

# HAJEE KARUTHA ROWTHER HOWDIA COLLEGE

(An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai.)

(Re-Accredited at "A" Grade, by NAAC,Banglore)

UTHAMAPALAYAM – 625533.



## DEPARTMENT OF PHYSICS

### BACHELOR OF SCIENCE - PHYSICS

### SYLLABUS

**(Effect from the Academic Year 2017 – 2018 Onwards)**

#### **PROGRAM SPECIFIC OUTCOMES**

- PSO1. Apply the knowledge of chemistry in natural products, drugs, biological and computer sciences.
- PSO2. Formulate problem solving techniques, develop critical thinking, analytical reasoning to design and perform experiments.
- PSO3. Strategise and apply apt techniques in quality control labs, pharmaceutical companies in addition to petrochemical, sugar, leather, dyeing, textile, cosmetics, match, cement, fertilizer industries.
- PSO4. Develop communication skills with comprehensive subject knowledge for competitive examinations.



# **HAJEE KARUTHA ROWTHER HOWDIA COLLEGE**

**[ AUTONOMOUS ] UTHAMAPALAYAM - 625533**

## **Choice Based Credit System (CBCS)**

### **B.Sc., Physics (Semester System)**

#### **Course Scheme, Scheme of Examinations and Syllabus**

(Effective from the academic year 2017 – 2018 )

**Qualification:** Passed in HSC with Physics, Chemistry and Mathematics or any other examination accepted by the Syndicate as equivalent with Physics, Chemistry and Mathematics as the subjects in higher secondary education level.

**Duration of the Course :** Three academic years ( **6** – Semesters)

#### **Program Specific Outcomes**

To enable the students,

1. To acquire knowledge of physics.
2. To understand the usage of physics in applied sectors.
3. To develop skills through practical's in laboratories, lab visits in research institution and field visits in industries.
4. To become motivated for pursuing higher education & research.
5. To become skilled either to suit with employment opportunities or to make self employments

#### **Subjects of study :**

Part - I - Tamil

Part - II - English

Part - III i) Core Subjects – Physics.

ii) Allied Subjects – Maths and Chemistry

Part - IV i) Non-major subjects

ii) Skill based Subjects

iii) Environmental Studies

iv) Value Education

Part-V Extension Activities

### **Structure of the question papers:**

#### **Theory:**

Internal	–	25 marks
External	–	75 marks
100 marks – Total		

**Question Paper:** Three Parts A, B and C (external)

Section - A - 10 questions (multiple choices)

Section - B - 5 questions (either a or b)

One problem is must (either a or b) in any unit

Section - C - 3 out 5 questions

#### **1. For Internal Examination : 25 marks**

1. Three tests to be conducted –15 marks (average of 2 tests to be taken)
2. Group discussion / Seminar / Quiz –5 marks
3. Two Assignments –5 marks each(average of 2 to be taken )
4. I- Internal Examination –25<sup>th</sup> working days
5. II- Test will be conducted –50<sup>th</sup> working days
6. III- Test will be conducted –75<sup>th</sup> working days

Eligibility for the degree – passing minimum is 40%.

**Question Papers in External Examination carrying 75 marks will be in the format below.**

Type	No of questions to be answered	Marks
Section A	10	10
Section B	5	35
Section C	3	30

Note: The internal and external marks, Passing minimum and the question pattern will be decided at the Board of Studies meeting to be held shortly.

#### **Practical**

Internal - 40 marks (record-10 and model exam-30)

External - 60 marks

Total - 100 marks

### Allocation of Papers and credits (semester wise) for UG programmes

Part	Course Category	Course Code	Course Title	Hrs/ Week	CIAE	TEE	Max. Marks	Credits
SEMESTER – I								
I	LANGUAGE-I	17UTAL11/ 17UARL11/ 17UMLL11	Tamil/Arabic/Malayalam	6	25	75	100	3
II	ENGLISH –I	17UENL11	English-I	6	25	75	100	3
III	Core-I	17UPHC11	Mechanics and Relativity	5	25	75	100	4
III	Core Practical-I	17UPHC2P	Major Practical-I	3				
III	Allied - I	17UMAP11	Ancillary Maths-I	6	25	75	100	5
IV	Skilled-I	17UPHS11	Properties of Matter and Sound	2	25	75	100	2
IV	Non Major Elective-I	17UPHN11	Basic Physics-I	2	25	75	100	2
				30			600	19
SEMESTER – II								
I	LANGUAGE-II	17UTAL21/ 17UARL21/ 17UMLL21	Tamil/Arabic/Malayalam	6	25	75	100	3
II	ENGLISH –II	17UENL21	English-II	6	25	75	100	3
III	Core-II	17UPHC21	Electricity	5	25	75	100	4
III	Core Practical-I	17UPHC2P	Major Practical-I	3	40	60	100	4
III	Allied-II	17UMAP21	Ancillary Maths-II	6	25	75	100	5
IV	Skilled-II	17UPHS21	Heat and Thermo Dynamics	2	25	75	100	2
IV	Non Major Elective-II	17UPHN21	Basic Physics-II	2	25	75	100	2
				30			700	23
SEMESTER – III								
I	LANGUAGE-III	17UTAL31/ 17UARL31/ 17UMLL31	Tamil/Arabic/Malayalam	6	25	75	100	3
II	ENGLISH –III	17UENL31	English-III	6	25	75	100	3
III	Core-III	17UPHC31	Electromagnetics	4	25	75	100	4
III	Core Practical-II	17UPHC4P	Major Practical-II	2				
III	Allied-III	17UMAP31	Ancillary Maths -III	6	25	75	100	5
III	Allied-I	17UCHA31	Ancillary Chemistry -I	4	25	75	100	4
III	Allied Practical-I	17UCHA2P	Ancillary Chemistry Practical-I	2				
				30			500	19

SEMESTER – IV								
I	LANGUAGE-IV	17UTAL41/ 17UARL41/ 17UMLL41	Tamil/Arabic/Malayalam	6	25	75	100	3
II	ENGLISH –IV	17UENL41	English-IV	6	25	75	100	3
III	Core-IV	17UPHC41	Optics and Laser	4	25	75	100	4
III	Core Practical-II	17UPHC4P	Major Practical-II	2	40	60	100	4
III	Allied-IV	17UMAP41	Ancillary Maths-IV	6	25	75	100	5
III	Allied-II	17UCHA21	Ancillary Chemistry-II	4	25	75	100	4
III	Allied Practical-I	17UCHA2P	Ancillary Chemistry Practical -I	2	40	60	100	1
V	Extension Activity				100		100	2
				30			700	26
SEMESTER – V								
III	Core-V	17UPHC51	Atomic and Quantum Mechanics	4	25	75	100	4
III	Core-VI	17UPHC52	Nuclear and Particle Physics	4	25	75	100	4
III	Elective-I	17UPHE51	Analog Electronics	4	25	75	100	4
III	Elective-II	17UPHE52	Astrophysics-I					
III	Allied-III	17UCHA31	Ancillary Chemistry-III	4	25	75	100	4
III	Allied Practical-II	17UCHA4P	Ancillary Chemistry Practical -II	2				
IV	Skilled-III	17UPHS51	Applied Physics	2	25	75	100	2
III	Core Practical-III	17UPHC6P	Major Practical-III	3				
III	Core Practical-IV	17UPHC6Q	Major Practical-IV	3				
III	Core Practical-V	17UPHC6R	Major Practical-V	2				
IV	EVS	17EVS51	Environmental Studies	2	25	75	100	2
				30			700	20
SEMESTER – VI								
III	Core-VII	17UPHC61	Classical and Statistical Mechanics	4	25	75	100	4
III	Core-VIII	17UPHC62	Condensed Matter Physics	4	25	75	100	4
III	Elective-III	17UPHE61	Digital Electronics	4	25	75	100	4
III	Elective-IV	17UPHE62	Astrophysics-II					
III	Allied-III	17UCHA31	Ancillary Chemistry-IV	4	25	75	100	4
III	Allied Practical-II	17UCHA4P	Ancillary Chemistry Practical –II	2	40	60	100	1
IV	Skilled-IV	17UPHS61	Applied Physics-II	2	25	75	100	2
III	Core Practical-III	17UPHC6P	Major Practical-III	3	40	60	100	4
III	Core Practical-IV	17UPHC6Q	Major Practical-IV	3	40	60	100	4
III	Core Practical-V	17UPHC6R	Major Practical-V	2	40	60	100	4
IV	VE	17UVED61	Value Education	2	25	75	100	2
				30			1000	33
Grand Total				180			4200	140

## **MECHANICS AND RELATIVITY**

**Programme : B.Sc., Physics**

**Part : III-Core-I**

**SEMESTER : I**

**Hour : 5**

**Course Code :17UPHC11**

**Credits : 3**

### **Course Outcomes**

CO1: Delineate the basic concepts of mechanics and relativity, covering space science technology

### **Unit I**

Equation of motion – Newton's law of motion, momentum and impulse- Law of conservation of linear momentum – collision – Elastic and inelastic collision – Newton's law of impact Coefficient of restitution – Impact of smooth sphere on a fixed plane – Direct and oblique impact of moving two smooth spheres – Calculation of final velocity of spheres – Loss of kinetic energy.

### **Unit II**

Moment of inertia – Parallel axes theorem – Perpendicular axes theorem - Moment of inertia of circular disc, about an axis passing through its centre and perpendicular to its own axis – Moment of inertia of solid sphere about all axis – Angular momentum and torque – Kinetic energy of rotation – Expression for the acceleration of a body rolling down on an inclined plane.

### **Unit III**

Kepler's laws of planetary motion – Law of gravitation – Mass and density of Earth - Compound pendulum – expression for period – Experiment to find g – Variation of g with latitude, altitude and depth-Gravitational potential and potential energy. Orbital velocity – Escape velocity- Stationary satellite- uses of satellites.

### **Unit IV**

Rocket – Principle –Theory of Rocket – Velocity of Rocket at any instant – Rocket propulsion systems \_ Specific impulse – Multistage Rocket – Shape of the Rocket. Frames of reference – Inertial and non-inertial frame of reference – Galilean transformation, Newtonian relativity – Michelson-Morley experiment – Significance of negative result.

### **Unit V**

Postulates of Special theory of relativity – Lorentz transformation – Lorentz Fitzgerald contraction – Time dilation – relativistic addition of velocities – Relativistic mass, relativistic momentum – Mass-Energy equivalence – relation between total energy and momentum.

