BACHELOR OF SCIENCE
PHYSICS

SYLLABUS 2017-18 Onwards

Dr. N.G.P ARTS AND SCIENCE COLLEGE (Autonomous)
(Re-Accredited with A Grade by NAAC)
(Affiliated to Bharathiar University,)
Dr. N.G.P. Nagar - Kalapatti Road
Coimbatore - 641 048

REGULATIONS

ELIGIBILITY

A pass in Higher Secondary Examination in Academic stream or Vocational stream under Higher Secondary Board of Examination, Tamil Nadu with Physics as one of the subjects and as per the norms set by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Academic Council, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the **Bachelor of Physics Degree Examination** of this College after a course of study of three Academic years.
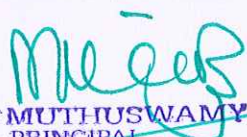
OBJECTIVES OF THE COURSE

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

1. Producing graduates who are well acquainted with the fundamentals of Physics and requisite skills, in order to use their knowledge in Physics in a wide range of practical applications.
2. Developing creative thinking and the power of imagination to enable graduates work in research in academia and industry for broader applications.
3. Relating the training of Physics graduates to the employment opportunities within the country.
4. To promote societal values through Physics related activities.

SCHEME OF EXAMINATIONS

Course Code	Course	Hrs of Instruction	Exam Duration (Hrs)	Max Marks			Credit Points
				CA	CE	Total	
First Semester							
Part – I							
17UTL11T 17UHL11H 17UML11M 17UFL11F	Tamil-I Hindi-I Malayalam-I French – I	5	3	25	75	100	3
Part – II							
17UEG12E	English - I	5	3	25	75	100	3
Part – III							
17UPY13A	**CORE-- I:**Mechanics, Properties of Matter and Acoustics	6	3	25	75	100	5
	Core Practical-I: General Experiments	5	-	-	-	-	-
17UMT1AB	**Allied- I:** Mathematics –I	7	3	20	55	75	4
Part – IV							
17UFC1FA	Environmental Studies	2	2	-	50	50	2
		30				425	17
Second Semester							
Part – I							
17UTL21T 17UHL21H 17UML21M 17UFL21F	Tamil-II Hindi-II Malayalam-II French – II	5	3	25	75	100	3
Part – II							
17UEG22E	English - II	5	3	25	75	100	3
Part – III							

10/01/2018

BoS Chairman/HoD
Department of Physics
Dr. N. G. P. Arts and Science College
Coimbatore – 641 048

Dr. P. R. MUTHUSWAMY
PRINCIPAL
Dr NGP Arts and Science College
Dr. NGP - Kalapatti Road
Coimbatore - 641 048
Tamilnadu, India

17UPY23A	**CORE-- II:** Heat and Thermodynamics	6	3	25	75	100	5
17UPY23P	**Core Practical-I:** General Experiments	5	3	40	60	100	4
17UMT2AB	**Allied - I:** Mathematics- II	7	3	20	55	75	4
Part – IV							
17UFC2FA	Value Education: Human Rights	2	2	-	50	50	2
		30				525	21
Third Semester							
Part – I							
17UTL31U 17UHL31H 17UML31M 17UFL31F	Tamil-III Hindi-III Malayalam-III French – III	4	3	25	75	100	3
Part – II							
17UEG32E	English - III	4	3	25	75	100	3
Part – III							
17UPY33A	**CORE-III:** Optics	5	3	25	75	100	5
17UPY33P	**Core Practical-II:** General Experiments	4	3	20	30	50	2
17UCY3AA	**Allied - II:** Chemistry- I	3	3	20	55	75	3
	Allied Practical- I	3	-	-	-	-	-
17UPY3SA	**Skill based Subject -I:** Principles of Programming Concepts and C Programming	3	3	20	55	75	3
Part – IV							
	NMEC –I:	2	2	-	50	50	2
17UFC3FA 17UFC3FB 17UFC3FC	Tamil / Advanced Tamil (OR) (Yoga for Human	2	2	-	50	50	2

17UFC3FD 17UFC3FE	Excellence)/ Women's Rights/ Constitution of India						
		30				**600**	**23**

Fourth Semester

	Part – I						
17UTL41U 17UHL41H 17UML41M 17UFL41F	Tamil-IV Hindi-IV Malayalam-IV French – IV	4	3	25	75	100	3

	Part – II						
17UEG42E	English - IV	4	3	25	75	100	3

	Part – III						
17UPY43A	**CORE- IV:** Atomic Physics and Spectroscopy	5	3	25	75	100	5
17UPY43P	**Core Practical-III:** General Experiments	4	3	20	30	50	2
17UCY4AA	**Allied - II:** Chemistry –II	3	3	20	55	75	3
17UCY4AP	**Allied Practical- I:** Chemistry	3	3	20	30	50	2
17UPY4SA	**Skill based Subject - II:** Object Oriented Programming with C++	3	3	20	55	75	3

	Part – IV						
	NMEC –II:	2	2	-	50	50	2
17UFC4FA 17UFC4FB 17UFC4FC	Tamil/ Advanced Tamil (or) General Awareness	2	2	-	50	50	2
		30				**650**	**25**

Fifth Semester

	Part – III						
17UPY53A	**CORE- V:** Mathematical Physics and Classical Mechanics	4	3	25	75	100	4
17UPY53B	**CORE- VI:** Electricity and Magnetism	4	3	25	75	100	4
17UPY53C	**CORE–VII:** Applied Electronics	4	3	25	75	100	4
17UPY53P	**Core Practical-IV:** General Experiments	4	3	20	30	50	2
17UPY53Q	**Core Practical-V:** Digital Electronics	4	3	20	30	50	2
	Elective- I:	4	3	25	75	100	4
17UPY5SA	**Skill based Subject III:** Digital Electronics and Operational Amplifier	3	3	20	55	75	3
17UPY5SB	**Skill based subject - IV:** Microprocessors	3	3	20	55	75	3
	Part – IV						
17UPY53T	**Industrial Training**	Grade A to C					
		30				**650**	**26**

Sixth Semester

	Part – III						
17UPY63A	**CORE–VIII:** Nuclear Physics	4	3	25	75	100	4
17UPY63B	**CORE- IX:** Quantum Mechanics and Relativity	5	3	25	75	100	5
17UPY63C	**CORE-X:** Solid State Physics	5	3	25	75	100	5
17UPY63P	**Core Practical-VI:**	4	3	20	30	50	2

	General Experiments						
17UPY63Q	**Core Practical VII:** Special Electronics and Microprocessor	4	3	20	30	50	2
	Elective- II:	4	3	25	75	100	4
	Elective- III:	4	3	25	75	100	4
Part – V							
17UEX65A	Extension Activity	-	-	-	50	50	2
		30				650	28
GRAND TOTAL						3500	140

ELECTIVE – I

(Student shall select any one of the following courses as Elective-I in Fifth semester)

S.No	Course Code	Name of the Course
1.	17UPY5EA	Material Science
2.	17UPY5EB	Energy Physics
3.	17UPY5EC	Agricultural Physics

ELECTIVE – II

(Student shall select any one of the following course s as Elective-II in Sixth semester)

S.No	Course Code	Name of the Course
1.	17UPY6EA	Fundamentals of Nano Science
2.	17UPY6EB	Optical Fibres and Fibre Optic Communication Systems
3.	17UPY6EC	Bio-Physics

ELECTIVE - III

(Student shall select any one of the following courses as Elective-III in Sixth semester)

S. No	Course Code	Name of the Course
1.	17UPY6ED	Space Physics
2.	17UPY6EE	Geophysics
3.	17UPY6EF	Medical Physics

NON MAJOR ELECTIVE COURSES (NMEC)

The Department offers the following two papers as Non Major Elective Course for other than the Physics students.

Student shall select the following Course as Non Major Elective Course during their third and fourth semester.

S. No	Course Code	Name of the Course
1	17UED34V	Everyday Physics –I
2	17UED44V	Everyday Physics –II

Total Credit Distribution

Courses	Credits	Total		Credits	Cumulative Total
Part I: Tamil	3	4x 100 =	400	12	24
Part II: English	3	4x 100 =	400	12	
Part III:					
CORE- theory	5	6x 100=	600	30	102
	4	4x100=	400	16	
CORE- Practical	4	1x100=	100	04	
	2	6x 100 –	600	12	
Allied theory	4	2x75 =	150	08	
Allied theory	3	2x75 =	150	06	
Allied Practical	2	1X50=	50	02	
Elective	4	3 x 100	300	12	
Skill based	3	4 x 75 =	300	12	
PART-IV					
NMEC	2	2 x 50 =	100	04	12
Value Education	2	2 x 50=	100	04	
Environmental studied	2	1 x 50 =	50	02	
General Awareness	2	1 x 50 =	50	02	
Part V:					
Extension	2	1x50 =	50	02	02
Total			**3500**	**140**	**140**

FOR COURSE COMPLETION

Students have to complete the following –Industrial training: Course code: 16UPY53T.

- Students must undergo Industrial training for 15 – 30 days during IV Semester Summer Vacation. Evaluation of the Report done by the Internal and External Examiner in the V Semester. Based on their performance Grade will be Awarded as follows:
  - Grade 'A' - 75marks and above
  - Grade 'B' 60-74 marks
  - Grade 'C' 40-59 marks
  - Below 40 marks - Reappear (RA)

Earning Extra credits is not mandatory for course completion

Extra credits

Course	Credit	Total credits
BEC/ Self study courses	1	1
Hindi / French/ Other foreign Language approved by certified Institutions	1	1
Type Writing / Short Hand Course	1	1
Diploma/certificate/CPT/ACS Foundation/ NPTEL Course	1	1
Representation – Academic/Sports /Social Activities/ Extra Curricular / Co-Curricular activities at University/ District/ State/ National/ International	1	1
		5

Rules:

The students can earn extra credits only if they complete the above during the course period (I to V sem) and based on the following criteria. Proof of Completion must be submitted in the office of the Controller of Examinations before the commencement of the VI Semester. (Earning Extra credits are not mandatory for Course completion)

1. Student can opt for BEC course/ Self-study course to earn one credit. They have to Enroll and complete any one of the courses during their course period before fifth semester (I sem to V sem).

Self study paper offered by the PHYSICS Department

S. No.	Semester	Course Code	Course Title
1.	I Sem to V Sem	17UPYSS1	Electrical and Electronic Appliances
2.		17UPYSS2	Biophysics and Biomedical Instrumentation

2. Student can opt Hindi/ French/ Other foreign Language approved by certified Institutions to earn one credit. The certificate(Hindi) must be obtained from **Dakshina Bharat Hindi Prachar Sabha** and He/ she has to enroll and complete during their course period (**first to fifth semester)**

3. Student can opt for Type writing /short hand course to earn one extra credit. He/she has to enroll and complete the course during their course period to obtain certificate through **Tamil Nadu Board of Technical Education**

4. Student can opt for Diploma/certificate/CPT/ACS Inter/ NPTEL Course to earn one extra credit. Student who opt for Diploma/ Certificate course have to enroll any diploma/certificate course offered by Bharathiar University through our Institution. Student who opt for CPT/ ACS/CMA have to enroll and complete the foundation level during the course period. Students who opt for NPTEL course should complete the course certificate through NPTEL.

5. Award Winners in Academic/ Representation in Sports /Social Activities/ Extra Curricular/ Co-Curricular Activities at University/ District/ State/ National/ International level can earn one extra credit.

PROGRAMME EDUCATIONAL OUTCOMES

On the successful completion of the **BSc Physics** programme, the following are the expected outcomes.

PO Number	PO Statement
PO1	Demonstrate an understanding of basic scientific principles, theories, and laws in Physics as well as an awareness of the changing nature of science.
PO2	Analyze, interpret, and evaluate scientific hypotheses and theories using rigorous methods use appropriate mathematical techniques and concepts to obtain quantitative solutions to problems in physics.
PO3	Demonstrate basic experimental skills by the practice of setting up and conducting experiments with minimizing measurement errors.
PO4	Demonstrate a qualitative understanding of the core physics ideas and the relationship of this physics to the humanities through both written and oral communication.
PO5	Demonstrate an ability to recognize the need for life-long learning for sustaining professional career.

17UPY13A	CORE- I:MECHANICS, PROPERTIES OF MATTER AND ACOUSTICS	SEMESTER I

Total Credits: 5

Hours/Week : 6

PREAMBLE

To enable students to learn and apply the basic principles, theory and concepts of Mechanics, Matter and Sound.

COURSE OUTCOMES

On the successful completion of the programme, students will able to demonstrate

CO Number	CO Statement	Knowledge Level
CO1	Basic understanding of phenomena like Work, Energy, its types and conservation laws.	K2
CO2	Application of Simple Harmonic theories through experiments in laboratories.	K3
CO3	Understanding of Gravitation and Elasticity concepts and their applications in real time examples.	K2
CO4	Comparing and understanding Viscosity and its methods.	K2
CO5	Interpreting different modes of vibrations and acoustical applications.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	M	S	S	M	S
CO3	S	S	S	M	M
CO4	S	S	S	S	S
CO5	M	S	S	M	S

S-Strong; M-Medium; L-Low

17UPY13A	CORE- I:MECHANICS, PROPERTIES OF MATTER AND ACOUSTICS	SEMESTER I

Total Credits: 5

Hours/Week : 6

CONTENTS

UNIT - I

Kinetic Energy and Work: Work – Kinetic energy - Work – Kinetic energy Theorem – Work done by the gravitational force – work done by the spring force – work done by an applied force – Power

Potential Energy and Conservation of Energy: Work and Potential energy – Conservative and Non-conservative forces – Conservation of mechanical energy – Work done on a system by an external force - Conservation of energy.

UNIT - II

Moment of Inertia: Definition – Angular Momentum of system of particles - Conservation of angular momentum – Torque - Parallel and perpendicular axes theorem – M.I. of rectangular Lamina and triangular lamina – M. I of a solid sphere.

Simple Harmonic Motion: Simple harmonic oscillator – Potential energy and kinetic energy and their average values – Simple pendulum – Compound pendulum: graph between time period and distance from centre of gravity-Condition for minimum time period – Torsional pendulum.

UNIT - III

Gravitation: Kepler's Law of Planetary motion – Newton's Law of gravitation – Boy's method for determining G – Gravitational potential – Gravitational field at a point due to spherical shell – Variation of 'g' with latitude, altitude and depth – Determination of g with compound pendulum.

Elasticity: Elastic modules – Poisson's ratio – relation between them – Expression for bending moment – Cantilever-determination of Young's modulus by non-uniform bending- Koenig's Method - I section girders.

UNIT - IV

Surface Tension: Surface Tension –Surface Energy-Excess of Pressure over a curved surface – Angle of Contact-Variation of surface tension with temperature – Jaeger's Experiment.

Viscosity: Viscosity – Ostwald's Viscometer - Poiseuille's formula for the flow of a liquid through a capillary tube - Stoke's Formula and Expression – Stoke's method for viscosity - Rotation viscometer- Viscosity of gases – Meyer's Modification of Poiseuille's formula-Rankine's method.

UNIT - V

Theory of vibrations: Simple Harmonic vibration – Progressive waves – properties – Composition of two S.H.M. and beats – stationary waves – Properties- Melde's Experiment – Transverse and longitudinal modes – Frequency measurement using Sonometer.

Acoustics: Acoustics of buildings: Requisites of good acoustics – Sabine's reverberation formula. Ultrasonics-Production of ultrasonic waves: Magnetostriction method - Piezo electric method – Properties and application.

