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* Not considered for Grand Total and CGPA
SEMMESTER-I: ALLIED -I  
INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY - I

Course Code : 14UCH1A1:1  
Max. Marks : 50

Hours/Week : 5  
Internal Marks: 20

Credit : 2  
External Marks: 30

Objectives:

- To understand the concept of periodic properties and molecular orbital theory.
- To know the chemistry of biomolecules.
- To study the concept of stereochemistry electrochemistry and photochemistry.
- To learn the principles of separation techniques.

UNIT – I  
15 hours

1.1 **Periodic properties**- Ionization potential, electron affinity and electro negativity-variation in the periodic table

1.2 **Molecular Orbital Theory**: Some important basic concepts of molecular orbital theory - LCAO. Bonding, anti-bonding orbital and bond order – application of MO theory to H₂, He₂, O₂ and F₂ molecules

1.3 **Industrial Chemistry**:
- #Soap and detergents – An elementary idea of soap and detergent. Cleansing action of soap and detergents#.

UNIT – II  
15 hours

2.1 **Carbohydrates**: Classification – Glucose and fructose – Preparation and properties – Sucrose – Manufacture and properties – Starch and cellulose – Properties and uses.

2.2 **Amino Acids and Proteins**: Amino acids – Classification, preparation and properties. Peptides (Elementary treatment) – Proteins – Classification based on physical properties and biological functions.

2.3 **Nucleic acid**: DNA and RNA – functions - #Structure of DNA and RNA#.

UNIT – III  
15 hours

3.1 **Synthetic polymers** – Teflon, Alkyl and Epoxy resins, Polyesters – definitions and uses
- Types of polymerization – Thermosetting and thermoplastics.

3.2 **Heterocyclic compounds** – Furan, thiophene, and pyridine – Preparation and properties.

3.3 **Stereoisomerism**: Optical isomerism – lactic and tartaric acid – Racemic mixture and resolution – Geometrical isomerism – #maleic and fumaric acid#.
UNIT – IV  
15 hours 
4.1 Chromatography – principles of column, paper and thin layer chromatography.
4.3 Phase Rule: 
Phase, Component, Degree of freedom, Phase Rule – Definition. One component system – Water system.

UNIT – V  
15 hours 
5.1. Electrochemistry: 
Specific and equivalent conductance – their determination – Effect of dilution on conductivities – An elementary idea about ionic theory – Ostwald’s Dilution Law, Kohlrausch Law, Conductometric titrations.
5.2. pH and Buffer: 
Importance of pH and buffers in the living systems. pH determination by colorimetric and electrometric methods.
5.3 Corrosion: Types of corrosion, Prevention.

Self study

Text books:


UNIT I : Text Book 1,2
UNIT II : Text Book 3
UNIT III : Text Book 3
UNIT IV : Text Book 4
UNIT V : Text Book 4
Books for reference:


VOLUMETRIC ANALYSIS - PRACTICAL

Course Code: 14UCH1A1P
Hours / Week: 3
Credit: 2
Max. Marks: 50
Internal Marks: 20
External Marks: 30

Objectives:

- To know the basic principles of volumetric analysis
- To understand the concepts of indicators and equivalent weight

1. Estimation of Sodium Hydroxide
   \[(\text{Na}_2\text{CO}_3 \times \text{HCl} \times \text{NaOH})\]
2. Estimation of Hydrochloric Acid
   \[(\text{H}_2\text{C}_2\text{O}_4 \times \text{NaOH} \times \text{HCl})\]
3. Estimation of Oxalic Acid
   \[(\text{FeSO}_4 \times \text{KMnO}_4 \times \text{H}_2\text{C}_2\text{O}_4)\]
4. Estimation of Ferrous Sulphate
   \[(\text{H}_2\text{C}_2\text{O}_4 \times \text{KMnO}_4 \times \text{FeSO}_4)\]
5. Estimation of KMnO4
   \[(\text{K}_2\text{Cr}_2\text{O}_7 \times \text{FAS} \times \text{KMnO}_4)\]
6. Estimation of Zn by EDTA
   \[(\text{MgSO}_4 \times \text{EDTA} \times \text{ZnSO}_4)\]
7. Estimation of Mg by EDTA
8. Estimation of Cu by iodometry
   \[(\text{K}_2\text{Cr}_2\text{O}_7 \times \text{thio} \times \text{CuSO}_4)\]
9. Estimation of Iodine
   \[(\text{K}_2\text{Cr}_2\text{O}_7 \times \text{thio} \times \text{I}_2)\]

Book for reference:

Objectives:

- To understand elastic properties and modulus of the materials.
- To study the principles of hydrostatics and hydrodynamics.

UNIT – I  Elasticity  12 hours


UNIT -II  Bending of beams  12 hours

Bending of beams: Cantilever - Expression for bending moment - Expression for depression - Expression for time period - Experiment to find Young's modulus - Non uniform bending (Pin and microscope) - Experimental determination of Rigidity Modulus –Static torsion method.

UNIT – III  Surface Tension  12 hours

Definition and dimensions of surface tension – Molecular explanation of surface tension – Angle of contact- Excess pressure inside a liquid drop and soap bubble –Excess pressure inside a curved liquid surface - Capillary rise method-Variation of Surface tension with temperature - Jaeger's Method.

UNIT – IV  Viscosity  12 hours

Streamline flow – Turbulent flow –Critical velocity-Reynold’s number-Co-efficient of viscosity and its dimension - Rate of flow of liquid in a capillary tube - Poiseuilles' formula - Experimental determination of co-efficient of viscosity of a liquid by Poiseuille’s method-Stoke’s method.
UNIT –V  Diffusion & Osmosis  12 hours

Osmosis and osmotic pressure – Laws of osmotic pressure -Experimental determination of osmotic pressure (Berkeley and Hartley method) — elevation of the boiling point – depression of freezing point.

#........................# Self study portion

Text Book :  

Unit I  Chapter 1  Sections 1.1 - 1.8.
Unit II  Chapter 1  Sections 1.10 - 1.21.
Unit III  Chapter 3  Sections 3.1 - 3.12.
Unit IV  Chapter 2  Sections 2.1 - 2.9.
Unit V  Chapter 4 & 5  Sections 4.1 - 5.6.

Books for Reference:
SEMMER I: MAJOR BASED ELECTIVE – I
PROPERTIES OF MATTER - PRACTICAL

Course Code : 14UPH1M1P       Max. Marks : 100
Hours / Week : 3        Internal Marks :  40
Credit : 3                  External Marks :  60

Objective:

To develop the experimental skills and determination of the physical coefficients of matters.

2. Compound Pendulum: Determination of the Acceleration due to Gravity and Radius of Gyration [g & K].
5. Thermal conductivity of a bad conductor using Lee’s Disc.
7. Determination of the Refractive Index [μ] of glass using a prism and a spectrometer.

Books for reference:

SEMESTER-II : ALLIED -II
INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY – II
(For B.Sc., Physics)

Course Code : 14UCH2A2:1
Max. Marks : 50
Hours/Week : 4
Internal Marks: 20
Credit : 2
External Marks: 30

Objectives:

- To understand the types of chemical bonding and the importance of coordination compound.
- To have knowledge of types for organic reaction and chemotheraphy.
- To study the importance of energetics and colloids.
- To know the concept of chemical equilibrium and catalysis.