### **Books for study:**

1. Mechanics – R. Murugesan, S. Chand & Co. Edition, 2002

### **Reference Books:**

1. Mechanics Part I and II, Narayanamoorthy, National publishing company, 2001.
2. Fundamental of physics D.Halliday, Resnick, Resnick and J.Walker, 6<sup>th</sup> Edition Wiley, New York 2001.

## **MAJOR PRACTICAL-I**

**Programme : B.Sc., Physics**

**Part : III-Core Practical-I**

**SEMESTER : I & II**

**Hours : 3**

**Course Code : 17UPHC2P**

**Credits : 4**

### **Course Outcomes**

Experimental verification of the various basic concepts of Physics.

### **Any Twelve Experiments**

1. Compound pendulum-determination of  $g$ .
2. Torsion pendulum-determination of  $I$  and  $G$ .
3. Young's modulus –Uniform bending –pin and microscope.
4. Young's modulus –Non Uniform bending –Optic lever.
5. Young's modulus –Cantilever – Pin and microscope.
6. Potentiometer- calibration of a low range voltmeter.
7. Potentiometer- calibration of an ammeter.
8. Potentiometer- internal resistance of a cell.
9. Carey Foster bridge-determination of resistance and resistivity.
10. Spectrometer – determination of refractive index of a prism.
11. Thermal conductivity of card board- Lee's disc method.
12. Sonometer- verification of laws.
13. Ballistic galvanometer comparison of capacitances.
14. Young's modulus –cantilever- Dynamic method.
15. Coefficient of viscosity – Stoke's method.
16. Determination of thermo emf- potentiometer.

## MATHEMATICS –I

**Programme : B.Sc., Physics**

**Part : III-ALLIED**

**SEMESTER : I**

**Hours : 6**

**Course Code : 17UMAP11**

**Credits : 5**

### COURSE OUTCOME:

**CO1:** The basic concepts of differential and integral calculus and apply the concept to solve geometric and physical problems.

### UNIT-I:

Theory of equations –  $n^{\text{th}}$  degree equation has exactly  $n$  roots – Relation between the roots and co-efficient.

### UNIT-II:

Finding the roots up to two decimals by Newton's, Horner's method.

### UNIT-III:

Radius of curvature, centre of curvature of plane curves – Definite integrals – Reduction formulas for  $\sin^n X$ ,  $\cos^n X$ ,  $\tan^n X$ ,  $\sec^n X$ ,  $\cot X$ ,  $\operatorname{cosec}^n X$  and  $\sin^m X \cos^n X$  and simple problems.

### UNIT-IV:

Expansions – Hyperbolic functions – Logarithm of complex numbers.

### UNIT-V:

Direction Cosines, direction ratios of a line – Angle between two straight line – equation of a plane – equation of a straight line – Angle between a plane and a line,

Co-planer lines – shortest distances.

### TEXT BOOK

“*Ancillary Mathematics*” Volume, by Dr.S.Arumugam, New Gamma Publications,1999. Reprint 2006.

**UNIT-I:** Chapter 1 (section:1.0-1.4)

**UNIT-II:** Chapter 1 (section: 1.5)

**UNIT-III:** Chapter 2,3

**UNIT-IV:** Chapter 4,5

**UNIT-V:** Chapter 6,7,8,9.



## **PROPERTIES OF MATTER AND SOUND**

**Programme : B.Sc., Physics**

**Part : IV SKILLED-I**

**SEMESTER : I**

**Hours : 2**

**Course Code : 17UPHS11**

**Credits : 27**

### **Course Outcomes**

Describing the macroscopic properties of matter and around for various applications in industries.

#### **Unit I**

Expression for – Stress, Strain –Poisson's ratio – Hook's law – Young's modulus – Bending of beam – Expression for bending moment – Uniform and Non –uniform bending (Theory).

#### **Unit II**

Definition of surface tension – Angle of contact – Capillary rise - Excess of pressure inside a bubble and spherical drop – Experimental determination of Surface Tension by Capillary rise method.

#### **Unit III**

Viscosity –Coefficient of viscosity – Streamline and turbulent motion – Critical velocity – Capillary flow Bernoulli's theorem – Coefficient of viscosity of a viscous liquid by Stokes' method – Venturimeter – Pitot's tube.

#### **Unit IV**

Simple harmonic motions – Progressive waves properties – Composition of two S.H.M. and beats stationary waves – Properties – Melde's experiment for the frequency of electrical maintained tuning fork – Transverse and longitudinal modes.

#### **Unit V**

Acoustics – Requisites for good acoustics - Ultrasonics – Production and detection- Properties and applications - Reverbration formula.

### **Books for study:**

1. Elements of properties of matter – D.S. Mathur – S. Chand & Co., 2004.
2. Properties of matter – R. Murugesan, S. Chand & Co., 2004.

### **Reference Book:**

1. Properties of matter – Brijlal and Subramanian S. Chand & Co., 2004.

## **BASIC PHYSICS-I**

**Programme : B.Sc., Physics**

**Part : IV-NME-I**

**SEMESTER : I**

**Hours : 2**

**Course Code : 17UPHN11**

**Credits : 2**

### **Course Outcomes**

Describes the fundamentals of physics to non major students

### **Unit-I**

S.I Units-measurements of length, mass, time and other physical quantities-Dimensional formula for area, volume, density and force-Uses of dimension.

### **Unit-II**

Matter-solid, liquid, gas and plasma- change of state-specific heat capacity-specific latent heat of ice and steam.

### **Unit-III**

Kinds of energy-mechanical energy, thermal energy, optical energy, sound energy, electrical energy, nuclear energy -conservation of energy.

### **Unit-IV**

Non-renewable energy-Fossil fuel, Coal and oil, Renewable energy-solar, wind, biomass and OTEC.

### **Unit-V**

Mirror-laws of reflection-image formation (concave and convex mirror)-lens-law's of refraction-image formation (concave and convex lens) – Defects of eye and rectification.

### **Books for study:**

1. First year B.Sc physics - B.V. Narayan Rao, New Age International (P) Ltd,1998.

### **Reference Books:**

1. Mechanics-D.S.Mathur-S.Chand & Co.,2002.
2. Properties of matter- D.S.Mathur-S.Chand&Co.,2002.
3. Properties of matter - Brijlal Subramanian-S. Chand & Co., 2006.

## **ELECTRICITY**

**Programme : B.Sc., Physics**

**Part : III-Core-II**

**SEMESTER : II**

**Hours : 5**

**Course Code : 17UPHC21**

**Credits : 4**

### **Course Outcomes**

Simulate practical knowledge with theoretical understanding of various electric circuits and instruments.

#### **Unit I**

Electric charges - Coulomb's law – Electric field – Flux of electric field - Gauss law and its proof –Applications of Gauss law – Electric field due to charged sphere (a) at a point outside (b) at a point inside (c) at a point on the surface of the sphere. Electric field due to infinite plane sheet of charges – Electric field at a point between two parallel plate charged conductors– Electric field near a conductor – Electric potential – Relation between electric field and potential – Potential due to charged spherical conductor at a point (a) outside (b) on the surface and (c) inside.

#### **Unit II**

Capacitance – Principle of capacitor – Expression for capacitance – Spherical capacitor (both outer sphere earthed and inner sphere earthed)– Cylindrical capacitor - Parallel plate capacitor with and without partially filled dielectric – Capacitors in series and parallel combinations- Energy of a capacitor – Loss of energy, when two charged conductors share the charges – Types of capacitors, fixed capacitor, variable capacitor, electric capacitor and sliding capacitor.

#### **Unit III**

Kirchoff's laws – Application of Kirchoff's laws to Wheatstone's networks – Carey Foster's bridge – Determination of the resistance of the given wire with the necessary theory –Temperature coefficient of resistance- determination of temperature coefficient using Carey Fosters bridge- Principle of potentiometer – Determination of internal resistance of the cell using potentiometer – Calibration of ammeter and voltmeter – low range.

#### **Unit IV**

Biot-Savart's law – Its application – Long straight wire of infinite length – Ampere's circuital theorem – Magnetic field at the centre of a circular coil carrying current – Magnetic field along the axis of a coil carrying current – Solenoid – Ballistic Galvanometer –Theory – Damping correction – Comparison between deadbeat and aperiodic galvanometer – Comparison of capacitance using B.G.(theory and experiment) – Comparison of e.m.f using B.G. (theory and experiment).

## **Unit V**

Seeback effect – Thermo e.m.f. – Neutral temperature – Temperature of inversion – Law of intermediate metals – Law of intermediate temperature – Measurement of e.m.f. of a thermocouple with a potentiometer – Peltier effect – Peltier coefficient – Thomson effect – Thomson coefficient – Thermoelectric power-Applications.

### **Books for study:**

1. Electricity and Magnetism - Sehgal, Chopra & Sehgal – S.chand & Co., 1998.

### **Reference Books:**

1. Electricity – R.Murugesan, S.Chand & Co., 2004.
2. Electricity and Magnetism – Dr.K.K.Tewari, S.chand & Co., 2002.
3. Electricity and Magnetism with Electronics – D.N.Vasudeva, S.Chand & Co., 2002.
4. Electricity and Magnetism 20<sup>th</sup> revised edition – Brijlal and Subramanian, S.chand & Co., 2007.
5. Electricity and Magnetism 2<sup>nd</sup> revised edition – Narayanamoorthy & Nagarathnam – National publishing Co., 1997.

## **MAJOR PRACTICAL-I**

**Programme : B.Sc., Physics**

**Part : III-Core Practical-I**

**SEMESTER : I & II**

**Hours : 3**

**Course Code : 17UPHC2P**

**Credits : 4**

### **Course Outcomes**

Experimental verification of the various basic concepts of Physics.

### **Any Twelve Experiments**

1. Compound pendulum-determination of  $g$ .
2. Torsion pendulum-determination of  $I$  and  $G$ .
3. Young's modulus –Uniform bending –pin and microscope.
4. Young's modulus –Non Uniform bending –Optic lever.
5. Young's modulus –Cantilever – Pin and microscope.
6. Potentiometer- calibration of a low range voltmeter.
7. Potentiometer- calibration of an ammeter.
8. Potentiometer- internal resistance of a cell.
9. Carey Foster bridge-determination of resistance and resistivity.
10. Spectrometer – determination of refractive index of a prism.
11. Thermal conductivity of card board- Lee's disc method.
12. Sonometer- verification of laws.
13. Ballistic galvanometer comparison of capacitances.
14. Young's modulus –cantilever- Dynamic method.
15. Coefficient of viscosity – Stoke's method.
16. Determination of thermo emf- potentiometer.

