"Dissemination of Education for Knowledge, Science and Culture"
-Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's

VIVEKANAND COLLEGE, KOLHAPUR

(EMPOWERED AUTONOMOUS)

DEPARTMENT OF ELECTRONICS

Three/Four- Years UG Programme

Department/Subject Specific Core or Major (DSC)

NEP- Phase-II

Curriculum, Teaching and Evaluation Structure

(as per NEP-2020 Guidelines)

for

B.Sc.-I Electronics

Semester-I & II

(Implemented from academic year 2024-25 onwards)

Department of Electronics

B.Sc.: Program Outcomes (POs):

PO 1: Disciplinary Knowledge: Graduates will gain in-depth understanding in their specific major or discipline, mastering the foundational principles and theories, as well as advanced concepts. Execute theoretical and practical knowledge developed from the specific curriculum.

PO 2: Problem-Solving Skills: Graduates will learn to use their knowledge to identify, analyze and solve problems related to their field of study.

PO 3: Analytical Skills: Graduates will gain the ability to collect, analyze, interpret, and apply data in a variety of contexts. They might also learn to use specialized software or equipment.

PO 4: Research Skills and Scientific Temper: Graduates might learn how to design and conduct experiments or studies, analyze results and draw conclusions. They might also learn to review and understand academic literature.

PO 5: Environment and Sustainability: Possess a sympathetic awareness of the environment while conducting research and scientific studies and focus on sustainable social development.

B.Sc. in Electronics: Program Specific Outcomes (PSOs):

PSO1: Apply foundational knowledge: Apply the fundamental principles and concepts of electronics to analyze and solve problems in electronic circuits, devices, and systems.

PSO2: Design and analyze electronic systems: Design and analyze electronic circuits, systems, and components to meet specific requirements, considering factors such as performance, reliability, cost, and sustainability.

PSO3: Implement and troubleshoot electronic circuits: Demonstrate proficiency in implementing electronic circuits, including the selection and use of appropriate components, tools, and techniques, and effectively troubleshoot and debug electronic systems.

PSO4: Utilize modern tools and techniques: Utilize modern software tools, simulation techniques, and laboratory equipment to design, analyze, and test electronic circuits and systems.

PSO5: Adapt to emerging technologies: Adapt to and keep pace with emerging technologies in the field of electronics, demonstrating an understanding of their applications, limitations, and implications.

Vivekanand College, Kolhapur (Empowered Autonomous)

Department of Electronics

NEP-Phase-II

Departmental Teaching and Evaluation scheme

(2024-25 onwards)

Three/Four- Years UG Programme

Department/Subject Specific Core or Major (DSC)

(as per NEP-2020 Guidelines)

First Year Semester-I & II

Sr. No.	Course Abbr.	Course code	Course Name	Teaching Scheme Hours/week		Examination Scheme and Marks				Course Credits
				TH	PR	SEE	CIE	PR	Marks	
Semester-I										
1	DSC-I	2DSC03ELE11	Analog Electronics-I	2	-	40	10	-	50	2
2	DSC-II	2DSC03ELE12	Digital Electronics-I	2	-	40	10	-	50	2
3	DSC ELE-PR-I	2DSC03ELE19	DSC Electronics Lab-1	-	4	-	-	25	25	2
4	OEC PHS-PR-I	2OEC03PHS12	Physical Science-I (Domestic Electrical Wiring-I)	-	4	-	-	25	25	2
Semester –I Total				**4**	**8**	**80**	**20**	**50**	**150**	**8**
Semester-II										
1	DSC -III	2DSC03ELE21	Analog Electronics-II	2	-	40	10	-	50	2
2	DSC -IV	2DSC03ELE22	Digital Electronics-II	2	-	40	10	-	50	2
3	DSC ELE-PR-II	2DSC03ELE29	DSC Electronics Lab-2	-	4	-	-	25	25	2
4	OEC PHS-PR-II	2OEC03PHS22	Physical Science-II (Domestic Electrical Wiring-II)	-	4	-	-	25	25	2
Semester –II Total				**4**	**8**	**80**	**20**	**50**	**150**	**8**

Abbreviations: TH-Theory, PR-Practical, PRO- Project, SEE- Semester End Examination, CIE-Continuous Internal Examination

Note: Minimum passing for 10 marks Internal evaluation = 04 marks
Minimum passing for 40 marks Theory paper = 16 marks
Minimum passing for 25 marks Practical = 10 marks
Passing percentage for Democracy, Election and Good Governance (DEGG) and Environmental Studies papers should be 40%

Separate passing for each Head - SEE, CIE and Practicals

Semester -I

B. Sc. Part – I Semester -I ELECTRONICS

DSC-I: 2DSC03ELE11: ANALOG ELECTRONICS-I

Credits: 02 Theory: 30hrs. Marks-50

Course Outcomes: After the completion of the course the student will be able to:

CO1: Identify and explain electrical components and determine the value of resistor, inductor and capacitor using color code method.