UNIT – I
12 hours
1.1. Coordination Chemistry:

1.2. Metallic Bond:
Electron gas, Pauling and Band Theories. Semiconductors – Intrinsic, n and p-type.

1.3. Compounds of Sulphur:
Peracids of sulphur and sodium thiosulphate.

UNIT – II
12 hours
2.1. Electron Displacement Effects
Inductive effect – Relative strength of aliphatic acid and alkyl amines. Resonance – Condition for resonance - Consequences of resonance - Hyper conjugation – definition and examples- steric effect.

2.2. Aromaticity
Conditions – Huckel’s rule - aromaticity of benzene.

2.3. Substitution reactions
Nitration, halogenation, sulfonation and alkynation of benzene.

UNIT –III
12 hours
3.1 Halogen containing compounds
Preparation and uses of Dichloromethane, Chloroform, Carbon tetrachloride, DDT, and BHC.

3.2. Chemotherapy
Struture and uses of Sulpha drugs – Sulpha pyridine, Sulpha – thiazole and sulph diazine –Antibiotics - Struture and uses of penicillin –G and Chloromycetin.

3.3. Name reactions
Benzoin, Perkin, Cannizaro, Claisen, Haloform, Carbylamine reactions – Biuret reaction.
UNIT – IV 12 hours

4.1 Solid State:
Typical crystal lattice – Unit cell. Elements of symmetry. Bragg’s equation, Weiss indices, Miller indices, Simple, Body centered and face centered cubes.

4.2 Energetics:
Second Law of thermodynamics - Carnot’s Theorem – Carnot Cycle.

4.3 Colloids:

UNIT – V 12 hours

5.1 Chemical Equilibrium:
Criteria of homogeneous and heterogeneous equilibria. Decomposition of HI and PCl5.

5.2 Chemical Kinetics:
Order, Rate, Molecularity of the reaction and rate constant, Determination of order of the reaction – Activation energy, Effect of temperature on reaction rate.

5.3 Catalysis:

#________# Self study

Text books:

UNIT I : Text Book 1
UNIT II : Text Book 2
UNIT III : Text Book 4
UNIT IV : Text Book 3
UNIT V : Text Book 3

Books for reference:


SEMESTER II: ALLIED – II

ORGANIC ANALYSIS - PRACTICAL

Course Code: 14UCH2A2P
Max. Marks: 50
Hours / Week: 3
Internal Marks: 20
Credit: 2
External Marks: 30

Objectives:

- To learn the techniques of organic qualitative analysis
- To learn the Nitrogen containing compounds.

A study of reactions of the following organic compounds:

1. Carbohydrate
2. Amide
3. Aldehyde
4. Ketone
5. Monocarboxylic acid
6. Dicarboxylic acid
7. Amine
8. Monohydrlic phenol
9. Ester
10. Nitro

The students may be trained to perform the specific reaction like test for element (Nitrogen only), Aliphatic or aromatic, saturated or unsaturated and functional group present and record their observation.

Book for Reference:

SEMESTER II: CORE – II
MECHANICS

Course Code : 14UPH2C2       Max. Marks : 100
Hours / Week : 4        Internal Marks : 40
Credit : 4        External Marks : 60

Objectives:

➢ To have an knowledge in the field of dynamics
➢ To understand the concepts of hydrostatics and hydrodynamics
➢ To learn the principles of Newtonian Mechanics

UNIT – I   Motion of Projectile and Impact of elastic bodies        12 hours


UNIT – II    Dynamics of Rigid Bodies           12 hours


UNIT – III  Gravitation & Centre of gravity           12 hours


  Centre of Gravity: Definition- C.G of solid cone -C.G of Solid hemisphere –C.G of hollow hemisphere.

UNIT – IV Centre of Pressure & Hydrodynamics         12 hours

  Centre of Pressure: Definition- Centre of Pressure of Vertical rectangular lamina – Centre of Pressure of Vertical triangular lamina -#Laws of floatation# - Meta centre - Meta centric height of a ship-Equation of continuity of flow - - Bernoulli’s theorem – Venturimeter – Pitot tube.
UNIT – V  Newtonian Mechanics  12 hours

Frame of reference-Inertial frame-Reduced mass -Conservation of linear and angular momentum of a particle-Conservation of energy of a particle-Centre of mass- Conservation of linear and angular momentum of a system-Conservation of energy of a system- Basic ideas of degrees of freedom, generalised co-ordinates and generalised momentum.

#..........................# Self study portion

Text Books :

Unit I  Chapter 1 & 2  Sections 1.1 - 2.1  T.B 1
Unit II  Chapter 6 & 7  Section 6.10 - 7.5  T.B 2
Unit III  Chapter 6  Sections 6.1 - 6.3  T.B 2
Unit IV  Chapter 4 & 5  Sections 4.1 - 5.4  T.B 1
Unit V  Chapter 6 & 13  Sections 6.1, 13.1 - 13.7  T.B 1

Books for reference:
Objectives:

- To have a knowledge and practical experience in determining physical constants
- To learn the measurements in Heat and optical experiments
- To study the characteristics of the semiconductor diodes.

1. Determination of the Young’s modulus \([Y]\) of a material using Non-uniform bending (Pin & Microscope).

2. Static Torsion: Determination of the Rigidity Modulus \([N]\) of a material.

3. Melde’s String - Determination of the frequency of a vibrator

4. Comparison of the co-efficient of viscosities of two liquids using the Burette method.


6. Determination of the specific gravity of a solid and liquid using a sonometer.

7. Air wedge: Determination of the thickness of a material by forming interference fringes.


Books for reference:


SEMESTER II: NON MAJOR ELECTIVE – I
PHYSICS OF HOME APPLIANCES

Course Code : 14UPH2N1  Max. Marks : 100
Hours / Week : 2  Internal Marks : 40
Credit : 2  External Marks : 60

Objectives:
➢ To learn the Physical principles and working mechanism of Home appliances
➢ To study the electrical circuit, Fault finding and Precautions

UNIT – I  Electrical Iron  6 hours


UNIT – II  Electric Stove and Electric Kettle  6 hours


UNIT – III  Electrical Mixer  6 hours


UNIT – IV  Water Immersion Heater and Electric Geyser  6 hours


UNIT – V  Washing Machines  6 hours

Washing machine: #Types of washing machines# – Conventional – Semi automatic – Automatic – Precaution and fault findings.

#............#  Self study portion
Text book


Unit I  Chapter 2
Unit II  Chapter 3
Unit III  Chapter 7
Unit IV  Chapter 1 & Chapter 9
Unit V  Chapter 8
SEMESTER III: ALLIED - III
CLASSICAL ALGEBRA
(For Physics and Chemistry Major)

Course Code  : 14UMA3A3:2  Max. Marks  : 100
Hours/Week  : 7  Internal Marks: 40
Credit  : 4  External Marks: 60

Objective:

To enhance the power of ideas for solving the problems in Algebra, Theory of equation, Matrices and Differentiation.

UNIT I  21 hours
Algebra: Binomial Series - Exponential series.

UNIT II  21 hours
Theory of equations: Relation between the coefficients and the roots of an algebraic equation - Reciprocal equations.

UNIT III  21 hours
Matrices: #Various types of Matrices# - Rank of a Matrix - Verification of Cayley-Hamilton theorem - Eigen values and Eigen vectors.

UNIT IV  21 hours
Finite differences: #Interpolation# - Linear interpolation - Newton’s (Forward and Backward) Interpolation formula - Lagrange’s Interpolation formula.

UNIT V  21 hours

#........... # Self study portion.

