MODERN EDUCATION SOCIETY'S

NOWROSJEE WADIA COLLEGE, PUNE -01

(An Autonomous college affiliated to Savitribai Phule Pune University)

F.Y. B. Sc. Electronic Science

SYLLABUS

UNDER NATIONAL EDUCATION POLICY 2020

TO BE IMPLEMENTED FROM

ACADEMIC YEAR 2024-25

(Faculty of Science and Technology)

Savitribai Phule Pune University, Pune

Credit Framework for Under Graduate (UG) (2024 – 25) (3 Subject)

Level / Difficulty	Sem	Subject-1				Subject-2	Subject-3	GE/OE	SEC	IKS	AEC	VEC	CC	Total
4.5 / 100	I	2 (T) + 2 (P)				2(T)+2(P)	2(T)+2 (P)	2 (T)	2 (T/P)	2 (T) (Generic)	2 (T)	2	--	**22**
	II	2 (T) + 2 (P)				2(T)+2(P)	2(T)+2 (P)	2 (P)	2 (T/P)	--	2 (T)	2	2	**22**
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 **Continue option**: Student will select one subject among the (subject 1, subject 2 and subject 3) as major and another as minor and third subject will be dropped.														
Level / Difficulty	**Sem**	**Credits Related to Major**				**Minor**		**GE/OE**	**SEC**	**IKS**	**AEC**	**VEC**	**CC**	**Total**
		Major Core	**Major Elective**	**VSC**	**FP / OJT/ CEP**									
5.0 / 200	III	4 (T) + 2 (P)	--	2 (T/P)	2 (FP)	2(T)+2(P)	--	2 (T)	--	2 (T) (Subject Specific)	2 (T)	--	2	**22**
	IV	4 (T) + 2 (P)	--	2 (T/P)	2 (CEP)	2(T)+2(P)	--	2 (P)	2 (T/P)	--	2 (T)	--	2	**22**
Exit option: Award of UG Diploma in Major and Minor with 88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor														
5.5 /300	V	8(T) + 4(P)	2 (T) + 2 (P)	2 (T/P)	2 (FP/CEP)	2(T)	--	--	--	--	--	--	--	**22**
	VI	8(T) + 4(P)	2 (T) + 2 (P)	2 (T/P)	4 (OJT)	--	--	--	--	--	--	--	--	**22**
Total 3 Years		**44**	**8**	**8**	**10**	**18**	**8**	**8**	**6**	**4**	**8**	**4**	**6**	**132**
Exit option: Award of UG Degree in Major with 132 credits OR Continue with Major and Minor														
6.0 /400	VII	6 (T) + 4 (P)	2 (T) + 2 (T/P)	--	--	4 (RP)	4(RM)(T)	--	--	--	--	--	--	**22**
	VIII	6 (T) + 4 (P)	2 (T) + 2 (T/P)	--	0	8 (RP)	0		0	0	0	0	0	**22**

Total 4 Years		**68**	**16**	**8**	**2**	**22**	**22**		**12**	**6**	**8**	**4**	**8**	**176**
Four Year UG Honours Degree in Major and Minor with 176 credits **OR**														
6.0 /400	VII	10(T) + 4(P)	2 (T) + 2 (T/P)	0	0	0	4 (RM)		0	0	0	0	0	**22**
	VIII	10(T) + 4(P)	2 (T) + 2 (T/P)	0	0	4 (OJT)	0		0	0	0	0	0	**22**
Total 4 Years		**76**	**16**	**8**	**2**	**14**	**22**		**12**	**6**	**8**	**4**	**8**	**176**
Four Year UG Honours with Research Degree in Major and Minor with 160-176 credits														

Notes:

Abbreviation: VSC: Vocational Skill Course, IKS: Indian Knowledge System, FP: Field Project, OJT: On Job Training, CEP: Community
Engagement and Service, GE/OE: Generic Elective / Open Elective, SEC: Skill Enhancement Course, AEC: Ability Enhancement Course, VEC:Value Education Course, CC: Cocurricular Courses, T – Theory, P – Practical

1. VSC, FP/OJT/CEP should be related to the Major subject
2. OE is to be chosen compulsorily from faculty other than that of the Major.
3. SEC to be selected from the basket of Skill Courses approved by college.
4. Student has to choose three subjects from the same faculty in First Year and at the start of Second year he has to opt one subject as Majorsubject and one another subject as Minor subject and the last one subject will be dropped by the student. Therefore, the student after completion of three year will be awarded degree in Major and Minor subject.
5. Student cannot select a subject as major or minor other than the subjects taken in first year
6. Frame each course having even number of credits such as 2 or 4 credit.
7. This UG credit structure is applicable for all the programme across all faculties, except the programmes required approval from apex bodies like AICTE, PCI, BCI, COA, NCTE, etc.

Title of the Course: B. Sc (Electronic Science)

Preamble:

Electronics technology has revolutionized various fields including communication, consumer appliances, medical, defense and so on. The advances in technology are making systems smaller, smarter and powerful. Electronics is an important branch of Science devoted to design implementation and analysis of circuits and systems. Knowledge of Electronics is based on fundamental laws of Physics and though new chips/SOC's are fabricated every day, basic principles remain the same.

The goal of the three-year course is to instill in students a confidence that they can get a grip of the subject and apply it for designing, testing and analyzing systems. The course will also make use of problem-solving approach wherein the students will be trained to apply the acquired knowledge to design and analyze circuits for specific applications. The students will be familiarized with programming languages, various development tools, modeling and simulation tools through lab sessions.