TEXT BOOKS:

1. *Murugesan R.* 2002. **Mechanics, Properties of matter and Sound.** *S.Chand and Co, New Delhi*

2. *Brij Lal and Subrahmanyam N.* 2003. **Properties of Matter**, *S.Chand and Co, New Delhi*

3. *Brij Lal and Subrahmanyam N.* 2008. **A Text Book of Sound.** *[2nd Edition], Vikas Publishing House, New Delhi*

REFERENCE BOOKS:

1. *Robert Resnick, David Halliday and Kenneth S.Krane.* 2001. **Physics.** *[10th Edition] Wiley India, New Delhi*

2. *Sears Semansky and Ground.* 2011. **University Physics.** *[13th Edition] Addison-Wesley, Boston*

3. *Ghosh M.* 1984. **A Text books of Sound.** *Chand and Co, New Delhi*

4. *Mathur D.S.* 2008. **Elements of Properties of Matter.** *S. Chand and Co, New Delhi*

5. *Mathur D.S.* 2006. **Mechanics.** *S. Chand and Co, New Delhi*

17UMT1AB	ALLIED MATHEMATICS – I	SEMESTER - I

TotalCredits:4

Hours /Week: 7

PREAMBLE

On completion of this course the students should gain knowledge about solving equations, solving first and second order differential equations using Laplace transforms.

To know about the concept of Fourier series which will be useful in their field of study.

COURSE OUTCOMES

In the successful completion of the course, student will be able to

CO Number	CO Statement	Knowledge Level
CO 1	Learn about Polynomial Equations.	K1
CO 2	Learn the concept & Manipulation of Matrices	K1
CO 3	Apply trigonometric functions to solve problems.	K2
CO 4	Learn about standard form of Laplace Transforms	K2
CO 5	Application of Laplace Transform in solving Differential Equations	K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	M	S	S	M	S
CO3	S	S	S	M	M
CO4	S	S	S	S	S
CO5	M	S	S	M	S

S- Strong; M-Medium ;L-Low

17UMT1AB	ALLIED MATHEMATICS – I	SEMESTER - I

TotalCredits:4

Hours /Week: 7

CONTENTS

UNIT - I

Theory of Equations: Polynomial Equations with real coefficients : Imaginary and irrational roots - Transformation of equation by Diminishing or increasing its roots by a constant-Reciprocal Equation.

UNIT - II

Matrices: Eigen Values and eigen vectors, Cayley-Hamilton theorem (without proof) - Verification and computation of inverse.

UNIT - III

Trigonometry: Expansion of $\cos n\theta$ and $\sin n\theta$ interms of powers of cosine and sine-Expansions of $\cos^n\theta$, $\sin^n\theta$ in powers of sine and cosine - hyperbolic functions.

UNIT - IV

Laplace Transforms: Definition-Standard forms of Laplace Transform - Linearity transformation- shift theorem-Transform of $tf(t), f(t)/t$.

UNIT - V

Inverse Laplace transforms: Inverse of standard functions -Application to solution of differential equations – Solving of simultaneous differential equation.

TEXT BOOK:

1. *Abdul Rasheed ,A.* **Allied Mathematics.** 2006.*Tata McGraw-Hill Education (P) Ltd, Chennai.*

REFERENCE BOOKS:

1. *Manichavasagam Pillai, T.K and Narayanan,S.* 2002. **Trigonometry.** *Viswanathan Publishers and Printers Pvt.Ltd.*

2. *Narayan,S and Manicavachagam Pillai,T.K.* 2002*.* **Ancillary Mathematics.** *Viswanathan Publishers and Printers Pvt.Ltd.*

17UPY23A	CORE- II: HEAT AND THERMODYNAMICS	SEMESTER II

Total Credits: 5

Hours/Week: 6

PREAMBLE

To enable students to learn and apply the basic principles, theory and concepts of Heat and Thermodynamics.

COURSE OUTCOMES

On the successful completion of the programme, students will able to demonstrate

CO Number	CO Statement	Knowledge Level
CO1	Understand the phenomena of Thermometry and Calorimetry.	K2
CO2	Study the applications of Heat transfer mechanisms in laboratories.	K3
CO3	Understand Kinetic theory of gases, its concepts and their applications.	K2
CO4	Compare and understand Thermodynamic and Statistical Thermodynamic principles.	K2
CO5	Interpret Third Law of Thermodynamics and concepts of Entropy.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	M	S	S	M	S
CO3	S	S	S	M	M
CO4	S	S	S	S	S
CO5	M	S	S	M	S

S-Strong; M-Medium; L-Low

17UPY23A	CORE- II: HEAT AND THERMODYNAMICS	SEMESTER II

Total Credits: 5

Hours/Week: 6

CONTENTS

UNIT - I

Thermometry: Gas Equation - Temperature Coefficient of Resistance -- Platinum Resistance Thermometer – Thermocouple – Thomson Effect – Thomson Coefficient – Thermo Electric Thermometer – Helium Vapour Pressure Thermometer.

Calorimetry: Definitions – Newton's law of cooling – Specific heat of a liquid-Joule's Electrical method- Calendar and Barnes' continuous flow method – Two specific heats of a gas – Specific heat of a gas by Joly's differential steam calorimeter – Regnault's method – Dulong and Petit's law – Variation of specific heat and atomic heat with temperature.

UNIT - II

Transmission of heat: Conduction, Convection and Radiation-- Conduction – Co-efficient of the thermal conductivity – Cylindrical flow of heat – determination of thermal conductivity of rubber and glass – Lee's disc method. Radiation – Black body radiation – Wein's Law - Raleigh – Jean's Law – Stefan's law – Experimental Determination of Stefan's constant – Mathematical derivation of Stefan's law

UNIT - III

Kinetic theory of gases: Postulates -- Mean free path – Degrees of freedom – Maxwell's Law of Equipartition of energy – Distribution of Velocity -- Transport phenomena – Viscosity and thermal conduction of gases – Van der waals equation – Low Temperature physics - Temperature of Inversion – Liquefaction of Gases – Liquefaction of air by Linde's Process.

UNIT - IV

Thermodynamics: First law of Thermodynamics – Isothermal and Adiabatic process –Determination of γ by Clement and Desorme's method – Second law of thermodynamics – Carnot's engine- Working efficiency – Carnot's refrigerator – Carnot's Theorem – Otto Cycle –Petrol and Diesel engines.

Statistical Thermodynamics: Ensembles – Types – Microcanonical Ensemble – Canonical Ensemble – Grand Canonical Ensemble – Comparison of Ensembles.

UNIT - V

Entropy: Entropy Change Reversible and Irreversible process – Third law of Thermodynamics --Temperature -Entropy diagram – Entropy of a perfect gas – Increase of entropy in any irreversible process – Thermo dynamic variables – Thermodynamic potentials - Maxwell's thermodynamics relations – Claussius and Clapeyron equation from Maxwell's equation.

TEXT BOOKS:

1. *Brij Lal and Subrahmanyam N.* 2010. **Heat and Thermodynamics**. *S Chand and Co, New Delhi*

2. *Murugesan R. and Kiruthiga Sivaprasath.* 2002. **Thermal Physics**. *[1st Edition] S Chand and Co, New Delhi*

3. *Brij Lal, Subrahmanyam N. and Hemne P.S.* 2014. **Heat Thermodynamics and Statiatical Physics.** *S Chand and Co, New Delhi*

REFERENCE BOOKS:

1. *Zemansky and Dcltanann R.H.* 2012. **Heat and Thermodynamics.** *[8th Edition] McGraw-Hill, New York*

2. *Mathur D.S.* 2002. **Heat and Thermodynamics.** *S Chand and Co, New Delhi*

3. *Agarwal Singhal and Sathyaprakash.* 2009. **Heat and Thermodynamics.** *Pragati Prakashan, Meerut.*

17UPY23P	CORE PRACTICAL – I: GENERAL EXPERIMENTS	SEMESTER-II

Total Credits:4

Hours/Week:5

LIST OF EXPERIMENTS:

Any 12 Experiments

1. Young's Modulus-Uniform Bending (Microscopic Method)
2. Young's Modulus-Non-uniform Bending (Microscopic Method)
3. Compound Pendulum – determination of 'g' and 'K'
4. Torsional Pendulum – Rigidity Modulus
5. Rigidity Modulus – Static Torsion
6. Spectrometer – Refractive Index of a glass Prism
7. Spectrometer – Grating- Minimum deviation & Normal Incidence
8. Moment of a Magnet – Tan C position
9. Viscosity – Poiseuille's Method
10. Meter Bridge- Temperature Coefficient of resistance
11. Meter Bridge- Specific Resistance of a material
12. Specific Heat capacity of a Liquid – Newton's method of cooling
13. Sonometer – Frequency of a tuning fork
14. Post office box- Determination of Temperature Coefficient of Resistance
15. Post office box- Determination of Specific Resistance

17UMT2AB	ALLIED MATHEMATICS – II	SEMESTER - II

Total Credits: 4

Hours/Week: 7

PREAMBLE:

On successful completion of course the students should have series of knowledge about the curvature, Beta, Gamma functions and its application.

To learn the partial differential equation types and integration of vectors.

COURSE OUTCOMES

In the successful completion of the course, student will be able to

CO Number	CO Statement	Knowledge Level
CO 1	Learn about Double Integrals.	K1
CO 2	Learn the concept Curvature and Radius of curvature	K1
CO 3	Solve second order differential equations.	K2
CO 4	Learn about the method of forming and solving Partial Differential Equations	K2
CO 5	Understand the application of Vector Calculus	K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	M	S	S	M	S
CO3	S	S	S	M	M
CO4	S	S	S	S	S
CO5	M	S	S	M	S

S- Strong; M-Medium ;L-Low

17UMT2AB	ALLIED MATHEMATICS – II	SEMESTER - II

Total Credits: 4

Hours/Week: 7

CONTENTS

UNIT - I

Multiple Integrals: Double Integrals - Evaluation of double integrals - Triple Integral - Applications of double and triple integration.

UNIT - II

Differential Calculus: Introduction – Curvature and Radius of curvature - Gamma and Beta Function: Gamma function – Beta Function – Relation between Gamma and Beta Function.

UNIT - III

Differential Equations: Linear differential equations of second order with constant coefficient whose R.H.S is of the form ve^{mx}, where v is any function of x - Linear equations with variable coefficients.

UNIT - IV

Formation of partial differential equations by elimination of arbitrary constants and functions -Definitions of general, particular and complete solutions - Solving standard forms $f(p, q) = 0$, $f(x,p,q) = 0$, $f(y,p,q) = 0$, $f(z, p, q) = 0$, $f(x,p) = f(y,q)$ - Lagrange's Differential equations $Pp+Qq = R$.

UNIT - V

Scalar and vector fields -Differentiation of vectors - Gradient, Divergence and Curl -Integration of vectors - Line integral - Surface integral – Volume integral.

TEXT BOOK:

1. *Duraipandian, P and Udhyabaskaran, S.* **Allied Mathematics Volume II**, *S.Chand and Company Ltd, New Delhi.*

REFERENCE BOOK:

1. *Abdul Rasheed ,A.* **Allied Mathematics**,*Vijay Nicole imprints (P) Ltd,Chennai.*

2*. Narayan,S and Manicavachagam Pillai,T.K.* 2002.**Ancillary Mathematics.** *Viswanathan Publishers and Printers Pvt. Ltd.*

3. *Kandasamy. P and Thilagavathi. K*. 2004. **Allied Mathematics II**. *S.Chand and Company Ltd,   New Delhi.*

17UPY33A	CORE- III: OPTICS	SEMESTER-III

Total credits:5

Hours/Week:5

PREAMBLE

To enable students to learn the concepts in physical and geometrical optics, and to understand the behavior of light and their applications.

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	(i)Classify different types of aberrations (ii) Demonstrate dispersive power of prism through experiments in laboratories.	K1,K2
CO2	Differentiate different Refractometers and interference phenomena in thin films.	K2
CO3	Recall Fresnel , Fraunhofer diffraction and determine dispersive power of grating through experiments in laboratories.	K2
CO4	(i) Identify and produce plane, circularly and elliptically polarized light. (ii)Compare different types of microscopes.	K1,K2
CO5	Understand basic principle of laser, fibre optics and their applications.	K2

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	S	M	S
CO3	S	M	S	M	M
CO4	S	S	S	S	M
CO5	S	S	M	M	S

S-Strong; M-Medium; L-Low

17UPY33A	CORE- III: OPTICS	SEMESTER-III

Total credits:5

Hours/Week:5

OBJECTIVE:

1. To enable students understand the behavior of light, concepts in physical and geometrical optics and their applications.

CONTENTS

UNIT - I

Geometrical Optics: Aberrations - Spherical aberrations in lens - Coma - Astigmatism - Chromatic aberration - chromatic aberrations in a lens - achromatic lens - condition for achromatism of two thin lenses separated by a finite distances-- dispersion by a prism - Cauchy's dispersion formula - dispersive power --Achromatism in prism.

UNIT - II

Interference: Interference in thin films due to reflected light – Fringes produced by a wedge shaped thin film – Newton's rings – Refractive index of the Liquid – Michelson interferometer – Determination of a wavelength of monochromatic light – Difference -- Wavelength between two neighbouring spectral lines – Jamin's Refractometer – Rayleigh's Refractometer.

UNIT - III

Diffraction: Fresnel's assumptions – rectilinear propagation of light – half period zone – Zone Plates – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction at a Single slit, Double slit, N Slit- Diffraction grating – Determination of Wavelength -- Resolving power and Dispersive power of Grating.

UNIT - IV

Polarization: Brewster's law **--**Double Refraction – Huygen's explanation – Production and Detection of Plane, Circularly and Elliptically Polarized light – Optical Activity – Fresnel's explanation - Specific rotation – Laurent's Half Shade Polarimeter.

Optical Instruments: Eye pieces – Huygens and Ramsden eyepieces – Cardinal Points –Comparison. Microscopes - Electron Microscope, SEM, TEM, STEM.

UNIT - V

Laser and Fibre Optics: Spontaneous and Stimulated emission – Einstein's coefficient – Optical Pumping and Population Inversion – Lasing action -- He-Ne, CO_2, Nd:YAG laser.

Optical fibres –Critical Angle – Modes of Propagation –Numerical Aperture and Acceptance Angle (Expression) – Types of Optical fibres – Fibre optic communication system – Fibre optic sensors.

TEXT BOOKS:

1. *Brij Lal and Subrahmanyam N.* 2006. **A Text book of Optics.** *S Chand and Co, New Delhi*

2. *Murugeshan R. and Kiruthiga Sivaprasath Er.* 2008 **Modern Physics.** *S Chand and Co, New Delhi*

3. *Senthil Kumar I.G.* 2013. **Engineering Physics I.** *VRB Publications, Chennai*

REFERENCE BOOKS:

1. *AjoyGhatak.* 2006. **Optics.** *[3rd Edition] Tata McGraw Hill Publishing Company Ltd, New York*

2. *MurugesanR.* 2010. **Optics and Spectroscopy.** *S Chand and Co, New Delhi.*

3. *Thyagarajan K. and AjoyGhatak.* 2004, **Introduction To Fiber Optics.** *Cambridge University Press, New Delhi.*

17UPY33P	CORE PRACTICAL - II: GENERAL EXPERIMENTS	SEMESTER –III

Total credits:2

Hours/Week:4

LIST OF EXPERIMENTS :

Any 8 Experiments

1. Air wedge – Thickness of a wire

2. Young's Modulus – Cantilever-dynamic method

3. Spectrometer – (i-d) Curve

4. Comparison of Viscosities – Capillary Flow Method

5. Characteristics of a Junction Diode

6. Potentiometer- Low range Voltmeter calibration

7. LASER- Determination of wavelength and particle size

8. Surface tension-drop weight method

9. Characteristics of transistor

10. Joule's calorimeter-Specific heat capacitance

11. Series resonance circuit.

17UCY3AA	ALLIED PAPER – CHEMISTRY I	SEMESTER III

Total Credits:3

Hours/Week: 3

PREAMBLE

To gain knowledge in the basics of chemistry which helps bioscience students to understand chemical bonding in the biomolecules and the techniques involved in the biochemistry.

