B.Sc., PHYSICS (2017 – 2018)

S. No	SEM	Category	Paper Code	Title of the Paper	Maximum Marks			Minimum Marks For Pass			Hours Week	Credits
					CIA	E.E	Total	CIA	E.E	Total		
1	I	Part-I	17U1PHT1/H1	Tamil-I/ Hindi-I	25	75	100	10	30	40	6	3
2		Part – II	17U1PHE1	English-I	25	75	100	10	30	40	6	3
3		Core	17U1PHC1	Properties of Matter and Sound	25	75	100	10	30	40	7	5
4		Core	17U1PHCP1	Major Practical -I	40	60	100	16	24	40	3	4
5		Allied	17U1PHMAA1	Allied Mathematics-I	25	75	100	10	30	40	5	3
		Allied	17U2PHMAA2	Allied Mathematics-II (NS)	-	-	-	-	-	-	3	-
6		ES	17U1PHES	Environmental studies	-	100	100	-	40	40	-	1
7	II	Part-I	17U2PHT2/H2	Tamil-II/Hindi -II	25	75	100	10	30	40	6	3
8		Part - II	17U2PHE2	English – II	25	75	100	10	30	40	6	3
9		Core	17U2PHC2	Mechanics and Special theory of Relativity	25	75	100	10	30	40	5	4
10		Core	17U2PHC3	Electricity & Electromagnetism	25	75	100	10	30	40	4	4
11		Allied	17U2PHMAA2	Allied Mathematics – II	25	75	100	10	30	40	3	4
12		Allied	17U2PHMAA3	Allied Mathematics – III	25	75	100	10	30	40	5	3
13		SBE	17U2PHS1	Skill Based Elective – I	25	75	100	10	30	40	1	1
14		VBE	17U2PHVE	Value Based Education	25	75	100	10	30	40	-	-
15	III	Part-I	17U3PHT3/H3	Tamil-III/ Hindi-III	25	75	100	10	30	40	6	3
16		Part – II	17U3PHE3	English-III	25	75	100	10	30	40	6	3
17		Core	17U3PHC4	Heat and Thermodynamics	25	75	100	10	30	40	5	5
18		Core	17U3PHC5	Laser Physics	25	75	100	10	30	40	5	4
19		Allied	17U3PHCHA1	Allied Chemistry-I	25	75	100	10	30	40	5	4
		Allied	17U4PHCHAP1	Allied Chemistry Practical (NS)	-	-	-	-	-	-	3	-
20		GS	17U3PHGS	Gender Studies	-	100	100	-	40	40	-	-

S. No	SEM	Category	Paper Code	Title of the Paper	Maximum Marks			Minimum Marks For Pass			Hours Week	Credits
					CIA	E.E	Total	CIA	E.E	Total		
21	IV	Part-I	17U4PHT4/H4	Tamil-IV/ Hindi – IV	25	75	100	10	30	40	6	3
22		Part – II	17U4PHE4	English – IV	25	75	100	10	30	40	6	3
23		Core	17U4PHC6	Optics	25	75	100	10	30	40	6	5
24		Core	17U4PHCP2	Major Practical-II	40	60	100	16	24	40	3	4
25		Allied	17U4PHCHA2	Allied Chemistry-II	25	75	100	10	30	40	5	4
26		Allied	17U4PHCHAP1	Allied Chemistry Practical (NS)	40	60	100	16	24	40	3	2
27		SBE	17U4PHS2	Skill Based Elective-II	25	75	100	10	30	40	1	1
28	V	Core	17U5PHC7	Atomic Physics and Wave Mechanics	25	75	100	10	30	40	5	6
29		Core	17U5PHC8	Basic Electronics	25	75	100	10	30	40	4	5
30		Core	17U5PHC9	Material Science	25	75	100	10	30	40	4	4
31		Core	17U5PHCP3	Major Practical – III	40	60	100	16	24	40	6	6
32		Major Elective-I	17U5PHEL1A 17U5PHEL1B	Energy Physics/ Information Technology	25	75	100	10	30	40	4	3
33		Major Elective-II	17U5PHEL2A 17U5PHEL2B	Digital Electronics/ Bio Physics	25	75	100	10	30	40	4	4
34		NME	17U5PHNME	Non-Major Elective	25	75	100	10	30	40	2	1
35		SSD	17U5PHSSD	Soft Skill Development	25	75	100	10	30	40	1	
36	VI	Core	17U6PHC10	Nuclear Physics	25	75	100	10	30	40	5	5
37		Core	17U6PHC11	Communication Electronics	25	75	100	10	30	40	5	5
38		Core	17U6PHC12	Linear Integrated Circuits	25	75	100	10	30	40	4	4
39		Core	17U6PHCP4	Major Practical-IV	40	60	100	16	24	40	6	6
40		Major Elective-II	17U6PHEL3A 17U6PHEL3B	Programming in C / History of Physics	25	75	100	10	30	40	4	3
41		Major Elective-IV	17U6PHEL4A 17U6PHEL4B	8085 Microprocessor & Applications / Nanoscience	25	75	100	10	30	40	4	4
42		GK	17U6PHGK	General knowledge	-	100	100	-	40	40	1	-
43		CN	17U6PHCN	Comprehensive Test	-	100	100	-	40	40	1	1
				Extension Activities	-	-	-	-	-	-	-	1
				Total			**4300**				**180**	**140**

B.Sc., PHYSICS (2017 - 2018)

Paper Code	Total No. Of Papers	Total Marks	Total Credits	Classification
Part - I	**04**	**400**	**12**	√
Part – II	**04**	**400**	**12**	√
Part – III Core Allied Major Elective	 16 06 04 **26**	 1600 600 400 **2600**	 76 20 14 **110**	√
Part – IV Environmental Studies Value based education Skill Based Elective Gender studies Non Major Elective Soft skill development G.K Comprehensive Test	 1 1 2 1 1 1 1 1 **9**	 100 100 200 100 100 100 100 100 **900**	 1 -- 2 -- 1 -- -- 1 **05**	√
Part – V	**Extension Activity**		**1**	X
Total	**43**	**4300**	**140**	√

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

Question Pattern for UG and PG Programmes for students to be admitted during 2017 – 2018 and afterwards

Total Marks: 75

QUESTION PATTERN

SECTION – A
(Question 1 to 10)

10 x 2 = 20 Marks

1. Short Answer Questions
2. Two Questions from each units (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.

பருவம்	பாடக்குறியீடு	தாளின் பெயர்	பயிற்சியின் நேரம் / வாரம்	சிறப்பு மதிப்பீடு
I	17U1____T1	**இக்கால இலக்கியம் (செய்யுள், உரைநடை, சிறுகதை, புதினம், நாடகம்,)**	6	3

கூறு: 1 செய்யுள் **நேரம்: 18**

1. இராமலிங்க அடிகளார் - திருவருட்பா - இறைத் திருக்காட்சி —1—10
2. பாரதியார் - தேசியகீதம் : பாரத தேசம் — எங்கள் நாடு,
3. பாரதிதாசன் - புதிய உலகம்: உலக ஒற்றுமை —பேரிகை, தளைஅறு, மானுட சக்தி
4. பட்டுக்கோட்டை கல்யாண சுந்தரம் -காடு வெளையட்டும் பெண்ணை ,
5. நாமக்கல் கவிஞர் - என்றுமுளதென்றமிழ் ,
6. கவிமணி : ஒற்றுமையே ,உயர்வு நிலை—நாட்டுக்குழைப்போம்

