

**SADAKATHULLAH APPA COLLEGE**  
**(AUTONOMOUS)**

(Reaccredited by NAAC with 'A' GRADE and ISO 9001: 2008 certified)

**Rahmath Nagar, Tirunelveli – 627 011**

**DEPT. OF PHYSICS**



**B.SC. (PHYSICS)**

**UNITIZED SYLLABUS (CBCS)**

**FOR**

**(2011 - 2014)**

(Applicable for students admitted in June 2011 and onwards)

**(Updated as per the resolutions passed in the  
Academic Council Meeting held on 14-03-2013)**



<b>COURSE STRUCTURE UNDER CBCS (2011 - 2014)</b>
<b>(B.Sc – PHYSICS MAJOR WITH ALLIED MATHEMATICS &amp; CHEMISTRY)</b>

I SEMESTER				II SEMESTER			
P	COURSE	H/W	C	P	COURSE	H/W	C
I	Tamil / Arabic	6	3	I	Tamil / Arabic	6	3
II	English	6	3	II	English	6	3
III	Core - 1	3	5	III	Core - 2	3	5
	Core Practical - I	3	--		Core Practical - I	3	3
	Allied I - 1	6	5		Allied I - 2	6	5
IV	Skill Based Elective - 1	3	2	IV	Skill Based Elective - 2	3	2
	SVE	3	2		ES	3	2
<b>TOTAL</b>		<b>30</b>	<b>20</b>	<b>TOTAL</b>		<b>30</b>	<b>23</b>
III SEMESTER				IV SEMESTER			
I	Tamil / Arabic	6	3	I	Tamil / Arabic	6	3
II	English	6	3	II	English	6	3
III	Core - 3	4	5	III	Core - 4	4	5
	Core Practical - II	2	--		Core Practical - II	2	3
	Allied II - 1	4	4		Allied II - 2	4	4
	Allied Practical - II	2	--		Allied Practical - II	2	2
IV	Skill Based Elective - 3	3	2	IV	Skill Based Elective - 4	3	2
	Non Major Elective - 1	3	2		Non Major Elective - 2	3	2
<b>TOTAL</b>		<b>30</b>	<b>19</b>	<b>TOTAL</b>		<b>30</b>	<b>24</b>
V SEMESTER				VI SEMESTER			
III	Core - 5	5	5	III	Core - 8	5	5
	Core - 6	5	5		Core - 9	5	5
	Core - 7	5	5		Core Practical - III	3	4
	Core Practical - III	3	--		Core Practical - IV	3	5
	Core Practical - IV	3	--		Project	5	5
	Core Elective - 1	4	4		Core Elective - 2	4	4
	Core El. Practical	2	--		Core El. Practical	2	2
IV	Skill Based Elective - 5	3	2	IV	Skill Based Elective - 6	3	2
<b>TOTAL</b>		<b>30</b>	<b>21</b>	<b>TOTAL</b>		<b>30</b>	<b>32</b>

<b>DISTRIBUTION OF HOURS, CREDITS, NO. OF PAPERS &amp; MARKS</b>
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PART	COURSE	SEMESTER	HOURS	CREDITS	PAPERS	MARKS	
<b>I</b>	Tamil / Arabic	I to IV	24	12	24	4	400
<b>II</b>	English	I to IV	24	12		4	400
<b>III</b>	Core + Practical	I to VI	61	60	95	9+4	1300
	C.Elective + Pract.+ Project	V & VI	17	15		2+1+1	400
	Allied I + Allied II + Practical	I to IV	24	20		2+2+1	500
<b>IV</b>	Skilled Based Elective	I to VI	18	12	20	6	600
	Non Major Elective	III & IV	6	4		2	200
	Social Value Education	I	3	2		1	100
	Environmental Studies	II	3	2		1	100
<b>V</b>	Extension Activities	I to IV	--	1	1	1	100
<b>TOTAL</b>			<b>180</b>	<b>140</b>	<b>140</b>	<b>41</b>	<b>4100</b>

