

**A.VEERIYA VANDAYAR MEMORIAL SRI PUSHPAM COLLEGE
(AUTONOMOUS),
POONDI, THANJAVUR DIST.**

**Question Pattern for UG and PG Programmes for students to
be admitted during 2014 – 2015 and afterwards**

Total Marks: 75

QUESTIONS PATTERN

**SECTION – A
(Question 1 to 10)**

10 x 2 = 20 Marks

1. Short Answer Questions
2. Two Questions from each unit (All are answerable)

**SECTION – B
(Question 11 to 15)**

5 x 5 = 25 Marks

1. 5 Paragraph type questions with "either / or" type choice.
2. One question from each unit of the Syllabus.
3. Answer all the questions.

**SECTION – C
(Question 16 to 20)**

3 x 10 = 30 Marks

1. 5 Essay type questions – any three are answerable.
2. One questions from each unit of the Syllabus.

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
I	14U1PHT1	$\sqrt{\mathfrak{R}} \zeta \rangle \sqrt{\mathfrak{R}} B \Delta$ $(\chi \leftrightarrow \Sigma f, E \rightarrow \rangle, \Sigma \zeta f \Delta,$ $\sqrt{\mathfrak{R}} B \kappa \leftrightarrow \zeta \rightarrow)$	6	3

{→: 1 $\neg \otimes \Phi \infty \perp$

... $\Sigma \leftrightarrow \Delta$: 18

1. $\sqrt{\leftrightarrow \zeta} \therefore o \equiv | \partial | | \langle \zeta | \square] | \kappa | \otimes \wp \zeta \square | \zeta \otimes E \heartsuit \neg \wp | \tau \rangle \Delta$

($| \kappa o \rangle \zeta B \Delta \xi \neg \kappa \mu \Delta$)

2. $\Sigma \zeta \therefore \mathfrak{R} | _ | \sigma \Theta | \square \rangle \tau \alpha \uparrow \dots \rangle [$

($\wp | \kappa \uparrow \square \rangle \lambda [E \oplus \heartsuit A$)

3. $\wp \zeta \leftrightarrow] B \zeta | \square \bullet \rangle \subseteq] \leftrightarrow \heartsuit \wp \zeta f _ | \perp$

($\bullet \rangle \subseteq] \leftrightarrow \heartsuit \neg \wp] \therefore \bullet \rangle \subseteq] \leftrightarrow \heartsuit \wp \lambda | \bullet \rangle \subseteq] \leftrightarrow \uparrow \rangle \zeta | \Delta,$

$\bullet \rangle \subseteq] \leftrightarrow \dots \rangle \sigma \lambda [\mu]$)

4. $\wp \zeta \leftrightarrow \rangle \zeta \otimes [\square T \leftrightarrow \uparrow \rangle \zeta \Phi$

5. $\wp \otimes | \mathfrak{R} \dots | \zeta \otimes | f | _ B \zeta \square \bullet \subseteq \leftrightarrow \Delta \square \Sigma \zeta |$

($\diamond \equiv \dots | \chi] | \therefore \diamond [\Sigma \zeta \dots f, \diamond \equiv | \perp \Sigma \zeta | \langle \tau \alpha \Sigma \zeta |, \gamma \subseteq] \leftrightarrow \zeta \Sigma \zeta |,$

$| [\spadesuit f \Sigma \zeta |, \therefore | [B \zeta \langle \Sigma \zeta |$)

6. $| \kappa \leftrightarrow \xi \uparrow \mu \square | \sigma \leftrightarrow \zeta \leftrightarrow [| | \rangle (| \zeta \nu \rightarrow \Delta | \sigma \Theta \angle \Delta \therefore \neg \heartsuit \wp] _ | \Gamma)$

{→: 2 $\chi | \leftrightarrow \Sigma | f$

... $\Sigma \leftrightarrow \Delta$: 18

1. $\dots | \otimes | \sigma \square \sqrt{\leftrightarrow \zeta} | \wp \zeta \kappa \Delta (1 \xi \rangle _ 15 \kappa | \leftrightarrow)$

2. $\dots | \otimes | \sigma \square \wp B \square \equiv | \perp \neg \rangle \zeta f | \Delta$

{→: 3 $E \rightarrow | | \rangle$

... $\Sigma \leftrightarrow \Delta$: 18

1. $\dots | \otimes | \sigma \square \zeta \leftrightarrow _ \neg | \zeta | \mathfrak{R} \zeta \Delta \kappa \zeta \spadesuit \Delta \wp \zeta | (1 \xi \rangle _ 10 \kappa | \leftrightarrow)$

$$2. \dots | \otimes | \sigma \square \dots \spadesuit \zeta \leftrightarrow \Rightarrow E > \Delta \xi \leftarrow \kappa \mu \Delta$$

$$\{ \rightarrow : 4 \Sigma \zeta f | \Delta$$

$$\dots \Sigma \leftrightarrow \Delta : 18$$

$$\zeta \rightarrow \kappa. \wp \zeta \left[\bullet \heartsuit \div \leftrightarrow \dots \setminus B [\square \neg | \langle \rangle \dots A \uparrow \rangle \left[$$

$$\{ \rightarrow : 5 \sqrt{R} | B \kappa \leftrightarrow \left[\zeta \rightarrow$$

$$\dots \Sigma \leftrightarrow \Delta : 18$$

$$E \rightarrow || \rangle, A \uparrow \spadesuit \Delta, \Sigma \zeta f | \Delta, | \sigma \rangle, \chi | \leftrightarrow \Sigma | f$$

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
I	14U1PHE1	PART – II ENGLISH PROSE, POETRY AND COMMUNICATION SKILLS	6	3

Objective

- To initiate the Students to understand English through Prose, Poetry and Basic Communicative Grammar

Unit – I

- 1) The Running Rivulets of Man,
- 2) Parliament is Marking Time,
- 3) The Lady in Silver Coat,
- 4) Mr. Applebaum at Play.

Unit – II

- 1) The Feigning Brawl of an Impostor,
- 2) Thy Life Is My Lesson,
- 3) Solve The Gamble,
- 4) The Stoic Penalty.

Unit – III

- 1) Nobility In Reasoning,
- 2) Malu the Frivolous Freak,
- 3) Bharath! Gird Up Your Loins!
- 4) Honesty is the Cream Of Chastity

Unit – IV

- John Milton – On His Blindness.
Oliver Goldsmith – The Village Schoolmaster.
William Wordsworth – The Daffodils.
P.B.Shelley – Ozymandias.
Keats – La Belle Dame Sans Merci.
Hopkins – Thou Art Indeed, Just Lord.

Unit – V

- Parts of Speech, Nouns, Pronouns, Conjunctions, Adjectives, Articles, Verbs, Adverbs, Interjection – sentence.

semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
I	14U1PHC1	Core – PROPERTIES OF MATTER AND SOUND	6	4

Objective:

- To understand the basic properties of materials.
- To acquire the knowledge about acoustics.

Unit –I Gravitation

Kepler's laws of planetary motion – Newton's law – deduction from Kepler's laws- Newton's law of gravitation – Determination of G-Boys' method – mass of earth and sun-gravitational field intensity – gravitational potential and potential energy – Gravitational potential and field at a point outside and inside a spherical shell and solid sphere-Inertial and gravitational mass – Earthquakes- Seismic waves - Seismography.

Unit –II Elasticity

Hook's law- stress vs strain curves - types of elasticity - Poisson's ratio - Experimental determination of rigidity modulus - static torsion - Searle's method - Twisting couple of a cylinder - Torsional Oscillations - Bending of beams - Expression for bending moment - Depression of the free end of a cantilever - Young's modulus theory and experiment – non uniform bending – uniform bending – I Section of girders .

Unit – III Viscosity and Surface tension

Poisoulli's formula–Theory and experiment for highly viscous liquid-Searle's viscometer-Meyer's formula for gases-determination of viscosity of gases-Rankine's method.

Surface tension: surface energy–Determination of the surface tension of water by capillary rise–surface tension by the method of drops- interfacial surface tension– Expression for excess of pressure–spherical drop and bubble- surface tension and angle of contact–Quincke's method .

Unit IV Hydrostatics and Centre of Pressure

Pascal's law – Thrust on an immersed plane – Centre of pressure – particular cases of centre of pressure – vertical rectangular lamina – vertical triangular lamina-vertical circular lamina – vertical square lamina- Atmospheric pressure – Correction of barometric reading – Change of pressure with altitude – reasons for such variation.

Unit –V Acoustics and Ultrasonics

Laws of transverse vibrations in string – Melde's string -Characteristics of musical sound – Intensity of sound – Acoustics of buildings – reverberation -Sabine's formula – Echoes and Echo effect-factors affecting acoustics of buildings-determination of absorption coefficient – Ultrasonic's- Properties - Production Methods - Piezoelectric & Magnetostriction and Detection–Uses.

Books for study:

1. Properties of matter – Brijlal and N. Subramanian.
2. Properties of matter and sound – R. Murugesan.
3. Hydrostatics – Narayanmurthi.

Books for Reference:

1. Properties of matter – D.S.Mathur.
2. Fundamentals of physics - Haliday and Resnik.
3. Sound – Brijlal and Subramanian.
4. Advanced level physics - Melkan and Marker
5. Physics for scientists and engineers - Paul.

B.Sc. Physics

Semester	Subject Code	Title of the paper	Hours of Teaching/ Week	No. Of credits
I	14U2PHCP1	Major - Practical -I	3	4

List of experiments – Any Ten experiments

1. Compound pendulum –Determination of acceleration due to gravity “g”.
2. Uniform bending (Telescope and optic lever) - Determination of Young’s Modulus.
3. Static torsion – rigidity modulus “n”
4. Stoke’s method –Coefficient of viscosity of liquid
5. Joule’s law-specific heat of liquid
6. Lee’s disc method – Thermal conductivity K
7. Cantilever depression (microscope) - Determination of Young’s Modulus.
8. Capillary flow method-viscosity of liquid
9. Koenig’s method – Determination of Young’s Modulus.
10. Torsional pendulum –M.I and “n”
11. Non uniform bending (pin and microscope) - Determination of Young’s Modulus.
12. Searle’s viscometer – viscosity of liquid
13. Mayer’s disc – viscosity of liquid
14. Forbes’s method – Thermal conductivity “K”
15. Sonometer –verification of laws and frequency determination
16. Drop weight method - S.T. and Interfacial S.T.

Semester	Subject Code	Title of the Paper	Hours of Teaching/Week	No. of Credits
I	14U1PHMAA1	Allied Mathematics-I (For Physics and Chemistry)	5	3

Objectives:

1. To introduce the basis concepts of summation of series and special types of matrices, theory & equation.
2. To introduce Higher-level integral.

UNIT-I

Binomial, exponential and logarithmic (without proof) series–summation using the three series.

