

**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)**

<b>Semester</b>	<b>Paper Code</b>	<b>Title of Paper</b>	<b>No. of Credits</b>
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**

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### **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	-	-	-	-	-

# **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**

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## **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  
3<sup>rd</sup> 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	-	-	-	-	-	-

**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	-	-	-	-	-	-	-