

**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)**

<b>Semester</b>	<b>Paper Code</b>	<b>Title of Paper</b>	<b>No. of Credits</b>
<b>II</b>	USEL121	Semiconductor Devices & Circuits	2
	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 121

**Title of Paper** : Semiconductor Devices & Circuits

**Paper** : I

**Credit** : 2 **No. 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)**

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

**Unit 2: Semiconductor Diodes & Circuits** **(10L)**

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-V characteristics, 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** **(10L)**

Uni-Junction Transistor (UJT), Junction Field Effect Transistor (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

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**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.

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**UNIT 1: Combinational Circuits**

**( 12 )**

Introduction, Types of Digital Circuits, Comparison, 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.

**UNIT 2 : Flip Flops****( 12 )**

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****( 12 )**

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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**F.Y.B.Sc. ( Electronic Science )**

**SEMESTER II ( 2022 Pattern)**

**Paper III : USEL 123 : Digital Electronic Circuits**

**( 2 Credits )**

**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.
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**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**

1. Study of forward and Reverse biased characteristics of PN Junction Diode
2. 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**

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