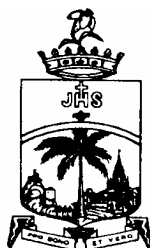


B Sc
PHYSICS

SYLLABUS (2007-2010)

under
CHOICE BASED CREDIT SYSTEM
(CBCS)



ST. JOSEPH'S COLLEGE (AUTONOMOUS)
(Nationally Reaccredited with A+ Grade / College with Potential for Excellence)
TIRUCHIRAPPALLI - 620 002

Features of Choice Based Credit System (CBCS)

The Autonomous St. Joseph's College (1978) Reaccredited with A+ Grade from NAAC (2007) has introduced the choice based credit system (CBCS) for UG and PG courses from the academic year 2001-2002.

OBJECTIVES of Credit System:

- * To provide mobility and flexibility for students within and outside the parent department
- * To provide broad based education
- * To help students learn at their own pace
- * To provide students scope for acquiring extra credits
- * To impart more job oriented skills to students
- * To make any course multi-disciplinary in approach

What is a credit system?

Weightage to a course is given in relation to the hours assigned for the course. Generally one hour per week has one credit. However, there could be some flexibility because of practicals, field visits and tutorials. The following Table shows the relation between credits and hours.

Hours in a week	Hours (2-3)	Hours (4)	Hours (5-6)
Theory Credits	1	3	4
Practicals Credits	1	2	3

For UG courses a student must earn a minimum of 140 credits to get a pass. The 140 credits are split as follows:

	BA	BSc	BCom
English	16	16	8
Languages	12	12	12
Allied: Compulsory - 2 courses	10	10	10
Allied: Optional - 2 courses	10	8	10
Computer Literacy	2	2	2
Foundation Courses	3	3	3
Environmental Studies	3	3	3
Electives	9	9	9
SHEPHERD	3	3	3
Core Courses	<u>72</u>	<u>74</u>	<u>80</u>
Total	<u>140</u>	<u>140</u>	<u>140</u>

A student can acquire credits more than 140 by taking electives offered by departments in the free hours available to him in 5th and 6th semesters.

Allied Courses:

The allied courses are of two categories.

Allied Compulsory and Allied Optional: The student has choice in allied optional as two courses are offered simultaneously. The department must offer two courses. The student has to choose one.

Electives

A student should take at least three electives.

A least one elective should be from Arts Department for a student of Science Department and vice versa for Arts students.

A student cannot take more than one elective from his parent department.

Credit System Codes - Subject Code Fixation

The various papers in the different courses are coded. The following code system is adopted.

- The code number of the subject should be as **07UPH1XX** where
 - a) 07 refers to year of revision
 - b) U refers to Undergraduate
 - c) PH refers to Physics*
 - d) 1 refers to Semester 1
 - e) 0X refers to Languages (Part 1)
 - f) 1X refers to General English (Part 2)
 - g) 2X refers to Core Major (Part 3)
 - h) 5X refers to Core Allied Compulsory (Part 3)
 - i) 7X refers to Core Allied Optional (Part 3)
 - j) 8X refers to Elective (Part 3)
 - k) 9X refers to Foundation Course (Part 4)
- } X - Paper number
- The code number of the subject should be as **07PEC1XX** where
 - a) 07 refers to year of revision
 - b) P refers to Postgraduate
 - c) EC refers to Economics*
 - d) 1 refers to Semester 1
 - e) 2X refers to Core
 - f) 4X refers to Optional
 - g) 6X refers to EDC
- } X-Paper number

Codes for Departments:

Sl. No.	Course	Subject Code
1.	Biochemistry	BI
2.	Biotechnology	BT
3.	Business Administration	BU
4.	Chemistry	CH
5.	Commerce	CO
6.	Computer Applications	CA
7.	Computer Science	CS
8.	Information Technology	IT
9.	Economics	EC
10.	English	EN
11.	English - General	GE
12.	Electronics	EL
13.	Foundation Course	FC
14.	French	FR
15.	Hindi	HI
16.	History	HS
17.	Human Resource Management	HR
18.	Mathematics	MA
19.	Physics	PH
20.	Plant Biology & Plant Biotechnology	PB
21.	Personnel Management & Industrial Relations	PM
22.	Sanskrit	SA
23.	Statistics	ST
24.	Tamil	TA
25.	Tamil - General	GT
26.	Transport Management	TM

Evaluation

For each course there is formative Continuous Internal Assessment (CIA) and Semester Examinations (SE) in the weightage ratio 50:50. The following table illustrates how one evaluates the **Overall Percentage Marks (OPM)** for a student in Part I (English) in the four papers put together.

$$\text{OPM} = \frac{a_1b_1 + a_2b_2 + a_3b_3 + a_4b_4}{(b_1+b_2+b_3+b_4)}$$

Where a_1, a_2, a_3 and a_4 indicate the marks obtained in the 4 semesters for English and b_1, b_2, b_3 and b_4 indicate the corresponding credits for the 4 courses. For example let us consider the following marks scored by a student in the 4 semesters in English.

Part II-General English

S. No.	Sem.	Subject	CIA	SE	Total	Avg	Credit	Cr.pts
1.	I	GE-I	50	48	98	49.0	4	196.0
2.	II	GE-II	50	48	98	49.0	4	196.0
3.	III	GE-III	50	50	100	50.0	4	200.0
4.	IV	GE-IV	50	48	98	49.0	4	196.0
TOTAL								788.0

$$\text{OPM} = 788 / \text{total number of credits} = 788.0 / 16 = 49.25$$

This percentage corresponds to III class.

If OPM is between 50 and 60 the student gets II class. If OPM is 60 and more then the student is placed in I class.

If scores OPM=75 and more he gets first class with distinction.

Similarly we can compute OPM for part II and Part III using the marks in various subjects and the corresponding credits.

Part IV consists of foundation courses, computer literacy, SHEPHERD programme, Service Organisation and only a pass is indicated for these and Part IV is not taken into account for computing OPM.

Declaration of result:

_____ has successfully completed B.Sc. degree course with FIRST CLASS. His overall average percentage of marks in part III is _____. He has acquired 11 more credits in the course by taking Foundation Courses, Environmental Studies, Computer Literacy, and SHEPHERD programme.

B. Sc. PHYSICS - COURSE PATTERN

Sem.	Part	Code	Subject Title	Hr	Cr
I	I	*	Tamil – I / Hindi – I / French – I / Sanskrit - I	4	3
	II	07UGE111	General English - I	5	4
	III	07UPH121	Mechanics and Properties of Matter	5	4
	III	@	Physics Practical - I	3	
	III	@	Basic Workshop Practice	3	
	III	07UMA157	Allied : Mathematics -I	6	5
	IV	07UFC191	Foundations of Humanity	2	1
			Library	2	
Total for semester - I				30	19
II	I	*	Tamil – II / Hindi – II / French –II / Sanskrit - II	4	3
	II	07UGE212	General English - II	5	4
	III	07UPH222	Electricity and Magnetism	5	4
	III	07UPH223	Physics Practical – I	3	4
	III	07UPH224	Basic Workshop Practice	3	2
	III	07UMA258	Allied : Mathematics -II	6	5
	IV	07UFC292	Environmental Studies	4	3
Total for semester - II				30	28
III	I	*	Tamil – III / Hindi – III / French –III / Sanskrit - III	4	3
	II	07UGE313	General English - III	5	4
	III	07UPH325	Mathematical Physics	5	4
	III	@	Physics Practical – II	3	
	III	07UCH371	Allied : Chemistry - I	(4)	(3)
	III	@	Allied : Chemistry Practical / or	(2)	-
	III	07UCS371	Allied : Computer Science - I / or		
	III	07UEL371	Allied : Electronics - I	6	4
	IV	07UFC393	Social Ethics / or		
	IV	07UFC394	Religious Doctrine-I	2	1
	IV	07UFC395	Computer Literacy	4	2
Total for semester - III				30	19
IV	I	*	Tamil – IV / Hindi – IV / French –IV / Sanskrit - IV	4	3
	II	07UGE414	General English – IV	5	4
	III	07UPH426	Sound, Thermal and Statistical Physics	5	4
	III	07UPH427	Physics Practical – II	3	4
	III	07UCH472	Allied : Chemistry - II	(4)	(3)
	III	07UCH473	Allied : Chemistry Practical / or	(2)	(2)
	III	07UCS472	Allied : Computer Science - II / or		
	III	07UEL472	Allied : Electronics - II	6	4
	IV	*	Elective - I	4	3
	IV	07UFC496	Building Men for Others / or		
	IV	07UFC497	Religious Doctrine-II	2	1
Total for semester - IV				30	26
V	III	07UPH528	Programming in C for Physics problems	5	5
	III	07UPH529	Atomic, Solid State and Nuclear Physics	5	5
	III	07UPH530	Analog Electronics	5	5
	III	07UPH531	Instrumentation /		
	III	07UPH532	Material Science	5	5
	III	07UPH533	Physics Practical – III	6	4
		*	Elective – II	4	3
Total for Semester -V				30	18

VI	III	07UPH634	Optics, Spectroscopy and Lasers	5	5
	III	07UPH635	Quantum Mechanics and Relativity	5	5
	III	07UPH636	Digital Electronics and Microprocessor	5	5
	III	07UPH637	Energy Physics /		
	III	07UPH638	Medical Physics	5	5
	III	07UPH639	Physics Practical – IV	6	4
		*		Elective –III	4
			Total for Semester -VI	30	27
I-V	IV		Extension Service : SHEPHERD		3
			Total Credits for All Semesters		140

* Code numbers according to the subjects chosen

@ Practical Examination in the following semester

Sem:I
07UGT101

Hours : 5
Credits: 4

பொதுத்தமிழ் - 1

நோக்கங்கள்:

1. சமூக மாற்ற உணர்வை ஊட்டும் தலைசிறந்த தற்காலக் கவிஞர்கள், உரைநடை ஆசிரியர்களது படைப்புகளின் இலக்கியநயம் பாராட்டல்.
2. சந்திப்பிழையின்றி எழுதப் பயிற்றுவித்தல்

பயன்கள்

1. சமூக உணர்வூட்டும் படைப்புகளை அழகியல் நுகர்ச்சி வாயிலாக மாணாக்கர் கற்றுக்கொள்வர்.
2. சந்திப்பிழை நீக்கி எழுதும் திறன் பெறுவர்.

செய்யுள் திரட்டு

1. மகாகவி பாரதியார் கவிதைகள்
2. பாரதிதாசன் கவிதைகள்
3. சுத்தானந்த பாரதியார், தமிழ்க்கனல் ஷஎன்னருமைத் தமிழர்களே'
4. கவிமணி கவிதைகள்
5. கவிஞர் கண்ணதாசன் - இயேசு காவியம்
6. பெருஞ்சித்திரனார் பாடல்கள்
7. அப்துல் ரகுமான் - ஆலாபனை
8. கவிஞர் அறிவுமதி கவிதைகள்
9. மொழிபெயர்ப்புக் கவிதைகள்
10. இலக்கணம்: வல்லினம் மிகும் - மிகா இடங்கள்

இலக்கிய வரலாறு - மூன்றாம் பாகம்

சிறுகதை

உரைநடை : முதல் ஆறு கட்டுரைகள்

பாடநூல்

1. செய்யுள் திரட்டு - தமிழ்த்துறை வெளியீடு, 2004-2007
2. இலக்கணம் - மேற்குறித்த நூலில் உள்ளது.
3. சமூகவியல் நோக்கில் தமிழ் இலக்கிய வரலாறு, தமிழ்த்துறை வெளியீடு
4. உரைநடை நூல் - திறன் வளர்க்கும் கட்டுரைகள், தமிழ்த்துறை வெளியீடு, 2004-05 (அறக்கட்டளைச் சொற்பொழிவு நீங்கலாக 12 கட்டுரைகள்)
5. சிறுகதை: உறவு, நியுசெஞ்சரி புத்தகநிலையம், சென்னை, 2007 முதற்பதிப்பு

Sem.: I
Code: 07UGE111

GENERAL ENGLISH - I

Hours : 5
Credits : 4

Objectives

1. To enable students develop their communication skills.
2. To inculcate in students the four basic skills: Reading, Writing, Listening and Speaking.