<b>SEMESTER WISE DISTRIBUTION OF HOURS</b>										
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PART	I	II	III				IV			TOTAL
SEM	T/A	ENG	CORE	CE	PRO	AL	SBE	NME	SVE/ES	
<b>I</b>	6	6	3+3	-	-	6	3	-	3	<b>30</b>
<b>II</b>	6	6	3+3	-	-	6	3	-	3	<b>30</b>
<b>III</b>	6	6	4+2	-	-	4+2	3	3	-	<b>30</b>
<b>IV</b>	6	6	4+2	-	-	4+2	3	3	-	<b>30</b>
<b>V</b>	-	-	15+6	4+2	-	-	3	-	-	<b>30</b>
<b>VI</b>	-	-	10+6	4+2	5	-	3	-	-	<b>30</b>
<b>TOT</b>	<b>24</b>	<b>24</b>	<b>61</b>	<b>12</b>	<b>5</b>	<b>24</b>	<b>18</b>	<b>6</b>	<b>6</b>	<b>180</b>

<b>ONE YEAR LANGUAGE COURSES</b> <b>(B.Sc. - CS, IT , BCA. , B.COM., B.COM. (CA) &amp; BBA)</b>							
<b>PART I TAMIL</b>							
<b>SEM</b>	<b>TITLE OF THE PAPER</b>	<b>S.CODE</b>	<b>H/W</b>	<b>C</b>	<b>MARKS</b>		
					<b>I</b>	<b>E</b>	<b>T</b>
<b>I</b>	இக்காலத் தமிழ்	11ULTA11	6	3	25	75	100
<b>II</b>	சமயத் தமிழ்	11ULTA21	6	3	25	75	100
<b>TOTAL</b>			<b>12</b>	<b>6</b>	<b>50</b>	<b>150</b>	<b>200</b>
<b>PART I ARABIC</b>							
<b>I</b>	Applied Grammar and Translation	11ULAR11	6	3	25	75	100
<b>II</b>	Functional Arabic and Translation	11ULAR21	6	3	25	75	100
<b>TOTAL</b>			<b>12</b>	<b>6</b>	<b>50</b>	<b>150</b>	<b>200</b>
<b>PART II ENGLISH</b>							
<b>I</b>	A Practical course in Speaking & Listening	11ULEN11A	6	3	40	60	100
<b>II</b>	Prose , Poetry and Composition	11ULEN21A	6	3	25	75	100
<b>TOTAL</b>			<b>12</b>	<b>6</b>	<b>65</b>	<b>135</b>	<b>200</b>
<b>TWO YEARS LANGUAGE COURSES</b> <b>(B.A. HIS. , ENG.LIT. ,B.Sc.-MATHS, PHYSICS, CHEMISTRY, ADVANCED ZOOLOGY AND BIOTECHNOLOGY &amp; MICROBIOLOGY)</b>							
<b>PART I TAMIL</b>							
<b>I</b>	இக்காலத் தமிழ்	11ULTA11	6	3	25	75	100
<b>II</b>	சமயத் தமிழ்	11ULTA21	6	3	25	75	100
<b>III</b>	பயன்பாட்டுத் தமிழ்	11ULTA31	6	3	25	75	100
<b>IV</b>	அறிவியல் தமிழ்	11ULTA41	6	3	25	75	100
<b>TOTAL</b>			<b>24</b>	<b>12</b>	<b>100</b>	<b>300</b>	<b>400</b>
<b>PART I ARABIC</b>							
<b>I</b>	Applied Grammar and Translation	11ULAR11	6	3	25	75	100
<b>II</b>	Functional Arabic and Translation	11ULAR21	6	3	25	75	100
<b>III</b>	Conversational Arabic	11ULAR31	6	3	25	75	100
<b>IV</b>	Quran , Hadeeth and Grammar	11ULAR41	6	3	25	75	100
<b>TOTAL</b>			<b>24</b>	<b>12</b>	<b>100</b>	<b>300</b>	<b>400</b>
<b>PART II ENGLISH</b>							
<b>I</b>	Prose, Poetry and functional Grammar - I	11ULEN11	6	3	25	75	100
<b>II</b>	Prose, Poetry and functional Grammar - II	11ULEN21	6	3	25	75	100
<b>III</b>	One Act Plays and Word Power	11ULEN31	6	3	25	75	100
<b>IV</b>	A Course in Spoken English	11ULEN41	6	3	40	60	100
<b>TOTAL</b>			<b>24</b>	<b>12</b>	<b>115</b>	<b>285</b>	<b>400</b>

<b>DEPT. OF PHYSICS</b>									
<b>CBCS SYLLABUS (2011 – 2014)</b>									
<b>PART III CORE , CORE ELECTIVE &amp; PROJECT</b>									
<b>(FOR B.Sc. - PHYSICS MAJOR)</b>									
<b>SEM</b>	<b>No.</b>	<b>TITLE OF THE PAPER</b>	<b>SUB.CODE</b>	<b>H/W</b>	<b>C</b>	<b>MARKS</b>			
						<b>I</b>	<b>E</b>	<b>T</b>	
<b>I</b>	C1	Basic Physics	11UCPH11	3	5	25	75	100	
	CP	Core Practical - I	--	3	--	EXAM II SEM			
<b>II</b>	C2	Mechanics and Astrophysics	11UCPH21	3	5	25	75	100	
	CP	Core Practical - I	11UCPH2P	3	3	40	60	100	
<b>III</b>	C3	Thermal Physics	11UCPH31	4	5	25	75	100	
	CP	Core Practical - II	--	2	--	EXAM IV SEM			
<b>IV</b>	C4	Electricity & Magnetism	11UCPH41	4	5	25	75	100	
	CP	Core Practical - II	11UCPH4P	2	3	40	60	100	
<b>V</b>	C5	Physical Optics & Spectroscopy	11UCPH51	5	5	25	75	100	
	C6	Basic Electronics	11UCPH52	5	5	25	75	100	
	C7	Quantum Mechanics and Statistical Mechanics	11UCPH53	5	5	25	75	100	
	CE1	A) Programming in C++ <b>OR</b>		11UEPH5A	4	4	25	75	100
		B) Programming in Java		11UEPH5B					
	CP	Core Practical - III		--	3	--	EXAM VI SEM		
		Core Practical - IV		--	3	--	EXAM VI SEM		
CEP	Core Elective Practical		--	2	--	EXAM VI SEM			
<b>VI</b>	C8	Digital Electronics	11UCPH61	5	5	25	75	100	
	C9	Modern Physics	11UCPH62	5	5	25	75	100	
	CE2	A) Material Science <b>OR</b>		11UEPH6A	4	4	25	75	100
		B) Numerical Methods		11UEPH6B					
	P	Project		11UPPH61	5	5	--	100	100
	CP	Core Practical - III		11UCPH6P1	3	4	40	60	100
		Core Practical - IV		11UCPH6P2	3	5	40	60	100
CEP	Core Elective Practical		11UEPH6P	2	2	40	60	100	
<b>TOTAL</b>				<b>78</b>	<b>75</b>	<b>475</b>	<b>1225</b>	<b>1700</b>	

<b>PART III - ALLIED II - PHYSICS (FOR B.Sc. – MATHS &amp; CHEMISTRY MAJORS)</b>								
<b>III</b>	1	Properties of Matter , Thermal Physics & Optics	11UAPH31	4	4	25	75	100
		Allied Practical	--	2	--	EXAM IV SEM		
<b>IV</b>	2	Modern Physics , Electro magnetism & Electronics	11UAPH41	4	4	25	75	100
		Allied Practical	11UAPH4P	2	2	40	60	100
<b>TOTAL</b>				<b>12</b>	<b>10</b>	<b>90</b>	<b>210</b>	<b>300</b>
<b>PART IV – SKILL BASED ELECTIVE</b>								
<b>I</b>	1	Computer Basics	11SEPH11	3	2	25	75	100
<b>II</b>	2	Energy Physics	11SEPH21	3	2	25	75	100
<b>III</b>	3	Laser & Applications	11SEPH31	3	2	25	75	100
<b>IV</b>	4	Introduction to Nanotechnology	11SEPH41	3	2	25	75	100
<b>V</b>	5	Communication Electronics	11SEPH51	3	2	25	75	100
<b>VI</b>	6	Biomedical Instrumentation	11SEPH61	3	2	25	75	100
<b>TOTAL</b>				<b>18</b>	<b>12</b>	<b>150</b>	<b>450</b>	<b>600</b>
<b>PART IV- NON MAJOR ELECTIVE (FOR OTHER MAJORS)</b>								
<b>III</b>	1	Office Automation	11NEPH31	3	2	25	75	100
<b>IV</b>	2	Physics for Competitive Examination	11NEPH41	3	2	25	75	100
<b>TOTAL</b>				<b>6</b>	<b>4</b>	<b>50</b>	<b>150</b>	<b>200</b>
<b>PART IV - SVE &amp; ES (FOR ALL MAJORS)</b>								
<b>I</b>	1	Social Value Education	11USVE11	3	2	25	75	100
<b>II</b>	2	Environmental Studies	11UENS21	3	2	25	75	100
<b>TOTAL</b>				<b>6</b>	<b>4</b>	<b>50</b>	<b>150</b>	<b>200</b>