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand bonding in molecules, crystals structures and evaluate their bonding characteristics and to gain knowledge in the basics of chemistry.	K2
CO2	Design a demonstration that enables the students to prepare laboratory solutions.	K2
CO3	Apply the concepts of bonding's in organic molecules and relate their displacement reactions with mechanism.	K2, K3
CO4	Know the fundamentals of adsorption techniques and adsorption process and to apply the concepts of chromatography in separation process.	K2, K3
CO5	Understand the preparation and uses of synthetic dyes and their application in day today life.	K2

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	M	S	S	S	S
CO3	S	S	S	S	S
CO4	M	M	S	S	S
CO5	M	M	S	S	S

S-Strong; M-Medium; L-Low

17UCY3AA	ALLIED PAPER – CHEMISTRY I	SEMESTER III

Total Credits:3

Hours/Week: 3

OBJECTIVES:

On successful completion of this course the students shall gain knowledge in the basics of chemistry which helps bioscience students to understand chemical bonding in the biomolecules and the techniques involved in the biochemistry.

CONTENTS

UNIT – I

Chemical bonding

1. Molecular Orbital Theory - bonding, antibonding and nonbonding orbitals. MO configuration of H_2, N_2, O_2, F_2- bond order – diamagnetism and paramagnetism.

2. Ionic Bond: Nature of ionic bond, structure of NaCl and CsCl, factors influencing the formation of ionic bond.

3. Covalent Bond: Nature of covalent bond, structure of CH_4, NH_3, H_2O, shapes of $BeCl_2$, BF_3, based on VSEPR theory and hybridization.

UNIT – II

Solutions

1. Normality, molarity, molality, mole fraction, mole concept.

2. Preparation of standard solutions - primary and secondary standards.

3. Principle of Volumetric analysis.

4. Strong and weak acids and bases - Ionic product of water- pH, pKa, pKb, Buffer solution, pH and pOH simple calculations.

UNIT–III

Basic Organic Chemistry

1. Electron displacement effect in organic compounds - Inductive effect – Electromeric effect - Resonance effect, Hyperconjugation and Steric effect.

2. Isomerism, Symmetry of elements (Plane, Centre and Axis of symmetry), Molecules with one chiral carbon and two adjacent chiral carbons –Optical isomerism of lactic acid and tartaric acid, Enantiomers, Diastereomers, Separation of racemic mixture (chemical, mechanical, biochemical and kinetic), Geometrical isomerism (maleic and fumaric acid).

UNIT – IV

Surface Chemistry

Adsorption – adsorbent and adsorbate, adsorption and absorption - chemisorption - physisorption - Difference between chemisorption and physisorption - applications of adsorption - Factors influencing adsorption, adsorption isobar, adsorption isostere.

Chromatography - Principles and applications of column, paper and thin layer Chromatography.

UNIT – V

Dyes

Terms used – chromophore, auxochrome, bathochromic shift, hypsochromic shift, hyperchromic shift and hypochromic shift. Classification of dyes based on chemical structure and application-Preparation of azo (Methyl orange) and triphenyl methane (Malachite green) dyes.

TEXT BOOKS

1. *R. D. Madan. 2001.* **Modern Inorganic Chemistry**. *S. Chand & Company, New Delhi.*

2. *Puri, Sharma, Pathania. 2004.* **Principles of Physical Chemistry**, *Vishal Publishing Company, Jalandhar.*

3. *B.S.Bhal , Arun Bhal,1997.* **Advanced Organic Chemistry,** *S. Chand & Co Limited, New Delhi.*

4. *M. K. Jain, S. C. Sharma. 2001.* **Organic Chemistry**, *Shoban Lal Nayin Chand, Jalandhar.*

5. *Gopalan R. 1991.***Elements of Analytical Chemistry**, *Sultan Chand & Sons, New Delhi.*

17UPY3SA	SKILL BASED SUBJECT-I : PRINCIPLES OF PROGRAMMING CONCEPTS AND C PROGRAMMING	SEMESTER-III

Total credits:3

Hours/Week:3

PREAMBLE

To enable students , learn the basic principles and concepts of C

Programming language

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of C programming	K1
CO2	Understand the strength of C through its rich set of operators	K2
CO3	Apply the knowledge of control structure as decision making and looping	K3
CO4	Build programs using arrays and functions	K3
CO5	Expose the concepts of C programming in Physics problem solving	K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	M
CO2	S	S	M	M	S
CO3	S	M	S	S	S
CO4	S	S	M	S	S
CO5	S	S	S	M	S

S-Strong; M-Medium; L-Low

17UPY3SA	SKILL BASED SUBJECT-I : PRINCIPLES OF PROGRAMMING CONCEPTS AND C PROGRAMMING	SEMESTER-III

Total credits:3

Hours/Week:3

OBJECTIVES

1. To enable students learn the basic principles and concepts of C Programming language

CONTENTS

UNIT - I

Introduction – character sets – constants – keywords – and identifiers – variables – variables – data types – declaration of variables – assigning values to variables – defining symbolic constants.

UNIT - II

Arithmetic operators – relational operators – logical operators – assignment operators – increment and decrement operators – conditional operators – special operators – arithmetic expression – evaluation of expression. – precedence of arithmetic operators – some computer problems – type conversion in expression – operator precedence and associativity – mathematical functions.

UNIT - III

Reading and writing character – formatted input and output – decision making : IF statement : Simple IF – IF ELSE – Nesting of IF.. ELSE – ELSE.

IF Ladder – Switch Statement – operator – go to statement – while .. do while – For loop – Jumps in loops – simple programs.

UNIT - IV

Arrays : Introduction – One dimensional array – declaration of array – Initiating on two and multidimensional arrays – declaring and initializing string variables – reading strings from terminal – writing strings on the screen – Arithmetic operations on characters – simple programs.

Sorting, searching program using one dimensional array, matrix manipulation.

UNIT - V

Conversion of Temperature from C to F and F to C – Determination of Velocity of Light – Foucalt's Rotating Mirror method – Determination of G by Boy's Method – Young's Modulus – Uniform and Non Uniform method – Determination of Frequency: Sonometer – Spectrometer: Refractive index and Dispersive power of Prism – Newton's rings: Radius of Curve

TEXT BOOKS:

1. *Balagurusamy E.* 2012. **Programming in ANSI C.** [6th Edition], Tata McGraw Hill Publishing Company Ltd, New York

2. *Karthikeyan E.* 2008. **A Textbook on C.** Prentice Hall India, New Delhi

3. *Palaniswamy S.* 2004. **Physics Through C Programming.** Pragati Publication.

REFERENCE BOOKS:

1. *Ashok N. Kamthane*. 2011. **Programming in C. [**2nd Edition], Pearson Education, Chennai

2. *Yaswanth, Kanitkar*. 2012. **Let Us C.** [13th Edition], BPB Publication, New Delhi

3. *Gotfried B.* 2010. **Programming with C.** [3rd Edition], Tata McGraw Hill Publishing Company Ltd, New York

17UPY43A	CORE- IV:ATOMIC PHYSICS AND SPECTROSCOPY	SEMESER-IV

Total credits:5

Hours/Week:5

PREAMBLE

To enable students learn the basic principles, properties and laws of x-ray spectrum.

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand and analyze properties of positive rays, x-rays and the different types of mass spectrograph	K2
CO2	Recall basic concept of atom model and classify different atom model	K1
CO3	Discuss and explain theory of optical spectra	K2
CO4	Explain in detail the laws and the importance of x-ray spectrum.	K2
CO5	Identify molecular spectrum and discuss its experimental study	K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	S	M	M	S	M
CO3	M	S	S	S	M
CO4	S	M	M	S	S
CO5	S	M	M	S	S

S-Strong; M-Medium; L-Low

17UPY43A	CORE- IV:ATOMIC PHYSICS AND SPECTROSCOPY	SEMESER-IV

Total credits:5

Hours/Week:5

OBJECTIVE:

1. To acquaint students with detailed study of atom, its various states and the application of observed theories.

CONTENTS

UNIT - I

Positive Rays: Positive rays – Discovery – Properties – Positive ray analysis – Thomson's Parabola method – action of Electric and Magnetic fields – Determination of e/m – determination of mass – discovery of stable isotopes– Limitations – Dempster's mass spectrograph –Aston's mass spectrograph- mass defect and packing fraction .

UNIT - II

Structure of the Atom: The Bohr atom model (Bohr Formula and Total energy) – Critical Potentials – Method of excitation of atoms – Experimental determination of critical potentials by Davis and Goucher's method.

Sommerfield's relativistic model– Vector atom model – Quantum numbers associated with Vector atom model – coupling schemes (LS, JJ coupling) – Pauli's exclusion principle – Periodic classification of elements.

UNIT - III

Magneto Optical Properties of Spectrum: Magnetic dipole moment due to orbital motion of the electron – Magnetic dipole moment due to spin – The Stern and Gerlach experiment –Spin-Orbit Coupling.

Optical spectra – Fine Structure of the sodium D line – Zeeman effect – Experimental arrangement– Lorentz classical theory – Expression for the Zeeman shift – Larmor's theorem – Quantum mechanical explanation of the normal Zeeman effect – Anomalous Zeeman effect – Paschen – Back effect – Stark effect

UNIT - IV

X-ray Spectra: X-ray – Coolidge tube – Properties -- X-ray diffraction-Bragg's law- Bragg's spectrometer - Powder crystal method – Rotating crystal method– X-ray Spectra – Characteristics–Continuous X-ray spectrum – polarization of X-rays – scattering of X-rays (Thomson's formula)   Moseley's law (Statement, Explanation and Importance) – Compton effect – Expression for change of wave length.

UNIT - V

Molecular Spectra: Origin of pure rotational spectra of a molecule -- Theory of the origin of vibration-rotation – Rayleigh's scattering - Raman Effect – Experimental study - Quantum Theory of Raman Effect – Applications – Ultraviolet Spectroscopy – Quartz Spectrograph for near U.V. region - Infrared Spectroscopy – Double beam Infrared spectrometer - Raman Spectroscopy.

TEXT BOOKS:

1. *Murugeshan R and Kiruthiga Sivaprasath Er.* 2008. **Modern Physics**. *S Chand and Co, New Delhi*

2. *Arthur Beiser*. 2008. **Concepts of Modern Physics.** *[7th Edition] Tata McGraw Hill Publishing Company Ltd, New York*

REFERENCE BOOKS:

1. *Sehgal D.L, Chopra K.L and SehgalN.K.* 1983. **Modern Physics.** *S Chand and Co, New Delhi*

2. *Galsstons S.* 2014. **Source book on Atomic Energy.** *[3rd Edition], Krieger Publishing Company, Florida*

3. *Rajam J. B.* 2010. **Atomic Physics.** *S Chand and Co, New Delhi.*

17UPY43P	CORE PRACTICAL - III: GENERAL EXPERIMENTS	SEMESTER – IV

Total credits:2

Hours/Week:4

LIST OF EXPERIMENTS:

Any 8 Experiments

1. Young's Modulus – Cantilever-Static method

2. Spectrometer – (i-i') Curve

3. Newton's rings – Refractive index of a lens

4. Potentiometer- Low range Ammeter calibration

5. Lee's Disc method – Thermal conductivity of a bad conductor

6. Viscosity – Stoke's Method – Co efficient of viscosity of liquid.

7. Carey Foster's Bridge – Temperature Coefficient

8. Characteristics of Zener diode

9. Characteristics of FET

10. Surface tension-Capillary rise method

11. Parallel resonance circuit

17UCY4AA	ALLIED PAPER – CHEMISTRY II	SEMESTER IV

Total Credits:3

Hours/Week: 3

PREAMBLE

To gain knowledge in the basics of chemistry which helps bioscience students to understand the periodic table, IUPAC nomenclature of organic compounds, enzyme kinetics and water technology.

COURSE OUTCOMES

On successful completion of the programme, students will able to

CO Number	CO Statement	Knowledge Level
CO1	Know the position of the elements in the periodic table and their properties. Compare and correlate the periodic behaviour of elements and their properties.	K1, K2, K3
CO2	Study the preparation, properties, structures and uses of Biomolecules.	K1,K2
CO3	Study and apply the concepts involved in naming organic compounds. Understand the substitution reactions of aromatic heterocyclic compounds.	K1, K2, K3
CO4	Study the spontaneity of the reaction, the nature of catalyst and reaction pathway.	K1, K2
CO5	Know the techniques involved in the purification of water.	K2, K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	M	S	S	S	S
CO3	S	S	S	S	S
CO4	M	M	S	S	S
CO5	M	M	S	S	S

S-Strong; M-Medium; L-Low

17UCY4AA	ALLIED PAPER – CHEMISTRY II	SEMESTER IV

Total Credits:3

Hours/Week: 3

OBJECTIVES:

On successful completion of this course the students shall gain knowledge in the basics of chemistry which helps bioscience students to understand the periodic table, IUPAC nomenclature of organic compounds, enzyme kinetics and water technology.

CONTENTS

UNIT - I

Periodic Table

1. Long form of periodic table – Classification of elements on the basis of electronic configuration – Periodicity in properties – Causes of periodicity- and factors affecting the magnitude of electron affinity, ionization energy, electro negativity, atomic radii and ionic radii.

UNIT - II

1. Carbohydrates - Classification, preparation, properties and structure of glucose, fructose, inter conversion of glucose to fructose and fructose to glucose, mutarotation.
2. Vitamins - Sources of vitamins, diseases caused by the deficiency of vitamins.

UNIT - III

1. IUPAC Nomenclature of organic compounds – alkanes, alkenes, alcohols, aldehydes, ketones, carboxylic acids (mono and dicarboxylic), benzene and naphthalene derivatives.

2. Heterocyclic Compounds – Preparation and properties (physical, chemical and electrophilic substitution reactions) of furan, pyrrole, pyridine and thiophene.

UNIT – IV

Chemical Kinetics

1. Rate of reaction, rate law, order, molecularity, first order rate law, half life period of first order equation, pseudo first order reaction, zero and second order reactions. Derivation of rate expression for I and II order kinetics.

2. Catalysis – homogenous, heterogeneous and enzyme catalysis (definition only), enzymes used in industry, characteristics of catalytic reactions.

UNIT - V

Water Technology:

1. Introduction- dissolved impurities in water – hard water – disadvantages of hard water, hardness, estimation of hardness by EDTA titration.

2. Softening methods – zeolite ,demineralization process, reverse osmosis – purification of drinking water, biological oxygen demand (BOD) and chemical oxygen demand (COD).

TEXT BOOKS:

1. *R. D. Madan. 2001.* **Modern Inorganic Chemistry**. *S. Chand & Company, New Delhi,.*

2. *Puri , Sharma, Pathania. 2004.***Principles of Physical Chemistry**, *Vishal Publishing Company, Jalandhar.*

3. *M. K. Jain, S. C. Sharma. 2001.* **Organic Chemistry**, *Shoban Lal Nayin Chand, Jalandhar.*

4. *Gopalan R. 1991.***Elements of Analytical Chemistry**, *Sultan Chand & Sons, New Delhi.*

5. *N Krishnamurthy, K Jeyasubramanian, P Vallinayagam.*2000. **Applied chemistry**, *Tata McGraw-Hill Publishing Company limited, New Delhi.*

17UCY4AP	ALLIED PRACTICAL I	SEMESTER IV

Total Credits:2

Hours/Week: 3

CONTENTS

I Volumetric analysis

1. Estimation of Sodium Hydroxide using standard Sodium Carbonate.

2. Estimation of Hydrochloric acid using standard Oxalic acid.

3. Estimation of Oxalic acid using standard Sulphuric acid.

4. Estimation of Ferrous sulphate using standard Mohr salt solution.

5. Estimation of Oxalic acid using standard Ferrous sulphate solution.

6. Estimation of Ferrous ions using Mohr salt solution.

II Organic Analysis

1. To distinguish between aliphatic & aromatic.

2. To distinguish between saturated & unsaturated.

3. Detection of Elements (N, S, Halogens).

4. Functional group tests for phenols, acids (mono & di), aromatic primary amine, monoamide, diamide, carbohydrate.
   Functional group characterized by Confirmatory test.