கூறு: 2 உரைநடை **நேரம்: 18**

1. கேட்டிவி - இராகபாவம் (1 முதல் 15 வரை)
2. கேட்டிவி - பயணங்கள் தொடரும்

கூறு: 3 சிறுகதை **நேரம்: 18**

1. கேட்டிவி - குரல் கொடுக்கும் வானம்பாடி (1 முதல் 10 வரை)
2. கேட்டிவி - மனோரஞ்சிதம் முழுவதும்

கூறு: 4 புதினம் **நேரம்: 18**

1. கு.வெ.பாலசுப்பிரமணியம் —காளவாய்

கூறு: 5 நாடகம் , இலக்கிய வரலாறு **நேரம்: 18**

1. கலைவாணன் — கு.சா.கிருஷ்ணமூர்த்தி(NCBH வெளியீடு)
2. சிறுகதை, புதினம், நாடகம், கவிதை, உரைநடை

பயன்கள்

சமீபகால தமிழ் இலக்கியம் பற்றி தெரிந்து கொள்ளுதல்

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
I	**17U1 _ E1**	**PART – II PROSE, POETRY AND COMMUNICATION SKILLS**	**6**	**3**

Objective

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

Unit – I

Shakespeare - Shall I compare thee to a Summer's Day?
John Milton – On His Blindness.
William Wordsworth – The Solitary Reaper
P.B.Shelley – Song to the Men of England.
Robert Frost – The Road not Taken
Nissim Ezekiel - Night of the Scorpion

Unit – II

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

Unit – III

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

Unit – IV

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

Unit – V

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

References Book:

A Melodious Harmony – Sri.KTV, Rajendra Publishing House, Poondi, 2017.
Flying Colours – Prof. K.Natarajan, New Century Book House (P) LTD., 2017.

Course Outcome

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

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
I	**17U1PHC1**	**Properties of Matter and Sound**	**7**	**5**

Objectives:

- 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 – Ultrasonics – Properties – Production methods – Piezoelectric & Magnetiostriction 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.

Course Outcome:

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

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
I	**17U1PHCP1**	**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.

Course Outcome:
Students acquire skills in doing experiments related to properties of matter and sound.

Semester	Subject Code	Title of the Paper	Hours of Teaching /Week	No. of Credits
I	**17U1PHMAA1**	**Allied Mathematics – I**	**5**	**3**

Objectives:

- To introduce the basic concepts of summation of series, theory of equations, special types of matrices, trigonometry and calculus.

UNIT- I

Algebra: Binomial Theorem: some standard expansions – general term – expansion of rationa fractions – approximations – summation of series - Exponential Theorem: results – summation of series - Logarithmetic series: standard results.

UNIT-II

Theory of Equations: Fundamental theorem of algebra **–** symmetric function of the roots – formation of equations – Diminishing of roots – Reciprocal Equations: four types.

UNIT-III

Matrices: Rank of a Matrix – elementary transformations - Linear Equations: Homogeneous and Non- Homogeneous equations – Characteristic Roots and Vectors – Properties of eigen vector – Cayley-Hamilton theorem.

UNIT-IV

Trigonometry: Expansion in series – expansion of $\cos^n\theta$ and $\sin^n\theta$ – expansion of $\cos n\theta$ and $\sin n\theta$ – expansion of $\sin\theta$, $\cos\theta$ and $\tan\theta$ - Hyperbolic Functions – relations connecting hyperbolic functions and circular functions – periods of hyperbolic function – Inverse hyperbolic functions.

UNIT-V

Differential Calculus: Curvature – radius of curvature in Cartesians – parametric form - Maxima and minima of a function of two variables – Lagrange's method of undetermined multipliers.

Textbook:

Allied Mathematics, Paper-I, First Semester, P. Kandasamy and K. Thilagavathy, S.Chand & Company Pvt. Ltd., New Delhi, 2014.

Unit I : Algebra: Chapter II, III, IV
Unit II : Theory of Equations: Chapter I, II.
Unit III: Matrices: Chapter II, III, IV.
Unit IV: Trigonometry: Chapter I, II.
Unit V : Differential Calculus Chapter IV, V.

References:

1. ***Algebra Volume I***, T.K.M. Pillay, T. Natarajan and K.S.Ganapathy, S. Viswanathan (Printers & Publishers) Pvt. Ltd.
2. ***Calculus Volume I***, S. Narayanan and T.K. Manicavachagom Pillay, S. Viswanathan pvt. Ltd., 2014.
3. ***Trigonometry***, Narayanan and T.K.Manicavachagom Pillay, S. Viswanathan pvt. Ltd., 2013.

Course Outcome:

To introduce the basic concepts of summation of series, theory of equations, special types of matrices, trigonometry and calculus.

Semester	Subject Code	Title of the Paper	Hours of Teaching /Week	No. of Credits
I & II	**17U2PHMAA2**	**Allied Mathematics – II (NS)**	**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

Expansions: Expansions of cos nθ and sin nθ – Expansions of tan nθ – Expansion of tan (A+B+C+…) – Powers of sines and cosines of θ – Expansions of $\cos^n\theta$ – Expansions of $\sin^n\theta$ – Expansions of sinθ and cosθ in a series of power of θ.

UNIT – II

Hyperbolic functions: hyperbolic functions – Relation between hyperbolic functions – Relation between circular functions – Inverse hyperbolic functions – separation of real and imaginary parts of inverse hyperbolic function.

UNIT – III

Correlation – Karl Pearson coefficient of correlation – Rank correlation – Regression: Regression coefficients – Properties of regression coefficients

UNIT – IV

Numerical solution of ordinary differential equation: Taylor series – Euler's method – Modified Euler's method – R. K method - 4^{th} order only.

UNIT – V

Planes: Standard Equation of planes – angle between the planes – **Straight lines:** Equations of straight lines – coplanar lines – S.D between two skew lines – **Sphere:** equation of sphere – centre and radius – length of the tangent from the point to the sphere.

Text Book:

1. Trignometry, T.K.M.Pillai, S. Narayanan, 2015
   Unit I : Chapter – 3
   Unit II : Chapter – 4
2. Fundamentals of Mathematical Statistics, S.C. Gupta, V. K. Kapoor, Sulthan, 2002.
   Unit III: Chapter – 10(Sec.10.2–10.4, 10.7), Chapter – 11(Sec.11.1–11.2.2)
3. Numerical methods, P. Kandasamy, Thilagavathi and Gunavathi
   Unit IV : Chapter – 11(Sec.11.5, 11.9, 11.11 – 11.3)
4. Analytical Geometry 3D - T.K.M.Pillai, 2015
   Unit V: Chapter – 2(Sec.1-7), Chapter – 3(Sec.1-4, 7, 8), Chapter – 4(Sec.1-4)

General References:

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

Course Outcome:

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

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
II	17U2____T2	**இடைக்கால இலக்கியம் – பயன்முறைத் தமிழ் –இலக்கண வரலாறு**	6	3

கூறு: I **நேரம்: 18**

1. திருஞானசம்பந்தர் - தேவாரம் - கோளறு திருப்பதிகம்
2. திருநாவுக்கரசர் -தேவாரம் -தனித்திருக் குறுந்தொகை - மாசில்வீணையும் - 1—10 பதிகம்
3. சுந்தரர் -தேவாரம் - திருநொடித்தான்மலைப் பதிகம் —தானெனை முன்படைத்தான்
4. மாணிக்கவாசகர் - திருவாசகம் - திருப்பொன்னூசல்

