PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM – 636 011

DEGREE OF BACHELOR OF SCIENCE

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR - B.Sc. PHYSICS

FOR THE STUDENTS ADMITTED FROM THE

ACADEMIC YEAR 2017 – 2018 ONWARDS

PERIYAR UNIVERSITY, SALEM -11
REGULATIONS

1. **Eligibility:**

Candidates seeking admission to first year of the Bachelor of Science - Physics shall be required to have passed the Higher secondary examination with Mathematics, Physics and Chemistry conducted by the Government of Tamil Nadu or an examination accepted as equivalent thereto by the Syndicate subject to the conditions as may be prescribed thereto are permitted to appear and qualify for B.Sc., (Physics) degree examination of this University after a course of study of three academic years.

2. Duration of the Course:

The course for the degree of Bachelor of Science shall consist of three years divided into six semesters with internal assessment under choice based credit system.

3. Course of Study:

The course of study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time.

I SEMESTER

1. Language -I (Tamil etc)
2. English -I
3. Core -Physics -I (Mechanics)
4. Allied Mathematics -I
5. Value Education

II SEMESTER

6. Language -II (Tamil etc)
7. English -II
8. Core Physics -II (Thermal Physics)
9. Core Physics -Practical I
10. Allied Mathematics -II
11. Allied Mathematics -III
12. Environmental Studies
13. Skill based Elective Course -I (Space Science)

III SEMESTER

14. Language -III (Tamil etc)
15. English -III
16. Core Physics -III (Properties of matter and Sound)
17. Allied Chemistry -I
18. Skill based Elective Course -II (Programming in C language)
19. Non -Major Elective Course -I (Essentials of Electricity)

IV SEMESTER

20. Language -IV (Tamil etc)
21. English -IV
22. Core -Physics -IV (Optics)
23. Core -Physics -Practical II
24. Allied Chemistry -II
25. Allied Chemistry -II Practical
26. Non -Major Elective Course II (Physics in Everyday Life)

V SEMESTER

27. Core -Physics -V (Electricity and Magnetism)
28. Core -Physics -VI (Basic Electronics)
29. Core -Physics -VII (Atomic Physics)
30. Core -Physics -Elective I
31. Core -Physics -Elective II
32. SBEC -III (Bio - Medical Instrumentation)
33. SBEC -IV (Digital Electronics)

VI SEMESTER

34. Core -Physics -VIII (Nuclear Physics)
35. Core -Physics -IX (Quantum Mechanics and Relativity)
36. Core -Physics -Elective III
37. Core -Physics -Practical III
38. Core -Physics -Practical IV
39. SBEC -V (Basics of electricity and Appliances)
40. SBEC -VI (Microprocessor and its applications)

Core Electives

Semester V: (Any two of the following)

1. Mathematical Physics and Numerical Methods
2. Solid State Physics
3. Applied Physics
4. Energy Physics

Semester VI: (Any one of the following)

1. Laser and Spectroscopy
2. Electronics and Communication

Skill Based Elective Courses

1. SBEC -I - Space Science
2. SBEC –II - Programming in C language
3. SBEC –III - Bio Medical Instrumentation
4. SBEC -IV - Digital Electronics
5. SBEC -V - Electrical Appliances
6. SBEC -VI - Microprocessor and its Application

Non-Major Elective Courses

1. Essentials of Electricity
2. Physics in Everyday life

4. Examinations

The theory examination shall be three hours duration to each paper at the end of each semester. The candidates failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examination

5. Scheme of Examinations:

The scheme of examination of different semester shall be as follows.

B.Sc PHYSICS Course Structure under CBCS
(For candidates admitted from the academic Year 2017-2018 onwards)

I - Semester							
Part	Title of the course	Instructional hours per week	Exam hours	Credits	Marks		
					Internal Marks	Semester Examination	Total
I	Tamil or any other language paper –I	6	3	3	25	75	100
II	English paper – I	6		3	25	75	100
III	Core Physics Paper-I	5	3	5	25	75	100
III	Core Physics Practical Paper-I*	3	3	-	-	-	-
III	Allied Maths paper-I (or) Allied Chemistry paper-I	5	3	5	25	75	100
III	Allied Maths paper-II (or)	2	3	-	-	-	-
III	Allied ChemistryPractical I*	2	3	-	-	-	-
IV	Value education	2	3	2	25	75	100
	Environmental studies*	1	3	-	-	-	-

*** - Examinations will be at the end of II semester**

II - Semester							
Part	Title of the course	Instructional hours per week	Exam hours	Credits	Marks		
					Internal Marks	Semester Examination	Total
I	Tamil or any other language - II	6	3	3	25	75	100
II	English paper – II	6	3	3	25	75	100
III	Core Physics Paper-II	5	3	5	25	75	100
III	Core Physics Practical Paper-I*	3	3	4	40	60	100
III	Allied Maths paper-III (or) Allied Chemistry paper-II	5	3	5	25	75	100
III	Allied Maths paper-II (or)	2	3	2	25	75	100
III	Allied Chemistry Practical I*	2	3	2	40	60	100
IV	Skill based Elective course- I	2	3	2	25	75	100
IV	Environmental studies*	1	3	2	25	75	100

*** - Continued from I semester and Examinations will be at the end of II semester**

Part	Title of the course	Instructional hours per week	Exam hours	Credits	Marks		
					Internal Marks	Semester Examination	Total
I	Tamil or any other language paper - III	6	3	3	25	75	100
II	English paper - III	6	3	3	25	75	100
III	Core Physics Paper-III	5	3	5	25	75	100
III	Core Physics Practical Paper-II*	3	3	-	-	-	-
III	Allied Maths paper-I (or) Allied Chemistry paper-I	5	3	5	25	75	100
III	Allied Maths paper-II (or)	2	3	-	-	-	-
III	Allied ChemistryPractical I*	2	3	-	-	-	-
IV	Skill based Elective course- II	2	3	2	25	75	100
IV	Non Major elective course I	2	3	2	-	-	-

*** - Examinations will be at the end of IV semester**

IV - Semester							
Part	Title of the course	Instructional hours per week	Exam hours	Credits	Marks		
					Internal Marks	Semester Examination	Total
I	Tamil or any other language - IV	6	3	3	25	75	100
II	English paper – IV	6	3	3	25	75	100
III	Core Physics Paper-IV	5	3	5	25	75	100
III	Core Physics Practical Paper-II*	3	3	4	40	60	100
III	Allied Maths paper-III (or) Allied Chemistry paper-II	5	3	5	25	75	100
III	Allied Maths paper-II (or)	2	3	2	25	75	100
III	Allied Chemistry Practical I*	2	3	2	40	60	100
IV	Non Major elective course II	2	3	2	25	75	100

*** - Continued from III semester and Examinationswill be at the end of IV semester**

V - Semester							
Part	Title of the course	Instructional hours per week	Exam hours	Credits	Marks		
					Internal Marks	Semester Examination	Total
I	Core Physics Paper V	5	3	3	25	75	100
III	Core Physics Paper VI	5	3	3	25	75	100
III	Core Physics Paper VII	5	3	5	25	75	100
III	Core Physics Elective-I	5	3	5	25	75	100
III	Core Physics Elective- II	5	3	5	25	75	100
III	Core Physics Practical Paper-III*	3	3	-	-	-	-
III	Core Physics Practical Paper-IV*	3	3	-	-	-	-
IV	Skill based Elective course- III	2	3	2	25	75	100
IV	Skill based Elective course- IV	2	3	2	25	75	100

*** - Examinations will be at the end of VI semester**

VI - Semester							
Part	Title of the course	Instructional hours per week	Exam hours	Credits	Marks		
					Internal Marks	Semester Examination	Total
I	Core Physics Paper VII	5	3	3	25	75	100
III	Core Physics Paper VIII	5	3	3	25	75	100
III	Core Physics Paper IX	5	3	5	25	75	100
III	Core Physics Elective-III	5	3	5	25	75	100
III	Core Physics Elective- IV	5	3	5	25	75	100
III	Core Physics Practical Paper-III*	3	3	4	25	75	100
III	Core Physics Practical Paper-III*	3	3	4	25	75	100
IV	Skill based Elective course- V	2	3	2	25	75	100
IV	Skill based Elective course- VI	2	3	2	25	75	100

*** - Continued from III semester and Examinations will be at the end of VI semester**

Total credit for V & VI semester = 57 Credits

Total credit for 3 years = 140 Credits

6. Question Paper pattern for Examination

Time : 3 Hrs. Max. Marks – 75

Part A: 10 x 2=20 Marks
(Answer all Questions)
(Two questions from each unit)

Part B: 5 x 5 =25 Marks
(Answer all Questions)
(One question from each unit with internal choice, In Part B out of total 10 questions, 4 questions may be problem oriented)

Part C: 3 x 10 = 30 Marks
(Answer any three Questions)
(One question from each unit)

7. Passing Minimum:

Theory:

IA: 25 marks **University Examination: 75 marks**

Evaluation Of IA		**Passing minimum**	
Tests	-15 marks	IA (40%)	- 10 marks
Assignment	-05 marks	UE (40%)	- 30 marks
Attendance	-05 marks	Total	- 40 marks
Total	-25 marks		
UE	-75 marks		

Practical:

IA: 40 marks **University Examination: 60 marks**

Evaluation Of IA		**Passing minimum**	
Observation	-10 marks	IA (40%)	- 16 marks
Model Exam	-15 marks	UE (40%)	- 24 marks
Record Submission	-10 marks	Total	- 40 marks
Attendance	-05 marks		
Total	-40 marks		
UE	-60 marks		

University Examination: 60 Marks

Evaluation for university practical examinations

Record Marks	– 10 Marks
Formula with expansion	– 10 Marks
Observation	– 20 Marks
Calculation	– 15 Marks
Result with units	– 05 Marks

The Candidate shall be declared to have passed the examination if the candidate secures not less than 40 marks in the University examination in each theory paper. For the practical paper a minimum of 40 marks out of 100 marks in the University examination and the record note book taken together is required to pass the examination. There is no passing minimum for record note book however submission of record note book is a must.

A candidate is deemed to have completed a course successfully and earned the appropriate credit, only if, the candidate earned a grade of E and above. RA denotes the candidate should Reappear the course again.

8. Classification of Successful candidates:

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed in First Class. All other successful candidates shall be declared to have passed in Second Class. Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed in First Class with Distinction provide they pass all the examinations prescribed for the course at first appearance.