Text Book:

UNIT I  Chapter 1  Sections 1.2, 1.3
UNIT II  Chapter 2  Sections 2.2, 2.4
UNIT III  Chapter 3  Sections 3.1 - 3.2
UNIT IV  Chapter 4  Sections 4.1 - 4.3
UNIT V  Chapter 6  Section 6.1

Books for reference:
SEMESTER III: CORE - III  
ACOUSTICS

Course Code : 14UPH3C3       Max. Marks : 100
Hours / Week : 4        Internal Marks : 40
Credit : 4        External Marks : 60

Objectives:

➢ To learn the properties of the sound waves
➢ To understand the concepts of acoustics,
➢ To learn the production of ultrasonics waves and its applications

UNIT – I     Sound and Harmonic Oscillators          12 hours

Origin of sound – #Longitudinal waves# – Properties of Longitudinal waves –
Transverse Waves – Properties of Transverse Waves – Simple harmonic motion – differential
equation of SHM – Energy of vibration – Linearity and superposition principle – Simple
pendulum – Bar pendulum – Kater’s Pendulum.

UNIT – II     Lissajou’s Figures            12 hours

Lissajou’s figures – composition of two SHM in a straight line – composition of two
simple harmonic vibrations of equal time periods acting at right angles – composition of two
SHM at right angles to each other and having time periods in the ratio 1:2 – Experimental
methods for obtaining Lissajou’s figures – Uses of Lissajou’s figures.

UNIT – III     Velocity of Sound          12 hours

Velocity of longitudinal waves in gases – Newton’s formula for velocity of sound – effect
of temperature – velocity of sound in water – effect of pressure – effect of density of the medium
– wave velocity and molecular velocity – Doppler effect – observer at rest and source in motion
– Source at rest and observer in motion – when both the source and the observer are in motion.

UNIT – IV     Vibrations in strings and Air Columns       12 hours

Laws of transverse vibration of strings–#verification of laws of transverse vibration of
strings# –Melde’s experiment – resonance – velocity of sound in Air by Resonance method –
Kundt’s tube – Intensity of sound – Decibel and Phone – Bel – musical scale.
UNIT – V    Practical Applications  12 hours


#..............#  Self study portion

Text book

UNIT I  Chapter 1  Sections 1.2 - 1.3
UNIT II  Chapter 2  Sections 2.2 - 2.4
UNIT III  Chapter 3  Sections 3.1 - 3.2
UNIT IV  Chapter 4  Sections 4.1 - 4.3
UNIT V  Chapter 6  Sections 6.1 - 6.3

Book for reference:
Objectives:

- To develop the skills in thermal and electricity experiments
- To have a knowledge in measurements and determining the physical coefficients
- To learn the circuit construction in the electricity and electronics experiments

Determination of the Young’s modulus \([Y]\) of a material using Uniform bending (Single Optic Lever).

1. Determination of the Co-efficient of viscosity \([\eta]\) of a highly viscous liquid using Stoke’s Method.
2. Joule’s Calorimeter: Determination of the Specific heat capacity of a liquid (with Barton’s correction).
3. Carey Foster’s Bridge: Determination of Resistance and Specific Resistance \([R & \rho]\) of a material.
4. Deflection Magnetometer – M & H.
5. Figure of merit of a Sensitive Galvanometer.
7. Bridge rectifier with \(\pi\)-section filter and Zener diodes.

Books for reference:

SEMESTER III: NON MAJOR ELECTIVE – II
MEDICAL PHYSICS

Course Code : 14UPH3N2       Max. Marks : 100
Hours / Week : 2        Internal Marks : 40
Credit : 2        External Marks : 60

Objectives:
➢ To acquire knowledge in biomedical instrumentation
➢ To learn the principles, properties and applications of Laser and Ultrasonics in Medicine

UNIT – I Pressure measurement 6 hours
Eye pressure measurement – Schiotz Tonometer – Goldmann Tonometer – Comparison between Schiotz and Goldmann Tonometers – Urinary bladder pressure – Direct measurement – Cathetar method.

UNIT – II Diagnostic Devices 6 hours
X-ray machine – Comparison between Radiography and Fluoroscopy – Angiography (Basic concept) – #Thermography# – Comparison between normal and cancer cells.

UNIT – III Therapeutic Devices 6 hours
External and internal defibrillators – ac defibrillator – DC defibrillator – Pace maker – Comparison between External and internal pace makers.

UNIT – IV Laser in Medicine 6 hours

UNIT – V Ultrasonics in Medicine 6 hours

..............# Self study portion
Text books


T.B 1  UNIT I  Chapter 6 & 15  Sections 6.3 - 6.6 & 15.10 - 15.13
T.B 2  UNIT II  Chapter 7 & 10  Sections 7.9 - 7.12 & 10.8 - 10.14
T.B 2  UNIT III  Chapter 5  Sections 5.5 - 5.7
T.B 2  UNIT IV  Chapter 7 & 10  Sections 7.2 - 7.4 & 10.9.3 – 10.9.8
T.B 2  UNIT V  Chapter 6  Section 6.5 - 6.8

Book for reference:

SEMESTER IV: ALLIED - IV
CALCULUS AND TRIGONOMETRY

Course Code : 14UMA4A4:2       Max. Marks : 100
Hours/week : 8         Internal Marks : 40
Credit : 4           External Marks : 60

Objective:
➢ To enhance the power of ideas for solving the problems in Calculus, ODE & PDE, Laplace transforms, Vector analysis and Trigonometry.

UNIT I                                                                                                          24 hours
Properties of definite Integrals – Integration by parts - Reduction Formulae for $\int x^n e^{ax} dx$, $\int \sin^n x \, dx$, $\int \cos^n x \, dx$.

UNIT II                                                                                                                               24 hours
Differential equations of the first order with higher degree - Equations solvable for $p$ - Equations Solvable for $y$ – Equations Solvable for $x$ - Clairaut’s form. Laplace transforms of the function $e^{at}$, $e^{-at}$, $f'(t)$, $f''(t)$, $\cos at$, $\sin at$, $\cosh at$, $\sinh at$, $t^n$, $e^{-at} f(t)$, where $n$ is a positive integer – Inverse transforms relating to the above standard functions.

UNIT III                                                                                                                             24 hours
Solving ODE of order two with constant coefficients using Laplace transforms - Partial Differential Equations of the first order – Formation of PDE by eliminating arbitrary constants - Standard type of first order equations I, II, III and IV (Clairaut’s form) - Lagrange’s equations.

UNIT IV                                                                                                                             24 hours

UNIT V                                                                                                                               24 hours

Text Books:

UNIT I  Chapter 1 Sections 11 – 13  T.B-1
UNIT II  Chapter 4 Sections 6.5 and Chapter 6 Sections 1 – 6  T.B-1
UNIT III Chapter 7 Sections 1 – 6  T.B-1
UNIT IV  Chapter 8 Sections 1.15 – 1.22, 2 – 6 and 9  T.B-1
UNIT V  Chapter 5 Sections 5.4, 5.5 T.B-2 and Chapter 2 Sections 1 – 3  T.B-1

Books for reference:
Objectives:

- To study about the nature of Heat
- To learn the concepts of thermodynamics and statistical Physics

UNIT-I  Kinetic theory of Heat  12 hours

Fundamental assumptions of Kinetic theory of heat-Pressure of a gas-Relation between pressure and Kinetic energy-Kinetic interpretation of temperature-Mean free path- Two specific heat capacities of gases - Mayer’s relation-Determination of specific heat capacity at constant volume by Joule’s method.