கூறு: 2 **நேரம்: 18**

1. குலசேகராழ்வார்: திருவித்துவக்கோட்டம்மான் : 1—10 பாடல்கள்
2. நம்மாழ்வார் - திருவாய் மொழி -இரண்டாம்பத்து —1—10 பாடல்கள்
3. ஆண்டாள் - நாச்சியார் திருமொழி —வாரணமாயிரம் 1—10 பாடல்கள்
4. திருமங்கையாழ்வார் - சிறிய திருமொழி —1—10 பாடல்கள்

கூறு: 3 **நேரம்: 18**

1. திருமூலர் - திருமந்திரம் - அட்டாங்க யோகம் —1—10 பாட்ல்கள்
2. குமரகுருபரர் - மீனாட்சியம்மை பிள்ளைத் தமிழ்: வருகைபருவம்
3. திரிகூடராசப்பக் கவிராயர் - குற்றாலக் குறவஞ்சி - நாட்டு வளம்
4. வீரமாமுனிவர் - திருக்காவலூர்க் கலம்பகம் — முதல் 5 பாடல்கள்
5. குணங்குடி மஸ்தான் சாகிபு - ஆனந்தக் களிப்பு —முழுதும்

கூறு: 4 பயன்முறைத் தமிழ் **நேரம்: 18**

வாக்கிய அமைப்பு - புணர்ச்சி வகைகள் - வலிமிகும், வலி மிகா இடங்கள் - எழுத்துப்பிழை நீக்கம் லகர, ளகர, ழகர வேறுபாடுகள் - சொற்களைப் பிரித்துப் பொருள் காணும் முறை - நிறுத்தற் குறியீடுகள் - சரியான தமிழ் வடிவம் அறிதல்.

சொல்லியல் - சொல் வகை - இலக்கண வகை - இலக்கிய வகை - பெயர்ச்சொல் - இடுகுறி - காரணம் - அறுபொருட் பெயர் (பொருள், இடம், காலம், சினை, குணம், தொழில்) - வினைச்சொல் - இடைச் சொல் - உரிச்சொல் - முற்று - எச்சம் - விகுதிகள் - இடைநிலை - தன்வினை - பிறவினை - தொிநிலை வினை - குறிப்பு வினை-வழுவமைதி.

கூறு: 5 இலக்கண வரலாறு **நேரம்: 18**

இலக்கண வரலாறு - தமிழ்த் துறை வெளியீடு.

பயன்கள்

இடைக்கால தமிழ் இலக்கியம் பற்றி தெரிந்து கொள்ளுதல்

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
II	**17U2 _ E2**	**PART – II 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

Shakespeare – The Seven Stages of Man
Long Fellow – A Psalm of Life
Nissim Ezakiel - Enterprise
William Wordsworth – The world is too much with us

Unit – II

Anton Chekov – The Proposal
J.B.Priestly - Mother's Day

Unit - III

William Faulkner - A Rose for Emily
P. Lankesh - Bread
Katherine Mansfield - The Doll's House

Unit – IV

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

Unit – V

Voices, Degrees of Comparison, Direct and Indirect

Book Prescribed:

Unit I , II, III , Voices of vision in English (Vol. I & II), Board of Editors, Pavai Printers (P) Ltd., Chennai, 2016.
Unit IV & V – Communicative grammar by the Department of English, Poondi, 2017.

Course Outcome

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

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
II	**17U2PHC2**	**Mechanics and Special Theory of Relativity**	**5**	**4**

Objectives:

- 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 – 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 continuums – 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.Murugeshan.

Books for Reference

1. Elements of Properties of matter – D.S. Mathur Unit III
2. Mechanics and Mathematical Methods – R. Murugeshan Unit IV

Course Outcome:

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

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
II	**17U2PHC3**	**Electricity and Electromagnetism**	**4**	**4**

Objectives:

- 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 – potential 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 – measurement of strong magnetic field (search coil method) – induction motor.

Unit – IV Chemical and Thermo electricity

Faradays laws of electrolysis – Ionic velocity and mobility – transport number – application of electrolysis – Thermocouple – Thermo electricity – Seeback effect – Peltier effect – Peltier coefficient – Thomson effect – 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. Electricity and magnetism – Brijlal and Subramanian.
2. Electricity and magnetism – R. Murugesan.

Books for Reference

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

Course Outcome:

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

Semester	Subject Code	Title of the Paper	Hours of Teaching /Week	No. of Credits
I & II	**17U2PHMAA2**	**Allied Mathematics – II (NS)**	**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

Expansions: Expansions of cos nθ and sin nθ – Expansions of tan nθ – Expansion of tan (A+B+C+…) – Powers of sines and cosines of θ – Expansions of $\cos^n\theta$ – Expansions of $\sin^n\theta$ – Expansions of sinθ and cosθ in a series of power of θ.

UNIT – II

Hyperbolic functions: hyperbolic functions – Relation between hyperbolic functions – Relation between circular functions – Inverse hyperbolic functions – separation of real and imaginary parts of inverse hyperbolic function.

UNIT – III

Correlation – Karl Pearson coefficient of correlation – Rank correlation – Regression: Regression coefficients – Properties of regression coefficients

UNIT – IV

Numerical solution of ordinary differential equation: Taylor series – Euler's method – Modified Euler's method – R. K method - 4^{th} order only.

UNIT – V

Planes: Standard Equation of planes – angle between the planes – **Straight lines:** Equations of straight lines – coplanar lines – S.D between two skew lines – **Sphere:** equation of sphere – centre and radius – length of the tangent from the point to the sphere.

Text Book:

5. Trignometry, T.K.M.Pillai, S. Narayanan, 2015
   Unit I : Chapter – 3
   Unit II : Chapter – 4
6. Fundamentals of Mathematical Statistics, S.C. Gupta, V. K. Kapoor, Sulthan, 2002.
   Unit III: Chapter – 10(Sec.10.2–10.4, 10.7), Chapter – 11(Sec.11.1–11.2.2)
7. Numerical methods, P. Kandasamy, Thilagavathi and Gunavathi
   Unit IV : Chapter – 11(Sec.11.5, 11.9, 11.11 – 11.3)
8. Analytical Geometry 3D - T.K.M.Pillai, 2015
   Unit V: Chapter – 2(Sec.1-7), Chapter – 3(Sec.1-4, 7, 8), Chapter – 4(Sec.1-4)

General References:

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

Course Outcome:

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

Semester	Subject Code	Title of the Paper	Hours of Teaching/ Week	No. of Credits
II	**17U2PHMAA3**	**Allied Mathematics- III**	**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 , sinax, & cosax only – solution of partial differentials of the form f(p, q) = o; f(z, p, q) = 0; f(x, p, q) = 0; f(y, p, q)= 0; f(x, p) = g(Y, q); z = p x + qy + f(p, q) - Lagrange's method for solving $P_p+Q_q=R$.

Unit – II: Laplace Transforms:

Definition – Laplace Transform of functions e^{at}, cosat, sinat and t^n - First Shifting theorem – Laplace transforms of e^{at}cos bt, e^{at} sin bt, e^{at} sinhbt, e^{at} coshbt, $e^{at}t^n$ - Transforms of f'(t) and f''(t) – Inverse transforms relating to the above standard forms - solution of ordinary differential equation with constant coefficients (involving the above transforms).