Candidates who pass all the examinations prescribed for the course in the first attempt and within a period of three academic years from the year of admission to the course alone are eligible for University Ranking.

Evaluation of Credits

Letter Grade	Cumulative Grade Points Average	Grade Description	Range of Marks*
S	10	Outstanding	90-100
A	9	Excellent	80-89
B	8	Very Good	70-89
C	7	Good	60-69
D	6	Average	50-59
E	5	Satisfactory	40-49
RA	0	Re-Appear	0-39

$$GP = \frac{(\text{Marks obtained in course x credit})}{100}$$

$$GPA = \frac{\text{Total Grade Points earned in a semester}}{\text{Total credits registered in a Semester}}$$

$$CGPA = \frac{\text{Sum of Grade Points earned}}{\text{Sum of credits registered}}$$

Classification

CGPA	**9 and above**	I Class with Distinction
CGPA	**between 7 and 8.9**	I Class
CGPA	**between 5 and 6.9**	II Class

Note:

The above classification shall be given for over all performance including Non – Major Electives and Skill based Courses. i.e., For Performance in the Part III only.

9. Maximum duration for the completion of UG Program:

The maximum duration for the completion of UG Program shall not exceed twelve semesters.

10. Commencement of this Regulation:

These regulations shall take effect from the academic year 2017 - 2018 and thereafter.

11. Transitory Provision:

Candidates who were admitted to the UG course of study before 2017 - 2018 shall be permitted to appear for the examinations under those regulations for a period for three years i.e. up to and inclusive of the examination of April/May 2020. Thereafter they will be permitted to appear only under regulations then in force.

Subject and Subject codes:

Subject Paper	Paper Code
Core Paper I	
Core Paper II	
Core Paper III	
Core Paper IV	
Core Paper V	
Core Paper VI	
Core Paper VII	
Core Paper VIII	
Core Paper IX	
Core Elective Paper I	
Core Elective Paper II	
Core Elective Paper III	
Core Elective Paper IV	
Core Practical I	
Core Practical II	
Core Practical III	
Core Practical IV	
Skill based Elective course- I	
Skill based Elective course- II	
Skill based Elective course- III	
Skill based Elective course- IV	
Skill based Elective course- V	
Skill based Elective course- VI	
Non Major Elective I	
Non Major Elective II	

Subject Paper	Paper Code
Allied Paper I	
Allied Paper II	
Allied Paper III	
Allied Paper IV	
Allied Practical I	
Allied Practical II	

Semester – I **Core –I** **Code:**

MECHANICS

Hours: 5 /wk **Credit Points: 5**

Internal Marks: 25 marks **External Marks: 75 marks**

UNIT I:

Projectile:

Definition of Range, time of flight and angle of projection –Range up and down an inclined plane maximum range – two directions of projections for a given velocity and range

Impulse–Impact:

Laws of impact – coefficient of restitution – impact of a smooth sphere on a fixed smooth plane – Direct impact between two smooth spheres – Loss of kinetic energy in direct impact – velocity change in oblique impact between two smooth spheres.

UNIT II

Simple Harmonic Motion:

Composition of two SHM's of same period along a straight line and at the right angles to each other –Lissajou's figures.

Dynamics of Rigid Bodies:

Moment of inertia–kinetic energy of a body rotating about a fixed axis–angular momentum of a rotating body–relation between torque and angular acceleration of a rigid body

Compound pendulum theory – interchangeability of center of suspension and center of oscillation – condition for minimum period –determination of g using compound pendulum – Bifilar pendulum – parallel threads

UNIT III

Center of gravity

Center of gravity of a solid cone, Solid hemisphere, hollow hemisphere and a tetrahedron

Friction:

Laws of friction – angle of friction – resultant reaction and cone of fiction – equilibrium of a body on an inclined plane under the action of a force

UNIT IV

Center of pressure:

Definition – center of pressure of a rectangular lamina and triangular lamina.

Hydrodynamics:

Equation of continuity of flow – Bernoullie's theorem – venturimeter – Pitot's tube

UNIT V

Classical Mechanics:

Mechanics of system of particles – conservation theorem for linear momentum, angular momentum and energy – constraints and its classification

Generalized coordinates – transformation between generalized coordinate and physical coordinates – principle of virtual work – D' Alembert's principle – derivation of Lagrangian equation of motion from D' Alembert's principle – Atwood's machine.

Books for Study:

1. R. Murugeshan, *Mechanics and Mathematical Physics*, S.Chand& Company Ltd., New Delhi , Third Revised Edition (2008)
2. M. Narayanamurthi and N. Nagarathinam, *Dynamics*, the National Publishing Company, 8th Edition(2008)
3. Narayanamurthi andM. Nagarathnam, *Statics, Hydrostatics and Hydrodynamics*, The National Publishing Company, 8th Edition(2008)

Books for Reference:

1. Herbert Goldstein, Charles Poole and John Safco, *Classical Mechanics*, Addition Wesley Publications (2005)
2. D.S. Mathur, *Mechanics*, S.Chand& Company Ltd., New Delhi, Third Revised Edition (2000)
3. Hugh D. Young and Roger A. Freedman, *Sears & Zemansky's University Physics with Modern Physics*, 14th Edition(2015)

Semester – II **Core – II** **Code:**

THERMAL PHYSICS

Hours: 5 /wk **Credit Points: 5**

Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT I

Thermometry and Calorimetry:

Platinum resistance thermometer –correction – advantages – definition of specific heat capacity –determination of specific heat capacity of liquid by Newton's law of cooling – specific heat capacities of a gas – determination of Cv by Joly's differential team calorimeter – determination of Cp by Regnault's method.

UNIT II

Low temperature physics:

Joule – Thomson effect – porous plug –theory and experiment – liquefaction of gases by Linde's process –liquefaction of Helium by K. Onnes method – properties of Helium I and Helium II –adiabatic demagnetization

Practical applications of low temperatures:

Applications in pure science – applications in in industry–Refrigeration– principle – carnot's cycle as refrigerator – refrigerant – Air conditioning – air conditioner

UNIT III

Thermodynamics:

Zeroth, first and second laws of thermodynamics –reversible and irreversible processes – heat engines – Carnot's petrol and diesel engines – their efficiency – entropy – change in entropy in reversible and irreversible processes – Third law of thermodynamics –Temperature – entropy diagram

UNIT IV

Conduction and Radiation:

Thermal Conductivity – definition –thermal conductivity of a bad conductor – Lee's disc method – good conductor – Searle's method – radiation – Blackbody radiation –definition – Wien's Displacement law – Rayleigh Jean's law – Planck's law – Stefan's law and experimental verification of Stepan's law – Solar constant – temperature of the sun by Angstrom's Pyrheliometer

UNIT V

Maxwell's Thermodynamic relations:

Derivation of Maxwell's thermodynamic relations – Helmholtz function – Gibb's function –Enthalpy – T–ds equation –Clausius–Clapeyron's Latent heat equation– specific heat relations

Books for Study:

1. Brijlal, Dr.N.Subramanyam and P.S. Hemne, *Heat and Thermodynamics*, S. Chand & Co, New Delhi , (2004)
2. R. Murugeshan and Kiruthiga Sivaprasath, *Thermal physics*, S. Chand & Co, New Delhi , (2008)
4. D.S. Mathur, *Heat and Thermodynamics*, S.Chand& Company Ltd., New Delhi (Third Revised Edition 2000).

Books for Reference:

1. J. B. Rajam and C. L. Arora, *Heat and Thermodynamics*, S.Chand& Company Ltd., New Delhi
2. A. B. Gupta and H. P. Roy, *Thermal Physics*, Books & Allied Ltd; 3rd Revised edition edition (2010)
3. Hugh D. Young and Roger A. Freedman, *Sears & Zemansky's University Physics with Modern Physics*, 14th Edition (2015)

SEMESTER – II

PHYSICS CORE PRACTICALS – I

Hours : 3 /wk **Credit Points : 4**

Internal Marks: 40 Marks **External Marks: 60 Marks**

List of experiments
(Any Sixteen Only)

1. Young's Modulus (q) – Non uniform Bending – pin and microscope method.
2. Young's Modulus (q) – Non uniform bending – scale and telescope method.
3. Torsion pendulum – Rigidity Modulus.
4. Surface tension and interfacial surface tension –Drop Weight method.
5. Compound pendulum – Determination of g and k.
6. Sonometer – frequency of a tuning fork –Determination of mass of a stone.
7. Viscosity of a liquid by graduated burette and mercury pellet method
8. Spectrometer – (i–d curve).
9. Spectrometer – Grating – normal incidence–measurement of Wavelength.
10. Potentiometer – calibration of low range Voltmeter.
11. P.O. Box – Temperature coefficient of resistance.
12. Lee's Disc – Thermal conductivity of a bad conductor and emissivity.
13. Joule's calorimeter – Specific heat capacity of aliquid – Barton's correction.
14. Current and Voltage sensitivities of a galvanometer.
15. Construction of basic logic gates (AND, OR, NOT) using ICs and verification of truth tables
16. Construction of special logic gates (NAND, NOR, EX–OR) using ICs and verification of truth tables.
17. Low range power pack using two diodes.
18. Specific heat capacity of a liquid – method of mixtures – Half time correction.
19. Sonometer –Determination AC frequency
20. Forward bias and reverse bias characteristics of zener diode

Reference books:

1. Ouseph, Srinivasan & Vijayendran, Practical Physics

2.P. R. Sasi Kumar, Practical Physics –, PHI.

3. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam.

4. Practical Physics – St. Joseph College, Trichy.

Semester: III **Core: III** **Code:**

PROPERTIES OF MATTER AND SOUND

Hours : 4 /wk **Credit Points : 5**
Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT I:
Elasticity:

Three types of elastic moduli – Poisson's ratio – Bending of beams– Expression for bending moment –Cantilever–Depression of the loaded end of a Cantilever

Expression for Young's modulus (uniform and non–uniform bending) – experimental determination of Young's modulus using pin and microscope method (uniform and non–uniform bending) – Determination of Young's modulus by Koenig's method for non–uniform bending

Torsion of a body – expression for couple per unit twist – determination of rigidity modulus – Static torsion method with scale and telescope – determination of rigidity modulus by torsion pendulum with mass

UNIT II:

Viscosity:

Definition of Coefficient of viscosity with unit and dimension – expression for critical velocity–Poiseulli's formula for coefficient of viscosity and its correction – determination of coefficient of viscosity by capillary flow method (Poiseulli's method) – comparison of viscosities by Oswald's viscometer – viscosity of a highly viscous liquid –Stoke's formula–Stoke's method for the Coefficient of a highly viscous liquid

Diffusion:

Definition– Graham's laws of diffusion in liquids–Fick's laws of diffusion– Analogy with heat conduction– experimental determination of coefficient of diffusion (Diffusivity)–Graham's law of diffusion of gases–Effusion–transpiration

UNIT III:

Surface tension:

Definition of surface tension with unit and dimension– Surface energy – formation of drops– angle of contact – excess of pressure inside curved surface – Experimental determination of surface tension (Jaegar's method) – drop weight method of determining surface tension and interfacial surface tension – Quincke's method

Osmosis: Definition– experimental determination of osmotic pressure – Laws of osmosis– osmotic pressure and vapour pressure of a solution.