UNIT – II

Gayley – Hamilton theorem (No proof)– characteristic equation – Roots and vectors – Symmetric, Orthogonal, Unitary, Hermitian Matrices – Simple examples.

UNIT – III

Radius of curvature (Cartesian and Parametric) - partial derivatives of a function of two functions – Jacobians of 2 and 3 variables.

UNIT – IV

Beta and Gamma Integral (Simple problems only) – Evaluation of double and triple integrals.

UNIT – V

Theory of Equations - relations between roots and co – efficient – symmetric functions of the roots in terms of co-efficients - imaginary roots and irrational roots - transformation of equation – Reciprocal equation.

Text Book:

Algebra volume I & II – Part I Algebra and Calculus Vol. II – T.K.M. Pillai (Relevant portions only)

Unit I : Chapter 3 (Vol – I),

Unit II : Chapter 2 (Vol – II),

Unit III: Chapter 1 (Section 6), chapter 3 (Section 3.2., 3.3.) and Chapter 7.

Unit IV: Chapter 5.

Unit V: Chapter 6 (Vol – I)

General Reference:

1. Algebra (Major) – T.K.M .Pillai.
2. Calculus(Major) – T.K.M. Pillai.
3. Ancillary Mathematics – P.R.Vittal, Margam Publications.

Semester	Subject Code	Title of the Paper	Hours of Teaching/Week	No. of Credits
I & II	14U2PHMAA2	Allied Mathematics-II (NS) (For Physics and Chemistry)	3+3	-

Objectives:

- To introduce concepts of Hyperbolic function and correlation.
- To introduce the concepts of numerical solution of ordinary differential equation and 3 dimensional analytical geometry.

UNIT – I : Trigonometry

Expansion of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$, $\sin^n \theta$, $\cos^n \theta$, $\tan^n \theta$ - Hyperbolic function - Relation between circular and hyperbolic functions - separation of real and imaginary parts of hyperbolic functions.

UNIT – II

Inverse hyperbolic functions - separation of real and imaginary parts of inverse hyperbolic function.

UNIT – III

Correlation (including rank correlation) - Regression - analysis of variation (one way classification)

UNIT – IV

Numerical solution of ordinary differential equation Taylor series methods Euler and Eluler modified method - R.K.4th order method.

UNIT – V

Standard equation of plane, straight line S.D. between two skew lines, spheres (up to intersection of plane).

Text Book:

1. Trigonometry & Analytical Geometry 3D - T.K.M.Pillai (Relevant portions only)
 2. Statistical Methods - S.P.Glupta Sultan & Chand (Relevant Portions)
 3. Numerical methods in science & Engineering M.K.Venkataraman (Relevant Portions).
- Unit I : Chapter 3, 4
Unit II : Chapter 4, 5
Unit III : Chapter 10, 11 and Chapter 5
Unit IV : Chapter 10
Unit V : Chapter 2, 3 & 4.

General References:

1. Trigonometry - S.Arumugam
2. Statistics - M.Sivathanupillai
3. Ancillary Maths - P.R.,Vittal, Margam Publications.

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
II	14U2PHT2	$\sqrt{f} \mathcal{R} \zeta \sqrt{f} \mathcal{R} B \Delta -$ $\wp B [\xi \oplus \uparrow > \tau \alpha - \sqrt{f} \mathcal{R} \square \kappa \leftrightarrow \zeta \rightarrow$	6	3

{→: 1

...Σ↔Δ: 18

1. $\int \Theta \zeta \spadesuit \otimes \Delta \wp \subseteq \int \square \dots > \kappa \zeta \leftrightarrow \Delta \square \dots | \zeta \langle \rightarrow \int \heartsuit \wp | \Delta$
2. $\int \Sigma \zeta \Upsilon \mathcal{R} | \leftrightarrow \otimes \int \square \dots > \kappa \zeta \leftrightarrow \Delta \square \wp \gamma \Delta \int \xi | \oplus \square \int \uparrow > \zeta \int f | \Delta \square$
 $\int \mathcal{R} | \int | \zeta \wp | \wp | \Delta$
3. $\bullet \subseteq \leftrightarrow \int \square \dots > \kappa \zeta \leftrightarrow \Delta \square \int \kappa \zeta^{\text{TM}} | \wp | \Delta (\sqrt{f} \oplus | \dots \langle \zeta | | \otimes \subseteq \sqrt{f} \wp \Delta \dots)$
4. $\therefore \zeta \setminus \mathcal{R} | \kappa \zeta \otimes | \int \square \int \kappa \zeta \otimes | \Delta \square \wp \int \wp \uparrow \mu$

{→: 2

...Σ↔Δ: 18

1. $\neg \wp \setminus B \zeta \alpha \kappa \zeta | \square \int \neg \therefore \zeta \alpha \square$ 4. $\therefore \zeta \setminus \mathcal{R} | \equiv | \otimes |$
2. $\Sigma \Delta \therefore \zeta \alpha \kappa \zeta | \square \int \kappa \zeta \Phi \neg \therefore \zeta \alpha \square$
 $(\chi B | \kappa \oplus \Upsilon B | \Sigma \Delta \dots \xi > _ 10 \wp \zeta f _ | \perp)$
3. $\gamma \int f \zeta \perp \square \int \heartsuit \wp \zeta | \kappa$
 $(\therefore \zeta | \alpha \uparrow \int \equiv | \perp \dots \xi > _ 10 \wp \zeta f _ | \perp)$
4. $\int \therefore \equiv | B \zeta \alpha \kappa \zeta | \square \neg \wp \setminus B \int \neg \therefore \zeta \alpha (\xi > _ 10 \wp \zeta f _ | \perp)$

{→: 3

...Σ↔Δ: 18

1. $\int \wp \int | \square \int \therefore \subseteq \int \leftrightarrow \Delta \square (\xi > _ > \subseteq \int \leftrightarrow \Delta \square | _ \sigma: 10 \wp \zeta f _ | \perp)$
2. $\zeta \therefore \leftrightarrow \zeta \int \wp \leftrightarrow \int \square * \spadesuit \zeta \otimes E B \Delta | \therefore \div \perp | \langle \uparrow > \tau \alpha (\xi \neg \kappa \mu \Delta)$
3. $\int \wp \int f \leftrightarrow \zeta \otimes \heartsuit \wp \mathcal{R} | \sigma \leftrightarrow \zeta B | \square \zeta \upsilon \oplus \zeta \mathcal{R} \zeta \oplus \kappa \Rightarrow E \square \Sigma \zeta \otimes | \kappa \langle \Delta$
4. $T \leftrightarrow \therefore \zeta \xi M \kappa | \square \int \mathcal{R} | \zeta \kappa \wedge | \int \Delta \wp | \Delta \square A B \kappa \zeta \heartsuit A$
5. $\zeta \square \equiv \zeta | \therefore \setminus > \zeta [\otimes \zeta] A \square \xi | \psi [\otimes > | \Delta (1 \xi > _ 4 \wp \zeta f _ | \perp)$

{→: 4 $\wp B [\xi | \oplus \uparrow > \tau \alpha$

...Σ↔Δ: 18

$\kappa \zeta \mathcal{R} | B \wp \therefore \heartsuit A \square A \square \downarrow E \kappa | | \perp \square \kappa \otimes \zeta \Delta, \kappa \otimes \tau | \zeta \sqrt{f} \equiv | \perp \square \blacklozenge \uparrow \mu \heartsuit \div | \omega \mathcal{N} \mathcal{R} |$
 $\Delta \int | \leftrightarrow, \langle | \leftrightarrow, \omega | \leftrightarrow \dots \kappa \rightarrow \wp \zeta | \perp \square \neg \otimes \zeta \upsilon | | \langle \heartsuit \div \rangle \uparrow \mu \heartsuit \neg \wp \zeta | \perp | \zeta \beta \Delta \xi | \oplus \square \Omega \rightarrow \uparrow > \upsilon$
 $\zeta \Xi | \perp \square \otimes \setminus B \zeta \spadesuit > \tau \alpha \kappa | \kappa \Delta \wp > _.$
 $\neg \otimes \zeta _ \otimes B _ \square \neg \otimes \zeta _ \kappa | \square \sqrt{f} \mathcal{R} | \square \kappa | \square \sqrt{f} \mathcal{R} | B \kappa | \square \neg \wp B | \downarrow \neg \otimes \zeta _ \square \sqrt{f} \zeta _ \square |$
 $\zeta \leftrightarrow \square \Delta \square \wp \rightarrow \neg \wp \zeta | \otimes \neg \wp B | (\neg \wp \zeta | \perp, \sqrt{f} \Delta, | \zeta \Delta, E | \spadesuit, \zeta \square \Delta, \neg > \zeta \alpha) \square \sigma | \spadesuit \downarrow \neg \otimes \zeta _ \square$
 $\sqrt{f} \downarrow \neg \otimes \zeta _ \square \chi \setminus \downarrow \neg \otimes \zeta _ \square \xi \upsilon \rightarrow \square \blacklozenge \downarrow \otimes \Delta \square \sigma \zeta | \perp \square \sqrt{f} \Omega | \int \square > [\sigma | \spadesuit \square \div \oplus \sigma | \spadesuit \square \neg$
 $> \setminus \Omega | \int \sigma | \spadesuit \square \zeta \heartsuit A \sigma | \spadesuit \square \kappa \neg \kappa | \therefore] .$

$$\{ \rightarrow : 5 \quad \sqrt{\mathfrak{R}} | \square \kappa \leftrightarrow \Gamma \zeta \rightarrow$$

$$\dots \Sigma \leftrightarrow \Delta : 18$$

$$\sqrt{\mathfrak{R}} | \square \kappa \leftrightarrow \Gamma \zeta \rightarrow \square > \tau \in \uparrow \mu | \oplus \neg \kappa \neq \Xi |.$$

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
II	14U2PHE2	PART – II ENGLISH EXTENSIVE READERS AND COMMUNICATIVE SKILLS	6	3

Objective

- To impart language and communicative skills through short stories, one act plays and communicative grammar

Unit – I

K.A.Abbas – The Sparrows
O’Henry – The Cop and the Anthem.
Guy de Maupassant – The Necklace.
R.K.Narayan – Engine Trouble.

Unit – II

Anton Chekov – The Proposal
O’Henry – While the Auto Watts

Unit - III

Saki – The Death Trap
Mahesh Dattani –The Girl who touched the stars
Claudia I.Haas – The Cellphone Epidemic

Unit – IV

Tense, Question Tag, Dialogue Writing, Paragraph Writing, Adjectives, Adverb

Unit – V

Voices, Degree of Comparison, Direct and Indirect

Book Prescribed:

Unit IV & V – Communicative grammar by the Department of English

Semester	Subject Code	Title of the Paper	Hours of Teaching/Week	No. Of Credits
II	14U2PHC2	Core –MECHANICS AND SPECIAL THEORY OF RELATIVITY	5	4

Objective:

- To introduce the concepts of Dynamics, Friction.
- To introduce the knowledge about Relativity.

