॥ सा विद्या या विमुक्तये ॥

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड
"ज्ञानतीर्थ" परिसर, विष्णुपुरी, नांदेड - ४३१६०६ (महाराष्ट्र)
SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED
"Dnyanteerth", Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)
Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

25
1994 - 2019
SILVER JUBILEE YEAR

ACADEMIC (1-BOARD OF STUDIES) SECTION

संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील प्रथम वर्षाचे **CBCS Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९–२० पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, **दिनांक ०८ जून २०१९ रोजी संपन्न झालेल्या ४४व्या मा. विद्या परिषद बैठकीतील ऐनवेळचा विषय क्र.११/४४–२०१९** च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या **संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील प्रथम वर्षाचे** खालील विषयांचे **C.B.C.S. (Choice Based Credit System) Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९–२० पासून लागू करण्यात येत आहेत.

1. Agricultural Microbiology
2. Agrochemicals & Fertilizers
3. Analytical Chemistry
4. B.C.A.
5. B.Voc. (Food Processing, Preservation and Storage)
6. B.Voc. (Web Printing Technology)
7. Biochemistry
8. Bioinformatics
9. Biophysics
10. Biotechnology (Vocational)
11. Biotechonology
12. Botany
13. Chemistry
14. Computer Application (Optional)
15. Computer Science (Optional)
16. Computer Science
17. Dairy Science
18. Dyes and Drugs
19. Electronics
20. Environmental Science
21. Fishery Science
22. Food Science
23. Geology
24. Horticulture
25. Industrial Chemistry
26. Information Technology (Optional)
27. Mathematics
28. Microbiology
29. Network Technology
30. Physics
31. Software Engineering
32. Statistics
33. Zoology

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.

जा.क्र.: शैक्षणिक–०१/परिपत्रक/पदवी–सीबीसीएस अभ्यासक्रम/
२०१९–२०/२९२

दिनांक : ०३.०७.२०१९.

स्वाक्षरित/–
उपकुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :

१) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

B. Sc. FY Syllabus structure
CBCS Pattern effective from June 2019
Subject: Electronics

Preamble:

Electronic Science is a base for core technologies of 21st century and can be a route to many different carrier paths. The boundaries of Electronic Science extends from basic physics, chemistry, mathematics, statistics, computer science, to applied subjects like industrial automation, telecommunications and biotechnology etc. In true sense it is a multidisciplinary subject. Quality assurance in higher education is chief motif of Accreditation. In achieving recognition, the institution or program of study is committed and open to external review to meet certain minimum specified standards. The major emphasis of this accreditation process is to measure the outcomes of the program that is being accredited. Program outcomes are essentially a range of skills and knowledge that a student will have at the time of graduation from the program.

The B.Sc. first year Electronics course is designed such that any HSC (XII th Science) passed student can choose Electronics as one of the optional subject for B.Sc. course. The First Year course is oriented to introduce learners to fundamental concepts of electronics, basic components, semiconductor devices, digital electronics, working and uses of some indispensable laboratory instruments.

B.Sc. FY Course Structure

Semester	Paper No.	Name of the Course	Periods/ Week	Total Periods	Internal Evaluation (CA)	University Evaluation (UA)ESE	Total Marks	Credits
I	CCEI-A	Basic Electronics and Network Analysis (P-I)	03	45	10	40	50	2
	CCEI-B	Basic Digital Electronics (P-II)	03	45	10	40	50	2
II	CCEII-A	Semiconductor Devices and Electronic Instruments (P-III)	03	45	10	40	50	2
	CCEII-B	Digital Logic Circuits (P-IV)	03	45	10	40	50	2
	CCEPI	Practicals based on CCEI(A&B) & CCEII(A&B)	03	90	20	80	100	4

Total Credits of Semester I and II = 12

CCEI-A (Paper-I): Basic Electronics and Network Analysis
Periods :45   Max. Marks : 50   Credits : 2

Course Pre- requisite: HSC (XII th Science) pass

Course Objectives:
1. To introduce to basic electronic components and their properties.
2. To understand various network theorems.
3. To introduce to AC fundamentals.