UNIT IV

Sound:

Equation of motion for a body executing angular simple harmonic oscillations–Definition of free, damped and forced vibrations – Theory of forced vibrations – Resonance – Sharpness of resonance – Fourier's theorem – application for Saw– tooth wave and square wave. –Sonometer – determination of A.C. frequency using sonometer

UNIT V

Ultrasonics:

Ultrasonics– Production –Piezo electric method –magnetostriction method – detection – properties – applications. Acoustics: Acoustics of buildings – reverberation time – derivation of Sabine's formula – determination of absorption coefficient.

Books for Study:

1. D.S. Mathur, *Elements of properties of matter*, S.Chand & Company Ltd., New Delhi (2010).
2. R. Murugeshan, *Properties of matter and acoustics*, S. Chand & Co, New Delhi (2012)
3. Brijlal and N. Subramanyam, *Properties of matter*, Eurasia Publishing House Limited (2005)
4. N. Subramaniam and Brijlal, *A Text Book of Sound*, Vikas Publication House Pvt Ltd, New Delhi (1999)

Books for Reference:

1. Richard P. Feynman, *Lectures on Physics. Vol. I & II*, The New Millennium Edition (2012)
2. David Halliday and Robert Resnick, *Fundamentals of Physics*, Wiley Plus, (2013)
3. B.H. Flowers and E. Mendoza, *Properties of matter*, Wiley Plus, 1991.
4. H.R. Gulati, *Fundamentals of General properties of matter*, S. Chand & Co. Pvt. Ltd, 2012.
5. Hugh D. Young and Roger A. Freedman, *Sears & Zemansky's University Physics with Modern Physics*, 14th Edition (2015)

Semester : IVCore : IV Code :

OPTICS

Hours : 6 /wk **Credit Points : 5**

Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT – I

Interference and Interferometers:

Coherence – temporal coherence and spatial coherence – Air wedge – testing the planeness of a surface– Michelson Interferometer – types of fringes – Difference in wavelength of Sodium D1, D2 lines and thickness of a thin transparent plate – Febry– Perot interferometer – formation of fringes. Holography: Holography – recording and reconstruction.

UNIT – II

DIFFRACTION AND OPTICAL INSTRUMENTS

Diffraction : Fresnel's and Fraunhoffer diffraction – Fresnel's half period zones – area of the half period zones – zone plate – Comparison of zone plate with convex lens – Fraunhoffer diffraction pattern with N slits(diffraction grating) – normal incidence – absent and overlapping spectra of diffraction grating. Optical Instruments: Rayleigh's criterion – Resolving power of a telescope, microscope and grating.

UNIT III

Polarization:

Polarization – Nicol prism as polarizer and analyzer –Dichroic Polarizers – Huygen's theory of double refraction in uniaxial crystals – Double image polarizing prisms – Quarter wave plate, Half wave plate –Babinet's compensator – Plane, elliptically and circularly polarized light – production and detection – Optical activity, analysis of light by Laurent's half shade polarimeter.

UNIT – IV

Aberrations:

Monochromatic aberrations – spherical aberration –methods of minimizing spherical aberration – Definition of coma, astigmatism and curvature of field, distortion – Method of minimizing spherical aberration – chromatic aberration – Equivalent focal length of two thin lenses – in contact and out of contact method. Eye pieces: Huygen's and Ramsden eyepiece – location of cardinal points. Velocity of light – determination of velocity of light – Kerr cell method

UNIT V

FibreOptics :

Introduction – fiber optic system – the fiber optic communication compared to metallic cable (electrical) communication– basic principle – total internal reflection – acceptance angle and numerical aperture – types of optical fibers based on material –propagation (transmission) of light through an optical fiber – index profile – fiber configurations – difference between single mode fiber and multimode fiber – difference between step index fiber and graded index fiber – fiber optic communication link.

Books for Study:

1. N. Subramaniyam, Brijlal and M.N. Avadhanulu, *A text book of Optics*, S. Chand & Co, New Delhi, (2012)
2. R. Murugeshan and Kiruthiga Sivaprasath, *Optics and spectroscopy*, S. Chand & Co, New Delhi (2010)
3. P. K. Chakrabarti, *Geometrical and Physical Optics*, New Central Book Agency (P) Ltd, Kolkata, (2010)
4. Ashok kumar, D.R. Khanna and H.R. Gulati, *Fundamentals of optics*, S. Chand & Co. Pvt. Ltd (2012)
5. Subir Kumar Sarkar, *Optic Fibres and Fibre Optic Communication Systems*, S. Chand & Co., New Delhi, 2003.

Books for Reference:

1. Eugene Hecht, *Optics*, Pearson, Fourth Edition, (2013)
2. Francis Jerkins and Harvey White, *Fundamental optics*, McGraw Hill Inc., New Delhi, (2011)
3. Ariel Lipson, Stephen G. Lipson & Henry Lipson, *Optical Physics*, Cambridge University Press; 4 edition (2010)
4. M.G. Raj, *Fundamentals of optics*, Anmol Publications Pvt. Ltd., NewDelhi (2004)
5. Hugh D. Young and Roger A. Freedman, *Sears & Zemansky's University Physics with Modern Physics*, 14th Edition (2015)

SEMESTER – IV

PHYSICS CORE PRACTICALS – II

Hours : 3 /wk **Credit Points : 4**

Internal Marks: 40 Marks **External Marks: 60 Marks**

List of experiments
(Any Sixteen Only)

01. Young's modulus (q) – uniform bending – pin and microscope.

02. Young's modulus (q) – uniform bending – scale and telescope method.

03. Static Torsion – Rigidity modulus.

04. Torsion Pendulum – Moment of Inertia and Rigidity modulus – symmetrical masses.

05. Surface tension of a liquid –capillary rise method.

06. Sonometer–relative density of solid and liquid

07. Specific heat capacity of a liquid by cooling – verification of Newton's law of cooling.

08. Air Wedge – thickness of a wire and its insulation.

09. Spectrometer – grating – minimum deviation –Determination of wavelength of mercury lamp.

10. Potentiometer – ammeter calibration.

11. Potentiometer – Specific resistance of the given coil and length of second coil without unwinding.

12. M and BH – Deflection Magnetometer – TAN A and TAN B position.

13. Field along the axis of a coil – deflection magnetometer –determination of BH.

14. Carey–Foster's bridge – Specific resistance of a coil.

15. BG – Comparison of Capacities.

16. BG – Comparison of EMF's of two cells.

17. Zener diode – Voltage regulator using four diodes and percentage of regulation.

18. Verification of De Morgan’s theorem.

19. Bridge rectifier

20. NAND and NOR gates as universal building block (Construction of AND, OR & NOT)

1. Ouseph, Srinivasan &Vijayendran, Practical Physics

2.P. R. Sasi Kumar, Practical Physics –, PHI.

3. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam.

4. Practical Physics – St. Joseph College, Trichy.

Semester: V Core: V Code :

ELECTRICITY AND MAGNETISM

Hours: 5 /wk Credit Points: 5

Internal Marks: 25 Marks External Marks : 75 Marks

UNIT I:

Principle of a capacitor – energy stored in a capacitor – energy density – change in energy due to dielectric slab – force of attraction between plates of a charged capacitor – capacitance of a spherical and cylindrical capacitors – types of capacitors – quadrant electrometer – measurement of potential, ionization current and dielectric constant.

UNIT II

Carey–Foster Bridge – theory – temperature coefficient of resistance – potentiometer – calibration of ammeter and high range voltmeter – thermoelectricity – laws of thermo e.m.f., intermediate metals, intermediate temperature – measurement of thermo e.m.f. using potentiometer–Peltier effect and Peltier coefficient – Thomson effect and Thomson coefficient – relation between π and σ – thermo electric diagrams and its uses.

UNIT III

Magnetic induction due to a straight conductor carrying current – magnetic induction on the axis of a solenoid – moving coil ballistic galvanometer – damping correction – determination of absolute capacity of a condenser – self – inductance by Anderson's Bridge method – experimental determination of mutual inductance – coefficient of coupling.

UNIT IV

Transient current – growth and decay of current in a circuit containing resistance and inductance – growth and decay of charge in a circuit containing resistance and capacitance – measurement of high resistance by leakage – growth and decay of charge in a *LCR* circuit – condition for the discharge to be oscillatory – frequency of oscillation.

UNIT V

Alternating current – peak, average and *RMS* value of current and voltage – form factor – ac circuit containing resistance and inductance – choke coil – ac circuit containing resistance and capacitance – series and parallel resonance circuits –*Q* factor – power in an ac circuit containing *LCR* – Wattless current – Transformer – construction, theory and uses – energy loss – skin effect.

Books for Study:

1. Brijlal and Subramaniam, *Electricity and Magnetism*, S. Chand & Co, New Delhi (2016)
2. R. Murugeshan, *Electricity and Magnetism*, S. Chand & Co, New Delhi (2016)
3. Hugh D. Young and Roger A. Freedman, *Sears & Zemansky's University Physics with Modern Physics*, 14th Edition (2015)

Books for Reference:

1. D. N. Vasudeva, *Electricity and Magnetism*, S. Chand & Co, New Delhi (2016)
2. K. K. Tewari, *Electricity and Magnetism*, S. Chand & Co, New Delhi (2016)
3. Hugh D. Young and Roger A. Freedman, *Sears & Zemansky's University Physics with Modern Physics*, 14th Edition (2015)

Semester: V **Core: VI** **Code:**

BASIC ELECTRONICS

Hours: 5 /wk **Credit Points: 5**
Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT I

Special diodes : Light Emitting Diode (LED) and its advantages – multicolor LEDs and its applications - Photo diode – characteristics and applications – Tunnel diode and its characteristics – Tunnel diode as an Oscillator – Varactor diode – Theory and its applications – Schottky diode – PIN diode and its applications.

