISBN-13:- 978-0750672696, Newnes Publisher

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur
	First Year BSc (Electronics) Semester-I
	Vertical : GE/OE
	Course Code: G04-GE-OE-105
	Course Name: GE/OE-I (Basic Electronic Consumer Applications

*Teaching Scheme	*Examination Scheme
Lectures:02 Hours/week, 02 Credits	UA:30 Marks
	CA: 20 Marks

Course Preamble: Electronics-GE/OE-I is one of the courses in the Electronics curriculum. This course provides an general understanding of various gadgets used in day-to-day life like Mobile Charger, TV Remote operated ON/OFF controls of fan, tube etc., LED lighting, Solar Cells and Study of different sensors popularly used in these gadgets.

	Course Objectives:
●	Basic understanding of Mobile Phone Charger
●	Use of LEDs in lighting decoration
●	Basic understanding of Solar Cell and its applications
●	Study of Various Sensors like LDR, PIR, IR transmitters and receivers, temperature sensor etc.
	Course Outcomes:
●	CO1: Understand the basic circuit of Mobile Phone Charger
●	CO2: Basic Study of LED and its application in LED lighting
●	CO3: Solar Cell construction and working, and application
●	CO4: Study of different sensors like light, motion, IR, temperature etc.
●	CO5: Applications of above sensors in day-to-day life.
Unit I	**General Consumer Applications** Hrs:(15) Weightage: 15 Marks
1.1	**Mobile Charger Power Supply** Hrs: (03) Weightage: 3 Marks
	Mobile Charger Power Supply - Basic information about mobile charger power supply, making 3.3 volt and 5 volt mobile charging power supply
1.2	**On/Off control using transistor and relay** Hrs: (03) Weightage: 3 Marks
	Basic study of transistor as a switch and electromagnetic relay, Use of power transistor and relay in on/off control of a fan/tube/LED bulb
1.3	**Use of LED lighting** Hrs: (03) Weightage: 3 Marks
	Use of LED lighting strips, power transistor and Timer IC-555 in decoration lighting.
1.4	**Solar cell applications** Hrs: (03) Weightage: 3 Marks
	Basic study of solar cell, use of solar cell (panel) for two-wheeler battery charging.

1.5	**TV remote control application**	Hrs: (03) Weightage: 3 Marks
	Basic study of IR transmitter and receiver, use of TV remote control to turn on/off fan/tubelight/LED bulb etc.	
Unit II:	**Sensors, actuators and their Consumer Applications** Hrs:(15) Weightage: 15 Marks	
2.1	**LDR and Burglar Alarm**	Hrs: (03) Weightage: 3 Marks
	Basic study of LDR and its application as burglar alarm	
2.2	**RTD and Temperature Controller**	Hrs: (03) Weightage: 3 Marks
	Basic study of RTD and its application in automatic water heaters	
2.3	**PIR Sensor and Motion Detection**	Hrs: (03) Weightage: 3 Marks
	Basic study of PIR sensor and its application in detecting motion in restricted area	
2.4	**Infrared transmitter-receiver & solenoid valve control** Hrs: (03) Weightage: 3 Marks	
	Basic study of infrared transmitter-receiver and solenoid valve, Use of IR(Tx and Rx) in of/off control of solenoid valve in Wash basin and toilet flushing system	
2.5	**LM-35 temperature sensor and fan-speed control** Hrs: (03) Weightage: 3 Marks	
	Basic study of LM-35 and its application in ceiling fan-speed control	
Reference Books		
1.	Sensors and Transducers by Patranabis 2nd Edition, PHI publications	
2.	A text book of applied electronics by R S Sedha, S Chand and Co. Pub.	
3.	Fundamentals of Sensors for Engineering and Science by Patrik F Dunn , CRC Press Inc.	
4.	Make Electronics (A hands on primer) by Charles Platt	

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur
	First Year BSc (Electronics) Semester-I
	Vertical : SEC
	Course Code: G04-SEC-105
	Course Name: Electronics-SEC-I
	Electronics Circuit Simulation With Proteus (Practicals only)

*Teaching Scheme	*Examination Scheme
Practical:04 Hours/week, 02 Credits	UA:30 Marks
	CA: 20 Marks

Course Preamble: Electronics Skill Enhancement Course (SEC-1) gives the students a software capability of simulating the digital and analog circuits without actually using the hardware components and physical presence in the laboratory. Proteus is one such Integrated Development Environment (IDE) tool popularly used by electronics community.