The syllabus has been designed such that basic fundamental concepts, knowledge and specific practical skills of the students are developed. The students will be first introduced to various components, devices and their applications, Network theorems and applications of electronics in day to day life. Digital Electronics fundamentals, Operational amplifier circuits, and its applications will be covered in the second semester. In the Second year the students will be taught the basic principles of communication, Analog and digital circuit design and Microcontrollers. In the third year the students will be given an insight to concepts of Embedded System Design, VLSI Technology, Communication systems and various discipline specific courses with a Project in the final semester.

Course Outcome:

The course aims to generate trained manpower with adequate theoretical and practical knowledge of the various facets of electronic circuits and systems. In this course, the students will get a comprehensive understanding of electronic devices and circuits. To acquaint the students with the fundamental principles of various devices is one of the principle objectives of this course. The student will get profound knowledge to design electronic circuits and conduct investigations, as well as to analyse and interpret data. They will develop the ability to use current techniques, skills, and modern tools necessary for practice.

Following are the objectives -

i. To design the syllabus with specific focus on key Learning Areas.
ii. To equip student with necessary fundamental concepts and knowledge base.
iii. To develop specific practical skills.

iv. To impart training on circuit design, analysis, building and testing.

v. To prepare students for demonstrating the acquired knowledge.

vi. To encourage student to develop skills for accepting challenges of upcoming technological advancements.

Program Specific Objectives:

i. To nurture academicians with focus and commitment to their subject
ii. To shape good and informed citizens from the students entering into the program.
iii. To credit a skilled workforce to match the requirements of society.
iv. To impart knowledge of science is the basic objective of this Programme.
v. To develop a scientific attitude is the major objective to make the students open-minded, critical and curious.
vi. To develop skills in practical work, experiments, and laboratory materials and equipment along with the collection and interpretation of scientific data to contribute to science.

Programme outcomes:

i. The students will graduate with proficiency in the subject of their choice.
ii. The students will be eligible to continue higher studies in their subject.
iii. The students will be eligible to pursue higher studies abroad.
iv. The students will be eligible to appear for the examinations for their jobs in government organizations.
v. The students will be eligible to apply for jobs with a minimum requirement of a B. Sc. Programme.

COURSE STRUCTURE
Semester I- F.Y.B.Sc.

Course Type	Course	Course / Paper Title	Hours / Week	Credit
Major Core Subject (2T+2P)	Discipline Specific Major Paper I	Basics of Analog and Digital Electronics-I	2	2
	Major Paper (Practical) I	Major Practical I	4	2
	Discipline Specific Major Paper II	Major Theory II	2	2
	Major Paper (Practical) II	Major Practical II	4	2
	Discipline Specific Major Paper III	Major Theory III	2	2
	Major Paper (Practical) III	Major Practical III	4	2
Generic/ Open Elective	OE I	Domestic Equipment Maintenance	2	2
VSC/SEC	SEC Practical	Circuit Simulation using P-Spice/Multisim/LTSpice/Proteus	4	2
AEC/ VEC/ IKS	AEC	English Communication I	2	2
	VEC	Environment Science I	2	2
	IKS	Generic	2	2
OJT/ FP/CEP/CC/RP	CC	Physical Education / Cultural Activities, NSS/NCC and Fine/ Applied/ Visual/ Performing Arts Course	-	-
Total Credits				22

Abbreviations:
OE: Open Elective, **AEC:** Ability Enhancement Course, **VEC:** Value Education Courses,
CC: Co-Curricular Courses, **IKS:** Indian Knowledge System, **OJT:** On Job Training,
FP: Field Project, **CEP:** Community Engagement Project

Semester II- F.Y.B.Sc.

Course Type	Course	Course / Paper Title	Hours / Week	Credit
Major Core Subject (2T+2P)	Discipline Specific Major Paper I	Basics of analog and Digital Electronics-II	2	2
	Major Paper (Practical) I	Major Practical II	4	2
	Discipline Specific Major Paper II	Major Theory II	2	2
	Major Paper (Practical) II	Major Practical II	4	2
	Discipline Specific Major Paper III	Major Theory III	2	2
	Major Paper (Practical) III	Major Practical III	4	2
Generic/ Open Elective	OE II	Computer Hardware Practicals	2	2
VSC/SEC	SEC	Practicals Based on PCB	2	2
AEC/ VEC/ IKS	AEC	English Communication I	2	2
	VEC	Environment Science I	2	2
OJT/ FP/CEP/CC/RP CC	CC	Physical Education / Cultural Activities, NSS/NCC and Fine/ Applied/ Visual/ Performing Arts Course	2	2
Total Credits				22

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Semester III (S.Y.B.Sc.)

Course Type	Course	Course / Paper Title	Hours / Week	Credit
Major Mandatory (4 + 4)	Major Core Paper 3 (Theory)	Analog Circuit Design	2	4
	Major Core Paper 4 (Theory)	Digital Circuit Design	2	
	Major (Practical) III	Practical Course III	4	2
Minor (4)	Minor Theory	Basics of Analog Circuit Design	2	4
	Minor (Practical) On Minor Paper II	Practicals based on Basics of Analog Circuit Design	2	
OE (2)	OE	Basics of Electricity and E-Vehicles	4	2
VSC (2)	VSC Practical I	C Programming Practcals	4	2
AEC(2),				2
VEC (2)				2
IKS (2)		History of Indian Telecommunication	2	2
FP/CEP (2)	FP	FP	2	2
CC(2)				2

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Semester IV (S.Y.B.Sc.)