Unit I

1. Prose : At the College
2. Shakespeare : The Merchant of Venice
3. Essential English Grammar : Units 1 to 5
4. Reading Comprehension

Unit II

5. Poetry : The Passionate Shepherd to his Love
6. Shakespeare : The Taming of the Shrew
7. Essential English Grammar : Units 6 to 10
8. Letter Writing : Informal

Unit III

9. Prose : Outside the Class
10. Shakespeare : The Tempest
11. Essential English Grammar : Units 11 to 15
12. Letter Writing : Formal

Unit IV

13. Prose : For Business and Pleasure
14. Poetry : Daybreak
15. Shakespeare : Julius Caesar
16. Essential English Grammar : Units 16 to 22

Unit V

17. Poetry : I love to see it lap the miles
18. Shakespeare : King Lear
19. Shakespeare : Macbeth
20. Essential English Grammar : Units 23 to 29

Required Reading

1. Krishnaswamy, N. & T. Sriraman: Creative English for Communication (Macmillan)
2. Raju, A.K. (ed.) : Pegasus (Macmillan)
3. Murphy, R. : Essential English Grammar (CUP)
4. Dodd, E.F. : Six Tales from Shakespeare (Macmillan)

Sem I
07UPH121

Hours/Week: 5
Credit : 4

MECHANICS AND PROPERTIES OF MATTER

Objectives :

- To study and apply the knowledge of Gravitation at various situation.
- To understand the dynamics of charged bodies under various fields and the rigid body dynamics in terms of MI.
- To study the basics of Elasticity and its importance in beams, girders.
- To study the concepts of viscosity and surface tension and the various methods to determine the parameters experimentally.

Unit I : GRAVITATION

Kepler's law – Newton's law of gravitation-determination of G – Boy's method – density of earth – mass of the earth and the sun- Gravitational field – Intensity of the field – Gravitational potential and potential energy – Gravitational potential at a point from a body of mass m – escape velocity – equi-potential surface – Gravitational potential and field at a point outside and inside a solid sphere – inertial and gravitational mass – acceleration due to gravity - value of g at the poles and at the equator – variation of g with latitude – altitude - depth and terrain

Unit II : DYNAMICS

Equation of the motion of an uncharged particle – Charged particle in a uniform and constant electric field – charged particle in an alternating field – charged particle in a uniform and constant magnetic field –charged particle in a combined electric and magnetic field. Moment of Inertia : radius of gyration – general theorems of M I - M I of a spherical shell –hollow and solid sphere – M I of a diatomic molecule –Kinetic energy of rotation – precession.

Unit III : CONSERVATION OF LAWS

Conservation forces and energy- negative gradient of potential energy- laws of conservation of momentum – motion of centre of mass -collision – values of the scattering angle-system of variable mass –rocket- angular momentum- torque- conservation of angular momentum.

Unit IV : ELASTICITY

Three types of elasticity - work done per unit volume in a strain - relation connecting elastic constants - resilience-twisting couple on a cylinder - compound pendulum – Kater's pendulum - torsional pendulum- determination of co-efficient of rigidity- bending of beam – bending moment – I form girders – cantilever - depression of beam-Koenig's method – factors affecting elasticity.

Unit V : VISCOSITY AND SURFACE TENSION

Viscosity : Critical Velocity - Significance of Reynolds Number – Poiseuille's Equation – Experiment to Find Viscosity – Motion in a Viscous Medium - Stoke's Law – Rotation Viscometer – Comparison of Viscosities – Ostwald's Viscometer – Viscosity of Gases – Mayer's Formula – Rankine's Method – Effect of Temperature and Pressure on Viscosity of Fluids - Surface Tension : Explanation to Surface Tension – Surface Film and surface energy – Angle of Contact – Drop Weight Method – Surface Tension of Liquid interfaces – Factors affecting Surface Tension

Books for Study:

1. D.S. Mathur, Properties of Matter, S.Chand, New Delhi, 2006
2. D.S. Mathur, Mechanics, S. Chand, New Delhi, 2005.

Unit	Book	Sections
I	1	7.2, 7.3, 7.6(b), 7.7, 7.9-7.13, 7.16, 7.18
II	2	4.2, 4.4 – 4.6
III	2	5.3, 5.4, 5.6, 6.1, 6.3, 6.5, 6.7-6.10
IV	1	8.1, 8.7, 8.8, 8.11, 8.15, 8.19, 8.22, 8.24, 8.26, 8.27
V	1	12.7-12.11, 12.14, 12.15, 12.17, 12.19, 12.20(i & ii), 12.21, 14.3-14.5, 14.15, 14.23-14.26

Sem I
07UMA157

Hours/Week: 6
Credit : 5

Allied: MATHEMATICS - I

Objectives

1. To train the student in mastering the techniques of various branches of Mathematics.
2. To motivate the students to apply the techniques in their respective major subjects.

Unit - I Differential and Integral Calculus

Successive differentiation - Leibnitz's theorem (No proof) - Maxima and minima - Integration by parts - properties of definite integrals. (Chapter 1.11, 1.12, 2)

Unit - II Reduction formula

Reduction formula for $\cos^n x$, $\sin^n x$, $e^{ax}\cos^n x$, $e^{ax}\sin^n x$ and $\tan^n x$. Evaluation of double and triple integrals (simple problems only). (Chapter 1.13 & 5)

Unit - III Differential equations

First order differential equations - Variable separable - Homogenous equation - Linear & Bernoulli's equation. Second order differential equations (linear) with constant co-efficients - homogeneous linear equations with variable co-efficients

Unit - IV Algebra

Eigen values and Eigen vectors of matrices: Problems- Cayley Hamilton theorem (No proof) and problems - Definition of Vector Space - Definition of linear independence of vectors - Examples in \mathbb{R}^3 .
(Chapter 8...6.4-8.6., Chapter 6.1.1-6.1.3, 6.3.5-6.3.7)

Unit - V Convergence of Series

Concept of limit of a sequence - limit of a function - Simple problems - Convergence, divergence and oscillation of a series - geometric series - tests of convergence and divergence, comparison, ratio and root tests(without proof). (Chapter 6(1-14))

Books for Study

1. Narayanan and T.K. Manickavasagam pillai Ancillary Maths Book II & III EDN 1999 (Relevant portion for units I, II and III)
2. S. Arumugam and others Modern Algebra (For unit IV)
3. Dr. M.K. Venkataraman, Higher mathematics for engineering and science (For unit V)

Sem:II
07UGT202

Hours : 5
Credits: 4

பொதுத்தமிழ்-2

நோக்கங்கள்

1. சமயநல்லிணக்க உணர்வை வளர்த்தல்
2. தமிழ்க்காப்பியங்களில் அழகும் அறிவுணர்வும் ஊட்டும் பகுதிகளைப் படித்துப் புரிந்து கொள்வர். உரைநடைக்கட்டுரை எழுதும் திறன் பெறுவர்.

பயன்கள்

தமிழைத் திருத்தமாகப் படிக்கவும் பேசவும் பிழையின்றி எழுதவும் தேர்ச்சி பெறுதல்.
தம் படைப்புக்களில் படித்தவற்றை முறையாகப் பயன்படுத்தல்

1. செய்யுள் திரட்டு

1. சிலப்பதிகாரம்
2. மணிமேகலை
3. சீவகசிந்தாமணி
4. கம்பராமாயணம்
5. தேம்பாவணி
6. சீறாப்புராணம்
7. இரட்சணிய சரிதம்
8. இலக்கணம்: எழுத்து, சொல்

2. இலக்கணம் - எழுத்து, சொல் (தமிழ்த் துறை வெளியீடு)

இலக்கிய வரலாறு - இரண்டாம் பாகம் (தமிழ்த்துறை வெளியீடு,2001)
உரைநடை நூல்-7 முதல் இறுதிக்கட்டுரைகள் வரை, திறன்வளர்க்கும் கட்டுரைகள் (7-12) (தமிழ் ஆய்வுத்துறை வெளியீடு, 2001)

பாடநூல்:

செய்யுள் திரட்டு - தமிழ்த்துறை வெளியீடு, 2004-07

Sem. : II
Code : 07UGE212

Hours : 5
Credits : 4

GENERAL ENGLISH - II

Objectives

1. To enable students develop their communication skills.
2. To inculcate in students the four basic skills: Reading, Writing, Listening and Speaking.

Unit I

1. Prose : Are you Smart?
2. Jules Verne : Around the World in 80 Days (Chap. 1 to 5)
3. Essential English Grammar : Units 30 to 35
4. Reading Comprehension

Unit II

5. Poetry : Gitanjali (Song 36)
6. Jules Verne : Around the World in 80 Days (Chap. 6 to 10)
7. Essential English Grammar : Units 36 to 40
8. Note-making

Unit III

9. Prose : Are you Creative?
10. Jules Verne : Around the World in 80 Days (Chap. 11 to 15)
11. Essential English Grammar : Units 41 to 45
12. Note-taking

Unit IV

13. Prose : How to Win?
14. Poetry : The Pond
15. Jules Verne : Around the World in 80 Days (Chap. 16 to 20)
16. Essential English Grammar : Units 46 to 50

Unit V

17. Poetry : The Tree
18. Jules Verne : Around the World in 80 Days (Chap. 21 to 26)
19. Essential English Grammar : Units 51 to 57
20. Dialogue Writing

Required Reading

1. Krishnaswamy, N. & T. Sriraman : Creative English for Communication (Macmillan)
2. Raju, A.K. (ed.) : Pegasus (Macmillan)
3. Murphy, R. : Essential English Grammar (CUP)
4. Verne, J. (Retold by M. Green) : Around the World in Eighty Days (Macmillan)

Sem II
07UPH222

Hours/Week: 5
Credit : 4

ELECTRICITY AND MAGNETISM

Objectives:

- To study Gauss theorem and its applications and also the principle and types of capacitors
- To study the principle of Magnetostatics, magnetic effects of electric current and their applications.
- To understand the working of potentiometer and its uses
- To understand the principle of electromagnetic induction and ac circuits

Unit I :ELECTROSTATICS

Flux of the electric field – Gauss’s Law – Application of Gauss’s Law – Coulomb’s Theorem – Electric Potential Difference – Relation between Electric Field and Electric Potential – Electric Potential Energy – Electrical Images – Poisson’s & Laplace Equation – Principles of a Capacitor – Types of Capacitor – Capacitance of Cylindrical and Parallel Plate capacitor – Parallel Plate with partly filled Dielectrics – Capacitors in Series and Parallel.

Unit II :MAGNETOSTATICS

Magnetic Vector Potential – Scalar Potential – Magnetic Shell – Potential at any point due to a magnetic shell – Magnetic Potential and Field at a Point on the axis of a Flat Circular Magnetic Shell – Equivalence of a Magnetic Shell and Current Circuit – Hall Effect – Magnetic Induction – Magnetization – Relation between B, H and M – Magnetic susceptibility – Magnetic Permeability – Properties of Diamagnetic, Paramagnetic, Ferromagnetic Materials.

Unit III : MAGNETIC EFFECT OF CURRENTS

Biot-Savart’s Law – Magnetic Induction at a point due to a straight conductor and circular coil carrying current – Force between two parallel current – carrying conductors – Moving Coil BG – Figure of Merit of BG – Absolute Capacitance of a Capacitor – Comparison of two Capacitances of BG – Comparison of emf’s of two cells using BG – Ampere’s circuital Law – Differential Form of Ampere’s Law.