	Course Objectives:
●	To develop practical skills in electronic circuit simulation
●	To gain practical knowledge by using Proteus IDE to correlate with the theory.
●	To prepare students to to get hands-on-practice of simulating digital and analog circuits.
●	To develop students to learn simulating skills in practicals.
●	To prepare students to make use of Proteus IDE as a simulating tool.
	Course Outcomes:
	On successful completion of this practical course student will be able to:
●	Learn about simulation
●	correlate theoretical concepts with simulating experiments and verifying the results.
●	Make the students to use Simulating Platform like Proteus IDE
●	develop basic skills of using platforms like Proteus.
●	understand the use of simulation in Electronics
	List of Experiments (using Proteus Simulation IDE Tool)
Sr. No.	**List of the Practicals (any 10 practicals)**
1.	To verify the truth tables for OR, AND, NOT, NAND, NOR, XOR and XNOR gates using simulation.

2.	Verify the truth tables of half adder and half subtractor circuits through circuit simulation.
3.	Verify the truth tables of full adder through simulation.
4.	Verify the truth tables of full subtractor through simulation.
5.	Verify the DeMorgan's Theorems using basic gates through simulation.
6.	Verify the Universality property of NAND and NOR gates through simulation
7.	Verify the Binary to Gray code converter through simulation.
8.	Use of XOR gate as 4-bit Controlled Inverter using simulation.
9.	Verify the Gray to Binary code converter through simulation.
10.	4-bit Parallel binary adder using simulation.
11.	Verification of given Boolean equation and its reduced form using simulation.
12.	Verification of Boolean Laws using simulation method.
13.	4-bit Parallel binary subtractor using simulation.
14.	Use of XOR gate as Parity Checker (Use minimum 4-input XOR gate)
15.	
Reference books	
1	Essential Circuit Analysis using Proteus^R by Farzin Asadi by Springer
2	Basic Electronic Circuits by Proteus Simulating Software by Mohammed Abdullah Ahmed Mareai (only PDF Version available)
3	Proteus (Design Software) by Lambert M. Surhone, Miriam T. Timpledon, Susan F. Maseken, VDM Publishing, 128 pages
4	Proteus Book by Javad Esmaeili
5	Engineering Design and Analysis Series:- Proteus Electronic Circuit Design and Simulation by Xie Long han Mo Yan , Publishing House of Electronics Industry
6	Proteus User Manual https://proteus-instruments.com/files/Proteus-User-Manual.pdf
7	Download Proteus Resources - brochures, helper files and ... https://www.labcenter.com/downloads/

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur
	First Year BSc (Electronics) Semester-I
	Vertical : AEC
	Course Code: ENG-101
	Course Name: English for Communication-Paper-I

*Teaching Scheme	***Examination Scheme**
Lectures:02 Hours/week, 02 Credits	**UA:30 Marks**
	CA: 20 Marks

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur
	First Year BSc (Electronics) Semester-I
	Vertical : IKS
	Course Code: IKS-101
	Course Name: Introduction to Indian Knowledge System in Science

*Teaching Scheme	***Examination Scheme**
Lectures:02 Hours/week, 02 Credits	**UA:30 Marks**
	CA: 20 Marks

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur
	First Year BSc (Electronics) Semester-I
	Vertical : VEC
	Course Code: ICD
	Course Name: Indian Constitution and Democracy

*Teaching Scheme	***Examination Scheme**
Lectures:02 Hours/week, 02 Credits	**UA:30 Marks**
	CA: 20 Marks

Semester II

NAAC Accredited-2022 'B++' Grade (CGPA-2.96)	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **First Year BSc (Electronics) Semester-II** **Vertical : DSC** **Course Code: G04-0205** **Course Name: Electronics-II (DSC 1-2)** **(Basic Circuit Theory and Network Analysis)**
*Teaching Scheme **Lectures:02 Hours/week, 02 Credits**	***Examination Scheme** **UA:30 Marks** **CA: 20 Marks**

Course Preamble: Analog Electronics is one of the core courses in the Electronics curriculum. This course provides basic understanding of the fundamental concepts in Analog Electronics. Students will study the classification, applications of passive circuit components used in electronic circuits, the course aims to develop practical skills in analyzing and optimizing the basic Electronic concepts.