Course Type	Course	Course / Paper Title	Hours / Week	Credit
Major Mandatory (4 + 4)	Major Core Paper 5 (Theory)	Communication Electronics	2	4
	Major Core Paper 6 (Theory)	Microcontroller Architecture and Programming	2	
	Major (Practical) IV	Practical Course IV	4	2
Major Electives				
Minor (4)	Minor Paper III (Theory)	Basics of Digital Circuit Design	2	4
	Minor (Practical) on Minor paper III	Practicals Based on Basics of Digital Circuit Design	4	
OE (2)		Consumer Electronics	4	2
VSC (2)	VSC Practical II	VSC Practical II	4	2
SEC (2)	Skill Paper III (Theory)	Automotive Electronics and E-Vehicles	4	2
AEC(2),	MIL	MIL-II (Hindi) / MIL-II (Marathi)	2	2
CEP(2)	CEP –I	Project	6	2
CC(2)	CC-4	Physical Education / Cultural Activities, NSS/NCC and Fine/ Applied/ Visual/ Performing Arts Course	2	2

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Semester V (Third Year)

Course Type	Course	Course / Paper Title	Hours / Week	Credit
Major Mandatory (4 + 4 + 2)	Major Core Paper VII (Theory)	Modern Communication Systems	2	2
	Major Core Paper VIII (Theory)	Embedded System Design Using Microcontroller	2	2
	Major Paper IX (Theory)	Analog Circuit Design and Application	2	2
	Major Paper X (Theory)	Power Electronics	2	2
	Major (Practical) V on Major Core Paper VII and VIII	Practical Course V	4	2
	Major (Practical) VI on Major Core Paper IX and X	Practical Course VI	4	2
Major Electives	Elective I (Theory)	PLC and SCADA	2	4
	Elective I (Practical)	Practicals based on PLC and SCADA	4	
	OR			
	Elective II (Theory)	Process Control	2	
	Elective II (Practical)	Practicals based on Process Control	4	
Minor (4)	Minor Paper III (Theory)	Nanoelectronics	2	2
VSC (2)	Major Specific Practical III	Electronic Circuit Design Using EDA Tools	4	2
FP / CEP(2)	FP –II/CEP II	Industrial Visit	6	2

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Semester VI (Third Year)

Course Type	Course	Course / Paper Title	Hours / Week	Credit
Major Mandatory (4 + 4 + 2)	Major Core Paper XI (Theory)	Basics of VLSI using Verilog	2	2
	Major Core Paper XII (Theory)	Arduino Interfacing and Python Programming	2	2
	Major Paper XIII (Theory)	Signals and Systems	2	2
	Major Paper XIV (Theory)	Digital Image Processing	4	2
	Major (Practical) VII on Major Core Paper XI and XII	Practical Course VII	4	2
	Major (Practical) VIII on Major Core Paper XIII and XIV	Practical Course VIII	4	2
Major Electives	Elective III (Theory)	Sensors and Systems	2	4
	Elective III (Practical)	Practicals Based on Sensors and Systems	4	
	OR			
	Elective IV (Theory)	Agricultural Electronics	2	
	Elective IV (Practical)	Practicals Based on Agricultural Electronics	4	
OJT(4)	OJT	On Job Training	12	4

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Semester VII (Fourth Year)

Course Type	Course	Course / Paper Title	Hours / Week	Credit
	Major Core Paper XV (Theory)	Advanced VLSI Technology	2	2
	Major Paper XVI (Theory)	Advanced Electronics Systems	2	2
	Major Paper XVII (Theory)	Smart Phone Electronics	4	2
	Major (Practical) IX	Practical Course IX	4	2
	Major (Practical) X	Practical Course XI	4	2
Major Electives	Elective V (Theory)	Instrumentation and Measurement Techniques	2	4
	Elective V (Practical)	Practical Based on Instrumentation and Measurement Techniques	4	
	OR			
	Elective VI (Theory)	Mathematical Methods for Electronics using C	2	
	Elective VI (Practical)	Practicals Based on Mathematical Methods for Electronics using C	4	
RP				4
RM	Research Methodology (Theory)	Research Methodology (Theory)	4	4

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Semester VIII (Fourth Year)

Course Type	Course	Course / Paper Title	Hours / Week	Credit
	Major Core Paper XVIII (Theory)	Robotics	2	2
	Major Paper XIX (Theory)	Applications of Electronics In Agriculture	2	2
	Major Paper XX(Theory)	Foundation of Semiconductor Devices	4	2
	Major (Practical) XI	Practical Course XI	4	2
	Major (Practical) XII	Practical Course XII	4	2
Major Electives	Elective VII (Theory)	Experimental Techniques for Synthesis of electronic Materials	2	4
	Elective VII (Practical)	Practical Based on Experimental Techniques for Synthesis of electronic Materials	4	
	OR			
	Elective VIII (Theory)	32-bit Microcontroller	2	
	Elective VIII (Practical)	Practicals based on 32 bit Microcontrollers	4	
RP			16	8

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	MODERN EDUCATION SOCIETY'S **NOWROSJEE WADIA COLLEGE, PUNE**	**Academic Year 2024-2025**

