VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS),

B.Sc.-I ELECTRONICS

Semester-I & II

CBCS Syllabus to be implemented from June 2021 Onwards.

VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)
B. Sc. -I Electronics Semester-I & II
CBCS Syllabus to be implemented from June 2021 Onwards.

1. **TITLE: B. Sc. Electronics**
2. **YEAR OF IMPLEMENTATION:** Syllabus will be implemented from June 2021 onwards.
3. **DURATION:** B.Sc. in Electronics Part- I The duration of course shall be one year and two semesters.
4. **PATTERN:** Pattern of examination will be semester.
5. **STRUCTURE OF COURSE:**

STRUCTURE OF COURSE

Sr. No.	Paper	Name of Paper	Marks
Electronics (Semester I)			
1	DSC-1005A	Analog Electronics-I	40 (Theory)
2		Digital Electronics-I	40 (Theory)
Electronics(Semester II)			
3	DSC-5B	Analog Electronics-II	40 (Theory)
4		Digital Electronics-II	40 (Theory)
Practical (Annual)			
5	Practical Paper-I	Electronics Practical Paper Based on DSC-5A and DSC-5B	50 (Practical)

6. **EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS (FOR REVISED SYLLABUS)**

Sr. No.	Title of old paper	Sr. No.	Title of New paper
SEMESTER I			
1	PAPER -I Network Analysis and Analog Electronics	1	ANALOG ELECTRONICS-I AND DIGITAL ELECTRONICS-I
SEMESTER – II			
2	PAPER-II LINEAR AND DIGITAL INTEGRATED CIRCUITS	3	ANALOG ELECTRONICS-II AND DIGITAL ELECTRONICS-II
PRACTICAL (ANNUAL PATTERN)			
3	Electronics Science Practical Paper-I	5	Electronics Science Practical Paper-II

CBCS SYLLABUS WITH EFFECT FROM JUNE 2021

B. Sc. Part – I Semester – I

ELECTRONICS

Part –I

DSC-1005A: ANALOG ELECTRONICS-I AND DIGITAL ELECTRONICS-I

Theory: 30 hrs. (37 lectures of 48 minutes)

Marks-40 **(Credits: 02)**

PART-I ANALOG ELECTRONICS-I

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 designing of rectifier, filter and voltage regulator circuits.

Unit -1: Basic Circuit Elements: **(9 Lectures.)**

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: **(10 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: **(9 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 andit's applications.

Unit-4: DC Power Supply: **(10 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 (2007)
- Basic Electronics and Linear circuits, N. N. Bhargava, D. C. Kulshreshtha, S.C. Gupta, Tata McGraw Hill (2008)
- A text book of Applied Electronics R. S. Sedha, S. Chand Publication.
- Electronic Devices and Circuits, Allen Mottershead, Goodyear Publishing Company.

CBCS SYLLABUS WITH EFFECT FROM JUNE 2021

B. Sc. Part – I Semester – I

PART II: DIGITAL ELECTRONICS-I

Theory: 30 hrs. (37 lectures of 48 minutes)

Marks-40 (**Credits: 02**)

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: **(10 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: **(9 Lectures)**

Study oflogic Gates: OR, AND, NOT, NOR, NAND,XOR, XNOR, Universal Gates, Boolean identities and Law's, fundamental theorems of Booleanalgebra.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 **(10 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. Demultiplexer; - 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 (2013)
- Digital Principles and Applications, A. P. Malvino, D. P. Leach and Saha, McGraw (2011)
- Modern Digital Electronics, R. P. Jain, Fourth Edition, Tata McGraw-Hill Education.

CBCS SYLLABUS WITH EFFECT FROM JUNE 2021
B. Sc. Part – I Semester – II
DSC-1005B: ANALOG ELECTRONICS-II AND DIGITAL ELECTRONICS-II

PART I-ANALOG ELECTRONICS-II

Theory: 30 hrs. (37 lectures of 48 minutes)
Marks-40 (**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: **(10 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: **(8 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: **(12 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: **(10 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:

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

CBCS SYLLABUS WITH EFFECT FROM JUNE 2021

B. Sc. Part – I Semester – II

PAPER-IV

DSC-1005B : ANALOG ELECTRONICS AND DIGITAL ELECTRONICS-II

PART II- DIGITAL ELECTRONICS-II

Theory: 30 hrs. (37 lectures of 48 minutes)

Marks-40 **(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: **(10 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 **(8Lectures)**

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 counters, 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 **(9 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 IC555 **(10 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, 3rd Edition.
- Digital Fundamentals, T. L. Floyd, Pearson Education (2013)
- Digital Principles and Applications, A.P. Malvino, D. P. Leach and Saha, McGraw (2011)

• Modern Digital Electronics, R.P. Jain, Tata McGraw-Hill Education, 4th Edition.