UNIT-II  Transmission of Heat  12 hours

Conduction process-Thermal conductivity-Measurement of thermal conductivity by Forbe’s method and Lee’s disc method for bad conductors-Thermal radiation- Stefan’s law- Newton’s law from Stefan’s law- Experimental determination of Stefan’s constant.

UNIT-III  Specific Heat  12 hours

Specific heat capacity of liquids- Dulong and Pettit’s law- Variation of specific heat and atomic heat with temperature - Newton’s law of cooling-Specific heat capacity of liquids-Barton’s correction.

UNIT-IV  Thermodynamics  12 hours

Statements of Zeroth, first, second and third laws of thermo dynamics- Isothermal and adiabatic processes-Work done during isothermal and adiabatic changes-Carnot’s Engine-Carnot’s theorem-Entropy-Change of entropy in reversible and irreversible processes.
UNIT-V Statistical Physics 12 hours


#.............# Self study portion

Text books


UNIT I Chapter 6 Sections 6.1 - 6.11 T.B 1
UNIT I Chapter 1 - 4 Sections 1.25 - 4.10 T.B 2
UNIT III Chapter 14 Sections 14.1 -14.5 T.B 2
UNIT IV Chapter 4 & 5 Sections 4.2 - 4.29 & 5.2 -5.6 T.B 2
UNIT V Chapter 9 -12 Sections 9.7 - 12.8 T.B 2

Books for reference:


Objectives:

- To learn the measurements and calibration techniques through properties of matter, heat, optics and electricity experiments

1. Determination of the Young’s modulus \([Y]\) of a material: Cantilever Depression (Scale and Telescope).

2. Determination of Static Torsion using Searle’s Apparatus.

3. Determination of the Co-efficient of viscosity \([\eta]\) of a highly viscous liquid using Searle’s Viscometer.


8. Determination of the Band Gap Energy \([E_g]\) of a thermistor using a Post Office Box.

Books for reference:


SEMESTER IV: SKILLED BASED ELECTIVE – II  
NANO-SCIENCE

Course Code : 14UPH4S2       Max. Marks : 100
Hours / Week : 2        Internal Marks : 40
Credit : 2        External Marks : 60

Objectives:
➢ To acquire knowledge about the Properties and structure of nano materials
➢ To study about fabrications and characterization of nano materials
➢ To learn the evaluation techniques of nano materials through microscopy

UNIT-I  Nano Technology             6 hours
Nanomaterials - #basis of nanomaterials# - Nanotechnology - four generations of Nano-technology - thermal, optical, electrical and magnetic properties of nanomaterials- Elementary ideas of Nano structures.

UNIT-II  Methods of Nano Materials             6 hours
Classification of Nano materials - technique of preparation - bottom up methodology (Sol-Gel preparation technique) - Top down methodology - fullerenes - Properties of fullerenes.

UNIT-III  Carbon Nano Tubes             6 hours
Types of carbon Nanotubes - single walled (SWNT) Nanotubes - multi walled (MWNT) Nanotubes - properties - kinetic property - electrical property - Chemical, mechanical applications – current applications.

UNIT-IV  Quantum dots, wire and well             6 hours
UNIT-V  Evaluation Techniques  

Scanning Probe Microscope - Types -Tunnelling Electron Microscope (TEM) -Atomic Force Microscopy(AFM) - Scanning Tunneling Microscopy (STM).

Self study portion

Text book:

UNIT I  
Chapter 1 & 2  
Sections 1.2 - 1.3  &  2.2 -2.6

UNIT II - IV  
Chapter 2 & 3  
Sections 2.8 - 2.10 & 3.1 -3.5

UNIT V  
Chapter 8 & 9  
Sections 8.2 - 8.3  &  9.1 -9.3

Books for References:
KK. Chattobpadhyay, Introduction to Nano Science and Technology, PHI, New Delhi, 2011.
Objective:

➢ To provide a more conventional history, with the emphasis on the character and philosophy of the period, the new ideas or methods that emerged during the period, and the major advances in each branch of science or technology.

UNIT – I Science in the seventeenth century
Heat as a fluid – Dr. Black & James Watt – Count Rumford and Heat as motion Benjamin Franklin – Coulomb’s law.

UNIT – II Electricity Magnetism & light

UNIT – III Atoms & Elements
Dalton’s atoms – Avogadro’s Hypothesis – Volta & birth of the battery – Davy’s electrochemistry – Mendeleev’s periodic table – Joule’s measurement.

UNIT – IV Life Science

UNIT – V Microbiology
Text book:

UNIT I  Chapter 1  Sections 1.1 - 1.9
UNIT II  Chapter 3  Sections 3.8 - 3.10
UNIT III  Chapter 5  Sections 5.2 - 5.9
UNIT IV  Chapter 6  Sections 6.2 - 6.9
UNIT V  Chapter 8  Sections 8.1 - 8.10

Book for reference:

Objective:

➢ To study about origin of universe and its expansion, star and solar system, earth and moon and components of telescopes.

UNIT – I Universe
Contribution of Chinese, Indian and Islamic civilization to astronomy- Nobel Prize to astronomers- difference among astrology, astronomy and astrophysics.


UNIT – II Stars

UNIT – III Solar system

UNIT – IV Earth and Moon:

Origin of moon – dark areas on the moon – lack of atmosphere in moon – waning / waxing of moon

UNIT – V Telescope
Text book:

UNIT I & IV       Chapter 2
UNIT II & III     Chapter 1
UNIT V            Chapter 3

Books for reference:
Objective:

➢ To study the static characteristics of electric charges, electromagnetic effect, AC circuits and magnetic properties of materials

UNIT – I Electrostatics and Condensers 15 hours
Principle of a capacitor – capacity of a spherical capacitor – Energy stored in a charged conductor– loss of energy due to sharing of charges between two charged conductors.

UNIT – II Magnetic Properties of Materials 15 hours

UNIT–III Magnetic Effect of Electric Current and Electrical Measurements 15 hours
Biot-Savart’s law – Magnetic intensity at a point due to a current carrying straight conductor, axis of a circular coil and solenoid – Moving coil ballistic galvanometer – damping correction- Ampere’s circuital law.
Carey Foster’s bridge – specific resistance – Potentiometer – Principle – Ammeter calibration. – Calibration of low range and high range voltmeter using potentiometer.
UNIT – IV Electromagnetic Induction 15 hours

UNIT – V Alternating Currents 15 hours
Peak value, Mean value and RMS value of an alternating current– form factor - AC circuit containing inductance ,resistance and capacitance LC series and Parallel – LCR in series – Parallel – Comparison between series and parallel resonance circuits– The Q factor- Power in AC circuit containing resistance ,inductance and capacitance– choke coil.

#.............#  Self study portion

Text book:

UNIT I Chapter 1 - 4 Sections 1.1, 2.12, 3.1, & 4.1 - 4.11
UNIT II Chapter 15 Sections 15.1 - 15.19
UNIT III Chapter 7 & 10 Sections 7.1 - 7.2 & 10.1 -10.17
UNIT V Chapter 13 Sections 13.1 - 13.6

Book for reference:
Brijlal and N.Subramaniam, Electricity and Magnetism, S.Chand & company, New Delhi 1995.
Objectives:

- To study about the properties of positive rays, photo electric effect and atom model.
- To study about Fine Structure of Spectral Lines and X-rays.