CO2: Understand the basic properties of electrical elements, and solve DC circuit analysis problems, DC network theorems.

CO3: Acquire the knowledge about the characteristics and working principles of PN junction diode, Zener diode, photo diode, LED and different diode applications.

CO4: Understanding and study of rectifier, filter and voltage regulator circuits.

Unit -1: Basic Circuit Elements: (7Lectures.)

Study of basic circuit elements and passive components: Resistor, Capacitor, Inductor, Transformer, Relays, Switches (working principle, circuit symbols, types, specifications and applications).

Unit -2: Circuit Analysis: (8 Lectures.)

Concept of Voltage and Current Sources, Internal resistance, Kirchhoff's Current Law, Kirchhoff's Voltage Law, Mesh Analysis, Node Analysis, Principle of Duality, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Millman's Theorem, (Numericals expected)

Unit -3: PN Junction Diode: (7 Lectures.)

Construction of PN junction, Formation of Depletion Layer, Barrier potential, Forward and Reverse bias, Diode Equation and I-V characteristics, Zener diode, Zener and Avalanche breakdown, Zener diode specifications. Photo diode. Light Emitting Diode (LED): construction and working, 7-segment display and it's applications.

Unit-4: DC Power Supply: (8 Lectures.)

Need of Power Supply, Block diagram of DC regulated power supply, Rectifiers: Half wave, Full wave rectifiers (center tapped and bridge):- Circuit diagrams, working and waveforms, ripple factor, PIV, efficiency and TUF. Filter-Shunt capacitor filter, Series inductor filter, π - filter. Regulation: Concept of Line and load regulation, Zener diode as voltage regulator, Three pin IC regulators: Block diagram, Specifications and applications. Fixed and Variable voltage IC regulator (IC 78xx,79xx and LM317). Concept of SMPS.

Reference Books:

- Basic Electronic, B. Grob, McGraw Hill, 8th Edition (1997)
- Basic Electronics and Linear circuits, N. N. Bhargava, D. C. Kulshreshtha, S.C. Gupta, Tata McGraw Hill, 1st edition (2008)
- Principles of Electronics - V. K. Mehta, Rohit Mehta S. Chand Publications, 11th edition (2008)
- A text book of Applied Electronics R. S. Sedha, S. Chand Publication, 1st edition (2008).
- Electronic Devices and Circuits, Allen Mottershead, Goodyear Publishing Company, 1st Edition(2011).

B. Sc. Part – I Semester -I ELECTRONICS
DSC-II: 2DSC03ELE12: DIGITAL ELECTRONICS-I
Credits: 02 Theory: 30hrs. Marks-50

Course Outcomes: After the completion of the course the student will be able to:

CO1: Understanding the basics of Digital Electronics, different number systems, Binary Codes and signed representation of binary number. Also understand the conversion between different number systems and solve the binary arithmetic problems.

CO2: Design and construction of the basic and universal logic gates and studying the Boolean algebra and simplification of Boolean expression using different methods.

CO3: Understanding and comparing different logic families according IC specifications and their circuit configurations.

CO4: Understand, analyze and design various combinational circuits.

Unit-1: Number System, Binary Codes and Binary Arithmetic: **(7 Lectures.)**

Decimal, Binary, Octal and Hexadecimal number systems and their inter conversions, BCD code, ASCII code, Gray Code, Excess-3 Code, Binary Arithmetic: Addition, Subtraction by 1's complement and2's complement method, Representation of signed and unsigned numbers,

Unit-2: Logic Gates, Boolean algebra: (**8 Lectures**)

Study of logic Gates: OR, AND, NOT, NOR, NAND,XOR, XNOR, Universal Gates, Boolean identities and Law's, fundamental theorems of Boolean algebra. Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh map minimization up to 4 variables for SOP).

Arithmetic Circuits: Binary Addition, Half and Full Adder, Half and Full Subtractor, 4-bit binary Adder/Subtractor.