	Course Objectives:
•	To study Resistors, Capacitors, Inductors, Transformers, Relays & their classification, PCB & its classification, Fuses, Mechanical switches.
•	To study fundamental laws used in Electronics i.e. Ohm's law, Kirchhoff's Law
•	To study the different types of electronic theorems like Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem
•	To understand the basic concept of two-port network and hence study Z, Y, H and T parameters.
•	To study various types of DC and AC sources used in Electronics, the terminologies used,
•	To study the phase relationship of current and voltage in pure resistor, pure capacitor and pure inductor.
•	To study the concept RC, RL and RLC Series circuit in AC analysis
•	To understand the concept of Series Resonance and Parallel Resonance.

•	To gain knowledge of applications of resonant circuits in Electronics.
•	To properly understand the use of formulas in solving the problems related to topics studied
	Course Outcomes:
	CO1: Able to identify different electronic components studied with their specifications and applications.
	CO2: Able to apply the laws and theorems used in Electronics.
	CO3: Able to solve the Two-port network problems using Z, Y, H and T parameters.
	CO4: Able to use the technical terminologies used in DC and AC circuit fundamentals
	CO5: Able to explain the phase relationship and RC, RL and RLC AC circuit analysis
	CO6: Application of Resonance Formulas in solving RLC series and parallel circuit problems.
Unit 1:	**Passive Circuit Elements and Network Theorems** Hrs:(15) Weightage: 15 Marks
1.1	Introduction, Resistors, Capacitors, Inductors, Transformers, Relays & their classification, PCB & its classification, Fuses, Mechanical switches. Hrs:(5) Weightage: 5 Marks
1.2	Ohm's law, Kirchhoff's Law, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem Hrs:(5) Weightage: 5 Marks
1.3	Black box theory, Concept of equivalent network, Z, Y, H & Transmission (ABCD) parameters, T-network, π-network (Numerical examples are expected) Hrs:(5) Weightage: 5 Marks
Unit 2:	**AC-DC Fundamentals** Hrs (15) Weightage: 15 Marks
2.1	DC sources: Introduction, Batteries, Regulated power supplies, Ideal, & practical Voltage source, Ideal & practical current source. Hrs:(4) Weightage: 4 Marks
2.2	AC sources: Introduction, Sinusoidal and non-sinusoidal sources, RMS current and voltage, Phase relationship of current and voltage in pure resistor, in pure capacitor and in pure inductor. Hrs:(5) Weightage: 5 Marks
2.3	RC and RL and RLC Series circuit. Series & parallel resonance circuit & resonant frequency. (Numerical examples are expected) Hrs:(6) Weightage: 6 Marks
Reference books:	
1.	Circuit and Networks: Analysis and Synthesis by A. Sudhakar & S.P. ShamMohan, (TMH)
2.	Network Lines and Fields by J.D. Ryder, (McGraw Hill)
3.	Network Analysis by M.E. Van Valkenberg(PHI, New Delhi)
4	Basic Electronics by Bernard Grob
5	A Text Book of Applied Electronics by R.S. Shedha (S.Chand& Co.)

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur
	Punyashlok Ahilyadevi Holkar Solapur University, Solapur
	First Year BSc (Electronics) Semester-II
	Vertical : DSC
	Course Code: G04-0205-P
	Course Name: Electronics-II-Practical Lab-II

*Teaching Scheme	*Examination Scheme
Practical:04Hours/week, 02Credit	UA:30 Marks
	CA: 20 Marks

Course Preamble: Electronics-II practical is one of the core courses in the Electronics subject curriculum. This course provides the basic understanding of performing the practicals in Analog Electronics. By combining theoretical knowledge with hands on practical will help students to develop practical skills in analyzing and optimizing the concepts in Electronics in broad and analog electronics in particular.

	Course Objectives:
●	To study and verify the basic laws in electronics i.e. Ohm's law and Kirchoff's laws.
●	To understand and verify important Theorems in Electronics like Thevenin's, Norton's, Superposition theorems.
●	To understand the concept of Resonance and verify the series and parallel resonance practically for RLC circuits
●	To verify practically the Z, Y, H, T parameters for simple resistive networks and for special networks like T and Π networks
	Course Outcomes COs
	The students will able to -
●	Verify the simple laws like Ohm's and Kirchoff's laws
●	Demonstrate and verify the Thevenin's, Noton's and Superposition theorems
●	Determine practically the series and parallel resonance frequencies of RLC circuits
●	Obtain the Z, Y, H and T parameters of a given simple resistive network practically
●	Obtain the impedance or admittance parameters of T and Π networks