Unit – I  Positive ray analysis  12 hours

UNIT –II  Photo Electricity  12 hours

UNIT – III  Vector atom model  12 hours

UNIT – IV  Fine Structure of Spectral Lines  12 hours

UNIT – V  X- Rays  12 hours

Self study portion
Text book:

UNIT I  Chapter 5 & 6  Sections 5.1 - 5.5 & 6.8 – 6.10
UNIT II  Chapter 8  Sections 8.1 - 8.6
UNIT III  Chapter 6  Sections 6.12 - 6.20
UNIT IV  Chapter 6  Sections 6.22 - 6.26
UNIT V  Chapter 7  Sections 7.1 - 7.14

Books for references:

SEMESTER V: CORE – VIII
OPTICS

Course Code : 14UPH5C8       Max. Marks      : 100
Hours / Week : 4        Internal Marks    :   40
Credit  : 4        External Marks   :   60

Objectives:

➢ To study about the principles of geometrical and physical optics.
➢ To understand the wave properties of light.

UNIT – I  Huygen’s Principle and its Applications           12 hours
Huygen’s Theory – Rectilinear Propagation – Refraction of a Plane Wave at a Plane Interface- Total
Internal Reflection - Reflection of a Plane Wave by a Plane Surface - Refraction of a Spherical Wave by a
Spherical Surface: -Convex surface- Concave surface-Lens Maker’s Formula

UNIT – II  Interference                           12 hours
Interference of Light Waves – #Theory of Interference (Analytical Method Only)# - Fresnal Biprism:
Experiment to determine the Wave length of light.
Thin Films-Interference due to films of variable thickness (Air Wedge)-Determination of the thickness of
the spacer used to form an Air Wedge - Newton’s Rings – Determination of wavelength.

UNIT – III   Interferometry and Holography            12 hours
Michelson’s Interferometer: Construction–Working–Measurement of Wavelength of monochromatic light
-Measurement of the thickness of a thin film.
Hologram - #Applications of Holography#.

UNIT – IV  Diffraction               12 hours
Diffraction – #Distinction between Interference and Diffraction# - Fresnel and Fraunhoffer types of
Diffraction –Fresnel Diffraction due to a straight Edge.
Fraunhoffer Diffraction at a Double slit: Interference –Theory of Plane Diffraction Grating-Determination
of the Wavelength of a Spectral Line using a Plane Transmission Grating – Dispersive Power of a Grating
UNIT – V  Polarization  12 hours

Polarization of Light – Production of Polarized Light by Reflection – Brewster’s Law – Application of Brewster’s Law-Polarizer and Analyzer – Malus Law.
Polarization by Double Refraction – Huygen’s Explanation of double Refraction – Optical Activity-Specific Rotation –Laurent’s Half-shade Polarimeter

#.............#   Self study portion

Text books:
T.B 2  Subrahmanyam, Brij Lal and M. N. Avadhanulu, A Text Book of Optics, 
S. Chand, New Delhi, 23rd Edition, 2006

UNIT I  Chapter 12  Sections 12.2 - 12.4.6    T.B 1
UNIT II  Chapter 14 & 15  Sections 14.4 - 14.9.2 & 15.1 - 15.6.3    T.B 2
UNIT III  Chapter 15 & 23  Sections 15.7.1 - 15.8.3 & 23.1 - 23.6    T.B 2
UNIT IV  Chapter 17 & 18  Sections 17.1 - 17.10 & 18.4 - 18.7.7    T.B 2
UNIT V  Chapter 20  Sections 20.1 - 20.26    T.B 2

Books for reference:
SEMESTER V: CORE – IX
SEMICONDUCTOR ELECTRONICS

Course Code : 14UPH5C9       Max. Marks : 100
Hours / Week : 4          Internal Marks : 40
Credit : 4               External Marks : 60

Objectives:
➢ To learn about the characteristics of semiconductor devices under forward and reverse biasing
➢ To study about the functions and different types of amplifiers and oscillators.

UNIT – I  Semiconductors and Diodes  12 hours
Intrinsic and Extrinsic semiconductors – n-type and p-type semiconductors – formulation of p-n junction – V-I characteristics – Zener diode – V-I characteristics – Zener diode voltage regulator – Half wave rectifier – Bridge rectifier.

UNIT – II Transistors and FET  12 hours

UNIT – III Amplifiers  12 hours

UNIT – IV Oscillators  12 hours

UNIT – V Operational amplifier  12 hours

.............# Self study portion

Text books:
<table>
<thead>
<tr>
<th>UNIT I</th>
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<td>UNIT V</td>
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<td>Sections 35.1 - 35.13</td>
<td>T.B 2</td>
</tr>
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</table>

Book for Reference:

B.L. Theraja, Basic Electronics, S.Chand & company Ltd, 5th edition, 2005
SEMESTER V: CORE – X
SOLAR ENERGY

Course Code : 14UPH5C10          Max. Marks : 100
Hours / Week : 4                  Internal Marks : 40
Credit : 4                        External Marks : 60

Objectives:

➢ To understand the concepts of conventional and non conventional energies.
➢ To learn the utilization of solar energy.

UNIT - I     Conventional & Non-Conventional Energy Resources        12 hours
Conventional Energy Resources: Fossil Fuels – Hydro resources – Nuclear resources.
Bio Mass Conversion Technology (Physical method) – Geo thermal Energy – Applications –

UNIT –II     Solar Radiation Analysis                                  12 hours
The characteristics of the sun – The solar constant – The electromagnetic energy spectrum-
Spectral distribution of solar radiation - Determination of Solar time – Solar radiation data –
Estimation of direct and diffused radiation –Pyrheliometers – Pyranometers.

UNIT- III     Solar Collectors & Solar Energy Storage               12 hours
Liquid flat plate Collectors - General Characteristics - Focusing type Solar Collectors - Solar
Concentrators and Receiver geometries - General Characteristics of focusing Collectors Solar
Storage.

UNIT-IV     Solar Thermal Systems and Refrigeration                 12 hours
Solar water heater – Box type Solar Cooker - Solar Furnaces - Solar green house - Solar
Dryer - Solar Distillation- Solar Refrigeration and Air conditioning system-Solar thermo
mechanical Systems-Solar thermal water pump-Solar Vapour Compression Refrigeration- Solar
Chimney Plant.

UNIT-V     Solar Photovoltaic Systems                               12 hours

#............#    Self study portion
Text books:


UNIT I  Chapter 1 & 7-10       Sections 1.13.2, 7.8, 8.4, 9.1 & 10.1.3    T.B 1
UNIT II Chapter 3 & 4      Sections 3.1 - 3.7 & 4.1 - 4.4    T.B 2
UNIT III Chapter 5, 7 & 9     Sections 5.3 - 5.11.7 & 7.1 – 7.5 & 9.1 – 9.2  T.B 2
UNIT IV  Chapter 5      Sections 5.2 - 5.11.7      T.B 1
UNIT V  Chapter 6        Sections 6.1 - 6.2.4     T.B 1

Books for reference:


SEMESTER V: CORE – XI
OPTICS AND NUMERICAL PROGRAMMING: PRACTICAL

Course Code : 14UPH5C11P       Max. Marks      : 100
Hours / Week : 4                 Internal Marks : 40
Credit : 4                     External Marks : 60

Objectives:

➢ To learn the measurement techniques of optical experiments
➢ To develop the skills in numerical programming

1. Determination of the Young’s modulus \([Y]\) of a material: Koenig’s Method.

2. Determination of the Cauchy’s Constants and the Dispersive power of a glass prism using a Spectrometer.

3. \(i-d\) curve: Determination of Refractive Index of Glass using a prism and a Spectrometer.


