Estd. 1962 "A++" Accredited by NAAC(2021) With CGPA 3.52	**SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA** PHONE : EPABX – 2609000, www.unishivaji.ac.in, **bos@unishivaji.ac.in** **शिवाजी विद्यापीठ, कोल्हापूर - ४१६००४,महाराष्ट्र** दूरध्वनी - ईपीएबीएक्स - २६०९०००, अभ्यासमंडळे विभाग दुरध्वनी विभाग २३१–२६०९०९३/९४	

SU/BOS/Science/ 70 **Date: 16 / 11 / 2022**

To,
The Principal,
All Affiliated Concerned Science Colleges/Institutions
Shivaji University, Kolhapur.

Subject :- Regarding syllabi of M. Sc. & B. Sc. Part- I (NEP-2020) degree programme under the Faculty of Science and Technology as per National Education Policy 2020 .

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the syllabi and Nature of question paper of **M. Sc. & B. Sc. Part- I** under the Faculty of Science and Technology **as per National Education Policy 2020 .**

Sr.No.	Faculty of Science and Technology	Programme/ Course
1	Electronics	M. Sc. Part -I Embedded Technology
		B. Sc. Part -I Electronics

This syllabi and nature of question paper shall be implemented from the Academic Year **2022-2023** onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in (students Online Syllabus)

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dy Registrar

Copy to:

1	The Dean, Faculty of Science & Technology	7	Appointment Section
2	Director, Board of Examinations and Evaluation	8	P.G.Seminar Section
3	The Chairman, Respective Board of Studies	9	Computer Centre (I.T.)
4	B.Sc. Exam	10	Affiliation Section (U.G.)
5	Eligibility Section	11	Affiliation Section (P.G.)
6	O.E. I Section	12	P.G.Admission Section

SHIVAJI UNIVERSITY, KOLHAPUR.

Accredited By NAAC with 'A++' Grade

CHOICE BASED CREDIT SYSTEM WITH
MULTIPLE ENTRY AND MULTIPLE ENTRY OPTIONS
UNDER NEP-2020

Syllabus For

B.Sc. Part - I Electronics

SEMESTER I AND II

(Syllabus to be implemented from 2022 onwards

Choice Based Credit System With MEME Options

B. Sc. - I (2018-19)

Semester-I Electronics Paper- I

DSC- A9 NETWORK ANALYSIS AND ANALOG ELECTRONICS

Credits: 02 (Marks 50) Hours: 30 (37.5 Lectures of 48 min)

Unit	Contents	Hours Allotted
1	**(A) Circuit Analysis**: Introduction to Active & passive components, color code, Study of Transformer. Concept of Voltage and Current Sources. Kirchhoff's Current Law, Kirchhoff's Voltage Law. Mesh Analysis. Node Analysis. Star and Delta networks, Star-Delta Conversion. Principal of Duality. **(B)** Superposition Theorem. Thevenin's Theorem. Norton's Theorem. Maximum Power Transfer Theorem. **(C)** Two Port Networks: h, y and z parameters and their conversion.	**15**
2	**(A) Junction Diode and Its applications:** PN junction diode constructions, Formation of Depletion Layer, Forward & Reverse biasing, I-V characteristics. Idea of static and dynamic resistance, Reverse saturation current, Zener and avalanche breakdown, Zenerdiode, Photo diode. Light Emitting Diode (LED): construction, working, 7-segment display, their applications. **(B) Rectifiers**- Half wave rectifier, Full wave rectifiers (center tapped and bridge), circuit diagrams, working and waveforms, ripple factor and efficiency. **Filter:** Shunt capacitor filter, its role in power supply, Output waveform and working. **(C) Regulation**- Line and load regulation, Zener diode as voltage regulator, and explanation for load and line regulation.	**15**
	TOTAL	**30**

Reference Books:

- A Textbook of Applied Electronics : R. S. Sedha , S. Chand Publications
- Electronic Devices and Circuits: Allen Mottershed
- Basic Electronics and linear circuits : Bhargava- Gupta , TMH
- Electric Circuits, S. A. Nasar, Schaum's outline series, Tata McGraw Hill (2004)
- Electronic Devices and Circuits, David A. Bell, 5th Edition 2015, Oxford University Press.
- Electronic Circuits: Discrete and Integrated, D.L. Schilling and C. Belove, TMH
- Electrical Circuit Analysis, Mahadevan and Chitra, PHI Learning
- Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn., Oxford University Press.
- J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)