Unit –III Fourier Series:

Definition – finding Fourier coefficients for the given periodic function with period 2π - Even and odd functions – Properties - Half range series.

Unit – IV Vector differentiation:

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

Unit – V Vector integration:

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

Text Book:

Unit I	:	Chapter 5 (Sec: 5.1 – 5.3)	Differential Equations – TKM Pillai
Unit II	:	Chapter 5	Calculus Volume III – TKM Pillai
Unit III	:	Chapter6 (Sec: 1 – 5)	Calculus Volume III – TKM Pillai
Unit IV	:	Chapter IV	Vector Algebra & Analysis – TKM Pillai
Unit V	:	Chapter VI	Vector Algebra & Analysis – TKM Pillai

General References:

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

Course Outcome:
- 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.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
II	**17U2PHS1**	**Skill Based Elective - I** **Basic Electrical Wiring & Fundamentals**	**1**	**1**

Unit – I

Generation of Electricity

Conventional methods of power generations – Thermal power plant – Atomic power station – Solar energy – wind mill energy.

Fundamentals of Electricity

Electron theory – Flow of electrons and current – Resistance Electromotive force voltage – potential difference – voltage drop – alternating current – Direct current-ohm'a law – Effects of electric current – Types of electrical circuits – work – power and energy.

Single phase and Polyphase AC circuits

Alternating current – amplitude – time period – frequency – RMS value – polyphase – 2 phase – 3 phase – advantages of polyphase over single phase – star connection – delta connection.

Unit – II

Transformer

Construction – Principle of operation – classification of transformers – types of core-Transformer losses – Efficiency – Alternator – Parts of an alternator – AC three phase motors – AC single phase motors.

House wiring

Earthing – Necessity of earthing – Types of earthing – safety fuse – fuses – circuit breaker – thermal fuses – Toggle switch – keyboard switches – wires and cables – connectors.

Books for Study

1. Electrical power – Dr. S. L. Uppal.
2. Basic Electrical Engineering – M. L. Anwani.

Course Outcome:
Logical and abstract thinking and analytical approach.

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
III	17U3____T3	காப்பியங்கள், கட்டுரைகள், இலக்கிய வரலாறு	6	3

கூறு: I காப்பியங்கள் I **நேரம்: 18**

1. சிலப்பதிகாரம் - புகார்க் காண்டம்—மனையறம்படுத்த காதை
2. மணிமேகலை - ஆதிரை பிச்சையிட்ட காதை
3. சீவக சிந்தாமணி - மண்மகள் இலம்பகம்
4. கம்பராமாயணம் - மிதிலைக் காட்சிப் படலம்

கூறு: 2 காப்பியங்கள் 2 **நேரம்: 18**

1. பெரிய புராணம் -மெய்ப்பொருள் நாயனார் புராணம் —முழுதும்
2. அரிசந்திரபுராணம் —மயான காண்டம்
3. தேம்பாவணி - திருமணப் படலம்—1—10 பாடல்கள்
4. சீறாப்புராணம் -நபி அவதாரப் படலம் —1—10 பாடல்கள்

கூறு: 3 கட்டுரைத் தொகுப்பு **நேரம்: 18**

கட்டுரைத் தொகுப்பு - தமிழ்த்துறை வெளியீடு

கூறு: 4 பொதுக்கட்டுரை, மொழிபெயர்ப்புப் பயிற்சி **நேரம்: 18**

பயிற்சிக் கட்டுரைகளும் கடிதங்களும் -பாவை வெளியீடு

கட்டுரைப் பயிற்சி - 10 மதிப்பெண்

மொழிபெயர்ப்புப் பயிற்சி - 5 மதிப்பெண்

கலைச்சொல்லாக்கம்

கூறு: 5 **நேரம்: 18**

அ. இலக்கிய வரலாறு

பக்தி இலக்கியங்கள் - காப்பிய இலக்கியங்கள் - சிற்றிலக்கியங்கள்

பயன்கள்

தமிழ் இலக்கிய வரலாற்றினையும் அதன் முக்கியத்துவத்தையும் தெரிந்து கொள்ளுதல்

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
III	**17U3 _ E3**	**PART - II 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

The gulling scene of malvalio – Twelfth Night

Unit – III

Romeo and Juliet

In Love is a "Midsummer Madness" – Tempest

Unit – IV

R.L. Stevenson – Treasure Island

Unit – V

Note making, Hints Developing, Expansion of Ideas and Proverbs, Clauses and sentence, Structure simple, Compound and Complex.

Book Prescribed:

Unit – I, II & III: Selected scenes from Shakespeare, Prof.K.Natarajan, Pavai Printers (p) Ltd., 2017.

Unit IV: Treasure Island Abridged by E.F. Dodd

Unit V: Communicative Grammar by Department of English, Poondi, 2017.

Course Outcome

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

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
III	**17U3PHC4**	**Heat and Thermodynamics**	**5**	**5**

Objectives:

- 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 pyrheliometer.

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 – MB Statistics – Quantum statistics – BE and FD statistics – Comparison of MB, BE, FD Statistics – photon gas – Planck's law of Radiation.

Books for study

1. Heat and thermodynamics – Brijlal and N. Subramaniyam
2. Heat and thermodynamics – M.W. Zemansky.

Books for Reference

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

Course Outcome:

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

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
III	**17U3PHC5**	**Laser Physics**	**5**	**4**

Objectives:

- 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 – The Threshold Condition – Line Broadening Mechanisms – Natural Broadening – Collision Broadening – Doppler Broadening.

Unit – II Pumping and Types of LASER

Population inversion – Pumping – pumping methods – Active medium – Metastable states – Pumping schemes – Two level, three level and four level pumping schemes (elementary ideas) – Types of lasers – solid state lasers – Ruby lasers – Nd-YAG laser – GaAs laser – Characteristics – Construction and working.

Unit – III Gas LASERs and Pulsed operation of LASERs

Gas lasers: He Ne laser – working principle – Energy level diagram – Argon Ion laser – Molecular gas laser – Co_2 laser – principle – construction and working – Pulsed lasers – Q switching – Mode locking – Frequency doubling – Tunable laser.

Unit – IV Applications

Laser materials – preparation and testing – Applications of lasers – Interferometery – 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 precautions and protective measures.

Unit – V Holography

Holography – Theory and basic principles – Hologram – Recording and reconstruction of hologram – Experimental techniques – characteristics of hologram – classifications – Reflection holography and applications Holographic interferrometry – 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. Lasers and Non- linear optics – B.B. Laud.

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.

Course Outcome:

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

Semester	Subject Code	Title of the paper	Hours of Teaching / week	No. of Credits
III	**17U3PHCHA1**	**Allied Chemistry – I**	**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, H_2, Cl_2, HF molecules and BF_3 – NH_3 - VSEPR theory -shapes of $BeCl_2$, BF_3, H_2O, PCl_5, XeF_6 – 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 firs 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 ultrafilltration. 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.