Unit –I Dynamics

Projectile-range on horizontal and inclined plane-Impulse and impact- Impulsive force-Laws of impact- Impact of a smooth sphere on a smooth horizontal plane- Direct and oblique impacts-Loss in kinetic energy-motion of two interacting bodies-reduced mass.

Unit – II Dynamics of rigid bodies

Kinetic energy of rotation – Theory of compound pendulum – equivalent simple pendulum-reversibility of centre of oscillation and suspension – Determination of g and radius of gyration of a bar pendulum – period of oscillation of a Bifilar pendulum with and without parallel threads – Centre of mass-velocity and acceleration of centre of mass-determination of motion of individual particle- system of variable mass – equation of motion for a rocket- conservation of linear and angular momentum.

Unit – III Friction

Static Friction – Laws of Friction, Sliding Friction, Angle of Friction – Cone of Friction –Acceleration down an inclined plane - Rolling Friction - Friction and Stability – Simple practical applications of Friction – The Prony Brake – The Rope Brake – The Band Brake – Lubricants – Principle of the Virtual work – Case of a body in Equilibrium On a Smooth Inclined Plane under the action of a force – case of Equilibrium of a body on a rough inclined plane.

Unit – IV Relativity I

Concept of space – Concept of time – concept of mass – Frame of reference – Newtonian relativity - Galilean transformation and invariance – Ether hypothesis - Michelson Morley experiment – explanations for the negative result - Postulates of special theory of relativity – explanation - Lorentz transformation - Time dilation-Length contraction.

Unit – V Relativity II

Relativity of simultaneity – Addition of velocities- Mass-energy equivalence. Minkowski's four dimensional space-time continuum – General theory of relativity- Particle wave duality- Photons and gravity – Gravitational red shift-Space time diagrams – Geometrical representation of simultaneity, contraction and dilation.

Books for study:

1. Dynamics – M. Narayanamurthi.
2. Mechanics – D.S. Mathur.
3. Modern Physics – R.Murugesan.

Books for reference :

4. Elements of Properties of matter - Mathur Unit III
5. Mechanics and Mathematical Methods – Murugesan Unit IV

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
III	14U2PHC3	Core- ELECTRICITY AND ELECTROMAGNETISM	4	4

Objective:

- To introduce the basic knowledge about Electrostatics.
- To introduce the knowledge about Magnetic, Chemical and Heating effects of current.

Unit I Electrostatics

Gauss theorem- statement and proof, application- field due to spherical symmetric charge- hollow spherical charge- equipotential surface - energy associated with an electric field- application- electric intensity and potential due to an earthed conducting sphere.

Unit II Magnetic Effect of Current

Magnetic field at a point on the axis of circular coil carrying current- at a point on the axis of a solenoid carrying current - ampere's theorem- application- Magnetic flux density within a long solenoid - theory of moving coil ballistic galvanometer- damping correction- I.H and B.H loops- hysteresis loss- experimental method for I.H curve.

Unit III Electromagnetic induction

Self-inductance of a coil- energy stored in an inductance- Determination of L by Rayleigh method- mutual induction- coefficient of coupling- determination of mutual induction using BG – flux meter induction coil- measurement of strong magnetic field (search coil method) – induction motor.

Unit IV Chemical and Thermo electricity

Faradays laws of electrolysis- Kohlrausch bridge- Ionic velocity and mobility- transport number- lead acid accumulator- application of electrolysis- Thermo electricity- Peltier coefficient- Thomson coefficient- thermoelectric diagram- uses.

Unit V Electromagnetic oscillations

Growth and decay of current in a circuit containing L and R, R and C - time constant- charging and discharging of C through L and R- condition for oscillations - Resonance- Q Factor- AC Bridge- Wien's bridge- Maxwell's displacement current Maxwell's electromagnetic equations(qualitative discussion only).

Books for study:

1. Brijlal and Subramanian - Electricity and magnetism.

Books for Reference:

1. Sehgal, Chopra, Sehgal - Electricity and magnetism.
2. A.S. Mahajan, A. A. Rangwaal- Electricity and magnetism.

Semester	Subject Code	Title of the Paper	Hours of Teaching/Week	No. of Credits
I & II	14U2PHMAA2	Allied Mathematics-II (NS) (For Physics and Chemistry)	3+3	4

Objectives:

- To introduce concepts of Hyperbolic function and correlation.
- To introduce the concepts of numerical solution of ordinary differential equation and 3 dimensional analytical geometry.

UNIT – I : Trigonometry

Expansion of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$, $\sin^n \theta$, $\cos^n \theta$, $\tanh \theta$ - Hyperbolic function – Relation between circular and hyperbolic functions – separation of real and imaginary parts of hyperbolic functions.

UNIT – II

Inverse hyperbolic functions – separation of real and imaginary parts of inverse hyperbolic function.

UNIT – III

Correlation (including rank correlation) – Regression - analysis of variation (one way classification)

UNIT – IV

Numerical solution of ordinary differential equation Taylor series methods Euler and Eluler modified method – R.K.4th order method.

UNIT – V

Standard equation of plane, straight line S.D. between two skew lines, spheres (up to intersection of plane).

Text Book:

4. Trigonometry & Analytical Geometry 3D – T.K.M.Pillai (Relevant portions only)
 5. Statistical Methods – S.P.Glupta Sultan & Chand (Relevant Portions)
 6. Numerical methods is science & Engineering M.K.Venkataraman (Relevant Portions).
- Unit I : Chapter 3, 4
Unit II : Chapter 4, 5
Unit III : Chapter 10, 11 and Chapter 5
Unit IV : Chapter 10
Unit V : Chapter 2, 3 & 4.

General References:

1. Trigonometry - S.Arumugam
2. Statistics - M.Sivathanupillai
3. Ancillary Maths - P.R.,Vittal, Margam Publications.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
II	14U2PHMAA3	Allied Mathematics- III (For Physics and Chemistry)	5	3

Objectives:

- To study vector differentiation and vector integration with application.
- To study ordinary Differential equation and partial differential equation
- To study Fourier series and Laplace transforms.

Unit-I : Differential Equation:

Second order differential equation with constant coefficient of the types $ay'' + by' + cy = e^{ax}, g(x), x^n, \sin ax, \& \cos ax$ only – solution of partial differentials of the form $f(p, q) = 0; f(z, p, q) = 0; f(x, p, q) = 0; f(Y, p, q) = 0; f(x, p) = g(Y, q); z = px + qy + f(p, q) : \text{Lagrange's method for solving } P_p + Q_q = R.$

Unit – II: Laplace Transforms:

Definition – Laplace Transform of function $e^{at}, \cos at, \sin at$ and t^n where 'n' is positive integer-First Shifting theorem – Laplace transforms of $e^{at} \cos bt, e^{at} \sin bt, e^{at} \sin hbt, e^{at} \cos hbt, e^{at} t^n$. Transforms of $f'(t)$ and $f''(t)$ – Inverse transforms relating to the above standard forms. Application of solution of ordinary differential equation with constant coefficients (involving the above transforms)

Unit –III Fourier Series:

Definition – finding Fourier coefficients for a d given periodic function with period 2π -odd, even functions – Half range series.

Unit – IV Vector differentiation:

Velocity and acceleration – scalar and vector fields – Divergence and curl-application – Laplace operator.

Unit – V Vector integration:

Application of Gauss and Stoke's theorems (no proof of the theorem).

Text Book:

Unit I	: Chapter2 & 4	Differential Equations – TKM Pillai
Unit II	: Chapter5	Calculus Volume III – TKM Pillai
Unit III	: Chapter6 Section 1 to 5	Calculus Volume III – TKM Pillai
Unit IV	: Chapter IV	Vector Algebra & Analysis – TKM Pillai
Unit V	: Chapter VI	

General References:

1. Engineering Mathematics – A Singaravelu(Volume I & II)
2. Vector Calculus – K.Viswanathan and S.Selvaraj.
3. Ancillary Mathematics – P.R.Vittal, Morgam Publications.

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
III	14U3PHT3	$ \zeta \heartsuit \div B \equiv \perp, \textcircled{R} \leftrightarrow \perp,$ $\sqrt{ \mathcal{R} } B \kappa \leftrightarrow \zeta \rightarrow$	6	3

$\{ \rightarrow : 1 \quad | \zeta \heartsuit \div B \equiv | \perp \quad 1$

... $\Sigma \leftrightarrow \Delta : 18$

1. $E[\heartsuit \wp] | \zeta \leftrightarrow \Delta \square A | \zeta (\mathcal{R} | \zeta) f \Delta \square | \zeta \spadesuit _ \kappa)$
2. $\therefore \setminus \dots : || \Gamma \square \therefore \Gamma (\kappa \spadesuit \Delta A \mathcal{R} | | \zeta | >$
3. $(\kappa | E \subseteq \zeta : \setminus \square \sigma : | \Gamma B | \sqrt{ \Delta \wp | \Delta$
4. $| \Delta \wp \leftrightarrow \zeta : \zeta B \square \Delta \square \bullet \subseteq \leftrightarrow | \zeta | f \Delta \square (f \zeta : \setminus \heartsuit \wp f \Gamma \Delta (84 \wp \zeta f _ | \perp)$

$\{ \rightarrow : 2 \quad | \zeta \heartsuit \div B \equiv | \perp \quad 2$

... $\Sigma \leftrightarrow \Delta : 18$

1. $\neg \wp \setminus B A \leftrightarrow \zeta \square \Delta \square \sqrt{ \langle B \zeta [\zeta | \therefore \zeta \oplus \Sigma \zeta B \spadesuit \zeta (A \leftrightarrow \zeta \square \Delta (27 \wp \zeta f _ | \perp)$
2. $\Sigma (\neg \kappa \setminus \wp \zeta \square \bullet B \Delta \kappa \leftrightarrow | \zeta | f \Delta (\xi > _ 20 \wp \zeta f _ | \perp)$
3. $\dots > \Delta \wp \zeta \kappa \setminus \square \Sigma \zeta \textcircled{R} | \heartsuit \wp f \Gamma \Delta (\xi > _ 10 \wp \zeta f _ | \perp)$
4. $(\oplus \zeta \heartsuit A \leftrightarrow \zeta \square \Delta \square \sigma \zeta > \uparrow \mu \mathcal{R} | \zeta | f \Delta \square \Sigma \div \partial \kappa > \zeta \leftrightarrow \heartsuit \wp f \Gamma \Delta (\xi > _ 10 \wp \zeta f _ | \perp)$

$\{ \rightarrow : 3 \quad | \textcircled{R} | \leftrightarrow \uparrow \neg > \zeta \zeta \heartsuit A$

... $\Sigma \leftrightarrow \Delta : 18$

$| \textcircled{R} | \leftrightarrow \uparrow \neg > \zeta \zeta \heartsuit A \square > \tau \alpha \uparrow \mu | \oplus \neg \kappa \neq \Xi |$