Course Outcome : After completion of this course students will be -

1. able to identify variety of electronic components viz. resistors, inductors capacitors and their types & uses.
2. able to understand I-V characteristics of basic electronic components.
3. able to apply network theorems to simplify given network.
4. able to distinguish between DC/AC sources, relate various characteristics of sinusoidal voltage and understand use of resonant circuits.

Unit I: Basic Circuit Analysis   **(10 periods)**

Ohm's law, KCL, KVL, sign conventions for IR drops and EMFs, <u>series circuits</u>:- proportional voltage formula, voltage divider, open and short in series circuit, <u>parallel circuits</u>:- proportional current formula, open and short in parallel circuit.   Book - 1

Unit II: Network Theorems   **(10 periods)**

Ideal constant-voltage source, ideal constant-current source, super position theorem, Thevenin theorem, Norton theorem, maximum power transfer theorem.   Book – 2

Unit III: Phasor Algebra   **(10 periods)**

Symbolic notation, significance of operator j, conjugate complex number, various forms of vector representations, arithmetic operations of vectors, powers and roots of vector quantity.   Book-2

Unit IV: AC Fundamentals   **(15 periods)**

Types of ac waveforms, cycle, time period, frequency, amplitude of ac voltage/current, characteristics of sine wave, different values of sinusoidal voltage/current, phase of ac, phase difference, vector representation of an ac quantity, R-L circuit, R-C circuit, series R-L-C circuit, resonance in series R-L-C circuit, resonance curve, bandwidth and Q-factor of series resonant circuit, parallel resonance, resonance curve, Q-factor, band width of parallel resonant circuit. (Book- 1)

Transformer and its working. (Book-2)

Text Books:

1. Basic Electronics Solid State(Multicolor illustrative edition), by B. L. Theraja, S. Chand & Company Ltd, New Delhi
2. A Textbook of Electrical Technology, by B.L. Theraja, Vol.1, Nirja Construction & Development Company.

Recommended Books/References:

1. A Text book of Applied Electronics by R. S. Sedha, New reprint of Revised Edition 2013, S. Chand & Company Ltd, New Delhi
2. Principles of Electronics (Multicolour revised edition), by V.K. Mehta, Rohit Mehta, S. Chand & Company, Ram Nagar, New Delhi.
3. Basic Electronics (eighth edition), by Bernard Grob, Pub.: Glencoe Mc Graw Hill, Pub. Company.
4. Android based App – 'Electronics' and similar
5. https://www.falstad.com/circuit/e-index.html (for circuit simulator applets)

Periods :45   **Max. Marks : 50**   **Credits : 2**

Course Pre- requisite: HSC (XII th Science) pass

Course Objectives:
1. To introduce to fundamental concepts of Digital Electronics & logic circuits.
2. To learn various number systems used in Digital Electronics.
3. To understand some identities & laws of Boolean algebra.
4. To build the skill of designing, simplification & implementation of simple combinational circuits.
5. To introduce digital arithmetic circuits.

Course Outcome : After completion of this course students will be -
1. able to distinguish between analogue & digital signal/data.
2. able to draw logic circuit for a given Boolean expression.
3. able to analyse, transform, minimize Boolean expression & implement it.

Unit – I   Number Systems and Codes   (15 periods)

Decimal, Binary Octal and Hexadecimal number systems, inter conversions of number systems, Binary arithmetic (addition, subtraction, multiplication, division), 1's compliment, 2's compliment, binary subtraction using 1's and 2's compliments, Codes: BCD, Gray code, Conversion of BCD to Binary, Binary to Gray code and vice versa, ASCII code.

Unit – II   Logic Gates   (10 periods)

Positive logic, Negative logic, Definition, symbol and truth table of NOT, OR, AND, NOR, EX-OR, EX-NOR gates. De-Morgan's theorem, Universal properties of NAND and NOR gates, bubbled OR gate, bubbled AND gate, gate propagation delay time, power dissipation.

Unit – III   Boolean Algebra and K-Map   (10 periods)

Boolean operations, logic expressions, rules and laws of Boolean algebra, Simplification of Boolean expression, SOP & POS form of Boolean expressions for logic network minterms, maxterms, Simplification of Boolean expression using K-map up to 4 variables for SOP.

