

| 18BSP603 | | | | | Basic Electronics | | | | | |
|-----------------|---|---|---|----------|--------------------|----|----|-----------|---------|-------------|
| Teaching Scheme | | | | | Examination Scheme | | | | | |
| L | T | P | C | Hrs/Week | Theory | | | Practical | | Total Marks |
| | | | | | MS | ES | IA | LW | LE/Viva | |
| 4 | 0 | 0 | 4 | 4 | 25 | 50 | 25 | -- | -- | 100 |

COURSE OBJECTIVES

- ☐ To introduce the operation of semiconductor devices
- ☐ To provide the knowledge about number system, arithmetic operation and sequential codes of digital electronic circuits
- ☐ To introduce the fundamental concepts and working principle of JT, JFET, FET, MOSFET
- ☐ To provide the understanding of basic Boolean laws, K-maps, SOP and POS method to design logic circuits and different class of digital circuits like unipolar, bipolar logic families -DTL, RTL, DCTL

UNIT 1 Physics of Semiconductors

15 Hrs.

Introduction to semiconductors, Electrical conduction, Band theory of solids, Energy bands, classification of matter, Intrinsic and Extrinsic semiconductors, conduction in semiconductors, electrical properties of semiconductors, formation of depletion region, drift and diffusion current in semiconductors, Junction diode and its characteristics, ideal and practical diode model, diode applications: HWR, FWR, Bridge FWR, power supply filters and capacitor filters, integrated circuit voltage regulators, diode limiting and clamping circuits, voltage multipliers, Zener diode and its applications, Varactor diodes, other types of diodes.

UNIT 2 Transistors and its applications

15Hrs.

Junction Transistor: Potential curves in unbiased and biased transistor, Transistor current components, Early effect, Static Characteristics of CB & CE configuration, active, cut off and saturation regions. Transistor as an Amplifier, Transistor current gains (Alpha, Beta, Gama)
 Junctions Field Effect Transistor, Qualitative Description of JFET, Drain and transfer characteristics of JFET, FET, MOSFET -Depletion and enhancement and their drain & transfer characteristics.

UNIT 3 Digital Electronics

15 Hrs.

Number systems: Binary, Octal, Hexadecimal number system and base conversions, Binary Arithmetic operations, 1's and 2's complement representation, Sequential Codes: Binary codes-BCD, Grey, cyclic, ASCII, EBCDIC, Parity Bit Code, and Unicode.

UNIT 4 Logic Gates

15 Hrs.

Logic Gates, Boolean Algebra: Postulates, Duality Principal, De Morgan's Law, Simplification of Boolean Identities, Standard SOP & POS Forms, Simplification using K-map, don't care condition implementation of SOP & POS form using NAND and NOR Gate. Bipolar Logic families, Unipolar Logic families, characteristics of Digital IC's. Resistance-Transistor Logic (RTL), Direct Coupled Logic (DCTL), Diode Transistor Logic.

Max. 60 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Demonstrate and analyse the behaviour of semiconductor devices

CO2 - To get an insight about the operation of JT, JFET, MOSFET in order to design the basic circuits

CO3 - Develop the digital logic to analyse the problems of number system and arithmetic operation

CO4 - Solve the sequential codes based problems of digital electronics

CO5 - Demonstrate the ability to use basic Boolean laws, K-maps and SOP, POS methods

CO6 - Ability to understand and analyse the unipolar and bipolar families like PMOS, NMOS, DTL, RTL and DCTL

TEXT/REFERENCE BOOKS

1. Principles of Electronics – V. K. Mehta 3rd Edition, S. Chand, Company Ltd, New Delhi
2. Electronic Devices- Thomas L. Floyd, 7th Edition, Pearson Education
3. Electronic Devices and Circuits – Allen Mottershed, 2003 Edition, Prentice-Hall, Pvt. Ltd, New Delhi
4. Electronics Principles – Albert Malvino, 6th Edition, 1999

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Part A/Question: 3 Questions of each unit carrying 3 marks each

Part B/Question: 2 Questions of each unit carrying 8 marks each

Exam Duration: 3 Hrs

36 Marks

64 Marks