List of Experiments

Sr. No.	Name of the Practical
1.	Verification of Ohm's Law
2.	Verification of Study of Kirchhoff's Laws
3.	Study Series /Parallel Resonance
4.	Study Thevenin's Theorem
5.	Study Superposition Theorem
6.	Study Maximum Power Transfer Theorem

7.	Measurement of Z, Y and h-parameters for two port resistive network
	Reference Books:

1.	Analog Electronics Laboratory Manual by Munaf S., Notion Press, 34 pages
2.	Practical Analog Electronics for Technicians by W.A. Kimber, ISBN-13:-978-0750629522, Routledge Publication; 1st edition, 244 pages
3.	Analog Electronics Lab Manual - https://kanchiuniv.ac.in/coursematerials/AE-lab-Manual-for-website-upload.pdf
4.	Analog Electronics Circuits Laboratory Manual https://ece.anits.edu.in/labmanuals/AEC%20lab%20manual.pdf
5.	ANALOG ELECTRONIC CIRCUITS LAB MANUAL https://ssit.edu.in/dept/assignment/aeclabmanual.pdf
6.	ANALOG ELECTRONICS LAB MANUAL https://electricvlab.com/downloads/manual-vtu-analog-electronics.pdf
7.	ANALOG ELECTRONIC CIRCUITS LAB MANUAL https://webstor.srmist.edu.in/web_assets/srm_mainsite/files/2018/Analog-Electronic-Circuits-Lab-Manual.pdf

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur
	First Year BSc (Electronics) Semester-II
	Vertical : GE/OE
	Course Code: G04-GE-OE-205
	Course Name: Electronics-GE/OE-II
	(Basic Study of Domestic Electronic Appliances)

*Teaching Scheme	***Examination Scheme**
Lectures:02 Hours/week, 02 Credits	**UA:30 Marks**
	CA: 20 Marks

Course Preamble: Electronics-GE/OE-II is one of the courses in the Electronics curriculum. This course provides an general understanding of various domestic electronic appliances used in day-to-day life like LED TV, Microwave Oven, Mixer-Grinder, washing machine, refrigerator etc. and Safety tips for handling ac mains appliances.

	Course Objectives:
●	To understand the basic AC fundamentals required for understanding domestic electronic appliances.
●	To understand the operating principles of LED TV, Mixer-Grinder, Refrigerator, Washing Machine, Microwave Oven.
●	To learn the use of Multi-meter, electric tester in testing the electronics appliances and also construct the electric board for testing purpose.
●	To understand the working principles of Electronic Meters, Automatic Water Heaters, Air Conditioners, Electric Vehicles, GUN type Thermometers, Pulse Oxymeter etc.
	Course Outcomes:
●	CO1: Able to explain the AC fundamentals and the technical terminologies related to AC mains supply.
●	CO2: Able to explain the working principles of different electronic gadgets used in homes like LED TV, Mixer-Grinder, Freeze, Oven, Washing machine etc.
●	CO3: Able to demonstrate the use of Multimeter, Electric Tester, Construction of Electric board.
●	CO4: Explain the working principle of Water Heater, Electronic meter
●	CO5: Explain the working principles of AC, Electric vehicles, Gun thermometer etc.

Unit I	Domestic Appliances Part - I	Hrs (15) Weightage: 15 Marks
1.1	AC fundamentals - ac and dc, domestic supply (230 Vac, 50 Hz), voltage, current, power, time-period, frequency of a sinewave.	
1.2	Basic working principle of LED bulb/tube, LED TV, microwave oven,	
1.3	Basic working principle of mixer/grinder, washing machine, TV remote control, water filter, refrigerator.	
Unit II	Domestic Appliances Part - II	Hrs (15) Weightage: 15 Marks
2.1	Working principles of Water heaters/ geysers, MSEB electronic meter, Inverter/UPS, Solar electricity and its installation	
2.2	Working principles of Electric vehicles, Air conditioners, Pulse oxymeter, Digital thermometer (Gun type).	
2.3	Construction of Electric board for household purpose, live current tester, simple multimeter, Safety tips for handling ac mains appliances, safety gloves.	
Reference books:		
1.	Electrical Home Appliances (in Hindi) by Bhartiya Technical Publication	
2.	Handbook of Repair and Maintenance of Domestic electronic Appliances by Shashi Bhushan Sinha, BPB Publication.	
3.	Water Heater Repair | PDF | Water Heating | Thermostat https://www.scribd.com/document/237767286/Water-Heater-Repair	
4.	SERVICE MANUAL Geysers | PDF | Water Heating https://www.scribd.com/document/440987303/SERVICE-MANUAL-Geysers	
5.	Handbook of Repair and Maintenance of Domestic Electronics Appliances by Shashi Bhushan Sinha, ISBN:- 9788183335027, BPB Publications, 183 pages	
6.	All About Repairing Major Household Appliances by Michael Squeglia, Hawthorn Books Inc., NewYork	

