

**BASIC ELECTRONICS | Syllabus | Marking Scheme | BE First Year Second Part**  
**BASIC ELECTRONICS ENGINEERING**

EX 451

Lecture : 3

Year : I

Tutorial : 1

Part : II

Practical : 3/2

Course Objectives:

- To understand the language of electronics, elements and their functionality
- Basic understanding of analog systems and their applications
- Basic understanding of digital systems and their applications

1. Basic Circuits Concepts (4 hours)

1.1 Passive components: Resistance, Inductance, Capacitance; series, parallel combinations; Kirchhoff's law: voltage, current; linearity

1.2 Signal sources: voltage and current sources; non-ideal sources; representation under assumption of linearity; controlled sources: VCVS, C CVS, VCCS, CCCS; concept of gain, transconductance, transimpedance.

1.3 Superposition theorem; Thevenin's theorem; Norton's theorem

1.4 Introduction to filter

2. Diodes (7 hours)

2.1 Semiconductor diode characteristics

2.2 Modeling the semiconductor diode

2.3 Diode circuits: clipper; clamper circuits

2.4 Zener diode, LED, Photodiode, varactors diode, Tunnel diodes

2.5 DC power supply: rectifier-half wave, full wave (center tapped, bridge), Zener regulated power supply

### 3. Transistor (4 hours)

- 3.1 BJT configuration and biasing, small and large signal model
- 3.2 T and  $\mu$  model
- 3.3 Concept of differential amplifier using BJT
- 3.4 BJT switch and logic circuits
- 3.5 Construction and working principle of MOSFET and CMOS
- 3.6 MOSFET as logic circuits

### 4. The Operational Amplifier and Oscillator (7 hours)

- 4.1 Basic model; virtual ground concept; inverting amplifier; non-inverting amplifier; integrator; differentiator, summing amplifier and their applications
- 4.2 Basic feedback theory; positive and negative feedback; concept of stability; oscillator
- 4.3 Waveform generator using op-amp for Square wave, Triangular wave Wien bridge oscillator for sinusoidal waveform

### 5. Communication System (4 hours)

- 5.1 Introduction
- 5.2 Wired and wireless communication system
- 5.3 EMW and propagation, antenna, broadcasting and communication
- 5.4 Internet / intranet
- 5.5 Optical fiber

### 6. Digital Electronics (11 hours)

- 6.1 Number systems, Binary arithmetic
- 6.2 Logic gates: OR, NOT, AND NOR, NAND, XOR, XNOR gate; Truth tables
- 6.3 Multiplexers; Demux, Encoder, Decoder
- 6.4 Logic function representation
- 6.5 Combinational circuits: SOP, POS form; K-map;

- 6.6 Latch, flip-flop: S-R flip-flop; JK master slave flip-flop; D-flip flop
- 6.7 Sequential circuits: Generic block diagram; shift registers; counters

## 7. Application of Electronic System (5 hours)

- 7.1 Instrumentation system: Transducer, strain gauge, DMM, Oscilloscope
- 7.2 Regulated power supply
- 7.3 Remote control, character display, clock, counter, measurements, data logging, audio video system

### Laboratory:

- 1. Familiarization with passive components, function generator and oscilloscope
- 2. Diode characteristics, rectifiers, Zener diodes
- 3. Bipolar junction transistor characteristics and single stage amplifier
- 4. Voltage amplifiers using op-amp, Comparators, Schmitt
- 5. Wave generators using op-amp
- 6. Combinational and sequential circuits

### References

- 1. Robert Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory" PHI; 8th Edition. 2000
- 2. Thomas L. Floyd, "Electronic Devices" 8th Edition, Pearson Education, Inc., 2007
- 3. A.S. Sedra and K.C. Smith, "Microelectronic Circuits", 6th Edition, Oxford University Press, 2006

### Evaluation Scheme

The questions will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below:

<b>Chapter</b>	<b>Hour</b>	<b>Mark Distribution*</b>
1	4	8
2	7	12
3	7	10
4	7	10
5	4	10
6	11	12
7	5	10
2, 3, 4, 5, 7		8
<b>Total</b>	<b>45</b>	<b>80</b>

\*There may be minor deviation in marks distribution.