## MATHEMATICS-II

**Programme : B.Sc., Physics**

**Part : III-ALLIED-II**

**SEMESTER : I & II**

**Hours : 6**

**Course Code : 17UMAP21**

**Credits : 5**

### COURSE OUTCOME:

**CO1:** To demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.

#### Unit-I

Vector differentiations – Velocity, acceleration – Vector Differential operators – Gradient – Divergence – Curl and their simple properties – Directional derivatives – solenoidal – irrotational vectors – Line integrals.

#### Unit-II

Matrices – rank – consistency of equations – Eigen values and Eigen vectors.

#### Unit-III

Curve fittings – Correlation – rank – Regression.

#### Unit-IV

Interpolation – Lagrange's and Newton method – index numbers

#### Unit-V

Fourier series – Trigonometric series, even and odd functions, half range – Fourier series.

### TEXT BOOK

“Allied Mathematics” Paper II by Dr. S.Arumugam, New Gamma Publications, Nov 2011..

## HEAT AND THERMO DYNAMICS

**Programme : B.Sc., Physics**

**Part : III-Skilled-II**

**SEMESTER : II**

**Hours : 5**

**Course Code : 17UPHC21**

**Credits : 4**

### Course Outcomes

Thermodynamics is the branch of physics that studies how heat changes to and from other energy forms.

### Unit I

Postulates of Kinetic theory of gases – Mean free path – Transport phenomena – Conduction, Viscosity and Diffusion.

### Unit II

Black body radiation – Prevost's theory – Emissive and Absorptive power – Distribution of energy in black body spectrum– Wien's displacement law.

### Unit III

Stefan's law of radiation – Derivation of Newton's law from Stefan's law – Solar constant – Temperature of Sun – Angstrom's pyroheliometer – Solar spectrum.

### Unit IV

Heat and Temperature - Thermodynamics – Zeroth law – I, II and III law of thermodynamics – Entropy – Change of entropy in reversible and irreversible process – Heat death – Change of entropy in converting ice into steam.

### Unit V

Cp and Cv of a gas – Meyer's relation – Experiment to determine Cp and Cv by Regnault's method.

### Books for study:

1. Heat, Thermodynamics and Statistical physics – Brijlal and Subramanian and P.S.Hemne, S.Chand & Co. 2004.
2. Heat and Thermodynamics – R.Murugesan, S.Chand & Co. 2004.

### Reference Book:

1. Heat and Thermodynamics – D.S.Mathur, S.Chand & Co. 2002.

## **BASIC PHYSICS-II**

**Programme : B.Sc., Physics**

**Part : III-NME-II**

**SEMESTER : II**

**Hours : 2**

**Course Code : 17UPHN21**

**Credits : 2**

### **Course Outcomes**

Describes the fundamentals concepts of physics to non major students

### **Unit-I**

Electric current – Voltage and resistance – Ohm's law and Kirchhoff's law – Resistance in series and parallel.

### **Unit-II**

DC source – Primary cells – Leclanche and Daniel cell – Secondary cells – Acid Accumulator – DC generator.

### **Unit-III**

Alternating current generating by hydro, thermal and atomic power stations – RMS value – Peak value – (Quantitative) – AC generator – no derivation.

### **Unit-IV**

Potentiometer - principle - comparison of emf's of two given cells – Electric power -Moving coil galvanometer – Conversion of galvanometer into ammeter and voltmeter.

### **Unit-V**

Simple electrical circuits – resistor, capacitor and inductor connected to AC source (independently) – Relationship between emf and current in each case – Diode – Bridge Rectifier.

### **Reference Books:**

1. Electricity and Magnetism – R. Murugesan – S. Chand & Co. 2004.



## **ELECTROMAGNETICS**

**Programme : B.Sc., Physics**

**Part : III-Core-III**

**SEMESTER : III**

**Hours : 4**

**Course Code : 17UPHC31**

**Credits : 4**

### **Course Outcomes**

Describes the phenomenon of the interaction of electric currents or fields and magnetic fields.

### **Unit-I**

Faraday's laws of Electromagnetic induction – Lenz's law – Self inductance – Energy stored in an inductance – Experiment to determine self inductance by Rayleigh method with theory – Mutual inductance – Determination of Mutual inductance using B.G. (with theory) – Coefficient of coupling – Eddy currents.

### **Unit-II**

Growth & decay of current in LR circuit – Growth and decay charges in CR circuit – Growth and decay of charge in a circuit with inductance, capacitance and resistance in series – Determination of high resistance by leakage (B.G.).

### **Unit-III**

Mean value of alternating e.m.f – RMS value of the alternating current/voltage – Alternating current applied to LR, CR and LCR circuits – Series Resonance Circuit – Parallel Resonance Circuit – Power in an A.C. Circuit – Wattless Current – Power factor – Q factor – Choke – Skin effect – A.C. bridges – Maxwell's bridge – Anderson's and Owen's bridge.

### **Unit-IV**

Definition of B,H and M and magnetic susceptibility – Magnetic materials & magnetization – Hysteresis – Work done in taking unit volume of magnetic materials through complete cycle of magnetization – Area of Hysteresis loop – Ballistic method. Determination of B and M – Axial coil methods.

### **Unit-V**

Derivations of Maxwell's equations – types of currents – displacement current – significance of displacement current – Maxwell's equation in material media and free space – Electromagnetic waves in free space – electromagnetic waves in isotropic non conducting media.

### **Book for Study:**

Electricity and Magnetism by Seghal, Chopra & Seghal, S. Chand & Sons. 1998.

### **Reference Books:**

1. Electricity and Magnetism by Brijlal & Subrahmaniyam
2. Electricity and Magnetism by R. Murugesan.
3. Electricity and Magnetism by Narayanmoorthy and Nagarathinam.

## **MAJOR PRACTICAL-II**

**Programme : B.Sc., Physics**

**Part : III-Core Practical-II**

**SEMESTER : III & IV**

**Hours : 3**

**Course Code : 17UPHC4P**

**Credits : 4**

### **Course Outcomes**

Experimental verification of the various basic concepts of Physics

### **Any Twelve Experiments**

1. Air wedge- determination of thickness of a wire.
2. Newton's rings- determination of Radius of curvature.
3. Spectrometer- grating –Normal incidence method- determination of  $\lambda$ .
4. Spectrometer –i-d curve- determination of  $\mu$ .
5. Spectrometer – Dispersive power of a prism.
6. Sonometer – determination of ac frequency mains.
7. B.G- determination of charge sensitiveness of BG.
8. Table galvanometer- determination of Figure of merit.
9. B.G – comparison of emf of the two cells.
10. De Sauty's bridge- comparison of capacitances.
11. Owen's bridge (AC) - comparison of capacitances.
12. Determination of  $B_H$ - Axial coil method.
13. Potentiometer- High range voltmeter.
14. Determination of M- Axial coil method.
15. Figure of merit –BG.
16. Determination of M &  $B_H$  by Tan C method.

## MATHEMATICS –III

**Programme : B.Sc., Physics**

**Part :III-ALLIED-IV**

**SEMESTER : III**

**Hours : 6**

**Course Code : 17UMAP31**

**Credits : 4**

### **COURSE OUTCOME:**

**CO1:** Know when there is a need for information to be able to identify, locate, evaluate and effectively use that information for the issue or problem at hand.

### **Unit-I**

Exact differential equation – second order equations – second order equation with right hand side in form  $X^n$ ,  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ ,  $e^{ax} \sin ax$ ,  $e^{ax} \cos ax$ .

### **Unit-II**

Laplace transforms –solution of differential equations using Laplace transforms – Partial Differential Equations – Formations – solutions- standard form  $P_p + Q_q = R$ .

### **Unit-III**

Growth, decay and chemical reactions – Simple electric circuits and planetary motions.

### **Unit-IV**

Analytical functions – C.R. equations (without proof) – bilinear transformations – cross ratios.

### **Unit-V**

Group – Axioms – abelian Groups – sub Groups – permutation Groups (No theorem), Homomorphism, cyclic groups.

### **TEXT BOOK**

“Ancillary Mathematics” Volume 3, by Dr. S.Arumugam, New Gamma Publications, 2006.

**Ancillary Chemistry -I**  
**Ancillary Chemistry Paper - III**  
**(Organic, Inorganic And Physical Chemistry)**

**Programme : B.Sc., Physics**

**Part :III-Ancillary-III**

**SEMESTER : III**

**Hours : 4**

**Course Code : 17UCHA31**

**Credits : 4**

**Course Outcome:** To comprehend adsorption, catalysis, polymers, photochemistry, coordination compounds and fertilizers.

**Unit – I**

Adsorption: Definition – difference between adsorption and absorption – adsorbate, adsorbent – physical adsorption – chemical adsorption – differences between these two types – factors influencing adsorption – adsorption of gases on solid surface – adsorption isotherm – Freundlich isotherm – Langmuir isotherm.

**Unit – II**

**Catalysis** : Definition – different types of catalysis – acid-base catalysis – surface catalytic reactions – definition and examples – autocatalyst – catalytic poisoning – promoters – enzyme catalysis – characteristics- Michaelis-Menten equation.

**Polymers** : Definition – classification of polymers – properties of polymers – addition and condensation polymerization reactions with examples – natural rubber – isoprene Unit – vulcanization of rubber – preparation and applications of polystyrene, urea – formaldehyde resin, Teflon and Buna-S-rubber.

**Unit – III**

**Photochemistry:** Comparison of thermal and photochemical reactions – definition of photochemical reactions – laws of photochemistry – Grotthus-Draper law – Einstein law – quantum efficiency – reasons for low and high quantum yield with examples – consequence of light absorption by atoms and molecules – Jablonski diagram – fluorescence – phosphorescence – photosensitization – chemiluminescence – bioluminescence – applications of photochemistry.

**Unit – IV**

Coordination compounds: Definition – nomenclature – definition of various terms involved in coordination chemistry – classification of ligands-Werner's theory, EAN rule – VB theory – Nickel carbonyl – chelates.

## Unit – V

**Fertilizers:** plant Nutrients -Role of NPK in plant growth-classification of fertilizers-natural and chemical fertilizers-urea-super phosphate –triple super phosphate -potassium nitrate- potassium chloride -ammonium nitrate -calcium ammonium nitrate (CAN) and complex fertilizer -fertilizer industries in India.