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 PublishingCo., 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., NewDelhi (2000)

Course Outcome:

- Students should able to understand the standardized names and symbols to represent atoms, molecules, ions and apply on chemical reactions.
- Students should able to explain the behavior and interactions between matter and energy at both the atomic and molecular levels.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III & IV	**17U4PHCHAP1**	**Allied Chemistry Practical (NS)**	**3+3**	**2**

A. Volumetric Analysis

1. Estimation of HCl (or H_2SO_4) by NaOH using a standard oxalic acid solution
2. Estimation of NaOH by H_2SO_4 (or HCl) using a standard Na_2CO_3 solution
3. Estimation of oxalic acid by $KmnO_4$ using a standard Mohr's salt solution
4. Estimation of Ferrous sulphate by $KmnO_4$ using a standard oxalic acid solution.
5. Estimation of Mohr's salt by $KmnO_4$ using a standard oxalic acid solution.
6. Estimation of KMnO4 by thio using a standard $K_2Cr_2O_7$ solution.
7. Estimation of $K_2Cr_2O_7$ by thio using a standard $CuSO_4$ solution
8. Estimation of $CuSO_4$ by thio using a standard $K_2Cr_2O_7$ 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, Pheno, 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)

Course Outcome:

- Facilitate the learner to make solutions of various molar concentrations.

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
IV	17U4____T4	சங்க இலக்கியம் – அற இலக்கியம் – செம்மொழி – இலக்கிய வரலாறு	6	3

கூறு: I

நேரம்: 18

குறுந்தொகை

1. குறிஞ்சி - (பா.எ.:3) 2. முல்லை - (பா.எ.94)
3. மருதம் - (பா.எ.45) 4. நெய்தல் - (பா.எ.:49)
5. பாலை - (பா.எ.:41)

நற்றிணை

1. குறிஞ்சி - (பா.எ. 32) 2. முல்லை - (பா.எ. 81) 3. மருதம் - (பா.எ. 210)
4. நெய்தல் - (பா.எ. 226) 5. பாலை - (பா.எ.229)

கலித்தொகை

1. பாலை - (பா.எ. 6) 2. குறிஞ்சி - (பா.எ. 38)

அகநானூறு

1. குறிஞ்சி : - (பா.எ. 68) 2. மருதம் - (பா.எ. 86)

கூறு: 2

நேரம்: 18

ஐங்குறுநூறு

குறிஞ்சி - தோழிக்கு உரைத்த பத்து: பாடல் எண்கள் —111—120

புறநானூறு

பாடல் எண்கள் 8,17,20,95,141,159,184,186,188,206

பதிற்றுப்பத்து

ஏழாம் பத்து —பாடல் எண். 1

பரிபாடல்

எட்டாம் பாடல் : செவ்வேள்

கூறு: 3

நேரம்: 18

நெடுநல்வாடை முழுவதும்

திருக்குறள்: வான்சிறப்பு, பெருமை, காதற் சிறப்புரைத்தல்

கூறு: 4

நேரம்: 18

செம்மொழி வரலாறு

மொழி - விளக்கம் - மொழிக்குடும்பங்கள் - உலகச் செம்மொழிகள் - இந்தியச் செம்மொழிகள் - செம்மொழித் தகுதிகள் - வரையறைகள் - வாழும் தமிழ்ச்செம்மொழி - தொன்மை - தமிழின் சிறப்புகள் - தமிழ்ச் செம்மொழி நூல்கள்.

கூறு: 5

நேரம்: 18

அ. இலக்கிய வரலாறு

சங்க இலக்கியங்கள், பதினெண்கீழ்க்கணக்கு நூல்கள்

பயன்கள்

சங்க கால தமிழ் இலக்கியம் பற்றி தெரிந்து கொள்ளுதல்

Semester	Subject Code	Title of The Paper	Hours of Teaching/ Week	No. of Credits
IV	**17U4 _ E4**	**PART - II 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:

English for Competitive Examinations, by Ayothi, Trichy, 2017

Course Outcome

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

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
IV	**17U4PHC6**	**Optics**	**6**	**5**

Objectives:

- 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 – 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

Ramsden's 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 – 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 – Khanna and Gulati
2. Optics – Jenkins and White.
3. Optics – Ajoy Ghatak

Course Outcome:

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

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
IV	**17U4PHCP2**	**Major Practical - II**	**3**	**4**

List of Experiments – Any TEN Experiments

1. Spectrometer -Determination of μ
2. Spectrometer - i-d curve
3. Spectrometer - $i\text{-}i^1$ 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
18. Post Office Box - Determination of specific resistance.

Course Outcome:
Students acquire skills in doing experiments related to different fields of physics viz.optics, electricity, magnetism, and thermal physics

Semester	Subject code	Title of the paper	Hours of Teaching /Week	No. of Credits
IV	**17U4PHCHA2**	**Allied Chemistry – II**	**5**	**4**

Unit – I

Concept of mole : Definition of mole - Avagadro number - calculation of molecular masses of Urea, Glucose, HCI, H_2SO_4, NaOH, Na_2CO_3 and sucrose - Molar volume, equivalent masses of acid and base (HCI, H_2SO_4, NaOH, Na_2CO_3).

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 HCI, H_2SO_4, 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 CH_4 - Electron displacement effect- inductive and mesomeric effects.

Carbohydrates: Definition –classification – D,L notations - mutarotation – invertsurar – 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, sulphathiozole, sulphaacetamide) – mode of action – uses –Definition of antimalarials, antipyretics , analgesics tranquilizers and sedatives , anti septics and disinfectants – structure , uses and side effects of Aspirin, Pharacetamol Phenacetin - local and general anesthetics - *Antibiotics* : Definition – structure ,mode of action and side effect of Pencillin, Chloramphenicol and tetracycline.

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

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 PublishingCo., 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).

Course Outcome:

- Students should understand the possible chemical modification of Aromatic compounds.
- Students should able to learn accepted models to describe the reactions between gaseous systems and become aware of their physical properties.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III & IV	**17U4PHCHAP1**	**Allied Chemistry Practical (NS)**	**3+3**	**2**

C. Volumetric Analysis

9. Estimation of HCl (or H_2SO_4) by NaOH using a standard oxalic acid solution
10. Estimation of NaOH by H_2SO_4 (or HCl) using a standard Na_2CO_3 solution
11. Estimation of oxalic acid by $KmnO_4$ using a standard Mohr's salt solution
12. Estimation of Ferrous sulphate by $KmnO_4$ using a standard oxalic acid solution.
13. Estimation of Mohr's salt by $KmnO_4$ using a standard oxalic acid solution.
14. Estimation of KMnO4 by thio using a standard $K_2Cr_2O_7$ solution.
15. Estimation of $K_2Cr_2O_7$ by thio using a standard $CuSO_4$ solution
16. Estimation of $CuSO_4$ by thio using a standard $K_2Cr_2O_7$ solution

D. 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, Pheno, Cresol, Aniline, Toludine, Urea, Benzaldehyde, Glucose

Reference:

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

Course Outcome:

- Facilitate the learner to make solutions of various molar concentrations.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
IV	**17U4PHS2**	**Skill Based Elective - II Domestic Electrical Appliances and Measuring Instruments**	**1**	**1**

Unit – I

Resistors

Resistance – unit – Law of resistance - effect of temperature on resistance (Carbon, Metal film, thin film, wire wound) – variable resistors – colour code.

Inductors

Inductance – General information – types of inductors (ferrite and choking inductors).

Capacitors

Capacitors Principles – types of capacitors (Air, Paper, electrolyte and mica) – fixed and Variable capacitors – specifications.

Illumination

Definition and units Light – luminous flux, Luminous intensity – illumination - units of illumination – types of light sources – Sodium vapour lamp – Mercury vapour lamp - Fluorescent lamp.