5. Programming Exercises to Evaluate Simple Mathematical Expressions

➢ Conversion of temperature from Celcius to Fahrenheit scal.
➢ Computation of area of a triangle given its three sides
➢ Computation of area of a triangle given its base and height.
➢ Computation of the value of \(\pi\) from the expression \(\pi = 4\tan^{-1}(1)\)

6. Programming Exercises using Control statements \([if, if-else, switch]\)

➢ To find the biggest of three numbers.
➢ To check whether a given number is a floating point input.
➢ Finding the solution of a quadratic equation using if-else construct.
➢ Finding the solution of a quadratic equation using switch statement.

7. Programming Exercises using Loops and Nested Loops \([while, do-while, for]\)

➢ To find the prime numbers in a given range.
➢ To find the factorial of a number.
➢ Conversion of decimal number into a binary number.
➢ To construct the multiplication table from 1 to 20.

8. Programming Exercises using One-Dimensional Arrays

➢ To print the elements of an array.
➢ To sort the elements of an array in ascending order.
➢ To find the biggest and smallest elements of an array.
➢ To construct the Fibonacci series using arrays
Books for reference:

Objectives:

➢ To develop the skills in analog and digital experiments
➢ To practice the assembly language programs of 8085 microprocessor using trainer kit.

2. Adder (Inverting and Non-inverting Modes), Subtractor using Op-amp IC741
3. Integrator and Differentiator Circuits using IC741 Op-Amps.
4. Verification of De Morgan’s Theorems and the Truth Tables for the Logic Gates (AND, OR, NOT, NAND, NOR & EX-OR) using ICs.
5. Block Transfer of Data using µp 8085.
7. Sorting of Data in Ascending order and Descending order using µp 8085.
8. Conversion of Binary Numbers to BCD coded form.

Books for reference:

# SEMESTER V: SKILLED BASED ELECTIVE-III
## SCIENTIFIC PROGRAMMING IN C

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### Objectives:
- To understand the basic concepts of C structure.
- To learn the keywords and functions of C
- To practice the programming exercises

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## UNIT – I  C Basics

### Importance of C – Basic structure of C Programs – Programming Style – #Basic concepts of flowcharts and algorithms –conventions used in writing algorithms -Character set, Keywords and Identifiers – Constants – Variables – Data Types – Declarations of Variables –Assigning values of variables

### Programming Exercises:
- Algorithm and flowcharts for
  1. To compute the largest of three numbers.
  2. To find the average of n numbers.
  3. To generate prime numbers between 1 to n.
  4. To find the factorial of a given number n.
  5. To find the roots of the quadratic equation.

---

## UNIT – II  Operators and Expressions

### Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional- Arithmetic expressions – Operator Precedence and Associativity

### Programming exercises:
  1. Conversion of temperature from Celcius to Fahrenheit scale and vice versa.
  2. Computation of area of a triangle given its three sides
  3. Computation of area of a triangle given its base and height.
  4. Computation of the value of $\pi$ from the expression $\pi = 4\tan^{-1}(1)$
  5. Area and perimeter of a square given its sides.

---

## UNIT – III Input, Output and Control Statements

### General I/P and O/P functions: scanf & printf functions - format specifiers-Conversion type characters for numeric and qualified data types-Decision making statements: if, if-else, switch, go-to, break and continue statements

### Programming exercise:
  1. To find the biggest of three numbers.
  2. To check whether a given number is a floating point input.
  3. Finding the solution of a quadratic equation using if-else construct.
  5. Finding the area of a triangle using switch statement-given (a) its three sides (b) its base and height.
UNIT – IV  **Loops and Nested Loops**  
6 hours

Loop Constructs – explanation of these constructs using flow charts – while loop – syntax of while loop – do-while loop – syntax of do-while loop – for loop – syntax of for loop – initialization, testing and incrementation

**Programming exercise:**
1. To find the prime numbers in a given range.
2. To find the factorial of a number.
3. Conversion of decimal number into a binary number.
4. To construct the multiplication table from 1 to 20.
5. To check for leap years for the period 1901-2100.

UNIT – V  **Arrays**  
6 hours

One–dimensional array declaration- initializing arrays- storing arrays in memory - accessing elements of an array

**Programming exercise:**
1. To print the elements of an array.
2. To sort the elements of an array in ascending order.
3. To find the biggest and smallest elements of an array.
4. To find the average of a given set of elements using arrays.
5. To construct the Fibonacci series using arrays.

#.............#  **Self study portion**

**Text books:**


UNIT I  Chapter 1 & 2  Sections 1.2 - 1.9 & 2.2 - 2.10  T.B 1

UNIT II  Chapter 3  Sections 3.2 - 3.10  T.B 1

UNIT III  Chapter 3 & 4  Sections 3.4 -3.5 & 4.2 - 4.13  T.B 2

UNIT IV  Chapter 4  Sections 4.6 - 4.9  T.B 2

UNIT V  Chapter 7  Sections 7.2 - 7.2.4  T.B 2

**Book for reference:**

SEMESTER V: EXTRA CREDIT – III
MOBILE TELEPHONY

Course Code : 14UPH5EC3       Max. Marks : 100
Hours / Week : --        Internal Marks : --
Credit : 4        External Marks : 100

Objectives:
➢ To learn about electronic communication principles
➢ To learn about the concepts of wireless communication and cellular systems.

UNIT – I          Wireless Communication

Wireless communication – applications-mobile and wireless devices-history of wireless Communication - wireless transmission-frequencies for radio transmission and their regulation

UNIT – II       Concepts of Wireless Transmission

Multiplexing: space division multiplexing-frequency division multiplexing-time division multiplexing-code division multiplexing-modulation: amplitude shift keying-frequency shift keying-phase shift keying-multicarrier modulation

UNIT – III    Spread Spectrum Communication and Cellular System

Spread Spectrum and its advantages-Direct sequence Spread Spectrum – Frequency Hopping Spread Spectrum – Cellular Systems-Medium Access Control-Motivation for MAC-SDMA-FDMA-TDMA-Fixed TDM-CDMA- Comparison of these

UNIT – IV       Telecommunication Systems


UNIT – V    GPRS and Bluetooth Services


Text book:
**SEMESTER VI: CORE – XII**  
**WAVE MECHANICS AND RELATIVITY**

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**Objectives:**
- To study about the fundamentals of wave mechanics
- To learn the theories of relativistic mechanics

**UNIT – I    Inadequacy of Classical theory    15 hours**


**UNIT – II    Foundations of Wave Mechanics    15 hours**


**UNIT – III    Formulation of Wave Mechanics    15 hours**


**UNIT – IV    Schrödinger’s Wave Equation    15 hours**


**Unit – V    Relativity    15 hours**

Text books:


UNIT I  Chapter 1  Sections 1.3 - 1.14  T.B 1
UNIT II  Chapter 2 & 4  Sections 2.2 - 2.10 & 4.1 - 4.4  T.B 1
UNIT III  Chapter 5  Sections 5.1 - 5.9  T.B 2
UNIT IV  Chapter 2  Sections 2.12 - 2.18  T.B 1
UNIT V  Chapter 10  Sections 10.1 - 10.11  T.B 3

Book for Reference:

R. Murugesan, Modern physics, S.Chand & Company Ltd, 4th edition, 2005
SEMESTER VI: CORE – XIII
DIGITAL ELECTRONICS AND MICROPROCESSOR

Course Code  : 14UPH6C13       Max. Marks      : 100
Hours / Week : 5        Internal Marks    :   40
Credit       : 4        External Marks   :   60

Objectives:

➢ To understand the digital principles and its applications
➢ To study about the architecture of Intel 8085 Microprocessor and its programming instructions.