CBCS SYLLABUS WITH EFFECT FROM JUNE 2021

B. Sc. Part – I Semester – I

PRACTICAL PAPER – I

(Maximum Marks: 50) (Credits 02)

Based on DSC-1005A and DSC-1005B

Practical: Four lectures of 48 minutes (3.2 hrs.) per week per batch.

ELECTRONICS LAB

Semester- I

Group- A (At least 10 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 ofThevenin`s Theorem.
4. Verification of Norton`s Theorem.
5. Verification of Superposition Theorem.
6. Study of the I-V Characteristics of P-N junction Diodes.
7. Study of the breakdown Characteristics of Zener Diode.
8. Study of Half wave and Full wave rectifier (centre tapped transformer /bridge)
9. Study of Logic Gates.
10. Study of Universal Gates using fundamental gates.
11. Study of De-Morgans Theorems.
12. Study of Half Adder and Full Adder
13. Study of Half and Full Subtractor
14. Study of BCD to seven segment Decoder.
15. Study of Multiplexer (4:1) and Demultiplexer (1:4)

Any 02 from the followings Computer Simulations

1. Study the effect of (a) C- filter and (b) Zener regulator on the output of FWR
2. Verification of the Norton and Thevenin's Theorems.
3. Study any Boolean expression using K-map.

CBCS SYLLABUS WITH EFFECT FROM JUNE 2021

B. Sc. Part – I Semester – I

PRACTICAL PAPER – I

(Maximum Marks: 50) (Credits 02)

Semester- II

Group- B (At least 10 experiments)

1. Study of I-V Characteristics of JFET.
2. Study of Input and Output Characteristics of CE configuration of BJT
3. Study of Voltage divider bias circuit for CE mode.
4. Design of a Single Stage CE amplifier of given gain
5. Study of the RC Phase Shift / Wein Bridge Oscillator.
6. Study the Colpitt`s oscillator /Hartley oscillator.
7. Building and testing of RS Flip-Flop using NAND/NOR gate.
8. Building and testing D and JK Flip-Flop using IC
9. Construction and study of Shift Register (serial-in and serial-out) using D-type/ JK Flip-Flop ICs
10. Design and study of 4 bit digital to analog converter using R-2R ladder network.
11. Design and study of an Astable Multivibrator using IC 555 Timer.
12. Design and study of a Monostable Multivibrator using IC 555 Timer.
13. Design and study of a Bistable Multivibrator using IC 555 Timer.

SPICE/MULTISIM simulations for electronic circuits and devices

AT LEAST 02 EXPERIMENTS FROM THE FOLLOWING

Any 02 from the followings computer simulations

1. Design clocked SR and JK Flip-Flops using Gates.
2. Design 4-bit asynchronous counter using Flip-Flop ICs.
3. Design a Counter type ADC

Structure of B. Sc. I (Sem I & II) (Electronics)

B. Sc. I	Subject (Core Course)	No. of Lect.	Hours	Credit
Semester-I	DSC-1005A :Analog Electronics-I and Digital Electronics-I	5	4	4
	ELECTRONICS LAB(I): DSC-1005A: Analog Electronics-I and Digital Electronics-I	4	3.2	2
Semester-II	DSC-1005B Analog Electronics-II and Digital Electronics-II	5	4	4
	ELECTRONICS LAB(II)- DSC-1005B: Analog Electronics-II and Digital Electronics-II	4	3.2	2

Nature of Question Paper

Vivekanand College, Kolhapur (Autonomous)
B.Sc. Part – I Electronics Semester I Examination ____
Course Code and Name: DSC 1005A: Analog Electronic-I

Day: **Time:**
Date: **Total Marks: 35**

Instructions: 1) All the questions are compulsory.
2). Figures to the right indicate full marks.
3) Draw neat labeled diagrams wherever necessary.

Section-I

Q.1) A) Select correct Alternatives from the following (05)

i) ----------

a) b) c) d)

ii) ----------

a) b) c) d)

iii) ----------

a) b) c) d)

iv) ----------

a) b) c) d)

v) ----------

a) b) c) d)

Q.1) B) Fill in the blanks (02)

i) ----------

ii) ----------

Q.2) Attempt Any Two (Eight Marks Each) (16)

i) ----------

ii) ----------

iii) ----------

Q.3) Attempt Any Three (Four Marks Each) (12)

i) ----------

ii) ----------

iii) ----------

iv) ----------

v) ----------

Evaluation Pattern:

Sem ester	Course Codes	End Semester Examination Marks	CIE/Internal assessment Marks and Pattern	Practical Examination Marks	Total Marks
I	DSC-1005A1	35	15 (Test)		50
	DSC-1005A2	35	15 (Test)		50
II	DSC-1005B1	35	15 (Test)		50
	DSC-1005B2	35	15 (Test)		50
	DSC-1005A and DSC-1005B			50 (Annually)	50

Mark Distribution of Practical (LAB) Course: Total Marks 50

Exam types	Experimental Groups		Journal assessment	Total Marks
	A	B		
Maximum Marks	22	22	06	50