TEXT BOOK:

1. *V. Venkateswaran, R. Veeraswamy& A. R. Kulandaivelu. 2004*. **Basic Principles of practical chemistry**, *Sultan Chand & Co.*

17UPY4SA	SKILL BASED SUBJECT - II: OBJECT ORIENTED PROGRAMMING WITH C++	SEMESTER-IV

Total credits:3

Hours/Week:3

PREAMBLE

To enable students learn the basic principles and concepts of Object

Oriented Programming with C ++

COURSE OUTCOMES

On successful completion of the course, students will able to

CO Number	CO Statement	Knowledge Level
CO1	Infer OOPS concept in programming	K2
CO2	Understand Basic Data Types	K2
CO3	Apply the constructors and destructors	K3
CO4	Build skill for programming with inheritance	K3
CO5	Expose problems solving with files	K4

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	M	M	M	S
CO3	S	M	M	S	S
CO4	S	M	S	S	S
CO5	M	S	S	S	S

S-Strong; M-Medium; L-Low

17UPY4SA	SKILL BASED SUBJECT - II: OBJECT ORIENTED PROGRAMMING WITH C++	SEMESTER-IV

Total credits:3

Hours/Week:3

OBJECTIVES:

1. To enable students learn the basic principles and concepts of Object Oriented Programming with C ++

CONTENTS

UNIT - I

Software evolution – Procedure Oriented programming object oriented programming (OOP) – Basic concepts benefits of OOP – Object oriented languages – Application of OOP .

A simple C++ program – Structure of C++ program- Applications of C++.

UNIT - II

Tokens – Key words- Identifiers and constants Basic data types – User defined Data Types – Derived data types -Symbolic constants –Operators in C++ - Scope resolution operators-Expressions and their types-Control structures.

UNIT - III

Introduction -The main function – Function prototyping – Call by reference – Return by reference - Inline functions – Default arguments – Constant Arguments - Function overloading .

UNIT - IV

Introduction-Specifying a class - Defining Member Functions –C++ Program with class.

Inheritance: Introduction-Defining derived classes-single inheritance-making a private member inheritance-multilevel inheritance-hierarchical inheritance-hybrid inheritance.

UNIT - V

Introduction-Classes for file stream operations-opening and closing file-detecting end-of-file-more about open(): file modes-Sequential input and output operations- updating a file:random access.

TEXT BOOKS:

1. *Balagurusamy E.* 2013. **Object Oriented Programming with C++** *[6th Edition], Tata McGraw Hill Publishing Company Ltd, New York*
2. *John R. Hubbard.* 2000. **Programming with C++.** *[2nd Edition], Tata McGraw Hill Publishing Company Ltd, New York.*

17UPY53A	CORE - V: MATHEMATICAL PHYSICS and CLASSICAL MECHANICS	SEMESTER-V

Total Credits:4

Hours/Week:4

PREAMBLE

 To enable students learn the basic lagrangian and Hamiltonian formulation

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Solve determinants and matrices	K1,K2, K3
CO2	Apply integral calculus and differential calculus to solve physical problems.	K3
CO3	Evaluate beta and gamma functions and the relationship between them	K3
CO4	Extend lagrangian formulation to oscillator and pendulum	K2
CO5	Apply Hamiltonian Formulation to oscillator and pendulum	K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	S	S	M	S	S
CO3	M	M	M	S	S
CO4	S	S	M	M	S
CO5	S	S	M	M	S

S-Strong; M-Medium; L-Low

17UPY53A	CORE - V: MATHEMATICAL PHYSICS and CLASSICAL MECHANICS	SEMESTER-V

Total Credits:4

Hours/Week:4

OBJECTIVE:

1. To enable students acquire the problem solving ability and to apply the equations for different physical problems.

CONTENTS

UNIT - I

Matrices: Basic ideas of matrices – addition, subtraction, scalar multiplication, Transpose of a matrix, conjugate of a matrix, diagonal matrix - Representation of vectors as column matrix – Determinants – Cramer's rule – Eigen Values and Eigen Vectors – Hermitian Matrix, Unitary Matrix.

Vector Analysis: Vector Operations - Vector Algebra – Component form – How vectors transform, Applications of vectors in Physics.

UNIT – II

Integral Calculus: Line integral, surface integral and volume integral – Fundamental theorem of Gradients – Gauss's Divergence Theorem (Statement only) – The fundamental theorem of curl – Stoke's theorem(Statement only). Divergence less and curl less fields. Curvilinear co-ordinates: – Spherical polar coordinates – cylindrical coordinates (Basic ideas).

Differential Calculus: The operator Δ - Gradient, Divergence, Curl – Physical interpretation - Product rules of Δ - Second derivatives.

UNIT - III

Special Functions

Definitions – The Beta function – Gamma function – Evaluation of Beta function – Other forms of Beta function – Evaluation of Gamma function – Other forms of Gamma function - Relation between Beta and Gamma functions – Problems.

UNIT - IV

Lagrangian Formulation

Constraints and Degrees of Freedom – Generalized coordinates – Generalized displacement – Velocity – Acceleration – Momentum – Force – Potential Energy – D'Alembert's Principle – Lagrangians equation from D'Alembert's principle – Application of Lagrange's equation of motion to Linear Harmonic Oscillator, Simple Pendulum and Compound Pendulum.

UNIT - V

Hamiltonian Formulation

Phase Space – Hamiltonian function – Hamiltonian Principle – Hamilton's canonical equations of motion- Physical significance of H – Applications of Hamiltonian equations of motion to Simple Pendulum, Compound Pendulum and Linear Harmonic Oscillator – Principle of Least Action – Canonical Transformations – Generating Functions – Advantages and Examples of Canonical Transformations.

TEXT BOOKS:

1. *Gupta B.D.* 2004. **Mathematical Physics**. [3rd Edition], Vikas Publishing House, New Delhi

2. *Sathiya Prakash.* 2014. **Mathematical Physics.** *[6th Edition] S Chand and Co, New Delhi*

3. *David J. Griffiths.* **Introduction to Electrodynamics –**, *Prentice Hall India Pvt. Ltd.,*

4. *Gupta, Kumar and Sharma.* 2012. **Classical Mechanics.** *Pragati Prakashan, Meerut*

REFERENCE BOOKS:

1. *Rajput B.S.* 2011. **Mathematical Physics.** *[23rd Edition], Pragati Prakashan.*

2. *Meerut Dass H.K. 2010.* **Mathematical Physics.** *S Chand and Co, New Delhi.*

17UPY53B	CORE- VI:ELECTRICITY AND MAGNETISM	SEMESTER-V

Total credits:4

Hours/Week:4

PREAMBLE

To enable students learn the basic principles, theories and concepts of electricity and magnetism.

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Analyze fundamental properties of the electric charge and simplify technical problems associated with the electrostatic force using calculus.	K1
CO2	Understand the fundamental problem in creating efficient thermoelectric materials.	K2
CO3	Evaluate technical problems associated with LR circuits and coils.	K3
CO4	Solve technical problems associated with the uniform and non-uniform magnetic fields on moving charges.	K2,K3
CO5	Classify magnetic materials, their properties and applications in industry.	K2

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	S	S	M	M	S
CO3	S	S	S	M	S
CO4	S	S	S	M	M
CO5	M	S	M	S	S

S-Strong; M-Medium; L-Low

17UPY53B	CORE- VI: ELECTRICITY AND MAGNETISM	SEMESTER-V

Total credits:4

Hours/Week:4

OBJECTIVE:

1. To enable students learn the basic principles, theories and concepts of electricity and magnetism.

CONTENTS

UNIT - I

Gauss theorem and its applications: Gauss Law – Applications – Field due to a uniformly charged sphere – Field due to an infinite plane sheet of charge - Field due to two parallel sheets of charge - Coulomb's Theorem – Mechanical force experienced by unit area of a charged conductor—Energy stored per unit volume in the medium surrounding the charged conductor – Deduction of Coulomb's inverse square law from Gauss's law.

UNIT - II

Thermo-electricity : Seebeck effect – Laws of thermo e.m.f – Peltier effect; determination of Peltier Coefficient Starling Method – thermo dynamical consideration of Peltier effect – Thomson effect – Thomson co-efficient – Thermodynamics of Thermocouple – Expressions for Peltier and Thomson coefficients –Thermoelectric diagrams and their uses.

UNIT - III

Varying currents: Growth and decay of currents in L-R circuit - charging and discharging of capacitor in C-R circuit - Decay of charge in LCR circuit – Importance in wireless Telegraphy.

Alternating current: Mean and RMS values of current and emf with sinusoidal wave form - LR, CR and series LCR circuits – reactance – impedance - phase-angle - power factor - vector diagram - resonance in a series LCR circuit - Q-factor - Vector diagram - Parallel Resonant Circuit – Comparison between series and parallel resonant circuits.

UNIT - IV

Magnetic Effects of Electric current: Biot-Savart Law - Force on a current carrying conductor – Force between two parallel current carrying conductors – Force experienced by an electron moving in a magnetic field – Torque on a current loop in a uniform magnetic field - Moving Coil Ballistic Galvanometer – Correction for damping – Dead beat – Comparison of two capacitances using BG. Ampere's circuital law (statement only) - Magnetic field due to a straight conductor, circular coil, solenoid, endless solenoid, Magnetic field due to a small current loop .

UNIT - V

Magnetic Properties of materials: Basic definitions – Magnetic field B - Magnetization M -- Magnetic field intensity H -- Magnetic Susceptibility and Magnetic Permeability -- dia, para, ferromagnetism and their

properties – Antiferromagnetism and Antiferromagnetism – The Electron theory of Magnetism. Magnetic hysterisis – area of the hysteresis loop – energy loss -- Determination of susceptibility- Curie Balance method – Magnetic circuits – Circuits comparison of magnetic application with electrical circuits.

TEXT BOOKS:

1. *Murugesan R.* 2011. **Electricity and Magnetism**. *[9th Edition], S Chand and Co, New Delhi.*

2. *Brijlal and Subramaniam.* **Electricity and Magnetism.** *S Chand and Co, New Delhi*

REFERENCE BOOKS:

1. *Vasudeva D.N.* 2011. **Fundamentals of Magnetism and Electricity.** *S Chand and Co, New Delhi*

2. *Duggal B.D. and Chhabra C.L.***Fundamental of Electricity and Magnetism** *Vishal Publishing Co, Jalandhar.*

3. *Robert Resnick, David Halliday and Kenneth S.Krane.* 2001.**Physics.** *[5th Edition] Wiley India, New Delhi*

4. *Griffiths. D.J.* 2006. **Introduction to Electrodynamics**. *Pearson Prentice Hall, New Delhi.*

17UPY53C	CORE- VII: APPLIED ELECTRONICS	SEMESTER-V

Total credits:4

Hours/Week:4

PREAMBLE

To enable students, learn the basic principles and working of oscillators, transistors and amplifiers.

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concept of semiconductors, types of solids, rectifiers and diodes	K1,K2
CO2	Analyze different actions of transistors through experiments in laboratories	K3
CO3	Construct different oscillators and amplifiers through laboratory experiment	K3
CO4	Compare and study modulators, demodulators with different types.	K2,K3
CO5	Differentiate FET,JFET,MOSFET and UJT	K2

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	S	S	S	M	M
CO3	S	S	M	S	S
CO4	M	M	S	S	M
CO5	S	S	M	S	M

S-Strong; M-Medium; L-Low

17UPY53C	CORE- VII: APPLIED ELECTRONICS	SEMESTER-V

Total credits:4

Hours/Week:4

OBJECTIVES:

1. To make students learn fundamentals of electronics and apply in their everyday life

CONTENTS

UNIT - I

Semiconductor Fundamentals and devices:

Energy band in solids – Types of semiconductor P type , N type –Intrinsic and extrinsic semiconductor.

Diodes, Rectifiers and Filters Characteristics of PN Junction—Zener diode – Zener diode as voltage regulator – Half wave and Full wave rectifier – Bridge rectifier and ripple factor -- Filter circuits.

Special purpose diodes: LED, Photodiode and Tunnel diode, SCR.

UNIT - II

Transistor and Transistor biasing: Transistor action – Common Emitter and Common base connections – Relation between α and β – Characteristics of CE connection – Transistor load line analysis – DC load line – Operating point.

Need for transistor biasing – Stabilization – Essentials of transistor biasing circuit – Stability factor – Base resistor method for transistor biasing – Voltage driver biasing

UNIT - III

Amplifiers: Voltage and power amplifiers – Classification of amplifiers – RC coupled Amplifier – Transformer coupled amplifier – Power amplifiers – Class A, Band C amplifiers – Push-Pull amplifiers.

Oscillators: Introduction - Types of oscillators - Fundamental principle of oscillators- Barkhausen criteria -Hartley oscillators - Colpitts oscillators – Phase shift oscillators - Wien bridge oscillators- Crystal oscillators.

UNIT - IV

Power Electronics: JFET – Difference between JFET and BJT – Principle and working of JFET – Characteristics and Parameters of JFET.

MOSFET – Working, characteristics of Depletion and Enhancement MOSFET

Uni junction transistor – Constructions – Operations - equivalent circuit of UJT – Characteristics of UJT - advantages of UJT – UJT relaxation Oscillator.

UNIT - V

Multivibrator – Types of multivibrator – Astable – Monostable – Bistable multivibrators.

Modulation and Demodulation: Modulation -- Types – Amplitude Modulation – Modulation factor – Analysis of AM wave –Side band frequencies in AM wave – Transistor AM modulator – Power – Limitations of AM-- Frequency modulation – Demodulation – AM diode detector – AM radio receivers – super heterodyne receiver – FM detection.

TEXT BOOKS:

1. *Metha V.K. and Mehta R.* 2010, **Principles of Electronics**, *[11th Edition], S Chand and Co, New Delhi*

2. *B L Theraja.* 2006. **Basic Electronics.** *S Chand and Co, New Delhi.*

3. *Millman J. Halkias C. and Chetan Parikh.* 2009, **Integrated Electronics**, *[2nd Edition] Tata McGraw Hill Publishing Company Ltd, New York.*

4. *Sedha R.S.* 2008. **A Text Book of Applied Electronics**. *[3rd Edition], S Chand and Co, New Delhi*

REFERENCE BOOKS:

1. *Chattopadhyaya D. and Rakshit P.C.* 2014. **Foundation of Electronics.** *New Age International, New Delhi*

2. *Murugeshan R and Kiruthiga Sivaprasath Er.* 2008. **Modern Physics**. *S Chand and Co, New Delhi*

3. *Millman and Halkias.* 1967. **Electronics Devices and Circuits.** *Tata McGraw Hill Publishing Company Ltd, New York*

17UPY53P	**CORE PRACTICAL –IV: GENERAL EXPERIMENTS**	**SEMESTER –V**

Total credits:2

Hours/Week:4

LIST OF EXPERIMENTS :

Any 8 Experiments

1. Young's Modulus – Non uniform bending -Koenig's method.
2. Spectrometer –grating---Minimum deviation-Mercury vapor lamp
3. Resistivity of Semiconductors – Four Probe method
4. M and H Determination-Deflection Magnetometer
5. Ballistic Galvanometer – Comparison of Mutual Inductance
6. Characteristics of UJT
7. IC regulated power supply
8. Hartley Oscillator
9. Polarimeter- Optical activity of liquid
10. Spectrometer-Biprism

17UPY53Q	CORE PRACTICAL - V: DIGITAL ELECTRONICS	SEMESTER –V

Total credits:2

Hours/Week:4

LIST OF EXPERIMENTS :

Any 8 Experiments

1. Sine wave generator using 741 IC
2. Square wave generator using 555 IC
3. Verification of Truth tables of IC gates: OR, AND, NOT, XOR, NOR and NAND.
4. NAND as universal building block- AND, OR, NOT,NOR
5. NOR as universal building block- AND, OR, NOT,NAND
6. De Morgan's theorems verification.
7. Study of RS Flip-Flop.
8. Study of Shift –Registers –Serial in Parallel out.
9. Half Adder and Full Adder
10. Half Subtractor and Full Subtractor

17UPY5SA	SKILL BASED SUBJECT-III : DIGITAL ELECTRONICS AND OPERATIONAL AMPLIFIERS	SEMESTER-V

Total credits:3

Hours/Week:3

PREAMBLE

To enable the students for learning and applying basic principles, theory
and concepts of digital electronics.

