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

# Course Structure & Credit Distribution for F. Y. B. Sc. Electronic Science (Sem. II) (2022-23)

Semester	Paper	Title of Paper	No. of
	Code		Credits
	USEL121	Semiconductor Devices & Circuits	2
II	USEL122	Digital Electronic Circuits	2
	USEL123	Electronics Practical's	2

# SYLLABUS (CBCS) FOR F. Y. B. Sc. (Electronic Science) (w.e.f. June, 2022)

Class: F.Y. B. Sc. (Electronic Science) (Semester- II)Paper Code: USEL 121Title of Paper : Semiconductor Devices & CircuitsPaper: ICredit: 2No. of lectures: 36

# • Learning Objectives:

- 1. To study characteristic features of semiconductor devices
- 2. To study elementary electronic circuits and applications
- 3. To study applications of semiconductor devices

# • Learning Outcomes:

At the end of this course, students should be able to:

- 1. Getting the fundamental knowledge of electronics components & circuits.
- 2. Identify active and passive components and understand basic circuit theory
- 3. Solve & minimize complex electronic circuits.

## **Unit 1: Basic of Semiconductor**

## (04L)

(10L)

(10L)

Introduction to semiconductor materials, Energy level diagram, Intrinsic & Extrinsic semiconductors, n-type semiconductor, p-type semiconductor.

# Unit 2: Semiconductor Diodes & Circuits

Study of semiconductor active components (w.r.t. symbol, working principle, characteristics, parameters, specifications, applications): P-N junction diode, Zener diode, Varactor diode, Light Emitting Diode(LED),Photo diode, Optocoupler, Rectifiers, clipper and clamper circuits.

# Unit-3:Bipolar Junction Transistor and its applications (12L)

Bipolar Junction Transistor (symbol, types, construction, working principle, I-Vcharacteristics, parameters, specifications),concept of amplifier, transistor as a amplifier, configurations of transistors (CC,CE& CB), Biasing circuit (Potential divider only), DC load line (CE), Q point, ,concept of class A, B, C and class AB amplifiers, transistor as a switch.

## **Unit-4: UJT and FETs**

Uni-Junction Transistor (UJT), Junction Field Effect Transitor (JFET), Metal Oxide Semiconductor Field Effect Transistor (MOSFET) (Symbol, construction, working principle, I-V characteristics), JFET as voltage variable resistor.

# **Reference Books:**

- 1. Basic Electronics: Bernard Grob, McGraw Hill Publication, 8th Revised Edition, 2010
- 2. Electronic Principles: Albert Malvino, David J Bates, McGraw Hill 7th Edition. 2012
- 3. Modern Digital Electronics: R.P. Jain, Mcgraw Hill

# ANEKANT EDUCATION SOCIETY'S TULAJARAM CHATURCHAND COLLEGE of ARTS, SCIENCE AND COMMERCE, BARAMATI (AUTONOMOUS)

# Revised Syllabus (2022-23) F.Y.B.Sc. (Electronic Science) SEMESTER II (2022 Pattern) Paper II : USEL 122 : Digital Electronic Circuits (2 Credits, 36 Lectures) TERM - II

#### **Objectives:**

- 1. To know about different Combinational Circuits.
- 2. To understand sequential circuits working of flip flops.
- 3. To understand Binary different Counters
- 4. To understand different Shift Registers.

#### Learning Outcomes:-

- 1. Design number of combinational circuits using logic gates.
- 2. Design various flip flops, counters and determining outputs.
- 3. Design different types of shift registers.

#### **UNIT 1: Combinational Circuits**

Introduction, Types of Digital Circuits, Comparision, Multiplexer- 2:1 Multiplexer, 4:1 multiplexer, Applications. Demultiplexer - 1 :2 Demultiplexer, 1:4 Demultiplexer, Applications. Encoders - Need, Types of Encoders - Decimal to BCD, Priority Encoder. Decoders - Need, Types of Decoders - BCD to 7 segment decoder. Types of 7 segment display - Common Anode, Common Cathode, IC 7447, IC 7448.

