Anekant Education Society's
Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati
Autonomous

Course Structure & Credit Distribution for
S. Y. B. Sc. (Electronics) (Sem. IV) (2022 Pattern)
(w.e.f. June, 2023)

Semester	Paper Code	Title of Paper	No. of Credits
IV	USEL241	Fundamentals of Instrumentation system	3
	USEL242	Communication Electronics	3
	USEL243	Practical Course	3

SYLLABUS (CBCS) FOR S. Y. B. Sc. (Electronics)

(w.e.f. June, 2023)

Class: S.Y. B. Sc. (Sem IV) (2022 Pattern)

Paper Code : USEL241

Title of Paper: Fundamentals of Instrumentation system

Paper : I

Credit : 3 **No. of lectures: 48**

Course Objectives:

1. To study the block diagram of electronic instrument.
2. To understand the working principles of popular instruments.
3. To know important technical specifications of instruments.
4. To learn the operating procedure of instruments.
5. To understand basic concepts and definitions in measurement.
6. Elaborate discussion about the importance of signal generators and analyzers in Measurement.
7. To study the instrumentation systems and perform its applications.

Course Outcomes:

After completing the course student will able to

1. To understand the performance characteristics of instruments and fundamentals of measurement.
2. To learn the construction, working principles of electrical/ analog instruments, digital instruments.
3. To know the calibration procedure of electrical instruments.
4. Apply fundamental knowledge of measurement in monitoring various electrical instruments.
5. Extend the ranges of analog instruments.
6. Use the knowledge of performance characteristics for selection and use of Instruments.
7. Understand construction, working principle and types of oscilloscopes.

Unit1: Fundamentals of Measurement : **(12)**

Introduction, Block diagram of Instrumentation system, Need of Instrumentation, General Measurement System, Classification of Instruments, Static and Dynamic characteristics of instruments, Measurement of physical parameters, measurement system block diagram,Measurement characteristics like accuracy, precision, sensitivity, linearity, resolution, reliability, repeatability, errors.types of error.

Unit : Digital Instruments : **(12)**

Introduction to digital instruments, Advantages of Digital instruments over Analog instruments, Block diagram, principle of operation, Accuracy of digital instruments,Its applications in digital instruments,Construction and working principles of Digital Multimeter, Volt meter, Current meter, multi-meter. Digital Clamp meter.

Unit3: Signal sources and Oscilloscope: **(12)**

Principle, block diagram, working and important specifications of signal and function generators, sweep generator, single trace CRO, dual channel and dual trace CRO comparison and applications, Concept of Digital Storage Oscilloscope (DSO).

Unit 4: Power Supplies: **(12)**

Principle, block diagram, working, important specifications , Fixed voltage power supply, variable power supply, dual power supply, CVCC supply, SMPS, d.c to d c converter, Types and applications.

Recommended Books:

1. Helfrik A. & Copper W., Modern Electronic Instrumentation and measurement techniques, PHI.
2. Kalsi H. S., Electronic Instrumentation, TMH.
3. Bouwens, Digital Instrumentations, TMH
4. Rashid Muhammad H, Power Electronics, PHI
5. B. S. Sonde, Power Supplies, TMH

Course Outcome	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	3	1	-	-	-	-	-	-
CO2	-	2	1	-	-	-	-	-	-
CO3	2	3	2	2	-	1	-	-	-
CO4	1	1	-	2	-		-	-	-
CO5	1	2	3	1	-	1	-	-	-
CO6	2	2	1	3	-	-	-	-	-
CO7	1	-	2	1	-	-	-	-	-

Justification For The Mapping:

PO1:Disciplinary Knowledge:

CO1: Students to Understanding the performance characteristics of instruments and fundamentals of measurement.

CO3:Student to development through the ability to ensure accurate measurements for Instruments .

CO4:By applying knowledge to monitor various electrical instruments, students demonstrate their ability to use acquired theoretical concepts.

CO5: Students to give knowledge for the basic measurements of instruments.

CO6: Students to understand the Study by various parameters characteristics of Instrumentation system.

CO7: Students will get Understand and knowledge of basic of oscilloscope and its Application.

PO2: Critical Thinking and Problem solving:

CO1: Students it requires evaluating the significance of these characteristics and their impact on measurements.
CO2:Critical thinking is applied in understanding the intricate details of instrument construction and working principles.
CO3: Students Knowledge of calibration requires thoughtful consideration of variables, and adjustments, showcasing critical thinking in the application of measurement principles.
CO4:Students must analyze data, identify anomalies, and problem-solve to ensure proper functioning.
CO5:Students must assess limitations, propose modifications, and anticipate potential challenges.
CO7:Understanding their construction, working principles, and types etc.

PO3: Social Competence:

CO1**:**The ability to articulate measurement principles contributes to collaborative problem-solving.
CO2:students engage in collaborative learning to understand instrument construction and working principles.
CO3:Communicating effectively about calibration processes ensures a shared understanding, contributing to the collective knowledge base.
CO5: Students to give knowledge to provide the concept of working place at groups.
CO6: Students to developing the skill of Instruments and its basic uses etc
CO7: students will get able and clearly understand the concept of oscilloscope and Instrumentation system.