Bachelor of Science in Electronic Science

Major (Theory) Subject-I

YEAR-I **SEMESTER-I**	**Name of Paper- Basics of Analog and digital Electronics-I** **Subject Code-**	**CREDITS-II** **HOURS-30**

Course specific outcomes- *1) To understand importance of Electronics in day today life*
2) To understand basics of electronics components (active and passive)
3) To make the students learn through problem solving
4) To understand digital electronics

Sr. no.	**COURSE CONTENT / SYLLABUS**	**Lectures**
UNIT I	**Passive Components and it's circuits** Resistor: Types, Power Rating, Tolerance Variable Resistors, Resistor Colour Code, Capacitor: Types of Capacitors -Fixed Capacitors, Variable Capacitors, Voltage Rating of Capacitors Inductor: Types of inductors: Fixed and Variable Inductors, Transformer: Basic Principle and types of transformers Series - Parallel circuits, RC Circuit with DC supply, AC applied to R, C and L, concept of impedance, LCR series resonant circuit, concept of phase difference, RC low pass and high pass filter.	**7**
UNIT II	**Semiconductor Diodes and Circuits:** The P -N Junction, P-N Junction Diode, Forward and Reverse V /I Characteristics. Rectifiers (half and full wave), rectifier with capacitor-filter, clipper and clamper circuits Special Diodes: Zener diode, light emitting diode, photo diode, solar cell, Optocoupler,	**8**
UNIT III	**Basics of Digital Electronics:** Number Systems: Decimal, Binary, Hexadecimal, BCD, Gray code and their inter-conversions, ASCII, Complements (1's, 2's), Rules of binary Addition, Subtraction. Logic gates: positive and negative logic, AND, OR, NOT, EX-OR, NAND, NOR, EX-NOR and truth tables, NAND and NOR universal gates	**7**
UNIT IV	**Boolean algebra and Theorems:** Boolean Theorems, De-Morgan's laws. Digital logic gates, Multi-level NAND & NOR gates. Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh Map Method: 3 variables), don't care condition. **Arithmetic Circuits:** Rules of binary addition and subtraction, subtraction using 1's and 2's complements, half adder, full adder, Half subtractor, Full subtractor, Four-bit parallel adder, Universal adder / subtractor, Digital comparator, Basic concept of Arithmetic and logical unit (ALU)	**8**
References :	1) Basic Electronics, Solid State: B.L.Theraja, S.Chand and Co. First Multicolour Edition 2005 2) Basic Electronics: Bernard Grob, McGraw Hill Publication, 8th Revised Edition 3) Electronic Principles: Albert Malvino, David J Bates, McGraw Hill 7th Edition 4) Electronic Devices and Circuits: Bolyestad, Tata McGraw Hill**.** 5) Morris Mano, "Digital Design "3rd Edition, PHI, New Delhi 6) Malvino Leach, "Digital Principles & Applications",(IV Edition) McGraw Hill 7) T.M. Floyd R.P. Jain, "Digital fundamentals", Pearson Education 8) R.P.Jain, "Digital Electronics", Tata McGraw Hill	
Learning outcomes:	*After completion of this course student will be able:* *1) To identify different parameters/functions/specifications of components.* *2) To solve problems based on network theorems.* *3) To perform simulations using simulator for analyzing network performance* *4) Students are new for the electronics; they will learn all basics of passive and active components.*	

	MODERN EDUCATION SOCIETY'S **NOWROSJEE WADIA COLLEGE, PUNE**	**Academic Year 2024-2025**
Bachelor of Science in Electronic Science		
Major(Practical) Subject-I		
YEAR-I	**Name of Paper-** **Practical Course I (Subject Code-)**	**CREDITS-II**
SEMESTER-I		**HOURS-30**

Course specific outcomes-

1) *To teach students how to draw different symbols and circuit diagrams*
2) To develop skill of circuit connections
3) To familiarize the student with different components and devices used in the laboratory and the device manuals
4) To familiarize students with laboratory instruments like Ammeter, voltmeter, DMM, Signal Generator, Function Generator, CRO and tools like cutter, stripper etc.
5) To train them to design and analyze the circuits for specific purpose
6) To teach the students how to analyze the results and calculate performance parameters
7) To motivate them to work on different mini projects

Sr.no.	COURSE CONTENT / SYLLABUS	Lectures
	Activity: Part1: Measurement of Amplitude and Frequency using CRO/DSO. Part 2: Familiarization with a) Resistance in series, parallel and series – Parallel. b) Multimeter – Checking of components. c) Voltage and Current dividers <u>List of Practical's: (Any 8)</u> 1.Diode Characteristics: PN junction and Zener Diode. 2.Binary to gray code conversion and Gray to Binary code conversion 3.Designing of logic gates using universal gates. 4.Rectifier Circuits: Half wave, Full wave and Bridge rectifier. 5.Study of logic gates using ICs 6.Verify Half adder and full adder using gates 7.4-bit binary parallel adder and subtractor using IC7483 8.Study of clipper circuits. 9.Arithmetic and logic unit (ALU) 10.Study of RC low pass filter. 11.Study of CR High pass filter. 12.Study of LCR series resonant circuit 13.Study of LEDs 14.Study of Photodiode.	**60**
Learning outcomes:	*After completion of this course student will be able:* *1) To identify different components and devices as well as their types* *2) To understand basic parameters associated with each device* *3) To know operation of different instruments used in the laboratory* *4) To connect circuit and do required performance analysis* *5) To compare simulated and actual results of given particular experiment*	

	MODERN EDUCATION SOCIETY'S **NOWROSJEE WADIA COLLEGE, PUNE**	**Academic Year 2024-2025**

Bachelor of Science in Electronic Science

OE (Theory) Subject-I

YEAR-I	**Name of Paper-**	**CREDITS-II**
SEMESTER-I	**Domestic Equipment Maintenance** **Subject Code-**	**HOURS-30**

Course specific outcomes-

1) Aptitude to apply Logic thinking and Basic Science knowledge for problem solving in various fields of electronics in industries.