Unit IV :CURRENT ELECTRICITY AND THERMO ELECTRICITY

Current and Current Density – Expression for current Density – Equation of Continuity – Drude – Lorentz Theory – Kirchoff’s Law – Carey Foster’s Bridge – Potentiometer – Measurement of Low Resistance – Kelvin & Double Bridge Method – Comparisons of Capacitances of Two capacitors – Capacitances of Capacitors – Kelvin’s Null Method – Laws of Thermo emf – Measurement of Thermo emf.

Unit V :ELECTROMAGNETIC INDUCTION AND AC CIRCUIT

Faraday’s Law of Electromagnetic inductions & Vector form – Self Induction – Self Induction of Long Solenoid – Raleigh’s and Anderson’s Bridge Method – Mutual Induction – Mutual Induction between two coaxial solenoids – Earth Inductor – Three phase AC generator – Star Connections – Delta Connections – Dynamo – Two phase generators – Direct Current – DC Motor.

Books Of Study:

1. R. Murugesan, Electricity and Magnetism, S. Chand and Co. Ltd., New Delhi, Fifth Revised Edition, 2006.

Unit	Book	Section
I	1	2.1-2.4, 2.11, 3.1,3.4,3.8-3.10,4.1-4.8, 4.13
II	1	22.1 – 22.3, 22.6-22.10, 15.1-15.9
III	1	10.2-10.4, 10.8, 10.11-10.18
IV	1	6.1-6.6, 7.1-7.5, 8.2, 8.3
V	1	11.1 – 11.11, 14.1-14.7

Books For References:

1. Brijlal and Subramanian, Electricity and Magnetism, Ratan Prgasham Publishing Ltd., Agra
2. Shegal Chopra Shegal, Electricity and Magnetism

Sem - I & II
07UPH223

Hrs/Week : 3
Credit : 4

B.Sc Physics - PHYSICS PRACTICAL – I

Any 20 Experiments

1. Surface Tension – Capillary rise
2. Surface Tension – Method of drops
3. Young's modulus – Cantilever
4. η – Variable pressure head
5. η – Constant pressure head
6. η – Stokes method
7. η_1 / η_2 – Ostwald viscometer
8. Sonometer – AC frequency and R.D of solid
9. Spectrometer – Solid Prism
10. Spectrometer – dispersive power
11. Airwedge
12. Liquid Lens – μ
13. M_1 / M_2 – Tan A and Tan B simultaneously
14. M_1 / M_2 – Vibration Magnetometer (Sum and Difference)
15. Long focus Convex Lens
16. Concave Lens
17. Acceleration due to gravity – Fall plate
18. P.O. Box – Temperature coefficient
19. Carey – Foster's Bridge – R and ρ
20. Potentiometer – low range voltmeter
21. Potentiometer – Internal resistance
22. Field along the axis of a coil – deflection magnetometer
23. Jolly's bulb. Pressure coefficient
24. K – Lee's disc
25. BG – Internal resistance of a cell.
26. BG – Comparison of EMF's and capacities
27. BG – Resistance and figure of merit – deflection method
28. Callendar and Barnes method
29. y, n, σ – Searle's method
30. Specific heat by cooling
31. Resonators

Sem - I & II
07UPH224

Hrs/Week : 6
Credit : 2

BASIC WORKSHOP PRACTICE

1. Pen stand
2. Paper Weight
3. Electroplating
4. Post Box
5. Screw Driver

Sem - II
07UMA258

Hours/week: 6
Credits : 5

Allied: MATHEMATICS - II

Objectives

1. To train the students in master in the techniques of various branches of Mathematics
2. To motivate the students to apply the techniques in their respective major subjects.

Unit - I NUMERICAL METHODS

Solution of simultaneous linear equations - Gauss Elimination - Gauss Seidal Methods - Numerical Solutions to O.D.E - Solution by Taylor's Methods - Euler's Method - Runge-Kutta Method (4th Order)(Chapter 4 Section 4.2, Chapter 6 Section 6.2 and Chapter 11 Section 11.6,11.10,11.14 and 11.16)

Unit - II PARTIAL DIFFERENTIAL EQUATIONS

Formation of p.d.e by eliminating constants and function - General -Particular and complete integral - Lagrange's form of the linear first order equations (Chapter 6 Section 6.1-6.6).

Unit - III VECTORS

Gradient, divergence and curl operations (No proofs of theorem, only simple applications)- Theorems of Gauss, Green and Stokes without proof - simple applications only. (Chapter 1-4)

Unit - IV TRIGONOMETRY

Expansion of functions $\sin nx$, $\cos nx$, $\sin^n x$, $\cos^n x$, $\sin^m x \cos^n x$. Infinite series of $\sin \theta$, $\cos \theta$, $\tan \theta$, Inverse trigonometric functions - Hyperbolic functions - Inverse hyperbolic functions (Chapter 3 & 4)

Unit - V COMPLEX ANALYSIS

Cauchy Riemann Conditions (No derivation) - Analytic function - (Concept of Complex integration) - Singularities contour integration (Integral over the unit circle only)(Chapter 1, Sections 1.11 and Chapter 5 Sections 1-3).

Books for Study

1. Venkataraman, M.K.: Numerical methods and Science and Engineering (For unit I)
2. Manickavasagam pillai, T.K. & Others: Ancillary Maths Book II & Others - Viswanathan Printers & Publish (for Unit II)
3. Manickavasagam pillai, T.K. & Others: Ancillary Maths Book III & Others - Viswanathan Printers & Publish (for Unit III & IV)
4. Narayanan and Manickavasagam Pillai, Complex Analysis (For Unit V).

Sem:III
07UGT303

Hours : 5
Credits: 4

பொதுத்தமிழ்-3

நோக்கங்கள்

1. தமிழ்ச்செய்யுள்களைப் படித்துப் பொருள் புரிந்து கொள்ளுதல்
2. செய்யுள்களில் அமைந்துள்ள சமூகக்கருத்துக்களை உணர்தல்
3. படைப்புத்திறனை வளர்த்தெடுத்தல்

பயன்கள்

1. புரிந்து கொண்ட கருத்துக்களில் பயனுள்ளவற்றைத் தெளிவாக, இனிமையாக எடுத்துச்சொல்லும் திறனைப் பெறுதல்.
2. தமிழ் மொழியின் சிறப்பை அறிதல்.

செய்யுள் திரட்டு

1. குறுந்தொகை
2. பதிற்றுப்பத்து
3. கலித்தொகை
4. புறநானூறு
5. சிறுபாணாற்றப்படை
6. பதினெண் கீழ்க்கணக்கு - திருக்குறள்
7. இலக்கணப் பகுதி: யாப்பு, அணி

இலக்கணம் : யாப்பு, அணி

புதினம் - சூரியகாந்தன், *அம்மன் பூவோடு*, பாவைபதிப்பகம், சென்னை, 2003
இலக்கிய வரலாறு - முதல் பாகம்.

பாடநூல்

செய்யுள் திரட்டு - தமிழ்த்துறை வெளியீடு 2004-07

சமூகவியல் நோக்கில் இலக்கிய வரலாறு - தமிழ்த்துறை வெளியீடு

Sem. : III
Code : 07UGE 313

Hours : 5
Credits : 4

GENERAL ENGLISH - III

Objectives

1. To enable students to acquire reading habit and thus develop their reading skills.
2. To make them activate their passive vocabulary and sentence structures through prescribed texts.
3. To enhance their taste for reading that will naturally develop their vocabulary power and sentence structures.
4. To develop the listening, speaking and writing skills of students through the prescribed texts.

Unit – I

1. Guy de Maupassant : The Diamond Necklace
2. Emile Gaboriou : The Accursed House
3. Sheila Kaye-Smith : Mrs. Adis
4. Anton Tchekov : The Bet
5. Reading Comprehension

Unit – II

6. O. Henry : After Twenty years
7. Leonard Merrick : The Judgement of Paris
8. Stephen Leacock : The Conjuror's Revenge
9. A.E. Coppard : The Halfyard Ham
10. Expansion of a Maxim

Unit – III

11. Far From the Madding Crowd : Chapters 1 to 4
12. Far From the Madding Crowd : Chapters 5 to 8
13. Far From the Madding Crowd : Chapters 9 to 11
14. Far From the Madding Crowd : Chapters 12 and 13
15. Essential English Grammar : Units 58 to 72

Unit – IV

16. P.G. Wodehouse : The Prize Poem
17. Mulk Raj Anand : The Barber's Trade Union
18. R.K. Narayan : Wife's Holiday
19. Kushwant Singh : The Mark of Vishnu
20. Essential English Grammar : Units 73 to 91

Unit - V

21. Far From the Madding Crowd : Chapters 14 to 15
22. Far From the Madding Crowd : Chapters 16 to 18
23. Far From the Madding Crowd : Chapters 19 to 21
24. Far From the Madding Crowd : Chapters 22 to 24
25. Précis Writing

Required Reading

1. Ramesh, K.P. (Ed.) : The Diamond Necklace and Other Stories (Macmillan)
2. Hardy, T. (Retold by EF Dodd) : Far From the Madding Crowd (Macmillan)
3. Murphy, Raymond : Essential English Grammar (CUP)

Sem III
07UPH325

Hours/Week: 5
Credit : 4

MATHEMATICAL PHYSICS

Objectives :

- To impart mathematical knowledge for the description of physical phenomena.
- To provide basic skills to learn and appreciate Physics through Mathematics.

Unit I : ERRORS, APPROXIMATIONS AND EXTREMUM OF FUNCTIONS

Introduction to errors – classifications – accuracy of a function methods – errors in laboratory instruments and methods – utility of errors. Approximation and applications. Maxima and minima: Geometrical interpretation and physical application – two and more independent variables – Lagrangian multiplier.

Unit II : FIELD THEORY

Vector and Scalar fields – Conservative and non conservative fields – Physical interpretation and applications of Gradient, Divergence and Curl of fields - Statement and proof of Gauss' divergence theorem, Stoke's theorem and Green's theorem - Physical meaning of each theorem – physical applications.

Unit III : LAPLACE TRANSFORMS AND ITS APPLICATIONS

Definition – transform rules : Addition, scaling, derivatives, integrals, differentiation, integration of transforms, shift of the time function shift of the transform function, periodic function – Inverse Laplace transforms – denominator containing : distinct linear factors, repeated linear factors and quadratic factors – Applications

Unit IV : FOURIER SERIES

Trigonometric series – sine and cosine series – complex form of Fourier series - evaluation of coefficients – Representation of some sample functions and applications.

Unit V : SPECIAL FUNCTIONS

Definitions - simple properties of Gamma, Beta, Delta and Error functions – series solutions of differential equations : Laguerre and Hermite – functions and polynomial – Orthogonality properties.

Book For Study :

Cyclostyled Text.

Semester III
07UCH371

Hrs/Week: 4 hr
Credit: 3

ALLIED CHEMISTRY - I

Unit - I Nomenclature and Isomerism

Nomenclature of straight chain and closed ring compounds-mono and poly functional organic compounds. Hybridisation- sp , sp^2 and sp^3 . Bond length, bond angle, dipole moment, inductive effect, mesomeric effect and hyperconjugation. Solubility- protic and aprotic solvents. Isomerism- geometrical; and optical isomerism, optical activity, asymmetry, dissymmetry, elements of symmetry, R, S notations. Reactive intermediates- carbocation, carbanion and free radicals (generation, structure and stability).

Unit - II Hydrocarbons

General methods of preparation of alkanes, properties- mechanism of free radical halogenation of alkanes, conformation analysis of ethane, n- butane and cyclohexane.

Methods of preparation of alkenes-stereochemistry of dehydrohalogenation (E1, E2, E1CB mechanism). Properties of alkenes- electrophilic and nucleophilic addition mechanisms.

