BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI -24

(For the candidates admitted from the academic year 2016 – 2017 onwards)

ALLIED PHYSICS COURSE I

Objective:

To understand basic theories and experiments in Physics.

UNIT I   Properties of matter

Elasticity : Stress – Strain – Young's modulus – Behaviour of wire under progressive tension –Bending of beams – Expression for the bending moment – Measurement of Young's modulus by bending of a beam – Non-uniform bending and Uniform bending.

Viscosity : Streamline flow and Turbulent flow – critical velocity - Poiseuille's formula – Determination of coefficient of viscosity of a liquid (Variable pressure head).

Surface Tension : Drop weight method of determining the surface tension of a Liquid – Experiment to determine the interfacial tension .

UNIT II   Mechanics

Centre of Gravity – Centre of Gravity of a solid hemisphere – Hollow hemisphere – Centre of Gravity of a solid cone – Centre of Gravity of a solid tetrahedron.

States of Equilibrium : Equilibrium of a rigid body – Stable, unstable and neutral equilibrium – Example.

Stability of Floating bodies – Metacenter – Determination of Metacentric height of a ship**.**

UNIT III   Thermal Physics

Thermodynamics : Laws of thermodynamics – Reversible and irreversible process – Heat engine – Carnot's theorem.

Radiation : Black body – Stefan's law – Newton's law of cooling – Newton's law of cooling from Stefan's law – Experimental determination of Stefan's constant – Wien's displacement law – Rayleigh – Jean's law – Planck's law.

Heat Conduction : Coefficient of Thermal Conductivity – Determination of Thermal Conductivity of a bad Conductor by Lee's disc method.

UNIT IV   Optics

Geometrical Optics : Spherical aberration of a thin lens – Methods of reducing spherical aberration – Coma – Aplanatic surface – Astigmatism – Curvature of the field – Distortion.

Interference : Introduction – Air wedge – Newton's rings – Colours of thin films.

Diffraction : Plane diffraction Grating – Theory of plane transmission Grating.

UNIT V   Electronics

Intrinsic and extrinsic semiconductor – PN Junction diode – Biasing of PN junction – V-I characteristics of junction diode – Rectifiers – Half wave – Full wave and bridge rectifiers –Zener diode – Characteristics of Zener diode – Voltage regulator – Transistor – Characteristics of transistor – CB, CE mode – Transistors as an amplifier.

Books for Study:

1. R. Murugeshan, *Properties of matter*, S. Chand & Co. Pvt. Ltd., Revised edition, 2012.
2. Narayanamoorthyand N. Nagarathinam , *Mechanics – Part II,* The National Publishing Company , Chennai,2005.
3. Dr.N. Subramaniyam,Brijlal and Dr.M.N.Avathanulu,*Optics,* S. Chand &Co. Pvt.Ltd.—25 ᵗʰrevised edition, New Delhi, 2012.
4. V.Vijayendran, S.Viswanathan, *Digital Fundamentals,* Printers & Publishers Private Ltd, Chennai, 2004.

Books for Reference:

1. Brijlal and Subramaniyan, *Properties of Matter,* S. Chand & Co.Pvt.Ltd.2005.
2. Brijlal and Subramaniyan., *Thermal Physics*, S. Chand & Co 2001.
3. Murugeshan and Kiruthiga Sivaprasath., *A Text Book of Optics.*, S. Chand & Co. Pvt.Ltd.- 9 th revised edition Ramnagar 2014, Newdelhi-110055.
4. Mehta V.K., *Principles of Electronics*, S.Chand and company Ltd, 2014

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ALLIED PHYSICS PRACTICALS I

(Any 12 Experiments)

Objective:

To acquire basic understanding of laboratory technique and to educate and motivate the students in the field of Physics.