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#### **UNIT 2 : Flip Flops**

Need of Sequential Circuits, types of Flip Flops - RSFF, Clocked RSFF, JKFF, DFF, TFF, Master Slave JKFF, Applications. Concept of Triggering levels - Positive Edge Triggering, Negative Edge Triggering. Positive Edge Triggered FFs, Negative Edge Triggered FFs, Timing Diagrams.

#### **UNIT 3 : Counter and Registers**

Counters : Introduction, Need of Counters, types of Counters : Asynchronous, Synchronous . Binary Counter, 4 bit binary counter, Up Counter, Down Counter, 3 bit Up-Down counter, timing diagrams, Modulus counter - IC 7490 as a decade counter.

Registers :Shift Registers, Left Shift, Right Shift. Type of Shift Registers -SISO, SIPO, PISO, PIPO, IC 7491A 8-bit Shift Register, Applications. Ring Counter, Universal Shift Register, Bidirectional Register.

#### **References :**

- 1. Digital Electronics : Principles, Devices and Applications Anil K. Maini (Wiley)
- 2. Digital Fundamentals Floyd T.N. and Jain R.P. (Pearson Education)
- 3. Digital System Design M. Morris Mano (Pearson Education)
- 4. Digital Principles and Applications Leach, Malvino, Saha (TMH)

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# **ANEKANT EDUCATION SOCIETY'S**

# TULAJARAM CHATURCHAND COLLEGE of ARTS, SCIENCE AND COMMERCE, BARAMATI

#### (AUTONOMOUS)

# Revised Syllabus (2022-23)

F.Y.B.Sc. (Electronic Science) SEMESTER II (2022 Pattern) Paper III : USEL 123 : Electronics Practicals TERM - II

#### **Learning Objectives :**

- 1. To teach students how to draw symbols, timing diagrams, circuit diagrams.
- 2. To develop skill of Circuit Connections.
- 3. To train them to design and analyze circuits for specific purpose.
- 4. To motivate them to work on different mini projects.

#### **Learning Outcomes :**

At the end of this course, students should be able to :

- 1. To identify different devices, ICs and their types.
- 2. To know working of different instruments used in the laboratory.
- 3. To connect circuit and do required performance analysis.

#### Group A : Activities ( Any one )

Perform any one of the following activities with proper documentation.

- a) Hobby Projects
- b) Internet Browsing
- c) Industrial Visit / Live Work Experience
- d) Market Survey of Electronic Systems
- e) Study tour and its Report Writing.

## Group B : Analog Electronics ( Any Four )

- 1. Study of forward and Reverse biased characteristics of PN Junction Diode
- Study of breakdown characteristics and voltage regulation action of Zener diode.
- 3. Study of output characteristics of Bipolar Junction Transistor in CE mode.
- 4. Study of output and transfer characteristics of JFET/MOSFET
- 5. Study of I-V characteristics of UJT and Demonstration of UJT based relaxation oscillator.
- 6. Study of low voltage Half-wave, Full-wave and Bridge rectifier circuits.
- 7. Study of amplification action of BJT.
- 8. Study of clipping circuit (Bias).
- 9. Study of opto-coupler.
- 10. Study of angular response of LED.
- 11. Study of transistor as switch.

## Group C : Digital Electronics ( Any Four )

- 1. Build and Test 8 : 1 MUX/ 1:8 DeMUX using gates.
- 2. Build and Test Keyboard Encoder.
- 3. Build and Test Diode Matrix ROM.
- 4. Study of Flip Flops (RS, JK, D, T types).
- 5. Study of Decade Counter.
- 6. Study of Up/ Down Counter.
- 7. Study of 4 bit Shift Register.
- 8. Study of Decoders