Unit- 3: Logic Families (**7 Lectures**)

Logic Families: Types of Logic Families, Characteristics of Logic Families, TTL NAND gate, TTL NOR gate, TTL NOT gate, Concept of Tristate Logic, MOS Technology, CMOS: NOR, NAND and NOT gates, Comparison of TTL and CMOS logic families.

Unit-4: Combinational circuits: (**8 Lectures**)

Multiplexers: - 2 to 1, 4 to 1 and 8 to 1. Demultiplexers: - 1 to 2, 1 to 4, 1 to 8. Encoder: concept of encoder, Decimal to BCD Encoder. Basic Binary decoders: 2 to 4 line, 3 to 8 line and 4 to 16 line, BCD to decimal decoder, Study of BCD to seven-segment decoder driver IC 7447.

Reference books:

- Digital Fundamentals, T. L. Floyd, Pearson Education ,8th Edition (2009)
- Digital Principles and Applications, A. P. Malvino, D. P. Leach and Saha, McGraw-Hill Education (2011), 7th Edition (2011)
- Modern Digital Electronics, R. P. Jain, Fourth Edition, Tata McGraw-Hill Education, 4th Edition (2009).

B. Sc. Part – I Semester -I ELECTRONICS
DSC- PR-I : 2DSC03ELE19: DSC ELECTRONICS LAB-1
Credits: 02 Practical: 60hrs. Marks-25
(Practical: Four lectures of 60 minutes per week per batch)

ANALOG ELECTRONICS LAB (At least 7 experiments)

1. To familiarize with basic electronic components (R, C, L, diodes, transistors), Digital Multimeter, Function Generator, power supplies and Oscilloscope etc.
2. Measurement of Amplitude, Frequency & Phase difference using Oscilloscope
3. Verification of Kirchhoff's Laws
4. Verification of Thevenin`s Theorem
5. Verification of Norton`s Theorem
6. Verification of Superposition Theorem
7. Study of the I-V Characteristics of P-N junction Diodes
8. Study of the a] breakdown Characteristics of Zener Diode
   b] Zener Diode as voltage regulator.
9. Study of Half wave and Full wave rectifier (centre tapped transformer /bridge)

DIGITAL ELECTRONICS LAB (At least 7 experiments)

1. Study of Logic Gates
2. Study of Universal NAND Gate
3. Study of Universal NOR Gate
4. Study of De-Morgans Theorems
5. Study of Half Adder and Full Adder
6. Study of Half and Full Subtractor
7. Study of BCD to seven segment Decoder
8. Study of Encoder
9. Study of Multiplexer (4:1) and Demultiplexer (1:4) using IC

B. Sc. Part – I Semester -I ELECTRONICS

OEC PHS-PR-I: 2OEC03PHS12: Physical Science-I (Domestic Electrical Wiring-I)

Practical: Four lectures of 60 minutes per week per batch
Marks: 25 (Credits 02)

Electrical Wiring-I Lab

1) Study of electrical components
2) Identification of Different wires
3) Introduction of tools, Electrical materials, Symbols and abbreviation
4) Introduction to electrical safety precautions
5) To study meters(DC and AC meters, Multimeter, megger, Energy meter)
6) Verification of equivalent resistances in series and parallel connection
7) Verification of equivalent capacitance in series and parallel combination
8) Study of transformer
9) Verification of ohm's law
10) Verification of Kirchoff's laws(KCL and KVL)
11) To study measurement of voltage, current and power in RL and RLC Circuit
12) Measurement of energy using single phase Energy meter.

Semester -II

B. Sc. Part – I Semester -II ELECTRONICS

DSC-III: 2DSC03ELE21: ANALOG ELECTRONICS-II

Theory: 30 hrs.

Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Analyze output in different operating modes of Bipolar Junction Transistor and Demonstrate the operating principle and output characteristics of Bipolar Junction Transistor

CO2: Explain construction and characteristics of JFETs, MOSFETs and UJT.

CO3: Design biasing circuits for BJT and study different coupling methods used in multistage amplifiers

CO4: Analyze the importance of feedback in amplifiers. Apply the knowledge gained in the design of transistorized circuits and Oscillators.

Unit-1: Bipolar Junction Transistor: **(7 Lectures.)**

BJT: Introduction, Structure, Working of transistor. Transistor configurations: CB, CE and CC configurations, characteristics of transistor in CE and CB configurations, Regions of operation (active, cut off and saturation), Current gains α and β. Relations between α and β, dc load line and Q point (Operating point), Significance of Q-point.