$\{ \rightarrow : 4 \quad \neg \wp \zeta \mu \mathcal{R} | \textcircled{R} | \leftrightarrow, \neg : \zeta \alpha \neg \wp B (\heartsuit A \heartsuit \wp \lambda \nu E$

... $\Sigma \leftrightarrow \Delta : 18$

1. $\sqrt{ [> \tau \alpha \mathcal{R} | \textcircled{R} | \leftrightarrow | \textcircled{C} \Delta, | | > \equiv | \textcircled{C} \Delta \square A \Gamma \kappa | \therefore \zeta \dots \wp \div \otimes \dots \leftrightarrow \zeta \leftrightarrow \zeta,$
 $\wp \zeta | \kappa \wp \heartsuit \neq \dots | \uparrow []$

$$\begin{aligned} &|\otimes\rangle \leftrightarrow \langle \otimes | \rho_{\lambda\nu} E \square 10 \therefore \langle \otimes | \rho J \\ &\neg \therefore \zeta \alpha \neg \rho B \langle \otimes A \otimes \rho_{\lambda\nu} E \square 5 \therefore \langle \otimes | \rho J \\ &|| \langle \otimes | \rho \otimes \zeta \langle \otimes | \rho \Delta \end{aligned}$$

$$\langle \otimes | \rho : 5$$

$$\dots \Sigma \leftrightarrow \Delta : 18$$

$$\partial \cdot \langle \otimes | \rho B \kappa \leftrightarrow \langle \otimes | \rho \rightarrow$$

$$\langle \otimes | \rho \rangle \langle \otimes | \rho B \equiv | \perp \square | \zeta \otimes \div B \langle \otimes | \rho B \equiv | \perp \square E \langle \otimes | \rho B \equiv | \perp$$

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
III	14U3PHE3	PART – II ENGLISH SHAKESPEARE, EXTENSIVE READERS AND COMMUNICATIVE SKILLS	6	3

Objective

- To introduce the language of the world renowned dramatist and novelist to enhance the vocabulary and communicative skills of the learners.

Unit – I

Funeral Oration – Julius Caesar

Trial for a Pound of Flesh – The Merchant of Venice

Unit – II

He Kills Sleep – Macbeth

A Real Love at First Sight – Twelfth Night

Unit – III

When the Moor Kills, "So Good a wife" – Othello

In Love is a "Midsummer Madness" – Tempest

Unit – IV

The Mayor of Casterbridge (Abridged) – Thomas Hardy

Unit – V

Note making, Hints Developing, Expansion of Ideas and Proverbs, Sequence of Sentences Synonyms, Antonyms.

Book Prescribed:

Unit-I : II & III: Selected scenes from Shakespeare.

Unit IV: The Mayor of Casterbridge Abridged by E.F.Dodd

Unit V : Communicative Grammar.

Semester	Subject code	Title of the paper	Hours of Teaching/Week	No. of Credits
III	14U3PHC4	Core- HEAT AND THERMODYNAMICS	5	4

Objective:

- To introduce the concepts of transmission of heat.
- To understand the basic concepts of Thermodynamics.

Unit I Transmission of Heat

Conduction process- coefficient of thermal conductivity- Rectilinear flow of heat along a bar- Forbes's method of finding- K- Lee's method for bad conductors- radial flow of heat between two coaxial cylinders- determination of K of glass .

Radiation: Stefan's Law-Experimental Verification of Stefan's law-Determination of Stefan's constant-Total radiation pyrometers-Solar constant-Angstrom's pyrhelimeter.

Unit II Thermodynamics

Zeroth law and first law of thermodynamics- reversible and irreversible process- second law of thermodynamics - Carnot's reversible engine - derivation - Thermodynamic scale of temp- Steam engine- Diesel Engine- Clausius- Clapeyron latent heat equation - Entropy - Change in entropy in reversible and irreversible process Maxwell's thermodynamic relations.

Unit III Change of state

Specific latent heat of Fusion- Laws of fusion- Application- determination of melting point of wax- Determination of Latent heat of fusion of ice- vaporization and condensation- Laws of boiling- change of boiling point with pressure- Applications- Latent heat of vapourization - cooling caused by evaporation- examples - Ammonia ice plant - Triple point- Gibb's phase rule.

Unit IV Low Temperature Physics

J.K. effect- Porous plug experiment - Liquefaction of gases- cascade process- liquefaction of oxygen - Linde's process - liquefaction of air - Liquefaction of Hydrogen and Helium- K. Onnes method - Helium I and II, Lamda point- Fountain effect- Adiabatic demagnetization - superconductivity.

Unit V Statistical Thermodynamics

Specification of the state of the system- probability calculation- Formulation of statistical problem - Phase space - M.B. Statistics-Quantum statistics - BE and FD statistics- Comparison of M.B, B.E, F.D. Statistics-photon gas- Planck's law of Radiation.

Books for study:

1. M.W. Zemansky - Heat and thermodynamics.
2. Brijlal and N. Subramanyam - Heat and thermodynamics.

Books for Reference:

1. F. Reif - fundamental of Statistical and thermal physics.
2. Anathakrishnan and Govindarajan- A textbook of Heat.
3. Sears - Heat and Thermodynamics.

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
III	14U3PHC5	Core- LASER PHYSICS	4	5

Objective:

- To give general ideas on Lasers.
- To know the application of Lasers.

Unit-I Properties of LASER

Laser characteristic properties - Coherence - Coherent length and Coherent time - Spatial coherence - Temporal coherence - principles of laser- absorption- spontaneous emission- stimulated emission- Einstein's theory of stimulated emission- Light Amplification - The Threshold Condition - Schawlow and Townes threshold condition - Line Broadening Mechanisms - Natural Broadening - Collision Broadening - Doppler Broadening.

Unit-II Pumping and Types of LASER

Population inversion- methods of achieving population inversion - Pumping - pumping methods - Active medium - Metastable states - Pumping schemes - Two level, three level and four level pumping schemes. -

Types of lasers- solid state lasers- Ruby lasers- Nd -YAG laser - semiconductor laser - GaAs laser - Characteristics - Construction and working - Laser diode characteristics.

Unit- III Gas LASERS and Pulsed operation of LASERS

Gas lasers: He Ne laser - working principle - Energy level diagram -Argon Ion laser - Helium Cadmium laser - Molecular gas laser - Co₂ laser - principle - construction and working - Dye laser - Pulsed lasers - Q switching - Techniques of Q switching - Mode locking- Frequency doubling - Tunable laser - Liquid lasers.

Unit IV Applications

Laser materials - preparation and testing - Applications of lasers - Interferometry- Testing of optical system - Lasers in communication - in computers - weapons - medical applications - Industrial applications - Laser radiation hazards including effects on the eye and skin - Laser safety standards and hazard classifications - Laser safety precautions and protective measures.

Unit V Holography

Holography- Theory and basic principles - Hologram - Recording and reconstruction of hologram - Experimental techniques - characteristics of hologram - classifications - Recording Materials - Reflection holography and applications Holographic interferometry - Non destructive testing, optical memory.

Books for Study:

1. Laser Fundamentals and applications, K. Thyagarajan, Ajoy Ghatak.
2. An introduction to laser theory and applications, M.N.Avadhanulu, S.Chand and Co.
3. B.B.Laud - Lasers and Non - linear optics.

Books for Reference:

1. Lasers and their applications- Besley- Taylor & Fancis. London
2. Lasers and their applications- J.Wilson, J.F.B.Hawkes- Prentice Hall- 1987.

Semester	Subject Code	Title of the paper	Hours of Teaching /week	No. of Credits
III	14U3PHCHA1	ALLIED CHEMISTRY –I (For Physics major)	5	4

Unit –I

Atomic Structure: Atomic number and mass number–isotopes (hydrogen, oxygen, chlorine and uranium)-Orbit and orbital – shapes of s, p, d orbitals - Aufbau principle Hund's rule – electronic configuration of hydrogen carbon, nitrogen, oxygen,- stability of half filled and completely filled orbitals with the examples if Cr, Cu and Ag.

Types of chemical bonds : Octet rule–formation of ionic, covalent , co-ordinate covalent bond with the examples of NaCl, H₂, Cl₂, HF molecules and BF₃-NH₃ . VSEPR theory-shapes of BeCl₂, BF₃, H₂O, PCl₅, XeF₆–inter and intra molecular hydrogen bonds and their consequences.

Unit -II

Kinetics: Definition with suitable examples of rate, rate law, rate constants, order, molecularity, pseudo first order and half life period - factors that influence the rate of chemical reactions – effect of temperature on rate .

Catalysis: General characteristics of a catalyst–types (homogeneous & heterogeneous, positive & negative and enzyme)–catalytic promoter and catalytic poisoning - intermediates compound theory and adsorption theory.

Energetics: Heat units-concept of internal energy, enthalpy, entropy – exothermic and endothermic reactions

Unit –III

Acid – base concept: Arrhenius, Lowry – Bronsted and Lewis concepts – strong & weak acids - pH, buffer solution – buffer action.

Colloids: Types- properties (Tyndall effect, Brownian movement, electrophoresis, elect osmosis) – purification by dialysis and ultrafiltration. Types of emulsions and gels

Water chemistry: Hard water – soft water, temporary and permanent Hardness – removal of hardness by reverse osmosis and ion exchange method.

Soaps and detergents – cleaning action of soap - -merits and demerits of soap and detergent

Unit - IV

Separation and purification techniques: Solvent extraction with Soxhlet apparatus - crystallization, fractional crystallization, distillation, fractional distillation, steam distillation with suitable examples.

Chromatography: adsorption and partition principles – column (preparation of column, development and elution), paper (sampling, ascending & descending developments, R_f values) and TLC (preparation of plate, sampling, ascending & descending developments) chromatography.

Unit -V

Organic compounds: Classification - functional groups – nomenclature of simple organic compounds.

Isomerism : Definition – types (structural & stereo) - position, chain, functional isomerism and metamersm shown by butyl alcohol - Geometrical isomerism exhibited by maleic & fumaric acids - optical activity – condition for optical activity - optical isomerism exhibited by lactic acid & tartaric acid – racemisation – resolution .

Hybridisation of carbon: SP^3 , SP^2 , & SP hybridization with geometry citing examples.