Unit – IV   Arithmetic Circuits   (10 periods)

Half Adder, full adder, realization of half and full adder using gates, parallel binary adder, half and full subtractor.

Text Books:

1. Digital Principles & Applications by A.P. Malvino & D.P. Leach (TMH, New Delhi)
2. Modern Digital Electronics by R.P. Jain, Tata McGraw Hill Publication.
3. Digital Fundamentals by Floyd, Pearson Education.

Recommended Books/References:

1. Digital Electronics: W. H. Gothman Prentice Hall , India.
2. Fundamentals of Digital Circuits by A. Anand Kumar, 3rd Edn, PHI Learninig Pvt. Ltd. Delhi.
3. Digital Electronics with practical approach –G N Shinde, Shivani Pub. Nanded.
4. https://www.falstad.com/circuit/e-index.html (for circuit simulator applets).

CCEII-A (Paper-III): Semiconductor Devices and Electronic Instruments
Periods :45   **Max. Marks : 50**   **Credits : 2**

Course Pre- requisite: (Paper-I): Basic Electronics and Network Analysis

Course Objectives:
1. To understand types of semiconductors, their properties & operations
2. To understand characteristics of transistors.
3. To introduce to DC power supply & its components.
4. To study working principles of multi-meter & CRO.

Course Outcome : After completion of this course students will be -

1. able to understand I-V characteristics of various semiconductor diodes.
2. able to understand input/output characteristics of transistor.
3. able to distinguish between unregulated & regulated power supply and its significance.
4. able to demonstrate the use of multi-meter & CRO.

Unit – I : Semiconductor Diodes: **(10 periods)**

Construction, working and V-I characteristics of P-N Junction diode, effect of temperature on

barrier potential, Zener diode, LED, photodiode, varactor diode.   Book-1

Unit – II : Transistors :   **(15 periods)**

Construction of NPN and PNP transistor, F-F, R-R-, F-R biasing, α_{dc} and β_{dc} of a transistor

and their relationship, C-E transistor characteristics: collector curves and base curves.

Construction, working and characteristics of UJT, JFET, MOSFET.   Book-2

Unit – III : Rectifiers and Voltage Regulators   **(10 periods)**

Block diagram of a power supply, half and full wave rectifiers, bridge rectifier, shunt capacitor

filter, load regulation, and line regulation, zener shunt regulator.   Book-1

Unit – IV: CRO and Multimeter: **(10 periods)**

Multimeter, applications of multimeter, sensitivity of galvanometer, conversion of galvanometer

into voltmeter and into ammeter. Cathode ray oscilloscope, cathode ray tube, deflection sensitivity

of CRT, applying signal across vertical plates, display signal waveforms on CRO, signal pattern on

screen, various controls of CRO, applications of CRO   (Book-1)

Text Books:

1. Principles of electronics by V.K. Mehta & Rohit Mehta (Multicolour revised edition) S. Chand & Company.

2. Electronic principles, A.P. Malvino, Tata Mc. Graw Hill, Pub. Co.Ltd., (Third edition).

Recommended Books/References:

1. Basic electronics (solid state) by B.L. Theraja, (multicolour illustrative edition), , S.Chand & Company Ltd., Ram Nagar, New Delhi.

2. Basic electronics by Bernard Grob, Glencoe ,(8th Edn) Mc. Graw Hill Pub.,Company.

3. Android based App – 'Electronics' and similar

4. https://www.falstad.com/circuit/e-index.html (for circuit simulator applets)

CCEII-B (Paper-IV): Digital Logic Circuits
Periods :45   Max. Marks : 50   Credits : 2

Course Pre- requisite: (Paper-II): Basic Digital Electronics

Course Objectives:
1. To introduce to data processing logic circuits.
2. To introduce to various Flip-Flops and their uses in sequential logic circuits.
3. To understand working of counters, registers, ADC and DAC

Course Outcome : After completion of this course students will be -
1. able to distinguish between JK Flipflop & JKMS Flipflop; between T Flipflop & D Flipflop.
2. acquire the skill of using FFs for given application such as register, counter etc.
3. able to present the use of MUX, DMUX.
4. able to understand the uses of ADC & DAC.