### Reference books

- Essential of physical chemistry - Arun Bahl, B.S. Bahl and G.D. Tuli (revised edition, S. Chand, 2014).
- Principles of physical chemistry - Puri, Sharma and Pathania (revised edition, Vishal pub., 2014).
- Modern Inorganic chemistry - R.D. Madan (revised edition, S. Chand, 2013).
- A Text book of Organic chemistry – Arun Bahl and B.S. Bahl (revised edition, S. Chand, 2014).
- J. Ghosh – Fundamental concepts of Applied Chemistry, S. Chand & Co.

# Ancillary Chemistry Practical-I

## PRACTICAL I - VOLUMETRIC ANALYSIS

**Programme : B.Sc., Physics**

**Part :III-ALLIED-IV**

**SEMESTER : III**

**Hours : 2**

**Course Code : 17UCHA2P**

**Credits : 1**

### COURSE OUTCOME:

A double titration involving making up of the solution to be estimated or single titration involving making up of the solution to be estimated and the preparation of a primary standard.

#### A. ACIDIMETRY AND ALKALIMETRY

1. Titrations between a strong acid and strong base.
2. Titrations between a strong acid and weak base.
3. Titrations between a weak acid and strong base.

#### B. PERMANGANIMETRY

1. Titrations between potassium permanganate and oxalic acid, ferrous sulphate and ferrous ammonium sulphate (Mohr's salt)

#### C. IODOMETRY (DEMONSTRATION ONLY)

1. Titrations of sodium thiosulphate with potassium permanganate and potassium dichromate.

### Distribution of Marks

**Maximum marks – 100**

**Duration of examination: 2 hrs**

<b>Internal – 40 marks</b>	
Attendance in the class	20 marks
Model test	10 marks
Observation notebook	10 marks
<b>Total</b>	<b>40 marks</b>
<b>External – 60 marks</b>	
Viva voce	10 marks
Record Notebook	10 marks
Procedure	10 marks
Estimation	30 marks
<b>Total</b>	<b>60 marks</b>

### Error calculation

Error	Marks
2-3%	30
3-4%	25
4-5%	15
> 5%	10

## **OPTICS AND LASERS**

**Programme : B.Sc., Physics**

**Part : III –Core-IV**

**SEMESTER : IV**

**Hours : 4**

**Course Code : 17UPHC41**

**Credits : 4**

### **Course Outcomes**

Identify the behavior and properties of light, its interaction with matter.

#### **Unit I**

Deviations produced by a lens - equivalent focal length of two thin lenses in & out of contact – Aberrations – Spherical and Chromatic - Methods of removal of spherical aberrations – Achromatic doublet – Achromatism of two lenses in contact and out of contact.

#### **Unit II**

Coherent sources-Interference in thin films-Michelson's interferometer- Airwedge – Newton's rings - Applications-Determination of wavelength-Resolution of spectral line-Refractive index of a gas-Fabrey-Perot interferometer.

#### **Unit III**

Fresnel and Fraunhofer diffraction -Zone plate-Theory-Comparison with convex lens - Fresnel and Fraunhofer diffraction in straight edge-Rectangular aperture-Circular aperture-Cornu spiral-Theory of plate transmission grating – experiment – Resolving power of optical instruments-Telescope,grating and prism.

#### **Unit IV**

Polarization-Polarizer-Analyzer-Polaroid and its applications-Double refraction-Nicol prism-Huygen's explanation of double refraction-QWP and HWP-Production and analysis of plane, circularly and elliptically polarized light-Optical activity- Fresnel's explanation-Specific rotation-Lorentz half shade polarimeter.

#### **Unit V**

Laser – Laser principle— emission and absorption of light - Spontaneous and stimulated emission –Einstein's co-efficients – Constructions, working and characteristics of NdYAG laser, CO<sub>2</sub> laser. Semiconductor laser - Applications - Holography.

#### **Text Book:**

1. Optics and Spectroscopy – R. Murugesan, S. Chand & Sons, 2002.

#### **Reference Books:**

1. Optics & Spectroscopy-Kakani & Bhandari-Sultan Chand & Sons, New Delhi-2002.
2. Textbook of optics by Brijlal & N. Subramanayan, S. Chand 2002.
3. Spectroscopy-B.K.Sharma,GOEL Publishing House, Meerut 2006.

## **MAJOR PRACTICAL-II**

**Programme : B.Sc., Physics**

**Part : III-Core Practical-II**

**SEMESTER : III & IV**

**Hours : 3**

**Course Code : 17UPHC4P**

**Credits : 4**

### **Course Outcomes**

Experimental verification of the various basic concepts of Physics

### **Any Twelve Experiments**

1. Air wedge- determination of thickness of a wire.
2. Newton's rings- determination of Radius of curvature.
3. Spectrometer- grating –Normal incidence method- determination of  $\lambda$ .
4. Spectrometer –i-d curve- determination of  $\mu$ .
5. Spectrometer – Dispersive power of a prism.
6. Sonometer – determination of ac frequency mains.
7. B.G- determination of charge sensitiveness of BG.
8. Table galvanometer- determination of Figure of merit.
9. B.G – comparison of emf of the two cells.
10. De Sauty's bridge- comparison of capacitances.
11. Owen's bridge (AC) - comparison of capacitances.
12. Determination of  $B_H$ - Axial coil method.
13. Potentiometer- High range voltmeter.
14. Determination of M- Axial coil method.
15. Figure of merit –BG.
16. Determination of M &  $B_H$  by Tan C method.



## **MATHEMATICS –IV**

**Programme : B.Sc., Physics**

**Part : III-ALLIED-IV**

**SEMESTER : III & IV**

**Hours : 6**

**Course Code : 17UMAP41**

**Credits : 4**

### **Course Outcome:**

Acquire good knowledge and understanding in advanced areas of mathematics and (statistics, chosen by the student from the given courses) formula and develop mathematical arguments in a logical manner.

#### **UNIT-I:**

Definition – Nature and scope –models – definitions of a standard linear programming problems – definition of feasible solution – optimal solution – optimum basic feasible solution – degenerate solution of a LPP.

#### **UNIT-II:**

Mathematical formulation of LPP – Slack and surplus variable – Graphical solution of LPP.

#### **UNIT-III:**

Simplex method of solving a LPP-Big -M method of penalties – concept of duality – formation of dual LPP – the dual of dual is the primal (only problems).

#### **UNIT-IV:**

Transportation problem – finding initial feasible solutions by North -West Corner method and Vogel's Approximation method –Optimal solution of Transportation problems.

#### **UNIT-V:**

Assignment problem – solution of assignment problem – travelling salesmen problem.

#### **TEXT BOOK :**

- 1.**OPERATIONS RESEARCH**by S.D.Sharma, KedarnathRamnath&co, 2004.
- 2.**LINEAR PROGRAMMING** by Dr.S.Arungam&Issac,New Gamma publications

## Ancillary Chemistry-II

Ancillary Chemistry paper – 2

Part - III

17UCHA21	Ancillary Chemistry Paper -II (Organic And Physical Chemistry)	Hours 4/Credits 4
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**Course Outcome:** To gain knowledge about nuclear chemistry, carbohydrates, stereoisomerism, chemotherapy, dyes, aminoacids and proteins.

### Unit – I - Nuclear Chemistry

Composition of the nucleus – nuclear forces – mass defect – binding energy – nuclear stability - Soddy's group displacement law – illustration - Nuclear fission: Definition – application of fission – principle of atom bomb - Nuclear fusion: Definition – emission of energy – Stellar energy – hydrogen bomb - Applications of radioactivity in medicine, agriculture, industry and analytical fields – carbon dating.

### Unit - II

Carbohydrates: Definition – classification – monosaccharides – properties and uses of glucose and fructose –Haworth structure (glucose only) – conversion of glucose to fructose and vice versa, mutarotation - Disaccharides: Sucrose – structure – distinction between sucrose, glucose and fructose - Polysaccharides: Starch and cellulose (Structure only) – cellulose derivatives.

### Unit – III

Stereoisomerism – chiral centre – optical activity of compounds containing one or two chiral centers (lactic and tartaric acid) – R-S notation – enantiomers – diastereoisomers – racemization – resolution - Geometrical isomerism of maleic and fumaric acids - E-Z notation of geometrical isomers.

### Unit – IV

Chemotherapy: Sulpha drugs – sulphadiazine – sulphanilamide –preparation and applications - Antimalarials – chloroquine and plasmoquine - Arsenical drugs: Salvarasan – 606 and neosalvarasan - Antibiotics: Definition – classification – penicillin - amoxicillin – ampicillin – tetracyclin – streptomycin – mode of application – uses only.

Hormones: structure – source – importance of testosterone – progesterone – thyroxin.

### Unit – V

Amino acids and proteins: Classification – synthesis – properties of amino acids – action of heat, dipolar ion, iso-electric point, and Ruhemann's purple - polypeptides – proteins – classification and biological functions.

Dyes : Definition – theory of colour and constitution – classification based on structure and applications – preparation of methyl orange – Bismark brown, malachite green – vat dye – indigo.

### Reference books

- Essential of physical chemistry - Arun Bahl, B.S. Bahl and G.D. Tuli (revised edition, S. Chand, 2014).
- Principles of physical chemistry - Puri, Sharma and Pathania (revised edition, Vishal pub., 2014).
- Modern Inorganic chemistry - R.D. Madan (revised edition, S.Chand, 2013).
- A Text book of Organic chemistry – Arun Bahl and B.S. Bahl (revised edition, S. Chand, 2014).
- J. Ghosh – Fundamental concepts of Applied Chemistry, S. Chand & Co.

## Ancillary Chemistry Practical-I

### PRACTICAL I - VOLUMETRIC ANALYSIS

17UCHA2P	VOLUMETRIC ANALYSIS	Hours 2/Credits 1
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A double titration involving making up of the solution to be estimated or single titration involving making up of the solution to be estimated and the preparation of a primary standard.

#### A. ACIDIMETRY AND ALKALIMETRY

4. Titrations between a strong acid and strong base.
5. Titrations between a strong acid and weak base.
6. Titrations between a weak acid and strong base.