1. Non-Uniform bending – Pin and Microscope.
2. Uniform bending-scale and Telescope.
3. Surface tension and Interfacial Surface tension by Drop weight Method.
4. Surface tension by Capillary rise Method.
5. Coefficient of viscosity of liquid – Variable Pressure head Method.
6. Thermal conductivity of a bad conductor – Lee's disc Method.
7. Specific heat capacity of liquid – Newton's cooling Method.
8. Spectrometer – Refractive index of a solid prism.
9. Spectrometer – Grating – Normal incidence.
10. Newton's Rings – 'R' determination.
11. Air wedge – Thickness of the given thin wire.
12. Potentiometer – low range voltmeter.
13. Carry Foster's Bridge – Resistance Determination.
14. Meter bridge – Specific resistance.
15. Characteristics of a junction diode –Forward resistance and knee voltage.
16. Characteristics of a Zener diode-Break down voltage.
17. Basic logic gates – AND, OR and NOT gates using discrete components.
18. Verification of NAND and NOR as Universal gates
19. Verification of De Morgan's theorem
20. Verification of Boolean algebra (any five)

Books for Study :

1. Dr.S.Somasundaram, *Practical Physics,* Apsara publications, Tiruchirapalli, 2012.
2. R. Sasikumar, *Practical Physics*, PHI Learning Pvt. Ltd, New Delhi2011.

Books for Reference:

1. S.Srinivasan,*A Text Book of Practical physics.,* S.Sultanch and publications.
2. Department of Physics, *Practical Physics,* (B.Sc Physics Main), St.Joseph's College, Tiruchirapalli 1998.

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ALLIED PHYSICS COURSE II

Objective:

This course is to high light the Modern Physics and digital Electronics

UNIT I   Electrostatics

Coulomb's inverse square law – Gauss theorem and its applications (Intensity at a point due to a charged sphere & cylinder) – Principle of a capacitor – Capacity of a spherical and cylindrical capacitors – Energy stored in a capacitor – Loss of energy due to sharing of charges - Capacitors in series and parallel – Types of capacitors.

UNIT II   Magnetism

Intensity of magnetization – Susceptibility – Types of magnetic materials – Properties of para, dia and ferromagnetic materials – Cycle of magnetization – Hysteresis – B-H curve – Applications of B-H curve – Magnetic energy per unit volume – Ferromagnets, ferrimagnets and their applications.

UNIT III   Atomic Physics

Atom Models : Sommerfield's and Vector atom Models – Pauli's exclusion Principle – Various quantum numbers and quantization of orbits.

X-rays : Continuous and Characteristic X-rays – Mosley's Law and importance – Bragg's law – Miller indices – Determination of Crystal Structure by Laue's Powder photograph method.

UNIT IV   Nuclear Physics

Introduction – Nucleus – Classification of Nuclei – Nuclear Size – Charge – Mass and Spin – Liquid drop model.Nuclear Radiations and their properties, particle accelerators – Betatron and Proton Synchrotron - Four types of reactions – Elementary particles and their classifications.

UNIT V   Digital Electronics

Decimal – Binary – Octal and Hexa Decimal number systems and their Mutual Conversions – 1's and 2's complement of a Binary number and Binary arithmetic (Addition, Subtraction, Multiplication and Division) – Binary Subtraction by 1's and 2's complement method – Basic logic gates – AND, OR, NOT, NAND, NOR and EX-OR gates – NAND and NOR as universal building gates – Boolean Algebra – Laws of Boolean Algebra – De Morgan's Theorems – Their verifications using truth tables.

Books for Study:

1. R. Murugesan., *Electricity and Magnetism.* S. Chand & Co, New Delhi, Third Revised edition,2001.
2. R. Murugeshan, Kiruthiga Sivaprasath, *Modern Physics.,*   S. Chand & Co, New Delhi, First edition, 1984,.
3. R. S. Sedha, *A text book of Digital Electronics,* S. Chand & Co, New Delhi, First edition ,2004.

Books for Reference:

1. Narayanamurthi, *Electricity and Magnetism,* The National Publishing Co, First edition,1988.
2. J. B. Rajam, *Atomic Physics.,* S. Chand & Company Limited, New Delhi, First edition, 1990.
3. B. N. Srivastava, *Basic Nuclear Physic,* Pragati Prakashan, Meerut, 2005.
4. Albert Paul Malvino, *Digital principles and Applications,* McGraw-Hill International Editions, New York, 2002.