1. Puri B.R. Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, Milestone Publishers, Delhi (2008)
2. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, Vishal Publishing Co., Jalandar, (2004)
3. Bahl B.S. Arun Bahl, Advanced Organic Chemistry, S. Chand & Company Ltd., New Delhi, (2005).
4. Usharani S., Analytical Chemistry, Macmillian India Ltd., New Delhi (2000)

Semester	Subject Code	Title of the Paper	Hours of Teaching /Week	No. of Credits
III & IV	11U4PHACHP	Allied Chemistry Practical (Non – semester)	3+3	-

A. Volumetric Analysis

1. Estimation of HCl (or H₂SO₄) by NaOH using a standard oxalic acid solution
2. Estimation of NaOH by H₂SO₄ (or HCl) using a standard Na₂CO₃ solution
3. Estimation of oxalic acid by KmnO₄ using a standard Mohr's salt solution
4. Estimation of Ferrous sulphate by KmnO₄ using a standard oxalic acid solution.
5. Estimation of Mohr's salt by KmnO₄ using a standard oxalic acid solution.
6. Estimation of KMnO₄ by thio using a standard K₂Cr₂O₇ solution.
7. Estimation of K₂Cr₂O₇ by thio using a standard CuSO₄ solution
8. Estimation of CuSO₄ by thio using a standard K₂Cr₂O₇ solution

B. Organic qualitative analysis

Systematic analysis of an organic compound , Preliminary tests, detection of element present, Aromatic or aliphatic, Saturated or unsaturated, nature of the functional group and exhibiting confirmatory tests for given organic compounds.

The following substance are prescribed:

Benzoic Acid , Cinnamic acid, Phenol , Cresol, Aniline , Toludine, Urea, Benzaldehyde, Glucose

Reference:

1. Venkateswaran V. Veerasamy R. Kulandaivelu A.R., Basic principles of Practical Chemistry, 2nd edition, Sultan Chand & sons, New Delhi, (1997)

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
IV	14U4PHT4	$\otimes \equiv \sqrt{\mathcal{R}} \mathcal{B} \Delta - \partial \otimes \sqrt{\mathcal{R}} \mathcal{B} \Delta - \neg \otimes \Delta \neg \therefore \zeta \alpha - \sqrt{\mathcal{R}} \mathcal{B} \kappa \leftrightarrow \Gamma \zeta \rightarrow$	6	3

$\zeta \rightarrow: 1$

... $\Sigma \leftrightarrow \Delta$: 18

$\zeta \rightarrow \zeta \rightarrow \zeta |$

1. $\zeta \Rightarrow E \square \dots > \zeta \alpha \zeta \nu \rightarrow$ (ϑς.♦.:1)
2. $\xi _ | \Gamma \square \neg \otimes \sigma \circ \uparrow _ > \zeta \Phi \zeta \nu \rightarrow$ (ϑς.♦.167)
3. $\therefore _ | \Delta \square > | \Gamma \sigma \zeta \nu \rightarrow$ (ϑς.♦.181)
4. $\neg \Sigma \Phi > _ \square > | \Gamma \sigma \zeta \nu \rightarrow$ (290)
5. $\vartheta \zeta | \Gamma \square > | \Gamma \kappa [\zeta \nu \rightarrow$ (347)

$\Sigma \nu | \square$

1. $\zeta \Rightarrow E \square$ (ϑς.♦. 1)
2. $\xi _ | \Gamma \square$ (ϑς.♦. 69)
3. $\therefore _ | \Delta \square$ (ϑς.♦. 70)
4. $\neg \Sigma \Phi > _ \square$ (ϑς.♦. 74)
5. $\vartheta \zeta | \Gamma \square$ (ϑς.♦.79)

$| \circ \uparrow \neg > \zeta |$

1. $\vartheta \zeta | \Gamma \square$ (ϑς.♦. 2)
2. $\zeta \Rightarrow E \square$ (ϑς.♦. 37)

$\partial | \Sigma \zeta | \rightarrow$

1. $\vartheta \zeta | \Gamma \square$ (ϑς.♦. 5)
2. $\therefore _ | \Delta \square$ (ϑς.♦. 6)

$\zeta \rightarrow: 2$

... $\Sigma \leftrightarrow \Delta$: 18

$\nu \equiv \zeta \rightarrow \pm \rightarrow$

$\zeta \Rightarrow E \square \zeta [\otimes \mathcal{R} \zeta \otimes \kappa [\vartheta \uparrow \mu$

$A \otimes \Sigma \zeta | \rightarrow$

$\vartheta \zeta f _ \diamond J | \perp 4, 30, 34, 47, 112, 165, 186, 191, 192, 242$

$\vartheta] \nu \rightarrow \heartsuit \vartheta \uparrow \mu$

$\sqrt{\leftarrow} J f \zeta \Delta \vartheta \uparrow \mu \vartheta \zeta f _ \diamond J . 4 (\Omega \Gamma \Delta, \mathcal{N} [, \kappa \neq, \sigma \bullet \Delta A)$

$\vartheta \backslash \vartheta \zeta f _$

$\vartheta \uparrow > \zeta \Delta \vartheta \zeta f _ \square | \kappa | B$

$\zeta \rightarrow: 3$

... $\Sigma \leftrightarrow \Delta$: 18

$\vartheta \otimes | \spadesuit \heartsuit \vartheta \zeta | \Gamma$

$\xi _ \kappa \mu \Delta$

$] \mathcal{R} \zeta \otimes \perp$

1. $\therefore _ \subseteq \mu$
2. $\approx \mathcal{R} | \xi | f | \therefore$
3. $\chi \omega \Upsilon$

{→: 4

...Σ↔Δ: 18

$\neg \otimes \Delta \neg \therefore \zeta \alpha \kappa \leftrightarrow \zeta \rightarrow$
 $\neg \therefore \zeta \alpha \square \sigma \langle \mathfrak{R} | \Delta \square \neg \therefore \zeta \alpha \mathfrak{R} \zeta | \Delta \wp \equiv | \perp \square \chi \uparrow | \Downarrow \neg \otimes \Delta \neg \therefore \zeta \alpha | \perp \square \sqrt{\subseteq}] B \Downarrow \neg \otimes \Delta \neg$
 $\therefore \zeta \alpha | \perp \square \neg \otimes \Delta \neg \therefore \zeta \alpha \uparrow > \zeta] | \perp \square \kappa | \leftrightarrow B | \oplus | \perp \square \kappa \zeta \downarrow \Delta > \tau \infty \Downarrow \neg \otimes \Delta \neg \therefore \zeta \alpha \square \neg > \zeta [| \therefore \square$
 $> \tau \alpha [E \oplus \heartsuit A | \perp \square > \tau \infty \Downarrow \neg \otimes \Delta \neg \therefore \zeta \alpha \pm _ | \perp$

{→: 5

...Σ↔Δ: 18

$\partial. \sqrt{\mathfrak{R}}] B \kappa \leftrightarrow \zeta \rightarrow$
 $\otimes \equiv | \sqrt{\mathfrak{R}}] B \equiv | \perp, \wp] \neg \spadesuit J \square \infty \mathfrak{R} | \square \mathfrak{R} \zeta \pm _ | \perp$

Semester	Subject Code	Title of The Paper	Hours of Teaching/ Week	No. of Credits
IV	14U4PHE4	PART – II ENGLISH ENGLISH FOR COMPETITIVE EXAMINATIONS	6	3

Objective

- To prepare the learners for competitive examinations and to know the fundamentals of practical communication.

Unit – I

Grammar – Number, Subject, Verb, Agreement, Articles, Sequence of Tenses, Common Errors.

Unit – II

Word Power - Idioms & Phrases, one word substitutes, Synonyms, Antonyms, Words we often confuse, foreign words & phrases, spelling.

Unit – III

Reading & Reasoning – Comprehension, Jumbled Sentences.

Unit - IV

Writing Skills – Paragraph, Precis Writing, Expansion of an idea, Report Writing, Essay, Letters, Reviews (Film & Book)

Unit – V

Speaking- Public speaking, Group Discussion, Interview, Spoken English.

Prescribed Text:

1. V.Saraswathi, English for Competitive Examinations, Chennai, Emerald Publishers, 2000.

Semester	Subject code	Title of the paper	Hours of Teaching /week	Credits
IV	14U4PHC6	Core – OPTICS	6	5

Objective:

- To acquire the knowledge about optical instruments.
- To introduce the knowledge about properties of light.

UNIT-I Lenses and Aberrations

Thin lens Equation – Lens makers Equation- Magnification – Power – Equivalent Focal Length of Two thin Lenses- Thick Lens – Nodal Points - Thick Lens Formula – Power of Thick lens- Nodal points – Aberrations- Spherical aberration due to thin Lens – Methods of reducing spherical aberration – Coma - Astigmatism – curvature – Distortion- Chromatic aberration – condition for achromatism.

UNIT- II Optical instruments

Ramsdens Eyepiece – Huygen’s eyepiece- comparison -Resolving power – Rayleigh Criterion – resolving power of a Telescope, Microscope, Prism – Dispersive power and resolving power of a plane transmission grating.

UNIT- III Interference

Colours of thin films – Air wedge – Newton’s Rings- Theory- transmitted light – Application – refractive index of a liquid – Haidinger’s Fringes – Michelson interferometer –Applications-Determination of λ – standardization of metre - Fabry – Perot interferometer and ETALON – Lummer and Gehrche plate.

UNIT-IV Diffraction

Types of diffraction - Fresnel’s diffraction -- Circular aperture - opaque circular disc- Diffraction pattern due a straight edge- Cornu’s spiral – Fresnel integrals- Fraunhofer diffraction at a single slit – Double slit – Grating - theory – oblique incidence – overlapping of spectral lines – Concave Reflection grating with theory.

UNIT- V Polarization

Nicol Prism – Nicol Prism as an Polarizer & Analyzer- Huygens’s explanation of double refraction- uniaxial crystals – Elliptically and circularly polarized light – production and detection – Quarter wave plate and Half wave plate- Optical activity – Laurent’s Half shade polarimeter.

Books for study:

1. Optics – Brijlal, Subramaniyan and M. N. Avadhanulu.
2. Optics and Spectroscopy – R. Murugesan.

Books for Reference:

1. Optics by Khanna and Gulati
2. Optics by Jenkins and White, Tata Mcgraw Hill
3. Optics by Ajoy Ghatak (Tata Mcgraw Hill).

B.Sc. Physics

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
IV	14U4PHCP2	Major Practical- II	3	5

Any Ten Experiments :-

1. Spectrometer - Determination of μ
2. Spectrometer - i - d curve
3. Spectrometer - i - i^1 curve
4. Spectrometer - Dispersive Power
5. Potentiometer - High range voltmeter calibration
6. Potentiometer - Ammeter calibration
7. Potentiometer - R and ρ determination
8. Potentiometer - Low range voltmeter calibration
9. Potentiometer - E.M.F. of Thermocouple
10. Filed along the axis of a coil - ' H ' determination
11. Filed along the axis of coil - ' M ' determination
12. Moment of a Magnet - Tan- C position
13. Carey Foster bridge - R and ρ determination
14. Carey Foster Bridge - Temperature co- efficient
15. Figure of merit - Galvanometer
16. B.G - current sensitivity
17. B.G. - Comparison of mutual inductances

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
IV	14U4PHCHA2	Allied Chemistry –II (For physics major)	5	4

Unit – I

Concept of mole : Definition of mole - Avagadro number - calculation of molecular masses of Urea, Glucose, HCl, H₂SO₄, NaOH, Na₂CO₃ and sucrose - Molar volume, equivalent masses of acid and base (HCl, H₂SO₄, NaOH, Na₂CO₃)

Concentration terms: % by weight, molarity, molality, normality, mole fraction - simple problems to prepare different normal / molar solution for the substances NaOH and Glucose - simple problems to prepare different normal / molar solution from the given strength of solutions using $V_1V_2 = V_2N_2$ formula (for the HCl, H₂SO₄, NaOH, solutions).