Unit – II

Measuring Instruments

Galvanometer – Ammeter – Voltmeter – Ohmmeter – Multimeter – CRO.

Electrical appliances

Heat producing appliances: Electric iron – Soldering iron – Water heaters – Electric Oven – Geysers – Electric mixer – working.

Bell and Buzzer – Electric fan – Emergency lamp – Refrigerator – Water cooler – working.

Books for Study:-

1. Home appliances GT Publications, Jaipur.
2. Electrical power – Dr. S. L. Uppal.
3. Basic Electrical Engineering – M.L. Anwani, Dhanpat Rai and Co. New Delhi.

Course Outcome:

A new perspective to look at everything from Physics point of view.

Semester	Subject Code	Title of the Paper	Hours of Teaching /week	No. of Credits
V	**17U5PHC7**	**Atomic Physics and Wave Mechanics**	**5**	**6**

Objectives:

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

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.

Course Outcome:

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

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
V	**17U5PHC8**	**Basic Electronics**	**4**	**5**

Objectives:

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

Unit – I Semiconductor Diodes, Rectifiers and Filters

Intrinsic and Extrinsic Semiconductors – PN junction diode – Volt-Ampere characteristics – Zener diode – Characteristics – Zener diode as voltage regulator – Half wave rectifier – Full wave rectifier – Efficiency – Centre tap – Bridge rectifier – Ripple Factor – Comparison of rectifiers – Filter Circuits – Capacitor filter – Choke input filter – Π filter.

Unit – II Transistors

Transistor – Transistor action – Transistor connections – common base – common emitter – common collector – characteristics – Transistor biasing – Stabilization – Essentials of a transistor biasing circuit – Methods of transistor biasing – Base resistor method – Biasing with feedback resistor – Voltage-divider bias method.

Unit – III Amplifiers

Single stage transistor Amplifiers – common based and common emitter – Multi stage transistor amplifier – RC Coupled Amplifier – Transformer coupled Amplifier – Power amplifiers - classification – Class A, Class B, Class C and Pushpull Amplifiers – Negative feedback amplifiers – Principle – Gain – advantages.

Unit – IV Oscillators

Sinusoidal Oscillators – classification – oscillator circuit – frequency stability - Essentials of feedback – Barkhausen criterion – Transistor oscillators – Tuned base oscillator – Tuned collector oscillator – Hartley oscillator – Colpitt's oscillator – Phase shift oscillator - Wien Bridge oscillator.

Unit – V Semiconductor Devices

FET – Characteristics – Biasing – Applications – FET Amplifier – MOSFET – Working Principle – SCR – Working – Principle – V-I Characteristics – SCR as a Switch – UJT – Characteristics – Advantages – Application – UJT Relaxation oscillator.

Books 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.

Course Outcome:

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

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
V	**17U5PHC9**	**Materials Science**	**4**	**4**

Objectives:

- To gain the knowledge about crystallography.
- To introduce the basic ideas of magnetic and engineering materials.

Unit – I Elementary Crystallography

Basic concepts of crystal – Lattice – Basis – Crystal structure - Unit cell – lattice parameters – crystal systems – Bravais lattice – crystal planes – Miller indices – Sc, Bcc, Fcc, HCP crystal structures – Bragg's law – Laue and Power methods of X- ray diffraction.

Unit – II Bonding and Defects in Solids

Interatomic forces – Bonding in solids – Primary bonds – Ionic, Covalent and metallic bonds – Secondary bonds – Dipole, dispersion and hydrogen bonds. Defects in solids – point defect – Line defects.

Unit – III Conductors and Semiconductors

Classical free electron theory of metals – Electrical and Thermal conductivity – Wiedmann-Franz law – Quantum free electron theory – Schrodinger wave equation – density of states – Band theory of solids – Brillouin zones. Semiconductors – Intrinsic and extrinsic semiconductors – carrier concentration of P-type and n-type – Hall Effect.

Unit – IV Dielectric and magnetic materials

Dielectrics – polarization – types of polarization – dielectric constant – Clausius Mossaotti relation – Properties of dielectric materials – Dielectric loss and breakdown. Magnetism – dia, para, ferro, antiferro and ferrimagnetisms – classical theory of diamagnetism – Langevin's theory of paramagnetism – Weiss's theory ferromagnetism – Anti ferromagnetic materials – Ferrimagnetic materials – Hard and soft magnetic materials.

Unit – V Superconducting and Engineering materials

Superconductors – properties – critical temperature – isotopic effect – Meissner effect – Types of superconductors – BCS theory - Polymers – Types of polymerization – Metallic glasses – Composite materials – Fibre optic materials – Acoustic materials – Group II-IV and Group II-VI Semiconductors.

Books for study

1. Solid State Physics – Dr .K. Ilangovan
2. Materials Science – Dr. Raghavan

Books for Reference

1. Materials Science – M. Arumugam
2. Solid State Physics – S.O. Pillai
3. Physics of Solids – W. Thompson.

Course Outcome:

- To gain the knowledge about crystallography.
- To introduce the basic ideas of magnetic and engineering materials.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
V	**17U5PHCP3**	**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, Bank pass filters- using R and C
23. Op-Amp – Adder and Sub tractor.
24. Op-Amp – Differentiator and Integrator.

Course Outcome:

Students acquire skills in carrying out experiments related to different fields of physics like optics, and electronics.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
V	**17U5PHEL1A**	**Major Elective – I Energy Physics**	**4**	**3**

Objective:

- To introduce the awareness of non-conventional energy.

Unit – I Introduction to Energy Sources

Energy Sources – Types – Various forms of Energy – World energy Features – Commercial energy sources and their availability – conventional and non conventional energy systems – comparison – Coal, oil, natural gas – Availability – Statistical details – applications – merits and demerits – prospects of renewable energy sources.

Unit – II Solar Energy

Introduction – Solar constant – nature of Solar radiation – Solar radiation measurements – Principle of conversion of solar radiation into heat – Solar energy collectors – Types – applications and advantages – Solar Ponds – Principle of operation – applications – Thermal electric conversion – photovoltaic generation – Solar cooking – merits and demerits.

Unit – III Biomass energy and Wind energy

Biomass energy – Classification – Photosynthesis – Biomass conversion process – Biogas plants – Types – Gobar gas plants – Biogas from plant wastes – wood gasification – ethanol from wood – advantages and disadvantages – Wind energy – Principles of wind energy conversion – WECS – Wind machines – Types – Energy Storage – Applications.

Unit – IV Other forms of energy sources

Geothermal energy – Geothermal sources – Advantages and disadvantages of geothermal energy over other energy forms – Applications – Ocean thermal energy conversion – OTEC – Power generation – Energy forms waves and tides – Hydrogen energy - methods – thermo chemical method – solar energy method – utilization of hydrogen gas.

Unit – V Impacts of non-conventional energy

Economic concept of energy – Conservation of energy **–** Patterns of energy consumption in domestic, industrial, transportation agricultural sectors – Conservation principles in these sectors – energy crisis and possible solution – energy options for the developing countries – impact due to non-conventional energy sources – global warming.

Books for Study

1. Non conventional Energy sources, G.D. Rai, 5th Edition, 2011.
2. Solar Energy, S.P. Sukhatme, Tata McGraw – Hill Publishing company, 2nd Edition 1997.