UNIT – II

Transistor circuits : Transistor CB, CE, CC configurations-Common emitter transistor as an amplifier - DC and AC load line analysis - Transistor biasing - stabilization - base resistor method-feedback resistor method - Voltage divider bias method.

UNIT – III

Construction of JFET – its characteristics and parameters - Common source JFET amplifier - MOSFET - Depletion MOSFET- Enhancement MOSFET - UJT, SCR - Construction, working, V-I characteristics and their application.

UNIT – IV

Multistage transistor amplifier – definition of gain, frequency response, decibel gain and bandwidth – frequency response, advantages, disadvantages and applications of RC coupled two stage transistor amplifier and transformer coupled two stage amplifier.

Principle of feedback in amplifiers – positive and negative feedback – effect of negative feedback - emitter follower – positive feedback amplifier as an oscillator – Colpitt's oscillator, Hartley oscillator and Piezoelectric crystal oscillator.

UNIT – V

Multivibrators: Astable, monostable and bistable multivibrator using transistors. Operational Amplifier : Op-amp characteristics – Inverting and non inverting amplifier–voltage follower-adder, subtractor, integrator, differentiator, comparator, sign changer and scale changer-phase shift oscillator, Wien bridge oscillator – log and antilog amplifiers - multistage Operational Amplifier.

Books for Study:

1. B.L. Theraja, *Basic Electronics* (Solid state), S. Chand & Co.(2006)

2. V.K. Metha, *Principles of Electronics*, S. Chand & Co. (2005)

3. R.S. Sedha, *A text book of Applied Electronics*, S. Chand & Co. (2008)

4. Hugh D. Young and Roger A. Freedman, *Sears & Zemansky's University Physics with Modern Physics*, 14th Edition (2015)

Books for Reference:

1. D. Chattopadhyay& P.C. Rakshit, *Foundations of electronics*, New Age International Publishers (2015)

2. Gupta & Kumar, *Hand book of Electronics*, Pragati Prakhasan, Meerut(2012)

3. M.K. Bagde and S.P. Singh, *Elements of electronics*, S. Chand & Co. (1993)

Semester: V **Core: VII** **Code:**

ATOMIC PHYSICS

Hours: 5 /wk **Credit Points: 5**
Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT – I

Photoelectric effect – Lenard's method to determine e/m for photoelectrons – Richardson and Compton experiment – relation between photoelectric current and retarding potential – relation between velocity of photoelectrons and frequency of light – failure of electromagnetic theory – Einstein's light quantum hypothesis and photoelectric equation – experimental verification of photoelectric equation – Millikan's experiment.

UNIT – II

Positive ray analysis – Thomson's parabola method – theory – determination of e/m and mass of positive ions – Astons mass spectrograph determination of masses of isotopes – uses of mass spectrographs – separation of isotopes – mass spectrograph method – diffusion method – thermal diffusion method – pressure diffusion method.

UNIT – III

Theory of alpha scattering – Rutherford scattering formula – experimental verification – nature of privileged quantum orbits – Bohr's correspondence principle – effect of motion of nucleus – evidences in favour of Bohr's theory – Determination of critical potential – Davis and Goucher's method –Sommer field's relativistic atom model – application to fine structure of Hα line.

UNIT – IV

Description of vector atom model – quantum numbers associated with vector atom model – coupling schemes – J.J. coupling – LS. coupling– application of spatial quantisation– Pauli's exclusion principle – the selection rule – intensity rule –Lande's g factor – Bohr magneton– applications of vector atom model – electron configuration – magnetic dipole due to spin – Stern – Gerlach experiment.

UNIT – V

Spectral terms and notations – fine structure of Sodium D lines – fine structure of Hα line – Zeeman effect –Larmor's theorem – Quantum mechanical explanation of normal Zeeman effect – anomalous Zeeman effect of D1 and D2 lines of Sodium –Paschen– Bach effect – Stark effect.

Books for Study:

1. R. Murugeshan and Kiruthiga Sivaprasath, *Modern physics*, S. Chand & Co, New Delhi (2016)
2. J.B. Rajam, *Atomic physics*, S.Chand & Co., (2004)
3. N. Subramaniyam, Brijlal and Jivan Seshan, *Atomic and Nuclear Physics*, S. Chand & Co, New Delhi, (2013)

4. Hugh D. Young and Roger A. Freedman, *Sears & Zemansky's University Physics with Modern Physics*, 14th Edition (2015)

Books for Reference:

1. Max Born, *Atomic physics*, Dover Publications Inc, 8 edition, (1990)
2. Samuel Glasstone, *A Source book on Atomic energy*, Krieger Publishing Company; 3rd Revised edition (2014)
3. Henry Semat, John R. Albright, *Introduction to Atomic and Nuclear Physics*, Fletcher & Son Ltd, Norwich; (1972)
4. T.A. Littlefield, N. Thorley, *Atomic and Nuclear Physics*, Medtec, New Delhi (2013)
5. B.N. Srivatsava, *Basic Nuclear Physics and Cosmic rays*, Pragti Prakashan publishers, Meerut (2011)
6. Bernald L. Cohen, *Concepts of Nuclear Physics*, McGraw–Hill Inc., US (1971)

Semester: VI Code: VIII Core:
NUCLEAR PHYSICS

Hours: 5 /wk **Credit Points: 5**
Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT –I:

NUCLEAR STRUCTURE

General properties of nucleus – size, mass and charge–Proton – electron theory – proton – neutron theory – Nuclear size –experimental measurement of nuclear radius – mirror nuclei method –meson theory of nuclear forces – nuclear models – liquid drop model –Weizacker's semi – empirical formula – nuclear shell model.

UNIT –II:

NUCLEAR DETECTORS

Principle and working – solid state detector – proportional counter – Wilson's cloud chamber – Scintillation counter – Accelerators: Synchrocyclotron – Synchrotron – Electron synchrotron –proton synchrotron – Betatron

UNIT – III:

ARTIFICIAL TRANSMUTATION

Rutherford's experiment – Bohr's theory of Nuclear disintegration – Qvalue equation for a nuclear reaction – threshold energy – types of nuclear reaction – energy balance and the Q value – threshold energy of an endoergic reaction.

Nuclear fission – Bohr Wheeler theory – chain reaction – critical sizeand critical mass – Nuclear fission reactor – Nuclear fusion – source of stellar energy – Carbon – Nitrogen cycle – Proton – Proton cycle –Thermo Nuclear reaction – plasma.

UNIT –IV:

RADIOACTIVITY

Laws of successive disintegration – transient – and secular equilibria– range of alpha particles – experimental measurement – Geiger –Nuttal Law– alpha ray spectra – Gamow's theory of alpha decay and its experimental verification – Beta ray spectra – origin of line and continuous spectrum – Fermi's theory of beta decay – K electron capture– Nuclear Isomerism.

UNIT – V:

Elementary Particles:

Elementary Particles – types of interactions – classification of elementary particles – particle quantum numbers – baryon number –lepton number – strangeness number – hyper charge –isospin quantum number.

Books for Study:

1. R. Murugeshan and Kiruthiga Sivaprasath, *Modern physics*, S. Chand & Co, New Delhi (2016)
2. J.B. Rajam, *Atomic physics*, S.Chand& Co., (2004)
3. N. Subramaniyam, Brijlal and Jivan Seshan, *Atomic and Nuclear Physics*, S. Chand & Co, New Delhi, (2013)
4. D.C.Tayal, *Nuclear Physics*, Himalaya Publishing House (2011)
5. Hugh D. Young and Roger A. Freedman, *Sears & Zemansky's University Physics with Modern Physics*, 14th Edition (2015)

Books for Reference:

1. Max Born, *Atomic physics*, Dover Publications Inc, 8 edition, (1990)
2. Samuel Glasstone, *A Source book on Atomic energy*, Krieger Publishing Company; 3rd Revised edition (2014)
3. Henry Semat, John R. Albright, *Introduction to Atomic and Nuclear Physics*, Fletcher & Son Ltd, Norwich; (1972)
4. T.A. Littlefield, N. Thorley, *Atomic and Nuclear Physics*, Medtec, New Delhi (2013)
5. B.N. Srivatsava, *Basic Nuclear Physics and Cosmic rays*, Pragti Prakashan publishers, Meerut (2011)
6. Bernald L. Cohen, *Concepts of Nuclear Physics*, McGraw–Hill Inc.,US (1971)

Semester: VICore : IX Code :

QUANTUM MECHANICSAND RELATIVITY

Hours : 5 /wk **Credit Points : 5**
Internal Marks: 25 Marks External Marks : 75 Marks

UNIT I:

WAVE MECHANICS I

Inadequacy of classical mechanics –Matter waves – de Broglie wavelength – characteristics of waves (amplitude– frequency– angular frequency– time

period– wave number– phase)– wave packet– phase velocity– group velocity– Davisson and Germer Experiment – G.P. Thomson's experiment

UNIT II:

WAVE MECHANICS II

Heisenberg's Uncertainty Principle– Elementary proof between Displacement and Momentum, Energy and Time– Illustration– Diffraction of electrons through a slit– Gamma ray microscope through experiment– Application– Non–existence of free electrons in the nucleus– Size and Energy in the ground state of Hydrogen atom

Basic postulates of wave mechanics –eigen value and eigen function– operator formalism – linear operators –self–adjoint operators – expectation values (position and momentum) –

UNIT III:

SCHRÖDINGER'S WAVE EQUATION IN ONEDIMENSION

Schrödinger'swave equation for time dependent and time independent forms –Schrodinger's equation for free particle – physical significance and properties of wave function –Normalized and orthogonal wave function–Particle in a box–Tunneling effect–Barrier penetration problem – Linear harmonic oscillator–zero point energy

UNIT IV:

SCHRÖDINGER'S WAVE EQUATION IN THREEDIMENSION

Three dimensional schrödinger's wave equation– Hydrogen atom– Wave equation for the Motion of a electron– Separation of variables– Azimuthal wave equation and its solution– Radial wave equation and it's solutions– Polar wave equation and its solution– Rigid rotator – Separation of variables – Rotational energy levels and eigen functions.

UNIT V:

RELATIVITY

Frame of reference –Gallilean transformation – Michelson & Morley experiment – postulates of special theory of relativity – Lorentz transformation – length contraction – time dilation – relativity of simultaneity – addition of velocities – variation of mass with velocity –mass – energy relation – Minkowski's four dimensional space – time continuum – four vectors – elementary ideas of general theory of relativity.