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand problems related to number systems and Boolean algebra.	K2
CO2	Apply logic gates and Demorgan's law through experiments in laboratories.	K1
CO3	Demonstrate flip flops using logic gates and Synchronous counters. Identify Shift Registers using JK / D Flip Flop	K3
CO4	Understand and demonstrate memories, its types and their applications.	K3
CO5	Make Use of OP-AMP through experiments in laboratories and for various applications.	K2

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	S	S	M	S	M
CO3	S	S	S	M	M
CO4	S	M	S	M	S
CO5	S	S	M	S	M

S-Strong; M-Medium; L-Low

17UPY5SA	SKILL BASED SUBJECT-III : DIGITAL ELECTRONICS AND OPERATIONAL AMPLIFIERS	SEMESTER-V

Total credits:3

Hours/Week:3

OBJECTIVES:

1. To enable students learn the basic concepts Number System, Boolean Algebra and its applications.

CONTENTS

UNIT - I

Number System, Binary Arithmetic and Codes

Binary Numbers- Octal numbers- Hexadecimal numbers (Conversion of one number system into other). Arithmetic operation – Binary Addition – Binary subtraction – 1's complement subtraction - 2's complement subtraction.

Codes – Binary coded decimal – BCD addition and subtraction – Weighted binary codes – Non- weighted codes- Excess 3 codes – Grey code – Error detection and correction codes – ASCII & EBCDIC codes

UNIT - II

Boolean algebra

Basic laws of Boolean algebra – Boolean addition and multiplication – Properties of Boolean algebra – De Morgan's theorems .

Logic gates and Arithmetic Circuits

OR, AND, NOT, NAND, NOR Ex-OR, Ex-NOR gates – Universal building blocks –– Half adder – Full adder – Half Subtractor – Full Subtractor – Parallel binary adder – Parallel binary Subtractor – Binary to Grey code converter – Grey to Binary converter

UNIT- III

Flip-flops and their applications

SR flip-flop – Clocked SR flip flop – D flip-flop JK flip-flop – T flip-flop – Triggering of flip-flops – Level triggering – Edge triggering – Master-Slave JK flip-flop.

Applications: Shift Registers – 3 and 4-bit shift registers – Counters – 4 bit Ripple binary counter – MOD 3 counters – MOD 6 counters and Decade counter (all MOD counters using JK flip-flop only).

UNIT – IV

A/D and D/A Converters and Memory Devices

A/D Converters – Simultaneous type and counter type – D/A Converters – Weighted resistors type – R-2R ladder type.

Memory Devices: Classification of memories – ROM – Architecture of ROM – 32 x 4 ROM using OR gates – Diode matrix ROM – PROM, EPROM, EEPROM, RAM (Basic ideas only)

UNIT – V

OP-Amplifier

Introduction- operational overview- IC identification- OP-AMP packages -characteristics of OP-AMP-Common mode rejection ratio(CMRR)- slew rate-inverting amplifier- Non inverting amplifier-adder or summing amplifier-OP-AMP as integrator, differentiator, difference amplifier, logarithmic amplifier-comparator.

TEXT BOOK:

1. *Salivahanan S. and Arivazhagan S.* 2009. **Digital Circuits and Design.** *Vikas Publishing House, New Delhi*

2. *Malvino and Leach.* 2010. **Digital Principles and Applications**, *Tata McGraw Hill Publishing Company Ltd, New York*

3. *Donald D Leach, Albert paul Malvino, GoutamSaha.* **Digital Principles and Applications.** *Special Indian edition, McGraw Hill Education, New Delhi.*

4. *Murugasen .R and Kiruthiga Sivaprakash .Er, 2014.* ***Modern Physics**, S.Chand &Company, Pvt.LtD, New Delhi.*

5. Shedha .R.S, 1999. **A Text Book of Applied Electronics**, *S.Chand &Company, Pvt.LtD, New Delhi.*

REFERENCE BOOKS:

1. *Moris Mano.* 2004. **Digital Logic and Computer Design.** *Pearson India, New Delhi*

2. *Gothmann W.H.* 2009. **Digital Electronics.** *Phi Learning, New Delhi.*

17UPY5SB	SKILL BASED SUBJECT–IV: MICROPROCESSORS	SEMESTER-V

Total credits:3

Hours/Week:3

PREAMBLE

To enable students, learn basic programming in microprocessor

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the microprocessor architecture	K1
CO2	Explain memory and I/O devices	K2
CO3	Develop assemble language programming	K2
CO4	Learn about the additional instructions in programming techniques	K3
CO5	Recall on code conversions and stack instructions	K1

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	S	S	M	M	M
CO3	S	S	M	S	M
CO4	M	M	S	M	M
CO5	S	S	M	M	S

S-Strong; M-Medium; L-Low

17UPY5SB	SKILL BASED SUBJECT–IV: MICROPROCESSORS	SEMESTER-V

Total credits:3

Hours/Week:3

OBJECTIVES:

1. To foster students learn the basic concepts of Microprocessors, semiconductor memories and its programming.

CONTENTS

UNIT – I

Micro Computers, Micro Processor And Assembly Language: Digital computers – computer languages – from large computers to single – chip microcomputers**.**

Micro Processor Architecture And Microcomputer Systems: Microprocessor Architecture and its operations – Memory – input and output (I/O) Devices – Examples of a microcomputer system – Review: Logic Devices for interfacing.

UNIT – II

8085 Micro Processor Architecture And Memory Interfacing: The 8085 MPU – Example of a Microcomputer – Memory – input and output displays – How does an 8085 – Based Single Board Micro computer work.

Interfacing I/O Devices: Basic interfacing concepts – interfacing output displays – interfacing input devices – memory – mapped I/O and I/O mapped I/O schemes.

UNIT – III

Introduction I/O 8085 Assembly Language Programming: The 8085 programming model – instruction classification – instruction format – How to write, Assemble and Execute a simple program – Overview of the 8085 instruction set.

INTRODUCTION TO 8085 INSTRUCTION: Data Transfer (copy) operations – Arithmetic operations – Logic operations – Branch operations – Writing assembly language programs – Debugging a program.

UNIT – IV

Programming Techniques With Additional Instructions: Programming techniques; Looping, counting and indexing – Additional Data transfer and 16-bit Arithmetic instructions – Arithmetic operations Related to Memory.

UNIT – V

Stack And Subroutines: Stack, Stack Pointer, Stack related instructions: PUSH, POP, XTHL, XCHG, SPHL, etc.; Subroutines, Unconditional/Conditional Call and Return instructions

Code Conversion, Bcd, Arithmetic And 16-Bits Data Operators: BCD-to-Binary conversion – BCD-to-Seven segment LED code conversion – Multiplication – subtraction with carry.

TEXT BOOKS:

1. Ramesh. S.Gaonkar **– Microprocessor Architecture Programming and Application with the 8085**. *Prentice Hall, New Delhi*

2. *Aditya P Mathur.* 1990. **Introduction to Microprocessors.** *[3rd Edition] Tata McGraw Hill Publishing Company Ltd, New York*

3. *NagoorKani A.* 2012**. Microprocessors And Microcontrollers.** *[2nd Edition], Tata McGraw Hill Publishing Company Ltd, New York*

REFERENCE BOOKS:

1. *Ramachandran K.* 2009. **Mechatronics and Microprocessors.** *Wiley India Pvt. Ltd, New Delhi.*

2. Leventhal**: Introduction to Microprocessor Hardware, Software, programming**.

17UPY63A	CORE- VIII: NUCLEAR PHYSICS	SEMESTER-VI

Total credits:4

Hours/Week:4

PREAMBLE

To enable students, acquire knowledge about concepts of Nuclear Physics and elementary particles

COURSE OUTCOMES

On successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Outline properties of nucleus and the various nuclear models	K1
CO2	Learn about the particle accelerators and detectors	K1
CO3	Determine alpha, beta , gamma rays and their properties	K2
CO4	Differentiate nuclear fission and nuclear fusion	K2
CO5	Explain cosmic rays and elementary particles.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	M
CO2	S	S	M	S	M
CO3	S	S	M	S	M
CO4	S	S	M	M	S
CO5	S	S	M	M	S

S-Strong; M-Medium; L-Low

17UPY63A	CORE- VIII: NUCLEAR PHYSICS	SEMESTER-VI

Total credits:4

Hours/Week:4

OBJECTIVES:

1. To make students acquire fundamental knowledge about the theoretical concepts of Nuclear Physics and elementary particles

CONTENTS

UNIT - I

Introduction to the Nucleus: General properties of Nucleus (Size, Mass, Density, Charge, Spin, Angular momentum, Magnetic dipole moment) – Binding energy – Packing fraction – Nuclear stability – Nuclear forces – Definition – Properties – Meson theory – Model of Nuclear Structure – The Liquid Drop model – Semi-Empirical mass formula – The Shell model – Evidence for Shell model –The collective model.

UNIT - II

Particle Accelerators and Detectors: Interaction between the energetic particles and matter – Heavy charged particles - Ionization chamber – Solid State detector – GM counter – Wilson Cloud chamber – Diffusion cloud chamber - Nuclear emission – Linear accelerators – Cyclotron – Betatron – Synchrotron.

UNIT - III

Radioactivity: Natural Radioactivity – Alpha, Beta and Gamma rays – Properties – Determination of e/m of Alpha particle – Determination of Charge of Alpha particle – Determination of e/m of Beta particle – determination of Wavelength of Gamma rays (Du Mond Spectrometer) – Origin of Gamma rays – Laws of Radioactivity – Soddy-Fajan's displacement law – Law of Radioactive disintegration – Half life period – Mean life period (Definitions, Expression) – Artificial Radioactivity – Preparation of radio elements – Application of radio isotopes.

UNIT - IV

Nuclear Fission: Nuclear fission – Energy released in Fission – Bohr and Wheelers theory of Nuclear fission – Chain reaction – Multiplication factor – Critical size – Natural Uranium and chain reactions – Atom Bomb – Nuclear reactor.

Nuclear Fusion: Nuclear fusion – Source of Stellar energy – Carbon Nitrogen cycle – Proton-Proton cycle – Hydrogen bomb – Controlled thermo nuclear reactions.

UNIT - V

Cosmic rays: Cosmic rays – Origin of cosmic rays – Latitude effect – Azimuth effect – Attitude effect – Seasonal, Diagonal changes – Primary and Secondary Cosmic rays cascade theory of shower – Pair production and Annihilation – Van Allen Belts.

Elementary particles: Introduction – particles and antiparticles – Antimatter – The fundamental interactions – Classification of elementary Particles - The Quark model.

TEXT BOOKS:

1. *Murugeshan R. and Kiruthiga Sivaprasath Er.* 2008. **Modern Physics.** S Chand and Co, New Delhi

2. *Tayal D.C.* 2011. **Nuclear Physics**. Himalaya Publishing House, Mumbai

3. Satyaprakash .***Nuclear Physics and particle Physics***. Sultan Chand& sons educational publishers-New Delhi

REFERENCE BOOKS:

1. *Arthur Beiser*. 2008. **Concepts of Modern Physics.** [6th Edition], Tata McGraw Hill Publishing Company Ltd, New York

2. *Richtmyer F.K.* 1956. **Introduction to Modern Physics**. Tata McGraw Hill Publishing Company Ltd, New York.

17UPY63B	CORE- IX: QUANTUM MECHANICS AND RELATIVITY	SEMESTER-VI

Total credits:5

Hours/Week:5

PREAMBLE

To enable students, learn the basic principles of wave mechanics,

Schrodinger wave equations and its applications

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concept of properties of waves, de Broglie wavelength and photoelectric effect.	K1
CO2	Explain uncertainty principle, its physical significance and applications	K2
CO3	Apply the concepts of Schrodinger equation to one dimensional problem	K3
CO4	Apply the concepts to three dimensional problem	K1
CO5	Understand theory of relativity and Lorentz transformation	K2

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	S	M	M
CO3	M	M	M	S	M
CO4	S	S	M	S	M
CO5	S	S	M	M	M

S-Strong; M-Medium; L-Low

17UPY63B	CORE- IX: QUANTUM MECHANICS AND RELATIVITY	SEMESTER-VI

Total credits:5

Hours/Week:5

OBJECTIVES:

1. To enable students learn fundamentals of wave mechanics, Schrodinger wave equations and its applications along with fundamental concepts in Relativity.

CONTENTS

UNIT - I

BASIC CONCEPTS: Conclusion from the electromagnetic theory-properties of photons-photons and gravity-The effect of(Gravitational Red Shift) gravity on Astronomical radiations-Einstein's photoelectric equation-Role of constants c and h physics-The Electron volt-de Broglie's matter waves-Absence of matter waves in macroscopic world-Davisson and Germer's experiment on diffraction of electrons-Matter waves(due to electrons) in atoms-wave-particle duality in nature-Quantum properties of micro particles.

UNIT - II

DEVELOPMENT OF QUANTUM MECHANICS: Probabilistic description of photons(double slit experiment) –Particle/Waves in classical physics and its physical significance-The form of wave function and its physical significance-The form of wave function for matter wave (wave packet, group velocity and phase velocity)-Heisenberg's uncertainty principle:(Δx, ΔP_X, ΔE, Δt),Experiment, Applications-

Operators and Observations-Angular momentum operators and its representation in spherical polar coordinates-Expectation value.

UNIT - III

ONE DIMENSIONAL PROBLEM: Schrödinger equation(time dependent form)-commutation relations - Steady state form of Schrödinger equation – Equation of continuity and probability current density - particle in a rectangular potential well - particle in one dimensional box - Orthogonality of Eigen functions-The harmonic oscillator-the potential step – rectangular potential barrier.

UNIT - IV

THREE DIMENSIONAL PROBLEMS: Schrödinger equation for the hydrogen atom – solution – quantum numbers – Eigen functions – Angular, Radial wave functions – shells and sub shells in atom – Aufbau principle – Hund's rule – Penetrating and non penetrating orbits.

UNIT - V

SPECIAL THEORY OF RELATIVITY : Frame of references – Galilean transformation – Newtonian relativity – The velocity of light – Failure of Newtonian mechanics – Newtonian relativity and electromagnetism – the concept of Ether – Michelson – Morley experiment – Einstein's postulates – Lorentz transformations – Inverse transformations – Velocity transformation – length contraction – Time dilation – variation of mass – Energy equation in relativity – Equivalence of energy and mass – World regions and the light cone.