Unit III Groups I, IV and VII

Occurrence, extraction and chemical properties of iron, cobalt, nickel and copper. Electrochemical theory of rusting. Position of hydrogen in periodic table, atomic hydrogen and isotopes of hydrogen. Preparation and structure of borazole, SiO_2 , SiC and $SiCl_4$. General characteristics of halogens- interhalogens.

Unit IV Chemical Kinetics

Rate of reaction, order, molecularity, first order rate law and simple problems, half life period of first order equation, pseudo first order reaction, zero and second order reactions. Arrhenius and collision theories- assumption, derivation, demerits- experimental determination of order of reactions.

UNIT V Photochemistry

Difference between photochemical reactions and dark reactions. Laws of photochemistry- Einstein law of photochemical equivalence, quantum yield. Kinetics of Hydrogen-chlorine, Hydrogen-bromine and decomposition of HI. Fluorescence, phosphorescence and chemiluminescence.

Reference:

1. Puri B.R., Sharma L.R., Kalia K.K., *Principles of Inorganic Chemistry*, (23rd edition), New Delhi, Shoban Lal Nagin Chand & Co., (1993)
2. Bahl B.S. and Arun Bahl, *Organic Chemistry*, (12th edition), New Delhi, Sultan Chand & Co., (1997).
3. Puri B.R., Sharma L.R., Pathania M.S., *Principles of Physical Chemistry*, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993)

Sem. III
07UCS371

Hours/week: 4
Credits: 2

Allied: COMPUTER SCIENCE - 1

Objectives:

To give the basic knowledge of computers and Email concepts

UNIT I:

Introduction – Characteristics of Computers – Technical Evolution of Computers – Categories of Commercial Computers – Computer Hardware – Computer Software – Uses and Impact of Computers – Organization of Computers: CPU and its Components – Types of Computers Memory – Input Devices – Output Devices. (18)

UNIT II:

Storage Devices: Magnetic Tape – Magnetic Disk – Optical Technology – Operating Systems: Introduction – Functions of Operating Systems – Compiler – Assembler and Interpreter – Loader and Linker – Introduction to DOS, Unix and Windows. (18)

UNIT III:

Computer Communications: Data Communication – Forms of Data Transmission – Data Transmission Techniques – Networks: LAN, MAN, WAN – Network Topology – Information Systems: DBMS Concepts and Features. (18)

UNIT IV:

Computer Languages: Flow Charts: Conventions – Advantages and Limitations – Types of Logic – Illustrations – Elements of Programming: Program Development Process – Categories of Programming Languages – Procedural Languages. (18)

UNIT V:

E-mail: Sending – Reading – Replying – Deleting – Exiting – Sending Mail to more than one Person – Sending Folder – Forwarding a Mail – Checking the Spelling – Attaching a Signature – Filling the Messages – Managing Address Book – Email Client Software. (18)

BOOKS FOR STUDY:

1. S Jaiswal, "IT Today", Galgotia publication private Limited, New Delhi, 2004
2. Joe Krayank & Joe Habraken, "Internet 6 in 1", Prentice Hall of India Private Limited, New Delhi, 1998.

BOOKS FOR REFERENCE:

1. Alexis leon, "IT applications", 2004
2. Christian Crumlish: The Internet, BPB Publication, New Delhi. 1998.

Sem III
07UEL371

Hours/week: 6
Credits : 4

Allied: ELECTRONICS - I

UNIT-I: Basics of Thyristors

Introduction - application - symbolic representation - specification - Thyristor rating - construction - principles of an SCR - two transistor analogy of SCR - method of triggering a thyristor - commutation of a thyristor - thyristor configuration - DIAC - TRIAC - UJT - rectifier circuits using SCR - solid state switching using thyristor.

UNIT-II: Thyristor Control Circuit

Temperature control - illumination control - Application of TRIAC as a three position static switch - light activated turn off circuit using DIAC - TRIAC and LDR - off at dark circuit - emergency light using SCR - Direct current breaker using SCR - battery operated inverter circuit using power transistor SCR - UJT operated timer circuit.

UNIT-III: Electronic Control of Heating and Welding

Introduction - resistance heating - induction heating - electronics heaters employ for induction heating - thyristorized supplies used for induction furnaces - dielectric heating - electric welding.

UNIT-IV: Photoelectronic Devices and Ultrasonics

Introduction - Light dependent resistors - light emitting diodes - photodiode-phototransistor - photovoltaic cells - photoconductive cell - photoelectric emission - photo-electric relay - application of ultrasonics - generation of ultrasonics - pulsed echo ultrasonic flaw detection - ultrasonic flaw detection using shadow method.

UNIT-V: Transducers

Classification of transducers - transducer for instrumentation and control system - selection of transducers - types of transducers - strain gauge as a transducer - variable resistor transducer - capacitive transducer - inductive transducer - potentiometric resistance type transducer - solar batteries - servomotors - eddy current clutches.

BOOK FOR STUDY

1. S.K.Bhattacharya and S.Chatterjee, Industrial Electronic and Control, Tata McGraw Hill, Second reprint, 1998, New Delhi.

Sem: IV
07UGT404

Hours : 5
Credits: 4

பொதுத்தமிழ்-4

நோக்கம்

1. நாடகத்தின் நோக்கம், அதன் போக்கு, உத்திகள், பாத்திரப்பாங்கு, உரையாடல் முறை, கற்பனைத்திறம் போன்றவற்றை வெளிப்படுத்தல்
2. புதிய நாடகங்களைப் படைக்கும் திறனை மாணவர்களிடையே உருவாக்குதல்.

பயன்கள்

1. நாடகவழி அழகியல் உணர்வுகளை வளர்த்தல்.
2. நாடகங்களைச் சமூகப் பயன்பாட்டிற்கு ஏற்ப உருவாக்குதல்

செய்யுள் நாடகம் :

மனோன்மணியம், பேராசிரியர் சுந்தரனார்

- அலகு 1: மனோன்மணியம், பாயிரம், அங்கம் 1, களம் 1-5 வரை
 அலகு 2: மனோன்மணியம், பாயிரம், அங்கம் 2, களம் 1-3 வரை
 அலகு 3: மனோன்மணியம், பாயிரம், அங்கம் 3, களம் 1-4 வரை
 அலகு 4: மனோன்மணியம், பாயிரம், அங்கம் 4, களம் 1-5 வரை
 அலகு 5: மனோன்மணியம், பாயிரம், அங்கம் 5, களம் 1-3 வரை

உரைநடை நாடகம் :

முனைவர் ஆ. சிவக்கண்ணன், பேராசிரியர் பிரம்மச்சாரி, நியூசெஞ்சுரி புத்தகநிலையம், 2005. (உரைநடை நாடகம் முழுமையும்)

பாடநூல்

1. பேராசிரியர் சுந்தரனார் , மனோன்மணியம் - (பதி) தமிழ்த்துறை, தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி
2. முனைவர் சிவக்கண்ணன், பேராசிரியர் பிரம்மச்சாரி, பாவைப்பதிப்பகம்.

மதிப்பெண் பகிர்வு

மனோன்மணியம்	- 80
உரைநடை நாடகம்	- 20

உரைநடை பாகம் 3-இல் நாடகம் கட்டுரை வினாவில் மட்டும் இடம் பெற வேண்டும்.

Sem. : IV
Code : 07UGE414

Hours : 5
Credits : 4

GENERAL ENGLISH - IV

Objectives

1. To enhance reading skills towards developing vocabulary power and composition skills.
2. To create in students a taste for enjoying English One-Act Plays thus making them imbibe dramatic skills.
3. To develop the listening, speaking and writing skills of students through the prescribed texts.

Unit – I

1. A. Ball : The Seven Slaves
2. R.H. Wood : Post Early for Christmas
3. Reading Comprehension
4. Essential English Grammar : Units 92 to 98

Unit – II

5. Monica Thorne : The King Who Limped
6. A.E.M. Bayliss : One Good Turn
7. A Tale of Two Cities : Part I
8. Essential English Grammar : Units 99 to 106

Unit – III

9. A Tale of Two Cities : PART II: Chapters 1 to 3
10. A Tale of Two Cities : PART II: Chapters 4 to 7
11. A Tale of Two Cities : PART II: Chapters 8 to 10
12. General Essay

Unit – IV

13. Allan Monkhouse : Night Watches
14. Ella Adkins : The Unexpected
15. A Tale of Two Cities : PART II: Chapters 11 to 13
16. Essential English Grammar : Units 107 to 114

Unit – V

17. Josephina Niggli : Sunday Costs Five Pesos
18. A Tale of Two Cities : PART III: Chapters 1 to 5
19. A Tale of Two Cities : PART III: Chapters 6 to 9
20. Report Writing

Required Reading

1. K.S. Ramamurthy (Ed.) : Seven One-Act Plays (OUP)
2. Dickens, C. (Retold by P. Atkinson): A Tale of Two Cities (Macmillan)
3. Murphy, Raymond : Essential English Grammar (CUP)

Sem IV
07UPH426

Hours/Week: 5
Credit : 4

SOUND, THERMAL AND STATISTICAL PHYSICS

Objectives :

- To study the nature and transmission of heat and the laws associated with them.
- To study the laws of thermodynamics and understand their applications.
- To acquire knowledge of Maxwell's thermodynamical relations and their importance.
- To understand the concepts of statistical thermodynamics and its applications.

Unit I : SOUND

Wave motion – characteristics of wave motion – transverse, longitudinal wave motion – Newton's formula for velocity of sound – effect of temperature, pressure, density of the medium, humidity and wind – stationary waves – Helmholtz resonator, theory of resonator, vibrations in rods, Kundt's tube, Doppler effect – applications, Acoustics of buildings – Reverberation – Sabine formula for reverberation- Ultrasonics – production and detection of ultrasonic waves – applications of ultrasonic waves.

Unit II : CHANGE OF STATE AND NATURE OF HEAT

Change of state – latent heat of fusion – laws of fusion – determination of latent heat of fusion of ice – vaporization and condensation – laws of boiling – Change in boiling point with pressure – latent heat of vaporization – vapour pressure of liquids – triple point – Gibb's phase rules – Mechanical equivalent of heat – Joules method, Callendar and Barnes continuous flow method – degrees of freedom and Maxwell's law of equipartition of energy- atomicity of gas – mean free path.

Unit III : TRANSMISSION OF HEAT

Coefficient of thermal conductivity- rectilinear flow of heat – along a bar – Forbes method of find K – Lee's method for bad (solid) conductors – K of glass – statement and derivation of Stefan's law – derivation of Newton's law of cooling from Stefan's law – determination of Stefan's constant (laboratory method) – distribution of energy in the spectrum of a black body-Wien's displacement law – derivation of Plank's law – solar constant – Angstrom's Pyroheliometer-temperature of the sun.

Unit IV : THERMODYNAMICS: Intermolecular force of attraction – porous plug – theory and experiment – Joule – Kelvin effect – Temperature of inversion – Zeroth law of thermodynamic – I law of thermodynamics for change in the state of a closed system – II law – Carnot engine – III law – statement only. Concept of entropy- derivations of Maxwell's thermodynamics relations – Helmholtz function - Gibbs's function – enthalpy- TdS equations- Clapeyron's latent heat equation

Unit V : STATISTICAL THERMODYNAMICS

Statistical equilibrium –Probability theorems in statistical thermodynamics- Maxwell – Boltzmann distribution law – Maxwell – Boltzmann distribution in terms of temperature – ideal gas- quantum statistics – Phase space- FD distribution law – application to electron gas — BE distribution law – application to photon gas- radiation laws – comparison of the three statistics.

Book For Study :

1. N. Subrahmanyam and Brijlal, Sound, Vikas publication House, 1994.
2. Brijlal and Subramanyam, Heat and thermodynamics, S.chand and co., 2000.