Co-ordination compounds: Double salts (Mohr's salt, potash alum) and complex salt - terminology in co-ordination chemistry - Werner's theory - IUPAC names simple co-ordination compounds -structure and uses of haemoglobin and chlorophyll.

Unit – II

Industrial chemistry: Fertilizers: Essential nutrients for plants -functions N,P,K nutrients- micronutrients and their role in plant life - formulae of urea, calcium superphosphate, super phosphate of lime, potassium sulphate - mixed fertilizers - **Pesticides**: Isecticides (stomach & contact poison and fumigant), fungicides, herbicides, rodenticides and their adverse effect - alternative methods for pest control - **Fuel Gases**: Water gas, natural gas, bio gas and producer gas (no manufacture)

Electrochemistry: specific conductivity - equivalent conductivity - effect of dilution - conductometric titrations - PH - buffer - calculation of pH using Henderson equation.

Photochemistry: Lambert Law, Lambert. Beer's Law, Grothus - Drapper law - Quantum yield - photo sensitization

Unit – III

Solid state : Elements of symmetry - crystal lattices & unit cell -seven crystal systems - cubic unit cells (sc, bcc & fcc cubes) - elementary structure of NaCl crystal - structure of metal crystals (hcp, ccp, bcc structure) - crystal defects (vacancy, interstitial and impurity)

Alloys: General methods of preparation of alloys - role of carbon in steel - heat treatment of steel - metallic bonding (electron sea model)

Phase rule: Definitions of phase, component and degrees of freedom - one component system (sulphur) two component system (Pb - Ag)

Unit – IV

Fundamental concepts in organic chemistry: Homolytic and heterolytic fissions - substitution, addition, elimination, and condensation reactions, electrophiles-nucleophiles and free radicals with suitable examples. Mechanism of chlorination of CH₄ - Electron displacement effect- inductive and mesomeric effects. Petroleum refinery products -Rectified spirit - methylated spirit - vinegar - formalin

Carbohydrates : Definition -classification -D,L notations - mutarotation - invert sugar - reducing and non reducing sugars - structure of starch and cellulose(no structural elucidation)- Gun cotton, cellulose acetate and viscose rayon.

Unit -V

Chemotherapy: Drugs - sulpha drugs (structures of sulphapyridine, sulphadiazine, sulphaguanidine, sulphathiazole, sulphaacetamide)- mode of action - uses -Definition of antimalarials, antipyretics , analgesics tranquilizers and sedatives , anti septics and disinfectants - structure , uses and side effects of Aspirin, Paracetamol Phenacetin - local and general anesthetics - *Antibiotics* : Definition - structure ,mode of action and side effect of Penicillin , Chloramphenicol and tetracycline.

Polymers: Homo and co- polymers with the examples of polythene and polyester, thermoplastic and thermosetting polymers (PVC and bakelite)

References:

1. Puri B.R. Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, Milestone Publishers, Delhi (2008)
2. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, Vishal Publishing Co., Jalandar, (2004)
3. Bahl B.S. Arun Bahl, Advanced Organic Chemistry, S. Chand & Company Ltd., New Delhi, (2005).
4. Jaya shree Ghosh , A text book of pharmaceutical chemistry, 3rd ed., S.Chand & Company Ltd., New Delhi (2008)

Semester	Subject Code	Title of the Paper	Hours of Teaching /Week	No. of Credits
III & IV	11U4PHACHP	Allied Chemistry Practical (NS)	3+3	2

A. Volumetric Analysis

1. Estimation of HCl (or H₂SO₄) by NaOH using a standard oxalic acid solution
2. Estimation of NaOH by H₂SO₄ (or HCl) using a standard Na₂CO₃ solution
3. Estimation of oxalic acid by KmnO₄ using a standard Mohr's salt solution
4. Estimation of Ferrous sulphate by KmnO₄ using a standard oxalic acid solution.
5. Estimation of Mohr's salt by KmnO₄ using a standard oxalic acid solution.
6. Estimation of KMnO₄ by thio using a standard K₂Cr₂O₇ solution.
7. Estimation of K₂Cr₂O₇ by thio using a standard CuSO₄ solution
8. Estimation of CuSO₄ by thio using a standard K₂Cr₂O₇ solution

B. Organic qualitative analysis

Systematic analysis of an organic compound , Preliminary tests, detection of element present, Aromatic or aliphatic, Saturated or unsaturated, nature of the functional group and exhibiting confirmatory tests for given organic compounds.

The following substance are prescribed:

Benzoic Acid, Cinnamic acid, Phenol, Cresol, Aniline, Toludine, Urea, Benzaldehyde, Glucose

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
V	14U5PHC7	Core- ATOMIC PHYSICS AND WAVE MECHANICS	6	5

Objective:

- To introduce the study of structure of atom.
- To acquire the basic knowledge about nature of particles.

Unit I Atomic structure

Vector atom model- spatial quantization and spinning of electrons- quantum numbers- coupling schemes- Pauli's exclusion principle- periodic classification- electronic configuration of elements- Orbital and spin magnetic moments- Stern and Gerlach experiment- Fine structure and hyperfine structure- Normal Zeeman effect- experiment and classical theory- Quantum mechanical explanation of Normal and anomalous Zeeman effect- Paschen- Back effect- Stark effect (Qualitative ideas)

Unit II X- ray Diffraction

Detection and absorption of X- rays - diffraction of X-rays- Laue's experiment- Bragg's Law-Bragg's X- ray spectrometer and crystal structure- powder diffraction method- Rotation photography- fine structure- analysis of x-ray spectra- Mosley's law and its importance- Compton scattering -theory and experiment.

Unit III Photo electric effect

Black body radiation and Planck's quantum principle-photoelectric effect- Experimental study- Lenard's method for e/m of photo electrons- Richardson and Compton experiment- laws of photo electric emission- Failure of classical theory- quantum theory - Einstein's photo electric equation- Millikan's experiment- photo cells and their applications- photomultiplier tubes.

Unit - IV Dual Nature of Matter

De Broglie idea of matter waves - De Broglie wavelength - wave velocity and group velocity - Davisson and Germer experiment - G.P. Thomson experiment for verifying de Broglie relation - Heisenberg's Uncertainty principle - Electron microscope - Gamma ray microscope.

Unit V Schrödinger's Wave Mechanics

Basic postulates of wave Mechanics-Development of Schrödinger wave equation -Time independent and dependent forms of equations-Properties of wave function- Orthogonal and normalized wave function Eigen function and Eigen values Applications of Schrödinger equation-particle in a box-Linear harmonic oscillator-The barrier penetration problem.

Books for Study

1. J. B. Rajam - Modern Physics.
2. R. Murugesan - Modern Physics.

Books for Reference:

1. B. D Duggal and C. L Copra- Modern Physics.
2. S.N. Ghoshal - Atomics and Nuclear Physics Vol. I.S., Chand & Co.,
3. Athour Bezier- Modern Physics.

Semester	Subject code	Title of the Paper	Hours of Teaching / Week	No. of Credits
V	14U5PHC8	Core : BASIC ELECTRONICS	6	6

Objective:

- To gain the concepts of electronics.
- To introduce the knowledge of opto electronic devices.

UNIT - I SEMICONDUCTOR DEVICES

Intrinsic and extrinsic semi conductor - PN junction diodes - biasing -voltage - Ampere characteristics - Zener diode - characteristics. FET, MOS FET, UJT, BJT, SCR - working - Equivalent circuits -V-I characteristics - applications - SCR as a switch.

UNIT - II RECTIFIERS, FILTERS and IC FABRICATION

Half wave rectifier - Full wave rectifier - Efficiency - centre tap- bridge rectifier- efficiency - ripple factor - Filter circuits- capacitor filters - choke input filter - π filter voltage stabilization using Zener diode- IC Fabrication - Advantages- Drawbacks - Scales of Integration - Classification - making of monolithic ICs- fabrication of IC components - Resistors - capacitors - diode - transistor.

UNIT - III AMPLIFIERS

Single stage transistor Amplifiers-Feedback Amplifiers-Principle-Advantages-Power amplifiers-Classification-Class A, Class B, Class C and Push-Pull Amplifiers.

OSCILLATORS

Sinusoidal Oscillators- classification - oscillatory circuit - frequency of oscillation- frequency stability-essentials of feedback - LC oscillator- transistor oscillators - tuned base - tuned collector - Hartley - Colpitt - Phase shift- Wien bridge.

UNIT - IV Operational Amplifiers

Differential amplifier - Common mode rejection ratio - Characteristics of an ideal op - amp - Virtual ground - Inverting amplifier - Non inverting amplifier - Applications. Adder - Subtractor - Integrator - Differentiator - Unity gain buffer.

UNIT - V Opto electronic devices

Introduction-Sensors- Emitters - LDR - principle - construction - characteristics - applications - switching device - photodiode - photo - transistor - photovoltaic cell - LED - LCD - PN junction lasers.

Book for Study:

1. Principles of Electronics - V. K. Metha.
2. Basic Electronics - B. L. Theraja.
3. Integrated circuits & Semiconductor devices - DEBOO/BORROUS

Books for Reference:

1. Basic electronics - A. P. Malvino.
2. Electronics - P. Arun.
3. Hand book of electronics - Gupta & Kumar.

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No.of Credits
V	14U5PHCP3	Core- PL – Major Practical- III	6	6

List of Experiments:

Any Twenty Experiments

1. Newton's rings- Radius of curvature
2. Newton's rings- Refractive index of liquid
3. Newton's rings- Refractive index of Lens
4. Air wedge- Thickness of wire
5. Spectrometer Grating- Normal Incidence
6. Spectrometer- minimum Deviation
7. Spectrometer- Dispersive power.
8. Spectrometer- Cauchy's constant
9. B.G- Comparison of capacitance
10. B.G- Absolute capacity
11. B.G- Thermo couple
12. B.G- mutual Inductance
13. Q- Factor
14. Junction Diode characteristics
15. Transistor Characteristics- CE
16. Transistor Characteristics- CB
17. Impedance and Power factor of a coil
18. RC coupled amplifier (Single stage)- Transistor
19. Full Wave rectifier
20. Emitter Follower amplifier
21. Bridge Rectifier
22. Low pass, High pass, Band pass filters- using R and C
23. Op-Amp – Adder and Subtractor.
24. Op-Amp – Differentiator and Integrator.