TEXT BOOKS:

1. *Gupta, Kumar and Sharma*. 2012. **Quantum Mechanics.** *[31st Edition], Jai Prakash Nath Publications, Meerut*

2. *Aruldas*. 2008. **Quantum Mechanics.** *[2nd Edition], PHI Learning, New Delhi*

3. H.S. Mani and G.K. Metha, **Introduction to Modern Physics**, *EWP, New Delhi, LCSE, 1988.*

4. S.P. Puri, **Special theory of relativity**, *Pearson, 2013.*

5. SwatiSaluja, Sathya Prakash, 2005.**Quantum mechanics**, *Publication: kedar Nath , Ram Nath and Co.*

6. P. M. Mathews, T. K. Venkatesan, **A Text Book for Quantum Mechanics** : *McGraw – Hill Publishers.*

REFERENCE BOOKS:

1. *Schiff L.I.* 1968. **Quantum Mechanics.** *[3rd Edition], Mcgraw-Hill College, Blacklick*

2. *Richtmyer and Et Al F.K.* 1956. **Introduction to Modern Physics.** *Tata McGraw Hill Publishing Company Ltd, New York*

3. *Agarwal B.K. and Prakash Hari.* 2007. **Quantum Mechanics.** *[1st Edition], PHI Learning, New Delhi*

17UPY63C	CORE- X: SOLID STATE PHYSICS	SEMESTER-VI

Total credits:5

Hours/Week:5

PREAMBLE

To enable students, learn bond theory, superconductivity and the concepts of Hall effect

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn about different features of crystals	K3
CO2	Classify solids based on band theory	K1
CO3	Explain free electron theory and determine Hall effect through experiments in laboratory	K3
CO4	Understand dielectric and know about the concepts of superconductivity	K2
CO5	Classify magnetic materials based on domain theory	K2

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	M	M
CO2	S	S	M	M	S
CO3	S	S	M	M	M
CO4	S	M	M	S	M
CO5	S	S	M	M	S

S-Strong; M-Medium; L-Low

| 17UPY63C | CORE- X:
SOLID STATE PHYSICS | SEMESTER-VI |

Total credits:5

Hours/Week:5

OBJECTIVES:

1. To enable students to acquire the fundamental knowledge of bond theory and formation of different materials.

CONTENTS

UNIT - I

Crystal Structures: Crystallography: Distinction between crystalline and amorphous solids – Different features of the crystal – Crystal lattice – Basis – Crystal structure – Unit cell – Number of lattice points per unit cell- Bravais lattices – Miller indices – Elements of Symmetry – Structure of diamond and NaCl crystal – Atomic Packing – Atomic radius –-Lattice constant and density- Crystal structures (SC, HCP, FCC, BCC) – Interplanar distance.

UNIT - II

Bond theory of solids: Classification of solids – Basics of Bond theory in crystals – Ionic, Covalent, Metallic, Molecular and Hydrogen bonding .

Thermal properties of solids: Specific heat capacity of solids – Einstein's theory of specific heat of solids –Debye's theory of specific heat capacity of a solid .

UNIT - III

Free electron theory: Drude Lorentz theory – Explanation of Ohm's law – Electrical conductivity – Thermal conductivity – Widemann and Franz law – Summerfield model

Hall Effect: Hall voltage and Hall coefficient – Mobility and Hall angle – Importance of Hall effect – Experimental determination of Hall coefficient.

UNIT - IV

Dielectrics: Dielectric constant and displacement vector- Dielectric loss – Clausius Mossotti relation- Atomic and molecular polarizability – Types of polarizability.

Super conductivity: Phenomena – Magnetic properties – Meissner effect – Experimental facts – Isotopes effect – Thermodynamic effect – Types of Superconductors – Applications -- BCS Theory.

UNIT - V

Magnetic Materials : Introduction – Dia, Para and Ferromagnetic materials -- Langevin's theory of diamagnetism – Langevin's theory of paramagnetism – Ferromagnetism – Domain theory of Ferromagnetism Hysteresis based on domains – Antiferromagnetism – Ferrimagnetism – Ferrites – Ferro electricity – Ferroelectric crystals -- Nuclear magnetic resonance.

TEXT BOOKS:

1. *Gupta and Kumar.*2012. **Solid State Physics**. *K.Nath & Co, Meerut*
2. *Murugeshan R. and Kiruthiga Sivaprasath Er.* 2008. **Modern Physics.** *S Chand and Co, New Delhi*
3. *Pillai S.O.* 2010**. Solid State Physics.** *[6th Edition], New Age Publisher, New Delhi*

REFERENCE BOOKS:

1. *Charles Kittel.* 2004. **Introduction to Solid State Physics.** *[8th Edition], John Wiley & Sons, New York*
2. *Dekker A.J.* 1969. **Solid State Physics**, *Macmillan India. New Delhi.*

17UPY63P	CORE PRACTICAL –VI: GENERAL EXPERIMENTS	SEMESTER –VI

Total credits:2

Hours/Week:4

LIST OF EXPERIMENTS :

Any 8 Experiments

1. Young's Modulus – Uniform bending-Koenig's method.
2. Spectrometer – Cauchy's constants
3. Spectrometer -Dispersive Power of the Prism
4. Band gap energy of a semiconductor –Thermal Method
5. Hall Effect-Determination of charge carrier
6. Ballistic Galvanometer – Calibration of low range Voltmeter
7. Colpitt's Oscillator
8. Field along the axis of a coil – Determination of B_H
9. RC Coupled Amplifier – Single Stage.
10. Spectrometer-Small angle prism
11. IC regulated Dual power supply

17UPY63Q	**CORE PRACTICAL - VII: SPECIAL ELECTRONICS AND MICROPROCESSOR**	**SEMESTER –VI**

Total credits:2

Hours/Week:4

LIST OF EXPERIMENTS :

Any 8 Experiments

1. 8085 ALP for 8 bit Addition and Subtraction

2. 8085 ALP for 8 Bit Multiplication and Division

3. 8085 ALP for finding the Biggest number element in the array and
    Sum of the elements in the Array

4. 8085 LED Interface

5. 8085 traffic Light Controller

6.OP-AMP –Adder, Subtractor

7. OP-AMP-Inverting-non-inverting

8. OP-AMP-Integrator, differentiator

9. Zero crossing detector

10.Astable multivibrator

11.4-bit adder and Subtractor-IC 7483

17UPY5EA	ELECTIVE- I: MATERIALS SCIENCE	SEMESTER-V

Total credits:4

Hours/Week:4

PREAMBLE

To enable students learn the properties of magnetic materials and new engineering materials

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand engineering materials with their bonding nature.	K2
CO2	Recall mechanical behaviours of engineering materials	K1
CO3	Explain properties of magnetic materials and dielectric materials with their domain structure	K2
CO4	Understand smart materials and their applications in modern trend.	K2
CO5	Apply the concepts of different testing methods such as NDT,SEM for various properties.	K2,K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	M	M	M	S
CO3	S	S	M	S	M
CO4	S	S	S	M	S
CO5	S	S	M	M	M

S-Strong; M-Medium; L-Low

17UPY5EA	ELECTIVE- I: MATERIALS SCIENCE	SEMESTER-V

Total credits:4

Hours/Week:4

OBJECTIVES:

1. To enable students to acquire the fundamental knowledge in Mechanical behaviour of materials and dielectrics.

CONTENTS

UNIT - I

Chemical bonding and Engineering materials

Bond energy – bond type and bond length – ionic and covalent bonding – Stability and metastability- variation in bonding character and properties–-Classification of engineering materials – levels of structure – structure-property relationship in materials.

UNIT - II

Mechanical behaviour of materials

Elastic behaviour – atomic model of elastic behaviour – Young's modulus – Poisson's ratio – shear modulus – bulk modulus – the modulus as a parameter of design – rubber like elasticity – plastic deformation – tensile stress - strain curve.

UNIT - III

Magnetic materials and dielectric materials

Terminology and classification – magnetic moment due to electron spin – ferromagnetism and the domain structure – soft and hard magnetic materials. Polarization – electronic, ionic, orientation and space charge polarization – temperature and frequency effects – electric breakdown – ferroelectric materials.

UNIT - IV

Smart Materials

Definition of smart materials - Types- Piezoelectric materials-Materials for MEMS and NEMS- Ferrofluid- Magnetic shape-memory alloys (MSMAs)- Shape memory alloy (SMA)- One way and Two way memory effect- Dielectric elastomers (DEs)- Light sensitive materials- Smart catalysts

UNIT - V

Non-destructive testing

Radiographic methods – photo-elastic methods – magnetic methods – electrical method – ultrasonic method. Equipments used for NDT – metallurgical microscope - electron microscope – scanning electron microscope (SEM).

TEXT BOOKS:

1. *Raghavan, V.* 1990. **Materials Science and Engineering – A first course.** *[3rd Edition] Prentice Hall, New Delhi*

2. *Arumugam.* 1990. **Materials Science.** *Anuradha agencies & publishers.*

3. *Gandhi, M.V. and Thompson,* B.S. 1992. **Smart Materials and Structures.** *Chapman & Hall.*

REFERENCE BOOKS:

1. *Kittel C.* 2012. **Introduction to Solid State Physics.** *[8th Edition], Wiley India, New Delhi*

2. *Manchandra V.K.* 1992. **A Text Book of Materials Science.** *New India Publishing House.*

3. *Myer Kutz,* 2006. **Mechanical Engineers' Handbook**: **Materials and Mechanical Design**. *[3rd Edition], John Wiley & Sons, Inc.*

4. *Culshaw B Smart,* 1996. **Structures & Materials.** *Artech House.*

17UPY5EB	ELECTIVE- I: ENERGY PHYSICS	SEMESTER-V

Total credits:4

Hours/WeeK:4

PREAMBLE

To enable students, learn the basic principles and fundamentals of energy sources and its applications.

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Make use of electrical energy in home appliances	K1
CO2	Discuss non- conventional energy sources	K1
CO3	Explain bio gas and the generation of bio gas.	K2
CO4	Understand thermal energy their laws and types of pyroheliometers	K2
CO5	Outline on solar energy and their applications.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	M	M
CO4	S	S	M	S	M
CO5	S	M	S	S	M

S-Strong; M-Medium; L-Low

17UPY5EB	ELECTIVE- I: ENERGY PHYSICS	SEMESTER-V

Total credits:4

Hours/WeeK:4

OBJECTIVES:

1. To enable students learn fundamentals of energy sources and its applications.

CONTENTS

UNIT - I

ELECTRICAL ENERGY

Heat developed in current carrying conductor – Application of heating effect – Electric heater or stove – Electric radiation and Electric Iron – Electric welding and electric furnace – Carbon arc – Electric Lamp – Efficiency of a Lamp – Measurement of Electric Power.

UNIT – II

WIND ENERGY: Power in the wind – Types of wind energy systems – Horizontal axis wind Turbine – Vertical axis wind Turbine- Merits and Demerits.

OCEAN ENERGY: Tidal Energy – Ocean Thermal Energy Conversion (OTEC) – Closed Cycle OTEC system – Open Cycle OTEC System.

UNIT – III

BIOMASS AND BIOGAS

Energy from biomass, biomass conversion technologies-wet and dry process-photosynthesis biogas generation: introduction –basic processes and energetic-advantages of anaerobic digestion-factors affecting bio-digestion and generation of gas.

UNIT – IV

THERMAL ENERGY

Definition of Total thermal Energy density - Spectral Energy density – Spectral Emissive power – Emissivity – Emissive power – Absorptive power – Reflective power – Kirchoff's Law of radiation and its proof – verification of Kirchoff's Results: Ritche's Experiment. Distribution of Energy in the thermal spectrum – Lummer and Pringsheim Experiment and its Results – Wien's Displacement Law and Radiation Law – Rayleigh Jean's Law Planck's Radiation Law – Deduction of Wien's Law and Rayleigh – Jean's Law from Planck's law.

UNIT – V

SOLAR ENERGY: Solar radiation – Solar radiation outside the earth's atmosphere Solar radiation at the earth's surface – Solar Thermal Energy – Solar Thermal devices and systems: Solar water heater – Sub components of solar water heater – Solar Cooker and its merits and demerits. Solar constant – Temperature of sun – Disappearing filament optical Pyrometer - Pyroheliometers: Angstrom Pyroheliometer – Water flow Pyroheliometer.

TEXT BOOKS:

1. *Rai G.D.* 2004. **Solar Energy Utilization.** *Khanna Publishers, New Delhi.*

2. *Brij Lal and Subrahmanyam N.* 2010. **Heat and Thermodynamics**. *S Chand and Co, New Delhi*

3. *MaheshwarDayal*. 1991. **Renewable Energy Environment and Development.** *Konark Publication, New Delhi*

4. *Suhatme S.P. and Nayak J. K.* 2009. **Solar Energy.** *[3rd Edition], Tata McGraw Hill Publishing Company Ltd, New York*

REFERENCE BOOKS:

1. *Brijlal and SubramanyamN.* 2001. **Electricity and Magnetism.** *S Chand and Co, New Delhi*

2. *Senthil Kumar I.G.* 2013. **Engineering Physics.** *VRB Publications, Chennai*

3. *Singhal, Agarwal and Prakash*. 2009. **Thermodynamics and Statistical Physics.** *Pragati Prakashan, Meerut*

4. *Mathur D.S.* 2002. **Heat and Thermodynamics.** *S Chand and Co, New Delhi*

5. *Rajam J.B. and Arora C.L.* 1981. **A Text Book of Heat and Thermodynamics.** *S Chand and Co, New Delhi*.

17UPY5EC	ELECTIVE- I: AGRICULTURAL PHYSICS	SEMESTER-V

Total credits:4

Hours/Week:4

PREAMBLE

To enable students learn the different concepts of Physics in Agriculture and its applications.

COURSE OUTCOMES

On successful completion of the programme, students will able to

CO Number	CO Statement	Knowledge Level
CO1	Classify and explain significance of soil	K2
CO2	Explain importance of ground water	K2
CO3	Learn basic principle of alternating current	K1
CO4	Analyze hygrometry and water pumps	K2
CO5	Make use of solar energy in everyday life	K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	S	M	S	S
CO3	S	S	S	M	M
CO4	S	S	M	M	S
CO5	S	S	S	S	S

S-Strong; M-Medium; L-Low

17UPY5EC	ELECTIVE- I: AGRICULTURAL PHYSICS	SEMESTER-V

Total credits:4

Hours/Week:4

OBJECTIVES:

1. To make students aware of the different concepts of Physics in Agriculture and its varied applications.

CONTENTS

UNIT – I

SOIL PHYSICS

Mechanical composition of soil – physical properties of soil, pore space, bulk density, particle density – classification – significance of clays – plasticity, shrinkage, flocculation and deflocculation – Soil structure – soil colour – Thermal properties of soil and soil temperatures types of soil water – its retention, movement – viscosity, swelling – soil moisture losses – Elementary ideas of soil water conservation.

UNIT – II

WATER PHYSICS

Water qualities – Rain fall – Ground water – Find Ground water – surface water pollution – instrumentation and sampling – water quality monitoring

UNIT – III
AC POWER SYSTEM

Principle of production of A.C. – Average value of A.C. voltage or current – R.M.S. value of alternating voltage or current – power consumed in A.C. Circuits – kilo watt hour – A.C. generator – Three phase A.C. – Distribution of three phase A.C. Three phase four system – The choke- The transformer – Transmission of electric power over long distances.

UNIT – IV
HYGROMETRY

Absolute Humidity – Relative Humidity – Dew point, Daniell's Hygrometer, Regnault's hygrometer. Advantages of Regnault's hygrometer – wet and Dry and Bulb hygrometer

PUMPS

Water pumps – common pump –Submersible Pump–Solar powered pump– Head discharge

UNIT – V
SOLAR COLLECTOR AND APPLICATIONS

Solar Air heaters- Application of solar air heaters. Solar Drying with various driers – Heating and Drying of Agricultural products – Theory of solar drying – moisture content and its measurement – solar ponds – Application of solar ponds – Solar pumping – Solar pump system components – Turbine driven pump – Application of solar energy to agricultural crops.