Unit	Book	Sections
I	1	Chapter 4; 4.1,4.3,4.4,4.5 Chapter 5; 5.4,5.5,5.6,5.7,5.8,5.9 Chapter 6; 6.1,6.16,6.17 Chapter 7; 7.12,7.13 Chapter8; 8.1,8.2,8.3, 8.6 Chapter10; 10.14,10.15,10.16,10.23,10.24,10.25,10.27
II	2	Chapter4; 4.1,4.2,4.3,4.8,4.10,4.11,4.12,4.14,4.24,4.25,4.26 Chapter5; 5.4,5.8,5.21,5.22,5.25.
III	2	Chapter8; 8.1,8.2,8.3,8.7,8.8,8.14,8.35,8.36,8.37,8.39,8.42,8.43,8.44,8.45 Chapter5; 5.43,5.44,5.45,5.46
IV	2	Chapter6; 6.2,6.8,6.25,6.38,6.44,6.47,6.52,6.53,6.54,6.55,6.62
V	2	Chapter9; .1,9.2,9.3,9.4,9.5,9.6,9.7,9.8,9.9,9.10,9.11,9.12,9.13

Sem IV
07UPH427

Hours/Week: 3
Credit : 4

PHYSICS PRACTICAL – II

Any 16 Experiments

1. Young's modulus – Uniform bending
2. Young's modulus – non uniform bending
3. η – Rankine's method
4. n and M.I - Torsional Oscillations
5. n – Static method
6. Compound pendulum
7. Kater's pendulum
8. Kundt's tube
9. Frequency - Melde's apparatus
10. BG (condenser method) – Resistance and figure of merit
11. B.G - Comparison of mutual Inductances.
12. Spectrometer – i-d curve
13. Spectrometer – i for d, d for i
14. Spectrometer – i-i'
15. Newton's rings
16. Stefan's constant
17. Field along the axis of the coil – vibration magnetometer
18. K- Forbe's method
19. Potentiometer – Ammeter calibration
20. Potentiometer – R and ρ
21. Absolute M and H
22. Junction diode and Zener diode characteristics.
23. Study of basic and universal gates (IC's)
24. Voltage doubler

Semester IV
07UCH472

Hrs/Week: 4
Credit: 3

Allied: CHEMISTRY - II

Unit I Carbohydrates, Benzene and Heterocyclic compounds

Classification of carbohydrates -structural elucidation of glucose and fructose-Fischer and Haworth structures, anomers, mutarotation, interconversion of glucose and fructose. Amino acids - preparation and properties of glycine and alanine. Proteins - peptide linkage- primary, secondary and tertiary structure of proteins. Chemistry of benzene- preparation, mechanism of electrophilic substitution reactions. Preparation and properties of chloro and nitrobenzene. Heterocyclic compounds - preparation of furan, mechanism of electrophilic substitution reactions. Pyridine - preparation, electrophilic and nucleophilic substitution reactions. Rearrangement pinacol-pinacolone, Hofmann and benzilic acid rearrangements.

Unit II Coordination Chemistry

Nomenclature and isomerism of coordination compounds. EAN rule, VB and Crystal field theories of octahedral, tetrahedral and square planar complexes. Chelation and its industrial applications. Magnetic studies - magnetic susceptibility, ferromagnetism and anti ferromagnetism.

Unit III Industrial Chemistry

Silicones-preparation, properties and uses. Glass -manufacture and types. Cement-composition, manufacture and setting of cement. Ceramics- composition, types and preparation. Noble gases- hydrides, clathrates, compounds of xenon. Solutions-concentration of solutions (normality, molality and molarity).

Unit IV Phase Rule

Phase rule- phase diagram of H₂O, CO₂, S, Pb-Ag and Zn-Mg systems. Adsorption - Langmuir and Freundlich adsorption isotherms. Applications of adsorption, principles of chromatography (Paper, TLC and column).

Unit V Electrochemistry

Faradays laws of electrolysis, specific conductance, equivalent conductance, cell constant. Arrhenius theory, Oswald's dilution law and Kohlrausch law. Conductometric titrations. Debye-Huckel theory of strong electrolytes (assumption only). Solubility product. Nernst equation- applications of EMF measurements.

Reference:

1. Puri B.R., Sharma L.R., Kalia K.K., *Principles of Inorganic Chemistry*, (23rd edition), New Delhi, Shoban Lal Nagin Chand & Co.,(1993)
2. BahL B.S. and Arun Bahl, *Advanced Organic Chemistry*, (12th edition), New Delhi, Sultan Chand & Co., (1997).
3. Puri B.R., Sharma L.R., Pathania M.S., *Principles of Physical Chemistry*, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993)

Sem III & IV
07UCH 473

Hrs/Week: 2
Credit : 2

Allied:
CHEMISTRY PRACTICAL

I. Volumetric Analysis

1. Estimation of NaOH using standard KMnO_4 and oxalic acid as link
2. Estimation of oxalic acid using standard KMnO_4 with oxalic acid as link
3. Estimation of ferrous sulphate using standard ferrous ammonium sulphate and standard KMnO_4 as link
4. Iodometric estimation of dichromate
5. Iodometric estimation of Copper
6. Estimation of Mg using EDTA

II. Qualitative Organic Analysis

To find out

1. Solubility in water, dil NaHCO_3 , dil. NaOH and dil. HCl
2. Saturated/unsaturated/brominable
3. Aliphatic/Aromatic
4. Functional group, and
5. Elements like nitrogen, sulphur and chlorine

Sem. IV
07UCS472

Hours/week: 6
Credits: 4

Allied: COMPUTER SCIENCE - II

Objectives :

To impart the knowledge about the MS-Office , DTP, Photoshop and Internet concepts

Unit I: Word & Excel

MS Word: Introduction to Word - Editing Document - Formatting Text and Paragraph - Spelling Checking - Enhancing Document - Columns, Tables and Other Features - Using Graphics - Mail Merge. MS Excel: Introduction to Excel - Using Commands and Functions - Inserting and Deleting Rows and Columns - Formatting a Worksheet - Printing the Worksheet - Creating Charts. (18)

Unit II: PowerPoint & Access

MS PowerPoint: Introduction to PowerPoint - Creating Presentation - Running Slide Show - Printing Presentation. MS Access: Introduction to Access - Creating a Simple Database and Tables - Entering and Editing Data - Finding, Sorting and Displaying Data. (18)

Unit III: Applications

DTP: Introduction to Desk Top Publishing - Common Features - DTP Programs Computer Virus: Introduction - Types of Virus - Prevention and Cure - E-mail. Multimedia: Introduction to Multimedia - Various Classifications. (18)

Unit IV: Photoshop

Photoshop: Environment - Different Layers and its Options - Import and Export Images - Image Editing - Channels, Masks and Actions - Filters - Animations. (18)

UNIT V: Internet

Fundamentals of Internet Concepts - Browsers - Functions - Netscape Navigator - Internet Explorer - Search Engines - HTML: Overview of HTML - Creating and Adding Structure to a Page - Formatting Text and Pages - Arranging Items within Tables. (18)

Books for Study

1. Taxali, R. K. : PC Software for WINDOWS Made Simple, Tata McGraw- Hill Publishing Company Ltd., New Delhi: 1998.
2. Nigre chapman and Jenny - Practical Multimedia, Willey Dreamtech, 2nd Edn, 2003
3. Joe Krayank & Joe Habraken, "Internet 6 in 1, Prentice Hall of India Private Limited, New Delhi, 1998

Books for Reference

1. Sanjay Saxena : A First Course in Computers, Vikas Publishing House Pvt. Ltd., New Delhi, 1999.

Sem IV
07UEL472

Hours/week: 6
Credits : 3

Allied:
ELECTRONICS - II

UNIT-I: Sensors and Amplifiers

Thermistor - Thermocouples - Pyrometers - Accelerometers - selsyns or synchros tachogenerator - Differential transformer - Microsyn-magnetic amplifiers - thyatron and thyatron amplifiers - operational amplifiers.

UNIT-II: Inverter, Choppers and Motor Control

Inverters - Choppers - Advantage of electric control of device - DC motor speed control - speed control of motor using thyristor technology - AC motor control - speed control of single-phase induction motor - Speed control of synchronous motor.

UNIT-III: Basic Concepts of Control System

Control system - servomechanisms - historical development of automatic control - Sampled-data and digital control systems - multivariable control systems - application of control theory in on-engineering fields.

UNIT-IV: Mathematical Models of Physical Systems

Introduction - differential equations of physical systems - transfer functions - block diagram algebra - signal flow graphs - illustrative examples.

UNIT-V: Feedback Characteristics & Components of Control System

Feedback and non-feedback systems - reduction of parameter variations by use of feedback - control over system dynamics by use of feedback - control of the effects of disturbance signals by use of feedback - regenerative feedback - linear approximation of non-linear systems - electrical systems - stepper motor - Hydraulic systems - pneumatic systems.

BOOK FOR STUDY

1. S.K.Bhattacharya and S.Chatterjee, Industrial Electronic and Control, Tata McGraw Hill, Second reprint, 1998, New Delhi.
2. I.J.Nagrath and M.Gopal, Control Systems Engineering, New Age International Ltd., New Delhi.

Sem V
07UPH528

Hours/Week: 5
Credit : 5

PROGRAMMING IN 'C' FOR PHYSICS PROBLEMS

Objectives :

- To get computer knowledge and understand the aspects of C language.
- To apply C language to write programs for solving specified problems in physics.

Unit I : DATA TYPES, OPERATORS AND EXPRESSIONS

Algorithm – flow chart - introduction to C – structure of a C programme - character set – keywords and identifiers – data types – constants – variables – declaration – symbolic constants – operators – expressions - evaluation to expressions – operator precedence – I / O statements – formatted I / O – simple C programmes for simple pendulum, lens and decimal to binary, octal conversions.

Unit II : I/O AND CONTROL STATEMENTS

IF and IF – Else statements - nesting IF statement – switch statement – goto statement – while statement – do – while statement – for statement – C programs for Young's and Rigidity modulus, frequency of oscillators and transistor parameters .

Unit III : FUNCTIONS AND STRINGS

Functions - library functions – passing arguments to a function – recursion – strings – string functions - storage classes – automatic variables – global and external variables – static variables. Programs for field along the axis, projectiles, centre of gravity of different objects .

Unit IV : ARRAYS, STRUCTURES AND UNIONS

Defining arrays (one and two dimensional) - manipulating arrays - multidimensional arrays – Structures – Definition and manipulation – User defined (type def.) – Unions – Definition – Programs for Matrix addition, subtraction and multiplication – Sorting and Searching.

Unit V : POINTERS AND FILES

Pointers – definition - declarations – operation on pointers – files – opening and closing a data file – creating a data file – processing a data file – simple file manipulation programs.

Book For Study:

1. Byron S. Gottfried, Theory and Problems of Programming With C, Schaum's Outline Series, TMH, New Delhi, 1996.

Unit	Book	Section
I	1	1.5, 2.1 – 2.9, 3.1 – 3.6
II	1	4.2 – 4.8, 6.1 – 6.11
III	1	7.2 – 7.4, 7.7, 8.1 – 8.4
IV	1	9.1 – 9.4, 11.1 – 11.3, 11.7
V	1	10.1, 10.5, 12.1 – 12.3.

Book For Reference:

Balagurusamy, E, Programming in ANSI C, TMH, New Delhi, 2000.

Sem V
07UPH529

Hours/Week: 5
Credit : 5

ATOMIC, SOLID STATE AND NUCLEAR PHYSICS

Objectives :

- To study atom models and their importance.
- To study crystal structure, bonding in crystals, Einstein's and Debye's theories.
- To study the process of radioactivity and its applications and also to study the structure and models of nucleus.
- To study about cosmic rays and to understand the working of particle accelerator and detectors.
- To study the aspects related to elementary particle and space physics.