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BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI -24

(For the candidates admitted from the academic year 2016 – 2017 onwards)

SECOND APPLIED PHYSICS I
(For B.Sc. Computer Science Student only)
APPLIED PHYSICS
ALLIED COURSE I

Objective :

To bring out the subjects related with the computer field which help students to keep pace with these topics.

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. Narayanamurthi and Nagarathinam, *Electricity and Magnetism*, The National Publishing Company, Madras, 1994.
2. Brijlal & Subramanian, *Electricity and Magnetism*, Ratan Prakashan Mandir, 1995.
3. Puri V.K., *Digital Electronics circuits and systems*, TATA Mcgraw hill publications, New Delhi, 2011.
4. Vijayendran. V & Subramanian. V, *Introduction to Integrated Electronics,* S. Viswanath PVT Ltd., Chennai 2012.

Books for Reference:

1. Murugeshan. R, *Electricity and Magnetism*, S. Chand & Company Ltd., 2015.
2. Gothaman W.H., *Digital Electronics*, Prentice Hall of India PVT., New Delhi, 1996.
3. Sanjay D Jain, *Applied Physics*, Universities Press, Hyderabad, Telengana.

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SECOND APPLIED PHYSICS II

APPLIED PHYSICS

ALLIED PRACTICAL

Objective:

It promotes the exhaustive requirements and expectations of the students to acquire practical knowledge for the theory given in their syllabus.

1. Semi-Conductor 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. Carey Foster's Bridge- Specific Resistance.
10. LCR - Series resonance circuit
11. LCR - Parallel resonance circuit
12. Mathematical Operator-Addition, Subtraction using OP-Amp.
13. Logic Gates (AND, OR, NOT, NAND, NOR and EX-OR) Using IC's.
14. NAND and NOR as Universal Gates.
15. Verification of De-Morgan's Theorems.
16. Half –Adder and Half –Subtractor using logic gates.
17. Full Adder and Full Subtractor using logic gates.
18. Single Stage Amplifier.

Books for Study:

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.

Books for Reference:

1. Department of Physics, *Practical Physics,* (B.Sc Physics Main), St. Joseph's College, Tiruchirapalli 1998.

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SECOND APPLIED PHYSICS III

APPLIED PHYSICS

ALLIED COURSE II

Objective:

To understand the rapid growth of electronic technology and simplify the learning process to a greater extent.

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 –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 - AC Successive approximation.

Books for Study:

1. Jacob Millman, *Micorelectronics*, McGraw Hill publications, New Delhi, 1985.
2. Theraja B.L., *The fundamentals of solid state physics*, Sultan Chand& Co., Delhi, 2002.
3. Mithal G.K. and Vanvasi, *Pulse and Digital electronics*, Khanna publication, New Delhi, 2006.

Books for Reference:

1. Ramanan,*Function Electronics*, TMH, New Delhi, 1994.
2. Millman&Halkias, *Electronics devices and Circuits*, McGraw-Hill, 1967.
3. Sanjay D Jain, *Engineering Physics*, Universities Press, Hyderabad, Telengana 2012.

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BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI -24

(For the candidates admitted from the academic year 2016 – 2017 onwards)

SECOND ALLIED PHYSICS I

(For B.Sc. Information Technology Student only)

DIGITAL COMPUTER FUNDAMENTALS

Unit I   Number Systems and Codes

Binary Number System – Binary to Decimal Conversion – Decimal to Binary Conversion – Binary Addition and Subtraction – Binary Multiplication and Division – Octal Numbers – Hexadecimal Numbers – Binary Codes – Error Detecting and Correcting Codes.

