॥ सा विद्या या विमुक्तये ॥

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

'ज्ञानतीर्थ', विष्णुपुरी, नांदेड – ४३१ ६०६ (महाराष्ट्र राज्य) भारत

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

'Dnyanteerth', Vishnupuri, Nanded - 431 606 (Maharashtra State) INDIA

Established on 17th September, 1994, Recognized By the UGC U/s 2(f) and 12(B), NAAC Re-accredited with'B++' grade

Fax : (02462) 215572 | **Academic-1 (BOS) Section** | website: srtmun.ac.in

Phone: (02462)215542 | E-mail: bos@srtmun.ac.in

विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत राष्ट्रीय शैक्षणिक धोरण २०२० नुसार पदवी द्वितीय वर्षाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२५–२६ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, दिनांक २७ मे २०२५ रोजी संपन्न झालेल्या मा. विद्यापरिषद बैठकीतील विषय क्रमांक १६/६१–२०२५ च्या ठरावानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील राष्ट्रीय शैक्षणिक धोरण–२०२० नुसारचे पदवी द्वितीय वर्षाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२५–२६ पासून लागू करण्यास मा. विद्यापरिषदेने मान्यता प्रदान केली आहे. त्यानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील बी. एस्सी द्वितीय वर्षाचे खालील विषयाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२५–२६ पासून लागू करण्यात येत आहेत.

01	B.Sc. Agriculture Microbiology	11	B.Sc. Physics
02	B.Sc. Botany	12	B.Sc. Seed Technology
03	B.Sc. Dairy Science	13	B.Sc. Horticulture
04	B.Sc. Electronics	14	B.Sc. Statistics
05	B.Sc. Environmental Science	15	B.Sc. Biochemistry
06	B.Sc. Fishery Science	16	B.Sc. Analytical Chemistry
07	B.Sc. Food Science	17	B.Sc. Agrochemical & Fertilizers
08	B.Sc. Geology	18	B.Sc. Industrial Chemistry
09	B.Sc./B.A. Mathematics	19	B.Sc. Industrial Microbiology
10	B.Sc. Microbiology		

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

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.:शै–१/एनइपी/विवत्रंविपदवी/२०२५–२६/११६
दिनांक ०५.०६.२०२५

सहाय्यक कुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत : माहितीस्तव तथा कार्यवाहीस्तव.
१) मा. कुलगुरू महोदयांचे कार्यलय, प्रस्तुत विद्यापीठ.
२) मा. प्र. कुलगुरू महोदयांचे कार्यलय, प्रस्तुत विद्यापीठ.
३) मा. आधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
४) मा. संचालक, परीक्षा व मुंल्यमापन मंडळ, प्रस्तुत विद्यापीठ.
५) मा. प्राचार्य, सर्व संबधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
६) सिस्टीम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. याना देवून कळविण्यात येते की, परिपत्रक अभ्यासक्रम संकेतस्थळावर प्रसिध्द करण्यात यावेत.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED - 431 606 (MS)

(Credit Framework and Structure of Four Year UG Program with Multiple Entry and Exit Option as per NEP-2020)

UNDERGRADUATE PROGRAMME OF

SCIENCE & TECHNOLOGY

Major in **Electronics** and Minor in **DSM** (Subject)

Under the Faculty of Science & Technology

(Revised as per the Govt. Of Maharashtra circular Dt. 13th March 2024)

Effective from the Academic year 2025 – 2026

Details of the Board of Studies Members in the subject Electronics under the faculty of Science & Technology of S.R.T.M. University, Nanded

Sr No	*Name of the Member*	*Designation*	*Address*	*Contact No.*
1	Prof. A C Kumbharkhane	Chairman	School of Physical Sciences, SRTM University, Nanded	9421869112
2	Prof. Y S Joshi	Member	Lal Bahadur Shastri Mahavidyalaya, Dharmabad	9405362172
3	Prof. S M Yenorkar	Member	Shri Shivaji College Parbhani	7276532176
4	Dr S K Gore	Member	Dnyanopasak Mahavidyalya, Jintur	9422879596
5	Dr M B Swami	Member	Maharashtra Udaygiri Mahavidyalaya, Udgir	8830089774
6	Dr D B Suryawanshi	Member	Shri Havgiswami College, Udgir	9423307098
7	Dr R S Kawale	Member	Dnyanopasak Mahavidyalya, Jintur	9545231648
8	Prof. I G Shere	Member	Shri Havgiswami College, Udgir	8329792082
9	Prof. Vikas Baburao Patil	Member	Punyashlok Ahilyadevi Holkar Solapur University, Solapur	9422532521
10	Prof. Girish Mukundrao Joshi	Member	Institute of Chemical Technology (ICT), Mumbai Marathwada Campus, Jalna	8838660102
11	Prof. R L Raibagkar	Member	Deptt. of Physics, Gulbarga University, Kalburgi	9739302083
12	Shri Jagdish Arun Deshmukh	Member	Cermet Resistronics, Pvt. Ltd. Pune	9623371844
13	Shri Arun Pandit Potdar	Member	Micromax Instruments Pvt. Ltd. Pune	9822061328
14	Miss. Shruti Mahesh Tiwari	Invitee Member (UG Student)	Lal Bahadur Shastri Mahavidyalaya, Dharmabad	
15	Shrise Sayantra Maroti	Invitee Member (PG Student)	Yeshwant Mahavidyalaya, Nanded	

Invitees for this Meeting				
16	Dr R V Suryavanshi	Invitee Member	Azad College, Ausa	8766817140
17	Shri G D Tingare	Invitee Member	Azad College, Ausa	9890497718
18	Dr Y T Nakate	Invitee Member	Yeshwant Mahavidyalaya, Nanded	8007739619
19	Shri S R Dulewad	Invitee Member	NES's Science College, Nanded	7709728100

Swami Ramanand Teerth Marathwada University, Nanded

Faculty of Science and Technology (Three Optional in the First Year)

Credit Framework for Four Year Multidisciplinary Degree Program with Multiple Entry and Exit

Subject: DSC (Major) /DSM (Minor 1 and Minor 2)

(For illustration PHY, CHE and ELE combinations are considered, which may change for different combinations)

Year & Level	Semester	Optional 1 (Major) *(From the same Faculty)*	Optional 2 (Minor 1) *(From the same Faculty)*	Optional 3 (Minor 2) *(From the same Faculty)*	Generic Elective (GE) (select from Basket 3 of Faculties other than Science and Technology)	Vocational & Skill Enhancement Course	Ability Enhancement Course (AEC) (Basket 4) Value Education Courses (VEC) / Indian Knowledge System (IKS) (Basket 5) *(Common across all faculties)*	Field Work / Project/Internship/ OJT/ Apprenticeship / Case Study Or Co-curricular Courses (CCC) (Basket 6 for CCC) *(Common across all faculties)*	Credits	Total Credits
1	2	3	4	5	6	7	8	9	10	11
2 (5.0)	III	SELECT1201 (2cr) SELECT1202 (2cr) SELECP1201 (2cr) SELECP1202 (2cr) 8 Credits	SDSMCT1201 (2cr) SDSMCP1201 (2cr) 4 Credits	--	GE3 SELEGE1201 2 Credits	VSC 1 SELEVC1201 2 Credits	ACEENG1201 (2Cr) MILXXX1201 (MAR/HIN/URD/KAN/PAL) (2Cr) 4 Credits	CCC (NCC/NSS/SPT/CLS/HWS/YGE/FIT) 2 Credits	22	88
	IV	SELECT1251 (2cr) SELECT1252 (2cr) SELECP1251 (2cr) SELECP1252 (2cr) 8 Credits	SDSMCT1251 (2cr) SDSMCP1251 (2cr) 4 Credits	--	GE 4 SELEGE1251 2 Credits	VSC 2 SELEVC1251 2 Credits	ACEENG1251 (2Cr) MILXXX1201 (MAR/HIN/URD/KAN/PAL) (2Cr) VECEVS1251 (2Cr) 6 Credits	--	22	
	Cum. Cr.	24	16	08	08	08	22	02	88	
Exit option: UG Diploma in Major DSC and Minor DSM on completion of 88 credits and additional 4 credits NSQF / internship in DSC										

Abbreviations:

1. **DSC:** Department/Discipline Specific Core (Major)
2. **DSE:** Department/Discipline Specific Elective (Major)
3. **DSM:** Discipline Specific Minor
4. **GE/OE:** Generic/Open Elective
5. **VSEC:** Vocational Skill and Skill Enhancement Course
6. **VSC:** Vocational Skill Courses
7. **SEC:** Skill Enhancement Courses
8. **AEC:** Ability Enhancement courses
9. **MIL:** Modern Indian languages
10. **IKS:** Indian Knowledge System
11. **VEC:** Value Education Courses
12. **OJT:** On Job Training: (Internship/Apprenticeship)
13. **FP:** Field Projects
14. **CEP:** Community Engagement and Service
15. **CC:** Co-Curricular Courses
16. **RM:** Research Methodology
17. **RP:** Research Project/Dissertation

SEM III

B.Sc. SY (Electronics) (Semester III)
SELECT1201(Theory) (Major-1): Amplifiers

Periods: 30 Hours **Max. Marks: 50** [ESE:40 & CA:10] **Credits : 2**

Course Pre-requisite: P-I: Basic Electronics & Network Analysis

Course Objectives:

1. To study transistor biasing.

2. To introduce h-parameters and circuit analysis.

3. To understand basics of Operational Amplifiers.

Course Outcome:

1. Knowledge of transistor biasing.-

2. Analysis of small signal amplifier using h-parameters and designing of CE amplifier.

3. Concept of an ideal amplifier, knowledge of IC 741 and its applications.

Curriculum Details:

SELECT1201 (Theory)(Major-1): Amplifiers

Module No.	Unit No.	Topic	No. of hours. required to cover the contents
1		**Transistor Biasing**	08
	1.1	DC load line, Q-point and maximum undistorted output	
	1.2	factors affecting bias variations	
	1.3	stability factor, stability factor for CB and CE circuits	
	1.4	Fixed bias, base bias with emitter feedback, base bias with collector feedback, voltage divider bias	
	1.5	Numerical Examples	
2		**Signal Amplifiers**	07
	2.1	h-parameters, an equivalent circuit for BJT transconductance model	
	2.2	analysis of CE-amplifier using h-parameters	
	2.3	analysis of CB-amplifier using h-parameters	
	2.4	analysis of CC-amplifier using h-parameters	
	2.5	Numerical Examples	
3		**Operational Amplifier**	08
	3.1	Theory of differential amplifier, constant current replacement for R_E	
	3.2	block diagram of Op-Amp, characteristics of an ideal Op-Amp, concept of virtual ground	
	3.3	input offset voltage, input offset current, input bias current, input and output impedances of Op-Amp, slew rate, CMRR	
	3.4	Op-Amp inverting amplifier, Op-Amp non-inverting amplifier	
	3.5	Numerical Examples	
4		**Applications of Op-Amp**	07
	4.1	Op-Amp as an adder, Op-Amp as subtractor	
	4.2	Op-Amp as differentiator, Op-Amp as an integrator, Op-Amp as comparator, Op-Amp as Schmitt's trigger	
	4.3	solving of differential equations using Op-Amp	
	4.4	voltage to current converter with floating load, current to voltage converter	
	4.5	Numerical Examples	

Reference Books:

1. A Text-book of Applied Electronics by R. S. Sedha, Multicolour Edn-2018, S. Chand & Company New Delhi.

2. Basic Electronics Solid State by B. L. Theraja, Multicolour Edn- 2008, S. Chand & Company New Delhi.

3. Handbook of Electronics by Gupta, Kumar, 44thEdn, 2017, Pragati Prakashan, Meerut.

4. Principles of Electronics by V. K. Mehata, Rohit Mehata, 2013 Edn, S. Chand & Company New Delhi.

5. Electronic Fundamentals and Applications by John D. Ryder, Prentice Hall of India Pvt Ltd.

6. Op-Amp and Linear Integrated Circuits by Ramakant Gaikwad, Prentice Hall of India Pvt Ltd.

7. Basic Electrical & Electronics Engineering by J. B. Gupta, Katson Books

B.Sc. SY (Electronics) (Semester III)

SELECT1202 (Theory) (Major-2): Microprocessor and Its Applications

Periods: 30 Hours **Max. Marks: 50** [ESE:40 & CA:10] **Credits : 2**

Course Pre-requisite: B.Sc. I Year (I & II) Electronics

Objectives:

1. To introduce the concept of microcomputer and microprocessor as a CPU.
2. To introduce interfacing chips.
3. To study instruction set of 8085 and ALP .

Course Outcome:

1. Knowledge of microprocessor based systems.
2. Knowledge of Instruction set of 8085 and ALP skills.
3. Working and applications of ICs 74LS373 and Intel 8255

Curriculum Details:

SELECT1202 (Theory)(Major-2): Microprocessor and Its Applications

Module No.	Unit No.	Topic	No. of hours. required to cover the contents
1		**Architecture of 8085 Microprocessor**	08
	1.1	Block diagram of microprocessor based system, features of Intel 8085	
	1.2	block diagram of Intel 8085, function of each block	
	1.3	functional pin diagram of Intel 8085 and pin description	
	1.4	demultiplexing of AD_0–AD_7 bus using latch IC 74LS373.	
2		**Instruction Set of 8085**	07
	2.1	Instruction cycle, machine cycle, T state	
	2.2	Instruction format (1, 2, 3 byte),	
	2.3	Addressing modes	
	2.4	Classification of instructions,	
	2.5	Instruction set of 8085.	
3		**Programming of 8085**	08
	3.1	Simple Assembly Language Programs (ALP): addition, Subtraction	
	3.2	ALP: complement, smaller no., larger no.	
	3.3	ALP: sum of series, block transfer	
	3.4	Delay, delay subroutine using one register and register pair	
4		**IC 8255 and Its applications**	07
	4.1	Block diagram of IC 8255,	
	4.2	Functional pin diagram of IC 8255	
	4.3	Operating modes of 8255	
	4.4	Control word pattern of 8255 and its application for interfacing LED and switch.	

Reference Books:

1. Fundamentals of Microprocessor and Microcomputers by B. Ram, 6th Edn, 5th Reprint, Dhanpat Rai Publications.

2. Microprocessor Architecture, Programming and Applications with the 8085 by Ramesh Gaonkar, 5th Edn, Penram International Publishing (India) Pvt. Ltd.

3. 8-bit Microprocessor by V. J. Vibhute, P. B. Borole, U. S. Shah, 6th Revised ed., Tech-Max Publications.

4. 8085 Assembly Language Programming by Lance A. Leventhal, McGraw Hill International Edn.

5. Introduction to 8085, 8086 Microprocessors and peripherals – K M Bakwad, A K Deshmane, Nikita Publication, Latur

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B.Sc. SY (Electronics) (Semester III)

SELECP1201: Electronics Lab-II(Practical) : Practical based on SELECT1201

Periods :60 Hours **Max. Marks : 50** [ESE:30 & CA:20] **Credits : 2**

Course Objectives:

Students are expected to:

1. Familiarize with various Amplifiers and Operational amplifier.

2. To understand the design and working of Amplifiers and Operational amplifier.

3. Understand the practical use of various Amplifier and Operational amplifier.

Course outcome:

Learner will be able to ….

1. Apply the concept and knowledge of Amplifiers and Operational amplifier.

2. Apply practical knowledge to solve real life problems of the society.

3. Understand of the course and create scientific temperament and give exposure to the students for independent use of Amplifiers and Operational amplifier circuit for innovative applications.

Curriculum Details:

SELECP1201: Electronics Lab-II(Practical) : Practical based on SELECT1201

Note:

1. A candidate is required to perform minimum 8 experiments out of the list provided during course of study in this semester.
2. Use graphs wherever necessary.

List of Experiments :

1. Design voltage divider bias circuit for CE amplifier with centred-Q. Measure it gain at 2 KHz frequency signal.
2. Design single stage C-E amplifier with & study its frequency response.
3. Design and study Emitter follower (CC amplifier) circuit and determine its output impedance.
4. Design and study inverting amplifier (DC gain) using Op-Amp.
5. Design and study non-inverting amplifier (DC gain) using Op-Amp.
6. Study of frequency response of Op-Amp as an inverting amplifier.
7. Study of frequency response of Op-Amp as a non-inverting amplifier.
8. Study of OP-Amp as an Adder.
9. Study of OP-Amp as an Integrator.
10. Study of OP-Amp as Schmitt's Trigger
11. Study of OP-Amp as Subtractor.
12. Study of OP-Amp as an Differentiator .
13. Study of OP-Amp as a Comparator.

B.Sc. SY (Electronics) (Semester III)

SELECP1202: Electronics Lab-III(Practical) : Practical based on SELECT1202

Periods :60 Hours **Max. Marks : 50** [ESE:30 & CA:20] **Credits : 2**

Course Objectives:

Students are expected to:

1. Familiarize 8085 microprocessor programming kit

2. To develop logic to construct the assembly language programs

3. To learn compile and execute the ALPs.

Course outcome:

Learner will be able to ….

1. Get the knowledge of programming using assembly language

2. Construct the assembly language programming

3. Understand applications of microprocessor 8085.

Curriculum Details:

SELECP1202: Electronics Lab-III(Practical) : Practical based on SELECT1202

Note:

1. A candidate is required to perform minimum 8 experiments out of the list provided during course of study in this semester.
2. Use graphs wherever necessary.
3. Assembly Language Programs (ALPs) are based on microprocessor 8085

List of Experiments :

1. ALP for addition of two bytes, result 8-bit.
2. ALP for addition of two bytes, result 16-bit.
3. ALP for subtraction of two bytes.
4. ALP to Find 1's compliment of 8-bit and 16-bit number
5. ALP to find 2's complement of 8-bit and 16-bit number
6. ALP for masking off:
    a) Four LSBs of given 8-bit number.
    b) Four MSBs of given 8-bit number.
7. ALP to transfer a block of data.
8. ALP to find sum of a series of 8-bit numbers.
9. ALP to find smallest number of a given series.
10. ALP to find largest number of a given series.
11. ALP for interfacing of LED/Switch using IC 8255.
12. ALP to generate square wave using IC 8255.

B.Sc. SY (Electronics) (Semester III)

SELEMT1201 (Theory) (Minor-1): Sequential Logic Circuits

Periods: 30 Hours **Max. Marks: 50** [ESE:40 & CA:10] **Credits : 2**

Course Pre-requisite: Knowledge of gates, Boolean algebra and combinational logic circuits.

Course Objectives:

1. Understand and implement the K-map for simplification of Boolean expression.
2. Understand, analyse and design sequential logic circuits.
3. Understand the operation and applications of Shift registers.
4. Understand the basics of A to D and D to A Converters

Course outcomes:

1. Ability to analyze and design sequential logic circuits.
2. Applications of knowledge to real digital world.
3. Proficiency in working wells digital IC's and memories.

Curriculum Details:

SELEMT1201 (Theory)(Minor-1): Sequential Logic Circuits

Module No.	Unit No.	Topic	No. of hours. required to cover the contents
1		**Karnaugh Map**	08
	1.1	Introduction, Standard representation for logic equations: SOP form, POS form, conversion to Standard forms. Representation of Standard SOP form on K-map,	
	1.2	Concept of minterm and maxterm, Standard SOP expression for a given truth table.	
	1.3	Karnaugh Map (k-map) Technique: K-map structure, Representation of truth table on K-map or vice versa,	
	1.4	simplification of Boolean Expression using K-map-Minimization of logical function, Don't Care Conditions.	
2		**Counters**	08
	2.1	Introduction, terms related to Counter, Types of Counters,	
	2.2	Asynchronous or Ripple Counters; A 2-bit, 3-bit, mod 5, mod 10 or decade counter.	
	2.3	Frequency division in asynchronous Counter, Problems faced by Asynchronous Counter.	
	2.4	Synchronous Counters (Parallel): A 2bit asynchronous Counter, 3-bit. Decade counter using IC 7490.	
3		**Shift Registers**	06
	3.1	Registers, Shift register	
	3.2	Type of shift registers, Serial in-Serial out, Serial in-parallel out, Parallel is - Serial out, Parallel in - Parallel out	
	3.3	Bi-directional Shift registers, Universal shift register IC 7495	
	3.4	Applications of Shift registers (ring Counter, Johnson's Counter).	
4		**A/D and D/A Converters -**	08
	4.1	Introduction, Digital to Analog (D/A) Converter, Parameters (Specifications) of DAC,	
	4.2	R-2R ladder type DAC, Weighted. Resistor type DAC.	
	4.3	Analog to Digital Conversion. The Counter type A/D Converter, The dual slope A/D Converter, the successive approximation type A/D converter.	

Reference Books:

1. Digital system and Microprocessor, Dr. S.N. Talbar, K.M. Bakwad, Ak. Deshmane Nikita publication Latur,
2. Fundamentals of Digital Circuits by A. Anand Kumar, 3rd Edn, PHI Learninig Pvt. Ltd. Delhi.
3. Digital Principles & Applications by A.P. Malvino & D.P. Leach (TMH, New Delhi)
4. Modern Digital Electronics by R.P. Jain, Tata McGraw Hill Publication.
5. Digital Fundamentals by Floyd, Pearson Education.
6. Digital Electronics with practical approach –G N Shinde, Shivani Pub. Nanded.
7. Android based App – 'Electronics' and similar

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

SELEMP1201: Practical (Minor Course)

Periods :60 Hours **Max. Marks: 50** [ESE:30 & CA:20] **Credits: 2**

Course Pre- requisite: B.Sc.F. Y. with optional subject Electronics

Course Objectives:

1. To learn Boolean algebra and K-map.

3. To learn Sequential logic circuit like counters and shift register

4. To learn data convertors

Course Outcomes: After completion of this course

1. Students will able to Simplify of Boolean expression using K-map

2. Students will be able to design counters and shift register using IC's

3. Students will be able to design A to D and D to A convertors.

Curriculum Details:

SELEMP1201 (Minor Course) : Practical

Note:

1. A candidate is required to perform minimum 8 experiments out of the list provided during course of study in this semester.

List of Practicals:

1. Implementation of Boolean expression from the given 4-variable truth table using K-map.
2. Study of the 2-bit synchronous counter using IC.
3. Study of the 3-bit (Mod-8) asynchronous counter.
4. Study of the 4-bit (Mod-16) asynchronous counter.
5. Design and verify the modified counter (Mod-7) using K-map.
5. Study of decade counter using IC 7490
6. Study of ring counter.
7. Construction and study of Serial in – Serial out shift register using IC 7495.
8. Mod-16 asynchronous counter using IC 7493.
9. Study of ADC using IC 0808
10. Study of R-2R Ladder DAC

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

SELEGE1201 [Generic Elective 3]: Electronics for Everyone

Periods :30 Hours **Max. Marks: 50** **Credits: 2**

Course pre-requisite :XII th Science pass from any faculty: No specific knowledge of electronics.

Course objectives :

1. Importance of safety and precautions to be taken by the students coming across electric and electronic devices.
2. Understand basics of electricity.
3. Understand various types of cells and batteries.
4. Understand Computer parts and their working.
5. Identify and use the various cables and connectors.

Course outcomes :

1. Students ensure their safety during coming across electric and electronic devices.
2. Students know the basics of electricity.
3. Students can understand various types of cells and batteries.
4. Students can identify different parts of computer and their working.
5. Students can identify and make use of different types of cables and connectors.

Curriculum Details :

SELEGE1201 [Generic Elective 3]: Electronics for Everyone

Module No	Unit No	Topic	Hrs. Required to cover the contents
1.		**Basic Workshop Practice**	08
	1.1	Importance of safety and Precautions to be taken in the industry/shop floor	
	1.2	Personal Protective Equipment (PPE), First Aid, Fire extinguishers.	
	1.3	Basic hand tools	
2		**Basics of AC and Electrical Cables**	**07**
	2.1	Electrical Terms, Conductor and Insulator	
	2.2	Single Range Meters	
	2.3	Measuring Instrument Meters	
3		**Cells and Batteries**	**07**
	3.1	Cells and Batteries	
	3.2	Secondary batteries-types of charge, discharge and maintenance	
4		**Computer hardware**	**08**
	4.1	Computer parts and their working, CMOS setup and install the windows OS.	
	4.2	Switch Mode Power Supply for PC, Hard Disk Drives, Different types of printers	
	4.3	Computer networking, Network Cable Components, and Servers	
	4.4	WiFi Network	
		Total	**30**

Text Books :-

1. ELECTRONICS MECHANIC NSQF LEVEL – 5 1st Year (Volume I of II) TRADE THEORY SECTOR: ELECTRONICS & HARDWARE

DIRECTORATE GENERAL OF TRAINING MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP GOVERNMENT OF INDIA NATIONAL INSTRUCTIONAL MEDIA INSTITUTE, CHENNAI

2. e-Link: https://www.bharatskills.gov.in/pdf/E_Books/ElectronicMechanic1stSEMTheory(NSQF).pdf

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

SELEVC1201: Analog and Digital Circuit Design (Vocational Course)

Periods :60 Hours **Max. Marks: 50** [ESE:30 & CA:20] **Credits: 2**

Course Pre- requisite: B.Sc.F. Y. with optional subject Electronics

Course Objectives:

1. To introduce basics of power supply and designing of power supply
2. To learn circuits using JFET and MOSFET.
3. To learn Boolean algebra and K-map.
4. To learn Sequential logic circuit like counters and shift register
5. To learn data convertors

Course Outcomes: After completion of this course

1. Student will be able to design power supply.
2. Students will able to Simplify of Boolean expression using K-map
3. Students will be able to design counters and shift register using IC's
4. Students will be able to design A to D and D to A convertors.

Curriculum Details:

SELEVC1201 (Vocational Course) : Analog and Digital Circuit Design

Note:

1. A candidate is required to perform minimum 8 Exercises out of the list provided during course of study in this semester.

Hands on Exercises:

1. Construct Half wave rectifier circuit and determine of ripple factor and efficiency (η)
2. Construct Full wave rectifier and determine of ripple factor and efficiency (η)
3. Design Zener shunt regulator, line and load regulation characteristics.
4. Construct Voltage regulators using IC 78XX series.
5. To study transfer and output characteristics of a n-channel Junction field effect Transistor (JFET) in Common-source configuration.
6. To study transfer and output characteristics of an n-channel Metal Oxide Semiconductor field effect Transistor (MOSFET) in Common-source configuration.
7. Implementation of Boolean expression from the given 4-variable truth table using K-map.
8. To design & verify the operation of 3-bit synchronous counter.
9. To design & verify operation of 2-bit Asynchronous counter.
10. To design & verify modified counter (Mod-5)
11. Construction and study of Serial in – Serial out shift register using IC 7495.
12. Mod-16 asynchronous counter using IC 7493.
13. Study of decade counter using IC 7490
14. Study of R-2R Ladder DAC

Text Books:

1. Principles of Electronics by V.K. Mehta & Rohit Mehta (Multicolor revised edition) S. Chand & Company.
2. Electronic Principles, A.P. Malvino, Tata Mc. Graw Hill, Pub. Co.Ltd., (Third edition).
3. Digital Principles & Applications by A.P. Malvino& D.P. Leach (TMH, New Delhi)
4. Modern Digital Electronics by R.P. Jain, Tata McGraw Hill Publication.
5. Digital Fundamentals by Floyd, Pearson Education.

Recommended Books/References:

1. Basic electronics (solid state) by B.L. Theraja, (multicolour illustrative edition), S.Chand& Company Ltd., Ram Nagar, New Delhi.
2. Digital Electronics: W. H. Gothman Prentice Hall, India.
3. Fundamentals of Digital Circuits by A. Anand Kumar, 3rd Edition, PHI Learning Pvt. Ltd. Delhi.
4. Digital Electronics with practical approach –G N Shinde, Shivani Pub. Nanded.

SEM IV

B.Sc. SY (Electronics) (Semester IV)

SELECT1251 (Theory)(Major-3): Oscillators and Multivibrators

Periods: 30 Hours **Max. Marks: 50** [ESE:40 & CA:10] **Credits: 2**

Course Pre-requisite: P-VI: Amplifiers

Course Objectives:

1. To study the principles of feedback in electronic circuits, including positive and negative feedback.
2. To study the operation of sinusoidal oscillators, including their working principles and applications.
3. To explore different types of oscillators (e.g., LC, RC) and their frequency stability.
4. To understand the working principles of multivibrators (Astable, Monostable, and Bistable) and their applications.
5. To analyze the operation of time-based circuits, such as sweep and sawtooth wave generators.
6. To explore the applications of time-based circuits in devices like oscilloscopes and televisions.

Course Outcome:

1. Demonstrate an understanding of positive and negative feedback and their effects on amplifier performance.
2. Design and analyze basic oscillator circuits for specific frequency requirements.
3. Describe the working principles of multivibrators and their applications in pulse generation and timing circuits.
4. Understand the operation of time-based circuits and their applications in generating linear time-dependent signals.
5. Apply knowledge of time-based circuits in real-world applications, such as display systems and measurement instruments.

Curriculum Details:

SELECT1251 (Theory)(Major-3): Oscillators and Multivibrators

Module No.	Unit No.	Topic	No. of hours. required to cover the contents
1		**Feedback Principles**	07
	1.1	Concept of positive and negative feedback,	
	1.2	Advantages of negative feedback such as gain stability, increased bandwidth	
	1.3	Decreased distortion,Decreased noise	
	1.4	Increases input impedance, Decreases output impedance	
	1.5	Numerical Examples	
2		**Sinusoidal Oscillators**	08
	2.1	Requirements of an oscillator, Barkhausen criterion	
	2.2	Hartley oscillator, Colpitts oscillator (circuit diagram, working condition for oscillations and expression for frequency for each oscillator)	
	2.3	R-C oscillators: phase-shift oscillator, Wien bridge oscillator, (circuit diagram, working condition for oscillations, and expression for frequency for each oscillator)	
	2.4	Numerical Examples	
3		**Multivibrators**	08
	3.1	Transistor as a switch,Transistorized Astable Multivibrator, transistorized	
	3.2	Monostable Multivibrator, Transistorized Bistable Multivibrator, transistorized	
	3.3	Schmitt's trigger	
	3.4	Block diagram of IC 555, IC 555 as Monostable multivibrator	
	3.5	Numerical Examples	
4		**Time Base Circuits**	07
	4.1	Introduction, types of time base circuits, methods of generating time base waveforms	
	4.2	Exponential sweep circuit, Sweep circuit using a transistor switch	
	4.3	Sweep circuit using UJT, Transistor constant current sweep	
	4.4	Miller sweep circuit, Bootstrap sweep circuit	
		Numerical Examples	

Reference Books:

1. A Text-book of Applied Electronics by R. S. Sedha, Multicolour Edition-2018, S. Chand & Company New Delhi.

2. Handbook of Electronics by Gupta, Kumar, 44th Edition, 2017, Pragati Prakashan, Meerut.

3. Introduction to Electronics by K J M Rao Oxford and IBH Publishing Company.

4. Basic Electronics Solid State by B. L. Theraja, Multicolour Edition- 2008, S. Chand & Company New Delhi.

5. Principles of Electronics by V. K. Mehata, Rohit Mehata, 2013 Edition, S. Chand & Company New Delhi.

B.Sc. SY (Electronics) (Semester IV)

SELECT1252 (Theory) (Major-4): Introduction to Microcontroller Intel 8051

Periods: 30 Hours **Max. Marks: 50** [ESE:40 & CA:10] **Credits : 2**

Course Pre-requisite: Microprocessor & Its Applications

Objectives:

1. To introduce concept of Microcontroller & study of Intel 8051 .
2. To study internal organization of 8051.
3. To study instruction set of 8051 and ALP.

Course Outcome:

1. Knowledge of internal architecture of 8051 and function of each block.
2. Instruction set of 8051 and ALP skills.
3. Knowledge of SFRs, Timers and Interrupts of 8051.

Curriculum Details:

SELECT1252 (Theory)(Major-4): Introduction to Microcontroller Intel 8051

Module No.	Unit No.	Topic	No. of hours. required to cover the contents
1		**Microcontroller Intel 8051**	08
	1.1	comparison between microprocessor and microcontroller	
	1.2	architectural block diagram of 8051, function of each block	
	1.3	pin diagram, features of 8051, functional pin diagram, pin description	
	1.4	structure of internal RAM.	
2		**Instruction Set of Microcontroller Intel 8051**	07
	2.1	Classification of instructions, syntax of instructions function.	
	2.2	Addressing modes	
	2.3	execution of every instruction	
3		**8051 Assembly Language Programming**	08
	3.1	Programmes for addition, subtraction, multiplication, division	
	3.2	OR, AND, XOR operations, 1's complement, 2's complement	
	3.3	sum of series, binary to gray conversion, gray to binary conversion,	
	3.4	larger of two numbers, smaller of two numbers and transfer of data block	
4		**SFRs, Timers and Interrupts of 8051**	07
	4.1	Special function registers (list, structure and uses)	
	4.2	timers, programming of timers/counters in various modes	
	4.3	interrupts, priority structure of interrupts.	

Reference Books:

1. 8051 Microcontrollers: Hardware, Software and Applications by Udayshankara and M. S. Mallikarjun Swamy, McGraw Hill Publication.

2. Microprocessors and Microcontrollers by U. S. Shah, Revised 2nd Edn, Tech-Max Publication, Pune.

3. The 8051Microcontroller and Embedded Systems Using Assembly and C by M. A. Mazidi, J. C. Mazidi and R. D. McKinlay, 2nd Edn, Pearson Publications.

4. The 8051 Microcontroller by Kenneth Ayala, 3rd Edn, Cengage Learning India Private Ltd.

B.Sc. SY (Electronics) (Semester IV)
SELECP1251: Electronics Lab-IV(Practical): Practical based on SELECT1251

Periods:60 Hours **Max. Marks: 50** [ESE:30 & CA:20] **Credits: 2**

Course Objectives:

Students are expected to:

1. Familiarize with various Oscillators and Multivibrators.

2. To understand the design and working of Oscillators and Multivibrators.

3. Understand the practical use of various Oscillators and Multivibrators.

Course outcome:

Learner will be able to ….

1. Apply the concept and knowledge of Oscillators and Multivibrators

2. Apply practical knowledge to solve real life problems of the society.

3. Understand of the course and create scientific temperament and give exposure to the

students for independent use of Oscillators and Multivibrators circuit for innovative applications.

Curriculum Details:

SELECP1251: Electronics Lab-IV(Practical): Practical based on SELECT1251

Note:

1. A candidate is required to perform a minimum of 8 experiments out of the list provided during the study in this semester.
2. Use graphs wherever necessary.

List of Experiments:

1. Construct and study transistorized Hartley oscillator.
2. Construct and study transistorized Colpitt's oscillator.
3. Construct and study a transistorized Phase shift oscillator.
4. Construct and test the Wein bridge oscillator using Op-Amp.
5. Design and build a transistorized Astable multivibrator of a given pulse and space width.
6. Design and study transistorized monostable multivibrator of given gate width.
7. Construct and study transistorized bistable multivibrator. Use manual triggering to test.
8. Construct and study Schmitt Trigger Using Transistors
9. Design and build astable multivibrator using IC 555.
10. Design and build monostable multivibrator using IC 555. Measure its gate width.
11. Construct and study the UJT time base circuit.
12. Construct and study constant current ramp generator. Measure its rise time and fall time.

B.Sc. SY (Electronics) (Semester IV)

SELECP1252: Electronics Lab-V(Practical) : Practical based on SELECT1252

Periods :60 Hours **Max. Marks : 50** [ESE:30 & CA:20] **Credits : 2**

Course Objectives:

Students are expected to:

1. Students are expected to:

1. Familiarize with Microcontroller programming kit.

2. To understand ALP using microcontroller

3. Understand the practical use of microcontroller programming

Course outcome:

Learner will be able to ….

1. know the programming logic

2. Apply practical knowledge to develop programs for various arithmetic, logical operations.

3. compile and execute the programs

Curriculum Details:

SELECP1252: Electronics Lab-V(Practical) : Practical based on SELECT1251

Note:

1. A candidate is required to perform minimum 8 experiments out of the list provided during course of study in this semester.
2. Assembly Language Programs (ALPs) are based on Microcontroller 8051.

List of Experiments :

1. ALP to add two 8-bit numbers.
2. ALP to add two 16-bit numbers.
3. ALP to subtract two 8-bit numbers.
4. ALP to multiply two 8-bit numbers.
5. ALP to divide two 8-bit numbers.
6. ALP to find 2's complement of an 8-bit number.
7. ALP to find 1's complement of a 16-bit number.
8. ALP to logically AND/OR/XOR two 8-bit numbers.
9. ALP to convert an 8-bit Binary number to Gray.
10. ALP to convert an 8-bit Gray number to Binary.
11. ALP to determine sum of a series of 8-bit numbers.
12. ALP to move a block of data.

B.Sc. SY (Electronics) (Semester III)
SELEMT1251 (Theory) (Minor-2): Fundamentals of Microprocessor 8085

Periods: 30 Hours **Max. Marks: 50** [ESE:40 & CA:10] **Credits : 2**

Course Pre-requisite: B.Sc. I Year (I & II) Electronics

Objectives:

1. To introduce the concept of Memory
2. To learn microcomputer and microprocessor as a CPU.
3. To study instruction set of 8085 and ALP.

Course Outcome: After completion of this course students will get

1. Knowledge of microprocessor based systems and Microprocessor 8085.
2. Know the working and applications of ICs 74LS373
3. Knowledge of Instruction set of 8085
4. Learn programming skill of assembly language.

Curriculum Details:

SELEMT1251 (Theory)(Minor-2): Fundamentals of Microprocessor 8085

Module No.	Unit No.	Topic	No. of hours. required to cover the contents
1		**Semiconductor Memories & Tristate Devices**	07
	1.1	Memory, Memory classification	
	1.2	RAM (SRAM & DRAM), ROM, PROM, EPROM, EEPROM, Flash	
	1.3	Tristate devices: Buffer, Bidirectional buffer, decoder	
	1.4	Block diagram of microcomputer, Microprocessor based system.	
2		**Architecture of 8085 Microprocessor**	08
	2.1	Block diagram of microprocessor based system, features of Intel 8085	
	2.2	Block diagram of Intel 8085, function of each block	
	2.3	Functional pin diagram of Intel 8085 and pin description	
	2.4	Demultiplexing of AD_0–AD_7 bus using latch IC 74LS373.	
3		**Instruction Set of 8085**	08
	3.1	Instruction cycle, machine cycle, T state	
	3.2	Instruction format (1, 2, 3 byte),	
	3.3	Addressing modes	
	3.4	Classification of instructions,	
	3.5	Instruction set of 8085.	
4		**Programming of 8085**	07
	4.1	Simple Assembly Language Programs (ALP): addition, Subtraction	
	4.2	ALP: complement, smaller no., larger no.	
	4.3	ALP: sum of series, block transfer	
	4.4	Delay, delay subroutine using one register and register pair	

Reference Books:

1. Fundamentals of Microprocessor and Microcomputers by B. Ram, 6th Edn, 5th Reprint, Dhanpat Rai Publications.

2. Microprocessor Architecture, Programming and Applications with the 8085 by Ramesh Gaonkar, 5th Edn, Penram International Publishing (India) Pvt. Ltd.

3. 8-bit Microprocessor by V. J. Vibhute, P. B. Borole, U. S. Shah, 6th Revised ed., Tech-Max Publications.

4. 8085 Assembly Language Programming by Lance A. Leventhal, McGraw Hill International Edn.

5. Introduction to 8085, 8086 Microprocessors and peripherals – K M Bakwad, A K Deshmane, Nikita Publication, Latur

B.Sc. SY (Electronics) (Semester IV)
SELEMP1251: Practical : Practical based on SELEMT1251

Periods :60 Hours **Max. Marks : 50** [ESE:30 & CA:20] **Credits : 2**

Course Objectives:

Students are expected to:

1. Familiarize 8085 microprocessor programming kit

2. To develop logic to construct the assembly language programs

3. To learn compile and execute the ALPs.

Course outcome:

Learner will be able to ….

1. Get the knowledge of programming using assembly language

2. Construct the assembly language programming

3. Understand applications of microprocessor 8085.

Curriculum Details:

SELEMP1251: Practical : Practical based on SELEMT1251

Note:

1. A candidate is required to perform minimum 8 experiments out of the list provided during course of study in this semester.

List of Experiments :

1.ALP for addition of two 8–bit nos., result 8-bit.

2. ALP for addition of two 8–bit nos., result 16-bit.

3. ALP for subtraction of two 8–bit nos..

4. ALP to Find 1's compliment of 8-bit and 16-bit number

5. ALP to find 2's complement of 8-bit and 16-bit number

6. ALP for masking off:

    a) Four LSBs of given 8-bit number.

    b) Four MSBs of given 8-bit number.

7. ALP to Shift an –bit number right by one bit.

8. ALP to Shift an –bit number Left by one bit.

9. ALP to transfer a block of data.

10. ALP to find sum of a series of 8-bit numbers.

11 ALP to find smallest number of a given series.

12. ALP to find largest number of a given series.

B.Sc. SY (Electronics) (Semester IV)

SELEGE1251: Electronic Gadgets and Domestic Appliances

Periods :60 Hours **Max. Marks : 50** [ESE:30 & CA:20] **Credits : 2**

Course Objectives:

Students are expected to:

1. To learn Structure of Electronic Gadgets and domestic appliances
2. To understand working of Calculator, digital clock.
3. To know working of In-Car Computers
4. To familiarize working of domestic appliances like Air-Conditioner & Refrigerator

Course outcome:

On completion of this course, the students will be able to
1. Describe structure of Electronic Gadgets and Domestic appliances.
2. Explain the working Electronic Gadgets and Domestic appliances.
3. Know about the air conditioning systems and Refrigeration Systems.

Curriculum Details : SELEGE1251: Electronic Gadgets and Domestic Appliances

Module No	Unit No	Topic	Hrs. Required to cover the contents
1		**Calculators**	07
	1.1	Structure of a Calculator	
	1.2	Internal Organization of a Calculator	
	1.3	Servicing Electronic Calculator	
2		**Digital Clocks**	07
	2.1	Introduction, Frequency divider	
	2.2	Simplified block diagram of digital clock	
	2.3	LSI Digital clock	
3		**In-Car Computers**	08
	3.1	Applications of solid state devices in automobiles,	
	3.2	Providing information	
	3.3	Electronic ignition, Electronic ignition lock system	
	3.4	Antibraking system (ABS), ECS, Airbag system	
4		**Domestic Appliances** Air Conditioner and Refrigerators	08
	4.1	Air Conditioning, Components of Air conditioning systems	
	4.2	All-water air conditioning systems, All-Air Air Conditioning Systems, Remote control buttons, Split air conditioners	
	4.3	Refrigeration, Refrigerants, Refrigeration Systems	
	4.4	Domestic Refrigerators	
		Total	**30**

Reference Books:

1. Consumer Electronics by Bali S P, Pearson Education, India, 2007
2. Electronic instruments and systems: Principles, maintenance and troubleshooting by R G Gupta, TataMcGraw Hill.
3. Modern Electronic Equipment: Troubleshooting, repair and maintenance by Khandapur, Tata McGraw Hill.

B.Sc. SY (Electronics) (Semester IV)

SELEVC1251: Introduction to Arduino Principles and Applications (Vocational Course)

Periods :60 Hours **Max. Marks : 50** [ESE:30 & CA:20] **Credits : 2**

Course Prerequisites:

1. Basic knowledge of Electronics and Circuit Theory.
2. Fundamentals of C Programming.
3. Basic understanding of Microcontrollers and Digital Logic.
4. Familiarity with electronic components (resistors, sensors, motors, etc.).

Course Objectives:

1. To introduce students to Arduino hardware and software environments.
2. To develop a strong foundation in embedded systems, microcontroller programming, and interfacing techniques.
3. To enable students to interface sensors, actuators, and communication modules with Arduino.
4. To provide hands-on experience in designing and implementing real-world applications using Arduino.
5. To prepare students for IoT, automation, and robotics applications using Arduino.

Course outcomes(COs):

After completing this course, students will be able to:

1. Explain the fundamental concepts of Arduino and embedded systems.
2. Write and execute Arduino programs using Embedded C.
3. Interface input devices (sensors) and output devices (displays, motors, etc.) with Arduino.
4. Develop simple automation and IoT-based applications.
5. Troubleshoot basic hardware and software issues in Arduino-based projects.
6. Design and implement a mini-project using Arduino

Curriculum Details:

SELEVC1251: Introduction to Arduino Principles and Applications (Vocational Course)

Module No.	Unit No.	Topic	No. of hours. required to cover the contents
1		**Introduction to Arduino I/O Functions**	16
	1.1	Getting Started with Arduino • Installing and setting up the Arduino IDE. • Installing Different Libraries and Boards • Understanding different features of Arduino Board	
	1.2	Digital Input and Output • Write first LED Blink Program • Understanding INPUT and OUTPUT Function • Use push buttons to control LEDs.	
	1.3	Analog Input and Output • Reading values from a potentiometer. • Generating PWM signals to control LED brightness.	
	1.4	Connecting Multiple Input and Output • Creating blinking sequences with multiple LEDs. • Connecting Multiple Switches beep the buzzer for sound	
2		**Sensor Interfacing and Data Acquisition**	16
	2.1	Interfacing Temperature and Humidity Sensor • Reading values from DHT11 sensor and displaying on the Serial Monitor.	
	2.2	Light and Proximity Sensor • Use of LDR to measure ambient light Intensity • Use of IR Proximity Sensor to detect obstacle	
	2.3	Ultrasonic Distance Measurement • Measuring distance using HC-SR04 Ultrasonic Sensor.	
	2.4	Soil Moisture Detection • Interface a soil moisture sensor with Arduino to measure soil humidity levels.	
3		**Actuators and Motor**	12
	3.1	Controlling LEDs and Buzzers with Sensors • Turning LEDs on/off based on sensor input. • Using a buzzer for alerts.	
	3.2	DC Motor Speed and Direction Control • Understanding the Principal Working of Dc Motor • Using L293N Motor Driver to control a DC motor.	
	3.3	Servo Motor Control • Understanding types of servo motors and its Application • Controlling the position of a servo motor using a potentiometer.	
	3.4	Controlling LEDs and Buzzers with Sensors • Turning LEDs on/off based on sensor input. • Using a buzzer for alerts.	

4		**Display Interfaces & Communication Protocols**	16
	4.1	Interfacing LCD Display & serial Communication • Displaying text on a 16x2 LCD. • Sending the data over serial terminal	
	4.2	Interfacing 7 Segment Display • Concept of Common Anode and Common Cathode • Showing Numbers on7 Segment Display	
	4.3	Project 1 :Based on Module 1and 2	
	4.4	Project 2:Based on Module 1and 2	

References:

❖ **Books:**

1. Hughes, J. M. (Year). Arduino: A Technical Reference. Publisher.
2. Massimo Banzi& Michael Shiloh, Getting Started with Arduino, O'Reilly Media.
3. Jeremy Blum, Exploring Arduino: Tools and Techniques for Engineering Wizardry, Wiley.
4. Simon Monk, Programming Arduino: Getting Started with Sketches, McGraw-Hill.
5. John Boxall, Arduino Workshop: A Hands-On Introduction with 65 Projects, No Starch Press.

❖ **Web Links & Online Resources:**

1. Official Arduino Website: https://www.arduino.cc/
2. Arduino Reference Guide: https://www.arduino.cc/reference/en/
3. Arduino Tutorials (Spark Fun): https://learn.sparkfun.com/tutorials
4. MIT OpenCourseWare: https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/