UNIT – I  Number Systems and logic gates                     15 hours

Introduction to decimal, binary, octal & hexadecimal number systems – Interconversions
– Simple binary arithmetic operations – Addition, Subtraction, Multiplication and Division – 1’s
& 2’s complements - BCD code - Gray code – ASCII code – Basic logic gates – symbols and
truth tables – AND, OR, NOT, NAND, NOR, EX-OR, and EX-NOR – Universality of NAND
and NOR gates.

UNIT – II  Boolean algebra and Simplification of logic expressions       15 hours

Laws of Boolean algebra – De-Morgan’s theorems - Reducing Boolean expressions
using Boolean laws – Sum of Products (SOP) - Product of Sum (POS)
Karnaugh map: Minterms – 2, 3 & 4 variables – Don’t care conditions.

UNIT – III  Arithmetic circuit, Combination circuit applications &
D/A&A/D converters                     15 hours

Half adder and Full adder – Half subtrator and Full subtractor – Multiplexer(2-input) –
Demultiplexer - Decoder – 2 to 4 Decoder – Encoder – Binary Weighted Resistor D/A converter

UNIT – IV  Flip-Flops, Registers & Counters                     15 hours

Registers Right Shift Register – Left Shift Register – Ring Counter – Johnson’s counter –
Asynchronous counter ( Mod – 2 counter) – Synchronous counter.
UNIT – V  Intel 8085 Microprocessor & Programs  15 hours

8-bit addition, subtraction, multiplication & division - Ascending and Descending orders – Largest number in an array – Sum of a series of 8-bit numbers, 16 bit addition.

#.............#  Self study portion

Text books:


UNIT I  Chapter 1 - 4  Sections 1.1 - 4.20  T.B 1
UNIT II  Chapter 5 & 6  Sections 5.1 - 6.23  T.B 1
UNIT III  Chapter 7, 8 & 16  Sections 7.1 – 8.18 & 16.1 -16.13  T.B 1
UNIT IV  Chapter 9 & 16  Sections 9.1 - 10.19  T.B 1
UNIT V  Chapter 1  Sections 1.10 - 1.11  T.B 2
UNIT V  Chapter 6  Sections 6.21 - 6.27  T.B 3

Books for References:
Objectives:
- To understand nuclear structure and its radiations.
- To study nuclear reactions and elementary particles.
- To learn the concepts of particle accelerators and Detectors

UNIT – I  Nuclear Structure  15 hours

UNIT – II  Radioactivity and Radiations  15 hours

UNIT – III  Particle accelerators and Detectors  15 hours
Linear accelerator – cyclotron – synchrocyclotron – Betatron – Proton synchrotron.
UNIT – IV  Nuclear fission, Fusion and transmutation  
15 hours

Nuclear Fission – energy released in fission – chain reaction – nuclear reactor – power reactor –
Nuclear Fusion – sources of stellar energy – thermonuclear reaction – controlled thermonuclear
reactions.

UNIT – V  Nuclear Reactions and elementary particles  
15 hours

Nuclear reactions – types of nuclear reactions – conservation laws – energy balance in nuclear
reactions and Q value.
Classification of elementary particles – particles and antiparticles – fundamental interactions –
quantum numbers – conservation laws.

#...........#   Self study portion

Text book:

UNIT I  Chapter 1  Sections 1.3.1 - 1.10.2
UNIT II Chapter 2 & 3 Sections 2.2 - 3.3.6
UNIT III Chapter 4, 5 & 8 Sections 4.3.1 - 5.13 & 8.4 - 8.9
UNIT IV Chapter 10 Sections 9.1 - 10.19
UNIT V Chapter 1 Sections 10.2 - 10.5.4
UNIT V Chapter 9 & 12 Sections 9.3 - 9.3.3 & 1.2 -12.6

Books for reference:
SEMESTER VI: CORE – XV
LASER AND SPECTROSCOPY

Course Code : 14UPH6C15       Max. Marks : 100
Hours / Week : 4       Internal Marks : 40
Credit : 4       External Marks : 60

Objectives:

➢ To understand the principles, production and applications of Laser.
➢ To understand the concepts of Infra red, Microwave, Raman Spectroscopy

UNIT – I   LASER FUNDAMENTALS         12 hours

Spontaneous and stimulated emission – Einstein’s Coefficients – Population inversion –
Metastable states - Pumping methods: Optical, Electrical pumping and Direct conversion –
pumping schemes: Two level and three level pumping scheme.

UNIT – II   TYPES AND APPLICATIONS OF LASER         12 hours

– Applications: Scanners – Compact discs – Holography.

UNIT – III  INFRA – RED SPECTROSCOPY          12 hours

Range of I.R. – Theory of IR absorption spectroscopy –Diatomic molecule as harmonic
oscillator - anharmonic oscillator – linear & symmetric top molecules – Double beam
I.R.Spectrometer – #Limitation of I.R.Spectroscopy#.

UNIT – IV   MICROWAVE SPECTROSCOPY         12 hours

Theory of microwave spectroscopy – Diatomic molecule as a Rigid Rotator –
Microwave spectrometer – Application: Carbon monoxide and HCl molecules – structure
determination of Carbon Oxysulphide (OCS) molecule.

UNIT – V    RAMAN SPECTROSCOPY          12 hours

Raman Effect - Characteristic properties of Raman lines – Mechanism of Raman spectra
– Classical and quantum theory – Difference between IR and Raman spectra — Raman
spectrometer – #Applications of Raman spectroscopy#.

#.............#   Self study portion
Text books:


UNIT I    Chapter 1    Sections 1.1 - 1.2    T.B 1
UNIT II   Chapter 2 & 5    Sections 2.1 - 2.5 & 5.9 -5.11    T.B 1
UNIT III - V  Chapter 2    Sections 2.30 -2.99    T.B 2

Books for reference:
SEMESTER VI: CORE – XVI
GENERAL PHYSICS AND SCIENTIFIC PROGRAMMING: PRACTICAL

Course Code : 14UPH6C16P       Max. Marks : 100
Hours / Week : 4        Internal Marks : 40
Credit : 4        External Marks : 60

Objectives:

➢ To practice the determination of coefficient and measurement of physical quantities in optical, electricity and magnetic experiments

➢ To practice the programming concepts in C

1. \textit{i-i’ curve}: Determination of Refractive Index of Glass using a prism and a Spectrometer.