#### B. PERMANGANIMETRY

2. Titrations between potassium permanganate and oxalic acid, ferrous sulphate and ferrous ammonium sulphate (Mohr's salt)

#### C. IODOMETRY (DEMONSTRATION ONLY)

2. Titrations of sodium thiosulphate with potassium permanganate and potassium dichromate.

### Distribution of Marks

Maximum marks – 100

Duration of examination: 2 hrs

<b>Internal – 40 marks</b>	
Attendance in the class	20 marks
Model test	10 marks
Observation notebook	10 marks
<b>Total</b>	<b>40 marks</b>
<b>External – 60 marks</b>	
Viva voce	10 marks
Record Notebook	10 marks
Procedure	10 marks
Estimation	30 marks
<b>Total</b>	<b>60 marks</b>

### Error calculation

Error	Marks
2-3%	30
3-4%	25
4-5%	15
> 5%	10

## **ATOMIC AND QUANTUM MECHANICS**

**Programme : B.Sc., Physics**

**Part : III-Core-5**

**SEMESTER : V**

**Hours : 4**

**Course Code : 17UPHC51**

**Credits : 4**

### **Course Outcomes**

Ascertain macroscopic properties of the objects in terms of microscopic view.

### **Unit-I**

Introduction- Atom model – Bohr atom model- Sommerfield relativistic atom model- Elliptical orbits- Relativistic variation of atomic mass-Application to the fine structure of spectral lines – Limitations of Sommerfield atom model. Vector atom model - spatial quantization and spinning electron hypothesis – Quantum numbers - Stern and Gerlach experiment - coupling schemes-Pauli's exclusion principle- Electronics structure of atoms - Zeeman effect – quantum theory of Normal Zeeman effect .

### **Unit-II**

X-rays-characteristics and continuous X-rays – its properties-application- Duane and Hunt law -Mosley's law and its importance. Compton effect – theory and experiment verification.

### **Unit-III**

Introduction-Blackbody radiation – Planck's hypothesis - Dual nature of matter and radiation-De Broglie's hypothesis of matter waves- de Broglie's wavelength - Davission's and Germer experiment - G.P.Thomson's experiment with relativistic correction.

Concept of wave packets for a quantum particle- group velocity and wave velocity and their relations – Heisenberg's uncertainty principle through experiment-illustration. Diffraction of electron through a single slit experiment-Applications of uncertainty principle.

### **Unit-IV**

Limitations of classical theory- Basic postulates of wave mechanics-Derivation of time dependent and time independent Schrodinger wave equation- wave function– Physical significance of wave function – Probability density and expression for probability current density – Expectation value – Normalisation of wave function of simpler types.

### **Unit-V**

Application of Schrodinger wave equation- Schrodinger equation for a free particle in one dimensional potential well - Eigen function and Eigen values –Particle in one dimensional box–Barrier penetration problem(potential step) .

### **Books for study:**

1. Modern Physics - Seghal,chopra & seghal. Sultan chand 1998.
2. Modern Physics - R.Murugesan S.Chand & Co.
3. Quantum Mechanics - Schiff

### **Reference Books:**

1. Quantum chemistry - R.K.Prasad.

## NUCLEAR AND PARTICLE PHYSICS

**Programme : B.Sc., Physics**

**Part : III-Core-VI**

**SEMESTER : V**

**Hours : 4**

**Course Code : 17UPHC52**

**Credits : 4**

### **Course Outcome:**

Distinguish the basic concepts of atomic nuclei, high energy particles and its energy counterpart to human life.

### **Unit I**

Classification of nuclei-Isotopes – isotones – isobars – isomers and mirror nuclei-atomic mass unit - general properties of nucleus - mass defect and packing fraction - nuclear binding energy - nuclear forces - Yukawa's theory (no derivation) - theories of nuclear composition – proton-electron and proton-neutron hypothesis- nuclear models-the liquid drop model - shell model.

### **UNIT-II**

Particle accelerators- linear accelerator- cyclotron - synchro cyclotron – betatron - nuclear radiation detectors-ionisation chamber - Geiger-muller counter – Wilson cloud chamber - photographic emulsion technique.-

### **UNIT-III**

Radio activity-properties of  $\alpha$ -rays,  $\beta$ -rays and  $\gamma$ -rays-Laws of radioactivity - half life period - mean life - range of  $\alpha$ -rays - Geiger nuttall law - experimental determination by Geiger and Nattal law -  $\alpha$ - particle disintegration energy - theory of  $\alpha$ -decay -  $\beta$  rays -  $\beta$  rays spectra - neutrino theory of  $\beta$  decay.

### **UNIT-IV**

Nuclear transmutations by  $\alpha$  particles – protons – deuterons - neutrons and electrons - photo disintegration - nuclear fission – nuclear fusion- Explanation for energy release -C.N cycle and P.P cycle- principle and action of Atom bomb - hydrogen bomb – Nuclear reactors – general features of nuclear reactors – Different types of nuclear reactors.

### **UNIT-V**

Cosmic rays-origin – primary – secondary - azimuthal effect - east-west effect - pair production and annihilation - Van Allen belt. fundamental particles - particles and antiparticles - particles instability-conservation laws.

### **Books for study:**

1. **Introduction to solid state physics** – C.Kittel-Vth edition, John Wiley & sons, New York, 1976
2. **Modern Physics** – Seghal, chopra & seghal. Sultan chand 1998.
3. **Modern Physics** – R.Murugesan S.Chand & Co.
4. **Atomic and Nuclear physics** – N.Subramanyam & Brij Lal, S.Chand & Co, 2000.

### **Reference Books:**

1. **Introduction to modern physics**-H.S.Mani &G.K.Mehta.
2. **Atomic and nuclear physics**-TALittlefield &N Thorley.
3. **Perspective of Modern Physics** by Arthur Beiser.
4. **Nuclear Physics** by D.C.Thayal-Himalaya Publishing House, New Delhi.

## **ANALOG ELECTRONICS**

**Programme : B.Sc., Physics**

**Part : III-Elective-I**

**SEMESTER : V**

**Hours : 4**

**Course Code : 17UPHE51**

**Credits : 4**

### **Course Outcomes**

Characterize the function of semiconductors and its contribution to various electronic devices.

### **Unit – I**

Current- Voltage- ohms law- Ideal voltage and current sources- voltage divider and current branching circuits- Thevenin's and Norton's theorem- maximum power transfer theorem- two port network analysis-three types.

### **Unit –II**

Junction diodes(general theory)- diode as a rectifier- voltage doubler, clippers and clampers- zener diodes- zener diode as voltage regulator- transistor- three types of configuration- relation between  $\alpha$ ,  $\beta$ ,  $\gamma$  – d.c and a.c load line and operating point-biasing circuits, fixed bias, emitter and voltage divider bias.

### **Unit –III**

Small signal CE amplifier- expression for voltage gain, current gain, power gain, input and output impedances using h-parameters- frequency response- power amplifiers- simple classification – Class B push pull amplifiers- OP amplifiers characteristics – inverting and non inverting amplifiers- application as adder, subtractor, integrator and differentiator.

### **Unit –IV**

Feedback principles- positive and negative feedbacks- effects of negative feedback on gain of the amplifier - Barkhausen's criterion- transistor oscillators- Hartley, Colpitt's and phase shift oscillator with mathematical analysis.

### **Unit-V**

Modulation – different kinds of modulation- amplitude modulation- modulation index- modulated power output-limitations- frequency modulation- advantages of frequency modulation- demodulation.

### **Books for Study:**

1. **Principles of Electronics**, V.K.Metha-S.Chand & Co.,2002.
2. **Basic Electronics**, B.L.Theraja-S.Chand & Co.,2003.
3. **Electronic Devices & Circuits**, Salivahanan,Sureshkumar,Vallavaraj, Tata Mc Graw Hill – 2004

### **Reference Books:**

1. **Basic Electronics**, A.Ubald Raj & G. Jose Robin 1998, Indira Publications
2. **Elements of Solid State Electronics**, Ambrose & Vincent Devaraj Indira, Indira Publications
3. **Basic Electronics**, J.J.Bophy,Fourth Edition 1983, Mc Graw Hill Book Company.

## **ASTROPHYSICS – I**

**Programme : B.Sc., Physics**

**Part : III-Elective-II**

**SEMESTER : V**

**Hours : 4**

**Course Code : 17UPHE52**

**Credits : 4**

### **Course Outcomes**

**One should have a broader understanding and appreciation of the intellectual and cultural benefits gained through astronomy as a science.**

### **Unit – I**

Birth of Modern Astronomy – Geocentric and Heliocentric theories – Celestial sphere – Coordinate systems – Horizontal and equatorial systems – Kepler's law – Newtonian gravitation.

### **Unit – II**

Elements of the telescope – Properties of images – Aberrations of telescopes – Different types of Optical telescopes – Observing in the ultraviolet – Observing in the infrared.

### **Unit – III**

Refracting and Reflecting telescopes – Schmidt telescope - Magnification of a telescope- Ground-based observing – Observations from space - Radio telescope – Advantages and disadvantages – Spectrograph - Limitation - High energy astronomy.

### **Unit – IV**

History of the Earth – Radio active dating – Plate tectonics - Temperature of a Planet - The atmosphere - Pressure distribution - Temperature distribution -Retention of an atmosphere – The magnetosphere - The orientation of Earth in space – Seasons – Precession of the Earth - Arc and time units – Time keepers – Sidereal time – local time - Standard time.

## **Unit – V**

Planets – Terrestrial and Jovian planets (Planets individual description is not required in detail) – Satellites – Asteroids - Meteoroids – Comets - The Moon - The lunar surface - The lunar interior.

### **Books for Study:**

1. Niclolas.A.Pananides and Thomas Arny, 1979, Introductory Astronomy, Addison Wesley Publ. Co.
2. A. Mujiber Rahman, 2018, Introduction to Astrophysics, KAMS Publications, Uthamapalayam.

### **Reference Books:**

1. Abell, Morrison and Wolf, 1987, Exploration of the Universe, 5<sup>th</sup> ed., Saunders College Publ.
2. Carrol and Ostlie, 2007, Introduction to Modern Astrophysics, 2<sup>nd</sup> ed., Pearson International.
3. Marc. L. Klutner, 2003, Astronomy A physical perspective, Cambridge University
4. Abhyankar, K.D., Universities Press.



# Ancillary Chemistry-III

## Part-III

17UCHA31	Ancillary Chemistry Paper - III (Organic, Inorganic And Physical Chemistry)	Hours 4/Credits 4
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**Course Outcome:** To comprehend adsorption, catalysis, polymers, photochemistry, coordination compounds and fertilizers.

### Unit – I

**Adsorption:** Definition – difference between adsorption and absorption – adsorbate, adsorbent – physical adsorption – chemical adsorption – differences between these two types – factors influencing adsorption – adsorption of gases on solid surface – adsorption isotherm – Freundlich isotherm – Langmuir isotherm.

### Unit – II

**Catalysis :** Definition – different types of catalysis – acid-base catalysis – surface catalytic reactions – definition and examples – autocatalyst – catalytic poisoning – promoters – enzyme catalysis – characteristics- Michaelis-Menten equation.