2) To acquire experimental skills, analysing the results and interpret data.

3) *Ability to manage operation and maintenance of sophisticated electronic gadgets / systems / processes that conforms to a given specification within ethical and economic constraints*.

Sr. no.	COURSE CONTENT / SYLLABUS	Lectures
UNIT I	**Unit 1- Geyser:** Study of household electric supply (single phase/ three phase), Construction and working of Geyser, parts and manufacturing process, types. Common faults and their troubleshooting: Dripping geyser overflow, overheating, steam or hot water escaping from overflow, water leaks through the ceiling, no hot water, water not hot enough, poor hot water pressure.	**10**
UNIT II	**Unit 2- Induction cooker:** Construction and working, parts and manufacturing process, types. Common faults and their troubleshooting: Cooker fuse blown, cooker buttons not working, cook top shuts off while cooking, food not get cooked or heated properly, overheating and uneven heating, display keep flashing, weird noises–crackling, fan noise, humming sound, clicking.	**10**
UNIT III	**Unit 3-: Microwave Oven:** Working, raw material and manufacturing process, types Common faults and their troubleshooting: Microwave does not heat, runs then stops, buttons do not work, plate do not spin, bulb does not turn ON during operation, sparking inside, Shuts OFF after few seconds.	**10**
References :	1) Electronic instruments and systems: Principles, maintenance and troubleshooting by R. G. GuptaTata McGraw Hill 2) Modern electronic equipment: Troubleshooting, repair and maintenance by Khandpur, TataMcGraw Hill 3) Electronic fault diagnosis by G. C. Loveday, A. H. Wheeler publishing 4) www.madehow.com	
Learning outcomes:	*After completion of this course student will be able:* *1) Capacity to identify and implementation of the formulate to solve the electronic related issues and analyse the problems in various sub disciplines of electronics.* *2) Capability to use the Modern Tools / Techniques for the operation and maintenance of the domestic electrical/ electronic gadgets* *3) Capability to use the Modern Tools / Techniques.*	

	MODERN EDUCATION SOCIETY'S **NOWROSJEE WADIA COLLEGE, PUNE**	**Academic Year 2024-2025**
Bachelor of Science in Electronic Science		
SEC Skill Enhancement Practical Subject-I		
YEAR-I	**Name of Paper-** Circuit Simulation using P-Spice/Multisim/LTSpice/Proteus	**CREDITS-II**
SEMESTER-I	**Subject Code-**	**HOURS-30**

Course specific outcomes-

1) The primary purpose of this course is to become familiar with the use of PSpice and to learn to use it to assist in the analysis of circuits

2) The most important things for Students to learn are:

a) Design and draw circuits

b) Simulate circuits

c) Analyze simulation results

Sr. no	COURSE CONTENT / SYLLABUS	Lectures
	Activity: Part 1-Introduction of Softwares, Installation of Softwares, drawing and saving Schematics. Part 2-Detailed explanation of Analysis Menu. **Simulation of :** 1.Diode Characteristics: PN junction and Zener Diode. 2.Binary to gray code conversion and Gray to Binary code conversion 3.Designing of logic gates using universal gates. 4.Rectifier Circuits: Half wave, Full wave and Bridge rectifier. 5.Study of logic gates using ICs 6.Verify Half adder and full adder using gates 7.4-bit binary parallel adder and subtractor using IC7483 8.Study of clipper/Clamper circuits. 9.Arithmetic and logic unit (ALU) 10.Study of RC low pass filter. 11.Study of CR High pass filter. 12.Study of LCR series resonant circuit 13.Study of LEDs 14.Study of Photodiode.	**60**
References:	1) Introduction to PSpice-A supplement to Electric Circuits 5th Edition: Susan A. Riedel, James W. Nilsson 2) Introduction to PSpice Using OrCAD for Circuits and Electronics: Rashid, Muhammad H.	
Learning outcomes:	*After completion of this course student will be able:* *1) Creating and editing designs* *2) Creating and editing symbols* *3) Creating and editing hierarchical designs* *4) Preparing circuits design for simulation*	

	MODERN EDUCATION SOCIETY'S NOWROSJEE WADIA COLLEGE, PUNE	Academic Year 2024-2025
Bachelor of Science in Electronic Science		
Major (Theory) Subject-I		
YEAR-I **SEMESTER-II**	**Name of Paper-** **Basics of Analog and Digital Electronics-II** **Subject Code- ELMJ121**	**CREDITS-II** **HOURS-30**

Course specific outcomes-

1) To know about the details of Transistors, FET and MOSFETS
2) To build and understand application circuits of electronic devices.
3) To study digital circuits.