Unit I :ATOMIC PHYSICS

Sommerfeld's relativistic atom model - vector atom model - quantum numbers associated with the vector atom model - coupling schemes - Pauli exclusion principle - periodic classification of elements - magnetic dipole moment (due to orbital motion of the electron and due to spin) - Stern and Gerlach experiment - spin orbit coupling - Zeeman effect - Lorentz classical theory of normal effect, shift, experiment - Larmor's theorem - quantum mechanical explanation of the normal and anomalous effect - Paschen Back effect - Stark effect

Unit II :SOLID STATE PHYSICS

Periodicity - Lattice, Basis, crystal - crystal structure - symmetry elements - 2D and 3D Bravais lattices - bonding in crystals - different types and their properties - band theory of solids - specific heat capacity: Einstein's theory and Debye's theory - superconductivity – experimental facts - persistent current - Type I - Type II - Meissner effect - BCS theory - applications

Unit III :RADIOACTIVITY AND NUCLEUS

Alpha particle spectra - Beta ray spectra - origin of the line and continuous spectrum - neutrino theory of beta decay - origin of gamma ray spectra -internal conversion - law of successive disintegration - radioactive dating – applications - general properties - binding energy - nuclear stability - theories of nuclear composition - nuclear forces - models of nuclear structure - liquid drop model and shell model.

Unit IV : PARTICLE DETECTORS, ACCELERATORS AND COSMIC RAYS

Particle detectors - interaction between energetic particles and matter – Wilson Cloud chamber - Geiger Muller Counter - nuclear emulsion technique - Particle accelerators - cyclotron - Betatron - Synchrotron – electron synchrotron and proton synchrotron - Discovery - latitude, azimuth, altitude and longitude effects - primary and secondary cosmic rays - showers - positron - meson - Van Allen belts - origin of cosmic rays

Unit V :ELEMENTARY PARTICLE PHYSICS AND SPACE PHYSICS

Properties of elementary particles (Lepton & Baryon) - exact conservation laws – energy - linear momentum - angular momentum – charge - Baryon & Lepton number -origin of these laws - fundamental interactions - approximate conservation laws. strangeness – parity - charge conjugation -time reversal - Quark model - unification of interaction -geography of the universe - Hubble's law.

Books for Study

1. R. Murugesan., Modern Physics, S.Chand & Co.,-Fourteenth Edition, New Delhi, 2001.
2. H.S Mani and G.K. Mehta, Introduction to Modern Physics, EW press, New Delhi

Unit	Book	Sections
I	1	4.11 - 4.28
II	1	5.15 - 5.17, 16.1 - 16.6, 16.10 – 16.15
III	1	11.13, 11.14, 11.19 - 11.25, 11.27, 11.34 - 11.36, 8.1 - 8.11
IV	1	14.1 - 14.16, 9.2, 9.6, 9.7, 9.11, 10.4, 10.7, 10.8, 10.9
V	2	11.1 - 11.8, 12.1 - 12.3

Books for Reference

1. Arthur Beiser, Concepts of Physics, Tata Mcgraw-Hill-Sixth Edition, 2003.
2. Sehgal Chopra Sehgal, - Modern Physics, Sultan Chand Sons, New Delhi, 2004.
3. Sanjiv and Puri, Modern Physics Concepts and Application , Narosa Publication, New Delhi – 2004.

Sem V
07UPH530

Hours/Week: 5
Credit : 5

ANALOG ELECTRONICS

Objective :

- To study the basic theorems and the working of diodes and their applications.
- To acquire the knowledge about transistor characteristics in different configurations and different types of biasing.
- To understand the different types of amplifiers and analyse the same.
- To study the concept of feedback and its applications in amplifiers and oscillators.
- To understand the working of multimeters and CRO and to grasp the basic ideas of integrated circuits, op-amps and its applications.

Unit I : DIODE CHARACTERISTICS AND APPLICATIONS

Constant voltage source, Constant current source, Conversion. Maximum power transfer theorem Thevenin's theorem. PN junction- formation-properties-applying voltage-current flow-V I characteristics- breakdown voltage and Knee voltage. Crystal diode as a rectifier-resistance. Half wave rectifier-Full wave rectifier-Centre tap and Bridge rectifier-Efficiency-Ripple factor- comparison. Filter circuits-types. Zener diode-equivalent circuit-voltage stabilizer. LED-voltage and current-advantages-applications. Photo diode-characteristics-applications. Clipping circuits. Clamping circuits.

Unit II : TRANSISTOR CHARACTERISTICS AND BIASING TECHNIQUES

Transistor-action-symbols-CB, CE, CC connections and comparison-CB and CE characteristics. Transistor as an amplifier in CE arrangement-Load line analysis-operating point-output and performance-cutoff and saturation points-power rating. Transistor biasing-stabilisation- essentials-stability factor-base resistor method-voltage divider bias method-design. Types of FET- JFET-working principle-symbol-comparison with bipolar transistor-output characteristics –shorted gate drain current, pinch off voltage and gate source cut off voltage - JFET parameters and biasing.

Unit III : SINGLE STAGE , MULTISTAGE AND POWER AMPLIFIERS

Single stage transistor amplifier-graphical representation-D.C. and A.C. equivalent circuits-load line analysis-voltage gain. Classification of amplifiers. Multistage transistor amplifier-gain, frequency response, decibel gain, bandwidth-RC coupled , Transformer coupled and direct coupled transistor amplifiers-comparison. Common source JFET amplifier-voltage gain. Difference between voltage and power amplifiers-performance quantities and classification of power amplifiers-maximum collector efficiency of series- fed and transformer coupled class A power amplifiers-thermal runaway-heat sink-push-pull and complementary-symmetry amplifier.

Unit IV: NEGATIVE FEEDBACK AMPLIFIERS AND OSCILLATORS

Feedback-Negative voltage feedback amplifier-principle-gain –advantages. Feedback circuit. Negative current feedback- principle- current gain - effects. Emitter follower-D.C. analysis-voltage gain-input impedance-output impedance-applications. Sinusoidal oscillator-types-oscillatory circuit. Positive feedback amplifier-oscillator –essentials- Barkhausen criterion. Colpitt's oscillator, Hartley oscillator, Phase shift oscillator, Wien bridge oscillator.Piezoelectric crystals-Quartz crystal-equivalent circuit-frequency response-transistor crystal oscillator. Switching action of a transistor-Astable Multivibrator.

Unit V : ELECTRONIC INSTRUMENTS, INTEGRATED CIRCUITS AND OPERATIONAL AMPLIFIER

Multimeter - applications-sensitivity-merits and demerits. Cathode ray oscilloscope-cathode ray tube-deflection sensitivity-applications. Integrated circuit-advantages and disadvantages-IC classifications-making monolithic IC. Operational amplifier-differential amplifier-basic circuit-operation-common mode and differential mode signals-voltage gains-CMRR. Operational amplifier (OP-AMP)-output voltage. OP-AMP with negative feedback-Inverting amplifier-input and output impedance- Noninverting amplifier-voltage follower-summing amplifiers-applications. OP-AMP integrator and differentiator.

Books for study

1. V. K. Mehta and Rohit Mehta, Principles of Electronics, S. Chand & Co.Ltd.2006.

Unit	Book	Section
I	1	1.9-1.13, 8.14-8.19, 9.2, 9.3, 9.8-9.22, 10.2-10.10, 21.17-21.23.
II	1	11.1, 11.4, 11.5, 11.8-11.17, 11.19-11.22, 12.2, 12.4-12.8, 12.10, 12.11, 22.1-22.4, 22.6, 22.8, 22.9, 22.12-22.14
III	1	13.1-13.8, 13.13, 14.1-14.6, 22.15, 22.16, 15.2-15.7, 15.9, 15.10, 15.15, 15.16
IV	1	16.1-16.14, 17.1-17.3, 17.5-17.7, 17.10-17.20, 21.9, 21.12
V	1	25.2-25.5, 25.10-25.17, 26.1-26.4, 29.1-29.8, 29.15-29.17, 29.22-29.27,29.32 - 29.35, 29.37, 29.38

Books for reference

1. R. S. Sedha, A text book of applied electronics, S. Chand & Co. Ltd. 2006.
2. B. L. Theraja, Basic electronics (solid state), S. Chand & Co. Ltd. 2003.

Sem V
07UPH531

Hours/Week: 5
Credit : 5

INSTRUMENTATION

Objectives:

- to understand the static and dynamic performance characteristics of instruments and understand the working principles of various transducers and amplifiers
- to acquire knowledge on different kinds of measurements of motion, power, flow, pressure, temperature and sound

Unit I : INSTRUMENTS AND THEIR STATIC PERFORMANCE CHARACTERISTICS

Functional elements of a measurement system - classification of instruments - standards and calibration - errors and uncertainties in performance parameters – types - propagation of uncertainties in compound quantities - static performance parameters - accuracy - precision - resolution - threshold - static sensitivity - linearity - hysteresis - deadband - backlash - drift - impedance loading and matching - specifications of instrument static characteristics

Unit II : DYNAMIC CHARACTERISTICS OF INSTRUMENTS

First and second order instruments - formulation of system equations - resistance transducer connected to display unit - thermal element - U - tube manometer - seismic motion transducer - dynamic response for harmonic - non-harmonic and transient inputs - first and second order compensation

Unit III : TRANSDUCER ELEMENTS AND AMPLIFIER FOR TRANSDUCERS

Analog transducers – electromechanical – potentiometric – inductive - electrodynamic, electromagnetic - eddy current - variable inductance – LVDT – capacitive – piezoelectric - resistance strain gauges and ionization gauges – opto - electrical and digital transducers - amplifiers - amplifying elements – mechanical – hydraulic – pneumatic - optical and electrical amplifying elements - A/D and D/A converters

Unit IV : MOTION, FORCE, AND PRESSURE MEASUREMENTS

Relative motion measuring devices – Electromechanical – optical –pneumatic. Force measurements – balance, hydraulic load cell, pneumatic load cell, Elastic force devices. Pressure measurements - moderate, high and low pressures.

Unit V : TEMPERATURE, FLOW AND ACOUSTIC MEASUREMENTS

Temperature measurements – Non-electrical, electrical and radiation methods. Flow measurements – Ultrasonic flow meter, hotwire anemometer and Laser Doppler anemometer. Characteristics of sound-sound pressure and power levels, loudness. Typical sound measuring system. Microphones.

Book For Study:

1. B.C. Nakra and K.K. Chaudhry., Instrumentation Measurement and Analysis, Tata McGraw Hill, New Delhi, 1997.

Unit	Books	Sections
I	1	1.3 - 1.6, 2.1 - 2.6
II	1	3.1, 3.2, 3.3.1 - 3.3.3, 3.4 - 3.4.1, 3.4.2
III	1	4.1 - 4.3, 5.1, 5.2
IV	1	7.1, 7.2, 8.1 - 8.5, 10.1 to 10.2.1, 10.3, 10.4
V	1	11.1 - 11.7, 12.1, 12.6, 13.1 - 13.6

Book For Reference :

1. Albert D.Helfrick and William D. Cooper., Modern Electronic Instrumentation and Measurement Techniques, Third Edition, Prentice Hall of India, New Delhi, 1995.

Sem V
07UPH532

Hours/Week: 5
Credit : 5

MATERIALS SCIENCE

Objective

- To understand the technological properties of engineering materials.
- To understand the phase diagrams and phase transformations.
- To acquire knowledge on corrosion and its prevention.
- To understand various mechanical properties and its testing mechanism
- To acquire knowledge about Nuclear and Space application materials.