Books for Study:

1. R. Murugeshan and Kiruthiga Sivaprasath, *Modern physics*, S. Chand & Co, New Delhi (2016)
2. V.K. Thangappan, *Quantum mechanics*, New Age International, (1993)
3. P.M. Mathews and K. Venkatesan, *A Text book of Quantum Mechanics*, Tata McGraw–Hill, New Delhi (1976)
4. G. Aruldass, *Quantum Mechanics*, Prentice–Hall Of India Pvt. Limited, (2002)
5. Hugh D. Young and Roger A. Freedman, *Sears & Zemansky's University Physics with Modern Physics*, 14th Edition (2015)

Books for Reference:

1. Max Born, *Atomic physics*, Dover Publications Inc, 8 edition, (1990)
2. Ajoy Ghatak& S. Loganathan, *Quantum Mechanics*, Springer (2004)
3. Linus pauling, E. Bright wilson, *Introduction to Quantum mechanics, Dover Publications Inc.*, United States (1985)
4. Arthur Beiser, *Concepts of modern Physics*, McGraw Hill Education; 6 edition (2009)

SEMESTER – VI

PHYSICS CORE PRACTICALS – III

Hours : 3 /wk **Credit Points : 4**

Internal Marks: 40 Marks **External Marks: 60 Marks**

List of experiments
(Any Sixteen Only)

01.Cantilever - Young's modulus *(q)* - mirror and Telescope.

02.Coefficient of viscosity - ungraduated burette - radius by mercury pellet.

03.Newton's rings - refractive index of a lens.

04.Spectrometer - i - i' curve.

05.Spectrometer - small angled prism.

06.Potentiometer - calibration of high range voltmeter.

07.Comparison of two low resistances by a potentiometer.

08.Deflection magnetometer - m and BH - $Tan\ C$ position.

09.Determination of thermo e.m.f - direct method – spot galvanometer.

10.Copper Voltameter-M and B_H.

11.B.G. - Charge Sensitivity.

12.B.G. - Determination of absolute capacity.

13.B.G. - Measurement of High resistance by leakage.

14.FET – Characteristics.

15.UJT – Characteristics.

16.SCR – Characteristics.

17.Hartley Oscillator.

18.Colpitt's Oscillator.

19.Microprocessor *8085* – Addition and Subtraction.

20. Microprocessor *8085* –Multiplication and Division.

Books for Study & Reference

1. Ouseph, Srinivasan & Vijayendran, Practical Physics

2.P. R. Sasi Kumar, Practical Physics –, PHI.

3. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam.

4. Practical Physics – St. Joseph College, Trichy.

SEMESTER – VI
PHYSICS CORE PRACTICALS – IV

Hours : 3 /wk **Credit Points : 4**
Internal Marks: 40 Marks **External Marks: 60 Marks**

List of experiments
(Any Sixteen Only)

01. Koenig's method - non - uniform bending.

02. Koenig's method - uniform bending.

03. Bifilar pendulum - Parallel threads.

04. Spectrometer - dispersive power of a grating.

05. Spectrometer - Cauchy's constant.

06.Potentiometer - EMF of a thermocouple.

07. Field along the axis of a coil - vibration magnetometer.

08. Carey Foster's bridge - temperature coefficient of resistance

09. Astable multivibrator using *555* timer

10. Monostable multivibrator using *555* timer

11. RS - flip flops using NAND and NOR gates.

12. RC coupled amplifier - single stage.

13. Common source FET Amplifier.

14. Operational amplifier-Inverting and Non inverting.

15. Operational amplifier-Adder and Subtractor.

16. Operational amplifier - Integrator and Differentiator.

17. V-I Characteristics of LED.

18. BCD to Seven segment display.

19. Half adder and Full adder.

20. Half subtractor and Full subtractor.

Reference books:

1. Ouseph, Srinivasan & Vijayendran, Practical Physics

2.P. R. Sasi Kumar, Practical Physics –, PHI.

3. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam.

4. Practical Physics – St. Joseph College, Trichy.

Semester: V **Core Elective: I** **Code:**

MATHEMATICAL PHYSICS &NUMERICAL METHODS

Hours: 5 /wk **Credit Points: 5**
Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT I: MATRICES

Solution of linear equation – Cramer's rule – characteristics matrix and characteristics equation of a matrix – eigen values and eigenvectors – sub space and null space Diagonalisation of 3 x 3 symmetric matrices

UNIT II: BETA AND GAMMA FUNCTIONS

Fundamental properties of gamma functions – the value and graph of gamma function – transformation of gamma function – different forms of beta function – relation between beta and gamma function –application

UNIT III: CURVE FITTING

Principle of least square – fitting a straight line – linear regression –fitting a parabola - fitting an exponential curve

UNIT IV: ITERATIVE METHODS

Solving non – linear equation – bisection method – Successive approximation – Newton Raphson method – modified Euler's method –Runge – Kutta method (second and third orders only)

UNIT V: NUMERICAL INTEGRATION

General formula – Trapezoidal rule – Simpson's - 1/3 rd rule and 3/8th rule – Gaussian quadrature formula

Books for study:

1. B. D. Gupta, *Mathematical Physics*, Vikas Publishing House, (2009)
2. S.S. Sastry, *Introductory methods of numerical analysis*, Prentice Hall of India, New Delhi (2012)
3. A. Singaravelu, *Numerical methods*, Meenakshi Agency, Chennai(2008)
4. M.K.Venkataraman, *Numerical method in Science and Engineering*, The National Publishing Company, Chennai,(1999)
5. R. Murugeshan, *Mechanics and Mathematical Physics*, S.Chand & Company Ltd., New Delhi , Third Revised Edition (2008)

Semester: V Core Elective: II Code:

SOLID STATE PHYSICS

Hours: 5 /wkCredit Points: 5

Internal Marks: 25 Marks External Marks: 75 Marks

UNIT I : CRYSTAL STRUCTURE

Crystal lattice - primitive and unit cell – crystal systems – Bravais lattice - Miller indices – Structure of Crystal - Simple Cubic, Body Centered Cubic, Face Centered Cubic and Hexagonal Close Packed structure, Sodium chloride structure, Zinc blende structure and Diamond structure.

UNIT II : CRYSTALLOGRAPHY AND CRYSTAL IMPERFECTIONS

X ray Spectrum - Moseley's law - diffraction of X-rays by crystals -Bragg's law in one dimension - Experimental method in X-ray diffraction – Laue's method, rotating crystal method – powder photograph method - point defects – line, surface and volume defects- effects of crystal imperfections.

UNIT III : MAGNETIC PROPERTIES

Different types of magnetic materials (dia- , para- , ferro – and antiferro) – Langevin's theory of diamagnetism - Langevin's theory of paramagnetism - Weiss theory of paramagnetism - quantum theory of ferromagnetism - ferrites - general properties of superconductors –type I & type II superconductors.

UNIT IV : DIELECTRIC PROPERTIES

Fundamental definition in dielectrics - different types of electric polarization - frequency and temperature effects on polarization -dielectric loss - Claussius - Mosotti relation - determination of dielectric constant - dielectric breakdown - properties of different types of insulating materials.

UNIT - V: MODERN ENGINEERING MATERIALS

Polymers - ceramics - super strong materials – cermets– high temperature materials – thermoelectric materials - electrets – nuclear engineering materials – plastics - metallic glasses - optical materials -fiber optic materials & uses.

Books for Study:

1. C. Kittel, *Introduction to Solid State Physics*, John Wiley (2004)
2. M. Arumugam, *Material Science*, Anuradha Agencies, (2004)
3. G. Vijayakumari, *Engineering Physics*, Vikas Publications
4. Hugh D. Young and Roger A. Freedman, *Sears & Zemansky's University Physics with Modern Physics*, 14th Edition (2015)

Books for Reference:

1. Raghavan, *Materials Science and Engineering*, (2004).
2. Azaroff, *Introduction to Solids*, (2004).
3. A.J. Deckker, *Solid State Physics*, (2004).

Semester: V **Core Elective: III** **Code:**

APPLIED PHYSICS

Hours: 5 /wk **Credit Points: 5**

Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT I

Crystal Growth

Nucleation concept – kinds of nucleation – equilibrium - stability and meta stable state – classical theory of nucleation – kinetic theory of nucleation – energy formation of a nucleus – various crystal growth methods – growth of crystals from solutions – preparation of a solution– saturation and super saturation – low temperature solution growth –slow cooling method – Mason

Jar method – evaporation method –crystal from gel – growth of crystals from melt – Bridgmann method.

UNIT II

Nanomaterials

Synthesis and classification of synthesis methods –techniques used in synthesis of nano materials – Chemical vapour Deposition, Sol-gel technique, Electro Deposition method, Ball Milling method – Properties of nano materials and applications

UNIT III

Vacuum Technology

Vacuum - Importance of Vacuum technology in Industry – unit of vacuum – pressure range for low vacuum to ultra-high vacuum

Pumps: Cenco-havoc rotating oil pump, Mercury diffusion pump and Turbo molecular pump.

Gauges: Pirani gauge, Penning gauge and Mc Lead gauge

UNIT IV

Spectroscopy

Resonance Spectroscopy Techniques : Principle of NMR spectroscopy – spectrometer and simple applications; Principle of NQR spectroscopy – spectrometer and simple applications; Principle of ESR spectroscopy – spectrometer and simple applications; Principle of Moss Bauer spectroscopy – spectrometer and simple applications.

UNIT V

Bio Physics

Basis of bio molecules and molecular system-Membrane biophysics - nerve cell - bio physical basis of nerve impulse conduction – membrane potential – resting potential and action potential - Gross bioelectrical phenomenon of ECG and EEG-Molecular basis of muscle contraction, ultra structure and molecular basis of vision and hearing

Books for study :

1. Charles P. Poole Jr, Frank J.Owens, *Introduction to Nanotechnology*, Wiley , India
2. T. Pradeep, *NANO: The Essentials* , McGraw-Hill Education

3. G. Vijayakumari, *Engineering Physics,* Vikas publications.
4. Dr. P. Ramaswamy and P.Santhana Ragavan, *Crystal Growth: Process and Methods*, Kuru Publications, Kumbakonam.
5. M. V. Volkenshtein , *Biophysics*, Mir Publications.
6. Peter Gray, *Biophysics: Concepts and Mechanism*, EW press.
7. Straughan and Walker, *Spectroscopy* — Vol. I, II and III,
8. V.V. Rao etal, *Vacuum Science and Technology*, Allied Publishers Ltd.
9. Narayanan.P, *Essentials of Bio-Physics*, New Age Publications

Semester: V **Core Elective: IV Code:**

ENERGY PHYSICS

Hours: 5 /wk **Credit Points: 5**
Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT I : SOLAR ENERGY

Solar constant - solar radiation at the earth's surface - beam and diffuse solar radiation - solar radiation measurements – angstrom compensation Pyrheliometer - solar records - solar pond – application of solar ponds – solar cells - principle - semiconductor fixation –conversion, efficiency and power output - solar functions – solar cooking - box type solar cooker - solar green house - types of greenhouses.