Books for Reference

1. Solar Energy, G.D. Rai, 5th Edition, 1995.
2. Energy Technology, S. Rao and Dr. B.B. Parulekar, 2nd Edition, 1997.

Course Outcome:

- To introduce the awareness of non-conventional energy.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
V	**17U5PHEL1B**	**Major Elective – I Information Technology**	**4**	**3**

Objectives:

- 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 study

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

Course Outcome:

- 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.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
V	**17U5PHEL2A**	**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 map – 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 – De-multiplexer – Logic families: Diode Logic – DTL, TTL and DCTL.

Unit – III Flip Flops, Counters and Registers

Flip Flops – RS, Clocked RS, JK, JK M/S, D, T, Flip flops – 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 – IV 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**.**

Unit – V Semiconductor Memories

Memory organization: General ideas Static RAM, Dynamic RAM, ROM, PROM, EPROM, and EEPROM – solid state memory.

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 – Kalsi.

Course Outcome:

- To gain the knowledge in Digital electronics.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
V	**17U5PHEL2B**	**Major Elective – II Biophysics**	**4**	**4**

Objective:

- To introduce the knowledge in biophysics.

Unit – I Thermodynamics of living system

Conservation of energy in living systems – Entropy and life – Gibbs free energy – Standard free energy – Equilibrium constant – Heat content of food, bomb calorimetry, chemical kinetics – rate, order, molecularity of reactions – energy of activation.

Unit – II Dynamics of biomolecules

Diffusion – Laws of diffusion – Active transport – Facilitated diffusion – Osmosis Osmotic pressure – Osmoregulation – Viscosity and biological importance – Surface tension – Factors influencing surface tension – Biological importance.

Unit – III Bioenergetics

Energy requirements in cell metabolism – role – Structure of mitochondria – high energy phosphate bond – transport of proteins – force for proteins stability – protein structures – protein function – Structure of myoglobin and hemoglobin – oxygen binding mechanism – Bohr effect – Electron transfer phenomenon – Biological transfer.

Unit – IV Molecular alphabets of life

Amino acids – nucleic acid bases – lipids – Classification – properties of amino acids – peptides – polypeptides – Nucleosides – nucleotides – polynucleotides – pentose hexose poly saceharides.

Unit – V Bioinstrumentation

Electrophoresis – principle – types – Chromatographic techniques – Flow Cytometry – Centrifugation of Biomolecules – types – Basics of light microscopy – different types of compound microscopes – Adsorption spectroscopy – Spectrophotometry – Flurometry – specialized instruments – life time measurements.

Books for Study

1. Introduction to Biophysics by Cortell.
2. Tex book of Biophysics – R.N. Roy, New Central Agency (P) Ltd, Culcutta.
3. Bioinstrumentation: Tools for understanding life – Wandersce, James H. Ed and others.

Books for Reference

1. Physical Chemistry for life Science, Peter Atkins and Julio de Paula, 2006, Oxford Press
2. Molecular and Cellular Biophysics, Meyer B Jackson (2006), Cambridge.
3. Physical Chemistry for the Biosciences, Raymond Chang, (2004), University book Science biological Thermodynamics, Donald, T.Hayine, (2007), Cambridge.

Course Outcome:

To introduce the knowledge in biophysics.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
V	**17U5PHNME**	**Non – Major Elective Non-Conventional Energy Sources**	**2**	**1**

Unit – I

Basics of Energy

Definition of energy – energy routes – energy resources (conventional and non - conventional) – types of conventional and non - conventional energy sources – merits and demerits.

Solar Energy

Solar energy – nature and solar radiation – components – solar heaters – crop dryers – solar cookers – photovoltaic generation – merits and demerits.

Biomass Energy

Biomass energy – classification – photosynthesis – Biomass conversion process – Gobar gas plants – wood gasification – advantages and disadvantages.

Unit – II

Geothermal & Wind Energy

Geothermal energy – its resources – power plants - types. Wind energy - nature and orgin – wind energy conversion systems – merits & demerits - limitations – wind energy stations in India.

Ocean Energy

Ocean energy resources – advantages & disadvantages - limitations – conversion technologies – principle of OTEC (ocean technology energy conversion) – merits and demerits – Tidal energy conversion – Tidal power.

Books for Study

1. Non Conventional energy sources – G. D. Rai.
2. Renewable energy sources and emerging technologies by D. P. Kothari, K. C. Singal & Rakesh Rajan, Prentice Hall of India PVT Ltd., New Delhi (2008).

Book for Reference

1. Renewable Energy sources and their environmental impact, S. A. Abbasi and Nasema Abbasi PHI learning pvt ltd., New Delhi (2008).

Course Outcome:

Awareness of the impact of Physics in social, economical and environmental issues.

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
V	**14U5PHSSD**	**SOFT SKILLS DEVELOPMENT**	**1**	**-**

Unit : I

Proficiency in English – Group Discussion - Interview – Presentation Skills – Percentage and its application – Error Correction.

Unit : II

Communication Skills – Art of Listening, Art of Reading, Art of Writing. Corporate Skill – Time Management, Stress Management.

Text Books

1. Meena K and Ayothi (2013) A Book on Development of Soft Skills (Soft. Skills: A Road Map to Success) P.R. Publishers & Distributors, No. B -20 & 21 V.M.M. Complex, Chatiram Bus Stand, Tiruchirappalli – 620002.
2. Hariharan S, Sundararajan N and Shanmugapriya S.P. (2010) Soft Skills, MJP Pubglishers, Chennai – 600 005.

References

1. Alex K (2012) Soft Skills – Know yourself & Know the world, S.Chand & Company LTD. Ram Nagar, New Delhi – 110 055.
2. Martin Avis, Effective Time Management Skills for everyone, Avis Consultancy, London.

Course Outcome:

Developing organizational behavior and employment skills to the employment organizations

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
VI	**17U6PHC10**	**Nuclear Physics**	**5**	**5**

Objectives:

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

Unit – I General Properties of Nuclei & Nuclear forces

Classification of nuclei – General properties of nucleus – Nuclear size – Experimental determination – electron scattering experiment – Nuclear mass – Dumpster's mass spectrograph – binding energy, mass defect and packing fraction – stability and binding energy – Semi empirical mass formula – Nuclear spin and magnetic moment – Electric quadruple moment – Nuclear forces – basic properties- Meson theory of Nuclear forces.

Unit - II Radioactivity

Laws of Natural radioactivity – Law of radioactive disintegration – Half life period – Mean life period – Law of successive disintegration – Radioactive Equilibrium – Types of radioactive radiations – Properties – Alpha emission – Velocity and Range of Alpha particles – Geiger and Nuttal law – Alpha particle spectra – Theory of alpha decay – Gamow's theory – Beta ray spectra – line and continuous spectrum – Neutrino theory – Gamma rays spectra – origin of Gamma rays – Nuclear isomerism – Internal conversion.

Unit – III Nuclear Reactions

General ideas of nuclear reactions – types of Nuclear reactions – energy balance in nuclear reaction – threshold energy – nuclear transmutations – types of transmutations with examples – discovery of neutron – properties – types – sources – detection.

Unit – IV Detectors and Accelerators

Solid state detectors – Geiger-Muller counter – Wilson-cloud chamber – Bubble chamber – Scintillation counters – Cerenkov counter – Linear accelerator – Cyclotron – Synchrocyclotron – Betatron – Electron synchrotron – Proton synchrotron.