Unit I :

TECHNOLOGICAL PROPERTIES AND PHASE DIAGRAMS

Classes of engineering materials – engineering requirements of materials – Level of structure – structure – property relationship in materials – selection of materials – weldability machineability - formability - castability- phase diagrams – phase rule: unary phase diagrams – binary phase diagrams – construction of phase diagram – the lever rule -isomorphous systems -Eutectoid system– perntectic and peritectoid system .

Unit II :

PHASE TRANSFORMATION AND DEFORMATION

Nucleation and Growth – solidification – Allotropic transformation – Iron–Carbon and Iron – Graphite equilibrium diagram – isothermal transformation – martensic transformation – phase transformation in alloy steels–nature of elastic deformation – electrometric deformation - an elastic deformation – thermo elastic effect elastic after effect – plastic deformation – visco elastic deformation – Mawell model – Voigt - Kelvin model.

Unit III :

CORROSION AND ITS PREVENTION

Type of corrosion – direct – electrochemical - Galvani cells - mechanisms of electro chemical corrosion – contact corrosion – high temperature corrosion - Passivity – factors influencing corrosion rate - specific types of corrosions - control and prevention of corrosion.

Unit IV :

MECHANICAL PROPERTIES AND TESTING

Fundamental properties – fatigue – creep – testing techniques - tensile – compression – hardness – impact - fatigue – creep – stress – rupture – factors affecting mechanical properties. - grain size – heat treatment – atmosphere exposure – low temperature- high temperature

Unit V :

MATERIALS FOR NUCLEAR AND SPACE APPLICATIONS

Nuclear power generation – Nuclear reaction cross – section-types of nuclear reactors – nuclear fuels – fuel cladding- moderators , control materials -coolants – shielding materials Space programme – structural material and their properties – system requirements – extreme high temperature materials- materials for thermal protection – pressure vessels – lubrication – electronic compounds.

Book For Study :

1. S.K. Hayra Choudhury, Materials Science and Processes – 1991.
2. CM Sri Vastava, C & C.Srinivasan, Science of Engineering materials

Unit	Book	Sections
I	1	1.2-1.6, 15.11-15.14, 6.10-6.18
II	1	11.2 – 11.4, 11.7-11.8, 11.10-11.12, 9.2-9.6, 9.20, 9.21
III	1	16.2 – 16-12
IV	1	8.3 – 8.16
V	2	17.1,17.4,17.5-17.11,18.1-18.8

Book For Reference :

1. V. Raghvan, Material Science and engineering, A first course, Prentice Hall Pvt.Ltd, New Delhi, 1989.
2. Dharmendra Kumar, SK Jain, AK Bhargava, Materials Science and Manufacturing Processes, Vikas Publishing House Pvt. Ltd, New Delhi, 1988.

Sem V
07UPH533

Hours/Week: 6
Credit : 4

PHYSICS PRACTICAL – III

Any 16 Experiments

1. Spectrometer – Grating (Normal incidence)
2. Spectrometer – Grating (Minimum deviation)
3. M – using coil carrying current – current copper voltmeter
4. M – using coil carrying current –current by Ammeter
5. Earth Inductor
6. Fresnel's biprism
7. BG- Absolute M
8. BG –Absolute C
9. Clipping and Clamping circuits (CRO)
10. Rectifiers and filter (CRO)
11. Conversion of galvanometer into an ammeter
12. Conversion of galvanometer into voltmeter
13. Transistor characteristics-CB
14. Transistor characteristics – CE
15. FET characteristics
16. Hartley oscillator
17. Colpitt's oscillator
18. Study of Transistor CE amplifier
19. Study of FET amplifier
20. Logic gates-Discrete components.
21. Adders and Subtractors
22. De Morgan's theorems and laws of Boolean algebra.

Sem VI
07UPH634

Hours/Week: 5
Credit : 5

OPTICS, SPECTROSCOPY AND LASERS

Objectives :

- To understand the concepts of interference, diffraction and polarization of light waves and their applications.
- To study different types of optical fibres and propagation of light waves in optical fibre.
- To understand the working principles of Lasers and their varied applications.
- To study the principles of MW, IR, Raman and X-Ray spectroscopy.

Unit I :

INTERFERENCE AND DIFFRACTION

Huygens principle – Young's experiment – coherent sources – Phase and path difference – Fresnel's biprism – interference in thin films due to reflected and transmitted lights – Newton's rings – theory – reflected and transmitted light – determination of the wavelength of sodium light using Newton's rings - Fresnel's assumptions – rectilinear propagation of light – zone plate – action of a zone plate for plane and spherical wavefront – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction at a single slit – plane diffraction grating – normal and oblique incidence – dispersive power of a grating – prism and grating spectra.

Unit II :

POLARISATION AND ELECTROMAGNETIC THEORY

Polarization of transverse waves – double refraction – Nicol prism – construction and working. Electromagnetic waves – Maxwell's equation (no derivation) propagation of Electromagnetic waves in an isotropic medium – production and detection of EM waves – Poynting vector.

Unit III :

MW AND IR SPECTRA

MW : Theory of MW spectroscopy – diatomic molecule as a rigid rotator – stark effect – Instrumentation.

IR : Range of IR radiation – theory of IR absorption spectroscopy – theory of vibrational diatomic molecule as anharmonic oscillator – Instrumentation.

Unit IV :

RAMAN AND X-RAY SPECTROSCOPY

Raman Spectroscopy – principle – characteristic properties of Raman lines – difference between Raman and IR spectra – pure rotational Raman spectra – vibrational-rotational Raman spectra – Instrumentation. Origin of X-rays – Instrumentation – X-ray diffraction – Bragg's x-ray spectrometer method (only)

Unit V :

LASERS AND FIBRE OPTICS

Basic ideas of Lasers – stimulated emission and population inversion – NH₃ masers and He-Ne lasers – laser Raman spectroscopy – Holography – principle and method – applications in science, medicine and Industry - Optical fiber and its importance – propagation of light waves in optical fiber – acceptance angle and cone – numerical aperture – modes of propagation – applications of Fiber – Fiber cable construction – strength number.

Book For Study

1. N. Subrahmanyam Brijlal, A textbook of Optics, S. Chand and company ltd. New Delhi, 2003.
2. Subir Kumar Sarkar, Optical Fibres and Fibre Optic Communication systems, S. Chand and company ltd., New Delhi, 2004.
3. Cyclostyled text.
4. Gurdeep R. Chatwal and Sham K. Anand, Spectroscopy (atomic and molecular), Himalaya Publishing House, 2004.

Unit	Book	Sections
I	1	2.8, 2.14, 2.15, 4.20, -4.24, 8.32-8.34, 11.16-11.19
	3	cyclostyled text
II	1	7.12, 8.2-8.4, 8.8, 8.16, 8.17, 8.23, 8.24, 9.2-9.5, 9.7, 9.22, 9.33, 9.36, 9.30, 9.41
III	4	2.4, 2.9, 2.10, 3.2, 3.4, 3.5, 3.9, 18.3, 18.6
IV	4	4.2, 4.3, 4.4, 4.5.3, 4.5.4, 4.6, 12.2.1, 12.3, 12.7.2
V	1	10.2, 10.10, 10.13
	2	1.1, 1.2, 1.3, 2.2, 2.4, 2.5, 2.7, 2.12, 5.2
	3	cyclostyled text

Books For Reference :

1. S.L Kakani, K.C. Bhandari, A text book of Optics, S. Chand and sons, New Delhi, 2002.
2. A. Joy Ghatak, Optics, 2nd edition, Tata McGraw Hill Pub. Company Ltd., New Delhi, 1997.
3. P.S. Kalsi, Spectroscopy of Organic Compounds, New age international pub., New Delhi, 2005.
4. H.S. Randhawa, Modern Molecular Spectroscopy, Macmillan India Ltd., New Delhi, 2003.

Sem VI
07UPH635

Hours/Week: 5
Credit : 5

QUANTUM MECHANICS AND RELATIVITY

Objectives :

- To understand the concepts of wave mechanics, dualistic nature of Nature.
- To understand the physical implications of wave functions, expectation value, linkage between classical and quantum physics.
- To apply the Schrödinger equation to 1D and 3D physical systems.
- To learn the 4D space and charges from our common sense.

Unit I :ONSET OF THE QUANTUM PHYSICS

Conclusions from the electro magnetic theory- Properties of photons- Photons and Gravity- The effect of (Gravitational Red shift) gravity on Astronomical radiations- Einstein's photoelectric equation- Role of constants c and h in Physics- The Electron volt - de Broglie's matter waves- Absence of matter waves in macroscopic world- Davisson and Germer's experiment on diffraction of electrons - Matter waves (due to electrons) in atoms- wave-particle duality in nature - Quantum properties of micro particles.

Unit II : DEVELOPMENT OF QUANTUM MECHANICS

Probabilistic description of photons (double slit experiment)- Particle/waves in Classical physics and Quantum physics (physical basis)- The concept of wave function and its physical significance- The form of wave function for matter wave (wave packet, group velocity and phase velocity)- Heisenberg's uncertainty principle:($\Delta x \Delta P_x, \Delta E \Delta t$), Experiment, Applications- Operations of observations- Operators and Observations- The correspondence principle and the Complementarity principle- Postulate: Expectation values- Angular momentum operators and its representation in spherical polar coordinates.

Unit III : ONE DIMENSIONAL SCHROEDINGER PROBLEMS

Schroedinger equation (time dependent form) – commutation relations- Steady state form of Schroedinger equation- Equation of continuity and probability current density- Particle in a rectangular potential well- Particle in one dimension box and in three dimension box- Orthogonality of eigen functions- The harmonic oscillator- the potential step- rectangular potential barrier.

Unit IV :THREE DIMENSIONAL SCHROEDINGER PROBLEMS

Schroedinger equation for the hydrogen atom- solution- quantum numbers- eigen functions- Angular, Radial wave functions- shells and subshells in atom- Aufbau principle- Hund's rule- Penetrating and non penetrating orbits- Parity.

Unit V : RELATIVITY

Frame of reference – Galelian transformation- Newtonian relativity- The velocity of light- Failure of Newtonian mechanics- Newtonian relativity and electromagnetism- the concept of Aether- Michelson-Moreley experiment- Einstein's postulates- Lorentz transformations- Inverse transformations - Velocity transformation- length contraction - Time dilation – variation of mass - Proper and isotropy of time- The Minkowski representation of the Lorentz transformation- Relativity and the fundamental concept of Newtonian mechanics- Energy momentum vector- Energy equation in relativity- Equivalence of energy and mass- World regions and the light cone.

Book for Study :

1. A K Saxena, Principles of Modern Physics, Narosa Publishing House, New Delhi, 2005.

Unit	Book	Sections
I	1	1.7,1.16,1.17,1.19,1.21,1.22 4.1-4.6
II	1	4.7-4.12, 4.14-4.19,4.24,4.25.
III	1	4.20-4.23,4.28
IV	1	5.1-5.4,5.6,5.7,5.10,5.11. 18.4.8
V	1	2.1-2.18, 2.20-2.22, 2.25, 2.26, 2.31.

Book for Reference :

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

Sem VI
07UPH636

Hours/Week: 5
Credit : 5

DIGITAL ELECTRONICS AND MICROPROCESSOR

Objectives :

- To simplify Boolean expressions using the methods of Boolean algebra and Karnaugh map and implementation of combinational logic circuits.
- To know the fixed function combinational logic circuits and their implementations.
- To study the fundamentals and applications of sequential logic circuits.
- To study the architecture and instruction set of an eight bit microprocessor.
- To write simple assembly language programs for an eight bit microprocessor.

Unit I :

BOOLEAN ALGEBRA AND KARANAUGH MAP

Boolean operations and expressions. Laws and rules of Boolean algebra. Demorgan's theorems. Boolean analysis of logic circuits. Simplification using Boolean algebra. Standard forms of Boolean expressions. Boolean expressions and truth tables. The Karnaugh map. Karnaugh map SOP and POS minimization. Implementing combinational logic. The universal property of NAND and NOR gates. Combinational logic using NAND and NOR gates.