UNIT II : WIND ENERGY

Basic principles of wind energy conversion - wind data and energy estimation - basic components of a Wind Energy Conversion System(WECS) - generator control - local control - application of wind energy- energy from tides

UNIT III : BIO-MASS ENERGY

Biomass energy - classification - Biomass conversion technologies -thermo chemical conversion - fermentation - photosynthesis -classification of biogas plants - Janta bio-gas - plant - gasification of wood - ethanol from wood by acid hydrolysis.

UNIT IV : ENERGY STROAGE

Lead acid battery - Nickel cadmium battery - high temperature battery- Sodium sulphur cell - advantages of Batteries - Hydrogen storage.

UNIT V : ENERGY CONSERVATION

Principles of energy conservation - types of energy audit – energy conservation approach technologies - co-generation - gas turbines and diesel engine - heat pipes - principle - classification of heat pipes

Books for study :

1. G. D. Rai, *Solar Energy*(1995)

2. S. P. Sukhatme, *Solar Energy*-, TMH Second Edition (1997)

3. G. D. Rai, Non - *Conventional energy Sources*, Khanna Publication (2003)

4. M. P. Agarwal, *Solar Energy*, S. Chand & Co.,

Semester : VI **Core Elective: VCode:**

LASER AND SPECTROSCOPY

Hours: 5 /wk **Credit Points: 5**

Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT I : ATOMIC SPECTROCOPY

Constant deviation spectrometer – Hartmann's formula – fine structure and super fine structure – Solar Spectrum – high resolution Spectroscopy – L. G. plate – Fabry – Perot etalon application

UNIT II : MOLECULAR SPECTROCOPY

Microwave spectroscopy – theory – pure rotational Spectra of diatomic molecules – rigid rotator – symmetric and asymmetric top molecule –microwave spectrometer – microwave oven

UNIT III : LASER PHYSICS

Laser – spontaneous and stimulated emission – population inversion –laser pumping – Einstein's coefficient resonators – vibrational modes of resonators – control resonators – Q- factor – losses in the cavity –Ruby laser – Helium Neon Laser – CO2 laser – solid state laser –Application of lasers in industry, medicine and instrumentation, holography

UNIT IV : INFRARED SPECTROSCOPY

energy of diatomic molecules –simple harmonic oscillator – diatomic vibrating rotator –vibration – rotation spectrum of Carbon Monoxide – Breakdown of the Born Oppenheimer –approximation –interaction of rotation and vibration – techniques and instrumentation – double and single – beam operation

UNIT V : RAMAN SPECTRPSCOPY

Raman effect – classical and quantum theory – molecular polarizability– pure rotational Raman spectra of linear molecules – vibrational Raman spectra – structure determination - vibrational spectroscopy-techniques and instrumentation

Books for study and reference :

1. N. Subramaniyam, Brijlal and M.N. Avadhanulu, *A text book of Optics*, S. Chand & Co, New Delhi, (2012)
2. R. Murugeshan and Kiruthiga Sivaprasath, *Optics and spectroscopy*, S. Chand & Co, New Delhi (2010)
3. Banwell, *Fundamentals of molecular spectroscopy*, Tata Mcgraw Hill, New Delhi(2016)
4. M.N.Aravamudhan, *An introduction to Laser theory and application*, S. Chand & Co. Pvt. Ltd (2012)
5. Chang Raymond, *Basic principles of spectroscopy*, McGrawHill, New Delhi, 2003.
6. Gurdeep R. Chatwal, *Spectroscopy (Atomic and Molecular)*, Himalaya Publishing House,
7. Nityanand Chowdry and Richa Verma, *Laser systems and applications*, PHI, (2011)
8. G. Aruldass, *Molecular Structure and Spectroscopy*, PHI (2007)

Semester: VI **Core Elective: VI Code:**

ELECTRONIC COMMUNICATION

Hours: 5 /wk **Credit Points: 5**

Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT – I

Modulation

definition - types of modulation AM, FM, PM – expression for amplitude modulated voltage - wave form of amplitude modulated wave - collector modulation circuit - single side band generation -balanced modulator - AM transmitter - block diagram and explanation- frequency modulation - expression for frequency modulated voltage -side bands in FM, AM production by transistor modulator -comparison of AM, FM, PM.

UNIT - II

Demodulation

Definition - diode detection of AM signals – FM detection - Foster Seely discriminator - radio receivers – straight receivers - TRF receivers - super heterodyne receivers - block diagram- explanation of each stage - FM receivers – block diagram.

UNIT – III

Television

Plumbicon - vidicon - scanning and interlaced scanning – block diagram of TV transmitter and receiver - colour TV - generation R, G,B signals - simplified block diagram of colour TV transmitter and receiver – TV transmitting antennas - dipole panel - TV receiving antenna - Yagi antenna - log antenna - log periodic antenna.

UNIT - IV

RADAR and Satellites

principle of radar - Radar equation - radar – transmitting systems - radar antennas - duplexer - radar receivers uses of radar – introduction to Satellite communication system –Basic components – Telemetry – and command system (Block diagram) – Satellite links

UNIT - V

Digital communication

Digital technology - fundamentals of data communication systems - characteristics of data transmission circuits– digital codes - error detection and correction - data sets and interconnection - requirements - modern classification – modern interfacing

Books for Study:

1. Gupta & Kumar, *Hand book of Electronics*, Pragati Prakhasan, Meerut (2012)

2. Kennedy and Davis , *Electronics Communication Systems*, TMH

3. Dennis Roddy and John Coolen, *Electronics Communications*, Pearson Education Publication (1995)

4. Louis E. Frenzel, *Principles of Electronic Communication Systems*, McGraw-Hill Education (2007)

Semester: II Skill Based Elective: I Code:

SPACE SCIENCE

Hours: 2 /wk **Credit Points: 2**
Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT I: Universe

Planets - interior planets - exterior planets - crust, mantle and core of the earth - different - region of earth's atmosphere - rotation of the earth - magnetosphere - Van Allen belts - Aurora.

UNIT II: Comets, Meteors, Asteroids

Composition and structure of comets - periodic comets – salient features of asteroids, meteors and its use

UNIT III : Sun

Structure of photosphere, chromosphere, corona - sunspots – solar flares - solar prominences - solar piages - satellites of planets -structure, phases and their features of moon.

UNIT IV : Stars

Constellations - binary stars - their origin and types star clusters –globular clusters - types of variable stars - types of galaxies.

UNIT V : Origin of Universe

Big bang theory - pulsating theory - steady state theory – composition of universe expansion

Reference:

1. K.D. Abyankar, *Astrophysics of the solar system*, University press, India

(1999)

2. BaidyanathBasu, Sudhindra Nath Biswas And Tanuka Chattopadhyay,

An Introduction To Astrophysics, Prentice Hall OfIndia, New Delhi (2010)

3. Prof. P. Devadas, *The fascinating Astronomy*, Devadas Telescopies, Chennai

4. R.P. Singhal, *Elements of Space Physics*, PHI, (2009)

Semester : III **Skill Based Elective : II** **Code :**

PROGRAMMING IN C LANGUAGE

Hours: 2 /wk **Credit Points: 2**

Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT - I

Evolution of computers - computer generations - history of development of computers

UNIT - II

Input unit - output unit - Central Processing Unit (CPU) –programming languages - algorithms - flow charts - operating system -basic principle

UNIT - III

Basic structure of C - programs - constants - variables - data type –declaration of variables - defining symbolic constants, operators and expression - reading a character - writing a character – formatted input and output statements

UNIT - IV

Control statements - simple if, if – else, else - if ladder – switching statements - go to statement - break and continue looping - while-do for statements - arrays - user defined functions - string functions -streat, strcpy, strlen, strcmp - elementary idea.

UNIT - V

Development of algorithm, flow chart and program for the following

1. Average of a set of numbers
2. Area of a triangle
3. Sorting a set of numbers in ascending and descending order
4. Summing the series of numbers
5. Solving the series of numbers.

Books for study and Reference :

1. E. Balagurusamy, Programming in ANSI C, McGraw Hill Education (2012)
2. Byron Gottfried, Jitender Chhabra, Programming with C, Schaum Series (2010)
3. Henry Mullish (Author), Herbert L. Cooper (Author),The Spirit of C (1998)
4. S. ThamaraiSelvi and R. Murugesan, C for all, Pearson education (2012)

Semester: V **Skill Based Elective: III** **Code:**

BIO – MEDICAL INSTRUMENTATION

Hours: 2 /wk **Credit Points: 2**
Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT I:

Introduction – Cells and their structures –Nature of cancer cells –Transport of ions through the cell membrane –Resting and acting potentials – Bio electric potentials –Difficult system of human body

UNIT II:

Electro - Cardiography (ECG) - Electromyography (EMG) - Electro - Encephelograph (EEG) - Phonocardiography

UNIT III:

Pacemakers - introduction - external and internal pacemakers -artificial heart valves - (principle - block diagram and operation)

UNIT IV:

Anesthesia machine - recording fetal heart movements and blood circulation using doppler ultrasonic method - laser based Doppler blood flow meter - Blood cell counter - B.P. measurement - direct and indirect method - Haemocytometer - counting of RBCs and WBCs.

UNIT V:

Radiation safety instrumentation - effects of radiation exposure –radiation monitoring instruments - pocket dosimeter - pocket typeradiation alarm

Books for Study and Reference:

1. Dr. M. Arumugam, Bio-medical Instrumentation, Anuradha Agencies (2002)

2. John G. Webster, Medical Instrumentation: Application and Design, John Wiley &Sons Inc (2009)

3. P.K. Bajpai, Biological Instrumentation and methodology, S Chand & Co (2010)

Semester: V **Skill Based Elective: IV** **Code:**

DIGITAL ELECTRONICS

Hours: 2 /wk **Credit Points: 5**
Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT I

Number system and codes

Binary, Octal, Hexadecimal – inter conversion – Gray code – excess 3-code – ASCII code – basic gates – DeMorgan's theorem – universal gates.