Semester-I
Electronics Paper- II
DSC- A10 DIGITAL INTEGRATED CIRCUITS

Credits: 02 (Marks 50) Hours: 30 (37.5 Lectures of 48 min)

Unit	Contents	Hours Allotted
1	**(A) Number System and Codes**: Decimal, Binary, Octal and Hexadecimal number systems, base conversions. Representation of signed and unsigned numbers, BCD, ASCII codes. Binary and Hexadecimal arithmetic; Addition, subtraction by 2’s complement method. **(B) Logic Gates and Boolean algebra**: Truth Tables of OR, AND, NOT, NOR, NAND, XOR, XNOR, Universal Gates, Basic postulates and fundamental theorems of Boolean algebra. De-Morgan’s Theorems	**15**
2	**(A) Combinational Logic Analysis and Design**: Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh map minimization up to 4 variables for SOP). **(B) Arithmetic Circuits**: Binary Addition. Half and Full Adder. Half and Full Subtractor, 4-bit binary Adder/Subtractor ALU. **(C) Data processing circuits**: Multiplexers, De-multiplexers, Decoders, Encoders.	**15**
	TOTAL	**30**

Reference Books:

- Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011, Tata McGraw
- Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.
- Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
- Digital Systems: Principles & Applications, R.J.Tocci, N.S.Widmer, 2001, PHI
- Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)
- R. L. Tokheim, Digital Principles, Schaum’s Outline Series, Tata McGraw- Hill (1994)

Semester- II

Electronics Paper- III

DSC- B9 ANALOG ELECTRONIC CIRCUITS

Credits: 02 (Marks 50) Hours: 30 (37.5 Lectures of 48 min)

Unit	Contents	Hours Allotted
1	**(A) Bipolar Junction Transistor**: Introduction and working , CE, CB, CC configurations, Characteristics of CB and CE configurations, Regions of operation (active, cut off and saturation), Current gains α andβ. Relations between α and β. dc load line and Q point **(B) Amplifiers**: Transistor biasing and Stabilization circuits- Fixed Bias and Voltage Divider Bias. Thermal runaway, stability and stability factor S. Transistor as Two port network, DC analysis of CE amplifier: Input, output Impedance, Current & voltage gains. Class A, B and C Amplifiers **(C) Cascaded Amplifiers**: Coupling Methods (RC, DC & TC) Two stage RC Coupled Amplifier and its Frequency Response.	**15**
2	**(A) Feedback in Amplifiers**: Concept of feedback, negative and positive feedback, advantages of negative feedback (Qualitative only). **(B) Sinusoidal Oscillators**: Barkhausen criterion for sustained oscillations. Colpitt's and Phase shift oscillator: Determination of Frequency and Condition of oscillation. Crystal Oscillator. **(C) Unipolar Devices**: JFET. Construction, working and I-V characteristics (output and transfer), Pinch-off voltage. UJT: Basic construction, working, equivalent circuit and I-V characteristics.	**15**
	TOTAL	**30**

Reference Books:

- A Textbook of Applied Electronics : R. S. Sedha , S. Chand Publications
- Electronic Devices and Circuits: Allen Mottershed
- Basic Electronics and linear circuits : Bhargava- Gupta , TMH
- Electric Circuits, S. A. Nasar, Schaum's outline series, Tata McGraw Hill (2004)
- Electronic Devices and Circuits, David A. Bell, 5th Edition 2015, Oxford University Press.
- Electronic Circuits: Discrete and Integrated, D.L. Schilling and C. Belove, TMH
- J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)

Semester- II

Electronics Paper- IV

DSC- B10 LINEAR AND DIGITAL INTEGRATED CIRCUITS

Credits: 02 (Marks 50) Hours:30 (37.5 Lectures of 48 min)