Unit II :

INTEGRATED CIRCUIT TECHNOLOGIES AND COMBINATIONAL LOGIC CIRCUITS

Digital integrated circuits-classification-performance characteristics and parameters of TTL and CMOS- comparison. CMOS circuits-inverter, NAND and NOR. TTL circuits-inverter and NAND. Basic adders. Parallel binary adders. Decoders. Encoders. Code converters. Multiplexers. Demultiplexers.

Unit III :

SEQUENTIAL LOGIC CIRCUITS

Latches. Edge triggered flip flops. Master slave flip flops. Flip Flop applications. Asynchronous counter operation. Synchronous counter operation. Up-down counters. Design of synchronous counters. Counter applications. Shift register functions. Serial Input /Serial Output, Serial Input /Parallel Output, Parallel Input /Serial Output and Parallel Input /Parallel Output shift registers. Shift register counters. Shift register applications.

Unit IV :

MICROPROCESSOR ARCHITECTURE AND INSTRUCTION SET

Basics of semiconductor memory-RAM, ROM, PROM and EPROM. Binary and Hexadecimal number system, BCD. Microcomputer organization-8085 Microprocessor-pin functions-Architecture-Machine and Assembly language- programmer's model of 8085. Instruction Set-data transfer, arithmetic, logic, branch, stack and stack related, I/O and Machine control and special instructions. The 8085 addressing modes.

Unit V :

MICROPROCESSOR ASSEMBLY LANGUAGE PROGRAMMING

Assembly language programs-data transfer-addition and subtraction-BCD addition and subtraction-8 bit multiplication-2 digit BCD multiplication-8 bit division-2 digit BCD division-sorting and searching-block move-BCD to Binary and Binary to BCD conversion.

Books For Study :

1. Thomas L. Floyd and R .P. Jain ,Digital fundamentals, Eighth edition, Pearson Education Pvt Ltd, 2005.
2. Vijayendran ,Fundamentals of Microprocessor 8085, S.Viswanathan Pvt.Ltd, 2006.

Unit	Book	Sections
I	1	1.1-1.3, 4.1 - 4.10, 5.2 -5.4.
II	1	1.4, 3.7, 11.1,11.3,11.4, 11.6, 6.2, 6.3, 6.5 – 6.9
III	1	7.1-7.3, 7.5, 8.1 -8.4, 8.7, 9.1 -9.5, 9.7, 9.8.
IV	1	10.1, 10.4
	2	Chapter 1.1-1.4, 2,3,4,5.
V	2	Chapter 6

Books For Reference

1. Anokh Singh and A.K. Chhabra, Fundamentals of Digital Electronics and Microprocessors, S.Chand & Co Ltd, 2005
2. A. P. Malvino and D.P. Leach, Digital Principles and Applications, 5th edition, 3rd reprint, Tata McGraw Hill, New Delhi, 2003.

Sem VI
07UPH637

Hours/Week: 5
Credit : 5

ENERGY PHYSICS

Objectives :

- To study the power potential of the Sun and its utility.
- To study the principle and performance of harnessing solar and other alternative energy sources.
- To understand the availability and practical usage of solar energy in various forms and other alternative energy sources.

Unit I : SOLAR ENERGY

An overview of thermal application and solar radiation – energy alternatives – devices for thermal collection and storage – thermal applications – Water heating – Space heating – Power generation – Space cooling and refrigeration – Distillation – drying – cooking – solar radiation outside the earth's atmosphere – solar radiation at the earth surface – instruments for measuring solar radiation and sun shine

Unit II : FLAT - PLATE COLLECTORS AND SOLAR AIR HEATERS

Performance analysis - Transmissivity of the cover system based on reflection - Refraction - Absorption - Transmissivity for diffuse radiation - Transmissivity - Absorptivity product - Overall loss coefficient and heat transfer correlations (qualitative only) - BNL solar flat - plate collector -- Some novel designs of solar air heater

Unit III : CONCENTRATING COLLECTORS AND THERMAL ENERGY STORAGE

Introduction - General characteristics - Definitions - Methods of classifications - Types of concentrating collectors - Flat Plate collectors with plane reflectors - Thermal energy storage - Sensible heat storage - Liquids - Solids - Latent heat storage - Thermal chemical storage

Unit IV : PHOTO CONVERSION

Photovoltaic conversion - Single crystal silicon cell - Principle and working insular cells - Conversion efficiency - Commercial solar cells - Single crystal silicon - Polycrystalline and amorphous silicon Cadmium sulphide - Cadmium telluride - copper indium diselenide – Applications - Photoelectro-chemical – Photochemical – Methods of Hydrogen production and storage.

Unit V : OTHER FORMS OF ENERGY

Wind energy - Recent developments - Energy from biomass - Direct methods - Indirect methods ~ Wave energy – Vegetation for fuel - Bio-diesel – Plants for Bio-diesel- Physical and chemical properties of Bio-diesel – Advantages of Bio-diesel with economical analysis.

Book For Study :

Cyclostyled text

Book For Reference :

1. P.Sukhatme, Solar energy(Second edition), Tata McGraw-Hill Publishing Co. Ltd. (New Delhi)
2. G.D.Rai, Solar Energy Utilization, Khanna publishers (New Delhi)

Sem VI
07UPH638

Hours/Week: 5
Credit : 5

MEDICAL PHYSICS

Objectives :

- To apply the principles of Physics to understand the functions of human bod.
- To understand the working principles of some used instruments in medicine.
- To apply the principles of in Nuclear medicine, Radiation protection and Imaging.

Unit I : PHYSICS OF BIO MECHANICS

Organs: Preparations of materials – bone, tissue, visco-elasticity kinematics of the knee, walking and running. Lever systems of the body, Mechanical analogue of muscle

Frequency: Non-ionising radiation effects on various organs low, high and ultra frequency applied to various organs

Pressure: Measuring blood pressure, Catheter, in hollow organs of the body, in the cardiovascular systems, eye, ear and urinary bladder.

Unit II : PHYSICS OF SENSES

Cutaneous sensation : Mechano receptors, thermoreceptors, noise receptors.

The clinical senses : Gestation, Olfaction

Audition : Normal sound levels, theories of hearing, measurement of hearing – anatomy and physiology of the ear

Vision: Intensity of light, limits of vision, colour vision – anatomy and physiology of the eye

Unit III : PHYSICS OF SOUND, LIGHT AND IMAGING

Application of visible, UV and IR in Medicine - making an X-ray image, produced live X-ray images, fluorescopy – Lasers in medicine. Basics of Ultrasonic imaging, CT imaging and Magnetic Resonance Imaging.

Unit IV : BIO POTENTIALS, BIOELECTRICITY AND THEIR APPLICATIONS

Resting membrane potential – Action potential – Type, properties – excitation and recording of an action potential, stimulators, voltage clamping - patch clamping.

Clinically important bioelectric signals: Electro cardiograph, Electro encephalography, Electromyography, Electro-olfactography, Electroretinography Electro-Oculography.

Unit V : PHYSICS OF NUCLEAR MEDICINE AND RADIATION PROTECTION

Handling of Radio nuclides – practical aspects of counting Radioactivity Radioisotope: as a tracer, for organs scanning, for therapeutic purpose, in sterilization of food and equipment and others.

Biological effects of ionization radiation – Radiation protection in : diagnostic radiology, radiation therapy – Radiation Accidents

Book for Study :

Cyclostyled Text

Sem VI
07UPH639

Hours/Week: 6
Credit : 4

PHYSICS PRACTICAL – IV

Any 16 Experiments

1. Spectrometer – Cauchy's constant (Grating and Prism).
2. Spectrometer – small angle prism
3. Potentiometer – EMF of a thermocouple
4. Potentiometer – High range voltmeter
5. BG - High resistance by leakage
6. BG-Absolute L – Anderson's method
7. Series resonance.
8. Parallel resonance.
9. Op Amp – Basic operations.
10. Astable multivibrator - Transistor
11. NAND and NOR as universal building blocks.
12. Simplification of Boolean expression using Karnaugh map and implementation
13. Parallel binary adder / subtractor
14. Encoders
15. Decoders and seven segment display
16. Multiplexer and demultiplexer.
17. Flop flops using IC gates
18. Shift register using flip flops
19. Counters using flip flops
20. Microprocessor programming I – Data transfer operations and exchange
21. Microprocessor programming II – Arithmetic operations

**ELECTIVES OFFERED BY VARIOUS DEPARTMENTS FOR
UG COURSES**

Sem	Code No.	Title of the Paper	Hours	Credits
Department of Business Administration				
IV	07UBU481	Soft Skills Development	4	3
V	07UBU582	Advertisement and Sales Promotion	4	3
VI	07UBU683	Personal Growth Programme	4	3
Department of Chemistry				
IV	07UCH481	Food and Nutrition	4	3
V	07UCH582	Everyday Chemistry	4	3
VI	07UCH683	Soil Testing	4	3
Department of Commerce				
IV	07UCO481	Elements of Business Process Outsourcing (BPO)	4	3
	07UCO482	Accounts for Executives	4	3
V	07UCO583	Soft Skills Development	4	3
	07UCO584	Fundamentals of Investment Management	4	3
VI	07UCO685	Small Scale Business Development	4	3
	07UCO686	Hotel Management	4	3
Department of Computer Science				
IV	07UCS481	Office Automation	4	3
	07UCS482	Internet Concepts	4	3
V	07UCS583	Fundamentals of Computer Networks	4	3
	07UCS584	Information Technology	4	3
VI	07UCS685	E-Commerce	4	3
	07UCS686	Foundations of Computer Science	4	3
Department of Computer Application (BCA) (SFS)				
IV	07UCA481	Personal Soft Skills	4	3
Department of Economics				
IV	07UEC481	Indian Economy	4	3
V	07UEC582	Tamil Nadu Economy	4	3
VI	07UEC683	Economics of Social Issues	4	3
Department of Electronics				
IV	07UEL481	Computer Electronics	4	3
V	07UEL582	Radio and Television	4	3
VI	07UEL683	DVD Player Assembling and Troubleshooting	4	3

Department of English

IV	07UEN481	English for Competitive Exams	4	3
	07UEN482	Film Studies	4	3
V	07UEN583	English for Communication	4	3
	07UEN584	Public Speaking in English	4	3
VI	07UEN685	English of Literature	4	3
	07UEN686	English for Empowerment	4	3

Department of History

IV	07UHS481	Tourism and Travel Agency	4	3
V	07UHS582	Tourism and Automation	4	3
VI	07UHS683	Indian History for Competitive Examinations	4	3

Department of Mathematics

IV	07UMA481	Mathematics for Competitive Examinations	4	3
V	07UMA582	Graph Theory	4	3
VI	07UMA683	Operations Research	4	3

Department of Physics

IV	07UPH481	Everyday Physics	4	3
V	07UPH582	Photography	4	3
VI	07UPH683	Cell Phone Servicing	4	3
VI	07UPH684	Electrical Wiring	4	3

Department of Plant Biology & Plant Biotechnology

IV	07UBO481	Mushroom Culture	4	3
V	07UBO582	Everyday Biology	4	3
VI	07UBO683	Remote Sensing	4	3

Department of Statistics

IV	07UST481	Statistics for Management	4	3
V	07UST582	Data Analysis for Competitive Examination	4	3
VI	07UST683	Actuarial Statistics	4	3

Department of Tamil

IV	07UTA481	மைய அரசுப்பணித்தேர்வுத் தமிழ்	4	3
V	07UTA582	தமிழ் இலக்கியத்தில் மனித உரிமைகள்	4	3
VI	07UTA683	சித்த மருத்துவம்	4	3
VI	07UTA684	மக்கள் தகவல் தொடர்பியல்	4	3