UNIT II

Boolean algebra

Laws of Boolean algebra – solving Boolean expression – K-map –minterms-– SOP – K-map simplification using minterm (2, 3 and 4variables) – POS – K-map simplification using max terms (2, 3 and 4variables) – incomplete specified functions.

UNIT III

Arithmetic and logic circuits

Half adder – Full adder – Half subtractor – Full subtractor – Decoder –BCD to seven segment decoder – Encoder – decimal to BCD encoder –multiplexer – applications – de-multiplexer.

UNIT IV

Sequential circuits

RS Flip flop using NOR and NAND gates – clocked RS flip flop – D flipflop – JK flip flop – Master Slave JK flip flop – Registers – Shift Registers (right to left and left to right) – applications.

UNIT V

Counters and data converters

Counters – modulus of a counter – asynchronous counter (4-bits) – synchronous counter (3-bits) – BCD counter – D/A conversion – R-2Rbinary ladder method – A/D conversion – successive approximation.

Books for study :

1. Don Leach, Albert Malvino, *Digital principles and applications*, McGraw-Hill Inc., US (1994)
2. V. Vijayendran, *Digital fundamentals*. S. Viswanathan Printers and Publishers Pvt. Ltd., (2009)
3. Virendra Kumar, *Digital electronics*, New Age International Publishers (2007)
4. Avinashi Kapoor and L. K. Maheswari, *Digital Electronics - Principles and Practice*, Macmillan India Limited (2004)
5. D. A. Godse and A.P. Godse, *Digital electronics*, Technical Publlsher, Pune (2008)
6. Morris Mano, *Digital Logic and Computer Design*, Pearson Education (2004)

Semester : VI **Skill Based Elective : V** **Code:**

Basic of Electricity and APPLIANCES

Hours: 5 /wk **Credit Points: 5**

Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT I

Electrical charge – current – potential – units – Ohm's law – electrical energy – power – watt – kWh – consumption of electrical power –resistance – capacitance – inductance and its units – measuring meter -Galvanometer, ammeter, voltmeter and multimeter.

UNIT II

Principles of transformers – constructional details – Core type, Shell type – classification of transformers – EMF equation – voltage ratio –current ratio – transformer on no load – auto transformer –applications.

UNIT III

AC and DC – single phase and three phase connections – three phase transformer – house wiring star-star, star-delta, delta –star connections – overloading – earthing – short circuiting – fuses –cooling of transformers – protective devices and accessories – losses in transformer.

UNIT IV

Electrical bulbs – fluorescent lamps – inverter – UPS – Stabilizer –principle and operations of fan – wet grinder – mixer – water heater –electric iron box – microwave oven – refrigerator.

UNIT V

Electric heating – resistance heating – induction heating – high frequency eddy current heating – Dielectric heating – resistance welding – electric arc welding – occupational hazards due to chemical reactions.

Books for study and reference:

1. P. L. Soni, P.V. Gupta and V.S.Bhatnagar, *A text book in electric power*, Dhanpat rai sons,
2. E.O. Taylor, *Utilization of electrical energy*, Orient Longman
3. H. Partas, *Arts and Science of utilization of electrical energy* DhanpatRai& Sons, New Delhi
4. J.B. Gupta, *An integrated course in electrical engineering*, S.K. Kataria & Sons (2013)
5. B.L. Teraja and A.K. Teraja, *A Textbook of Electrical Technology,* S. Chand & Co. New Delhi (2006)
6. *Alternating current electrical engineering*, Philip Kemp, Mcmillan (1963)

Semester: VI Skill Based Elective: VI Code:

MICROPROCESSOR AND ITS APPLICATIONS

Hours : 2 /wk Credit Points : 2

Internal Marks: 25 Marks External Marks : 75 Marks

UNIT- I

Terms related to microprocessor (microprocessor, micro computer, Bit, Byte, MSB, LSB, Nibble, Word, Instruction, Bus, Mnemonic, Program, Machine language, Assembly language) - Functional block diagram of micro computer - Development of microprocessor – Pin configuration of microprocessor of 8085 – power supply - address bus – Multiplexed address/data bus – control and status signals- interrupt signals –clock signals- hand shake signals – reset signals

UNIT-II

Architecture of microprocessor 8085 – Word length –registers – ALU – Accumulator – stack pointer – program counter – Instruction register – Instruction decoder & machine cycle encoder – timing and control unit - Flags – PSW –internal data bus –Instruction format – Mnemonics – Classification of instructions of 8085 based on their length with examples

UNIT-III

Addressing modes of 8085- Instruction set of 8085 – Classification of instruction set based on their operations with examples – Data transfer operations – Arithmetic operations – Logical operations – Branching operations – Machine control operations

UNIT-IV

Assembly language programs: Transferring a block of data – 8 bit addition - 8 bit subtraction - 8 bit multiplication – 8 bit division –Square root of a number

UNIT-V

Assembly language programs: Arranging numbers in ascending and descending order (Bubble sort method) – Finding greatest and smallest number in an array – Sum of N numbers – Generating Fibonacci series

Books for Study and reference:

1. Ramesh Gaonkar, *Microprocessor Architecture, Programming and Applications with the 8085*, Penram International Publishing, 6th edition (2013)
2. B. Ram, *Fundamentals of Microprocessor and Microcontrollers*, Dhanpat Rai Publications (2008)
3. Aditya P. Mathur, *Introduction to Microprocessor*, Mc graw Hill (1990)
4. V. Vijayendran, *Fundamental of Microprocessor 8085: Architecture Programming, and Interfacing*, Viswanathan, S., Printers & Publishers PVT Ltd (2009)
5. Charles M. Gilmore, Microprocessor: Principles and Application, McGraw-Hill (1995)

Semester: III Non-Major Elective: I Code:
ESSENTIALS OF ELECTRICITY

Hours: 2 /wkCredit Points: 2
Internal Marks: 25 Marks External Marks: 75 Marks

UNIT I:

Electrification by friction - two kinds of electricity - capacitor -principle of condenser - types of condensers - fixed condenser -variable condenser.

UNIT II:

Condenser boxes - electrolytic condenser - guard ring - condenser -condenser in series - condensers in parallel.

UNIT III:

Electric field - potential - Ohm's law - electrical energy and power -resistance - types of resistance - fixed resistance - variable resistance.

UNIT IV:

Colour codes - resistance in series - resistance in parallel - Kirchoff's law - application to Wheatstone's network.

UNIT V:

Primary cell - Daniel, Lechlanche, Dry cell - Secondary cell - Lead acid, Nickel (Principle only) - Cadmium cell - rechargeable cell.

Books for Study and Reference:

1. Brijlal and Subramaniam, *Electricity and Magnetism*, S. Chand & Co, New Delhi (2016)
2. R. Murugeshan, *Electricity and Magnetism*, S. Chand & Co, New Delhi (2016)

Books for Reference:

1. D. N. Vasudeva, *Electricity and Magnetism*, S. Chand & Co, New Delhi (2016)
2. K. K. Tewari, *Electricity and Magnetism*, S. Chand & Co, New Delhi (2016)
3. Hugh D. Young and Roger A. Freedman, *Sears & Zemansky's University Physics with Modern Physics*, 14th Edition (2015)

Semester: IV **Non-Major Elective: II** **Code:**

PHYSICS IN EVERYDAY LIFE

Hours: 2 /wk **Credit Points: 2**
Internal Marks: 25 Marks **External Marks: 75 Marks**

UNIT I: MECHANICS

Motion, Force and Newton's laws - momentum - projectile and circular motions - gravitation - planetary motion and earth satellites –communication satellites - work, power and energy - energy and environment – rotational motion

UNIT II: PROPERTIES OF MATTER

Three states of matter - binding forces - fluid pressure and thrust - applications - Pascal law - Archimedes principle – capillary action -Bernoulli's principle - Viscosity

UNIT III: HEAT AND SOUND

Measurement of heat and temperature - clinical thermometer – heat transfer - thermos flask - change of state - effect of pressure on boiling point and melting point - heat engines - steam engine and dieselengine – sound and music - reverberation - acoustics of building -recording and reproduction of sound in film

UNIT IV: ELECTRICITY AND MAGNETISM

Colomb's law - action of points, lightning arrester - Ohm's law -electric power - electrical safety - electromagnetic induction -Faraday's Law - Lenz Law - transformers - mariner's compass

UNIT V: OPTICS

Light - optical instruments - camera - telescope - microscope -projector - nuclear energy - fission and fusion - nuclear power plants -atom bomb and hydrogen bomb

Books for study:

1. R. Murugeshan, *Allied Physics I & II*, S. Chand & Co, New Delhi (2006)
2. D.S. Mathur, *Elements of properties of matter*, S.Chand & Company Ltd., New Delhi (2010).
3. R. Murugeshan, *Properties of matter and acoustics*, S. Chand & Co, New Delhi (2012)
4. Brijlal & Dr. N. Subramanyam and P.S. Hemne, *Heat and Thermodynamics*, S. Chand & Co, New Delhi , (2004)
5. R. Murugesan, *Electricity*, S. Chand & Co, New Delhi (2010)
6. R. Murugeshan and Kiruthiga Sivaprasath, *Modern physics*, S. Chand & Co, New Delhi (2016)
7. N. Subramaniyam, Brijlal and M.N. Avadhanulu, *A text book of Optics*, S. Chand & Co, New Delhi, (2012)

Semester :I/III **Allied: Code :**

Allied Physics–I

Hours: 5 /wk **Credit Points: 5**

Internal Marks: 25 Marks External Marks: 75 Marks

UNIT I:

Properties of matter:

Elasticity–Bending of beams – Expression for bending moment – Expression for Young's modulus (uniform and non–uniform bending) – experimental determination of Young's modulus using pin and microscope method (uniform and non–uniform bending) –Torsion of a body – expression for couple per unit twist – determination of rigidity modulus of a wire by torsional pendulum– Static torsion method with scale and telescope – drop weight method of determining surface tension and interfacial surface tension

UNIT II

SOUND:

Laws of transverse vibrations of strings–Sonometer – verification of laws of transverse vibrations of strings–determination of AC frequency

Ultrasonics:

Introduction to ultrasonics – piezo electric effect–production by piezo electric method – properties – applications– Acoustics: Acoustics of buildings – reverberation time – derivation of Sabine's formula – determination of absorption coefficient.