Unit-2: Unipolar Devices: **(7 Lectures.)**

JFET: Construction, working and I-V characteristics (output and transfer), MOSFET: Construction, working and I-V characteristics (output and transfer).UJT: introduction, structure and characteristics.

Unit-3 Amplifiers: **(8 Lectures.)**

Need of transistor Biasing, Transistor biasing and Stabilization circuits- Fixed Bias and Voltage Divider Bias. Thermal runaway, stability and stability factor S., Class A, B, AB and C Amplifiers (Comparative Study on the basis of Q point),

Single stage CE amplifier: Current gain, Voltage gain, Power gain, input and output resistances, frequency Response.

Cascaded Amplifiers: Two stage RC, LC, TC and DC Coupled Amplifiers and their Frequency Responses, Concept of Differential amplifier and its advantages.

Unit-4: Feedback Amplifier and Oscillators: **(8 Lectures.)**

Concept of feedback, negative and positive feedback, advantages of negative feedback (Qualitative only).

Oscillators: Barkhausen criterion for sustained oscillations. Phase shift, Wein Bridge, Hartley and Colpitt's oscillator .UJT as relaxation oscillator.

Reference Books:

- Principles of Electronics - V. K. Mehta, Rohit Mehta, S. Chand Publications, 11th edition (2008)
- Basic Electronics and Linear circuits, N. N. Bhargava, D. C. Kulshreshtha, S. C. Gupta, Tata McGraw Hill , 1st edition (2008)
- A text book of Applied Electronics R. S. Sedha, S. Chand Publication , 1st edition (2008).
- Electronic Devices and Circuits, Allen Mottershead, Goodyear Publishing Company, 1st edition (2011).
- Integrated Electronics, J. Millman & C. C. Halkias, 2nd edition, 2010, TMH.

B. Sc. Part – I Semester -II ELECTRONICS

DSC-IV: 2DSC03ELE22: DIGITAL ELECTRONICS -II

Theory: 30 hrs.

Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Understand, analyze and design various sequential circuits.

CO2: Understanding the working of different shift registers and counters.

CO3: Became able to know various types of analog to digital converters and digital to analog converters.

CO4: Explain and compare the working of multivibrators using special application IC 555. Understanding and designing of multivibrator circuits.

Unit-1: Sequential Circuit: (**7 Lectures**)

Concept of Flip-flop, RS, D and JK Flip-Flops, Concept of Clock, Level and Edge Triggered RS,D, JKFF, Preset and Clear operations. Race-around conditions in JK Flip-Flop, Master- slave JK Flip-Flop, T-Flip-flop

Unit-2: Shift registers and Counters (**8 Lectures**)

Concept of register, Left shift and Right Shift operations, Types of shift registers: SISO, SIPO, PISO & PIPO (only up to 4 bits).

Counters**:** classification of counter**s,** Asynchronous counters: 3 bit ripple counter, Decade Counter. Synchronous Counter: 3 bit and decade synchronous counter. Ring Counter and Johnson Counter, Applications of Counters

Unit-3: Data Converters (**7 Lectures**)

4 bit binary weighted and R-2R ladder network DAC: circuit and working. DAC Characteristics: Accuracy and Resolution. ADC: Flash, Counter type, successive approximation ADC, ADC Characteristics

Unit-4: Study of Timer IC 555 (**8 Lectures**)

IC555 timer**:** Introduction, Block diagram, Astable, Monostable and Bistable multivibrator circuits. Applications of IC555: PWM, square wave generator and FSK

Reference books:

- Digital design, Morris Mano, Prentice Hall of India, 4th Edition (2007).
- Digital Fundamentals, T. L. Floyd, Pearson Education , 8th Edition (2009)
- Digital Principles and Applications, A.P. Malvino, D. P. Leach and Saha, McGraw , 7th
- Edition (2011)
- Modern Digital Electronics, R.P. Jain, Tata McGraw-Hill Education, 4th Edition (2009).