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
V	14U5PHEL1A	Major Elective-I MATERIALS SCIENCE	4	3

Unit I Elementary crystallography

Fundamental definitions: Lattice – Basis - Crystal structure space lattice - unit cell- primitive cell - lattice parameters- seven crystal systems and 14 Bravais lattice- crystal planes - Miller indices - inter planar spacing- coordination number - packing fraction- symmetry elements - point group and space group.

Unit II Bonding in Solids

Inter - atomic forces - nature and characteristics of ionic- Covalent- metallic and hydrogen bonding - bond energy - bond lengths.

Drude Lorentz free electron theory - electrical and thermal conductivity- electrical resistivity vs temperature - Fermi energy, classification of solids based on band theory - introduction to superconductivity - Type I and Type II superconductors and their applications - BCS theory.

Unit III Magnetic and Electric Properties

Introduction to Dia, Para and Ferro magnetic materials- classical theory of diamagnetism- Langevin theory of Para magnetism- Weiss theory of ferromagnetism- ferromagnetic domains.

Dielectric polarization – polarisability - dielectric constant- source of polarisability – dipolar - ionic and electronic polarisability- local field- Clausius - Mossotti relation - Ferro electricity - Ferrites and its applications.

Unit IV Defects and Corrosion

Point- line and surface defects- definition- electric and plastic Deformation - slip and yield - edge dislocation - screw dislocation- Burgers circuit and Burgers vector - dislocation climb.

Classification of corrosion- dry corrosion and wet corrosion - mechanics of corrosion- hydrogen evolution corrosion and oxygen absorption corrosion - prevention and control of corrosion.

Unit V Engineering Materials

Polymer- types of polymerization- composite materials- cements and cement concrete- fiber reinforced plastics (FRP) - ceramics- refractory materials- Group III- IV semiconductors- Group II- IV semi conductors- fiber optic materials- LED and LCD - Acoustic materials- and their applications.

Books for Study

1. M. Arumugam - Material Science.

Books for Reference:

1. Wert Thompson - Physics of Solids
2. Ragavan - Materials Science.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
V	14U5PHEL1B	Major Elective –I INFORMATION TECHNOLOGY	4	3

Objective:

- To introduce the knowledge of different types of computers.
- To introduce the concepts of communication using computer.
- To introduce the knowledge about Multimedia technologies and their applications.

Unit I Introduction

Types of Computers- characteristics- microcomputers, mini main, super, mainframe and network computers- central processing unit, memory-inside a typical computer system, memory and processor- the peripheral devices – CISC and RISC [qualitative only]- Auxiliary storage devices- types of input and output devices.

Unit II Computer system software and Data Base Management

Operating system – Utilities – compilers- and interpreters- word and image processors- Functions of operating system- Classification of operating systems- Types of High level languages- General software features and Trends- Data processing. Introduction to database- Importance and characteristics- Types of database management systems [types of models]- database Design.

Unit III Telecommunications, internet and intranet

Introduction to telecommunications- computer networks- communication systems- distributed systems. Internet and World Wide Web - Electronic mail- voicemail-teleconferencing – fax – intranets.

Unit IV Multimedia and new technologies

Introduction to multimedia- multimedia tools- introduction virtual reality- electronic commerce- hypermedia- data warehouses and data marts- data mining- online analytical processing (olap) - geographic information system (gis).

Unit V Applications and information technology

Computers in business and industry- computers in home- computers in education and educational training- computers in entertainment, science, medicine, and engineering- careers in information technology.

Books for Reference:

1. Fundamentals of information technology
 - Alexis Leon & Mathews Leon
 - Leon tech world publishers, Chennai and vikas pub pvt. Ltd., New Delhi

Semester	Subject code	Title of the paper	Hours of Teaching / Week	No. of Credits
V	14U5PHEL2A	Major Elective –II DIGITAL ELECTRONICS	4	4

Objective:

- To gain the knowledge in Digital electronics.

Unit I Number system and Boolean algebra

Number system- Conversion to one another- Binary Codes Decimal- 8421- Excess 3 code- Alphanumeric code, Gray code, ASCII code - Logic gates: OR, AND, NOT EXOR, NOR and NAND gates - Universality - Boolean algebra - laws of Boolean Algebra- DeMorgan's laws- verification- simplification of Boolean equations - Karnaugh maps - Simplification SOP & POS.

Unit II Combinational Circuits and Logic Hardware

Half adder - Full adder - Half Subtractor - Full Subtractor - Parallel binary adder. Subtractor using 2's Complement - BCD adder- Encoder - Decoder - Multiplexer - Demultiplexer - Logic families: Diode Logic- DTL, TTL and DCTL.

Unit III Flip Flops and Semiconductor memories

Flip Flops- RS, Clocked RS, JK, JK M/S, D, T, Flip flops - Memory organization: General ideas Static RAM, Dynamic RAM, ROM, PROM, EPROM, and EEPROM - solid state memory.

Unit IV Counters and Registers

Asynchronous Counters - Mod-2, Mod- 5 and Mod -8 ripple counter - Synchronous counters - Decade counters- Ring counter - Designing aspects of counters using JK Flip Flop. Registers: shift left - shift right - Serial and Parallel shift registers.

Unit V A/D & D/A Converters

Accuracy - Resolution- D/A Converters: Binary Weighted resistor network - Binary ladder[R-2R] - A/D converter: Simultaneous conversion- counter type methods - Dual Slope method - Voltage to Frequency converters - Frequency to Voltage converters.

Books for Study

1. Malvino and Leach - Digital Principles and Application
2. W.H. Gothmann - Digital Electronics
3. Millman and Halkias - Integrated Electronics

Books for Reference:

1. Electronic instrumentation by Kalsi.

Semester	Subject code	Title of the paper	Hours of Teaching / Week	No. of Credits
V	14U5PHEL2B	Major Elective – II MEDICAL PHYSICS	4	4

Objective:

- To gain the knowledge about Medical Physics

Unit I Terminology, Modeling and Measurement:

Terminology, Modeling and Measurement – Applications of Electricity and Magnetism in Medicine – Electrical Shock, High frequency Electricity in Medicine, Low – frequency Electricity and Magnetism in Medicine.

Unit II Light in Medicine

Measurement of light and its units, Application of visible light in Medicine, Applications of Ultraviolet and Infrared light in Medicine, Lasers in Medicine.

Physics of Diagnostic X Rays

Making an X- ray image, Radiation to patient from X- rays. Producing live X- ray images – Fluoroscopy.

Unit III Radio isotopes in Medicine (Nuclear Medicine)

Sources of Radioactivity for Nuclear Medicine, Basic Instrumentation and its clinical applications, Nuclear Medicine imaging devices, Therapy with radioactivity, Radiation doses in Nuclear Medicines.

Unit IV Radiation Protection in Medicine

Biological effects of ionizing radiation, Radiation protection in Diagnostic Radiology, Radiation protection in Radiation therapy, Radiation protection in Nuclear Medicine, Radiation Accidents.

Unit V Computers in Medicine

History taking, Laboratory Automation, Electrocardiogram interpretation, Patient monitoring, Drug–test interactions, prescribing drug dosage, Pulmonary function testing, Medical record systems, Hospitals book keeping, other uses of computers in medicine.

Books for Study:

1. Medical Physics: by John R. Cameron & James G. Skofronick, A Wiley – Interscience Publication, John Wiley & Sons.

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
VI	14U6PHC9	Core- NUCLEAR PHYSICS	6	6

Objective:

- To gain the knowledge about Properties of Nuclei.
- To introduce knowledge Cosmic rays and elementary particles.

Unit I General Properties of Nuclei & Nuclear Forces

Nuclear size- experimental determination- electron scattering experiment- Nuclear mass- Dempster's mass spectrograph- binding energy, mass defect and packing fraction- stability and binding energy- Semi empirical mass formula- Nuclear spin and magnetic moment- Electric quadrupole moment - Nuclear forces - basic properties- Meson theory of Nuclear forces.

Unit II Radioactivity

Laws of Natural radioactivity- Law of successive disintegration- Radioactive Equilibrium- Alpha emission- properties of Alpha particles- velocity and range of alpha particles- Geiger- Nuttal law- Alpha ray fine structure- potential barrier problem and Gamow's theory- Beta emission- properties of beta particles- Beta ray spectra- explanation of continuous spectrum and Neutrino hypothesis- Gamma - emission- properties of Gamma rays- origin of Gamma ray- Gamma ray spectra- pair production- internal conversion- nuclear isomerism.

Unit III Nuclear Reactions and Models

General ideas of nuclear reactions- different types of Nuclear reactions- energy balance in Nuclear reaction- threshold energy- Bohr's compound Nucleus model- Artificial Transmutations- different types with examples- discovery of neutron- properties- sources- Detection- Neutron induced reactions- liquid drop model- fission and liquid drop model- fusion (qualitative idea)- Shell model- magic numbers- energy levels.

Unit IV Detectors and Accelerators

Scintillation counters- Cerenkov counter- BF₃ Counter- Semi conductor detectors - Wilson cloud chamber- Bubble chamber-linear accelerator- Betatron- synchrocyclotron- electron synchrotron- proton synchrotron.

Unit V Cosmic Rays and elementary Particles

Primary and Secondary cosmic rays- cosmic ray showers- cascade theory- discovery of positron and mesons and their properties- Van Allen belts- Origin of cosmic rays- classification of elementary particles and their decay modes- particles and antiparticles- fundamental interactions- elementary particle quantum numbers- conservation laws- strange particles and Hyperons.

Books for Study:

1. J.B. Rajam - Modern Physics
2. R. Murugesan - Modern Physics

Books for Reference:

1. R.C. Sharma - Nuclear Physics.
2. R.K. Puri and V.K. Babbar - Introductory Nuclear Physics

Semester	Subject Code	Title of the Paper	Hours of Teaching /week	No. Of Credits
VI	14U6PHC10	Core- COMMUNICATION ELECTRONICS	6	6

Objective:

- To impart the concepts of Colour TV.
- To gain the knowledge about Radio and Fiber optic communications.

To introduce

Unit I Modulation

Essential of modulation - Amplitude modulation- Frequency modulation - single side band modulation- Principles – determination of modulation factors – wave analysis - mathematical expressions - The balanced modulator- signal to noise ratio – comparison between AM and FM modulation – Demodulation – AM diode detectors – FM detectors.

Unit II Radio Communications

Principles – Radio broadcasting systems – Amplitude modulated transmitters – Frequency modulated transmitters – SSB transmitters – mathematical analysis – Radio receivers – types – Simple crystal receiver – tuned radio frequency receiver - AM superhetrodyne receiver – SSB receivers.