TEXT BOOKS:

1. *Brij Lal and SubrahmanyamN.* 2010. **Heat and Thermodynamics.** *S. Chand and Co, New Delhi*

2. *Mathur D.S.* 2006. **Mechanics**. *S Chand and Co, New Delhi*

3. *Rai G.D.* 2004. **Solar Energy Utilization.** *Khanna Publishers, New Delhi*

REFERENCE BOOKS:

1. *Buckman H.O. and Brady*. 1990. **Nature and properties of Soil.** *[10th Edition], Maxwell Macmillan International, London*

2. *William A. Jury, Wilford R. Gardner and Hale Gardner W.* 1972. **Soil physics.** *Wiley, New York*

3. *KohnKe H.* 1988. **Soil physics.** *Tata McGraw Hill Publishing Company Ltd, New York*

4. *John C. Rodda, Richard A. Downing, Frank M. Law*, 1976, **Systematic Hydrology**, *Newnes Butterworths.*

17UPY6EA	ELECTIVE- II: FUNDAMENTALS OF NANOSCIENCE	SEMESTER- VI

Total credits:4

Hours/Week:4

PREAMBLE

To enable students , learn basics of nanotechnology and their applications

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Outline the basics of Nanotechnology	K2
CO2	Learn about synthesis of nanomaterials	K1
CO3	Classify types of nanostructures	K2
CO4	Summarize on functional nanomaterials	K2
CO5	Apply nanomaterials in various fields	K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	S	S	S	M	M
CO3	S	M	M	M	S
CO4	S	S	M	M	S
CO5	S	S	M	M	S

S-Strong; M-Medium; L-Low

17UPY6EA	ELECTIVE- II: FUNDAMENTALS OF NANOSCIENCE	SEMESTER-VI

Total Credits:4

Hours/WeeK:4

OBJECTIVES:

1. To enable students learn fundamentals of Nanoscience, nanomaterials synthesis mechanisms and applications.

CONTENTS

UNIT - I

Introduction to Nanotechnology

Scientific revolution, Historical milestones, Emergence of Nanotechnology, Definition of nanotechnology, Bohr radius, Quantum confinement, Nanosized effects, Challenges in Nanotechnology

UNIT - II

Synthesis of Nanomaterials

Physical method: Ball Milling, Sputter deposition, electric arc deposition, Ion beam technique. Chemical method: Wet chemical synthesis – sol-gel processing, co-precipitation, hydrothermal, chemical vapor condensation, chemical bath deposition

UNIT - III

Types of Nanostructures

Definition of a Nano system - Types of Nanocrystals-One Dimensional (1D)-Two Dimensional (2D) –Three Dimensional (3D) nanostructure materials - Quantum dots - Quantum wire

UNIT - IV

Functional Nanomaterials

Carbon (CNT, graphene), Noble Metals (Au, Ag), Metal oxides (TiO2, SnO2, ZnO), Semiconductors (CdS, CdSe, CdTe), Magnetic nanoparticles, Semiconductor Nanocomposites

UNIT - V

Applications of Nanomaterials

Applications in Physics: Nanoelectronics, Quantum dot and Dye sensitized solar cells, Photovoltaics, Hydrogen Production, Quantum electronic devices, CNT based transistor and Field Emission Display, Other applications: Nanosensors, Nanomedicine, Nanorobotics.

TEXT BOOKS:

1. *Viswanathan B.* 2006. **Structure and Properties of Solid State Materials** *[2nd Edition], Oxford: Alpha Science International*

2. *Pradeep T.* 2007. **Nano-The Essentials.** *Tata McGraw-Hill publishing company limited, New Delhi*

3. *Ramachandra Rao, M.S, Shubra Singh,* **Nanoscience And Nanotechnology: Fundamentals to Frontiers** *, Wiley India.*

4. *Puri* V.K , 2004, **Digital Electronics: Circuits and Systems**, *McGraw-Hill Education, Publication .*

REFERENCE BOOKS:

1. *Wilson. M, Kannangara. K, Smith. G, Simmons. M and Raguse B.* 2005. **Nanotechnology: Basic Science and Emerging technologies**, *[1st Edition], Overseas Press India Pvt Ltd, New Delhi.*

2. *Hari Singh Nalwa.* 2002. **Nano Structured Materials and nanotechnology.** *(Concise Edition) Academic Press.*

17UPY6EB	ELECTIVE- II: OPTICAL FIBRES AND FIBRE OPTIC COMMUNICATION SYSTEMS	SEMESTER-VI

Total credits:4

Hours/Week:4

PREAMBLE

To enable students, learn the principle behind fiber optics and its communications

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Classify fibres based on mode of propagation	K1
CO2	Summarize various techniques for fibre fabrication	K2
CO3	Explain fibre optic losses and dispersion	K2
CO4	Select light sources for fibre communication	K3
CO5	Apply optical fibres in various fields	K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	M
CO2	S	S	M	M	S
CO3	S	M	S	S	S
CO4	S	S	M	M	M
CO5	S	S	M	S	S

S-Strong; M-Medium; L-Low

17UPY6EB	ELECTIVE- II: OPTICAL FIBRES AND FIBRE OPTIC COMMUNICATION SYSTEMS	SEMESTER-VI

Total credits:4

Hours/WeeK:4

OBJECTIVES:

1. To enable students learn fundamentals of Fiber optics and their communication mechanisms along with their applications.

CONTENTS

UNIT – I

Fibre Classification

Propagation of light waves in an optical fibre – Acceptance angle and Acceptance cone of a fibre – Numerical Aperture (NA) – NA of a graded Index Fibre – Mode of propagation. Fibres – classification – stepped index fibre – stepped index monomode fibre – Graded index multimode fibre – Comparison of step and graded index fibres.

UNIT – II

Fibre Fabrication And Cables

Classification of Techniques – External chemical vapour deposition – Characteristics – Internal chemical vapour deposition (1st method only) – Characteristics – Phasil system Fibre cable construction – losses incurred during installation of cable – Testing of cables – cable selection criteria.

UNIT – III : Fibre Losses And Dispersion In Optics Attenuation in optic fibre – Rayleigh Scattering losses – Absorption losses – Bending losses – Radiation induced losses – Inherent defect losses – CORE- and Cladding losses. Dispersion in an Optical Fibre – Inter-modal dispersion – Material Chromatic Dispersion – Dispersion Power penalty – Total Dispersion delay.

UNIT – IV

Light Sources For Optical Fibres

LED – The process involved in LEDS – Structures of LED – Fibre – LED Coupling – Modulation bandwidth and Spectral Emission of LEDS- Laser diodes, Demodulation.

UNIT – V

Applications In Communication Systems

Introduction – Video Link Satellite Link – Computer Link – Nuclear Reaction Link – Community Antenna Television – Switched Star CATV – Networking. Optical Networks and networking, Fibre amplifiers, WDM, DWDM& CWDM.

TEXT BOOK:

1. *Subir Kumar Sarkar*. 2007. **Optical Fibres and Fibre Optic Communication Systems.** *[4th Edition] S Chand and Co, New Delhi*
2. *SG Gupta.* **Text book on Optical Fiber Communication and its Applications.** *Eastern Economy Edition*

REFERENCE BOOK:

1. *Thyagarajan K. and AjoyGhatak.* 2004, **Introduction To Fiber Optics.** *Cambridge University Press, New Delhi.*

17UPY6EC	ELECTIVE- II: BIO-PHYSICS	SEMESTER-VI

Total credits:4

Hours/Week:4

PREAMBLE

To enable students, learn basics of Biophysics, Molecular Kinetics and Radiation Biology.

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Outline the structure of biomolecules	K2
CO2	Learn about diffusion, osmosis and filtration	K1
CO3	Recall significance of adsorption, hydrotrophy and colloids.	K1
CO4	Apply optical techniques in biological studies	K3
CO5	Explain the concepts of radioactivity and bio electricity	K2

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	M	S	S	M	S
CO3	S	S	M	M	M
CO4	S	S	M	S	S
CO5	S	S	M	M	M

S-Strong; M-Medium; L-Low

17UPY6EC	ELECTIVE- II: BIO-PHYSICS	SEMESTER-VI

Total credits:4

Hours/WeeK:4

OBJECTIVES:

1. To enable students learn fundamentals of Biophysics, Molecular Kinetics and Radiation Biology.

CONTENTS

UNIT – I

STRUCTURE OF BIOMOLECULES

Introduction - Atomic structure - Hydrogen atom - Bonds between atoms and molecules - secondary or weak bonds - Bond energy - Disulphate bonds – Peptide bond - Structure of Proteins - Molecular weight determination - Kinetic methods - Static methods - Structure of nucleic acids - DNA - RNA.

UNIT – II
KINETICS OF MOLECULES I

Diffusion: Factors affecting diffusion - Simple diffusion – Fick's law of diffusion - Diffusion of electrolytes - Biological significance of diffusion

Osmosis: Osmosis - Osmotic pressure - Laws of osmosis - osmometry - osmotic pressure of electrolytes.

Filteration : Filteration - Passage of fluid though blood vessels - Formation of Urine- Dialysis Principle of dialysis in artificial kidney - kinds of dialysis.

UNIT – III

KINETICS OF MOLECULES II

Adsorption: Adsorption - Factors affecting adsorption - Adsorption of ions by Solids and Liquids - adsorption of Gases by solids - Biological significance of adsorption.

Hydrotropy : Hydrotropy - Biological importance of hydrotropy.

Precipitation: Precipitation - Biological significance.

Colloids: Types of colloids - characteristics of colloids - stability of colloids - Gel - Emulsions - Techniques for the separation of colloids - Biological importance of colloids – Gibb's Donnan Equilibrium.

UNIT - IV

OPTICAL TECHNIQUES IN BIOLOGICAL STUDIES

Characteristics of light- compound·microscope - Ultraviolet microscope - Electron microscope - Transmission electron microscope - Scanning Electron microscope - Monochromator – Light sensitive detectors- Spectrophotometer - Atomic absorption flame photometer – Electromagnetic radiation Spectroscopy - Ultraviolet, visible, infrared and fluorescent spectroscopy – Atomic absorption and emission spectroscopy - mass spectroscopy - Raman spectroscopy – x ray diffraction crystallography.

UNIT -V

BIOELECTRICITY AND RADIATION BIOLOGY

Membrane potential - Resting membrane potential - Action potential and nerve impulse conduction Rate of nerve impulse conduction- Recording of nerve impulses by C.R.O – Resting membrane potential - Monophasic and diphasic action potentials - Radioactivity - Natural radioactivity Artificial or induced radioactivity – Radioactive disintegration - units of Radioactivity.

TEXT BOOKS:

1. *Subramanian, M.A.* 2006. **Biophysics: Principles and Techniques**. *MJP Publishers, Chennai [Units II, IV & V]*

2. *Palanichamy, S. and Shanmugavelu, M.* **Principles Of Biophysics.** *Palani Paramount Publications, Palani (Units I & III)*

REFERENCE BOOKS:

1. *Thiravia* Raj, *S.***Biophysics.** *Saras Publications, Nagerkoil*

2. *Daniel, M.* 1998. **Basic Biophysics for Biologist.** *Agro-bios, Jodhpur.*

3. *Pattabhi, V. and Gowtham, N.* 2011. **Biophysics.** *[2nd Edition], Narosa Publishing House, New Delhi*

17UPY6ED	ELECTIVE- III: SPACE PHYSICS	SEMESTER-VI

Total credits:4

Hours/Week:4

PREAMBLE

To enable the students, learn fundamental concepts of Space Physics,

Stellar Evolution and the theories of Universe.

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand basic astronomical instruments	K2
CO2	Recall of Solar systems	K1
CO3	Explain birth and death of variable stars and binary stars	K2
CO4	Outline stars and the measurement of stellar distance	K2
CO5	Learn theories of universe, galaxies and star clusters	K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	S	S	M	S
CO3	S	S	M	M	M
CO4	S	M	S	M	S
CO5	S	S	M	M	S

S-Strong; M-Medium; L-Low

17UPY6ED	ELECTIVE- III: SPACE PHYSICS	SEMESTER-VI

Total Credits: 4

Hours/WeeK:4

OBJECTIVES:

1. To make students learn fundamental concepts of Space Physics, Stellar Evolution and the theories of Universe, Galaxies and Star Clusters.

CONTENTS

UNIT - I

Astronomical instruments

Optical telescope - reflecting telescope - types of reflecting telescope - advantages of reflecting telescope - Radio telescopes - astronomical spectrographs - photographic photometry - photo electric photometry - detectors and image processing.

UNIT - II

Solar system

The sun-physical and orbital data - Photosphere - Chromosphere - corona - solar prominences - sunspot - sunspot cycle - theory of sunspots - solar flare - mass of the sun - solar constant - temperature of the sun - source of solar energy - solar wind. Other members of the solar system - Mercury - Venus - Earth - Mars - Jupiter - Saturn - Uranus - Neptune - Pluto - Moon - Bode's law - Asteroids - comets - Meteors.

UNIT - III

Stellar Evolution, Binary and variable stars

Birth of a star - Death of a star - Chandrasekhar limit - white dwarfs - Neutron stars - black holes - Quasars - Nebulae - Supernovae

Binary stars - Origin of Binary stars. Variable stars - Cepheid variables - RV Tauri variables - long period variables - irregular variables - flare stars.

UNIT-IV

Magnitudes, distance and spectral classification of stars

Magnitude and brightness - apparent magnitude of stars - absolute magnetic of stars - relation between apparent magnitude and absolute magnitude of stars - Luminosities of stars - measurement of stellar distance - Geometrical parallax method - distance from red shift measurement - Harvard system of spectral classification .

UNIT-V

Theories of the universe, galaxies and star clusters

Origin of the universe - the big bang theory - the steady state theory - the oscillating universe theory - Hubble's law.

Galaxies - types of galaxies - Milky Way - star clusters - open clusters - globular clusters.

TEXT BOOKS:

1. *Krishnasamy, K.S.* 2002. **Astro Physics – A Modern Perspective**. *New Age International Pvt Ltd, New Delhi.*

2. *Murugesan, R.* 2003. **Modern Physics**, *[11th Edition] S Chand & Company Ltd, New Delhi.*

REFERENCE BOOKS:

1. *BaidyanathBasu*, 2001. **An Introduction to Astro physics**, *2nd printing, Prentice Hall of India Private limited, New Delhi.*

2. *Kumaravelu, S.* 1993. **Astronomy**, *Janki calendar corporation, Sivakasi.*

3. *Baker and Fredrick*, 1964**. Astronomy.** *[9th Edition] Van No strand Rein hold Co, New York.*

4. **Illustrated World of Science Encyclopedia** - *Vol I and Vol VIII - Creative world publication - Chicago.*

17UPY6EE	ELECTIVE –III: GEOPHYSICS	SEMESTER-VI

Total credits:4

Hours/Week:4

PREAMBLE

To enable the students, learn fundamental concepts of Seismology and Geophysics

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics of seismology and its properties	K2
CO2	Outline surface waves and seismometry	K2
CO3	Explain the basics of earthquake and gravity	K2
CO4	Infer theories of earth magnetism and internal structure of earth	K2
CO5	Learn about the concepts of radioactivity and geothermal physics	K1

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	M	S	M
CO3	S	S	S	M	M
CO4	M	M	S	S	M
CO5	S	S	M	M	M

S-Strong; M-Medium; L-Low

17UPY6EE	ELECTIVE –III: GEOPHYSICS	SEMESTER-VI

Total Credits:4

Hours/Week:4

Objectives:

1. To enable students to learn fundamental concepts of Seismology, Geophysics and Geomagnetism

UNIT - I

Introduction and Seismology

Introduction - Seismology: P waves, S waves, their velocities - Time distance curves and the location of epicenters - Effect of boundaries - Major discontinuities and resulting phase of seismic waves - Derivation of properties from the velocities

UNIT - II

Surface Waves and Seismometry

Surface waves: Rayleigh waves and Love waves - Study of earth by surface waves.

Seismometry: Horizontal seismograph and seismography equation – Strain seismograph.

UNIT - III

Earthquakes and Gravity

Earthquakes: Focus, magnitude, frequency - Detection and prediction - Gravity: The potential (Laplace's equation and Poisson's equation) -

Absolute and relative measurements of gravity - Hammond Faller method - Worden gravimeter.

UNIT - IV

Geomagnetism and Internal structure of the Earth

Geomagnetism: Fundamental equations - Measurements: method of Gauss, saturation induction magnetometers, proton precession magnetometers, alkali vapour magnetometers - Theories of earth's magnetism - Causes of the main field -Dynamo theories – Internal structure of the earth: The CORE- variation of mechanical properties with depth - Materials and equation of state of the interior of the earth.