4. Vibration magnetometer: Determination of M & H.

5. Programming Exercises using Two-Dimensional Arrays
   ➢ To accept the elements and print a two dimensional array.
   ➢ Trace of a square matrix.
   ➢ Transposing a square matrix.
   ➢ Addition of two square matrices (n \times n matrices)

6. Programming Exercises using Functions
   ➢ To evaluate the factorial of a given number.
   ➢ To find the sum of two numbers
   ➢ To construct the Fibonacci series

7. Programming Exercises for Curve Fitting using Regression Analysis
   ➢ To fit a given set of data to a straight line using linear least square fit.
   ➢ To fit a given set of data to an exponential equation of the form $p = p_0 e^{kt}$

8. Programming Exercises for Evaluation of some Statistical Parameters
   ➢ Calculation of median of a given data set.
   ➢ Calculation of mode of a given data set.
Books for reference:


Objectives:

- To practice circuit constructions of analog and digital experiments
- To practice Intel 8085 microprocessor programming

1. Study of Series and Parallel Resonance Circuits
2. Hartley Oscillator.
4. Verification of NAND and NOR as Universal Gates.
6. Eight Bit Multiplication and Division using μp 8085.
7. Searching for the Biggest and Smallest Numbers of an Array
8. Conversion of a Decimal Number to Hexadecimal form and vice versa

Books for reference:

SEMESTER VI: SKILL BASED ELECTIVE – IV
ADVANCED SCIENTIFIC PROGRAMMING IN C

Course Code : 14UPH6S4       Max. Marks : 100
Hours / Week : 2        Internal Marks : 40
Credit : 2        External Marks : 60

Objectives:

➢ To study the functions and applications of C programming.
➢ To practice problems in numerical computation.
➢ To programming exercises in C.

UNIT –I  Matrices                                   6 hours

Two dimensional arrays – declaration –elements of a two dimensional array - #accessing of the elements# – initialization of arrays

Programming exercise:

1. To accept the elements and print a two dimensional array.
2. Trace of a square matrix.
3. Transposing a square matrix.
4. Addition of two square matrices(n × n matrices)

UNIT –II  Functions                 6 hours

Function main() -User defined and library functions- Concepts associated with functions:
function declaration or function prototype, #function definition# - arguments of a function-passing arguments to a function- return statement in a function- and function call-Recursion

Programming exercise:

1. To evaluate the factorial of a given number.
2. To find the sum of two numbers
3. To construct the Fibonacci series

UNIT –III  Curve Fitting : Regression               6 hours

Linear least square fit –fitting linear equations of the form \( y = ax + b \)–fitting

Programming exercise:

1. To fit a given set of data to a straight line using linear least square fit.
2. To fit a given set of data to an exponential equation of the form \( y = p_0 e^{kt} \)
UNIT –IV        Numerical Integration            6 hours

Need and scope for numerical integration – numerical integration using trapezoidal rule (two point
formula), Simpson’s 1/3 rule (three point formula

**Programming exercise:**
1. To find the integral of a given function using trapezoidal rule.
2. To find the integral of a given function using Simpson’s 1/3 rule.

UNIT –V        Evaluation of statistical parameters        6 hours

Classification and tabulation of data – finding the limits of intervals – inclusive and exclusive
methods – calculation of arithmetic mean, median and mode

**Programming exercise:**
1. Calculation of median of a given data set.
2. Calculation of mode of a given data set.

#.............#    Self study portion

Text books:
T.B 1         K.R. Venugopal and S.R. Prasad, Mastering C, Tata Mc-Graw Hill, New Delhi,
1st edition, 2007

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Book for reference:
Suresh Chandra, Computer Applications in C, Narosa Publishing House, New Delhi,
Objective:

➢ To develop the skills and quantitative knowledge in physics concepts to face competitive examinations.

UNIT – I  Mechanics and sound


UNIT – II  Heat and Thermodynamics


UNIT – III  Electromagnetism


Electrostatics


UNIT – IV  Optics

UNIT – V  Modern Physics


Text book:

UNIT I  Chapter 1
UNIT II  Chapter 2 & 3
UNIT III  Chapter 4, 5 & 8
UNIT IV  Chapter 10
UNIT V  Chapter 9 & 12

Book for reference:
SEMESTER I: ALLIED – I
PROPERTIES OF MATTER AND SOUND

Course Code : 14UPH1A1      Max. Marks : 50
Hours / Week : 5       Internal Marks : 20
Credit : 2       External Marks : 30

Objectives:
- To understand the Properties of solid and liquid particles and its applications
- To study the concepts of heat, gravitation and their implications
- To learn the basic concepts of osmosis and diffusion

UNIT – I                     12 hours

Elasticity:  Stress and strain – Hooke’s law –Types of elastic constants – Young’s modulus, Rigid modulus & Bulk modulus –Poisson’s ratio –Determination of Young’s modulus by non-uniform bending (Pin and Microscope) - #Surface tension:- Definition# –Molecular theory- Determination of surface tension by Jaeger’s method.


UNIT – II                    12 hours


UNIT – III                      12 hours

Sound:  Simple harmonic motion –Equation of simple harmonic motion – composition of two SHM’s in a straight line – composition of two SHM’s at right angles to each other –Lissajou’s Figures(Basic concept only) –Ultrasonic – Properties – Production by Piezo-electric method-Application of Ultrasonics– Reverberation and reverberation time–Conditions for a good auditorium.

UNIT – IV                                    12 hours


UNIT – V                      12 hours


Osmosis:  Osmosis and osmotic pressure – Laws of osmotic pressure -Experimental determination of osmotic pressure (Berkeley and Hartley method)

#...........#  Self study portions
Text books:


Unit – I: Chapter 1 & 2 Section: 1.1 - 2.11 T.B 1
Unit – III: Chapter 11 Section: 11.1 - 11.17 T.B 1
Unit – IV: Chapter 4 & 5 Section: 4.1- 5.5 T.B 3
Unit – V: Chapter 2 & 8 Section: 2.21, 8.1- 8.28 T.B 2

Books for reference:

Objective:

- To develop the experimental skills and determination of the Physical coefficients of matters.

1. Young’s Modulus – Non Uniform bending (Pin & Microscope)

2. Surface Tension – Capillary Rise Method.

3. Potentiometer – Low range Voltmeter calibration


7. Sonometer verification of I and II laws.

8. Zener Controlled rectifier.

Books for reference:


SEMESTER II: ALLIED –II
MODERN PHYSICS

Course Code : 14UPH2A2      Max. Marks : 50
Hours / Week : 4       Internal Marks : 20
Credit : 2       External Marks : 30

Objectives:
➢ To study the fundamental concepts of light, electricity and atomic models
➢ To learn the spectral studies of IR, UV and Raman and understand the basics of semiconductors

UNIT – I


UNIT – II

Electricity: Coulomb’s law – Principle of capacitor –Energy stored in a charged capacitor – Loss of energy due to sharing of charges.
KIRCHOFF’S LAW – CAREY FOSTER’S BRIDGE – DETERMINATION OF SPECIFIC RESISTANCE – CALIBRATION OF AN AMMETER USING POTENTIOMETER.

UNIT – III

Nuclear fission and fusion – Radioactivity – Construction and working of an Ionization chamber- Construction and working of G.M Counter.

UNIT – IV


UNIT – V


#........................# self study portion
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Book for reference:

Course Code : 1UPH2A2P       Max. Marks       :  50
Hours / Week : 3       Internal Marks    :   20
Credit     : 2       External Marks   :   30

Objectives:

➢ To learn the measurements in Heat and optical experiments
➢ To study the characteristics of the semiconductor diodes.
➢ To learn the circuit construction in the electricity and electronics experiments

1. Young’s modulus (Scale and telescope method) Non Uniform bending.

2. Potentiometer – Ammeter calibration.


5. Thermal conductivity of a bad conductor – Lee’s disc method.


7. Spectrometer Solid Prism - μ

8. Basic logic gates using discrete components.

Books for reference:
