

# **B.Sc. PHYSICS**

## **SYLLABUS: 2011**

**CHOICE BASED CREDIT SYSTEM (CBCS)**



**St. JOSEPH'S COLLEGE (Autonomous)**

*Re-accredited with A+ Grade by NAAC*

*College with Potential for Excellence by UGC*

**TIRUCHIRAPPALLI - 620 002**

## B.SC. PHYSICS : COURSE DETAIL – 2011

Sem	Part	Code	Subject Title	Hours	Credit
I	1	11UGT110001	General Tamil – I / Hindi – I / French – I	4	3
	2	11UGE120101	General English – I	5	3
	3	11UPH130201	Core1-Mechanics and Properties of Matter	5	4
	3	@	Physics Practical – I	3	
	3	@	Basic Workshop Practice	3	
	3	11UPH130401	Allied – 1: Mathematics-1	6	5
	4	11UCE140801	Communicative English	-	5
	4	11UFC141001	Value Education - I: Essentials of Ethics, Yoga & Stress Management	2	2
			Library	2	
			<b>Total Credits for Semester 1</b>	<b>30</b>	<b>22</b>
II	1	11UGT210002	General Tamil – II / Hindi – II / French – II	4	3
	2	11UGE220102	General English – II	5	3
	3	11UPH230202	Core2- Electricity and Magnetism	5	4
	3	11UPH230203	Core3- Physics Practical – I	3	4
	3	11UPH230204	Core4-Basic Workshop Practice	3	4
	3	11UPH230402	Allied – 1: Mathematics - 2	6	5
	4	11UCE240802	Computer Literacy	2	2
	4	11UFC241002	Value Education – II : Fundamentals of Human Rights	2	1
			<b>Total Credits for Semester 2</b>	<b>30</b>	<b>26</b>
III	1	11UGT310003	General Tamil – III / Hindi – III / French – III	4	3
	2	11UGE320103	General English – III	5	3
	3	11UPH330205	Core5 – <b>Mathematical Physics</b>	5	4
	3	@	<b>Physics Practical – II</b>	3	
	3	11UPH330403A	Allied – 2: Chemistry-1	4	4
		@	Allied Chemistry Practical (OR)	2	
	3	11UPH330403B	Allied – 2: Computer Science-1	(6)	(5)
	4	11UCE340901	Environment studies	4	2
	4	11UFC341003A	Professional Ethics-1 : Social Ethics (OR)	2	2
	4	11UFC341003B	Professional Ethics-1: Religious Doctrine	(2)	(2)
		Library	1		
		<b>Total credits for semester-3</b>	<b>30</b>	<b>18/19</b>	

Sem	Part	Code	Subject Title	Hours	Credit
IV	1	11UGT410004	General Tamil – IV / Hindi – IV / French – IV	4	3
	2	11UGE420104	General English – IV	5	3
	3	11UPH430206	Core6 - Sound, Thermal and Statistical Physics	5	4
	3	11UPH430207	Core7-Physics Practical – II	3	4
	3	11UPH430404A	Allied – 2: Chemistry-2	4	4
		11UPH430405	Allied: Chemistry Practical (OR)	2	2
	3	11UPH430404B	Allied – 2: Computer Science – 2	(6)	(5)
	3	11UPH430301A	Core Elective-1-Instrumentation (OR)	4	4
	3	11UPH430301B	Core Elective-1-Material Science	(4)	(4)
	4	11UFC441004A	Professional Ethics-2 :Social Ethics (OR)	2	2
	4	11UFC441004B	Professional Ethics-2:Religious Doctrine	(2)	(2)
			Library	1	
			<b>Total Credits for semester 4</b>	<b>30</b>	<b>26 / 25</b>
	V	3	11UPH530208	Core8-Programming Skill in C for Solving Physics Problems	5
3		11UPH530209	Core9- Atomic, Solid State and Nuclear Physics	5	4
3		11UPH530210	Core10-Analog Electronics	5	4
3		11UPH530211	Core11-Physics Practical-III	6	4
3		11UPH530302A	Core Elective-2 – Photography (OR)	4	4
3		11UPH530302B	Core Elective-2 – Non-Destructive Testing	(4)	(4)
3		11UPH530303A	Core Elective-3 – Energy Physics (OR)	3	3
3		11UPH530303B	Core Elective-3 – Bio-Medical Instrumentation	(3)	(3)
4		11UPH540601	Skill Based Elective-1-Cell Phone Servicing	2	2
			<b>Total Credits for Semester-5</b>	<b>30</b>	<b>25</b>
VI	3	11UPH630212	Core12-Optics, Spectroscopy and Laser	5	4
	3	11UPH630213	Core13-Quantum Mechanics and Relativity	5	4
	3	11UPH630214	Core14-Digital Electronics and Microprocessor	5	4
	3	11UPH630215	Core15-Physics Practical-IV	6	4
	3	11UPH630304A	Core Elective-4-Communication Systems (OR)	4	4
	3	11UPH630304B	Core Elective-4-Astrophysics	(4)	(4)
	4	11UPH640602A	Skill Based Elective-2-Electrical Wiring (OR)	2	2
	4	11UPH640602B	Skill Based Elective-2-Videography	(2)	(2)
		Library	3		
		<b>Total Credits for Semester-6</b>	<b>30</b>	<b>22</b>	
1-5	5	11UCE551101	SHEPHERD & GENDER STUDIES		6
			<b>Total Credits for all Semesters</b>		<b>145</b>

@ - Exam at the end of the year

பருவம் -1  
11UGT110001

மணி நேரம் - 4  
புள்ளிகள் - 3

### பொதுத்தமிழ் - I

#### நோக்கங்கள்

1. சமூக மாற்றச் சிந்தனைகளை உள்ளடக்கிய தற்கால இலக்கியங்களை அறிமுகம் செய்தல்.
2. புதுக்கவிதை, சிறுகதை, உரைநடை ஆகிய இலக்கியங்களின் நயம் பாராட்டுதல்.
3. சந்திப்பிழையின்றி எழுத மாணவர்களைப் பயிற்றுவித்தல்.

#### பயன்கள்

1. மாணவர்கள் சமூக மாற்றச்சிந்தனைகளை அறிந்துகொள்வர்.
2. சந்திப்பிழைகளை நீக்கி எழுதும் திறன் பெறுவர்.
3. புத்திலக்கியங்களைப் படைக்கும் திறனையும், திறனாய்வு செய்யும் திறனையும் பெறுவர்.

#### அலகு-1

(10 மணி நேரம்)

மகாகவி பாரதியார் கவிதைகள்  
பாரதிதாசன் கவிதைகள்  
உரைநடை—முதல் மூன்று கட்டுரைகள்  
(கட்டுரைக்களஞ்சியம்)

#### அலகு-2

(12மணி நேரம்)

கவிமணி தேசிகவிநாயகம் கவிதைகள்  
நாமக்கல்கவிஞர் வெ.இராமலிங்கம் கவிதைகள்  
இலக்கணம் -வலிமிகும் இடங்கள்

#### அலகு-3

(10 மணி நேரம்)

கவிஞர் கண்ணதாசன் கவிதைகள்  
இலக்கியவரலாறு- மூன்றாம் பாகம்  
சிறுகதை- முதல் ஆறு சிறுகதைகள்

#### அலகு-4

(14 மணி நேரம்)

பாவலரேறு பெருஞ்சித்திரனார் பாடல்கள்  
அப்துல் ரகுமான் கவிதைகள்  
இலக்கிய வரலாறு – நான்காம் பாகம்  
இலக்கணம் - வலி மிகா இடங்கள்

#### அலகு-5

(14 மணி நேரம்)

கவிஞர் மேத்தா கவிதைகள்  
மொழிபெயர்ப்புக்கவிதைகள்  
சிறுகதை- 7 முதல் 12 முடிய உள்ள சிறுகதைகள்  
உரைநடை- 4முதல் 6 முடிய உள்ள கட்டுரைகள்  
(கட்டுரைக்களஞ்சியம்)

#### பாடநூல்

1. பொதுத்தமிழ் - செய்யுள் திரட்டு- தமிழ்த்துறை வெளியீடு- 2011-2014
2. சமூகவியல் நோக்கில் தமிழ் இலக்கிய வரலாறு, தமிழ்த்துறை வெளியீடு, தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி-2
3. உரைநடை நூல் - தமிழ்த்துறை வெளியீடு, 2011-2014
4. சிறுகதைத்தொகுப்பு  
(கட்டுரைக்களஞ்சியம்)

#### மதிப்பெண் பகிர்வு

பிரிவு	பாகம் -1	பாகம் -2	பாகம்-3
செய்யுள்	12 (12 வினாக்கள்)	8 (2 வினாக்கள்)	30 (2 வினாக்கள்)
இலக்கியவரலாறு	6 (6 வினாக்கள்)	8 (2 வினாக்கள்)	15 (1 வினா)
உரைநடை	-----	-----	15 (1வினா)
இலக்கணம்	2 (2 வினாக்கள்)	4 (1 வினா)	-----
சிறுகதை	-----	-----	15 (1 வினா)

Semester: I  
Code:11UGE120101

Hours :5  
Credits: 3

### GENERAL ENGLISH – I

#### Objectives:

1. To enable the students to develop their effective communicative skills in English.
2. To empower the students with fluency and accuracy in the use of English Language.
3. To transform them into globally employable persons with placement skills.

#### UNIT-I 12 Hrs

**Prose** Education.  
Employment.  
Unemployment.

**Poem** William Shakespeare— “All the World’s a Stage.”

**Letter Writing** Formal and Informal.

**Short Story** O Henry – Robe of Peace. (Extensive Reading).

**Essential English Grammar** – 1-6 units

#### UNIT-II 12 Hrs

**Prose** Application.  
Planning.  
Curriculum Vitae.

**Poem** Ben Jonson—“On Shakespeare”  
Reading Comprehension

**Short Story** Rudyard Kipling—The Miracle of Puran Bhagat  
(Extensive Reading).

**Essential English Grammar** – 7-12 units.

#### UNIT-III 11 Hrs

**Prose** Interview.  
Reporting.  
General Knowledge.

**Poem** Robert Herrick—“Gather Ye Rosebuds.”  
Note Making

**Short Story** H.G.Wells—The Truth About Pyecraft (Extensive Reading).

**Essential English Grammar** – 13-18 units

#### UNIT-IV 20 Hrs

**Prose** Review.(Super Toys)  
Stress.  
No Time.

**Poem** Oliver Goldsmith—“ The Village Schoolmaster”  
Developing story from hints

**Short Story** John Galsworthy—“Quality” (Extensive Reading).

**Essential English Grammar** – 19-24 units

#### UNIT-V 15 Hrs

**Prose** Killers.  
Galloping Growth.  
A Short Story.

**Poem** William Blake—“ From Auguries of Innocence”  
Précis Writing

**Short Story** William Somerset Maugham— Mabel  
(Extensive Reading).

**Essential English Grammar** – 25-30 units

#### Text Books

1. Krishnaswamy. N, Sriraman T. Current English for Colleges. Hyderabad: Macmillan Indian Ltd,2006.
2. Dahiya SPS Ed. Vision in Verse, An Anthology of Poems. New Delhi: Oxford University Press,2002.
3. Murphy, Raymond. Essential English Grammar. New Delhi: Cambridge University Press,2009.
4. Seshadri, K G Ed. Stories for Colleges.Chennai: Macmillan India Ltd,2003.

Semester – I  
11UPH130201

Hours/Week : 5  
Credits : 4

### MECHANICS AND PROPERTIES OF MATTER

#### Objectives:

- To study and apply the knowledge of gravitation at various situation.
- To understand the concepts of statics, hydrostatics, hydrodynamics and 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 Statics

Friction – Laws of Friction – Coefficient of Friction-Equilibrium on a Rough Inclined Plane – Impulse- Collision – Oblique Impact of Smooth Spheres - Direct impact of two smooth spheres – loss of kinetic energy due to direct impact and oblique impact of two smooth spheres .

#### UNIT – II Hydrostatics and Hydrodynamics

Center of pressure – centre of pressure of a rectangular lamina and triangular lamina – Atmospheric pressure – Variation of atmospheric pressure with altitude – Equation of continuity – Energy of liquid – Euler's equation – Bernoulli's theorem – Applications.

#### UNIT – III Dynamics of rigid bodies

Moment of inertia - Radius of gyration - Theorems of M .I - M.I of circular disc, solid cylinder, hollow cylinder, solid sphere and hollow sphere - K.E. of a rotating body – M.I of a diatomic molecule – Rotational energy state of a rigid diatomic molecule - centre of mass – conservation of linear momentum – Relation between Torque and angular momentum .

#### UNIT – IV Gravitation and Elasticity

Newton's law – Kepler's law – G by Boy's method – Gravitational field and potential – potential and field due to a spherical shell and solid

sphere – Compound pendulum – Moduli of elasticity – work done in a strain – Rigidity modulus by static torsion (scale & telescope) Torsional oscillation of a body - Bending of beams – bending moment – cantilever – Y - Uniform and non-uniform bending.

#### UNIT – V Viscosity and Surface Tension

Critical velocity – Poiseuille's formula – coefficient of viscosity -  $\eta$  by variable pressure head – Terminal velocity and Stoke's formula – Stokes method – variation of viscosity with temperature and pressure – viscosity of gases – Rankine's method – Surface tension – work done – Angle of contact – Quincke's method – Drop weight method.

#### Books for study:

- R. Murugesan , Mechanics and Mathematical Physics , S.Chand & Company Ltd., New Delhi, Third Revised Edition, 2008.
- R. Murugesan, Properties of Matter, S.Chand Company Ltd., New Delhi (2010).

UNIT	BOOK	SECTIONS
I	1	14.1-14.5
	2	1.1 – 1.6
II	1	4.1-4.6 , 4.8 , 5.1-5.4
III	2	7.1-7.3 ,7.5-7.7 , 7.9, 7.10 , 10.5 ,10.6
	1	13.1 , 13.3 ,13.4 ,13.5.
IV	2	6.1-6.6 , 6.10 , 1.1 ,1.2 , 1.5 , 1.11 ,1.13 -1.16 , 1.21 .
V	2	2.1-2.3 ,2.5 ,2.7 -2.10 , 2.13 ,2.14 , 3.1 ,3.3 ,3.6 ,3.13 ,3.15 ,3.17 .

#### Books for Reference

- DS Mathur, Properties of Matter, S Chand, New Delhi, 2006.
- DS Mathur, Mechanics, New Delhi, 2005.

**SEMESTER – I**  
**11UPH130401**

**Hours/Week : 6**  
**Credits : 5**

### **ALLIED MATHEMATICS I**

[For I B.Sc. Physics, Chemistry, Computer Science, Electronics, I BCA]

#### **UNIT – I**

Partial Fractions - Binomial Series - Summation of series - Finding terms - Coefficient of  $x^n$  (simple problems only).

Book 1: Chap 1 - sec 1.1 - 1.2, pp: 1-27.

#### **UNIT – II**

Exponential Series - Summation - Logarithmic Series - Summation.

Book 1: Chap 1 - sec 1.3, pp: 28-48.

#### **UNIT – III**

Matrices – Rank of a matrix - Solving simultaneous linear equation in three unknowns using Elementary operations method - Eigen values and Eigen vectors - Verification of Cayley Hamilton theorem.

Book 1: Chap 3 - sec 3.2 - 3.4, pp: 137 - 160.

#### **UNIT – IV**

Higher Derivatives - Formation of equations involving derivatives - Applications of Leibnitz's theorem.

Book 1: Chap 6 - sec 6.1, pp: 266-281.

#### **UNIT – V**

Expansions of  $\cos nq$  and  $\sin nq$  - Powers of sines and cosines off in terms of functions of multiples of  $q$ .

Book 1: Chap 5 - sec 5.1 - 5.4, pp: 220-242.

#### **Text Book:**

Ancillary Mathematics, Vol-I, 2009 Edition, S. Narayanan, R. Hanumantha Rao T.K. Manicavachagom Pillay, Kandaswamy.

பருவம் -2  
11UGT210002

மணி நேரம் - 4  
புள்ளிகள் - 3

### பொதுத்தமிழ் - II

#### நோக்கங்கள்

1. சமய நல்லிணக்க உணர்வை வளர்த்தல்.
2. தமிழ்க் காப்பியங்களில் அழகும், அறிவுணர்வும் ஊட்டும் பகுதிகளைப் படித்துப் புரிந்து கொள்ளுதல்.
3. உரைநடைக் கட்டுரை எழுதும் திறன் பெறுதல்.

#### பயன்கள்

1. தமிழைத் திருத்தமாகப் படிக்கவும், பேசவும், பிழையின்றி எழுதவும் கூடிய திறன் பெறுவர்.
2. இலக்கியங்களில் படித்தவற்றை முறையாக வாழ்க்கையில் கடைப்பிடிப்பர்.

#### அலகு : 1

(12 மணி நேரம்)

சிலப்பதிகாரம் – அடைக்கலக் காதை - மதுரைக் காண்டம்  
இலக்கிய வரலாறு – சைவம் வளர்த்த தமிழ் முதல் புராணங்கள் முடிய.

#### அலகு : 2

(12 மணி நேரம்)

மணிமேகலை – சிறைக்கோட்டம் அறக்கோட்டம் ஆக்கிய காதை  
பெரியபுராணம் – திருநாளைப்போவார் நாயனார் புராணம்  
உரைநடை – 7 முதல் 9 முடிய உள்ள கட்டுரைகள்  
(கட்டுரைக்களஞ்சியம்)

#### அலகு : 3

(12 மணி நேரம்)

கம்பராமாயணம் – வாலி வதைப்படலம்  
செம்மொழியான தமிழ்மொழியே:1 – 20 பக்கங்கள்  
இலக்கணம் – எழுத்திலக்கணம்

#### அலகு : 4

(12 மணி நேரம்)

தேம்பாவணி – மகன் நேர்ந்த படலம்  
சீறாப்புராணம் – அபீறாகு வதைப்படலம்  
உரைநடை – 10 முதல் 12 வரையிலான கட்டுரைகள்  
செம்மொழியான தமிழ்மொழியே – 21- 37 பக்கங்கள்

#### அலகு : 5

(12 மணி நேரம்)

இராவண காவியம் – ஆரியப் படலம்  
இலக்கிய வரலாறு – தமிழ் இலக்கண நூல்கள் முதல் சிற்றிலக்கியங்கள் முடிய.  
இலக்கணம் – சொல்லிலக்கணம்

#### பாடநூல்கள்

1. செய்யுள் திரட்டு – தமிழாய்வுத்துறை வெளியீடு, 2011 – 2014.
2. இலக்கிய வரலாறு, தமிழாய்வுத்துறை வெளியீடு, 2010.
3. உரைநடைநூல், தமிழாய்வுத்துறை வெளியீடு, 2011-2014
4. செம்மொழியான தமிழ்மொழியே, சங்கம் வெளியீடு, மதுரை.2010

#### மதிப்பெண் பகிர்வு

பிரிவு	பாகம் -1	பாகம் -2	பாகம்-3
செய்யுள்	12 (12 வினாக்கள்)	8 (2 வினாக்கள்)	30 (2 வினாக்கள்)
இலக்கியவரலாறு	4 (4 வினாக்கள்)	4 (1 வினா)	15 (1 வினா)
உரைநடை	-----	-----	15 (1வினா)
இலக்கணம்	2 (2 வினாக்கள்)	4 (1 வினா)	-----
செம்மொழி	2 (2 வினாக்கள்)	4 (1 வினா)	15 (1 வினா)

Sem: II  
Code: 11UGE220102

Hours :5  
Credits: 3

### GENERAL ENGLISH –II

#### Objectives:

1. To enable the students to develop their effective communicative skills in English.
2. To empower the students with fluency and accuracy in the use of English Language.
3. To transform them into globally employable persons with placement skills.

<b>UNIT-I</b>		<b>12 Hrs</b>
<b>Prose</b>	Environment. A Dead Planet. Riddles.	
<b>Poem</b>	William Wordsworth—Nutting. Shelley- Ozymandias. Filling Money Order Chalan and Bank Chalan	
<b>Short Story</b>	G.K.Chesterton – The Hammer of God (Extensive Reading)	
<b>Essential English Grammar:</b> -31-36 Units		

<b>UNIT-II</b>		<b>12 Hrs</b>
<b>Prose</b>	Qahwah A Dilemma Computeracy	
<b>Poetry</b>	John Keats—La Belle Dame Sans Merci Robert Browning- The Last Ride Together	
<b>Short Story</b>	Katherine Mansfield—A Cup of Tea (Extensive Reading)	
<b>Dialogue Writing</b>		
<b>Essential English Grammar:</b> 37-42Units		

<b>UNIT-III</b>		<b>11 Hrs</b>
<b>Prose</b>	Review (Use Your English) Entertainment You and Your English	
<b>Poetry</b>	Walt Whitman- I Celebrate Myself. Mathew Arnold—Dover Beach.	

**Short Story** Thomas Wolfe—The Far and the Near (Extensive Reading)  
**Conversations**  
**Essential English Grammar:**43-48Units

#### UNIT-IV 20 Hrs

<b>Prose</b>	War Minus Shooting . Usage and Abusage.
<b>Poetry</b>	Sarojini Naidu—The Gift of India.. Robert Frost—Design .
<b>Short Story</b>	R.K. Narayan—Half a Rupee Worth (Extensive Reading) Manohar Malgonkar—Bacha Lieutenant
<b>Story Telling</b>	
<b>Essential English Grammar:</b> 49-54Units	

#### UNIT-V 15 Hrs

<b>Prose</b>	Who's Who.
<b>Poetry</b>	Nissim Ezekiel. The Night of The Scorpion
<b>Short Story</b>	Anita Desai—A Devoted Son (Extensive Reading) Ruskin Bond—The Boy Who Broke the Bank(Extensive Reading) Report Writing

**Letter to the Editor**  
**Essential English Grammar:** 55-60Units

#### Text Books

1. Krishnaswamy. N, Sriraman T. Current English for Colleges. Hyderabad: Macmillan Indian Ltd,2006.
2. Dahiya SPS Ed. Vision in Verse, An Anthology of Poems. New Delhi: Oxford University Press,2002.
3. Murphy, Raymond. Essential English Grammar. New Delhi: Cambridge University Press,2009.
4. Seshadri, K G Ed. Stories for Colleges.Chennai: Macmillan India Ltd,2003



**SEMESTER – II**  
**11UPH230202**

**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 understand 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 – differential form of Gauss 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 — Capacitance of Cylindrical and Parallel Plate capacitor – Parallel Plate with partly filled Dielectrics – Capacitors in Series and Parallel- Types of Capacitor.

#### **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 Current**

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 of Ballistic Galvanometers (BG) – uses - 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 – Ohm's Law and Electrical Conductivity - Drude – Lorentz Theory – Kirchoff's Law – Carey Foster's Bridge – Potentiometer - Measurement of Low Resistance – Kelvin & Double Bridge Method – Comparison 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 – Experimental determination of mutual inductance – Coefficient of coupling - Earth Inductor – Three phase AC generator – Star Connections – Delta Connections – Dynamo – Two phase generators – Direct Current – field excitation - DC Motor.

#### **BOOKS FOR 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, 15.1-15.8
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, 2000.
2. Shegal Chopra Shegal, *Electricity and Magnetism*, S. Chand & Sons, New Delhi, 1987.

**Semester – I & II**  
**11UPH230203**

**Hours/Week : 3**  
**Credit : 4**

**I B.Sc. PHYSICS PRACTICAL – I**

**Any 20 Experiments**

1. Surface Tension – drop weight method.
2. Surface Tension – capillary rise method.
3. Viscosity – constant pressure head.
4. Viscosity – variable pressure head.
5. Viscosity – Stokes method.
6. Young's modulus – cantilever / stretching.
7. Young's modulus – non uniform bending (pin and microscope).
8. Sonometer – frequency of the tuning fork – RD of solid.
9. Sonometer – AC frequency determination.
10. Spectrometer – refractive index of a solid prism.
11. Spectrometer – dispersive power of a prism.
12. Potentiometer – internal resistance.
13. Potentiometer – low range voltmeter.
14. P.O Box – temperature coefficient.
15. Carey Foster's bridge - R and  $\rho$ .
16. Convex lens - f, R and  $\mu$ .
17. Concave lens - f, R and  $\mu$ .
18. Field along the axis of a coil – deflection magnetometer.
19. M1/M2: Tan A and Tan B simultaneous Method.

20. M1/M2 – vibration magnetometer.
21. Air wedge.
22. Newton's rings.
23. B.G. – Figure of merit.
24. B.G. comparison of EMF's and capacitance.
25. Resonators.
26. g – by fall plate.
27. Specific heat by cooling.
28. Specific heat capacity of solid by the method of mixture.

**Book for Reference:**

B.Sc. Physics Practical Manual (Main) Dept. of Physics, SJC.

**Semester – I & II**  
**11UPH230204**

**Hours/Week : 3**  
**Credit : 4**

**BASIC WORKSHOP PRACTICE**

1. Paper Weight
2. Pen Stand
3. Wood Carving
4. Electroplating
5. Assembling the Extension Card
6. Tube light assembling

**SEMESTER – II**  
**11UPH230402**

**Hours/Week : 6**  
**Credits : 5**

**ALLIED MATHEMATICS - II**

[For I B.Sc. Physics, Chemistry, Computer Science, Electronics, I BCA]

**UNIT - I**

Integration - Integrals of functions containing linear functions of  $x$  - Integrals of functions involving  $a^2 + x^2$  - integrals of Rational algebraic functions - Integration of irrational functions.

Book 1: Chap. I sec 6.1, 6.2, 7 (Omit 7.4), 8 case (i) to (iv) only  
Page no: 7-13, 23-31, 39-47.

**UNIT – II**

Properties of definite integrals - Simple applications - Integration by parts - Bernoulli's formula.

Book 1: Chap. I Sec. 11, 12, 15  
Page no: 61-72, 93, 94.

**UNIT – III**

Differential equations of first order - Variable separable - Homogeneous equations - Nonhomogeneous equations - Linear equation - Bernoulli's equation.

Book 1: Chap 4: Sec 1-5  
Page no: 205-218.

**UNIT – IV**

Second order Linear equations with constant co-efficients - Particular integrals for  $e^{(kx)}$ ,  $\sin kx$ ,  $\cos kx$ ,  $x^n$  and  $e^{(kx)} X$ .

Book 2: Chap 3: Sec 1-4, Page no: 42-60.

**UNIT – V**

Laplace transform - Definition - Some general theorems - Inverse Transform.

Book 1: Chap 7: 7.1, 7.2, 7.3, 7.4, 7.5  
Page no: 289-308.

**Text Book:**

1. Ancillary Mathematics, Vol-II (2009), S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagom Pillay, Kandaswamy.
2. Ancillary Mathematics Book II: Narayanan, Manicavachagom Pillay.

பருவம் - 3  
11UGT310003

மணி நேரம் - 4  
புள்ளிகள் - 3

### பொதுத் தமிழ் - III

#### நோக்கங்கள்

1. செம்மொழித் தமிழ்ச்செய்யுள்களான பதினென்மேல் கணக்கு, பதினென்கீழ்க் கணக்குப் பாடல்களைப் படித்துப் பொருள் புரிந்து கொள்ளும் திறன் பெறுதல்
2. பண்டைய இலக்கியங்களில் அமைந்துள்ள சமூகக் கருத்துக்களை உணர்தல்.
3. மரபுக் கவிதை வடிவங்களை அறிதல்.
4. கவிதைகளில் அணிகள் அமைந்துள்ள பாங்கைப்பிரிதல்.
5. புதினம் வழித் தற்காலச் சமுதாயச் சிக்கல்களையும், அதற்கான தீர்வுகளையும் ஆராய்ந்தறிதல்.

#### பயன்கள்

1. செம்மொழியாம் தமிழ் மொழியின் சிறப்பை அறிந்துகொள்வர்.
2. பண்டைய இலக்கியங்கள் உணர்த்தும் அறக்கருத்துக்களை அறிந்து, மாணவர் ஒழுக்க நெறியில் வாழ்ந்து சமூகத்தை மேம்படுத்துவர்.
3. மாணவர் புதினத்தைக் கற்பதன் மூலம் சமுதாயச் சிக்கல்களை உணர்ந்து அவற்றிற்குத் தீர்வு காண்பர்.

அலகு : 1

(16 மணி நேரம்)

பத்துப்பாட்டு - குறிஞ்சிப்பாட்டு (முழுமையும்)

அலகு : 2

(10 மணி நேரம்)

நற்றிணை, குறுந்தொகை, யாப்பிலக்கணம் (வெண்பா, ஆசிரியப்பா)

அலகு : 3

(10 மணி நேரம்)

இலக்கிய வரலாறு – ‘தமிழ்மொழியின் தொன்மையும் சிறப்பும்’ முதல் ‘சங்கத் தொகை நூல்கள்’ முடிய.

புதினம் – முழுமையும்.

அலகு : 4

(12 மணி நேரம்)

கலித்தொகை, பதிற்றுப்பத்து, புறநானூறு, அணியிலக்கணம்.

அலகு : 5

(12 மணி நேரம்)

திருக்குறள்

இலக்கிய வரலாறு – சங்க இலக்கியங்களின் தனித்தன்மைகள் முதல் இரட்டைக் காப்பியங்கள் முடிய.

#### பாடநூல்கள்

1. செய்யுள் திரட்டு, தமிழாய்வுத்துறை வெளியீடு (2011 - 2014)
2. சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு, தமிழாய்வுத்துறை வெளியீடு, 2010
3. புதினம் (ஒவ்வொரு கல்வியாண்டும் ஒவ்வொரு புதினம்).

#### மதிப்பெண் பகிர்வு

பிரிவு	பாகம் -1	பாகம் -2	பாகம்-3
செய்யுள்	12 (12 வினாக்கள்)	8 (2 வினாக்கள்)	30 (2 வினாக்கள்)
இலக்கியவரலாறு	6 (6 வினாக்கள்)	8 (2 வினாக்கள்)	30 (2 வினாக்கள்)
புதினம்	-----	-----	15 (1வினா)
இலக்கணம்	2 (2 வினாக்கள்)	4 (1 வினா)	-----

Sem: III  
Code: 11UGE320103

Hours :5  
Credits: 3

### GENERAL ENGLISH -III

#### Objectives:

1. To enable the students to complete the pre-reading task to comprehend the local and global issues in the lessons..
2. To enable the students to complete the post-reading task centering on Grammar and Skill Development
3. To empower the students with globally employable skills.

#### UNIT-I

12 Hrs

Larry Collins & Dominique Lapierre  
Freedom at Midnight (Extract)  
Alfred Uhry  
Driving Miss Daisy  
Extensive Reading—Robinson Crusoe (Chapters 1-3)  
Essential English Grammar—61-66.

#### UNIT-II

12 Hrs

Alfred Lord Tennyson  
Ulysses  
Nathaniel Branden  
Our Urgent Need for Self-esteem  
Extensive Reading—Robinson Crusoe (Chapters 4-6)  
Essential English Grammar—67-72.  
Reader's Mail :The Hindu

#### UNIT-III

11 Hrs

Daniel Goleman  
Emotional Intelligence  
Marcel Junod  
The First Atom Bomb.  
Extensive Reading—Robinson Crusoe (Chapters 7-9)  
Essential English Grammar—73-78.  
Job Application.

#### UNIT-IV

20 Hrs

E.K.Federov  
Climate Change and Human Strategy.  
Paolo Mauro  
Corruption: Cases, Consequences and Agenda for further Research.  
Extensive Reading—Robinson Crusoe (Chapters 10-12)  
Essential English Grammar—79-84.  
Minutes Writing.

#### UNIT-V

15 Hrs

Anne Frank  
The Diary of Young Girl  
A.P.J.Abdul Kalam  
Wings of Fire  
Extensive Reading—Robinson Crusoe (Chapters 13-15)  
Essential English Grammar— 85-90.  
Resume Writing.

#### Text Books

1. Elango K. *Insights*. Hyderabad: Orient Blackswan Pvt Ltd,2009.
2. Murphy, Raymond. *Essential English Grammar*. New Delhi. Cambridge University Press India Ltd,2009.
3. Defoe, Daniel. *Robinson Crusoe*. Chennai: MacMillan India Ltd,2009.
4. Stevenson R.L. *Treasure Island*. Chennai: MacMillan India Ltd,2009.
5. Ram N Ed. *The Hindu*. Tiruchirappalli.

**Semester – III**  
**11UPH330205**

**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 Functions and Multiple Integrals**

Functions – Graphs of Elementary functions – Continuity of Functions – Total Differential of a function – Change of variables. Double Integrals – Double Integrals in Polar coordinates – Applications. Triple Integrals - Triple Integrals in Spherical Coordinates – Applications

#### **UNIT - II Field Theory**

Line and Surface Integrals – Differential Operators - Grad, Div and Curl – Vector Relations – Gauss Theorem – Stokes Theorem - Green's Theorem – Physical Interpretation - Applications.

#### **UNIT - III Special Functions**

Definitions - simple properties of Gamma, Beta, Delta and Error functions – series solutions of Legendre and Hermite differential equations - Orthogonality properties, Generating functions and Rodrigue's Formula (Expressions only).

#### **UNIT - IV Fourier Series and Fourier Transform**

Dirichlet's Conditions – Definition of Fourier Series – Determination of Fourier Coefficients – Fourier series for odd and even functions – Applications (Half wave, Full wave, square wave, saw tooth and triangular wave) – Fourier Transform – Definition – Theorems – Fourier Transform of Slit function and Delta function.

#### **UNIT – V Numerical Methods**

Transcendental Equation - Solving by Graphical Method – Newton Raphson method. Numerical Integration – Trapezoidal and Simpson's 1/3 rule- Numerical Method of solving differential equation – Euler's Method – Runge-Kutta IV order method – applications.

#### **BOOK FOR STUDY:**

Course Material (By Dept of Physics)

#### **BOOKS FOR REFERENCE:**

1. BS Rajput and Yoga Prakash, Mathematical Physics, Pragati Prasashan, Meerut, 1989.
2. Sathiya Prakash, Mathematical Physics, S Chand, New Delhi, 2/e, 2004.

**Semester: III****Hours/Week : 4****Paper Code: 11UPH 330403A****Credits : 4****ALLIED: CHEMISTRY FOR PHYSICS - I****Objectives**

1. To learn the nomenclature and isomerism of organic compounds
2. To study the preparation and properties of alkanes
3. To understand the chemistry of hydrogen, halogens and metals
4. To understand the principles of chemical kinetics and photochemistry

**Unit – I: Nomenclature and Isomerism (12 hrs)**

Nomenclature of straight chain and closed ring compounds-mono and poly-functional organic compounds. Hybridisation - sp, sp<sup>2</sup> and sp<sup>3</sup>. 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 (12 hrs)**

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: Chemistry of Hydrogen, Halogen, Silicon and metals(12hrs)**

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<sub>2</sub>, SiC and SiCl<sub>4</sub>. General characteristics of halogens-interhalogens.

**Unit – IV: Chemical Kinetics (12 hrs)**

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 (12 hrs)**

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, (23<sup>rd</sup> 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, (23<sup>rd</sup> edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993).

**Semester : III**  
**11UPH330403B**

**Hours/week : 6**  
**Credits : 5**

**ALLIED: COMPUTER SCIENCE – 1**  
**INTERNET CONCEPTS AND WEB DESIGN**

**Objective:**

To impart the knowledge on Basic Concepts and to know the features of HTML and VB Script to design web pages.

**UNIT - I (12 Hrs.)**

Fundamentals of Internet Concepts: - Browsers - Functions - Search Engines - 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.

**UNIT - II (12 Hrs.)**

HTML : structure - Tags - Document Layout - comments - headings - paragraphs - breaks - texts formatting – lists.

**UNIT - III (12 Hrs.)**

HTML: special characters - links - images - form - tables - frames.

**UNIT - IV (12 Hrs.)**

VB Script: Language structure - control structure - Procedures and functions.

**UNIT - V (12 Hrs.)**

VB Script: Input & Output - Data Validation -Integration with Forms.

**BOOK(S) FOR STUDY:**

1. Joe Krayank & Joe Habraken, "Internet 6 in 1, Prentice Hall of India Private Limited, New Delhi, 1998
2. Thomas A Powell, "The Complete Reference - HTML", Osborne-McGraw-Hill, Third Edition, 2000.

3. Christopher J.Goddard, Mark White, "Mastering VB Script", Galgotia publications, New Delhi.

**BOOK(S) FOR REFERENCE:**

1. Dinesh Maidasani, "Information Technology", Laxmi Publications, 2003.
2. David Mercer, "HTML Crash Course", Schaum's Easy Outlines, 2003.
3. Adrian kingsly- Hughes, Kathie Kingsly – Hughes, Deaniel Read, "VB Script", Third Edision, Wiley India Pvt Ltd. 2009.



பருவம் - 4  
11UGT410004

மணி நேரம் - 4  
புள்ளிகள் - 3

**பொதுத் தமிழ் - 4**

**நோக்கங்கள்**

1. நாடகத்தின் நோக்கம், அதன் போக்கு, உத்திகள், பாத்திரப் பாங்கு, உரையாடல் முறை, கற்பனைத் திறம் போன்றவற்றை வெளிப்படுத்துதல்.
2. புதிய நாடகங்களைப் படைக்கும் திறனை மாணவர்களிடையே உருவாக்குதல்.

**பயன்கள்**

1. நாடகவழி அழகியல் உணர்வுகளை வளர்த்துக் கொள்வர்.
2. நாடகங்களைச் சமூகப் பயன்பாட்டிற்கு ஏற்ப உருவாக்கும் திறன் பெறுவர்.

**அலகு : 1** (12 மணி நேரம்)  
மனோன்மணியம், பாயிரம், அங்கம் - 1, களம் 1 - 5 வரை.

**அலகு : 2** (12 மணி நேரம்)  
மனோன்மணியம், அங்கம் - 2, களம் 1 - 3 வரை.  
உரைநடை நாடகம் - ஈரோடு தமிழன்பன் - ஈர நெருப்பு  
(முதல் மூன்று நாடகங்கள்)

**அலகு : 3** (12 மணி நேரம்)  
மனோன்மணியம், அங்கம் - 3, களம் 1 - 4 வரை.

**அலகு : 4** (12 மணி நேரம்)  
மனோன்மணியம், அங்கம் - 4, களம் 1 - 5 வரை.

**அலகு : 5** (12 மணி நேரம்)  
மனோன்மணியம், அங்கம் - 5, களம் 1 - 3 வரை.  
உரைநடை நாடகம் - ஈரோடு தமிழன்பன் - ஈர நெருப்பு,  
(4, 5, 6 ஆம் நாடகங்கள்)

**பாடநூல்கள்**

1. சுந்தரனார், பெ. மனோன்மணியம், தமிழாய்வுத்துறை (பதிப்பு), தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி-2. (அங்கம் - 3 இல்களம் - 4 நீங்கலாக)
2. உரைநடை நாடகம் - ஈரோடு தமிழன்பன் - ஈர நெருப்பு, அய்யா நிலையம், நாஞ்சிக் கோட்டை சாலை, தஞ்சாவூர் - 613 006.

**மதிப்பெண் பகிர்வு**

பிரிவு	பாகம் -1	பாகம் -2	பாகம்-3
மனோன்மணியம்	20 (20 வினாக்கள்)	20 (5 வினாக்கள்)	60 (4 வினாக்கள்)
உரைநடை நாடகம்	-----	-----	15 (1 வினா)

Sem: IV  
Code: 11UGE420104

Hours :5  
Credits: 3

### GENERAL ENGLISH -IV

#### Objectives:

1. To enable the students to complete the pre-reading task to comprehend the local and global issues in the lessons..
2. To enable the students to complete the post-reading task centering on Skill Development and Grammar..
3. To empower the students with globally employable soft skills.

#### UNIT-I

12 Hrs

##### Life Stories

F.G.Herod  
Mother Teresa  
R.K.Narayan  
Swami and Friends  
Treasure Island (1-4)  
91—95.

Extensive Reading  
Essential English Grammar  
Film Review (The Hindu).

#### UNIT –II

12 Hrs

Imogen Grosberg  
See Off the Shine  
George Orwell  
The Porting Spirit  
Treasure Island (5-8)  
96-100.

Extensive Reading  
Essential English Grammar  
Article Writing on Current Issues.

#### UNIT-III

11 Hrs

Philip Agre  
Building an Internet Culture  
Satyajit Ray  
Odds Against Us  
Treasure Island (9-12)  
101-105.

Extensive Reading  
Essential English Grammar  
Mock Interviews

#### UNIT-IV

20Hrs

Jerzy Kosinski  
TV as Babysitter.  
E.F.Scumacher  
Technology With Human Face.  
Treasure Island (13-17)  
106-110.

Extensive Reading  
Essential English Grammar  
Mock Group Dynamics

#### UNIT-V

15 Hrs

Aluizio Borem, Fabrico  
R.Santos & David E.Bower  
Advent of Biology  
Mark Ratner & Daniel Ratner  
Nanotechnology  
Treasure Island (18-22)  
111-114.

Extensive Reading  
Essential English Grammar  
Presentation Skills

#### Text Books

1. Elango K. *Insights*. Hyderabad: Orient Blackswan Pvt Ltd,2009.
2. Murphy, Raymond. *Essential English Grammar*. New Delhi. Cambridge University Press India Ltd,2009.
3. Defoe, Daniel. *Robinson Crusoe*. Chennai: MacMillan India Ltd,2009.
4. Stevenson R L. *Treasure Island*. Chennai: MacMillan India Ltd,2009.
5. Ram N Ed. *The Hindu*. Tiruchirappalli.

**SEMESTER – IV**  
**11UPH430206**

**Hours/Week : 5**  
**Credits : 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 thermo dynamical 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 : Transmission of Heat**

Coefficient of thermal conductivity- rectilinear flow of heat along a bar – Forbes method – Lee's method for bad conductors and liquids- convection and its applications – Black body – Stefan Boltzmann law – Wien's displacement law – Rayleigh- Jeans law - derivation and experimental verification of Stefan's law – Newton's law of cooling from Stefan's law – solar constant – temperature of the Sun - Angstrom's Pyroheliometer.

#### **UNIT – III : Thermodynamics I**

Thermodynamic system – zeroth law of thermodynamics – internal energy - I law of thermodynamics – reversible and irreversible process – Carnot's ideal heat engine – Carnot's cycle – internal combustion engine – Otto and diesel engine - second law of thermodynamics – entropy – change in entropy during reversible and irreversible process – entropy and second law of thermodynamics – third law of thermodynamics

#### **UNIT – IV : Thermodynamics II**

Thermodynamic variable - Statistical equilibrium – Maxwell's thermodynamic relations –applications – Joule Thomson cooling – temperature of inversion – Clausius Claperon's latent heat equation – thermodynamic potential – T.dS equation – Joule Thomson porous plug experiment – Joule Thomson expansion – liquefaction of gases – liquefaction of hydrogen and Helium – adiabatic demagnetization – refrigerator.

#### **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.

#### **BOOKS FOR STUDY:**

1. N. Subrahmanyam and Brijlal, Sound, Vikas publication House, 1994.
2. Brijlal and Subramanyam, Heat and thermodynamics, S. Chand and Co., 2007.

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	Chapter15; 15.1, 15.2, 15.8-15.12, 15.22, 15.23 Chapter 8; 8.6, 8.12- 8.15, 8.20 – 8.22, 8.26 - 8.28
III	2	Chapter4; 4.1, 4.2, 4.6, 4.7, 4.20, 4.23, 4.24, 4.28, 4.31, 4.33 Chapter 5; 5.1 – 5.6, 5.15 Chapter 6; 6.15
IV	2	Chapter6; 6.1 -6.3, 6.424, 6.4.4, 6.4.7, 6.5, 6.9, Chapter7; 7.5, 7.6, 7.10, 7.11, 7.16, 7.21 Chapter 2; .20, 2.21
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

#### **BOOK FOR REFERENCE:**

1. Heat, Thermodynamics and Statistical Physics, Brijlal N. Subramaniam, S.Chand and Co., New Delhi, 2007.
2. Thermal Physics, Garg and others, 1996, Tata McGraw Hill, New Delhi.

**SEMESTER – III & IV**  
**11UPH430207**

**Hours/Week : 3**  
**Credits : 4**

**II B.Sc. PHYSICS PRACTICAL - II**

**Any 16 Experiments**

1. Jolly's bulb – pressure coefficient
2. K- Lee's disc.
3. K- Forbe's method.
4.  $y$ ,  $n$ ,  $\sigma$  - Searle's method.
5.  $n$  and M.I – torsional pendulum.
6. Compound pendulum.
7. Kater's pendulum
8. Kundt's tube.
9. Frequency – Melde's apparatus.
10. Young's modulus – uniform bending (scale and telescope).
11. Young's modulus – Koenig's method.
12.  $n$  - Static method.
13.  $\eta$  - Rankine's method.
14. Spectrometer –  $i$ - $d$  curve.
15. Spectrometer –  $i$ - $i'$  curve.
16. Field along the axis of a coil – vibration magnetometer.
17. Potentiometer – ammeter calibration.
18. Potentiometer -  $R$  and  $\rho$ .
19. B.G. – comparison of mutual inductance.
20. B.G. – Resistance and figure of merit (condenser method).
21. Absolute  $M$  and  $H$ .

22. V-I Characteristics Junction diode and Zener diode .
23. Study of basic and universal gates (IC's).

**Book for Reference:**

B.Sc. Physics Practical Manual (Main) Department of Physics, SJC.

**SEMESTER: IV**  
**11UPH 430404A**

**Hours/Week : 4**  
**Credits : 4**

**ALLIED : CHEMISTRY FOR PHYSICS - II**

**Objectives**

1. To learn the chemistry of carbohydrates and proteins
2. To study the theories of coordination compounds
3. To study the applications of industrially important compounds
4. To understand phase rule and its applications
5. To understand the principles and applications of electrochemistry

**Unit – I: Carbohydrates, Benzene and Heterocyclic compounds (12 hrs)**

Classification of carbohydrates – Properties and uses of glucose and fructose- 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. Heterocyclic compounds – Preparation and properties of pyrrole and pyridine

**Unit - II: Coordination Chemistry (12 hrs)**

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 (12 hrs)**

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 (12 hrs)**

Phase rule- phase diagram of H<sub>2</sub>O, CO<sub>2</sub>, 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 (12 hrs)**

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, (23<sup>rd</sup> 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, (23<sup>rd</sup> edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993).

**SEMESTER: III & IV**  
**Code: 11UPH 430405**

**Hours/Week : 2**  
**Credits : 2**

**ALLIED: CHEMISTRY PRACTICAL**

**Objectives**

- To understand the principles of titrimetric analysis and organic qualitative analysis

**Unit – I: Volumetric Analysis**

- Estimation of HCl (Std. oxalic acid x NaOH x HCl)
- Estimation of NaOH (Std.  $\text{Na}_2\text{CO}_3$  x HCl x NaOH)
- Estimation of oxalic acid (Std. FAS x  $\text{KMnO}_4$  x oxalic acid)
- Estimation of FAS (Std. oxalic acid x  $\text{KMnO}_4$  x FAS)
- Estimation of  $\text{KMnO}_4$  (Std.  $\text{K}_2\text{Cr}_2\text{O}_7$  x FAS x  $\text{KMnO}_4$ )
- Estimation of ascorbic acid (iodimetry)
- Estimation of phenol / aniline (iodimetry)
- Estimation of copper (iodimetry)
- Estimation of zinc (EDTA titration)
- Estimation of magnesium (EDTA titration)
- Estimation of hardness of water (EDTA titration)

**Unit – II: Organic Analysis**

- Identification of acidic, basic, phenolic and neutral organic substances
- Test for aliphatic and aromatic nature
- Test for saturation and unsaturation
- Detection of N, S and halogens.

**Reference:**

- J.N. Gurtu and Kapoor, Experimental Chemistry, S. Chand and Co. 1987.
- N.S. Gnanapragasam and G. Ramamurthy, Organic Chemistry – Lab Manual, S. Viswanathan & Co. Pvt. Ltd., 1998.

**Semester : IV**  
**11UPH430404B**

**Hours/week : 6**  
**Credits : 5**

**ALLIED: COMPUTER SCIENCE – 2**  
**INFORMATION SYSTEMS**

**Objective:** To enable the students to develop the knowledge on basic concepts of Computer Science and Information Technology

**UNIT - I (12 Hrs.)**

**COMPUTER FUNDAMENTALS:** A word with Computers – Organisation of Computers – Input and Output Devices – Storage devices and File organization .

**UNIT - II (12 Hrs.)**

**SYSTEM SOFTWARE :** Operating System: Custom made Software – Pre Written Software – Computer Processing Techniques – Functions of Operating System: Processor Management – Memory Management – Device Management – Information Management.

**UNIT - III (12 Hrs.)**

**COMPUTER COMMUNICATIONS AND NETWORKS:** Forms Data Communication - Data Transmission Techniques – Communication Channel Bandwidths – Types of Communication Channels – Transmission Modes – Local Area Network – Metropolitan Area Network – Wide Area Network- Network Topology – Network Connecting Devices.

**UNIT - IV (12 Hrs.)**

**INFORMATION SYSTEMS:** System Analysis and Design: Introduction – System Analysis – System Design – System Development – System Implementation – System Maintenance. **DATABASE CONCEPTS:** Introduction – Database Management Systems – Features of DBMS.

**UNIT - V (12 Hrs.)**

**COMPUTER LANGUAGES:** Flowcharts: Program Flowcharts – Types of Logic Used in Flowchart – **ELEMENTS OF PROGRAMMING:** Qualities of a Good Program – Program Development Process - Categories of Programming Languages.

**BOOK FOR STUDY:**

S Jaiswal, "IT Today", Galgotia publication private Limited, New Delhi, 2004.

**BOOK FOR REFERENCE:**

Alexis leon and Mathews Leon, "IT tools and Applications", Vijay Nicole Imprints Pvt. Ltd., 2004.

**SEMESTER – 4**  
**11UPH430301A**

**Hours/Week : 4**  
**Credits : 4**

**CORE ELECTIVE – I : INSTRUMENTATION**

**Objectives:**

- To understand the static performance characteristics of instruments and understand the working principles of various transducers and amplifiers.
- To acquire knowledge on different kinds of measurements of motion, 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 – dead band - backlash - drift - impedance loading and matching - specifications of instrument static characteristics.

**UNIT – II : 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.

**UNIT – III : Amplifiers and Relative Motion and Force Measurements**

Amplifiers – amplifying elements – mechanical – hydraulic – pneumatic – optical and electrical amplifying elements - A/D and D/A converters. Relative motion measuring devices – Electromechanical – optical – pneumatic. Force measurements – balance, hydraulic load cell, pneumatic load cell, Elastic force devices.

**UNIT – IV : Pressure and Temperature Measurements**

Pressure measurements – moderate, high and low pressures. Temperature measurements – Non-electrical, electrical and radiation methods.

**UNIT – V : Flow and Acoustic Measurements**

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. Characteristics of sound- sound pressure and power levels, loudness. Typical sound measuring system.- Microphones.

**BOOK FOR STUDY:**

B.C. Nakra and K.K. Chaudhry., *Instrumentation Measurement and Analysis*, Second Edition, Tata McGraw Hill, New Delhi, 2004.

UNIT	Chapter	Sections
I	1	1.3, 1.4, 1.6
	2	2.1 – 2.6
II	4	4.1 – 4.3
III	5	5.1, 5.2, 5.6
	7	7.1, 7.2
	8	8.1 - 8.5
IV	10	10.1 to 10.2.1, 10.3, 10.4
	11	11.1 – 11.7
V	12	12.1, 12.5
	13	13.1 – 13.6

**BOOK FOR REFERENCE:**

- Albert D Helfrick and William D. Cooper, *Modern electronic Instrumentation and Measurement Techniques*, 3/e, PHI, New Delhi 1995.
- MIT open course – Lecture and Animation Series.

**SEMESTER – IV**  
**11UPH 430301B**

**Hours/Week : 4**  
**Credits : 4**

**CORE ELECTIVE – I: MATERIAL SCIENCE**

**Objectives:**

- To understand the parameters that control the properties of the materials.
- To understand the requirement of the material for specific application.

**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

**UNIT – II : Phase Transformation and Deformation**

Nucleation and Growth – solidification – Allotropic transformation- isothermal transformation – martensic transformation – phase transformation in alloy steels–nature of elastic deformation – electrometric deformation - an elastic deformation – plastic deformation – visco elastic deformation .

**UNIT – III : Corrosion and its Prevention**

Types 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 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.

**BOOKS 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	CHAPTER	SECTIONS
I	1	1	1.1 – 1.6
		15	15.11 – 15.14
		16	6.11 – 6.12
II	1	11	11.1 – 11.4, 11.8, 11.10, 11.11.
		9	9.2,9.3,9.12,9.21
III	1	16	16.2 – 16.12
IV	1	8	8.3 – 8.16
V	2	17	17.6 – 17.11.
		18	18.1 – 18.7.

**BOOKS FOR REFERENCE:**

1. V.Raghavan, 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.



**SEMESTER – V**  
**11UPH530208**

**Hours/Week : 5**  
**Credits : 4**

### PROGRAMMING SKILL IN C FOR SOLVING PHYSICS PROBLEMS

#### Objectives

- To develop computer knowledge and to impart computing skill through C language
- To apply C language to write simple programs for solving general, physics and physics related mathematics of specific nature.
- 3 hour teaching with 2 hour practical - any 10 problems outlined need to be completed during the practical class and the average mark out of 10 problems with 1 test is considered as assignment component for 25 marks and 10 marks respectively.

#### UNIT – I : Data Types, Operators and Expressions

Structure of C language – Lexical elements of C language: C character set – constants – keywords – delimiters – variables – data types and sizes – variable declaration – labels – expressions – statements. Operators and Expressions: Arithmetic operators and expressions – relational operators – logical and Boolean operators – assignment operators – data type conversion and mixed mode operations.

G	Temperature conversion from Centigrade to Fahrenheit, Kelvin scales	Assignment statements
P	Period of Oscillations of Simple pendulum inside a lift up-down	- do -
M	Computation of mathematical quantity for a given radius value	- do -

#### UNIT – II : I/O and Control Statements

Input / Output in C: input functions – output functions – formatted input / output.

Control structures: Unconditional control – bidirectional conditional control – multi conditional control – loop control structures.

G	Cost of operating electrical devices	for structure
P	Young's and Rigidity Modulus	do- while structure
M	Solution to the general Quadratic equation Preparation of Multiplication Table Newton-Raphson method applied to Physics Problem	If – else structure for structure any loop structure

#### UNIT – III : Functions and Files

C functions: Library functions – user defined functions – advantages of the functions – arguments – function declaration – recursive functions – storage class specifiers - scope of the variables – scope rules for identifiers

Files : data types – with fopen(), modes in fopen(), with fclose() – random access

G	Arranging a series of numbers into ascending / descending order	Use of function
P	Trapezoidal Rule applied to Physics Problem	- do -
M	To find the value of e up to n terms To find the function value f(x) with 3 boundary conditions To find the factorial of a given number	- do -

#### UNIT – IV : Arrays and String

Arrays declaration – multidimensional array - array initialization – rules to initialize an array – strings/character arrays – rules

G	Conversion of all small case letters in to capital letters	Use of strings
P	Field along the axis of the coil	Use of arrays
M	Matrix: Addition, Subtraction, Multiplication and Inverse of any order	- do -

#### UNIT – V : Pointers, Structures and Unions

Pointers: declaring a pointer variable – address operator – pointer arithmetic – pointers as function parameters – passing parameters by reference – pointers and arrays – dynamic storage allocation.

Structure: declaration and period operator – structure initialization – structure arrays – structure and function – structure and pointers – structure of pointer arrays – structure within structure – self referential structure.

Union : Rules to use union

G	Construct the structure with Hour, Minute, Second as structure member - Convert to Military time	Use of Structure
P	Sum , Difference and Modulus of two complex numbers	Use of Structure
M	Sort n numbers in ascending order using Bubble Sort technique	Use of Pointers

**Note:** Problems of G-General, P-Physics, M-Mathematics nature.

**BOOK FOR STUDY**

Schaum's Outlines : Programming with C, Byron S. Gottfried, Tata McGraw Hill Pub. Co Ltd., New Delhi, 5/e, 2007.

UNIT	SECTION
I	1.9, 2.1 – 2.4, 2.7 – 2.13, 3.1 – 3.4
II	4.1 – 4.9, 6.1 – 6.11
III	3.6, 7.1 – 7.6, 12.1 – 12.5
IV	9.1 – 9.5
V	10.1 – 10.5, 11.1 – 11.7

**Note:** Problems of G-General, P-Physics, M-Mathematics nature.

**Book for Reference:**

1. Balagurusamy. E., Programming in ANSI C, Tata McGraw Hill, New Delhi, 2004.

**SEMESTER – V**  
**11UPH 530209**

**Hours/Week : 5**  
**Credit : 4**

### **ATOMIC, SOLID STATE AND NUCLEAR PHYSICS**

#### **Objectives**

- To study atom models and their importance.
- To study crystal structure, bonding in crystals, specific heat and superconductivity.
- To study the structure and models of nucleus and also to study the process of radioactivity and its applications.
- To study the working of detectors, accelerators and cosmic rays.
- 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's 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 - Optical spectra - 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, unit cell, 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 super conductors - Meissner effect - BCS theory – applications.

#### **UNIT – III : Nucleus and Radioactivity**

General properties - binding energy - nuclear stability - theories of nuclear composition - nuclear forces - models of nuclear structure - liquid drop model and shell model - Alpha particle spectra - Beta ray spectra - origin of the line and continuous spectrum - neutrino theory of beta decay - origin of gamma ray spectra – Nuclear isomerism- internal conversion - law

of successive disintegration - radioactivity dating - Biological effect of nuclear radiations.

#### **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 . Cosmic Rays: Discovery - latitude, azimuth, altitude and longitude effects - primary and secondary cosmic rays - showers - positron - mesons - 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., Kiruthiga Sivaprasath. Modern Physics, S. Chand & Co., Thirteenth Revised Multi coloured Edition, New Delhi, 2007.
2. H.S Mani and G.K. Mehta, Introduction to Modern Physics, EW Press, New Delhi, 1988.

UNIT	BOOK	SECTION
I	1	6.11 - 6.28
II	1	7.16-7.17, 41.1 - 41.6, 41.10 - 41.15, 42.1
III	1	27.3 - 27.11, 31.13 - 31.14, 31.19 - 31.27, 31.34 - 31.36
IV	1	29.1 - 29.2, 29.6 - 29.7, 29.11, 30.4, 30.6 - 30.8, 37.1 - 37.11
V	2	11.1 - 11.18, 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.

**SEMESTER – V**  
**11UPH530210**

**Hours/Week : 5**  
**Credit : 4**

### **ANALOG ELECTRONICS**

#### **Objectives:**

- To study the working of diodes and their applications.
- To understand the working of multimeters and CRO.
- 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 grasp the basic ideas of Power electronic devices, integrated circuits, and Op-amps - its applications.

#### **UNIT – I : Diode Characteristics, Applications and Electronic Instrumentation**

PN junction- formation – properties - applying voltage-current flow-VI 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. Multimeter - applications- sensitivity- merits and demerits. Cathode ray oscilloscope-cathode ray tube-deflection sensitivity-applications.

#### **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. Transistor biasing- stabilisation- essentials-stability factor-base resistor method-voltage divider bias method. 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 and Transformer coupled transistor amplifiers. 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. Emitter follower- voltage gain- 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. Astable Multivibrator- Bistable Multivibrator.

#### **UNIT – V : Power Electronic Devices, Integrated Circuit Technologies and Operational Amplifier**

SCR: Working-equivalent circuit-important terms- V-I characteristics. TRIAC: construction- equivalent circuit-operation- characteristics. 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. Schematic symbol of OP-AMP output voltage. OP-AMP with negative feedback-Inverting amplifier- Non-inverting amplifier-voltage follower-summing amplifiers- Integrator and differentiator.

#### **BOOK FOR STUDY**

1. V.K. Mehta and Rohit Mehta, Principles of Electronics, S. Chand & Co. Ltd. Eleventh Edition, New Delhi, 2008.

UNIT	BOOK	SECTION
I	1	5.14-5.19; 6.2, 6.3; 6.7-6.15; 6.18-6.21; 6.24-6.27; 7.2-7.4; 7.6-7.10; 22.2-22.5; 22.13 - 22.15, 22.20.
II	1	8.1-8.2, 8.4, 8.5; 8.7-8.10, 8.12-8.14, 8.16-8.18, 8.20-8.22; 9.2, 9.4-9.8, 9.12; 19.1-19.4, 19.6, 19.8-19.10, 19.13, 19.14, 19.16.
III	1	10.1-10.3, 10.5-10.9; 10.18; 11.15, 11.3, 11.5, 11.6; 19.20, 19.21, 19.24; 12.4-12.9, 12.11, 12.12, 12.17, 12.19.
IV	1	13.1-13.4, 13.9, 13.11, 13.14; 14.1-14.3, 14.5-14.7, 14.10-14.14, 14.16, 14.18-14.20; 18.12, 18.14.
V	1	20.1-20.5; 21.2-21.6; 23.1, 23.2, 23.4, 23.5; 25.1-25.5, 25.7, 25.8, 25.16, 25.17, 25.22-25.24, 25.26, 25.27, 25.32-25.35, 25.37.

### BOOKS FOR REFERENCE

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

### Semester – V 11UPH530211

Hours/Week : 6  
Credit : 4

### III B.Sc. PHYSICS PRACTICAL - III

#### Any 16 Experiments

1. Stefan's constant.
2. Spectrometer – grating – normal incidence.
3. Spectrometer – grating – minimum deviation.
4. M – using coil carrying current – Cu voltameter.
5. M – using coil carrying current – ammeter.
6. Earth inductor.
7. Fresnel's biprism.
8. B.G. - absolute M.
9. B.G. – absolute C
10. Zener regulated power supply.
11. Clipping and clamping circuits.
12. Conversion of galvanometer into an ammeter.
13. Conversion of galvanometer into voltmeter.
14. Transistor characteristics – CB.
15. Transistor characteristics – CE.
16. FET – characteristics.
17. Hartley oscillator.
18. Colpitt's oscillator.
19. Study of transistor CE amplifier.
20. Study of FET amplifier.
21. Logic gates – by discrete components.
22. De Morgan's theorem and Boolean algebra.

**SEMESTER – V**  
**11UPH530302 A**

**Hours/Week : 4**  
**Credits : 4**

**ELECTIVE – II : PHOTOGRAPHY**

**Objectives**

- To acquire knowledge about the parts and types of camera, sizes and types of films used and get trained in taking still photograph, developing and printing.
- To understand the basic principles of enlarging and colour photography.
- To acquire knowledge about digital photography.

**UNIT – I Camera**

Basic parts of the camera, three important controls of the camera, types of camera-Box camera, simple miniature camera, Modern reflex camera-TLR and SLR cameras

**UNIT – II Films-Sizes And Types**

Black and White films, types of film, Film sizes and negatives, interchangeable lenses

**UNIT – III Exposure and Pictorial Composition**

Exposure for photographing in artificial light, depth of field ,depth of focus, exposure for taking photographs of moving subjects –shutter speed for moving objects-panning-practical hints for exposing

**UNIT – IV Developing the Film**

Basic principle in film developing-dish developing- tank developing-time and temperature control of developing.

**UNIT – V Printing, Enlarging, Colour and Digital Photography**

Contact printing-enlarging, techniques and practical hints on enlarging –primary and complementary colour- colour films-camera for colour photography – digital photography – choosing a digital camera – digital manipulation.

**Practical Sessions**

- Camera handling technique
- Developing process
- Printing techniques

**BOOK FOR STUDY**

- Course Material Prepared By Department of Physics, St. Joseph's College.

**BOOK FOR REFERENCE**

1. O.P. Sharma, Practical photography
2. Teach yourself Photography – Lee Forst – Hodder & Stoughton – U.K.

**SEMESTER – V**  
**11UPH530302 B**

**Hours/Week : 4**  
**Credits : 4**

**ELECTIVE-II: NON-DESTRUCTIVE TESTING**

**Objectives:**

- To give basic and advanced techniques in Non-destructive testing
- To apply the above techniques for industrial use

**UNIT – I : Visual Examination & Liquid Penetrant Testing**

Basic principles- The eye- Unaided visual inspection- Optical aids used for visual inspection- Application – Liquid penetrant testing - Physical principles procedure – Penetrant testing materials - Testing methods – Applications and limitations.

**UNIT – II : Magnetic Particle Testing and Eddy Current Testing**

Principle of MPT – Magnetizing techniques- Procedure- Equipment- Limitations- Eddy Current Testing principles- Instrumentation Techniques- Applications - Limitations

**UNIT – III : Radiography**

Basic principle – X ray source-production of gamma ray sources- Properties of X rays and gamma rays- Attenuation in specimen effect of radiation on film – radiographic imaging – Inspection techniques – Applications - Limitations – Safety in industrial radiography- Neutron radiography.

**UNIT – IV : Ultrasonic Testing**

Basic properties of sound beam- Ultrasonic transducers- Inspection methods- Techniques for normal beam inspection - Techniques for angle beam inspection – Flaw characterization techniques , detection equipment- Modes of display- Immersion testing- Applications – Advantages-Limitations.

**UNIT – V : Acoustic Emission Testing**

Principles of Acoustic Emission Testing - Techniques- Instrumentation sensitivity- Applications standards- Structural integrity assessment- Acoustic emission technique for leak detection.

**BOOK FOR STUDY:**

Practical Non- Destructive testing by Dr.BaldevRaj, T.Jayakumar and M.Thavasimuthu, Narosa Publications, New Delhi, 2009.

UNIT	CHAPTER	SECTIONS
I	2,3	2 to 2.4 , 3.1 to 3.6
II	4,5	4.1 & 4.6. 5.1 to 5.7
III	6	6.1 to 6.14
IV	7	7.1 to 7.8
V	8	8.1 to 8.8.

**BOOK FOR REFERENCE:**

Barry Hull & Vernun John, Nondestructive testing, Springer, 1988.

**SEMESTER – V**  
**11UPH530303A**

**Hours/Week : 3**  
**Credits : 3**

**ELECTIVE – III: 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 – 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 -

**UNIT – III : Concentrating Collectors and Thermal Energy Storage**

General characteristics - Definitions - Methods of classifications - 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 in solar cells - Conversion efficiency - Single crystal silicon - Polycrystalline and amorphous silicon Cadmium sulphide - Cadmium telluride - copper indium diselenide

**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 .

**BOOK FOR STUDY :**

P. Sukhatme, Solar energy (Second edition), Tata McGraw-Hill Publishing Co. Ltd. (New Delhi)

**BOOK FOR REFERENCE:**

G.D.Rai, Solar Energy Utilization, Khanna publishers (New Delhi).



**Semester – V**  
**11UPH530303B**

**Hours/Week : 3**  
**Credits : 3**

**ELECTIVE-III: BIO-MEDICAL INSTRUMENTATION**

**Objectives:**

- To study the function of various transducers and electrodes in Bio-medical instrumentation.
- To understand the working principles of various instruments in Medicine.
- Updating the knowledge of ultrasonic and X-Ray measurements in Medicine.

**UNIT – I : Bio-Electric Potentials**

Resting and action potentials – Propagation of action potentials – Bioelectric potentials: The electrocardiogram (ECG) – The electroencephalogram (EEG) – The Electromyogram (EMG) – Other Bioelectric potentials

**UNIT – II : Bio-Potential Electrodes**

Electrode theory – Microelectrodes – Body surface electrodes – Needle electrodes- reference electrodes – pH electrode – Blood gas electrode – Specific ion electrode

**UNIT – III : Cardiovascular Measurements**

Electrocardiography – ECG amplifiers – Electrodes & leads – ECG Recorder principles – Measurement of Blood pressure: Indirect measurement – Measurement of Blood flow and cardiac output

**UNIT – IV : Nervous Measurements**

Anatomy – Neuronal communication – Neuronal Receptors – Measurements from the nervous system – Neuronal firing measurements – EMG measurements – Computerized Axial Tomography

**UNIT – V : Ultrasonic and X Ray Measurements**

Basic modes of transmission – Ultrasonic Imaging – Ultrasonic diagnosis – Ultrasonic transducers – Ophthalmic scans – Instrumentation for diagnosis - X rays – Special techniques.

**BOOK FOR STUDY:**

Bio-medical Instrumentation and measurements by Leslie Cromwell, Fred. J. Weibell, Erich A. Pfeiffer, Prentice Hall India, Second Edition (Pearson Education).

UNIT	BOOK	SECTIONS
I	1	3.1- 3.3 ,3.3.1-3.3.4
II	1	Chapter 4
III	1	6.1, 6.1.2-6.1.4, 6.2, 6.2.1, 6.3, 6.3.1-6.3.4
IV	1	8.1, 8.2, 8.2.1, 8.3, 8.3.1, 8.4.2, 10.1,10.2, 10.4, 10.7, 10.7.1-10.7.3,15.4.4
V	1	9.2.2, 9.2.3, 9.3, 9.3.4, 14.2, 14.2.1, 14.2.2, 14.3

**Semester - 5**  
**11UPH540601**

**Hours/Week : 2**  
**Credit : 2**

**SKILL BASED ELECTIVE-I: CELL PHONE SERVICING**

**Objective:**

- \* To understand cell phone communication methods.
- \* To know the parts of the cell phone.
- \* To understand working of each blocks of cell phone.
- \* To impart the knowledge of troubleshooting the cell phone.
- \* To give practice of troubleshooting the cell phone.

**UNIT – I : Fundamentals of CELL phone**

Introduction to GSM/CDMA - Concepts of GSM/CDMA Cellular Technologies - Working of GSM - Information of Cell Sites & Base Station - Call Processing of a GSM – GPRS - Mobile Softwares (PC suite)

**UNIT – II : Chip level study**

Chip Level Information of Mobile Phones( Tools & Components ) - BGA - SMD - Air Gun - Soldering Station - Rework Station - Soldering lead - Soldering paste - De- Soldering wire - Identification of IC's - Assembling & Disassembling of mobile phones

**UNIT – III : Trouble shooting**

Causes for various problems & Troubleshooting of Problems in a Mobile Phone - Network Problems - Display Problems - SIM Card Problems - Charging problems - Battery Problems - Software Unlocking - Software Flashing - IMEI information - Downloads of logos & Ring tones - Problems related to mobile phone hand sets -replacement of Various components ICS

**UNIT - IV : Practical 1**

Disassembling the cell phone - Battery problems – display – Antenna problems – Network problems – SIM Card problems – SMD soldering.

**UNIT – V : Practical 2**

Software Unlocking – Software flashing – Downloads of logos – Downloads of Ring tones – Hand set problems – Replacement of modules (display, mic, speaker, antenna, amplifier, etc)

**BOOK FOR STUDY**

Cell Phone Servicing, Prof B.Kanickairaj, Department of Physics, SJC.

**SEMESTER – VI**  
**11UPH630212**

**Hours/Week : 5**  
**Credit : 4**

### OPTICS, SPECTROSCOPY AND LASERS

#### Objectives:

- To understand the concepts of Dispersion of Light , interference, diffraction and polarization of light waves and their applications
- To study the principles of MW, IR, Raman and Resonance Spectroscopy and its applications.
- To understand the working principle of Lasers, and their applications
- To study different types of optical fiber and its applications

#### UNIT – I : Geometrical Optics

Fermat's Principle – Dispersion of Light – Dispersive Power – Deviation without dispersion – Dispersion without deviation- Constant deviation Prism- Constant deviation spectroscope- Aberration- Spherical aberration- methods of minimizing spherical aberration – Chromatic aberration of a lens – Lateral chromatic aberration – Eyepiece- Huygen's eyepiece – Ramsden's eyepiece.- Fourier optics ( Basic concept only)

#### UNIT – II : Physical Optics

Interference- Condition for sustained interference of light – Fresnel's Prism – color of thin film due to transmission – Michelson Interferometer and its applications. Fresnel & Franhofer diffraction – Zone plate – construction –theory- Diffraction at straight edge –Plane transmission grating – theory – Determination of light using grating (Normal Incidence) - Polarization – double refraction – Nicol prism – Theory of Production of elliptically and circularly polarized light – Quarter wave plate – Half-wave Plate - Detection of plane, circularly and elliptically polarized light – Optical activity.

#### UNIT – III : Microwave and Infrared Spectroscopy

Theory of Microwave spectroscopy – diatomic molecule as a rigid rotator- Instrumentation. IR- Range of IR radiation – theory of IR absorption spectroscopy – theory of vibrational diatomic molecule as anharmonic oscillator – Instrumentation

#### UNIT – IV : Raman and Resonance Spectroscopy

Raman spectroscopy – Introduction – quantum theory – characteristics of Raman lines – instrumentation.-Resonance Spectroscopy: ESR, NMR, NQR (Principle & Instrumentation only)

#### UNIT – V : Lasers and Fibre Optics

Basic ideas of Lasers – stimulated emission and radiation – Population inversion – He- Ne Lasers – Semiconductor Lasers – Laser Raman Spectroscopy- Holography – Principle and method – applications –Optical fibre and its importance – Types of fibres-Propagation of light waves in optical fibre – acceptance angle and cone – Numerical aperture- modes of propagation- Applications.

#### BOOKS FOR STUDY:

- Optics and Spectroscopy – R. Murugesan and Kiruthiga sivaprasath S.Chand & Company Ltd, 7<sup>th</sup> Revised Edition. 2010
- Subir Kumar Sarkar – Optical fibers and Fibre optic communication systems. S.Chand and company Ltd. 2004
- Gurdeep R. Agarwal and Sham K.Anand – Spectroscopy (atomic and molecular), Himalaya Publishing House, 2004.

UNIT	BOOK	SECTION
I	1	17.1, 1.7,1.9,1.10 , 1.12, 1.13, 1.16 , 1.17 , 1.20 , 1.25 -1.27
II	1	2.1,2.3,2.5,2.11,2.12, 3.1,3.3,3.7,3.10,3.12,3.17,4.1,4.5,4.8,4.10,4.11-4.15
III	3	10.2,10.10,10.13
IV	3	2.4,2.9,2.10,3.2,3.4 , 3.5,3.9,18.3,18.6,
V	2	4.2-4.5,5.4, 12.2,12.3,12.7

#### BOOKS FOR REFERENCE:

- S.L. Kakani, K.C. Bhandari, A text book of Optics, S.Chand and Sons, New Delhi, 2002.
- N.Subramanyam, Brijal, A Text Book of Optics S.Chand and Company Ltd New Delhi
- B.B.Laud, Lasers and Non-Linear Optics, New Age International Publishers, 2007.
- G. Aruldas, Molecular Structure and Spectroscopy, PHI Learning Private Limited, New Delhi, Second Edition, 2009.
- Joseph W. Goodman, Introduction to Fourier Optics, Viva Books Private Limited, Third Edition, 2007.

**SEMESTER – VI**  
**11UPH 630213**

**Hours/Week : 5**  
**Credit : 4**

### 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 Schrodinger equation to 1D and 3D physical systems.
- To learn the 4D space and changes from our common sense.

#### UNIT – I : Onset of the Quantum Physics

Conclusion 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 - Operators and Observations - The correspondence principle and the Complementarity principle - Angular momentum operators and its representation in spherical polar coordinates - Expectation value.

#### 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 dimensional 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.

#### UNIT – V : Relativity

Frame of reference - Galilean transformation - Newtonian relativity - The velocity of light - Failure of Newtonian mechanics - Newtonian relativity and electromagnetism - the concept of Ether - Michelson - Moreley experiment - Einstein's postulates - Lorentz transformations - Inverse transformations - Velocity transformation - length contraction - Time dilation - variation of mass - Energy equation in relativity - Equivalence of energy and mass - World regions and the light cone.

#### BOOK FOR STUDY

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, 4.28.1 - 4.28.2, 4.28.4 - 4.28.7
IV	1	5.1 - 5.4, 5.6, 5.7, 5.10, 5.11
V	1	2.4 - 2.16, 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.

**SEMESTER – VI**  
**11UPH 630214**

**Hours/Week : 5**  
**Credit : 4**

### **DIGITAL ELECTRONICS AND MICROPROCESSOR**

#### **Objectives**

- To study number systems and to simplify Boolean expression using the methods of Boolean algebra and Karnaugh map.
- To know the fixed function combinational logical circuits and their implementation.
- To study the fundamentals and applications of sequential logic circuits
- To study the architecture and instruction set of an eight bit microprocessor.
- To write assembly language programs for an 8-bit microprocessor.

#### **UNIT – I : Number Systems, Boolean Algebra And Karnaugh Map**

Binary numbers, Decimal - to - Binary conversion, Binary arithmetic; 1's and 2's complements; Hexadecimal numbers; Binary coded decimal; Digital codes; Logic gates - Inverter, AND, OR, NAND, NOR and exclusive OR & NOR gates; Boolean operations and expression; laws and rules of Boolean algebra; De Morgan's theorems; Boolean analysis of logic circuits; Simplification using Boolean algebra; Standard forms of Boolean expressions; Karnaugh map SOP and POS minimization.

#### **UNIT – II : Integrated Circuit Technologies and Combinational Logic Circuits**

Digital integrated circuits - Classification - Performance characteristics and parameters of TTL and CMOS; CMOS circuits - MOSFET, Inverter and NAND; TTL circuits - inverter and NAND; Implementing combinational logic; The universal property of NAND and NOR gates; Combinational logic using NAND and NOR gates; Basic adders; Parallel binary adders. Decoders; Encoders; Code converters. Multiplexers, Demultiplexers.

#### **UNIT – III : Sequential Logic Circuits**

Latches-Edge triggered flip flop- Master-Slave 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 Sets of Intel 8085**

Semiconductor memories. Intel 8085, ALU, Timing and control UNIT - Register, Data and Address Bus, Pin configuration, Intel 8085 instructions, Opcode & Operands, Instruction word size; Instruction sets - Data transfer, Arithmetic, Logical, Branch, Stack I/O and Machine control groups.

#### **UNIT – V : Assembly Language Programs of Intel 8085**

Assembly language. Simple programs. Addition of two 8 - bit numbers; 8 - bit subtraction; Addition of two 8 - bit numbers; Sum 16 - bits - Binary and Decimal One's and Two's complement of 8 - bit and 16 - bit numbers, 8 - bit multiplication - Product 16 - bit, 8 - bit Division – Multibyte addition - Binary and Decimal.

#### **BOOKS FOR STUDY**

1. Thomas L. Floyd and R.P. Jain, Digital fundamentals, Eighth edition, Pearson education Pvt, Ltd, 2008.
2. Dr. Badri Ram, Fundamentals of Microprocessors and Microcomputers, 4<sup>th</sup> edition, Dhanpat Rai & Sons, New Delhi, 1995.

UNIT	BOOK	SECTIONS
I	1	2.2 - 2.5, 2.8, 2.10, 2.11; 3.1 - 3.6; 4.1 - 4.10
II	1	11.1, 11.3, 11.4; 5.2 - 5.4; 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	2	2.22; 3.1, 3.1.1 - 3.1.8, 3.2, 3.2.2, 3.2.3; 4.1, 4.3, 4.6.1 - 4.6.5
V	2	5.2; 6.2 - 6.6, 6.9 - 6.12, 6.29 - 6.32

#### **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, 5<sup>th</sup> edition, 3<sup>rd</sup> Print, Tata Mc Graw Hill, New Delhi, 2003.

**Semester – VI**  
**11UPH 630215**

**Hours/Week : 6**  
**Credit : 4**

**III B.Sc. PHYSICS PRACTICAL - IV**

**Any 16 Experiments**

1. Monostable and bistable multivibrators.
2. Spectrometer – Cauchy's constant.
3. Spectrometer – small angle prism.
4. B.G. – L by Anderson's bridge.
5. B.G. – High resistance by leakage.
6. Potentiometer – EMF of a thermocouple.
7. Potentiometer – High range voltmeter.
8. Series and parallel resonance.
9. NAND and NOR as universal building blocks.
10. Adders and Subtractors.
11. Op-amp - basic operations.
12. Astable multivibrator.
13. Simplification of Boolean expression using k map and implementation.
14. Encoder and Decoder.
15. Binary adder and subtractor.
16. Multiplexer and Demultiplexer.
17. Flip Flops using IC gates.
18. Shift registers.

19. Counters.
20. Microprocessor – data transfer operations and exchange.
21. Microprocessor – arithmetic operations.

Semester – VI  
11UPH 630304 A

Hours/Week : 4  
Credits : 4

### ELECTIVE-IV: COMMUNICATION SYSTEMS

#### Objectives:

- To study Radio and TV broad casting methods (Transmission and Reception).
- To know Telephone systems.
- To understand Radar systems.
- To study the structure of fiber optic cable, modes of propagation of light in fibre optic cable.

#### UNIT – I : Radio Transmission Systems

Introduction – AM transmitters – FM transmitters – Tuned RF receivers – Superheterodyne receiver – AM broadcast receivers – RF amplifier – FM receiver- Measurement of Receiver Performance – sensitivity, selectivity, adjacent channel selectivity – signal to noise ratio

#### UNIT – II : Television Systems

Television basics – TV camera systems – CCD Camera- Television transmitters – Monochrome TV receiver – Principle of a colour TV – PAL colour receiver- Television screens – CRT and LCD

#### UNIT – III : Switched Communication Systems

Basic system structure – Telephony – Telephone Transmitter, Telephone Receiver – basic telephone set – Wireless communication systems – GPRS – Bluetooth-Cellphone.

#### UNIT - IV : Radar and Navigation Systems

Basic Radar system – Pulsed Radar system – Moving Target Indicator (MTI) – CW Doppler Radar – Frequency Modulated CW radar – Radio Navigational aids – Radio Direction Finding

#### UNIT – V : Fibre Optic Communication Systems

Total internal reflection and basics of fibre optic system – Optical fibres – Types of optical fibres – Optical propagation theory (based on ray optics)- Fibre Attenuation – Fibre selection – Fibre materials Fibre fabrication – Cabling – Fibre connectors – Applications – Internet, Information superhighway, medicine – Fibre Optic Transmitters and receiver (Block diagram only)

#### BOOKS FOR STUDY:

1. Principles of Communication Engineering by Anokh Singh, S. Chand and Company Ltd., First Edition, Reprint 2001.
2. Optical Communications – Components and Systems by JK Franz & VK Jain, Narosa Publishing House Pvt. Ltd. I Edition, Reprint 2005.

UNIT	BOOK	SECTIONS
1	1	2.1,-, 2.3, 2.3.1, 2.4.1, 2.4.4, 2.5, 2.5.1
2	1	5.1, 5.2, 5.6, 6.1.1, 6.1.2, 6.2, 6.2.1, 6.6, 6.7, 6.7.1-6.7.5
3	1	12.2, 12.3, 12.3.1, 12.3.2, 12.4, 12.5.1-12.5.7, 12.6- 12.8
4	1	13.1, 13.2.1, 13.2.2, 13.3.1-13.3.4, 13.4.1-13.4.2, 13.5, 13.6, 13.7, 13.8.1
5	2	4, 4.1, 4.2, 4.3.1-4.3.3, 4.5.5, 4.6, 4.7.4

**Semester – VI**  
**11UPH630304B**

**Hours/Week : 4**  
**Credits : 4**

### **ELECTIVE-IV: ASTROPHYSICS**

#### **Objective:**

To impart an understanding of the great number of diverse phenomena in the Universe through Physics

#### **UNIT – I : Elements of Space Dynamics**

Man's quest for space – the energy requirements – Rocket propulsion – suborbital flights – Artificial earth satellites – Lunar and planetary probes

#### **UNIT – II : The Heart of the Solar System**

Vital statistics of the Sun – the solar photosphere – the Fraunhofer lines – structure of solar atmosphere – the solar interior – Sunspots and solar activity – other features of the solar activity – Radio studies of the quiet Sun – Radio radiation of the distributed Sun.

#### **UNIT – III : Small Bodies in the Solar System**

Asteroids – Meteorites – Comets as members of the Solar system – Physical properties of comets – Origin and evolution of comets – Space studies of comets – Meteors – an inventory of satellites – the large satellites – Medium, small and tiny satellites – Planetary rings.

#### **UNIT – IV : Our Home and the Nearest Neighbour**

EARTH: Gross properties – internal structure – the terrestrial atmosphere – the Earth's magnetic field – motions – Solar terrestrial relations – the Earth in space – atmospheric circulation in the troposphere. MOON : Some basic facts – telescopic studies – internal structure – surface features – Origin of the Moon – the lunar environment – Solar and Lunar eclipses.

#### **UNIT – V : Life in the Universe**

Nature of life on Earth – A survey of objects in the Solar System – Pre Mariner search for life on Mars – Post Mariner search for life on Mars – Life outside the Solar system – the search for life in the Universe.

#### **BOOK FOR STUDY**

Astrophysics of the Solar System – KD Abhyankar,  
University Press Pvt. Ltd.,  
Hyderabad, 1999

UNIT	SECTION
I	3.1 – 3.6
II	4.1 – 4.10
III	9.1 – 9.11
IV	5.1 – 5.9, 6.1 – 6.6
V	11.1 – 11.7



**Semester – VI**  
**11UPH640602A**

**Hours/Week : 2**  
**Credit : 2**

### **SKILL BASED ELECTIVE-II: ELECTRICAL WIRING**

#### **Objectives:**

- To study the different electric parameters and types of power generation.
- To understand the distribution symbols and electrical connections used in electrical wiring.
- To provide practical training in basic aspects of electrical wiring.

#### **UNIT – I : Electricity Generation**

Fundamentals of electricity – Current, Volt, resistance – Ohm's law – Power, - Kilowatt hour – Watt meter – Electrical measurements – Electric power generation by Thermal, hydro, atomic and nuclear methods – Battery –Generators – Study of Generator.

#### **UNIT – II : Electric Circuits and Distribution:**

Symbols of electrical parameters –Importance Series, Parallel connections – Ac and DC – Conductors – Inductor, Capacitors –Inductor, Capacitor and transformer – Distribution methods – single phase and three phase – Star and delta connections – Rules of electric connections – SWG –Motors – Study of motor and series and parallel circuits.

#### **UNIT – III : Electrical Wiring – I**

Tools – Methods of Joining conductors – House wiring methods – Glit, wood casing, Tough – Rubber sheathed conduit or PVC pipe – concealed. Switches – ceiling roze – lamp holders, sockets – Fuse base – Distribution box –Trip switches – Earth connection –Experimental study of house wiring.

#### **UNIT – IV : Electrical Wiring – II**

Main board preparation – Distribution – Cut – out preparation – Switch board preparation – Power factor –IEE regulations – Safety precautions –

Testing the insulation –Experimental study of main, distribution and switch boards.

#### **UNIT - V : Electrical Appliances**

Tungsten - filament bulb – tube light –mercury and sodium vapour lamp – emergency lamp - heater – iron box – table fan – ceiling fan – battery eliminator – electrical requirement to washing machine and refrigerator – procedure to rectify the electrical faults in electrical appliances.

#### **BOOK FOR STUDY:**

Electrical Wiring by Prof.B.Kanickairaj, Department of Physics, SJC.

**Semester – VI**  
**11UPH 640602B**

**Hours/Week : 2**  
**Credit : 2**

**SKILL BASED ELECTIVE-II: VIDEOGRAPHY**

**Objectives:**

- To study the different types of video cameras.
- To understand the video editing softwares.
- To provide practical training in basic operations of camera and video editing.

**UNIT – I : Video Camera**

Principle of Television - Colour composite Video signal - Colour Television systems(PAL, SECAM, NTSC) - Video camera: Pick up Device - Optical section - Charge Couple Device-CCD - Electronic Shutter - Handling highlight - HAD sensor - Advantages / limitation / resolution of CCD - Digital Signal processing in camera - Feature comparison in various Popular camera Models of Sony/Panasonic.

**UNIT - II : Video Technique**

Video camera ACCESSORIES: Zoom lens - View Finder - Microphone - Battery - AC adapter - Camera cable - Care and handling of the Equipment.

Functions and Controls of Video Camera: Power on/off - VTR on/off - Zoom control - Iris Control auto/ manual/ - Viewfinder - Earphone - Camera Connector - Video out

Video recording - corrections applied to video processing: Shading Corrections - Aperture Correction - Flare Correction - ABL - Gamma correction - Chrome gamma/colour correction

**UNIT – III : Video Editing Softwares**

Software overview (Windows Movie Maker, Adobe premier, Pinnacle Video Studio, Ulead Video Studio, Magix Video Studio) – Video capture and record – edit – Title - Audio – Create video file and Disk (DVD and Blue Ray)

**UNIT – IV : Practical – I: Video Shooting**

Functions of Video Camera – Video Shooting (Indoor and Outdoor) – mini project

**UNIT – V : Practical – II : Video Editing**

Functions of Ulead Video Studio – Video Editing - creating a MPEG video file and DVD – mini project

**BOOK FOR STUDY:**

Videography by Prof.B.Kanickairaj, Department of Physics, SJC, 2011.

### SKILL BASED ELECTIVES

#### BOTANY

11UBO540601	Mushroom Culture
11UBO640602	Herbal Technology

#### BUSINESS ADMINISTRATION

11UBU540601	Personality Development
11UBU640602	Managerial Skills

#### CHEMISTRY

11UCH540601	Food and Nutrition
11UCH640602	Everyday Chemistry

#### COMMERCE

11UCO540601A	Accounting for Executives
11UCO540601B	Soft Skills for Managers
11UCO640602A	Total Quality Management
11UCO640602B	Fundamentals of Accounting Packages

#### COMMERCE (CA)

11UCC540601	Soft Skills
11UCC640602	Basics of Accounting

#### COMPUTER APPLICATIONS (Dept of IT)

11UBC540601A	Fundamentals of IT
11UBC540601B	Internet Concepts
11UBC640602A	Visual Programming
11UBC640602B	Flash

#### COMPUTER SCIENCE

11UCS540601A	Office Automation
11UCS540601B	Internet Concepts
11UCS640602A	Fundamentals of Computer Networks
11UCS640602B	E-Commerce

#### ECONOMICS

11UEC540601	Security Analysis
11UEC640602	Economics of Insurance

#### ELECTRONICS

11UEL540601	DVD Troubleshooting and Assembling
11UEL640602	PC Assembling

#### ENGLISH LITERATURE

11UEN540601	Business English Writing
11UEN640602	Media Skills

#### HISTORY

11UHS540601	Indian History for Competitive Exams
11UHS640602	Tourism and Travel Management

#### MATHEMATICS

11UMA540601	Mathematics for Competitive Exams
11UMA640602	MATLAB

#### PHYSICS

11UPH540601	Cell Phone Servicing
11UPH640602A	Electrical Wiring
11UPH640602B	Videography

#### STATISTICS

11UST540601	Data Analysis for Competitive Exams
11UST640602	Statistics for Management

#### TAMIL

11UTA540601	தமிழ் இலக்கியத்தில் மனித உரிமைகள்
11UTA640602	மைய அரசுப் பணித் தேர்வுத்தமிழ்