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur
	First Year BSc (Electronics) Semester-II
	Vertical : SEC
	Course Code: G04-SEC-205
	Course Name: Electronics-SEC-II
	Introduction to Arduino Programming (Practicals only)
*Teaching Scheme	***Examination Scheme**
Practical:04 Hours/week, 02 Credits	**UA:30 Marks**
	CA: 20 Marks

Course Preamble: Electronics Skill Enhancement Course (SEC-1) gives the students a software capability of simulating the digital and analog circuits without actually using the hardware components and physical presence in the laboratory. Proteus is one such Integrated Development Environment (IDE) tool popularly used by electronics community.

	Learning Objectives:
	Students will be able to-
1.	To develop practical skills in electronic circuit simulation
2.	To gain practical knowledge by using Proteus IDE to correlate with the theory.
3.	To prepare students to to get hands-on-practice of simulating digital and analog circuits.
4.	To develop students to learn simulating skills in practicals.
5.	To prepare students to make use of Proteus IDE as a simulating tool.
6.	To develop practical skills in almost any electronic circuit simulation
	Course Outcomes:
	On successful completion of this practical course student will be able to:
1.	Learn about simulation and make awareness of need of simulation.
2.	correlate theoretical concepts with simulating experiments and verifying the results.
3.	Make the students to use Simulating Platform like Proteus IDE etc.
4.	develop basic skills of using platforms like Proteus.
5.	understand the use of simulation in designing and verifying the results of any experiment in Electronics

	List of Experiments
Sr. No.	**Name of the Practical (Any Ten practicals)**
1.	LED Blinking:- Connect an LED to one of the Arduino's digital pins. Write a program to make the LED blink at a specific rate. Experiment with different blinking rates
2.	Controlling LEDs with Switches:- Connect one or more switches to digital pins. Write a program to turn LEDs on or off based on the state of the switches. Try to implement more complex logic, such as toggling LEDs with switches.
3.	Interfacing a 7-Segment Display:- Connect a 7-segment display to the Arduino. Write a program to display numbers (0 to 9) on the display. Try to display few characters.
4.	Sensing Analog Input using Potentiometer:- Connect a potentiometer (analog input device) to one of the Arduino's analog pins. Write a program to read the analog value from the potentiometer and observe the value on output window. Use the analog input to control the brightness of an LED.
5.	Temperature and Humidity Sensor Interfacing:- Connect a temperature/humidity sensor module to Arduino board and turn on the relay for the set value of temperature.
6.	Motion detector Sensor interfacing:- Connect a motion detector sensor module (PIR) to Arduino board and turn on the buzzer if a motion is detected.
7.	IR transmitter-sensor interfacing:- Connect an IR transmitter-sensor module to Arduino board and turn on the solenoid valve when the object interrupts the module.
8.	Methane Gas sensor interfacing:- Connect a methane gas sensor module to Arduino board and turn on the buzzer for gas leakage.
9.	PWM control of DC motor:- Connect a DC motor module to PWM pins of Arduino board along with three on/off controlling switches. Vary the speed of DC motor (slow, medium and fast) based on the switch pressed.
10.	Running LED Effect:- Connect eight LEDs to digital pins of Arduino board and write a program to produce running LED effects. Try different LED patterns.
11.	Relay Control:- Connect a relay control module to digital pins of Arduino board and write a program to turn on and off the relay based on whether switch is ON or OFF.
12.	7-Segment Display Multiplexing:- Connect a 3 or 4 Digit Seven Segment Display Module and Write a program to display 8421 on 7-segment display
13.	Arithmetic Operations:- Connect two digital switches (A & B) to digital I/O pins of the Arduino board and Two LEDs to remaining digital I/O pins. Write a program to Add and Subtract two binary bits and display the result on LEDs
14.	Logical Operations:- Connect two digital switches (A & B) to digital I/O pins of the Arduino board and one LED to remaining digital I/O pins. Write a program to Logically AND, OR, Ex-OR, NAND, NOR two binary bits and Complement single binary bit. Display the results on LED.
15.	Delay Program Testing:- Write a Delay Program to blink the LED connected to digital I/O pin of Arduino board. Vary the delay time and observe the effect.