Unit III Microwaves, Radars and Antennas

Generation – klystron – Reflex klystron – magnetron oscillator – Radars – Radar Range Equation application of microwaves - Attenuators – Effective parameters of an antenna – power gain-isotropic antenna – YAGI – UDA antenna.

Unit IV Colour Television

Essentials of colour television- perception- three colour theory- luminescence-hue- saturation- TV camera- luminescence signal- TV display tubes- Delta gun and precision- in- line picture tubes- convergence adjustments- signal transmission- modulation of colour difference signals- PAL, NTSC, SECOM colour TV systems- Block diagram- Merits and demerits.

Unit V Fibre Optic Communication

Principle- classification of optical system – single mode – multi mode step index – multi mode graded index – structure – propagation of light – Snell’s law – total internal reflection – light propagation through fibre – cone of maximum acceptance – numerical aperture – fibre losses – splicer’s and connectors – types – fibre optic communication system – advantages.

Books for Study

1. Electronic communications- Roddy and Coolen
2. Monochrome and Colour television- R.R. Gulati.

Books for References:

1. Electronic communication-Kennedy
2. Communications Electronics-N.D. Deshpande, D.A. Deshpande and P.K. Rangole.

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
VI	14U6PHCP4	Core- PL Major Practical – IV	6	6

Any Twenty Experiments:

1. FET Characteristics
2. Zener Diode Characteristics
3. Temperature Co efficient of a Thermistor
4. Transistor Power Amplifier
5. Principle of a multimeter
6. Zener Regulated Power Supply
7. Voltage Doubler
8. FET Amplifier
9. Hartley oscillator- Transistor
10. Colpitt's oscillator- Transistor
11. Construction of IC Regulated Power supply
12. Transistor as a switch
13. Astable Multivibrator- Transistor
14. Logic gates- Discrete components
15. DTL- NAND gate
16. RTL- NOR gate
17. Logic Gates- IC
18. Study of Universal gates- NAND and NOR
19. Half adder and subtractor
20. Full adder and subtractor
21. Verification of Demorgan's theorem
22. Parallel Binary adder
23. Encoder (0 to 8)
24. Microprocessor- Addition and subtraction
25. Microprocessor- 8 bit multiplication

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
VI	14U6PHEL3A	Major Elective – III PROGRAMMING IN C	5	3

Objective:

- To introduce the knowledge in computer programming.

Unit I

Introduction- Importance of C- Basic structure of C program- Character set- key- words and Identifiers- Constants- variables- Data types- Declaration of Variables- Assigning values of Variables- Operators and Expression- Arithmetic, Relational, Logical, Assignment, increment, Conditional, Bitwise and Comma Operators- Arithmetic expression- precedence and associativity.

Unit II

Input Output Statements- get char , put char , Formatted output (Printf) and Formatted input (scanf) Control structure- Decision making with if- if else- switch- go to-break and continue statements- While- do while- For statements.

Arrays: One-dimensional and two-dimensional arrays, declaring arrays, storing arrays in memory- initializing arrays.

Unit III

Functions- Basic functions- Return values and their types- calling functions - function arguments- Recursion -external variables and scope rules.

Structures and Union: Structures- Arrays of Structures- Arrays within structures- Structures and functions- Unions.

Unit IV

Pointers: Pointers and functions- arguments- Pointers and arrays- address arithmetic- character pointers and functions- Pointer arrays preprocessor: Macro substitution- File inclusion- Compiler control directives- opening and closing a file- reading and writing data- error handling- Random Access.

Unit V

Algorithm, flowchart and program for the following problems:

1. Average of a set of numbers
2. Conversion of Fahrenheit to Celsius
3. Solving quadratic equation
4. Finding the factorial using recursion
5. To add/ subtract / multiply two matrices
6. To find the smallest and largest element in an array
7. Sorting a set of numbers in ascending/ descending order
8. To arrange the names in alphabetical order
9. Numerical integration by Trapezoidal/ Simpson's rule
10. Determination of roots by Newton - Raphson method

Reference:

1. Programming in ANSI C- E. Balagurusamy - Tata McGraw- Hill
2. Schaum's Outline Series Theory and problems of programming with C- Byron S. Gottfried, McGraw Hill internationals.
3. Programming with C- Venugopal, K.R , and Sudep R.P- Tata McGraw- Hill 1998
4. Let us C- Yashwant Kanetkar.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. Of Credits
VI	14U6PHEL3B	Major Elective– III HISTORY OF PHYSICS	5	3

Objective:

- To know the History of physics.

Unit I Ancient Greeks of Newton

Pythagoras – Democritus’s theory – Aristotle and why things happen – Aryabhata – Copernicus – Kepler and the elliptical orbit – Galileo, his laws of motion and telescope – Newton and his three laws of motion and gravity.

Unit II Light, Gases, Atomic Structure and Thermodynamics

Light – Newton’s Corpuscular theory – Young and double slit experiment – Fresnel and light waves – Development of science of gases – Pascal and Boyle – Atomic theories of Dalton and Bohr – The birth of thermodynamics – Joule’s measurement – The first and second laws – Maxwell’s Demon.

Unit III Electricity and Magnetism

Experiments of Galvani, Oersted, Ampere, Faraday, Coulomb, Rutherford and Benjamin Franklin – Volta and the birth of battery – Thomas Alva Edison – Maxwell and his field – Lasers – Superconductors.

Unit IV Quantum Mechanics and Relativity

Planck’s idea – Einstein’s photoelectric effect – Schrodinger and his wave equation – Heisenberg’s uncertainty principle – Stern – Gerlach experiment – Einstein’s special theory of relativity – Twin paradox – General theory of relativity.

Unit V Physics in India

Why is the sea blue? – Raman effect – Bose and his statistics – Bosons and Bose condensation – Chandrasekhar, his limit and white dwarfs – Saha and his ionization formula – Homi Bhabha: Research findings – The institution builder – Birth of DAE and AEET.

Books for study and reference:

1. R. Spangerrburg and D.K. Moser, The History of Science: From the Ancient Greeks to the Scientific revolution (University Press, Hyderabad, 1999).
2. R. Spangerrburg and D.K. Moser, The History of Science: In the Eighteenth century (University Press, Hyderabad, 1999).
3. R. Spangerrburg and D.K. Moser, The History of Science: In the Nineteenth century (University Press, Hyderabad, 1999).
4. R. Spangerrburg and D.K. Moser, The History of Science: From 1900 to 1945 (University Press, Hyderabad, 1999).
5. R. Spangerrburg and D.K. Moser, The History of Science: From 1946 to 1990 (University Press, Hyderabad, 1999).
6. G. Venkataraman, Raman and his effect (University Press, Hyderabad, 1995).
7. G. Venkataraman, Saha and his formula (University Press, Hyderabad, 1995).
8. G. Venkataraman, Bose and his Statistics (University Press, Hyderabad, 1992).
9. G. Venkataraman, Chandrasekhar and his limit (University Press, Hyderabad, 1992).
10. G. Venkataraman, Bhabha and his magnificent obsessions (University Press, Hyderabad, 1994).
11. R.P. Crease, C.C. Manu, The second creation (Affiliated East West Press, New Delhi, 1986).

Semester	Subject code	Title of the paper	Hours of Teaching /Week	No. of Credits
VI	14U6PHEL4A	Major Elective – IV 8085 MICROPROCESSOR & APPLICATIONS	5	4

Objective:

- To introduce the knowledge in 8085 Microprocessor.

Unit I Microprocessor architecture and microcomputer systems

Microprocessors – organization of microprocessor- machine language - micro processor architecture and its operations – The 8085 MPU- pin diagram – 8085 architecture – communication and bus timing- timing diagrams: Example (i)transfer of byte from memory to MPU, (ii)Execution of instruction MVI A, XXH – Address decoding and memory addresses.

Unit II 8085 Assembly Language programming

Assembly language –assembler- mnemonics –Instruction and op-code format- Instructions classification including its size: Data transfer, Arithmetic, Logical, Branching and machine control-Five addressing modes of 8085.

Unit III Programming Aspects

Flow chart- Writing ALP technique- Debugging of a program- How to write ALP and execute a simple program-8bit:addition, subtraction, multiplication and division-16 bit instructions- Simple programs using IN, OUT and JMP instructions.

Unit IV Counters and Time delays in Programming

Programming techniques: looping , counting and indexing- Counting and Time delay programs: using one register, register pair, loop and loop within a loop- Example programs: hexadecimal counter, Zero to nine counter and generating pulse waveforms

Unit V Prelude to interfacing

Introduction to interfaces-merits and cautions- 8255(PPI or PIA) : interfacing keyboard and seven segment display–8254(8253) programmable interval timer- 8259A programmable interrupt controller-8257 DMA controller.

Books for study and reference:

1. Microprocessor Architecture, Programming and Application 8085–III–By Ramesh S.Gaonkar.
2. Microprocessor & Applications Adhidya P.Mathur.

Semester	Subject code	Title of the paper	Hours of Teaching /Week	No. of Credits
VI	14U6PHEL4B	Major Elective- IV NANO SCIENCE	5	4

Objective:

- To introduce basics of Nano Science.

Unit I

Introduction to nanoscience and technology–Importance of nanomaterials-classification-Nanostructures-Types and Properties-Optical, Electronic and Magnetic Materials; Engineering challenges for Nanotechnology, potential impact devices and systems, examples-Basic physics of nanomaterials, quantum confinement, molecular assembly, surface alignment, size effects.

Unit II

Useful techniques for nanoscience and technology – nanofabrication; lithography electron beam lithography, molecular beam epitaxy, chemical vapor deposition, electrochemical deposition, solution chemistry – structural characterization; SPM, XRD, BET, TEM, SEM – optical property characterization; UV- Visible, Fluorescence, Raman and IR – composition analysis; XPS and Auger Spectroscopy.

Unit III

Techniques for nanoscience characterization and fabrication of nanoscale systems and devices – scanning probe microscopy, nanotweezers electron microscopy, molecular manufacture, nano fabrication, nanolithography, focused ion beam, electron beam lithography, fullerenes.

Unit IV

Molecular Electronics; molecular wire, Molecular Diode, Transistor and Switch-Characterization and performance.

Unit V

Nanoscale in biology and biometric materials mineralized tissues, apatite crystals, organic/inorganic matrix, precipitation, artificial bone, cell structure membranes actin, macromolecules, bioadhesion, ligand - receptor interactions, collagen structure, bone morphogenic proteins, cell migration, cell attachments, phagocytosis, macrophage response.

Reference:

1. M.Ratner *et.al.*, Nanotechnology; A Gentle intro Practices–hall ISBN 0-13-101400-5, 2003.
2. Nanotechnology; Basic Science and Emerging Technologies, CRC Press
3. Charles P.Poole Jr and Frank J.Owens. "Introduction to Nanotechnology" Wiley, 2003.
4. A.S.Edelstien and R.C.Cornmarata, Nanomaterials; synthesis, Properties and Applications, 2ed, Iop (U.K), 1996.