Unit – V Comic Rays and elementary Particles

Discovery of Cosmic rays – Latitude effect – Azimuth effect – Altitude effect – Primary and Secondary cosmic rays – cosmic ray showers – Van Allen belts – Origin of cosmic rays – Elementary particles – classification – Particles and antiparticles – fundamental interactions – elementary particle quantum numbers – conservation laws and symmetry.

Books for Study

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

Books for Reference

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

Course Outcome:

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

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
VI	**17U6PHC11**	**Communication Electronics**	**5**	**5**

Objective:

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

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 and Radars

Generation – Klystron – Two cavity – Multi cavity Klystron – Reflex Klystron – Travelling wave tube – Construction – Operation – Magnetron – Cavity magnetron – Applications

Radar – Block diagram of a simple radar – Classification – Radar range equation – Pulsed radar system – Radar displays – A scope display – Plane position indicator – Scanning and Tracking with radar – Applications.

Unit – IV Antenna and Satellite Communication

Antenna – Resonant antenna – Antenna gain – Impedence matching – Grounded antennas – High frequency antennas – Dipole arrays – YAGI-UDA antenna – Rhombic antenna.

Satellite Communications: Satellite orbits – Satellite frequencies – Station keeping – Transmission path – Link calculations – Factors affecting satellite communication.

Unit – V Fiber 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.
3. Microwave and radar engineering – M. Kulkarani- Umesh Publications, Delhi.

Books for Reference

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

Course Outcome:

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

Semester	Subject Code	Title of the Paper	Hours of Teaching /week	No. of Credits
VI	**17U6PHC12**	**Linear Integrated Circuits**	**4**	**4**

Objectives:

- To gain the knowledge in operational amplifiers.
- To introduce the concepts of IC's.

Unit – I Operational Amplifier characteristics

Introduction to Operational Amplifier – Op-Amp Characteristics – Differential amplifier – Ideal - Practical Op-Amp – Op -Amp parameters – Output offset voltage – Input offset current – Frequency response of op-amp – Inverting and Non-inverting Amplifier.

Unit – II Operational amplifier with negative feedback

Feedback configuration – Block diagram – Voltage – Series feedback – Negative feedback – Closed Loop Voltage gain – Input Resistance with feedback – Output resistance with feedback – Bandwidth with feedback – Effect of feedback on total of output offset voltage.

Unit – III Applications of Operational Amplifier

Basic Op-Amp circuits – Summing and difference amplifier – Integrator – Differentiator – Linear op-amp circuits – DC sources – Current-to-Voltage and Voltage-to-Current converters – Log and Antilog amplifiers.

Unit – IV Signal Generators

Comparator – Regenerative Comparator (Schmitt Trigger) – Triangular wave generator – Sawtooth Waveform generator – Multivibrator – Astable – Monostable – 555 Timer.

Unit - V IC Fabrication

IC Fabrication – Advantages – Drawbacks – Scales of Integration – Classification - making of monolithic ICs – fabrication of IC components – Resistors – capacitors – diodes – transistors.

Books for study

1. Integrated Electronics (Analog and digital circuits and systems), Jacob Millman and Christos C. HalKias, Tata McGraw Hill edition, New Dehli.
2. Electronic Devices and Circuits, Millman and HalKias.
3. Micro Electronics, Digital and Analog circuit and System – Jacob Mill man.

Course Outcome:

- To gain the knowledge in operational amplifiers.
- To introduce the concepts of IC's.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
VI	**17U6PHCP4**	**Major Practical – IV**	**6**	**6**

List of Experiments - 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 mulitmeter
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

Course Outcome:
Students acquire skills on designing electronic circuits and making observations.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
VI	**17U6PHEL3A**	**Major Elective – III Programming in C**	**4**	**3**

Objective:

- To introduce the knowledge in C programming.

Unit –I C **Fundamentals, Operators and Expressions**

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 Control structures and Arrays

Input Output Statements – getchar, putchar, Formatted output (Printf) and Formatted input (Scanf) Control structure– Decision making with if – if else – switch – goto – 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, Structures and Unions

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 and Files

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

Unit - V Programming

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

Books for Study:

1. Programming in ANSI C- E. Balagurusamy - Tata McGraw- Hill
2. Schaum's Outline Series Theory and problems of programming with C- Byron S. Gottfriend, McGraw Hill internationals.

Books for Reference:-

1. Programming with C- Venugopal, K.R , and Sudep R.P- Tata McGraw- Hill 1998
2. Let us C- Yashwant Kanetkar.

Course Outcome:

- To introduce the knowledge in C programming.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
VI	**17U6PHEL3B**	**Major Elective – III History of Physics**	**4**	**3**

Objective:

- To know the history of physics.

Unit - I Ancient Greeks of Newton

Pathagoras – 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 law 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 Daton and Bohr – The birth of Thermodynamics – Joule's measurement – The first and second laws – Maxwell's Demon.

Unit –III Electricity and Magnetism

Experiment 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 Mechanic and Relatively

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

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 finding – The institution builder – Birth if DAE and AEET.

Books for Study and Reference

1. R. Spangerrburg and D.K. Moser, The History of Science: Form 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 Nineteeth century (University Press, Hyderabad, 1999).
4. R. Spangerrburg and D.K. Moser, The History of Science: From 1900 to 1945 (University Press, Hyderabad, 1999).

Course Outcome:

To know the history of physics.

Semester	Subject Code	Title of the Paper	Hours of Teaching/ week	No. of Credits
VI	**17U6PHEL4A**	**Major Elective – IV 8085 Microprocessor & Applications**	**4**	**4**

Objective:

- To introduce the knowledge in 8085 Microprocessor.

Unit – I Microprocessor architecture and microcomputer system

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.

Course Outcome:

- To introduce the knowledge in 8085 Microprocessor.

Semester	Subject Code	Title of the Paper	Hours of Teaching /week	No. of Credits
VI	**17U6PHEL4B**	**Major Elective – IV Nanoscience**	**4**	**4**

Objective:

- To introduce basics of Nanoscience.

Unit – I Introduction to Nanoscience

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

Unit – II Nanofabrication Methods

Electron beam lithography, nanolithography, focused ion beam, molecular beam epitaxy, chemical vapour deposition, electrochemical deposition, solution chemistry – Ball milling – fullerenes.

Unit – III Characterization Techniques

Scanning probe microscopy– X-ray diffractrometry – Transmission electron spectroscopy – Scanning electron spectroscopy – UV- Visible, Fluorescence – Raman and IR spectroscopy–X-ray photoelectron spectroscopy– Auger Spectroscopy – Nanotweezers electron microscopy,

Unit – IV Nanoelectronics

Nano electronics – Birth of electronics – Micro and Nano fabrication – Quantum electronic devices – Quantum computers – Experimental implementation of quantum computers – MEMS – Carbon nanotube FETs – Nano MOSFETs – Molecular diodes, transistors - Applications.

Unit – V Nanobiology

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

Books for Study

1. M.Ratner.et al., Nanotechnology; A Gentle intro Practices – hall ISBN 0-13-101400-5, 2003.
2. Nanotechnology; Basic Science and Emergining Technologies, CRC Press

Books for Reference

1. Charles P.Poole Jr and Frank J.Owens. "Introduction to Nanotechnology" Wiley, 2003.
2. A. S. Edelstien and R.C. Cornmarata, Nanomaterials; synthesis, Properties and Applications, 2ed, Iop (U.K), 1996.

Course Outcome:

To introduce basics of Nanoscience.