<b>PART III – CORE &amp; CORE ELECTIVE (PHYSICS MAJOR)</b>			
<b>I SEMESTER</b>			
<b>C 1</b>	<b>BASIC PHYSICS</b>		<b>11UCPH11</b>
<b>Hrs / Week : 3</b>	<b>Hrs / Sem : 45</b>	<b>Hrs / Unit : 9</b>	<b>Credits : 5</b>

**UNIT I -Elasticity**

Stress and strain- Hooke's law - factors affecting elasticity - different moduli - Poisson's ratio – resilience - bending of beam - bending moment - cantilever - E by cantilever depression - non uniform bending - uniform bending-torsion of a cylinder - rigidity modulus of a wire.

**UNIT II- Geometrical Optics**

Lens - lens equation - lens maker's equation - Newton's lens equation - magnification power –Aberration - spherical aberration - reducing spherical aberration – coma - aplanatic points –astigmatism - chromatic aberration - achromatic lenses.

**UNIT III-Sound**

Stationary waves - properties - interference - Conditions for interference of sound waves - Laws of transverse vibration of a string - Melde's experiment – Musical sound and noise - characteristics of Musical sound - intensity of sound - Measurement of intensity of sound - Decibel & Phon-bel & phon - Limits of audibility.

**UNIT IV-Acoustics**

Reverberation - Sabine's reverberation formula - absorption coefficient-factors affecting the acoustics of building - sound distribution in an auditorium - requisites for good acoustics - ultrasonics - production, detection and application.

**UNIT V –Electronics**

Semi conductors - N type and P type semi conductors – P N junction diode – characteristics under FB and RB – Zener diode - FW rectifier – Zener regulated power supply - Bipolar transistors – characteristics under CE mode – transistor constants.

**TEXT BOOKS:**

1. College Physics - Volume I & III – N. Sundararajan & others –United Publishers, Mangalore.
2. Text Book of Sound - Brijlal and Subramaniam - Vikas Publishing Pvt. Ltd, New Delhi.

**REFERENCE BOOKS:**

1. Properties of Matter - Brijlal & Subramanian
2. Properties of Matter - R.Murugesan
3. Text book of optics - Brijlal & Subramanian
4. Principles of Electronics - V.K.Mehta
5. Optics & Spectroscopy - R.Murugesan.



<b>II SEMESTER</b>			
<b>C 2</b>	<b>MECHANICS AND ASTROPHYSICS</b>		<b>11UCPH21</b>
<b>Hrs / Week : 3</b>	<b>Hrs / Sem : 45</b>	<b>Hrs / Unit : 9</b>	<b>Credits : 5</b>

### **UNIT I - Rotational motion**

Rotational effect of a force - couple and its torque - angular velocity - angular acceleration - rotation with constant angular acceleration - K.E. of rotation - work & power in rotation - torque and angular acceleration - angular momentum - conservation of angular momentum - rectilinear vs rotational motion.

### **UNIT II – Collision**

Elastic and inelastic - Lab frame and centre of mass frame - perfectly elastic collision in one dimension - Final velocities after collision - perfectly inelastic collision in one dimension - co efficient of restitution -elastic collision in two dimension.

### **UNIT III – Gravitation**

Newton's law of gravitation– gravitational field – gravitational potential – gravitational potential energy – gravitational potential and field due to thin spherical shell, hollow sphere, solid sphere - Kepler's laws of planetary motion - derivation of Kepler's laws from Newton's law of gravitation – inertial mass and gravitational mass – escape velocity.

### **UNIT IV – Satellites**

Satellite motion- orbital velocity- time period-launching of artificial satellites-binding energy of a satellite- geostationary satellite- weightlessness-artificial gravity in space stations- remote sensing through satellites- Indian remote sensing satellites-applications of remote sensing.