Sr no	COURSE CONTENT / SYLLABUS	Lectures
UNIT I	**Bipolar Junction Transistor:** Basic operation, Study of CE, CB, CC configurations, CE characteristics, Potential divider biasing of BJT, Applications: Transistor as switch, Transistor as amplifier, **FET:** Basic operation, Types, Drain Characteristics and Transfer Characteristics **MOSFET**: Types, Basic operation, characteristics.	**7**
UNIT II	**Network Theorems:** KVL, KCL, Voltage divider rule, current divider rule, Norton's, Thevenin's Maximum Power transfer, Superposition and problems based on above theorems.	**8**
UNIT III	**Combinational Circuits** Multiplexer (2:1, 4:1), demultiplexer (1:2, 1:4) and their applications, Code converters- Decimal to binary, Hexadecimal to binary, BCD to decimal, Encoder & decoder 3x4 matrix keyboard encoder, priority encoder, BCD to seven segment decoders.	**7**
UNIT IV	**Sequential Circuits** **Flip flops:** RS using NAND/NOR, latch, clocked RS, JK, Master slave JK, D and T. Flipflop. **Counters:** Ripple Counter, Binary counter, up-down counter, concept of modulus counters, Decade counter, Counters for high-speed applications (Synchronous counters) with timing diagrams. **Shift registers:** SISO, SIPO, PISO, PIPO shift registers, state diagrams for each, ring counter, Universal 4-bit shift register and Applications.	**8**
References:	1) Basic Electronics, Solid State: B.L.Theraja, S.Chand and Co. First Multicolour Edition 2005 2) Basic Electronics: Bernard Grob, McGraw Hill Publication, 8th Revised Edition, 3) Electronic Principles: Albert Malvino, David J Bates, McGraw Hill 7th Edition. 4) Electronic Devices and Circuits: Bolyestad, Tata McGraw Hill. 5) Morris Mano, "Digital Design "3rd Edition, PHI, New Delhi 6) Malvino Leach, "Digital Principles & Applications",(IV Edition) McGraw Hill 7) T.M. Floyd R.P. Jain, "Digital fundamentals", Pearson Education 8) R.P.Jain, "Digital Electronics", Tata McGraw Hill	
Learning outcomes:	*After completion of this course student will be able:* *1) To analyze performance parameters based on study of characteristics of electronic devices transistors, FET, MOSFET, OPAMP and digital circuits.* 2) *To build and test the circuits like street light controller using electronic devices.*	

	MODERN EDUCATION SOCIETY'S **NOWROSJEE WADIA COLLEGE, PUNE**	**Academic Year 2024-2025**
Bachelor of Science in Electronic Science		
Practical Subject-II		
YEAR-I	**Name of Paper-** **Practical Course II** **Subject Code-**	**CREDITS-II**
SEMESTER-II		**HOURS-30**

Course specific outcomes-

1) To build op-amp configurations and study its performance
2) To build application circuits of op-amp and study its performance
3) To teach the students how to analyze the results and calculate performance parameters
4) To understand features of laboratory instruments like Ammeter, voltmeter, DMM, Signal Generator, Function Generator, CRO

List of Practicals (Any 12)

1. To study I/O characteristics of BJT.
2. To study I/O characteristics of FET.
3. To study I/O characteristics of MOSFET.
4. Study of Up/Down Counter
5. Study of Decade counter
6. Study of 4-bit Shift register
7. Study of R-S, J-K & D Flip-Flop
8. Study of 2:1 Multiplexer & 1:2 Demultiplexer.
9. Verification of Kirchhoff's Law.
10. Verification of Thevenin's Theorem.
11. Verification of Superposition theorem.
12. Verification Maximum Power Transfer Theorem.
13. Study of BCD to seven segment decoders.
14. Study of Modulus of a counter.

Learning outcomes:	*After completion of this course student will be able* *1) To connect op-amp circuits and analyze the output.* *2) To build application circuits of op-amp.* *3) To learn bit storage in ROM*

	MODERN EDUCATION SOCIETY'S **NOWROSJEE WADIA COLLEGE, PUNE**	**Year 2024-2025**
Bachelor of Science in Electronic Science		
OE (Practical) -I		
YEAR-I	**Name of Paper-** **Computer Hardware**	**CREDITS-II**
SEMESTER-II	**Subject Code-**	**HOURS-30**

Course specific outcomes-

1) Acquire the knowledge of computer hardware.
2) Understand working of computers.
3) Understand configuration of computers.
4) Understanding of peripheral devices
5) Understanding the formatting of hard disk and creation of logical partition

Practical List

1.Front panel indicators & switches and Front side & rear side Connectors.
2.Study of the Motherboard
3.Study of HDD, CD DVD and add on cards.
4.Install Hard Disk and configure to the PC's
5.Printer Installation and Servicing and troubleshoot
6.Install and configure Scanner.
7.Identification of symptoms for failure
8.Study of different Anti-Virus software for example Norton, Quick heel etc.
9.To Assembling a Computer.
10.Formatting disk drives.
11.Creation of Logical Disk Drives
12.Understanding control panel settings

Learning outcomes:	*After completion of this course student will be able:* *1) Student will different types of computer hardwares* *2) Student will Understand how to configure the computer* *3) Student will learn how to format hard disk, create logical drives,*

	MODERN EDUCATION SOCIETY'S **NOWROSJEE WADIA COLLEGE, PUNE**	**Academic Year 2024-2025**
Bachelor of Science in Electronic Science		
SEC Skill Enhancement Course (Practical) II		
YEAR-I	**Name of Paper-** **Project: PCB Design and Fabrication**	**CREDITS-II**
SEMESTER-II	**Subject Code-**	**HOURS-30**

At the end of the course the student should be able to:
1) To provide students for knowledge of Electronics Components and soldering techniques and its
2) package information for electronics circuit design.
3) Knowledge for the assembling of electronics circuit with components on PCB (Printed Circuit Board) of circuit design.
4) Design and development of Small electronic project based on hardware and software for electronics systems.