**Polymers :** Definition – classification of polymers – properties of polymers – addition and condensation polymerization reactions with examples – natural rubber – isoprene Unit – vulcanization of rubber – preparation and applications of polystyrene, urea – formaldehyde resin, Teflon and Buna-S-rubber.

### Unit – III

**Photochemistry:** Comparison of thermal and photochemical reactions – definition of photochemical reactions – laws of photochemistry – Grotthus-Draper law – Einstein law – quantum efficiency – reasons for low and high quantum yield with examples – consequence of light absorption by atoms and molecules – Jablonski diagram – fluorescence – phosphorescence – photosensitization – chemiluminescence – bioluminescence – applications of photochemistry.

### Unit – IV

**Coordination compounds:** Definition – nomenclature – definition of various terms involved in coordination chemistry – classification of ligands-Werner's theory, EAN rule – VB theory – Nickel carbonyl – chelates.

## Unit – V

**Fertilizers:** plant Nutrients -Role of NPK in plant growth-classification of fertilizers-natural and chemical fertilizers-urea-super phosphate –triple super phosphate -potassium nitrate- potassium chloride -ammonium nitrate -calcium ammonium nitrate (CAN) and complex fertilizer -fertilizer industries in India.

### Reference books

- Essential of physical chemistry - Arun Bahl, B.S. Bahl and G.D. Tuli (revised edition, S. Chand, 2014).
- Principles of physical chemistry - Puri, Sharma and Pathania (revised edition, Vishal pub., 2014).
- Modern Inorganic chemistry - R.D. Madan (revised edition, S. Chand, 2013).
- A Text book of Organic chemistry – Arun Bahl and B.S. Bahl (revised edition, S. Chand, 2014).
- J. Ghosh – Fundamental concepts of Applied Chemistry, S. Chand & Co.

# ANCILLARY CHEMISTRY PRACTICAL-II

## PRACTICAL II - ORGANIC ANALYSIS

17UCHA4P	Organic Analysis	Hours 2/Credits 1
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### ORGANIC ANALYSIS

Analysis of an organic compound containing one or two functional groups and confirmation by the preparation of a solid derivative / colour reactions - acids, phenols, aldehydes, esters, amines (primary, secondary and tertiary), amides, anilides, aliphatic diamide and monosaccharide.

### Distribution of Marks

**Maximum marks – 100**

**Duration of examination: 2 hrs**

Internal – 40 marks	
Attendance in the class	20 marks
Observation notebook	10 marks
Model test	10 marks
<b>Total</b>	<b>40 marks</b>

External – 60 marks	
Viva voce	10 marks
Record Notebook	10 marks
Preliminary reactions	5 marks
Detection of element	5 marks
Aliphatic / Aromatic	5 marks
Saturated / Unsaturated	5 marks
Detection of functional group with correct procedure	15 marks
Derivative / Colour reaction	5 marks
<b>Total</b>	<b>60 marks</b>

## APPLIED PHYSICS-I

**Programme : B.Sc., Physics**

**Part : III-Skilled-III**

**SEMESTER : V**

**Hours : 4**

**Course Code : 17UPHS51**

**Credits : 4**

### Course Outcomes

Elucidate the basic concepts of Opto-electronic and photonic equipments, its applications in various fields and devices such as LED, LCD, LDR, etc.

### Unit- I

Introduction- p n junction as a light source- construction and working of LED – LED materials – LED applications- LCD-characteristics and action of LCD– advantages.

### Unit –II

Introduction – principle of optical fibre- light transmission in a optical fibre - acceptance angle – critical angle - numerical aperture.

### Unit –III

Fibre index profiles - step index graded index fibre - advantages of fibre optic communications - optical switching - logic gates.

### Unit –IV

Introduction to Photo detector – characteristics of photo detectors – PN junction photo detector.

### Unit- V

Photo diode – PN junction Photo diode - PIN Photo diode – Avalanche photo diode – Photo transistor.

### Books for study:

1. **Fundamentals of solid state physics** by saxena , gupta saxena – pragati pragashan x revised edition1991.
2. **Semiconductor physics and Optoelectronics**, P.K. Palanisamy.
3. **Electronic devices and circuits** by S.Salivahanan, N. Suresh kumar, A. Vallavaraj, Tata McGraw Hill, New Delhi.

### Reference Books:

1. **Solid state physics** by R.K.Puri & V.K.Babbar – Chand & Co., I Edition ,1997.
2. **Material Science** by M. Arumugam -Anuradha Agencies Revised Edition, 1997.
3. **Modern Physics** R.Murugesan – Chand & Co ., XI Revised Edition 2003.
4. **Principles of Solid state** by H.V. Keer – Wiley Eastern Ltd.,I Edition 1993.
5. **Introduction to solids** by Azaroff – TMH,reprint 1978.

### **MAJOR PRACTICAL-III**

**Programme : B.Sc., Physics**

**Part : III-Core Practical-III**

**SEMESTER : IV & V**

**Hours : 3**

**Course Code : 17UPHC6P**

**Credits : 4**

#### **Course Outcomes**

Experimental verification of the various basic concepts of Physics

#### **Any Twelve Experiments**

1. Spectrometer- determination of Cauchy's constants.
2. Spectrometer- Hartmann's interpolation formula.
3. Spectrometer – i-i' curve.
4. LCR Series resonance- determination of self inductance.
5. LCR parallel resonance- determination of self inductance.
6. BG –High resistance by leakage method.
7. Maxwell's bridge-self inductance.
8. Spectrometer – Small angled prism.
9. B.G. – Comparison of Mutual Inductance.
10. Anderson's Bridge – Self Inductance.
11. Impedance and power factor – LR circuit.
12. Impedance and power factor – CR circuit.
13. B.G – Determination of mutual inductance.
14. Rayleigh's bridge – Self inductance.
15. Resolving power of a prism.
16. B.G. – Absolute capacity of a condenser.

## **MAJOR PRACTICAL-IV**

**Programme : B.Sc., Physics**

**Part : III-Core Practical-IV**

**SEMESTER : IV & V**

**Hours : 3**

**Course Code : 17UPHC6Q**

**Credits : 4**

### **Course Outcomes**

Experimental verification of the various basic concepts of Physics

### **Any Twelve Experiments**

1. Bridge rectifier –  $\pi$  filter.
2. Single stage amplifier – determination of gain and frequency response.
3. Two stage amplifier- with feedback- determination of gain and frequency response.
4. Two stage amplifier- without feedback- determination of gain and frequency response.
5. Hartley oscillator-self inductance.
6. Colpitt's oscillator-self inductance.
7. Dual power supply using IC7805and IC7905.
8. Transistor characteristics-CE mode.
9. Astable multivibrator- discrete components.
10. Zener diode – Characteristics.
11. FET – Characteristics in CE mode.
12. IC 7805 – Regulated power supply.
13. Zener diode – voltage regulator.
14. Logic gates – discrete components.
15. Full wave rectifier -  $\pi$  filter.
- 16.Clipper and Clamper – discrete components.
17. Differentiating and Integrating circuits by discrete components.

## **MAJOR PRACTICAL-V**

**Programme : B.Sc., Physics**

**Part : III-Core Practical-V**

**SEMESTER : IV & V**

**Hours : 2**

**Course Code : 17UPHC6R**

**Credits : 4**

### **Course Outcomes**

Experimental verification of the various basic concepts of Physics

### **Any Twelve Experiments**

1. Logic gates- using IC.
2. Universal gates-NAND gate – IC.
3. Universal gate-NOR gate –IC.
4. Astable multivibrator-IC 555.
5. Astable multivibrator-IC 741.
6. OP-amp -integrator differentiator.
7. OP-amp -adder and subtractor.
8. Half and Full adder using IC.
9. Four bit binary adder using IC.
10. Four bit binary counter using IC.
11. BCD counter using IC.
12. Ring counter using IC.
13. BCD to seven segment decoder using IC.
14. Schmitt trigger- IC 555.
15. Modulo- n-counter.
16. 4 Bit binary subtractor.
17. Shift -Register using IC

### **Reference Books :**

1. Practical Physics and Electronics –C.C Ouseph, U.J. Rao & V.Vijayendran
2. Practical Physics - S.Viswanathan (Printers & Publishers pvt Ltd; 2007)
3. Practical Physics –Pragathi Prakashan publications.

## **ENVIRONMENTAL STUDIES**

**Programme : B.Sc., Physics**

**Part : IV**

**SEMESTER : V**

**Hours : 2**

**Course Code : 17UEVS51**

**Credits : 2**

### **COURSE OUTCOMES:**

**CO1: Demonstrate basic knowledge about Ecology, Living Organisms and its allied problems.**

**CO2: Acquire skills to help individuals in identifying and solving problems related to pollution.**

**CO3: Motivate public to understand the values of Conservation of Biodiversity.**

### **UNIT – I: Earth and its Environment**

**a) Earth- formation and Evolution of Earth over time - structure of Earth and its components – Atmosphere, Lithosphere, Hydrosphere and Biosphere.**

**b) Resources – renewable and non renewable resources**

### **UNIT – II: Ecology and ecosystem concepts**

**a) Ecology – definition - Ecosystem : Definition – structure and function – energy flow – food chain and Food web – one example for an ecosystem**

**b) Biogeochemical cycles – Nitrogen, carbon, Phosphorous and Water**

### **UNIT – III: Biodiversity of India**

**a) Introduction – definition – Values of Biodiversity – Threat to Biodiversity – Conservation of Biodiversity**

**b) Biodiversity of India – as a megadiversity nation – bio-geographical distribution – Hot spots of biodiversity – National Biodiversity conservation Board and its function**

### **UNIT – IV: Pollution and Global issues**

**a) Definition, causes, effects and control measures of Air, Water, Soil, Marine, Noise, Thermal and Nuclear pollution**

**b) Global issues: Global Warming and Ozone layer Depletion**

### **UNIT – V: Development and Disaster Management**

**a) Sustainable Development – Sustainable Agriculture – Organic farming, Irrigation – Water harvesting and Waste recycling – Cyber waste and management**

**b) Disaster Management – Flood and Drought – Earthquake and Tsunami – Landslides and Avalanches – Cyclones and Hurricanes –Precautions, Warnings, Rescue and Rehabilitation.**

### **TEXT BOOK:**

**1.Environmental studies – Published by Madurai Kamaraj University.**

### **REFERENCES:**

**1.Environmental Studies by Dr.N.Arumugam&Prof.V.Kumarasan, Saras Publication-2009.**

**2.Environmental Studies by Bharathiar University, Coimbatore – 2004.**



## **CLASSICAL AND STATISTICAL MECHANICS**

**Programme : B.Sc., Physics**

**Part : III-Core-VII**

**SEMESTER : VI**

**Hours : 4**

**Course Code : 17UPHC61**

**Credits : 4**

### **Course Outcomes**

Cognise the statistical nature of physical systems from energy perspectives.