### **UNIT V- Astrophysics**

Physical properties of stars- luminosity, brightness, distance, surface temperature, mass, chemical composition, internal temperature, internal pressure, mass-luminosity relation- stellar evolution- formation of stars- white dwarf(brief account only)- black holes- supernova explosion.

### **TEXT BOOKS:**

1. College Physics - Volume I & III – N. Sundararajan & others – United Publishers, Mangalore.
2. College Physics - Volume I - A.B. Gupta - Books and allied (P) Ltd, Kolkatta

### **REFERENCE BOOKS:**

1. Properties of matter - Brijlal and Subramaniam -S.Chand & Co. Ltd. New Delhi.
2. Mechanics & Electrodynamics - Brijlal and Subramaniam

<b>I &amp; II SEMESTERS</b>		
<b>CORE PRACTICAL – I (EXAM. END OF II SEM.)</b>		<b>11UCPH2P</b>
<b>Hrs / Week : 3</b>	<b>Hrs / Sem : 45</b>	<b>Credits : 3</b>

- 1) Measurements using Vernier calipers, Screw gauge
- 2) Measurements using microscope, spectrometer
- 3) E - Uniform Bending – Pin & Microscope
- 4) E - Non Uniform Bending - Scale & Telescope
- 5) E - Cantilever Depression
- 6) n - Torsion Pendulum
- 7) Bifilar Pendulum
- 8) Frequency of a tuning fork - Melde's string
- 9) Refractive index & Dispersive Power of prism-Spectrometer
- 10) Thickness of a wire –Air wedge
- 11) PN junction diode, Zener diode characteristics
- 12) Transistor characteristics- CE mode
- 13) Thermal conductivity of a bad conductor-Lee's Disc
- 14) Newton's rings
- 15) Viscosity – Capillary flow
- 16) Newton's law of cooling - Specific heat capacity of liquid

<b>III SEMESTER</b>			
<b>C 3</b>	<b>THERMAL PHYSICS</b>		<b>11UCPH31</b>
<b>Hrs / Week : 4</b>	<b>Hrs / Sem : 60</b>	<b>Hrs / Unit :12</b>	<b>Credits :5</b>

**UNI I - Kinetic theory**

Mean free path - Expression for mean free path - Elementary treatment - Brownian motion - Salient features - vertical distribution of Brownian particles - Expression for Avogadro number - Degrees of freedom and the ratio of specific heat capacities of mono, di and tri atomic gases - Transport phenomena - viscosity - thermal conductivity –diffusion – Real gases – Andrews’ experiment on carbon di oxide – Critical constants of a gas.

**UNIT II - Thermodynamics**

Thermodynamic system – surroundings and boundary – state of a system and thermodynamic variables – thermodynamic equilibrium – thermodynamic processes – work depends on the path - First law of thermodynamics - Significance - isothermal and adiabatic change - Application of first law - Zeroth Law of thermodynamics - significance - Second Law of thermodynamics - significance - entropy - change of entropy when ice is converted into steam - change of entropy of a perfect gas - principle of increase of entropy - third law of thermodynamics - Maxwell's thermodynamic relations - Clausius Clapeyron's latent heat equations – effect of pressure on boiling point and melting point – triple point of water.

**UNIT III - Low temperature and Hygrometry**

Porous plug experiment - theory - relation between Boyle's temperature, temperature of inversion and critical temperature – J.T effect vs. reversible adiabatic expansion – regenerative cooling – liquefaction of air- Liquefaction of hydrogen and helium - adiabatic demagnetization - Theory and Experimental set up - thermal conductivity – humidity, relative humidity, dew point, Regnault's hygrometer.

**UNIT IV – Thermal conduction and radiation**

Thermal conductivity – Lee’s experiment – properties of thermal radiation – black body – absorptive and emissive power radiation in a uniform enclosure – laws of radiation – Kirchoff’s law – Stefan-Boltzmann law – proof – Newton’s law of cooling – black body spectrum – Wein’s displacement law – Rayleigh-Jean’s law – Planck’s law – deductions from Planck’s law - radiation pressure – surface temperature of the sun.

**UNIT V – Common thermodynamic applications and fuels**

Steam power plants – internal combustion engines – room air conditioner – domestic refrigerator - Fuel cells – Hydrogen/Oxygen cells – hydrocarbon cells – fuels – solid, liquid, gas – non conventional fuels.