Sr. no.	COURSE CONTENT / SYLLABUS	Lectures
	Course Contents: Mini project may be carried out in one or more form of following: Product preparations, working/non-working models, prototype development, fabrication of setups, laboratory experiment development, process modification/development, simulation, software development, integration of software and hardware, statistical data analysis, survey, creating awareness in society. The student is required to submit a report based on the work. The evaluation of the project shall be on continuous basis. Course Guidelines: 01. Students should select a problem which addresses some basic home, office or other real-life applications. 02. The electronic circuit for the selected problem should have at least 20 to 25 components. 04. Soldering of components should be carried out by students. 05. Students should develop a necessary PCB for the circuit with the help of software. 06. Students should see that final circuit submitted by them is in working condition. 07. 5-10 pages report to be submitted by students. 08. Group of maximum three students can be permitted to work on a single mini project. 09. The mini project must have hardware part. The software part is optional. 10. Department may arrange demonstration with poster presentation of all mini projects developed by the students at the end of semester. 11. It is desirable that the electronic circuit/systems developed by the students have some novel features.	**60**
Learning outcomes:	*After completion of this course student will be able:* *1) Students will be able to practice acquired knowledge within the chosen area of* *2) technology for project development.* *3) Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.* *4) Reproduce, improve and refine technical aspects for engineering projects.* *5) Work as an individual or in a team in development of technical projects.* *6) Communicate and report effectively project related activities and findings*	

NEP, Exam pattern (UG)

The Examination pattern for Under graduate (UG) courses.

EVALUATION PATTERN: For Two Credit Courses

(i) Each course shall be evaluated with Continuous Evaluation (CE) and EndSemester Examination (EE).

(ii) Continuous Evaluation shall be of 15 marks and End Semester Examination(EE) shall be of 35 marks

(iii) To pass a course of 2credits, a student has to earn minimum 20 marks, provided that he/she should earn minimum 6 marks in Continuous Evaluation and minimum 14 marks in End-Semester Examination. That is passing criterion is minimum 40% marks in the examination.

(iv) For Internal evaluation (out of 15 marks), There has to be one written test of 10 marks (Mid-Semester Examination). For remaining 5 marks shall be based on the continuous evaluation consisting of tutorial, viva, seminars, home-assignments, mini project, survey, group discussion etc.(on approvalof Head of the Department)

(v) There shall be revaluation of the answer scripts of End-Semester Examination (out of 35 marks) of theory papers only, but not of internalassessment papers as per Ordinance No. **134 A and B.**

ATKT RULES

(i) Minimum number of credits required to take admission to Second year of B.Sc. course is 31 (70%) (As same as SPPU) minimum number of credits required to take admission to Third year of B. Sc.course is 44 (100%) to be completed from First year of B. Sc. and pass in physical education examination in first year of B. Sc. and 22 credits from second year of B. Sc (As same as SPPU).

AWARD OF GRADES AND GRADE POINTS

The mapping of percentage to letter grade and grade point is given in the followingTable 1

CGPA will be calculated as follows:

Table No. 1

Sr. No.	Grade Letter	Grade Point	Marks
1.	O (Outstanding)	10	$90 \leq$ Marks ≤ 100
2.	A+ (Excellent	9	$80 \leq$ Marks ≤ 89
3.	A (Very Good)	8	$70 \leq$ Marks ≤ 79
4.	B+ (Good)	7	$55 \leq$ Marks ≤ 69
5.	B (Above Average)	6	$50 \leq$ Marks ≤ 54
6.	C (Average)	5	$45 \leq$ Marks ≤ 49
7.	D (Pass)	4	$40 \leq$ Marks ≤ 44
8.	F (Fail)	0	Marks < 40
9.	Ab (Absent)	0	

PERFORMANCE INDICES:

The performance of a student in a Semester is indicated by a number called the Semester Grade Point Average (SGPA). Similarly, the performance of a student in the Course is indicated by a number called the Course Grade Point Average (CGPA).

The End-Semester results and final result of the courses will contain SGPAand CGPA,respectively.

(1) **SGPA**: The SGPA is the weighted average of the grade points obtained by students in all the courses during the Semester. That is

$$SGPA = \frac{\sum_{i=1}^{p} C_i G_i}{\sum_{i=1}^{p} C_i}$$

(2) For example, suppose in a Semester, student has registered for five courses having credits C1, C2, C3, C4 and C5 and suppose his/her grade points are G1,G2, G3, G4 and G5, respectively. The SGPA is calculated as

$$SGPA = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4 + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

SGPA is calculated correct up to two decimal places by rounding off.

(3) **CGPA**: The CGPA is the weighted average of the grade points obtained in all courses (theory and Practicals) by students in all the courses in 6 semesters. Itis calculated in the same manner as the SGPA.

RESULTS:

Based on the performance of the student in the Semester Examinations, NowrosjeeWadia College will declare the results and issue the Semester Grade sheets. Also, the College will declare the results and issue the Grade sheets at the end of the course.