B. Sc. Part – I Semester -II ELECTRONICS
DSC- PR-I : 2DSC03ELE29: DSC ELECTRONICS LAB-2
Credits: 02 Practical: 60hrs. Marks-25
(Practical: Four lectures of 60 minutes per week per batch)

ANALOG ELECTRONICS LAB (At least 7 experiments)

1. Study of I-V Characteristics of JFET
2. Study of Input, Output and transfer Characteristics of CE configuration of BJT
3. Study of Voltage divider bias circuit for CE mode
4. Transistor as a switch
5. Design of a Single Stage CE amplifier of given gain
6. Study of the RC Phase Shift Oscillator
7. Study of the Wein Bridge Oscillator
8. Study the Colpitt`s oscillator
9. Study the Hartley oscillator

DIGITAL ELECTRONICS LAB (At least 7 experiments)

1. Building and testing of RS Flip-Flop using NAND/NOR gate.
2. Building and testing D and JK Flip-Flop using IC
3. Construction and study of Shift Register (serial-in and serial-out) using D-type/ JK Flip-Flop ICs
4. Study of 3-bit Asynchronous counter
5. Study of 3-bit Flash ADC
6. Design and study of 4 bit digital to analog converter using R-2R ladder network.
7. Design and study of an Astable Multivibrator using IC 555 Timer.
8. Design and study of a Monostable Multivibrator using IC 555 Timer.
9. Design and study of a Bistable Multivibrator using IC 555 Timer.

B. Sc. Part – I Semester -II ELECTRONICS

OEC PHS-PR-II: 2OEC03PHS22: Physical Science-II (Domestic Electrical Wiring-II)

Credits: 02 Practical: 60hrs. Marks-25

(Practical: Four lectures of 60 minutes per week per batch)

Electrical Wiring-II Lab

1. Measurement of resistance to earth using an electrical equipment (Megger)
2. To make different joints on wire (straight joint, T-joint, Britannia joint)
3. To Study types of switches and holders
4. To wire up a circuit with one lamp controlled by one switch
5. To wire up a circuit with two lamp controlled by one switch
6. To wire up a circuit with two lamp controlled by two switch
7. To wire up a circuit to control three lamps by using one SP switch
8. To wire up a circuit to control one lamp from two place using two way switches (staircase wiring)
9. To study Godown wiring
10. To study fuses, MCBs and importance of Earthing
11. To study circuit of SMPS
12. To study circuit of UPS

Question Paper Format:

Seat No.	

Ques. paper code	

VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

B.Sc. Part- I (Electronics) (Semester-I) Examination……..
Course Code and Name: DSC03ELE11: Analog Electronics-I

Day: Time: 2 hours
Date: --/--/---- Marks : 40

Instructions:
1) All the questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagrams wherever necessary.
4) Use of log table/calculator is allowed.

Q. 1. Select correct alternative (One mark each): [8]

i) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

ii) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

iii) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

iv) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

v) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

vi) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

vii) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

viii) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

Q.2. Attempt any TWO (Eight marks each): [16]

i) Xyzabcdefghijklmnop.

ii) Xyzabcdefghijklmnop.

iii) Xyzabcdefghijklmnop.

Q.3. Attempt any FOUR (Four marks each): **[16]**

i) Xyzabcdefghijklmnop.

ii) Xyzabcdefghijklmnop.

iii) Xyzabcdefghijklmnop.

iv) Xyzabcdefghijklmnop.

v) Xyzabcdefghijklmnop.

vi) Xyzabcdefghijklmnop.

Evaluation Pattern for practical Course:

Marks Distribution of Practical (LAB) course: Total Marks: 100

Course	Experimental work	Journal assessment	Seminar/ Mini Project	Total Marks
Major	20	05	-	25
OE	20	05	-	25

Equivalence of Courses:

B.Sc. Part I (Semester I and II)

Semester	Old Course			Course in NEP Phase-II		
	Course code	**Course Name**	**Credits**	**Course code**	**Course Name**	**Credits**
I	DSC-1005A1	Analog Electronics-I	**2**	2DSC03ELE11	Analog Electronics-I	**2**
	DSC-1005A2	Digital Electronics-I	**2**	2DSC03ELE12	Digital Electronics-I	**2**
II	DSC-1005B1	Analog Electronics-II	**2**	2DSC03ELE21	Analog Electronics-II	**2**
	DSC-1005B2	Digital Electronics-II	**2**	2DSC03ELE22	Digital Electronics-II	**2**
	DSC-1005A & DSC-1005B	Electronics Lab(I)	**4**	2DSC03ELE19	DSC Electronics Lab-1	**2**
				2DSC03ELE29	DSC Electronics Lab-2	**2**