PO4: Research related skills and Scientific temper:

CO3: Students understanding calibration procedures, as accurate measurements are crucial in scientific experiments.for research related.
CO4**:** students Knowing the calibration procedure of electrical instruments is a foundational skill in research-related activities.
CO5: Students understanding that experimentation and continuous improvement are inherent to the research process.
CO6: Students understanding concept uses of instruments i.e analog and digital instruments For practically. And theoretically.
CO7: Students to able and interview of measurement systems concepts.

PO6: Personal and Professional competence:

C03: students will knowledge to monitor various electrical instruments, students demonstrate their ability to use.
CO5: Students knowledge about to the theory and practical for the basic measurements and instruments.

SYLLABUS (CBCS) FOR S. Y. B. Sc. (Electronics) (w.e.f. June, 2023)

Class: S.Y. B. Sc. (Sem IV) (2022 Pattern)

Paper Code : USEL242

Title of Paper: Communication Electronics

Paper : II

Credit : 3 **No. of lectures: 48**

Course Objectives:

1. To study basics of communication systems.
2. To understand telephone system.
3. To understand Amplitude Modulation.
4. To understand AM demodulation techniques.
5. To understand Frequency Modulation.
6. To understand demodulation techniques.
7. To learn the Digital communication system

Course Outcomes:

CO1: Understand and identify the fundamental concepts and various components of communication systems.

CO2: Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system

CO3: Develop the ability to compare and contrast the strengths and weaknesses of various communication systems

CO4: Define the need of modulation for communication systems

CO5: Explain the behavior of the communication systems in the presence of noise.

CO6: Compare the different analog and digital modulation schemes for transmission of information.

CO7: Calculate the bit error rate for different digital modulation schemes.

CO8: Analyze the received signal with the optimum detection over the band-limited channel.

UNIT- 1: Basics of communication and telephone systems (12)

Block diagram of communication system, Types of electronic communication systems: analog and digital communication, base band and broad band communication, simplex and duplex communication, Noise in communication, classification of noise, Signal to noise ratio, Noise figure, Noise temperature. Problems based on noise calculations.

Principle of telephony, Telephone handset, Telephone exchange : Working, Functions and classification, Tones in telephones, pulsed and DTMF dialing, Block diagram of PSTN.

UNIT- 2: Amplitude Modulation and AM Receiver (12)

Need, Concept and types of modulation, AM waveform, mathematical expression of AM, Modulation index, Concept of side band and power distribution, Single side band communication and Vestigial side band transmission, AM using diode and transistor.

AM Receiver: Crystal, TRF and super-heterodyne receiver, characteristics of receiver: Sensitivity, Selectivity, Distortion, Dynamic range, Intermediate frequency, Image rejection.

UNIT-3: Frequency Modulation and FM receiver (12)

FM modulation: definition, mathematical expression, frequency spectrum, bandwidth for FM.

FM using varactor diode, Block Diagram of FM Receiver.

FM Demodulator: Slope detector, Balanced slope detector, Foster-Seeley detector.

UNIT- 4: Pulse Digital Communication Systems (12)

Block diagram of digital communication system, bit rate, baud rate. Serial and parallel communication, concept of sampling, Sampling theorem, Concepts of ASK, FSK, PSK, PAM, PWM, PPM, PCM, FDM ,TDM, MODEM, and Set Top Box.

Recommended Books:

1. Communication Electronics : Principles and applications by Louis E Frenzel 3rd edition TMH Publications.
2. Electronics Communication Systems : Keneddy
3. Telecommunication Switching Systems and Network: Vishwanathan Thiagarajan, PHI publication.
4. Electronics Communication Systems by Denis Roddy, John Coolen, PHI publication.

Course Outcome	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	2	2	1	-	-	-	1	-
CO2	1	1	-	2	2	-	-	-	-
CO3	2	2	-	-	-	-	1		-
CO4	2		2	-	-	-	-	-	-
CO5	-	1		-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	1
CO7	1	-	2	-	-	-	-	-	-

Justification For The Mapping:

PO1:Disciplinary Knowledge:

CO1: Students focused on understanding the fundamental concepts and components of communication systems, which aligns with the goal of developing disciplinary knowledge in communication Electronics.

CO2: Students will understand the technical aspects of signal to noise ratio, noise figure, and noise temperature, understanding of the Principles and considerations in communication system design.

CO3: Students will comparing and contrasting various communication systems demonstrates the ability to critically analyze and evaluate different technologies.

CO4:The importance of modulation in communication systems, indicating a practical understanding of the mechanisms that enhance signal transmission.

CO7: Students will be get Understand concept of communication system and its Applications.

PO2: Critical Thinking and Problem solving:

CO1: Students will critical thinking by laying the foundation for understanding fundamental concepts and components in communication systems.

CO2: Students will understand that communication Methods.

CO3:This process involves higher-order thinking skills, such as synthesizing information, making informed judgements for Communication skills.

CO5: Students will able to understand Basic method,use types of communication system.