The class will be awarded to a student on the basis of CGPA. The award of the classshall be as per Table 2 and corresponding percentage calculation for the CGPA is given in Table No. 3

Table 2

Sr. No.	CGPA	Class of the degree awarded
1	9.50 or more than 9.50	OUTSTANDING (O)
2	8.50 or more but less than 9.50	EXCELLENT (A+)
3	7.50 or more but less than 8.50	VERY GOOD (A)
4	6.25 or more but less than 7.50	GOOD (B+)
5	5.25 or more but less than 6.25	ABOVE AVERAGE (B)
6	4.75 or more but less than 5.25	AVERAGE (C)
7	4.00 or more but less than 4.75	PASS (D)

Percentage of marks corresponding to CGPA is calculated by the formulae which aregiven in the following Table 3.

Table 3

GRADE	Formula for the percentage of marks
O	20 × CGPA - 100
A+	10 × CGPA -5
A	10 × CGPA - 5
B+	12× CGPA - 20
B	5× CGPA + 23.75
C	10 × CGPA -2.50
D	6.6× CGPA + 13.6

The above percentage calculations are illustrated in the following Table 4

Table 4

Some examples of CGPA to Percentage calculations

CGPA obtained	Formula	Percentage (%)	Grade
10	20 × 10 - 100 = 100	100	O
9.75	20 × 9.75 - 100 = 95	95	O
9.5	20 × 9.5 - 100 = 90	90	O
9.0	10 × 9 – 5 = 85	85	A+

8.0	10 × 8.0 – 5 = 75	75	A
7.0	12 × 7.0 – 20 = 64	64	B+
6.67	12 × 6.67 – 20 = 60.04	60.04	B+
6.25	12× 6.25 – 20 = 55	55	B+
5.25	5 × 5.25 + 23.75 = 50	50	B
4.75	10 × 4.75 – 2.50 = 45	45	C
4.0	6.6 × 4.0 + 13.6 = 40	40	D

While declaring the results, the existing ordinances are applicable. There is also a provision for verification and revaluation. In case of verification, the existing rules will be applicable. The revaluation result will be adopted if there is a change of at least 10% marks and in the grade of the course.

PATTERN OF THE QUESTION PAPER: Two Credits

(1) Internal Examination:

(Mid-Semester Examination of 10 marks, Duration: 30 Mins)

Question No.	Total Marks	No. Of questions	Remarks
Q. 1.	5	Attempt any 5 out of 7	Definitions/Counter examples/Short answer objective type of questions/True or False.(Each question carries 1 mark.)
Q. 2.	5	Solve any 1 out of 2 questions	Descriptive type questions (Each question carries 5marks)

(2) End Semester Examination (EE):

Shall be of 35 marks, 2 hours duration. The pattern of the question papershall be as follows:

Question No.	Total Marks	No. Of questions	Remarks
Q. 1.	5	Solve any 5 out of 7	Definitions/Counter examples/Short answer / objective type of questions/True or False. (Each question carries 1 mark.)
Q. 2.	10	Solve any 5 out of 7OR Solve any 2 out of 3	Descriptive type questions (Each question carries 5 marks)
Q. 3.	10	Solve any 2 out of 3	Descriptive type questions (Each question carries 5 marks)
Q. 4.	10	Solve any 2 out of 3OR Solve any 1 out of 2	Descriptive type questions

EVALUATION PATTERN: For Four Credit Courses

(i) Each course shall be evaluated with Continuous Evaluation (CE) and EndSemester Examination (EE).

(ii) Continuous Evaluation shall be of 30 marks and End Semester Examination(EE) shall be of 70 marks.

(iii) To pass a course of 4credits, a student has to earn minimum 40 marks, provided that he/she should earn minimum 12 marks in Continuous Evaluation and minimum 28 marks in End-Semester Examination. That ispassing criterion is minimum 40% marks in the examination.

(iv) For Internal evaluation (out of 30 marks), There has to be one written test of 20 marks (Mid-Semester Examination). For remaining 10 marks shall be based on the continuous evaluation consisting of tutorial, viva, seminars, home-assignments, mini project, survey, group discussion etc.(on approvalof Head of the Department)

(v) There shall be revaluation of the answer scripts of End-Semester Examination (out of 70 marks) of theory papers only, but not of internalassessment papers as per Ordinance No. **134 A and B.**

PATTERN OF THE QUESTION PAPER: Four Credits

(1) Internal Examination:

(Mid-Semester Examination of 10 marks, Duration: 30 Mins)

Question No.	Total Marks	No. Of questions	Remarks
Q. 1.	10	Attempt any 5 out of 7	Definitions/Counter examples/Short answer /objective type of questions/True or False. (Each question carries 2 mark.)
Q. 2.	10	Solve any 1 out of 2 questions	Descriptive type questions(Each question carries 10 marks)

(2) End Semester Examination (EE):

Shall be of 70 marks, 2 hours and 30 Minutes duration. The pattern of the question paper shall be as follows:

Question No.	Total Marks	No. Of questions	Remarks
Q. 1.	10	Solve any 5 out of 7	Definitions/Counter examples/Short answer / objective type of questions/True or False. (Each question carries 2 mark.)
Q. 2.	20	Solve any 5 out of 7OR Solve any 2 out of 3	Descriptive type questions
Q. 3.	20	Solve any 2 out of 3	Descriptive type questions (Each question carries 5 marks)
Q. 4.	20	Solve any 2 out of 3OR Solve any 1 out of 2	Descriptive type questions

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