UNIT III

Heat:

Vander Waal's equation of state–critical constants–determination of critical constants–Joule–Kelvin effect–Porous plug experiment–theory of porous plug experiment–temperature inversion–Liquefaction of gases– liquefaction of Hydrogen–Thermal conductivity–coefficient of thermal conductivity–determination of coefficient of thermal conductivity of bad conductor by Lee's disc method.

UNIT IV

Gravitation:

Newton's law of gravitation – inertial mass– gravitational mass–Kepler's laws of planetary motion–deduction of newton's law of gravitation from Kepler'slaws–determination of G by Boy's experiment–variation of g with altitude– variation of g with depth

UNIT V

Electricity:

Electric circuit–open circuit–closed circuit–switches–types of switches–fuses–types of fuses– rewirable type fuse–cartridge fuse–circuit breaker–merits of circuit breaker – Carey foster's bridge– theory – measurement of resistance–potentiometer–principle and theory determination of internal resistance of a cell–calibration of low range voltmeter.

Books for Study and Reference:

1. R. Murugeshan, *Allied Physics I & II*, S. Chand & Co, New Delhi (2006)
2. D.S. Mathur, *Elements of properties of matter*, S.Chand & Company Ltd., New Delhi (2010).
3. R. Murugeshan, *Properties of matter and acoustics*, S. Chand & Co, New Delhi (2012)
4. Brijlal & Dr.N.Subramanyam and P.S. Hemne, *Heat and Thermodynamics*, S. Chand & Co, New Delhi , (2004)
5. R. Murugesan, *Electricity*, S. Chand & Co, New Delhi (2010)

Semester :II/IV **Allied: Code :**

Allied Physics–II

Hours: 5 /wk **Credit Points: 5**

Internal Marks: 25 Marks External Marks: 75 Marks

UNIT I:

Atomic physics:

The vector atom model – spatial quantization–spinning of an electron – quantum numbers associated with the vector atom model – coupling schemes – LS and jj coupling – the Pauli's exclusion principle – Stern and Gerlach experiment

UNIT II

Nuclear Physics:

Nuclear models – liquid drop model – semi empirical mass formula – merits and demerits -shell model – evidences for shell model – nuclear radiation detectors –ionization chamber – Wilson cloud chamber

UNIT III

Solid state physics:

Bonding in crystals – ionic bond – covalent bond – metallic bond – molecular bond – hydrogen bond – their properties

Simple crystal structures – simple cube – body centered cube – face centered cube – co-ordination number – atomic radius – packing factor

UNIT IV

Semiconductor physics:

Theory of energy bands in crystals – distinction between conductors, insulators and semiconductors – intrinsic and extrinsic semiconductors – zener diode characteristics – break down voltage – zener diode as voltage regulator

Basic logic gates – OR, AND, NOT, NAND, NOR, XOR gates – NAND & NOR as universal building block –De Morgan's theorem and its verification - laws of Boolean algebra – simplification of Boolean expressions

UNIT V

LASERS and MASERS:

Basic concepts of stimulated emission – distinction between stimulated and induced emission–population inversion and Meta stable state – ammonia maser – ruby laser – semiconductor laser – uses of laser.

Books for Study and Reference:

1. R. Murugeshan, *Allied Physics I & II*, S. Chand & Co, New Delhi (2006)
2. R. Murugeshan and Kiruthiga Sivaprasath, *Modern physics*, S. Chand & Co, New Delhi (2016)
3. N. Subramaniyam, Brijlal and M.N. Avadhanulu, *A text book of Optics*, S. Chand & Co, New Delhi, (2012)
4. R. Murugeshan and Kiruthiga Sivaprasath, *Optics and spectroscopy*, S. Chand & Co, New Delhi (2010)

SEMESTER – IV B.Sc.,
Allied Physics Practicals

Hours : 3 /wk **Credit Points : 4**

Internal Marks: 40 Marks **External Marks: 60 Marks**

List of experiments
(Any Sixteen Only)

01. Young's modulus (q) –non–uniform bending – scale and telescope method.
02. Young's modulus (q) – uniform bending – scale and telescope method.
03. Static Torsion – Rigidity modulus of a rod
04. Torsion Pendulum – Rigidity modulus of a wire.
05. Surface tension and interfacial surface tension of a liquid –drop weight method.
06. Sonometer – frequency of a tuning fork
07. Sonometer – AC frequency
08. Air Wedge – thickness of a wire.
09. Newton's rings –determination of wavelength of light
10. Spectrometer –Refractive index of a solid prism.
11. Spectrometer – grating –normal incidence –Determination of wavelength of mercury lamp.
12. Determination of viscosity using graduated burette
13. Specific heat capacity of a liquid –half time correction.

14. Potentiometer – calibration of ammeter.
15. Potentiometer – calibration of low range voltmeter.
16. Potentiometer –Determination of internal resistance of a cell.
17. Characteristics of zener diode.
18. Verification of truth tables of AND, OR & NOT gates using ICs.
19. Construction of low range power pack using two diodes.
20. Verification of De Morgan's theorems

MODEL QUESTION PAPER

Core III : Properties of matter **Course Code:**

Time : 3 hours Max. Marks :

75

SECTION – A (10X2=20 Marks)

Answer all Questions

1. Write the expression for Poisson's ratio in terms of elastic constants.
e†C ñ£PLèO¡ õ£Jô£è ð£Œú¡ MAîˆFŸè£ù «è£¬õ¬ò â¿¶è.
2. Define: Torsion
õ¬óòÁ: ºÁ,°
3. Write the unit and dimension for coefficient of viscosity
ð£Aò™ â‡E¡ Üô° ñŸÁ‹ ðKñ£íˆ¬î â¿¶è
4. Define: Effusion
õ¬óòÁ: ªð£N¾
5. Define: Surface tension.
õ¬óòÁ: ðóŠ¹ Þ¿M¬ê.
6. What is osmotic pressure?
Êêš×´ **ðóõ™ Ü¿ˆî‹ â¡ø£™ â¡ù?**
7. Give the condition for damped vibrations.
î¬ì»Á ÜF˜¾èÀ,è£ù õ¬óò¬ø¬ò î¼è
8. State Fourier's theorem.
çÌKò˜ «îŸøˆ¬î, ÃÁè
9. What is piezo electric effect?
d«ê£ l¡ M¬÷¾ â¡ø£™ â¡ù?
10. Mention the applications of ultrasonics.
eªò£LèO¡ ðò¡è¬÷ î¼è.

SECTION – B (5x5 = 25 Marks)

Answer all questions Choosing either a (or) b.

11. (a) Obtain an expression for the internal bending moment of beam.
ê†ìˆF¡ õ¬÷¾ F¼Š¹ˆ FøÂ,è£ù «è£¬õ¬òŠ ªðÁè.

(or)

(b) Derive an expression for couple per unit twist.
æóô° ºÁ,° Þó†¬ì,è£ù «è£¬õ¬ò ªðÁè

12. (a) How will you compare the viscosities of two liquids by Ostwald's viscometer.

Ývõ£™† ð£Aò™ñ£Q Íô‹ Þ¼ FóõƒèO¡ ð£Aò™ î¡¬ñ¬ò âšõ£Á åŠH´õ£Œ?

(or)

(b) Explain the experimental determination of coefficient of diffusion.
«ê£î¬ù º¬øJ™ Móõ™ â‡¬í è£µ‹ «ê£î¬ù¬ò M÷,°è º¬ø¬ò M÷,°è.

13. (a) State the laws of osmatic pressure.
Êêš×´ ðóõ™ Ü¿ˆîˆFŸè£ù MFè¬÷ ÃÁè.

(or)

(b) How will you determine the surface tension of a liquid by drop weight method?
¶O â¬ì º¬øJ™ å¼ FóõˆF¡ ðóŠ¹ Þ¿ M¬ê¬ò âšõ£Á è£‡õ£Œ?

14. (a) Derive an expression for the condition of forced vibrations.
FEŠ¹ ÜF˜¾èÀ,è£ù Gð‰î¬ùJ¡ «è£¬õ¬ò î¼M..

(or)

(b) How will you determine the A.C. frequency by sonometer method?
«ê£ù£e†ì˜ º¬øJ™ ñ£ÁF¬ê I¡«ù£†ìˆF¡ ÜF˜ªõ‡¬í âšõ£Á è£‡õ£Œ?

15. (a) Explain the production of ultrasonic waves using magneto striction method.
è£‰ˆ ²¼,è º¬øJ™ eªò£L Ü¬ôèœ à¼õ£,°õ¬î M÷,°è.

(or)

(b) Determine the absorption coefficient.
à†èõ˜ °íèˆ¬î è£‡è.

SECTION – C (3x10 = 30 Marks)

Answer Any THREE questions

16. (a) Derive an expression for young's modulus of a beam by uniform bending method

(b) Describe an experiment to determine young's modulus of a beam by uniform

bending method.

(a) æ¼ sê†ìˆF¡ Yó£ù õ¬÷¾,è£ù òƒ °íè‹ è£µ‹ «è£¬õ¬ò õ¼M

(b) Yó£ù õ¬÷¾ Íô‹ òƒ °íè‹ è£µ‹ «ê£î¬ù º¬ø¬ò MõK

17. Obtain Poiseuille's formula for the viscosity of a liquid by Poiseuille's method including corrections for pressure and volume heads.
Ü¿ˆî ºè´ ñŸÁ‹ c÷ˆFŸ,è£ù F¼ˆîƒè¬÷ àœ÷ì,Aò tFóõˆF¡ ð£Aò™ è£µ‹ ð£ŒÅLJ¡ êñ¡ð£†¬ì è£‡.

18. Derive an expression for the excess pressure on a curved surface of a liquid membrane.
å¼ °INJÂœ àœ÷ I¬è Ü¿ˆîˆFŸè£ù «è£¬õ¬ò õ¼M.

19. Derive the condition for saw tooth wave and square wave using Fourier's theorem

çÌKò˜ «îŸøˆ¬î ðò¡ ð´ˆF Þó‹ð ð™ ñŸÁ‹ ê¶ó Ü¬ôèÀ,è£ù Gð‰î¬ù¬ò õ¼M

20. Obtain the equation of reverberation time using Sabine's formula.
ê¬ðQ¡ õ£ŒŠð£†¬ì ðò¡ð´ˆF âF ºö,è «ïóˆFŸè£ù êñ¡ð£†¬ì ªðÁè.