Unit II   Boolean Algebra and Logic Gates

Boolean Algebra: Definitions – Fundamentals of Boolean Algebra – Laws and Theorems of Boolean Algebra -Boolean Functions – Minterms and Maxterms — DeMorgan's Theorems.   Logic Gates: AND,OR,NOT,NAND,NOR and Exclusive OR Gates – Applications of XOR Gate – The Exclusive NOR Gate – Positive and Negative Logic – Logic Chararcteristics – Bipolar Logic Families – Integrated Circuits — Universal Building Blocks (UBB) – NAND Gate as UBB – NOR Gate as UBB.

Unit III   K Map Techniques

Karnaugh Map with 2, 3 and 4 variables -Sum of Products - AND-OR Network and Product of Sum - NAND and NOR Implementation — AND-OR-INVERT Implementation – OR-AND-INVERT Implementation – Don't Care Conditions – Overlapping Groups – Rolling the Map – Eliminating Redundant Groups.

Unit IV   Combinational Logic Circuits

Binary Adders - Half and Full Adders – BCD Adder - Binary Subtractors – Half and Full Subtractors – Multiplexers (4:1 line) – 1 to 4 line Demultiplexers – Decoders: BCD to decimal ,BCD to Seven Segment. Encoders: 4:2 line, Octal to Binary - Floating Point Number System – Range of Stored Numbers.

Unit V   Sequential Logic Circuits:

Flip Flops – RS Flip Flop – Clocked RS Flip Flop – D Flip Flop – JK Flip Flop – T Flip Flop – Triggering of Flip Flops – Master Slave Flip Flop – Conversion of D Flip Flop and T Flip Flop – Clock – Counters and Shift Registers: Counters – Asynchronous or Ripple Counter – Ring Counter – Twisted Ring Counter – State Diagrams and State Tables – Magnitude Comparator – Programmable Arrays of Logic Cells – Shift Registers-SISO – SIPO – PIPO – PISO.

Text Book:

1. Principles of Digital Electronics, Dr. K. Meena, PHI Learning Private Limited, New Delhi, 2009.

Reference Book:

1. Digital Logic Design, M. MorrisMano, Pearson Education, 2010
2. Digital Technology, Virendrakumar, New Age international (P) Ltd., publisher, New Delhi, 2001.

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SECOND ALLIED PRACTICAL

DIGITAL COMPUTER FUNDAMENTALS LAB

(Any 12 experiments)

1. Verification of Logic gates
2. Construction of Half and Full adder
3. Construction of Half and Full subtractor
4. K-Map
5. Arithmetic Logic Unit
6. Study of Multiplexer and De-multiplexer
7. Encoder and Decoder using diodes
8. Flip-flops using NAND and NOR gate
9. Shift Register
10. Up Down Counters
11. Ring Counter
12. Johnson counter / Twisted ring counter
13. NAND as UBB
14. NOR as UBB
15. Study of RAM

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SECOND ALLIED PHYSICS II

COMPUTER AND ORGANIZATION ARCHITECTURE

UNIT I   Computer Organization, Architecture and Functions

Organization and Architecture – Structure and function – Computer Component – Computer Function – Interconnection Structures – Bus Interconnections.

UNIT II   Memory organization

Computer Memory System Overview – Cache Memory principles – Semiconductor Main Memory: Organization – DRAM and SRAM – Types of ROM – Error Correction.

UNIT III   I/O Modules

External Devices - I/O Modules – Programmed I/O – Direct Memory Access – I/O Channels and Processors.

UNIT IV   Instruction sets, processor organization and control unit

Machine Instruction Characteristics – Types of operands – Addressing – Instruction formats – processor organization – Register Organization – instruction cycle. Control Unit: Micro Operations – Control of the processor.

UNIT V   Parallel Processing

Parallel Organization – Multiprocessor Organization – Symmetric multiprocessors – Multithreading and Chip Microprocessor – Non uniform memory Access - Vector Computation.

Text Book :

Computer Organization & Architecture Designing for Performance – William Stallings, Pearson Education, 2014

Reference Book :

Computer Architecture and Organization : From 8085 to Core 2 Duo and Beyond, Subrata Ghoshal, Pearson Education, 2011

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