UNIT - V

Geochronology and Geothermal Physics

Geochronology: Radioactivity of the earth - Radioactive dating of rocks and minerals Geological time scale - The age of the earth - Geothermal physics: Flow of heat to the surface of the earth - Sources of heat within the earth - Process of heat transport internal temperature of the earth.

TEXT BOOKS:

1. *Garland, G.D.* l979. **Introduction to Geophysics**, *[11th Edition], WB Saunder Company, London*
2. *Cook, A.H.* 1973. **Physics of the Earth and Planets**. *[1stEdition], McMillan Press, London*

17UPY6EF	ELECTIVE –III: MEDICAL PHYSICS	SEMESTER-VI

Total credits:4

Hours/Week:4

PREAMBLE

To enable students, learn fundamental concepts of Radiation Physics and its applications.

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall on the characteristics and production of X-rays	K1
CO2	Summarize theory of radiation and various radiation chambers	K2
CO3	Explain principle and the function of various imaging system	K2
CO4	Discuss basic teletheraphy techniques	K2
CO5	Analyze various measures and radiation protection devices	K3

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	S	S	S	M	M
CO3	S	S	S	M	S
CO4	S	S	S	S	S
CO5	S	S	M	M	S

S-Strong; M-Medium; L-Low

17UPY6EF	ELECTIVE –III: MEDICAL PHYSICS	SEMESTER-VI

Total credits:4

Hours/WeeK:4

OBJECTIVES:

1. To enable students learn fundamental concepts Radiation Physics and its applications in medical fields.

CONTENTS

UNIT - I

X-RAYS

Electromagnetic spectrum - production of x-rays - x-ray spectra - Brehmsstrahlung - Characteristic x-ray - X-ray tubes - Coolidge tube - x-ray tube design - tube cooling - stationary mode - Rotating anode x-ray tubes - Tube rating - quality and intensity of x-ray. X-ray generator circuits - half wave and full wave rectification - filament circuit - kilo voltage circuit - high frequency generator - exposure timers - HT cables.

UNIT - II

RADIATION PHYSICS

Radiation units - exposure - absorbed dose - rad gray - kera relative biological effectiveness - effective dose - sievert - inverse square law - interaction of radiation with matter - linear attenuation coefficient. Radiation Detectors -Thisble chamber - condenser chambers - Geiger counter - Scintillation counter - ionization chamber - Dosimeters - survey methods - area monitors - TLD and semiconductor detectors.

UNIT - III

MEDICAL IMAGING PHYSICS

Radiological imaging - Radiography - Filters - grids - cassette - X-ray film - film processing - fluoroscopy - computed tomography scanner - principle function -display - generations - mammography. Ultrasound imaging - magnetic resonance imaging - thyroid uptake system - Gamma camera (Only Principle, function and display)

UNIT - IV

RADIATION THERAPY PHYSICS

Radiotherapy - kilo voltage machines - deep therapy machines - tele-cobalt machines - Medical linear accelerator. Basics of Teletherapy units - deep x-ray, telecobalt units, medical linear accelerator - Radiation protection - external beam characteristics - phantom - dose maximum and build up - bolus - percentage depth dose - tissue - air ratio - back scatter factor.

UNIT - V

RADIATION PROTECTION

Principles of radiation protection - protective materials - radiation effects - somatic, genetic stochastic and deterministic effect, Personal monitoring devices - TLD film badge - pocket dosimeter.

TEXT BOOKS:

1. *Thayalan, K.* 2003. **Basic Radiological Physics.** *Jayapee Brothers Medical Publishing Pvt Ltd, New Delhi*

2. *Williams and Wilkins,* 1990. **Christensen's Physics of Diagnostic Radiology**: *Curry Dowdey and Murry - Lippincot*

3. *Khan, F.M.* 2003 **Physics of Radiation Therapy** - *Williams and Wilkins, [3rd Edition]*

4. *Bushberg, Seibert, Leidholdt, Boone Lippincot Williams and Wilkins,* 2002. **The Essential Physics of Medical Imaging**: *[2nd Edition]*

REFERENCE BOOKS:

1. *Lippincot Williams and Wilkins,* 1998. **Nuclear Medicine Physics**: *Chandra Publishers*

2. *John R Gunniingham and Johns,* 1990. **The Physics of Radiology.** *Charles C Thomas USA*

3. *William R Hendee* 1992. **Medical Imaging Physics** - *Mosby, [3rd Edition]*

4. *Govindarajan, K.N.* 1992. **Advanced Medical Radiation Dosimetry**: *Prentice - Hall of India Pvt Ltd, New Delhi*

17UED34V	NMEC-I: EVERYDAY PHYSICS –I	SEMESTER-III

Total Credits:2

Hours/Week:2

PREAMBLE

To enable students, learn fundamental concepts in physics

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall the principle of TV, lift and nuclear reactors	K1
CO2	Discuss the relationship between temperature and pressure	K1
CO3	Explain the principle of Doppler effect and SONAR	K2
CO4	Know the basics of bio materials and smart materials	K2
CO5	Learn solar energy and its applications	K1

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	S	S	M	M	S
CO3	S	S	S	M	M
CO4	M	S	S	S	M
CO5	S	S	M	S	S

S-Strong; M-Medium; L-Low

17UED34V	NMEC-I: EVERYDAY PHYSICS –I	SEMESTER-III

Total Credits:2

Hours/Week:2

OBJECTIVE:

1. To enable non-major Physics students to create interest in Physics and to make them aware with fundamental concepts of Physics

CONTENTS

UNIT - I

How things work?

Basic principles – Televisions – Lifts – Submarines – Helicopters – Fax machines – Nuclear reactors.

UNIT - II

Heat

Transmission of heat – Variation of boiling point with pressure – Pressure cooker – Refrigerator – AC Principle and their capacities.

UNIT - III

Sound and Optics

Sound waves– Doppler effect– SONAR. Power of a lens – Long sight, Short sight – Microscope, Telescope, Binocular and Camera.

UNIT - IV

Bio materials & Smart materials

Biomaterials – Biomedical compatibility of Ti–Al-Nb alloys for implant application. Smart materials – Shape Memory Alloys – Piezoelectric materials.

UNIT – V

Solar energy and its Applications

Solar energy – Solar water heater – Solar driers – Solar cells – Solar electric power generation – Solar distillation – Solar cooking.

TEXT BOOKS:

1. **The Learner's series – Everyday science**, *Infinity Books, New Delhi*
2. *Brij Lal and Subrahmanyam, N.* 2008. **A Text Book of Sound.** *[2nd Edition], Vikas Publishing House, New Delhi*
3. *Brij Lal and Subrahmanyam*, N. 1994. **A Textbook of Optics**, *[4th Edition] S Chand and Co, New Delhi.*
4. *Rai G.D.* 2004. **Solar Energy Utilization.** *Khanna Publishers, New Delhi.*
5. *Senthil Kumar I.G.* 2013. **Engineering Physics I & II.** *VRB Publications, Chennai.*

REFERENCE BOOK:

1. *Resnick and Halliday,* **Principles of Physics.** 2015. *[9th Edition], Wiley Publication*

2. *Sukhatme. S.P.* 1997. **Solar Energy, Principles of thermal collection and storage** *[2nd edition], Tata McGraw-Hill Publishing Co. Ltd., New Delhi.*

3. *Mathur*, *D.S.* 2002. **Heat and Thermodynamics.** *S Chand and Co, New Delhi*

4. **Illustrated World of Science Encyclopedia**, *Vol I and Vol VIII, Creative world publication, Chicago.*

17UED44V	NMEC-II: EVERYDAY PHYSICS –II	SEMESTER-IV

Total Credits:2

Hours/Week:2

PREAMBLE

To enable students, aware fundamental concepts in physics

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Outline the basics of force and energy	K2
CO2	Explain the function of mobile technology and its features	K4
CO3	Learn basic nano technology properties and applications	K1
CO4	Discuss moon ,earth and their relations	K2
CO5	Understand fossil fuel energy	K2

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	M	M	S	M
CO3	S	S	S	M	M
CO4	S	S	M	M	S
CO5	S	M	M	S	S

S-Strong; M-Medium; L-Low

| 17UED44V | NMEC-II: EVERYDAY PHYSICS –II | SEMESTER-IV |

Total Credits:2

Hours/Week:2

OBJECTIVE:

1. To enable non-major Physics students to create interest in Physics and to make them aware with fundamental concepts of Physics

CONTENTS

UNIT - I

Force and Energy

Force- Newton's laws of motion- circular motion – centripetal force – centrifugal force. Centrifuge – washing machine.

Energy – different forms of energy – Law of conservation of energy. Electric bulb-tube light-CFL, LED bulbs.

UNIT - II

Mobile Technology

Mobile Technology-GSM, CDMA – Mobile phone Features –2G, 3G, 4G and 5G networks.

UNIT - III

Nano Technology

Nano Technology – Everyday applications of Nano technology – Medicine –Electronics – Environment – Consumer products

UNIT - IV:

Geo physics

Gravitation – The Moon and Tides - Earthquake – Richter scale – Thunder and lightning – lightning arrestors

UNIT – V:

Fossil Fuel Energy

Fossil Fuels – Definition – Energy Production – How Fossil Fuels work – Oil – Coal – Natural Gas - Advantages and Disadvantages of Fossil Fuels.

TEXT BOOKS:

1. **The Learner's series – Everyday science**, *Infinity Books, New Delhi*
2. *Brij Lal and Subrahmanyam N.* 2003. **Properties of Matter**, *S.Chand and Co, New Delhi*
3. *Garland, G.D.* l979. **Introduction to Geophysics**, *[11th Edition], WB Saunder Company, London*
4. *Senthil Kumar I.G.* 2013. **Engineering Physics I & II.** *VRB Publications, Chennai.*

REFERENCE BOOKS:

1. *Resnick and Halliday,* 2015.**Principles of Physics**, *[9th Edition], Wiley Publications.*
2. **Illustrated World of Science Encyclopedia**, *Vol I and Vol VIII, Creative world publication, Chicago.*

17UPYSS1	SELF STUDY PAPER –I: ELECTRICAL AND ELECTRONIC APPLIANCES	SEMESTER: I To V

Total credits:1

PREAMBLE

To enable students, learn the principle and working of home appliances.

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn about measurement devices	K1
CO2	Outline the working principle of home appliances	K2
CO3	Apply fibre optics to various fields	K3
CO4	Construct basic robot	K3
CO5	Analyze computers and their components	K1

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	S	S	M	S
CO3	S	S	M	M	S
CO4	M	M	S	S	S
CO5	S	S	M	M	S

S-Strong; M-Medium; L-Low

17UPYSS1	SELF STUDY PAPER –I: ELECTRICAL AND ELECTRONIC APPLIANCES	SEMESTER: I To V

Total credits:1

Objectives:

1. This paper is designed to make the students aware of the latest type of appliances and gadgets available and to know how they work.

UNIT - I

Test and Measurement

Digital calipers – digital screw gauge – digital balance – digital clock – digital thermometer – digital multimeters – digital oscilloscopes.

UNIT - II

Home appliances

Air conditioner – refrigerator – microwave oven – induction cooker – washing machines – inverters – solar powered appliances – digital cameras.

UNIT - III

Communication

Fibre optics – cellular phones – cellular phone jammers – Bluetooth – WiFi – LiFi -- Global positioning system – RFID security systems.

UNIT - IV

Robotics

Basics – robotic arm – mobile robots – autonomous robots - Honda's ASIMO robot.

UNIT - V

Computers

Basic components – Motherboards – Memory – I/O devices – assembling – operating systems.

BOOKS FOR STUDY:

1. *GottapuSasibhushana Rao*, 2012. **Mobile Cellular Communication**, [1st Edition], Pearson.

2. *S K Saha*, 2008. **Introduction to Robotics**, [1st Edition], Tata McGraw-Hill Education.

3. *Alok Kumar*, 2008. **Computer General Awareness** [1st Edition], UpkarPrakashan.

17UPYSS2	SELF STUDY PAPER –II: BIOPHYSICS AND BIOMEDICAL INSTRUMENTATION	SEMESTER: I To V

PREAMBLE

To enable students understand the properties of medical instrumentation based on physical concepts.

COURSE OUTCOMES

On successful completion of the programme, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall fundamentals and basic concepts of atomic structure	K1
CO2	Explain physical properties of diffusion, osmosis and dialysis	K2
CO3	Outline the fundamentals of biomedical instrumentation	K2
CO4	Illustrate the principle of imaging systems	K2
CO5	Learn about the basic radiotherapy and laser	K1

MAPPING WITH PROGRAMME OUTCOMES

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	S	S	M	S	M
CO3	S	S	M	M	S
CO4	S	S	M	S	S
CO5	S	S	M	S	S

S-Strong; M-Medium; L-Low

17UPYSS2	SELF STUDY PAPER –II: BIOPHYSICS AND BIOMEDICAL INSTRUMENTATION	SEMESTER: I To V

Total credits:1

OBJECTIVES:

1. To understand the biological significance in terms of physical properties and understand the medical instrumentation based on physical concepts.

UNIT – I

Fundamentals of Biophysics

Atom – atomic structure – Chemical bonds: ionic bonds, covalent bonds, formation of covalent bonds, weaker interaction – Fundamental concepts: light, sound, pressure, heat content of food, blood pressure, pH – determination of pH – buffer solution – determination of pH by indicators –

Nucleic acids: DNA, RNA.

UNIT – II

Biophysical properties

Surface tension – Diffusion: definition, factors affecting diffusion, biological signification of diffusion – Osmosis: definition, factors affecting osmosis, biological signification of osmosis – Adsorption: definition, factors affecting diffusion, biological signification of diffusion – Colloids: definition – characteristics of colloids: kinetic properties, optical properties, electrical properties, stability of colloids – biological importance of colloids – Dialysis: principle of dialysis – kinds of dialysis.

UNIT – III

Fundamentals of Biomedical Instrumentation

Sources of Biomedical signals – Basic medical instrumentation system – Intelligent medical instrumentation systems: Microprocessor based medical instruments – PC based medical instruments – Biomedical recorders: Basic electronic recording system, Electrocardiograph (ECG), Block diagram of ECG, Electroencephalograph (EEG), Block diagram of EEG.

UNIT – IV

Fundamentals of Biomedical imaging systems

X-ray Imaging system: Nature of X-rays, X-ray machine – Computed Tomography (CT scan): Principle, Components of CT scan system – Magnetic Resonance Imaging (MRI) system: Principle, basic NMR components, block diagram of the NMR detection system, biological effects of NMR imaging, advantages of NMR imaging system – Ultrasonic Imaging systems: Medical ultra sound, echocardiograph, digital scan converter, biological effects of ultra sound.

UNIT – V

Radiotherapy: Radioactive decay – alpha, beta and gamma - Isotopes – Medical linear accelerator machine – radiation detectors – GM counter, Ionization chamber.

Laser: principle – types of lasers: Ruby laser, Helium-neon laser, semiconductor laser – laser safety – Uses of laser in medical field.

TEXT BOOKS:

1. *Subramanian, M.A. 2006.* **Biophysics: Principles and Techniques.** *MJP Publishers, Chennai.*

2. *Palanichamy, S. and Shanmugavelu, M.* **Principles of Biophysics.***Palani Paramount Publications, Palani.*

3. *R.S.Khandpur,2014.***Handbook of Biomedical instrumentation,** *TMH Publication Ltd.*

4. *Murugesan, R. 2003.* **Modern Physics,** *[11th Edition] S Chand & Company Ltd, New Delhi.*

REFERENCE BOOKS:

1. *Thiravia* Raj, S.**Biophysics.** *Saras Publications, Nagerkoil*

2. *Daniel, M. 1998.* **Basic Biophysics for Biologist.** *Agro-bios, Jodhpur.*

3. *Pattabhi, V. and Gowtham, N. 2011.* **Biophysics.** *[2nd Edition], Narosa Publishing House, New Delhi.*

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