Unit	Contents	Hours Allotted
1	**(A) Sequential Circuits**: SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered)Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. Master-slave JK Flip-Flop. **(B) Shift registers:** Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits). **(C) Counters (4 bits)**:Ring Counter. Asynchronous counters, Decade Counter. Synchronous Counter. UP/DOWN Counter. **(D) Data Conversion**: **DAC** : performance characteristics,4 bit binary weighted and R-2R circuit and working. Accuracy and Resolution. **ADC** :performance characteristics, successive approximation ADC, Dual slope ADC (Mention of relevant ICs for all).	15
2	**(A) Operational Amplifiers (Black box approach):** Characteristics of an Ideal and Practical Operational Amplifier (IC 741), Open and closed loop configuration, Frequency Response. CMRR. Slew Rate and concept of Virtual Ground. **(B) Applications of Op-Amps**: Inverting and non-inverting amplifiers, Summing and Difference Amplifier, Differentiator, Integrator, Wein bridge oscillator, Comparator and Zero-crossing detector **(C) Clock and Timer (IC 555)**: Introduction, Block diagram of IC 555, Astable and Monostable multivibrator circuits.	**15**
	TOTAL	**30**

Reference Books:

- Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011, Tata McGraw
- Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.
- Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
- Digital Systems: Principles & Applications, R.J.Tocci, N.S.Widmer, 2001, PHI
- Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)
- R. L. Tokheim, Digital Principles, Schaum’s Outline Series, Tata McGraw- Hill (1994)

ELECTRONICS LAB

Semester- I

Group- A (At least 10 experiments)

Credits: 02 Hours: 30

Any 08 from the followings Hardware circuits

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. Study of the I-V Characteristics of (a) p-n junction Diode, and (b) Zener diode.
4. Study of Full wave rectifier.
5. To verify the Thevenin and Superposition Theorems
6. Study of Logic Gates.
7. Study of Universal Gates
8. Study of De-Morgans Theorems.
9. Half Adder and Subtractor
10. Full Adder and Subtractor (using 7483 & 7404)
11. Study of Encoder & seven segment Decoder.
12. 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. To verify the Norton and Maximum power Transfer Theorems.
3. Design and analyze the series and parallel LCR circuits
4. Study any Boolean expression using K-map.

Semester- II

Group- B(At least 10 experiments)

Credits: 02 Hours: 30

Any 08 from the followings Hardware circuits

1. To build and test Flip-Flop (RS, Clocked RS, D).

2.To make a Shift Register (serial-in and serial-out) using D-type/JK Flip-Flop ICs

3.Op-Amp as adder and Subtractor

4. Design the inverting and non-inverting amplifier using an Op-Amp of given gain.

5 . To investigate the use of an op-amp as an Integrator & Differentiator.

6. To design a Wien bridge oscillator for given frequency using an op-amp.

7. Design a digital to analog converter (DAC) of given specifications.

8. To design an Astable Multivibrator of given specification using IC 555 Timer.

9. To design a Monostable Multivibrator of given specification using IC 555 Timer.

10. Design a Colpitt's oscillator of given frequency.

11. Study of the output and transfer I-V characteristics of common source JFET

12. Design of a Single Stage CE amplifier of given gain & study frequency response.

Any 02 from the followings computer simulations

1. To study the zero-crossing detector and comparator.

2. Design clocked SR and JK Flip-Flop`s using Gates.

3. Design 4-bit asynchronous counter using Flip-Flop ICs.

4. Design a SAR type ADC of given specifications.

EQUIVALENCE IN ACCORDANCE WITH TITLIES AND CONTENTS OF PAPERS (FOR REVISED SYLLABUS UNDER CBCS PATTERN 2022 ONWORDS)

Sr. No.	Title of old paper	Sr. No.	Title of New paper
SEMESTER I			
1	Network Analysis And Analog Electronics	1	**DSC- A9** Network Analysis And Analog Electronics
2	Digital Integrated Circuit	2	**DSC- A10** Digital Integrated Circuit
SEMESTER – II			
3	Analog Electronics Circuits	3	**DSC- B9** Analog Electronics Circuits
4	Linear & Digital Electronics Circuits	4	**DSC- B10** Linear & Digital Electronics Circuits
ANNUAL PATTERN			
5	Electronics Practical I & II	5	Electronics Practical I & II