	Reference Books:
1	Getting Started with Arduino 3rd Edition by Massimo Banzi - Co-founder of Arduino and Michael Shiloh, Shroff Publishers and Distributors Pvt. Ltd., ISBN:- 978-93-5110-907-5
2	Arduino Books for Beginners by Mike Cheich, Programming Electronics Academy Publications, 306 pages
3	Programming Arduino: Getting Started with Sketches, Third Edition by Simon Monk, McGraw-Hill Education Publication, 176 pages, ISBN-13:- 978-1264676989
4	Programming Arduino Next Steps: Going Further with Sketches, Second Edition by Simon Monk, McGraw-Hill Education Tab, 320 pages, ISBN-13:- 978-1260143249
5	ARDUINO PROGRAMMING: 3 books in 1 - The Ultimate Beginners, Intermediate and Expert Guide to Master Arduino Programming by Ryan Turner, Nelly B.L. International Consulting Ltd. Publications, 410 pages, ISBN-13:- 978-1647710774
6	Proteus User Manual https://proteus-instruments.com/files/Proteus-User-Manual.pdf
7	Download Proteus Resources - brochures, helper files and ... https://www.labcenter.com/downloads/

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur
	First Year BSc (Electronics) Semester-I
	Vertical : AEC
	Course Code: ENG-201
	Course Name: English for Communication-Paper-II
*Teaching Scheme	***Examination Scheme**
Lectures:02 Hours/week, 02 Credits	**UA:30 Marks**
	CA: 20 Marks

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur
	First Year BSc (Electronics) Semester-I
	Vertical : VEC
	Course Code: ENS24
	Course Name: Environmental Studies
*Teaching Scheme	***Examination Scheme**
Lectures:02 Hours/week, 02 Credits	**UA:30 Marks**
	CA: 20 Marks

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur
	First Year BSc (Electronics) Semester-I
	Vertical : CC
	Course Code: CES-201/CC-201/CC-202/CC-203/CC-204/CC-205/CC-206
	Course Name: Community Engagement and Services/National Service Scheme/National Cadet Corps/Sports/Cultural Activities/Health, Wellness and Fitness/ Yoga Education
*Teaching Scheme	***Examination Scheme**
Lectures:02 Hours/week, 02 Credits	**UA:30 Marks**
	CA: 20 Marks

###################################

UA

Punyashlok Ahilyadevi Holkar Solapur University, Solapur.

Faculty of Science & Technology.

Nature of Question Paper for CBCS Pattern

B. Sc. (Part- I) w.e.f. AY 2024-25

Time: Total Marks: 30

Instructions

1) All Questions are compulsory

2) Figure to right indicate full marks.

Q.1 Choose correct alternative. (MCQ)   **06 Marks**

1)

a)   b)   c)   d)

2)

a)   b)   c)   d)

3)

a)   b)   c)   d)

4)

a)   b)   c)   d)

5)

a)   b)   c)   d)

6)

a)   b)   c)   d)

Q.2. Answer the following. (Any three)   **6 (2+2+2)**

A)

B)

C)

D)

E)

Q.3. Answer the following (Any two).   **6 (3+3)**

A)

B)

C)

Q.4. Answer the following (Any two).   **6 (3+3)**

A)

B)

C)

Q.5. Answer the following (Any one).   **6 Marks**

A)

B)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur.

Faculty of Science & Technology.

Nature of Question Paper for CBCS Pattern

B. Sc. (Part- I) w.e.f. AY 2024-25

Time: Total Marks: 20

- **Internal Evaluation System for 20 Marks**

    ➢ Choose any two of the following

    ➢ Home Assignment / Unit Test / Tutorial /Seminar

- **Pattern of Examination:**

    ➢ External Evaluation + Internal Evaluation

    ➢ 30 Marks + 20 Marks = 50 Marks

- **Passing Criteria:**

    ➢ Written Exam – 12 out of 30

    ➢ Continuous Assessment (CA) – 08 out of 20