### **Unit-I**

Frames of reference-Mechanics of a particle-conservation of linear momentum- conservation of angular momentum- conservation of energy-Mechanics of a system of particles- conservation of linear momentum- conservation of angular momentum- conservation of energy- Work energy theorem-Conservative forces-examples.

### **Unit-II**

Constraints – Difficulties due to constraints - Degrees of freedom under constraints - Forces of constraints -Generalized co-ordinates - Generalized momentum. Principle of virtual work-D'Alembert's principle - Lagrangian equation of motion from D'Alembert's principle (Derivation)-Simple applications-(simple pendulum, compound pendulum, Atwood's machine) -Superiority of lagrangian approach over Newton's approach.

### **Unit-III**

Introduction - Cyclic coordinates - Hamiltonian function H- Physical significance-Hamilton's equation of motion (derivation) -Hamilton's principle-Lagrangian's equation of motion from Hamilton's principle -Simple applications(Linear harmonic oscillator, compound pendulum, Motion of a particle in a central force field).

### **Unit-IV**

Microscopic and Macroscopic systems-Ensembles-Phase space-Probability-Basic postulates of statistical mechanics-Definition of mathematical probability-Thermodynamic probability-Boltzmann's theorem on entropy and probability-Statistical equilibrium-Maxwell Boltzmann statistics- Maxwell Boltzmann energy distribution law- Maxwell Boltzmann velocity distribution law.

### **Unit-V**

Bose-Einstein statistics- Bose-Einstein distribution law-Photon gas-Planck's law of Black body radiation(derivation)-Deduction of Wien's and Rayleigh Jean's law of black body radiation-Fermi Dirac statistics- Fermi Dirac distribution law-Electron gas- Comparison between three statistics.

### **Books for study:**

1. **Elements of Statistical Mechanics**, Gupta & Kumar, Macmillan Publication, Bombay.
2. **Classical Mechanics**, Gupta, Kumar and Sharma, Pragati prakashan publication, Meerut.

### **References:**

1. **Statistical physics and Thermodynamics**, Agarwal, S. Chand and Co. Ltd., New Delhi.
2. **Statistical Mechanics**, Agarwal and Melvin Eisner, Wiley Eastern Ltd, New Delhi.
3. **Classical Mechanics**, Goldstein, Addition-Wesley Publishing company, New Delhi.
4. **Classical Mechanics**, Satya Prakash, S. Chand and Co. Ltd., New Delhi.
5. **Classical Mechanics**, Takwale R.G and Puranik P.S, Tata Mc Graw Hill Co., Ltd, New Delhi.

## **CONDENSED MATTER PHYSICS**

**Programme : B.Sc., Physics**

**Part : III-Core-VIII**

**SEMESTER : VI**

**Hours : 4**

**Course Code : 17UPHC62**

**Credits : 4**

### **Course Outcomes**

It is the field of physics that deals with the macroscopic and microscopic physical properties of matter.

### **Unit I**

Bonding in solids - Classification of bonds in solids - ionic , covalent, metallic, molecular and hydrogen bonds. Introduction about Crystals and amorphous solids - Fundamental terms of crystallography - classifications of crystals – Bravais lattices – Unit cell - Miller indices - crystal structures of SC, BCC, FCC and hexagonal closed packed structure and Zinc blende.

### **Unit II**

Free Electron theory of solids – classification of conducting materials- drift velocity–mobility - mean free path - relaxation time. Expression for electrical and thermal conductivity - Wiedemann Franz law - Super conductivity - general properties of super conducting materials - types of superconductors – applications.

### **Unit III**

Classification of solids on the basis of energy band theory - classification of semiconductors- application of semiconductors - Carrier concentration in an intrinsic semiconductor - Carrier concentration in an extrinsic semiconductor - Hall effect- Determination of Hall coefficient.

### **Unit IV**

Different types of magnetism –dia – para - ferro - antiferro and ferrimagnetism. Langevin's theory of dia and para magnetism – Concept of domain – Weiss theory of ferromagnetism -Magnetic materials - properties and applications of soft and hard magnetic materials - magnetostriction materials - ferrites and hysteresis.

### **Unit V**

Dielectrics - polar and non polar dielectrics types of polarizations – electronic – ionic – orientational - space charge - local field(or)internal field - Clausius -Mosotti equation - experimental determination of dielectric constant - dielectric loss sources - dielectric strength and breakdown - properties and applications of dielectrics.

### **Books for study:**

1. **Modern Physics** - R.Murugesan S.Chand & Co.
2. **Introduction of Solid State Physics for UG students** –P.K. Palanisamy
3. **Fundamentalnof solid state physics** by Saexena,gupta saexena,pragati prakashan-1991.

### **Reference Books:**

1. Introduction to solids by Azaroff TMH,Reprint 1978
2. Material Science by Arumugam-Anuradha Agencies-1997.
3. Solid state physics by R.K.Puri & V.K Babbar-Chand &co.
4. Materials science – R.suresh,Lakshmi publications.

## **DIGITAL ELECTRONICS**

**Programme : B.Sc., Physics**

**Part : III-Elective-III**

**SEMESTER : VI**

**Hours : 4**

**Course Code : 17UPHE61**

**Credits : 4**

### **Course Outcomes**

Explains the basic principles of digital systems and its applications.

#### **Unit – I**

Number system – Binary, decimal, Octal, hexadecimal systems - Conversion from one another – Binary addition, subtraction,, multiplication, division – Binary subtraction by 1's and 2's complement – Basic laws of Boolean Algebra – Boolean Addition – Properties of Boolean Algebra – De Morgan's theorems - their proof.

#### **Unit – II**

Logic gates – OR, AND, NOT, NOR, NAND and EX-OR- IC version- pulse diagram-Universal gates – Logic families – Diode Resistor logic (DRL) – OR gate, AND gate – RTL NOT gate – Sum of products(SOP) - product of sums (POS)- expression from a truth table Karnaugh map – 2variable , 3variable and 4 variable – simplification using K-map – pairs, quads and Octets (both SOP and POS method).

#### **Unit – III**

Half adder – Full adder – 4bit binary adder- 4 bit parallel subtractor – Multiplexer(MUX) – 4 to 1 MUX DE Multiplexer(DMUX) – 1 to 4 DMUX – Encoder - 8 to 3 Encoder – Decimal to BCD Encoder – Decimal to BCD Encoder – Decoder – 3 to 8 decoder ,BCD to Decimal Decoder – BCD to 7 segment Decoder

#### **Unit – IV**

Timer – IC 555 mono and astable multi vibrator - Flip Flops - R-S flip flops - clocked R-S flip flops - J-K flip flop – J-K master Slave flip flop – D flip flop – application of flip flop.

#### **Unit – V**

Register – Shift register – Classification – Serial in – Serial out (SISO) shift register – Counters – 4 bit binary counter – Decade counter, Ring counter - Binary ladder type – Analog to Decimal converter (A/D) –Digital to analog converter (D/A) - Successive Approximation type.

#### **Books for Study:**

1. **Digital principles and applications** - 6<sup>th</sup> edition, Malvino, Leech, Tata Mc-Graw Hill , 1996.
2. **Digital electronics**, Jose robin,
3. **Digital principles** –Floyd.

## **ASTROPHYSICS – II**

**Programme : B.Sc., Physics**

**Part : III-Elective-IV**

**SEMESTER : VI**

**Hours : 4**

**Course Code : 17UPHE62**

**Credits : 4**

### **Course Outcomes**

**Discuss the properties of degenerate matter and the outcome of stellar evolution for stars of different mass**

### **Unit -I**

Sun - Physical properties – Composition – Photosphere – Chromosphere – Corona – Sunspots - Sunspot groups - Sunspot cycle – Coronal Mass Ejections (CMEs) - Solar Prominences - Solar Flares - Solar Wind -Communication disturbances - Auroras.

### **Unit -II**

Stellar Parallax - Distance units - Stellar motions - Star light measurements - luminosity and brightness of Star- Colours of Star-Spectra of Stars –Hertzsprung-Russell diagram -Luminosity classification – Stellar diameters.

### **Unit -III**

Nuclear energy for stars - Nuclear reactions – Stellar evolution - birth of Star - Main Sequence stars – Cepheid variables - Planetary nebulae - white dwarfs - origin of red giants - Colour Magnitude diagram - Neutron stars - Black holes – The Schwarzschild radius - Stellar black holes - Non-Stellar black holes - Physics of a black hole.

### **Unit -IV**

Identifying Galaxies - Galaxy nomenclature - Types of Galaxies - Spiral-Elliptical - irregular galaxies - Milky Way Galaxy and its structure - Properties of Galaxies - Visual binaries- Mass of a binary system - Mass luminosity relationship- Star clusters- Galactic clusters - Pulsars – Quasars.

## **Unit –V**

Cosomology – the scale of the universe – the expansion of the universe – Olber's Paradox - Cosmological models – Steady state theory - Big bang theory – Origin of the cosmic background radiation.

### **TEXT BOOKS:**

1. Niclolas.A.Pananides and Thomas Arny, 1979, Introductory Astronomy, Addison Wesley Publ. Co.
2. A. Mujiber Rahman, 2018, Introduction to Astrophysics, KAMS Publications, Uthamapalyam.

### **Reference Books:**

1. Abell, Morrison and Wolf, 1987, Exploration of the Universe, 5<sup>th</sup> ed., Saunders College Publ.
2. Carrol and Ostlie, 2007, Introduction to Modern Astrophysics, 2<sup>nd</sup> ed., Pearson International.
3. Marc. L. Klutner, 2003, Astronomy A physical perspective, Cambridge University
4. Abhyankar, K.D., Universities Press.

## ANCILLARY CHEMISTRY-IV

### Part-III

17UCHA41	Ancillary Chemistry Paper- IV (Organic And Physical Chemistry)	Hours 4/Credits 4
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**Course Outcome:** To understand heterocyclic compounds, alkaloids, vitamins, antibiotics, chemical kinetics, chromatography, chemotherapy and electrochemistry.

