॥ 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

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

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

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विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत राष्ट्रीय शैक्षणिक धोरण २०२० नुसार पदव्यूत्तर द्वितीय वर्षाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२४–२५ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, या विद्यापीठा अंतर्गत येणा–या सर्व संलग्नित महाविद्यालयामध्ये शैक्षणिक वर्ष २०२४–२५ पासून राष्ट्रीय शैक्षणिक धोरणानुसार पदव्यूत्तर द्वितीय वर्षाचे अभ्यासक्रम लागू करण्याच्या दृष्टीकोनातून विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत येणा–या अभ्यासमंडळांनी तयार केलेल्या पदव्यूत्तर द्वितीय वर्षाच्या अभ्यासक्रमांना मा. विद्यापरिषदेने दिनांक १५ मे २०२४ रोजी संपन्न झालेल्या बैठकीतील विषय क्रमांक १५/५९–२०२४ च्या ठरावाअन्वये मान्यता प्रदान केली आहे. त्यानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील खालील एम. एस्सी द्वितीय वर्षाचे अभ्यासक्रम (Syllabus) लागू करण्यात येत आहेत.

1) M. Sc. II year Biotechnology (Affiliated College)
2) M. Sc. II year Biotechnology (Campus)
3) M. Sc. II year Bioinformatics (Sub Campus Latur)
4) M. Sc. II year Bioinformatics (Affiliated College)
5) M. Sc. II year Clinical Research (Affiliated College)
6) M. Sc. II year Botany (Campus)
7) M. Sc. II year Herbal Medicine
8) M. Sc. II year Boany (Affiliated College)
9) M. Sc. II year Geology (Campus)
10) M. Sc. II year Dairy Science
11) M. Sc. II year Electronics
12) M. Sc. II year Environmental Science
13) M. Sc. II year Environmental Science (Campus)
14) M. Sc. II year Geography (Campus)
15) M. Sc. II year Applied Mathematics
16) M. Sc. II year Mathematics
17) M. Sc. II year Mathematics (Campus)
18) M. Sc. II year Microbiology
19) M. Sc. II year Microbiology (Campus)
20) M. Sc. II year Statistics
21) M. Sc. II year Statistics (Campus)

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/२०२४–२५/१०९
दिनांक १२.०६.२०२४

डॉ. सरिता लोसरवार
सहा.कुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत : १) मा. आधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मुंल्यमापन मंडळ, प्रस्तुत विद्यापीठ.
३) मा. प्राचार्य, सर्व संबधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) मा. संचालक, सर्व संकुले परिसर व उपपरिसर, प्रस्तुत विद्यापीठ
५) सिस्टीम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. याना देवून कळविण्यात येते की, सदर परिपत्रक संकेतस्थळावर प्रसिध्द करण्यात यावे.

Swami Ramanand Teerth Marathwada University, Nanded

Faculty of Science & Technology

Credit Framework for Two Year PG Program

Subject:Electronics

Year & Level	Sem.	MajorSubject (DSC)	MajorSubject (DSE)	RM	OJT/FP	Research Project	Practicals	Credits	Total Credits
1	2	3	4	5	6	7	8	9	10
1	1	**SELEC401(4Cr)** (Semiconductor Devices and Technology) **SELEC402(4Cr)** (Embedded System Design) **SELEC403(4Cr)** (Measurement & Instrumentation)	**SELEE401** (3Cr) Programming in C/C++ **OR** Internet of Things	**SVECR401** *Research Methodology* **(3Cr)**			**SELEP401(1Cr)** (Semiconductor .Lab) **SELEP402(1Cr)** (Embedded Lab) **SELEP403(1Cr)** (Instrumentation Lab) **SELEP404(1Cr)** (C-Prog. Lab)	**22**	**44**
	2	**SELEC451(4Cr)** (Digital System Design) **SELEC452(4Cr)** (Fiber Optics Communication) **SELEC453(4Cr)** (Network Analysis)	**SELEE45**1(3Cr) Introduction to JAVA **OR** Digital Image Processing	**---**	**SELEOJ451 (3 Cr)**	--	**SELEP451(1Cr)** (Digital Lab) **SELEP452(1Cr)** (Fiber optics Lab) **SELEP453(1Cr)** (Network Lab) **SELEP454(1Cr)** (Java-Lab)	**22**	
Exitoption:ExitOptionwithPGDiploma*(after2024-25)*									
2	3	**SELEC501(4Cr)** (Electrodynamics) **SELEC502(4Cr)** (Communication Electronics) **SELEC503(4Cr)** (Industrial Process Control)	**SELEE501(4Cr** ***(FromsameDepartment/School)*** Analog Circuit Design **OR** Introduction to Web Technologies	--		Research Project **SELER551 (4 Cr)**	**SELEP501(1Cr)** (Communication Lab-I) **SELEE502(1Cr)** (PLC Lab-II)	**22**	**44**
	4	**SELEC551(4Cr)** (Power Electronics) **SELEC552(4Cr)** (Mechatronics and robotics)	**SELEE551(4Cr)** ***(FromsameDepartment/School)*** Programming in Python **OR** Signal & System	**SVECP551** Publication Ethics **(2Cr)**		Research Project **SELER552 (6 Cr)**	**SELEP551(1Cr)** (Power Electronics Lab-III) **SELEE552(1Cr)** (Robotics Lab-IV)	**22**	
Total Credits		**44**	**14**	**05**	**03**	**10**	**12**	**88**	

M. Sc. Second Year Semester III
Teaching Scheme

	CourseCode	CourseName	CreditsAssigned			TeachingScheme (Hrs/week)	
			Theory	Practical	Total	Theory	Practical
Major	**SELEC501**	Electrodynamics	04	--	**04**	04	--
	SELEC502	Communication Electronics	04	--	**04**	04	--
	SELEC503	Industrial Process Control	04	--	**04**	04	--
Elective(DSE)	**SELEE501**	Analog Circuit Design OR Introduction to Web Technologies	04	--	**04**	04	--
Research Project	**SELER551**	Research Project	04	--	**04**	04	--
ELE/DSE Practical	**SELEP501**	Communication Lab-I	--	01	**01**	--	02
	SELEP502	PLC Lab-II	--	01	**01**	--	02
Total Credits			**20**	**02**	**22**	**18**	**04**

M.Sc. Second YearSemesterIV

TeachingScheme

	CourseCode	CourseName	CreditsAssigned			TeachingScheme (Hrs/week)	
			Theory	Practical	Total	Theory	Practical
Major	**SELEC551**	Power Electronics	04	--	**04**	04	--
	SELEC552	Mechatronics and robotics	04	--	**04**	04	--
Elective(DSE)	**SELEE551**	Programming in Python OR Signal & System	04	--	**04**	04	--
ResearchMethodology	***SVECP551***	Publication Ethics	02		**02**		
Research Project	**SELER552**	Research Project	04	--	**04**	04	--
ELE/DSE Practical	**SELEP501**	Power Electronics Lab-III	--	01	**01**	--	02
	SELEP502	Robotics Lab-IV	--	01	**01**	--	02
Total Credits			**18**	**02**	**20**	**18**	**04**

SELEC501 : Electrodynamics

Periods : 60 Hours **Max Marks:100 (ESE:80+CA:20)** **Credits :4**

Course Objective

1. Gain a deep understanding of the foundational principles of electromagnetism, including Maxwell's equations
2. Develop proficiency in the mathematical tools and techniques essential for solving complex problems in electrodynamics
3. Investigate the propagation and characteristics of electromagnetic waves, including their interaction with different media

Course Outcomes

After learning this course student will be able to

1. Understand basic concepts of electrostatics and magneto statics.
2. Analyse Maxwell's equation in different forms.
3. Examine the phenomena of wave propagation in different media and its interfaces and in applications of microwaves.
4. Analyse the nature of electromagnetic wave propagation in guided medium that are used in microwave applications.

Unit	Topic	No. of Hrs
I	Electrostatics - Vector calculus, Coulomb's law, Gauss's Law, Electric Dipole, Polarization in Dielectrics, Continuity equation, Laplace and Poisson's equations Magnetostatics – Biot Savert's law, Ampere's law and electromagnetic induction, Magnetic Dipole.	**15**
II	Transmission lines – Types of transmission lines, Transmission line parameters and equations, reflections and voltage standing wave ratio, line impedance, normalized impedance and admittance, Smith chart construction and applications, single stub and double stub matching Waveguides- Concept of waveguides, frequency range, relation to transmission lines, Rectangular waveguides: TM and TE Modes Microwave Sources and Devices -Reflex Klystron, Magnetron, TWT, Gunn diode, IMPATT diode, Crystal Detector and PIN diode.	**15**
III	Electromagnetic Waves Maxwell's equations and Wave equations, Plane wave propagation in free space, dielectrics and conductors, boundary conditions, skin depth, Poynting theorem, Reflection and refraction, polarization, interference, coherence and diffraction	**15**
IV	Antennas – Retarded potential and Hertzian dipole, Radiation fields of elemental dipoles, antenna patterns and radiation parameters, Thin Linear Antenna, Antenna Arrays, Receiving Antennas, Travelling Wave Antenna, Yagi-Uda Antenna, Broadband Antennas, Aperture Antennas, Frii's free space receiver power equation.	**15**

References:

1. Microwave Devices and Circuits- Samuel Y. Liao, PHI, 3rd Edition, 2002.
2. Principles of Electromagnetics- N. Sadiku, Oxford University Press.
3. Schaum's Electromagnetics, Second Edition, Joseph A. Edminister, 2nd edition
4. Field and Wave Electromagnetics – David K. Chang, 3rd edition, Pearson education, 2009

SELEC502: Communication Electronics

Periods : 60 Hours **Max Marks:100 (ESE:80+CA:20)** **Credits :4**

Course Objectives

1. To enable the students to understand communication engineering in order to familiarize with the concepts of data communications
2. Impart the basic concepts of analog and digital modulation schemes
3. To enable the students to understand Satellite Systems

Course Outcomes

After learning this course student will be able to

1. Describe basic concept of communication system, types of noise affecting communication system, noise parameters and Understand the behavior of nature on Radio Wave propagation
2. Illustrate various Digital Transmission Techniques.
3. Evaluate and test various Modulation and Demodulation Technique Circuits

Unit	Topic	No. of Hrs
I	Introduction to communication systems and Radio Wave propagation, Basics of Communication systems, Modulation and Bandwidth requirements, Need of modulation. Noise: External - Atmospheric, Extra-terrestrial, Industrial, Internal - thermal agitation, shot, transit time, Noise Calculations, noise figure, signal to noise ratio. Propagation of waves: Ground waves, sky-wave propagation, ionosphere, space waves, tropospheric scatter propagation.	**15**
II	Digital Communication Systems: A/D and D/A converter, Coded communication, AM, PWM, PPM, PCM, delta modulation, adaptive delta modulation, quantization and noise consideration. Digital Transmission and Reception: Timing, base band systems, ASK, FSK, PSK, QAM.	**15**
III	Error detection and coding: Parity check, CRC, Hamming distance, Hamming codes, Cyclic codes, line synchronization codes, Manchester code, NRZ coding, Walsh codes	**15**
IV	Satellite Systems: History of satellite communications, Orbital mechanics, Look angle determination, Orbital perturbations, Satellite subsystems – AOCS, TTC and M, power systems, communications subsystems, satellite antennas, Satellite frequency bands, satellite Multiple access formats	**15**

References:

1. Analog and Digital Communication systems- M.S. Roden, 3rd Edition, Prentice Hall of India.
2. Modern Digital and Analog Communication Systems- B.P. Lathi.
3. Satellite Communication" by D.C. Agrawal and A. K. Malini

SELEC503: Industrial Process Control

Periods : 60 Hours **Max Marks:100 (ESE:80+CA:20)** **Credits :4**

Course Objective

1. Understand the operation of a PLC
2. Understanding of PLC programming, ladder logic.
3. to clear idea about Control loop Characteristics

Course Outcomes

After learning this course student will be able to

1. Identify the basic elements of process control system.
2. Explore the operational modes of various process Controllers.
3. Select different control parameters for the optimal performance of control system.
4. Develop the PLC program for discrete state process control.

Unit	Topic	No. of Hrs
I	Introduction to Process Control Introduction to Control System, Open loop and closed loop control system, Feedback and Feed forward system, Process-Control Block Diagram, Control System Evaluation Analog and Digital processing.	**15**
II	Control loop Characteristics Control system Configuration, Multivariable Control System, Control System Quality and Stability, Process-loop tuning, Stability criterion: Routh-Hurwitz and Nyquist plot	**15**
III	PLC hardware Types of PLC, CPU unit architecture, Memory classification, Input/output devices and it's interfacing, Digital-Analog modules, Communication modules, Special function modules.	**15**
IV	PLC Ladder Programming Programming languages for PLC, PLC module addressing, registers basics, basic relay instructions, timer-counter instructions, arithmetic functions, comparison functions, data handling, data move functions, input-output instructions, sequencer instructions, Case studies	**15**

References:

1. Process Control Instrumentation Technology, Curtis D. Johnson, Eighth Edition,(2008)
2. Control System-I,U.A. Bakshi, V.U. Bakshi, Technical Publications, 3rd Edition, (2012)
3. Programmable Logic Controllers, W. Bolton,4th Edition, 2006
4. Practical SCADA for Industry David Bailey BEng, Bailey and Associates, Perth, Australia (2003)

SELEE501: Analog Circuit Design

Periods : 60 Hours **Max Marks:100 (ESE:80+CA:20)** **Credits :4**

Course Objective

1. Understand the fundamental principles of analog electronics
2. Study the characteristics and applications of operational amplifiers
3. To Understand the fundamental of Power supply designing

Course Outcomes

After learning this course student will be able to

1. Design and analyze analog electronics systems
2. Understand the design of power supply
3. Learn different filters
4. Design and understand the amplifiers

Unit	Topic	No. of Hrs
I	Design of Power Supply: Simple op-amp voltage regulator, Three terminal voltage regulators, Fixed and adjustable voltage regulators (78XX, LM317), Heat sink, Dual power supply (LM320, LM317), Basic switching regulator and its characteristics	**15**
II	Oscillators: Sinusoidal oscillators, Phase-shift oscillator, Resonant circuit oscillators, A general form of oscillator circuit, Wien bridge oscillator, Crystal oscillators, Frequency stability	**15**
III	Amplifiers: Classification of Amplifiers, Feedback Concept, Transfer Gain with Feedback, General Characteristics of Negative Feedback Amplifiers, Input Resistance, Output Resistance, Method of Analysis of a Feedback Amplifier, Voltage Series Feedback, A Voltage Series Feedback Pair, Current Series Feedback, Current Shunt Feedback,Voltage Shunt Feedback	**15**
IV	Filters: Active Filters: Ideal Responses, Approximate Responses, Passive Filters, First-Order second order, low pass , Band pass , Band reject filter ,butterworth filter, filter designing	**15**

References:

1.Electronics Device and Circuits by Jacob Milman, Christos C. Halkias, Chetan D. Parikh, Tata Macgraw Hill Publication [Second Edition].

2. Electronics Principles by Albert Malvino [seventh Edition]

3. Op-amps and Linear Integrated Circuits, Ramakant A. Gaikwad, Fourth Edition, PHI

SELEE501: Introduction to Web Technologies

Periods : 60 Hours **Max Marks:100 (ESE:80+CA:20)** **Credits :4**

Course Objective

1. Understand the basics of the internet and web terminologies
2. Understand the basic concepts of the Web and its architecture and components
3. Learn about the fundamental tools and technologies for web design
4. Be able to create web pages using HTML and CSS

Course Outcomes

After learning this course student will be able to

1. Design static web pages using HTML
2. Understand the concept behind web designing
3. Learn about static and dynamic web sites

Unit	Topic	No. of Hrs
I	Historical Roots of HTML, Web page, Website, Structure of HTML documents and Basic Tags: HTML, HEAD, TITLE, BODY. Formatting Tags: Paragraph Tags, List tags, HR Tag. Headings Tags, PRE tag, DIV tag, SPAN tag, Text-Level Elements: B tag, I tag, U tag, SUP tag, SUB tag, BIG tag, SMALL tag, STRIKE tag & other different formatting tags.	15
II	WWW, Web browser. Web server, Web protocols: URL, Hyperlink (Anchor) Tag &it's all attributes, Creating Email Hyperlinks (using mailto anchor). The Role of Images on the Web, <img> tag &its all attributes, Using Images as links Tables in HTML:- TABLE, TR, TH, TD tag with example, table with all Attributes	15
III	Frames in HTML: FRAMESET & FRAME tags & its attributes, Simple Frame Example. Forms in HTML: Introduction to forms. FORM element & it's attributes (Action,Method(GET, POST), Name) Form controls: Text Controls, Password Field, Multiline Text Input, Pull-Down Menus, Check Box, Radio Buttons, Scrolled List, Reset ,Button and Submit button.	15
IV	Introduction of DHTML, Ramifications of DHTML. Rollover Buttons. Introduction to Cascading Style Sheets (CSS). Embedded Styles, Inline Styles, Imported/External Styles, Style Sheet Example.	15

References:

1. HTML The complete Reference -2nd Edition Thomas A Powel Tata McGraw Hill publication

2.The complete Reference (HTML & XHTML)-5th Edition Thomas A Powel Tata McGraw Hill publication

3.Computer Fundamental s (6 th Edition) P. K. Sinha BPB Publication

SELEP501: Communication Lab-I

1) To study the digital communication ASK
2) To study the Am modulation Transmission and receiver
3) To Study time division Multiplexing
4) To study Error code detection
5) To study PCM
6) To study PPM

SELEE502: PLC Lab-II

1. Automatic indication of water tank level using PLC
2. Study of Traffic lights indication using PLC
3. Study of Logic Gates using PLC
4. Forward and Reverse direction control of Motors using PLC
5. Study of water bottle filling plant
6. Introduction of SCADA system

SELEC551: Power Electronics

Periods : 60 Hours **Max Marks:100 (ESE:80+CA:20)** **Credits :4**

Course Objective

1. To introduce students to the basic theory of power semiconductor devices and passive components, their practical applications in power electronics.
2. To familiarize students to the principle of operation, design and synthesis of different power conversion circuits and their applications.
3. To provide strong foundation for further study of power electronic circuits and systems

Course Outcomes

After learning this course student will be able to

1. Design and Analyze power converter circuits and learn to select suitable power electronic devices by assessing the requirements of application fields
2. Describe basic operation and compare performance of various power semiconductor devices, passive components and switching circuits
3. Identify the critical areas in application levels and derive typical alternative solutions, select suitable power converters to control Electrical Motors and other industry grade apparatus.

Unit	Topic	No. of Hrs
I	Introduction to power electronics: Power semiconductor devices: Power diodes, thyristors, power MOSFETs, power transistors, IGBT, Thyristor firing circuits: Limitations of di/dt and dv/dt ratings, main features of firing circuits, R and RC firing circuits, UJT firing circuit. Commutation Techniques	**15**
II	Phase controlled rectifiers**:** Single phase half wave rectifiers: with R load, RL load, RL load with freewheeling diode, RLE load. Single phase full wave converters: Single phase semi converters, single phase two pulse converters with continuous and discontinuous current. Three-phase converter: System using diodes and thyristors, three-phase full converters, three phase semi converters, dual converters.	**15**
III	AC Voltage controllers: Types of AC voltage controllers, integral cycle control, single phase voltage controllers, with R and RL loads, single-phase sinusoidal voltage controllers, working of three-phase controllers with star & delta loads. Cycloconverters: Principle of cyclo converter operation, single-phase to single-phase circuit, step-up and step-down cyclo converter.	**15**
IV	Inverters: Principle of operation, single-phase voltage source inverters, basic series and parallel inverter circuits, types of inverters, voltage control in single-phase inverters, pulse-width modulated inverters, current source inverters. Choppers: Basic principle, control strategies, step-up and step-down choppers, types of chopper circuits, Switching-mode regulators- buck regulators, boost regulators, buck-boost regulators, cuk regulators.	**15**

References:

1. Power Electronics: Bimbhra P S, Khanna Publishers, 2003.
2. Power Electronics Circuit devices and applications: Rashid M H, PHI.
3. Thyristor Engineering: Berde, M S Khanna publishers.
4. Power Electronics: Vedam Subrahmanyam, New Age International, 2002.

SELEC552: Mechatronics and robotics

Periods : 60 Hours **Max Marks:100 (ESE:80+CA:20)** **Credits :4**

Course Objective

1. Understand key elements of Mechatronics system, representation into block diagram
2. Understand concept of transfer function, reduction and analysis
3. Understand principles of sensors, its characteristics, interfacing with DAQ microcontroller

Course Outcomes

After learning this course student will be able to

1. An ability to design, analyze, and optimize mechatronic products
2. An ability to identify, select, and integrate mechatronic components to meet product requirement
3. Understanding different translational motions in robotics

Unit	Topic	No. of Hrs
I	Introduction to Mechatronics: what is mechatronics, an overview of - the design process, various systems in mecharonics such as embedded systems, modeling systems, measurement systems, control systems, examples of mechatronic systems Sensors and Transducers: Introduction to sensors and transducers, sensitivity analysis, effect of component variation, measurement of motion, digital sensors for motion measurement,force, torque and tactile sensors,vibration- acceleration sensors, flow measurement, temperature sensors and devices, applications of sensors	**15**
II	Mechanical actuation systems: mechanisms and their role in mechatronic systems, translational and rotational motion – degrees of freedom, kinematic chains – examples of links, toggle linkage, slider-crank etc. cams, gears – types, gear trains, gear ratios, uses of rotation-to-translational motion – rack and pinion, ball screw and links, Ratchet and pawl, belt and chain drives,	**15**
III	Basic system models: Mechanical (translational and rotational) system building blocks, electrical system building blocks, electrical and mechanical analogies and their use in analysis, basic idea of fluid system building blocks and thermal system building blocks System models- Engineering system models, rotational-translational systems, electromechanical systems, linearity	**15**
IV	Artificial intelligence-basic ideas, meaning, perception and cognition, reasoning and learning Communication Systems- meaning of centralized hierarchical and distributed control. Parallel and serial data transmission, modes of serial data transmission, types of networks and methods of network access control Meaning of and basic elements of protocols, open systems interconnection communication model, serial communication interfaces, parallel communication interfaces, wireless protocols	**15**

References:

1. Mechatronics: Electronic Control Systems in Mechanical and El
2. Robotics Engineering – An integrated approach. By Richard W. Klafter, Thomas A.
3. Chmielewski and Michael Negin, PHI Learning Pvt. Ltd.

SELEE551: Programming in Python

Periods : 60 Hours **Max Marks:100 (ESE:80+CA:20)** **Credits :4**

Course Objective

1. To learn the basics of Python syntax, including variables, data types, operators, conditional statements, loops, functions, and files.
2. To be able to write simple Python programs that solve real-world problems.
3. To learn about object-oriented programming in Python.

Course Outcomes

After learning this course student will be able to

1. Create an application with the support of graphics in Python.
2. abele to write program in Python IDLE
3. To learn how to design and program Python GUI
4. to learn 2D and 3D graphics

Unit	Topic	No. of Hrs
I	Introduction, Python Basics: Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting, Your Program. Flow control: Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements	**15**
II	Functions: def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling. Lists: The List Data Type, Working with Lists, Augmented Assignment Operators, Met	**15**
III	Lists: The List Data Type, Working with Lists, Augmented Assignment Operators, Methods.Dictionaries and Structuring Data: The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things, Manipulating Strings - Working with Strings, Useful String Methods.	**15**
IV	Visualization using 2D and 3D graphics: Visualization using graphical objects like Point, Line, Histogram, Sine and Cosine Curve, 3D objects	**15**

References:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition,
2. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley
3. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education

SELEE551: Signal & System

Periods : 60 Hours **Max Marks:100 (ESE:80+CA:20)** **Credits :4**

Course Objective

1. To describe various signals and systems mathematically and understand how to perform mathematical operations on them.
2. Also familiar with commonly used signals such as the unit step, ramp, and impulse function, sinusoidal signals, complex exponentials and their operations.
3. Analysis using Fourier series and Fourier transform for a given signal.

Course Outcomes

After learning this course student will be able to

1. On completion of the course, student will be able to
2. Understand mathematical description and representation of continuous and discrete time signals and systems.
3. Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system

Unit	Topic	No. of Hrs
I	**Introduction:** Definitions of a signal, classification of signals, basic operations on signals, elementary signals, discrete time signals, sampling process and nyquist rate. Definition of a system, systems viewed as interconnections of operations, properties of systems.	**15**
II	**Time-domain representations for LTI systems:** convolution integral and convolution sum and their properties, properties of LTI systems, impulse and step response, differential and difference equation representations and their block diagram representations.	**15**
III	**Fourier series representation for signals:** Introduction, discrete time and continuous time Fourier series and their properties, problems. Discrete and continuous time Fourier transforms and their properties. parseval's relationship, time bandwidth product, duality property.	**15**
IV	**Laplace Transform:** The Laplace transform, unilateral Laplace transform and its inversion, properties, solving differential equations, properties of bilateral Laplace transform and ROC, inversion of bilateral Laplace transform, analysis of LTI systems using Laplace transforms, transfer function, causality and stability, frequency response from poles and zeros.	**15**

References:

1. Signals and Systems: Simon Haykin, Barry Van Veen, John Wiley India, 2ndEdn, 2008.

2. Signals and systems: Alan V Oppenheim, Alan S Willsky and Hamid Nawab, ,PHI, 2nd edition, 2002.

SELEP551: Power Electronics Lab-III

1) To obtain the V-I characteristics of SCR (Silicon Controlled Rectifier).
2) To obtain the V-I characteristics of TRIAC for both forward and reverse biased conduction
3) To study triggering of (i) IGBT (ii) MOSFET (iii) power transistor
4) To study single phase cyclo-converter
5) To study operation of IGBT/MOSFET chopper circuit
6) To study single-phase ac voltage regulator with resistive and inductive loads.

SELEE552: Python Lab Practical-IV

1. Write a Program for checking whether the given number is a even number or not.
2. Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
3. Write a program to compute the number of characters, words and lines in a file.
4. Find mean, median, mode for the given set of numbers in a list.
5. Write a script that imports requests and fetch content from the page. Eg. (Wiki)
6. Write a GUI for an Expression Calculator using token

Research Project Guidelines

M. Sc.-II (Electronics)/Semester III/IV students will have project.

The Projects will be evaluated at the time of final examination, jointly by the external and internal examiners, by conducting viva and demonstration of the project work.

[Note:- Not more than 6 to 8 projects be evaluated by a single external examiner]

A copy of the project work be made available to the external examiner at least a day before the actual date of examination.

GUIDELINES FOR PROJECTS:

1. The Project experiment should be open ended
2. It may be based on any topics of the syllabus
3. It may be based on collection of data and then analysis leading to some meaningful conclusion
4. It may be based on review of a suitable research topic
5. It may be based on development of a new idea and design/fabrications
6. It may consist of hardware and software

PRESENTATION OF THE PROJECT:

Actual presentation format of the project may be decided by the teacher and the student. However, the following guidelines are given for general consideration.

1. At least four copies of the project be submitted.
2. It should be typed on sunlit bond A4 paper, single side with one and half/double - spacing.
3. The project should be of 30 to 40 pages.
4. It should be duly certified by the project supervisor and countersigned by the Head of the Department.
5. The project record should include information under the following/suitable heads:

(a) Introduction

(b) Theory (Related to the project)

(c) Experimental details

(d) Observations and Graphs, if any

(e) Results and discussion

(f) References