

APPLIED PHYSICS-I

Objectives:

- To have a knowledge about the alternating current and its components
- To know about the number systems and the semiconductor memories
- To acquire knowledge about Boolean algebra, arithmetic and combinational logic circuits.

Unit I: Current Electricity

Ohm's Law - Verification of Ohm's Law - Kirchoff's law - Applications of Kirchoff's law - Wheatstone's bridge - Metre bridge - Carey Foster's bridge - Potentiometer Measurement of Current and Resistance - Calibration of low range Voltmeter.

Unit II: Alternating Current

AC circuits with double components – Measurement of current and voltage – Power in an AC circuit - Power factor (derivation) - Wattless current – Choke - Series and parallel resonant circuits – Impedance - Q factor - Selectivity and Sharpness of resonance.

Unit III: Number Systems, Codes and Logic gates

Number Systems - Conversions - Binary: Addition, Subtraction, Multiplication, Division - 8421 Code - BCD Code - Excess 3 code - Gray code - Binary to Gray and Gray to Binary Conversion - ASCII code – Basic and Derivative Gates: AND, OR, NOT, NAND, NOR, EX-OR - NAND & NOR as Universal Gates.

Unit IV: Boolean algebra, Arithmetic and Combinational Logic Circuits

Basic laws of Boolean algebra - De Morgan's theorem - Verification of Boolean expression using Boolean laws - Half-adder - Full adder - Half-Subtractor - Full Subtractor (using basic gates) – Encoder - Decimal to BCD encoder- Decoder - BCD to decimal decoder.

Unit V: Semiconductor Memories

Introduction – ROM using diodes and transistors – ROM in terms of digital circuits – Building memory of larger capacity – PROM – EPROM – EEPROM – ROM as a unit in microcomputers – RAM – Static RAM – Flip Flop as a RAM cell – Memory expansion - Memory Parameters.

Books for study:

1. Brijlal & Subramanian, Electricity and Magnetism, Ratan Prakashan Mandir, 1995. (Unit I & II)
2. Puri V.K., Digital Electronics circuits and systems, Tata Mc Graw Hill publications, New Delhi, 2011.

(Unit III, IV & V)

References

1. Narayanamurthi and Nagarathinam, Electricity and Magnetism, The National Publishing Company, Madras, 1994.
2. Jacob Millman, Integrated Electronics, Tata Mc Graw Hill publications, New Delhi, 2003.

3. Murugesan .R, Electricity and Magnetism, S. Chand & Company Ltd., 2015.
4. Gothman W.H., Digital Electronics, Prentice Hall of India PVT., New Delhi, 1996.
5. Rajendran .V, Applied Physics, TATA Mc Graw hill publications, New Delhi, 2002.

Semester: III & IV

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APPLIED PHYSICS –II (PRACTICAL)

1. SemiConductor diode - Characteristics.
2. Zener diode – Characteristics.
3. FET- Characteristics.
4. Transistor Characteristics - CE configuration.
5. Transistor Characteristics - CB Configuration.
6. Metre Bridge-Specific Resistance.
7. Potentiometer-Measurement of Current.
8. Potentiometer-Calibration of low range voltmeter.
9. LCR - Series resonance circuit.
10. LCR - Parallel resonance circuit
11. Mathematical Operator-Addition, Subtraction using OP-Amp.
12. Logic Gates (AND, OR, NOT) Using discrete components.
13. NAND and NOR as Universal Gates.
14. Verification of De-Morgan's Theorems.
15. Half Adder and Half Subtractor using logic gates.
16. Full Adder and Full Subtractor using logic gates.

References

1. Srinivasan M.N., Balasubramanian S. & Renganathan R., A Text book of Practical Physics, Sulthan Chand & Sons, New Delhi, 2000.
2. Somasundram S., Practical Physics, Apsara Publications, Tiruchirappalli, 2012.

APPLIED PHYSICS-III

Semester: IV

18UPH4AC5

Objectives:

- To know about the difference between conductors, insulators and semiconductors
- To have a basic idea about the lasers and optoelectronic devices
- To learn about the operational amplifier and transistor

Unit I: Semiconductor Physics

Theory of energy bands in crystals - Distinction between conductors, Insulators and Semiconductors – Intrinsic and Extrinsic semiconductors – Hall effect in semiconductor– Zener diode – Tunnel diode - Backward diode - Breakdown voltage - Avalanche Breakdown.

Unit II: Transistors

Transistors - PNP and NPN transistors - DC Characteristics of CE and CB configuration - Hybrid parameters - Functions of Transistor as an amplifier and oscillator – FET - N-channel FET - Performance characteristics - FET amplifier

Unit III: Lasers

Laser and Maser - Basic concepts of stimulated emission – Spontaneous emission - Population inversion and Meta stable state - He-Ne laser - Ruby laser - Ammonia Maser - Production – Advantages.

Unit IV: Opto-Electronic Devices

LED Radiation transition - Emission spectra – Luminescent efficiency - Method of Excitation- Visible LED - Materials for LED - LED configuration and performance - Photo conduction – Photo diode - Photo transistor - Electronic watches - Seven segment display - LCD.

Unit V: Operational Amplifier

The basic operational amplifier – Inverting and non- inverting operational Amplifier – Differential operational amplifier – CMRR - Basic uses of operational amplifier as sign and scale changer and phase shifter - Adder – Subtractor – Comparator - Differentiator .

Book for study:

1. Theraja B.L., The fundamentals of solid state physics, Sultan Chand & Co., Delhi, 2002 (Unit I).
2. Ramaswami.V, Engineering Physics, D.Prentice Hall of India, New Delhi, 1953 (Unit III).
3. V.K. Metha, Rohit Metha, Basic Electronics, S. Chand & Co., New Delhi, 2015 (Unit II, IV & V).

References

1. Jacob Millman, Microelectronics, McGraw Hill publications, New Delhi, 1985.
2. Mithal G.K. and Vanvasi, Pulse and Digital electronics, Khanna publication, New Delhi, 2006.
3. Ramanan, Function Electronics, TMH, New Delhi, 1994.
4. Millman & Halkias, Electronics Devices and Circuits, McGraw-Hill, 1967.