Unit I: Data Processing Circuits   (10 periods)

Introduction to multiplexers, designing of 2:1 MUX, 4:1 MUX, and 8:1 MUX, introduction to demultiplexers, designing of 2:1 DMUX, 4:1 DMUX, and 8:1 DMUX, Encoders: decimal to BCD encoder, priority encoder, Decoders: BCD to decimal decoder, BCD to seven segment decoder.

Unit – II   Flip- Flops   (10 periods)

1-bit memory cell, S-R flip-flop, clocked S-R flip-flop, preset and clear facility in flip–flop, J–K flip-flop, race around condition, master-slave JK Flip Flop, D-type and T-type flip flop.

Unit – III   Sequential logic circuit   (15periods)

Concept of counters, types of counters, modulo of counter, 2-bit, 3-bit and 4-bit asynchronous counters, 2-bit, 3-bit and 4-bit synchronous counters, mod-5counter, decade counter using IC 7490, ring counter, shift registers: SISO, SIPO, PISO, PIPO.

Unit – IV   Data Converters   10

D to A converters: R-2R Ladder DAC, characteristics of DAC, resolution, linearity, accuracy, settling time. A to D converters: parallel comparator ADC, successive approximation ADC, Characteristics of ADC: resolution, conversion time, quantization error.

Text Books:

1. Digital Principles & Applications by A.P. Malvino& D.P. Leach (TMH, New Delhi)
2. Modern Digital Electronics by R.P. Jain, Tata McGraw Hill Publication.
3. Digital Fundamentals by Floyd, Pearson Education.
4. 8-bit Microprocessor by V J Vibhute, P B Borole, U S shah. Tech Max Publication ,Pune.

Recommended Books/References:

1. Digital Electronics: W. H. Gothman Prentice Hall , India.
2. Fundamentals of Digital Circuits by A. Anand Kumar, 3rd Edn, PHI Learninig Pvt. Ltd. Delhi.
3. Digital Electronics with practical approach –G N Shinde, Shivani Pub. Nanded.
4. https://www.falstad.com/circuit/e-index.html (for circuit simulator applets).

Paper – V
(Practicals based on Paper-I, II, III and IV)
ELEC V: Laboratory Course Work
(CBCS PATTERN)

Periods: 80   **(Marks: 100)**   **Credits: 4**

Note:
  i.   Every student must perform at least 12 experiments, not less than SIX Experiments from each group.
  ii. Use graphs wherever necessary.

Group I :
  1. Identification of electronic components: Resistors, Capacitors, Inductors, transformers, diodes & transistors.
  2. Study of electronic instruments: Voltmeter, Ammeter and Multimeter.
  3. Study of Electronic instruments: Power supply, signal generator and CRO.
  4. Determination of value of given resistors by using colour code method & verification of it by multimeter.
  5. Determination of amplitude, frequency and time period of observed voltage waveform by using CRO.
  6. Verification of Thevenin's theorem.
  7. Study of Maximum power transfer theorem and determination of internal resistance of a source.
  8. Study of P-N junction diode characteristics and determination of bulk resistance.
  9. LED characteristics.
  10. Photo diode characteristics.
  11. Study of Zener diode characteristics and determination of breakdown voltage.
  12. Study of Common-Emitter transistor characteristics and determination of β_{dc}.
  13. JFET characteristics.
  14. Study of Series resonance circuit and determination of its bandwidth and Q-factor.
  15. Study of Half wave rectifier and determination of ripple factor and efficiency (η)
  16. Study of Full wave rectifier and determination of ripple factor and efficiency (η)
  17. Study of Zener shunt regulator, line and load regulation characteristics.

Group II :

1. Study of basic gates (verification of truth table) using ICs.

2. Construction of basic gates using NAND gates.

3. Construction and study of half adder using NAND gates.

4. Construction and study of full adder using NAND gates.

5. Implementation of Boolean expression from the given 4-variable truth table using K-map.

6. Verification of De Morgan's theorems.

7. Construction and study of JK, T-type and D-type flip-flops using IC 7476.

8. Study of decade counter using IC 7490.

9. Construction and study of Serial in – Serial out shift register using IC 7495.

10. Mod-16 asynchronous counter using IC 7493.

11. 4-bit Binary to Gray converter using IC 7486.

12. 4-bit Gray to Binary converter using IC 7486.