#### Unit – I

Heterocyclic compounds – preparation and reactions of pyrrole, furan, pyridine, quinoline, isoquinoline (Structural elucidation & synthesis not necessary).

#### Unit – II

Alkaloids – definition - pharmacological properties and importance of the following alkaloids – nicotine, quinine, piperine and cocaine (Structural elucidation not necessary).

Vitamins - Classification and biological functions of vitamins A, B<sub>6</sub>, B<sub>12</sub>, C, D, E and K (Structural elucidation not required) - Antibiotics Classification and biological functions of antibiotics – penicillin, chloroamphenicol, streptomycin and tetracyclin (uses and structure only)

#### Unit – III

Chemical kinetics: Rate of reaction-rate law and rate constant – order and molecularity of a reaction – zero order – first order- second order reaction – examples. First order rate equation and half life period – derivation–Pseudo first order reactions- Carbon dating.

#### Unit – IV

Chromatographic technique: Principle – classification -adsorption and partition Chromatography- thin layer chromatography – column chromatography (adsorption) – paper Chromatography – gas-solid and gas-liquid chromatography- applications of each type- ion exchange chromatography.

Chemotherapy - Sulpha drugs -sulphadiazine-sulphanilamide -preparation and applications.

Antimalarials; Chloroquine and plasmoquine-Arsenical drugs; Salvarasan 606, Neosalvarasan



## Unit –V

### Electrochemistry:

$P^H$  – Definition - simple calculation of  $P^H$  from Molarity of acids and bases - common ion effect - its application in analytical chemistry - buffer solution - definition - theory of buffer action – applications.

Acid – base indicators-working range - commercial cells and batteries - primary and secondary cells - Weston – cadmium cell - lead storage cell - electroplating - principle and methods.

### Reference books

- Essential of physical chemistry - Arun Bahl, B.S. Bahl and G.D. Tuli (revised edition, S.Chand, 2014).
- Principles of physical chemistry - Puri, Sharma and Pathania (revised edition, Vishal pub., 2014).
- Modern Inorganic chemistry - R.D. Madan (revised edition, S.Chand, 2013).
- A Text book of Organic chemistry – Arun Bahl, B.S. Bahl (revised edition, S.Chand, 2014).

J. Ghosh – Fundamental concepts of Applied Chemistry, S. Chand & Co.

# ANCILLARY CHEMISTRY PRACTICAL-II

## PRACTICAL II - ORGANIC ANALYSIS

17UCHA4P	Organic Analysis	Hours 2/Credits 1
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### ORGANIC ANALYSIS

Analysis of an organic compound containing one or two functional groups and confirmation by the preparation of a solid derivative / colour reactions - acids, phenols, aldehydes, esters, amines (primary, secondary and tertiary), amides, anilides, aliphatic diamide and monosaccharide.

### Distribution of Marks

**Maximum marks – 100**

**Duration of examination: 2 hrs**

<b>Internal – 40 marks</b>	
Attendance in the class	20 marks
Observation notebook	10 marks
Model test	10 marks
<b>Total</b>	<b>40 marks</b>

<b>External – 60 marks</b>	
Viva voce	10 marks
Record Notebook	10 marks
Preliminary reactions	5 marks
Detection of element	5 marks
Aliphatic / Aromatic	5 marks
Saturated / Unsaturated	5 marks
Detection of functional group with correct procedure	15 marks
Derivative / Colour reaction	5 marks
<b>Total</b>	<b>60 marks</b>

## **APPLIED PHYSICS-II**

**Programme : B.Sc., Physics**

**Part : III-Skilled-IV**

**SEMESTER : VI**

**Hours : 2**

**Course Code : 17UPHS61**

**Credits : 2**

### **Course Outcomes**

Explains the application of physics to the needs of medicine

### **Unit-I**

Transducers - characteristics of transducers – static and dynamic active transducers – magnetic induction type - -piezo electric type – photo voltaic type – thermo electric type.

### **Unit-II**

Passive transducers – resistive type – effect and sensitivity of a bridge – capacitive transducer – linear variable differential transformer (LVDT).

### **Unit-III**

Characteristics of basic recording system – Electro Cardio Graphy (ECG) – ECG leads – unipolar and bipolar – ECG recording setup.

### **Unit-IV**

Electroencephalo graph (EEG) – origin – block diagram of EEG unit – Electro myograph (EMG) – block diagram of EMG recorders.

### **Unit-V**

Digital thermometer – computer tomography (CT) principle – block diagram of CT scanner.

### **Books for study:**

1. **Biomedical Instrumentation**, EDII, 1994 by Dr.M.Arumugam

### **Reference Book:**

1. **Hand book of Biomedical instrumentation**, R.S. Khanpur, 1999, Tata-Mcgraw Hill.

### **MAJOR PRACTICAL-III**

**Programme : B.Sc., Physics**

**Part : III-Core Practical-III**

**SEMESTER : IV & V**

**Hours : 3**

**Course Code : 17UPHC6P**

**Credits : 4**

#### **Course Outcomes**

Experimental verification of the various basic concepts of Physics

#### **Any Twelve Experiments**

1. Spectrometer- determination of Cauchy's constants.
2. Spectrometer- Hartmann's interpolation formula.
3. Spectrometer – i-i' curve.
4. LCR Series resonance- determination of self inductance.
5. LCR parallel resonance- determination of self inductance.
6. BG –High resistance by leakage method.
7. Maxwell's bridge-self inductance.
8. Spectrometer – Small angled prism.
9. B.G. – Comparison of Mutual Inductance.
10. Anderson's Bridge – Self Inductance.
11. Impedance and power factor – LR circuit.
12. Impedance and power factor – CR circuit.
13. B.G – Determination of mutual inductance.
14. Rayleigh's bridge – Self inductance.
15. Resolving power of a prism.
16. B.G. – Absolute capacity of a condenser.

## **MAJOR PRACTICAL-IV**

**Programme : B.Sc., Physics**

**Part : III-Core Practical-IV**

**SEMESTER : IV & V**

**Hours : 3**

**Course Code : 17UPHC6Q**

**Credits : 4**

### **Course Outcomes**

Experimental verification of the various basic concepts of Physics

### **Any Twelve Experiments**

1. Bridge rectifier –  $\pi$  filter.
2. Single stage amplifier – determination of gain and frequency response.
3. Two stage amplifier- with feedback- determination of gain and frequency response.
4. Two stage amplifier- without feedback- determination of gain and frequency response.
5. Hartley oscillator-self inductance.
6. Colpitt's oscillator-self inductance.
7. Dual power supply using IC7805and IC7905.
8. Transistor characteristics-CE mode.
9. Astable multivibrator- discrete components.
10. Zener diode – Characteristics.
11. FET – Characteristics in CE mode.
12. IC 7805 – Regulated power supply.
13. Zener diode – voltage regulator.
14. Logic gates – discrete components.
15. Full wave rectifier -  $\pi$  filter.
- 16.Clipper and Clamper – discrete components.
17. Differentiating and Integrating circuits by discrete components.

## **MAJOR PRACTICAL-V**

**Programme : B.Sc., Physics**

**Part : III-Core Practical-V**

**SEMESTER : IV & V**

**Hours : 2**

**Course Code : 17UPHC6R**

**Credits : 4**

### **Course Outcomes**

Experimental verification of the various basic concepts of Physics

### **Any Twelve Experiments**

1. Logic gates- using IC.
2. Universal gates-NAND gate – IC.
3. Universal gate-NOR gate –IC.
4. Astable multivibrator-IC 555.
5. Astable multivibrator-IC 741.
6. OP-amp -integrator differentiator.
7. OP-amp -adder and subtractor.
8. Half and Full adder using IC.
9. Four bit binary adder using IC.
10. Four bit binary counter using IC.
11. BCD counter using IC.
12. Ring counter using IC.
13. BCD to seven segment decoder using IC.
14. Schmitt trigger- IC 555.
15. Modulo- n-counter.
16. 4 Bit binary subtractor.
17. Shift -Register using IC

### **Reference Books :**

1. Practical Physics and Electronics –C.C Ouseph, U.J. Rao & V.Vijayendran
2. Practical Physics - S.Viswanathan (Printers & Publishers pvt Ltd; 2007)
3. Practical Physics –Pragathi Prakashan publications.

## VALUE EDUCATION

**Programme : B.Sc., Physics**

**Part : IV**

**SEMESTER : VI**

**Hours : 2**

**Course Code : 17UVED61**

**Credits : 2**

### COURSE OUTCOMES:

CO1: Develop the overall personality including physical, mental, emotional and spiritual aspects

CO2: Demonstrate good manners and cooperative citizenship

CO3: Develop respect for the dignity of individual and society

### **UNIT – I: Values and the Individual**

Values meaning – The Significance of Values – Classification of Values – Need of Value Education – Values and the individual: Self Discipline, Self Confidence, Self Initiative, Empathy, Compassion, Forgiveness, Honesty and Courage.

### **UNIT – II: Values and Religion**

Karmayoga in Hinduism – Love and Justice in Christianity – Brotherhood in Islam – Compassion in Buddhism – Ahimsa in Jainism – and Courage in Sikhism – Need for Religious Harmony.

### **UNIT – III: Values and Society**

Definition of Society – Democracy – Secularism – Socialism – Gender Justice – Human Rights – Socio-Political Awareness – Social Integration – Social Justice.

### **UNIT – IV: Professional Values**

Definition – Accountability – Willingness to learn – Team Spirit – Competence Development – Honesty – Transparency – Respecting Others – Democratic Functioning – Integrity and Commitment.

### **UNIT- V: Role of Social Institutions in Value Formation**

Role of Family – Peer Group – Society – Educational Institutions – Role Models, and Mass Media in value formation.

### **Text Book:**

Value Education, Madurai Kamaraj University Publications

### **REFERENCE BOOKS:**

- Subramanyam, .K , values in Education. Madurai; Ramana Publications, 1995.
- Doss. A. G. Indian Social Institutions, Delhi: Forward Publishing Company, 2000.
- Joseph.K.P, e.d., Peace and Value Education : A Creative Response to Consumerism and
- Communalism, Hyderabad: National Institute of Peace and Value Education. 2003.
- BediKiran, What Went Wrong....and Continues, Delhi: UBS Publishers and Distributors Pvt.Ltd., 2005.
- Sekar, Vincent, Quest for Harmony: An Anthology of Religions in Dialogue, Bangalore: Claretian Publications, 2001.

**METHODOLOGY:** The each above mentioned values may be taught through parables, new analysis, role play, group discussions, debates, case studies and field work.