PO3: Social Competence:

CO1:Students are better equipped to engage in meaningful conversations within social and professional settings about the knowledge of basic communication system.

CO4: students finally will understand get knowledge about the Various parameters and t types of Modulation.

CO7:This understanding can be valuable in collaborative projects and decision-making processes where communication reliability is a critical factor.

PO4: Research related skills and Scientific temper:

CO1: Students will be Understanding fundamental concepts in communication systems is the starting point for any research endeavor in this field.

CO2: Students to analyze existing research, and identify gaps for further methods of communication system .

PO5:Trans-disciplinary knowledge:

CO5**:** Students will get knowledge on circuit designing using communication system .

PO7: Effective Citizenship and Ethics:

CO3**:** Students to Evaluating the strengths and weaknesses of communication systems requires a consideration of ethical implications.

PO8: **Environmental and Sustainability:**

CO1:Students can use this knowledge to propose and implement sustainable practices in the design and maintenance of communication technologies.

PO9:Self -directed and Life long learning:

CO6:Students gain the ability to approach unfamiliar challenges with a systematic and self-directed mindset.

SYLLABUS (CBCS) FOR S. Y. B. Sc. (Electronics) (w.e.f. June, 2023)

Class: S.Y. B. Sc. (Sem IV) (2022 Pattern)
Paper Code : USEL243
Title of Paper: Practical Course
Paper : III
Credit : 3 **No. of lectures: 48**

Course Objectives:

1. To make use of different basic concepts for building different applications.
2. To understand design procedures of different electronic circuit as per requirement.
3. To build experimental setup and test the circuits.
4. To develop skills of analyzing test results of given experiments.

Course Outcomes:

1. Design and implement hardware circuit to test performance and application in communication electronics.
2. Design any power supply circuit and test it.
3. Design any instrumentation based application circuit and test it.
4. Design and test analog modulation circuit.
5. To understand the benefits of electronics in communication systems.
6. Design, Build and test modulator and demodulator.
7. Develop op-amp based circuits.

List of Practical (Instrumentation): Any Four

1. Temperature measurement system using LM – 35
2. Study of Function generator
3. Multi-range voltmeter
4. Variable power supply using IC 317.
5. Study of CVCC/SMPS.
6. Study of LDR based system

List of Practical (Communication Principles): Any Four

1. Design, Build and test Amplitude Modulator and Demodulator.
2. Design, Build and test Frequency Modulator and Demodulator.
3. Time Division Multiplexing circuit.
4. Frequency Shift Keying(FSK) using XR 2206
5. Study of PAM,PPM and PWM
6. Delta Modulation circuit using opamp.

Activity : Any One

1. Internet Survey of Recent Trends in Electronics.
2. Seminar
3. Group Discussion
4. Hobby Project

***8 experiments and one activity are compulsory.**

Course Outcome	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	-	-	2	1	1	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-
CO3	1		-	3	-	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-
CO5	1	1	1	2	-	-	-	-	-
CO6	2	2	-	1	-	-	-	-	-
CO7	1	1	-	-	-	-	-	-	-

Justification For The Mapping:

PO1:Disciplinary Knowledge:

CO2: Students to design and testing of a power supply circuit contribute to the application of disciplinary knowledge.

CO3: students will be get prepare the practical application of knowledge in electronic instrumentation and testing.

CO4: Students to Designing and testing analog modulation circuits involve the practical application of knowledge in communication Electronics.

CO5: Students get benefits of electronics in communication systems.and application.

CO6: students will get knowledge in designing and testing modulator and demodulator circuits.

CO7: Students we have to Developing op-amp based circuits requires applying disciplinary knowledge in electronic circuits.

PO2: Critical Thinking and Problem solving:

CO2: students will have a Designing a power supply circuit requires critical thinking to choose components and solve potential issues.

CO4:Designing and testing analog modulation circuits involve critical thinking to choose modulation schemes, analyze signal quality, and troubleshoot issues.

CO5: Students understanding benefits is more critical thinking is still involved in analyzing and evaluating the advantages. Recognizing the benefits of electronics in communication.

CO6:Designing, building, and testing modulator/demodulator circuits require critical thinking to optimize performance in electronic communication.

CO7: Students to Developing op-amp circuits demands critical thinking to choose configurations, analyze circuit behavior, and troubleshoot issues.

PO3: Social Competence:

CO1:The process of designing and implementing hardware circuits for communication electronics involves not only technical skills but also social competence.

CO5: Students will be understanding the basic knowledge social skills and knowledge about principle of communication methods.

PO4: Research related skills and Scientific temper:

CO1:This aligns with research-related skills as it involves designing and implementing circuits, requiring analytical and problem-solving abilities.
CO3: Students to Designing instrumentation circuits involves research to meet specific application requirements.
CO5:Understanding the benefits involves exploring existing knowledge and literature related to electronics in communication. This contributes to research-related skills and scientific temper by gaining insights from existing studies.
CO6: Students to Designing, building, and testing modulator/demodulator circuits involves research and practical experimentation.

PO5:Trans-disciplinary knowledge:

CO1: Students will get knowledge on circuit designing hardware used in Practically.