**TEXT BOOKS:**

1. College Physics - Volume I & III – N.Sundararajan & others –United Publishers, Mangalore.
2. College Physics - Volume I - A.B.Gupta - Books and allied (P) Ltd,Kolkatta
3. Heat and thermodynamics - Brijlal and Subramaniam

**REFERENCE BOOKS:**

1. Heat & Thermodynamics - Brijlal Subramanian
2. Thermal Physics - Charles Kittel.

<b>IV SEMESTER</b>			
<b>C 4</b>	<b>ELECTRICITY &amp; MAGNETISM</b>		<b>11UCPH41</b>
<b>Hrs / Week : 4</b>	<b>Hrs / Sem : 60</b>	<b>Hrs / Unit :</b>	<b>Credits : 5</b>

**UNIT I - Electrostatics**

Conservative nature of electrostatic field – Gauss' law –proof- Integral form of Gauss's law – surface charge and force on conductors – Laplace equations (one, two and three dimension forms) –The method of electrical images – solutions of laplace equations (cartesion, spherical coordinate forms) .

**UNIT II - Current electricity**

Super position theorem, Reciprocity theorem, Thevenin and Norton theorem– Wheatstone's bridge – sensitiveness of the Wheatstone's bridge – Meter bridge - Carey fosters bridge – LR, RC and L C R circuits – high resistance by leakage.

**UNIT III - Chemical effects of current**

Faraday's laws of electrolysis- silver voltometer - electrolytic conduction – dissociations theory – back emf in electrolysis – cond activity in electrolyte – Kohlraash bridge – ionic velocities and mobilities – experimental determination of ionic mobilities – reversible and irreversible cells(introduction only) – Gibbs helmholtz equation.

**UNIT IV - Magnetic effects of electric current**

Cork screw rule – right hand thumb rule – definition for B - Biort savort's law - Ampere's law – magnetic field due to current in a straight conductor and circular coil – magnetic field due to a solenoid – self induction ,mutual induction – Rayleigh bridge – experiment to find mutual inductance – coefficient of coupling.

**UNIT V - Alternating current**

Measurement of a.c. – a.c. circuit containing L and R – LCR circuits (series and parallel) – theory and applications – power in an a.c. circuit – Kirrchoff's law in a.c. – application of Kirchoff's law – Owen's bridge- Anderson bridge – series and parallel circuits – admittance.

**TEXT BOOKS:**

1. Electricity and magnetism – R.Murugeshan (Revised edition 2008)

**REFERENCE BOOKS:**

1. Electricity and magnetism – D.C.Tayal
2. Electricity and magnetism - Brijlal and N.Subramaniyan.
3. Electricity and magnetism- Ubald Raj & Jose Robin

<b>III &amp; IV SEMESTERS</b>		
<b>CORE PRACTICAL – II (EXAM. END OF IV SEM.)</b>		<b>11UCPH4P</b>
<b>Hrs / Week : 2</b>	<b>Hrs / Sem : 30</b>	<b>Credits : 3</b>

1. Determination of refractive index of glass – Newton’s rings method
2. Grating- Normal incidence- Spectrometer
3. i-d curve- Spectrometer
4. Axial coil –determination of magnetic moment of a magnet
5.  $m$  &  $B_H$ - Deflection Magnetometer & Vibration Magnetometer
6. Calibration of low range voltmeter – Potentiometer
7. Calibration of low range ammeter – Potentiometer
8. LCR series resonance
9. LCR parallel resonance
10. Current and voltage sensitiveness of BG
11. Owen’s bridge
12. Desauty bridge
13. Determination of  $B_H$  using copper voltameter
14. Determination of band gap energy of a thermistor using
15. Carey Foster Bridge

<b>V SEMESTER</b>			
<b>C 5</b>	<b>PHYSICAL OPTICS AND SPECTROSCOPY</b>		<b>11UCPH51</b>
<b>Hrs / Week : 5</b>	<b>Hrs / Sem : 75</b>	<b>Hrs / Unit : 15</b>	<b>Credits : 5</b>

**UNIT I - Interference**

Conditions for interference – interference due to reflected light – Newton’s rings – theory and experiment to find,  $R$  and  $\mu$  refractive index of liquid – Air wedge - theory and expt to find the diameter of a thin wire – testing the planeness of the surface – Michelson’s interferometer – determination of wavelength and thickness of a mica sheet and standardization of metre.

**UNIT II - Diffraction**

Fresnel and Fraunhofer classes of diffraction – zone plate - Fresnel’s diffraction at a straight edge-theory of diffraction grating – determination of wave length – absent spectra –overlapping spectra - Dispersive and resolving powers of a grating – comparison between prism and grating spectrum.

**UNIT III - Polarisation**

Double refraction – Huygen’s explanation- Nicol prism-quarter wave plate and half wave plate- plane, partially, elliptically, and circularly polarized light - their production and detection – optical activity - Fresnel’s explanation-bi quartz polarimeter - determination of specific rotatory power.

**UNIT IV - IR and Raman spectroscopy**

Preliminaries – selection rules –vibrating diatomic molecule – diatomic vibrating rotator – vibration of poly atomic molecules – normal vibration of  $\text{CO}_2$  and  $\text{H}_2\text{O}$  molecules – Biological and other application of IR – theory of Raman scattering – classical, quantum theory – rotational Raman spectrum – application of Raman spectrum.

**UNIT V – ESR, NMR, NQR AND MASSBAUER spectroscopy**

Magnetic properties of nuclei – resonance condition – NMR instrumentation – relaxation process – principles of ESR – ESR spectrometer – hyperfine structure - ESR spectrum of Hydrogen atom – Quadrupole nucleus – principle of NQR – transition for axially symmetric system - transition for non axially non symmetric system – experimental techniques in MASSBAUER spectroscopy – applications.

**TEXT BOOKS:**

1. Optics and Spectroscopy - Murugesan
2. Molecular structure and spectroscopy - G.Aruldas

**REFERENCE BOOKS:**

1. Optics - Brijlal & Subramaniam

V SEMESTER			
<b>C 6</b>	<b>BASIC ELECTRONICS</b>		<b>11UCPH52</b>
<b>Hrs / Week : 5</b>	<b>Hrs / Sem : 75</b>	<b>Hrs / Unit : 15</b>	<b>Credits : 5</b>

### **UNIT I – Special diodes and FETs**

LED – LED voltage and current – advantages – multicolor LEDs – applications of LEDs – photo diode – characteristics – applications – opto isolator – tunnel diode – tunnel diode oscillator – varactor diode – applications – Shockley diode – JFET – construction , working – differences between JFET and BJT – JFET characteristics – parameters – MOSFET – D-MOSFET – E-MOSFET.

### **UNIT II – Transistor amplifier**

Faithful amplification - transistor biasing – inherent variations of transistor parameters – stabilization – stability factor – methods of transistor biasing – practical circuit of a transistor amplifier – phase reversal – DC and AC equivalent circuits - load line analysis – classification of amplifiers – multistage amplifiers – important terms – RC coupled amplifier – transformer amplifier – direct coupled amplifier.

### **UNIT III - Transistor audio power amplifiers**

Difference between voltage and power amplifier – performance quantities of power amplifiers – classification of power amplifiers – thermal runaway – heat sink – stages of a practical power amplifier – driver stage – output stage – push pull amplifier – feedback – principles of negative feedback – advantages – emitter follower – applications of emitter follower – Darlington amplifier.

### **UNIT IV - Oscillators**

Oscillatory circuit - Positive feedback – essentials of transistor oscillator - Barkhasuen criterion – tuned collector, Hartley, Colpitt and phase shift oscillators – Wienbridge oscillator – transistor crystal oscillator - multi vibrators – astable, mono stable, bistable multi vibrators.

### **UNIT V - Power electronics and SCR**

Power electronics – The Triac –Triac construction – operation - applications – The diac – operation – applications – UJT – construction – operation - characteristics – advantages – applications – SCR & SCR as half wave rectifier – construction - working – important terms – characteristics – SCR as a switch.

### **TEXT BOOKS:**

- 1.Principles of electronics – V.K. Mehta and Rohit Mehta – S. Chand & Co. Ltd., New Delhi.
- 2.Electronic fundamentals and applications – John D.Ryder

### **REFERENCE BOOKS:**

1. College Physics - Volume III – N. Sundararajan & others.
2. Electronic principles – sixth edition – Albert Paul Malvino.
3. Electronics - Sanjay Sharma.

V SEMESTER			
<b>C 7 QUANTUM MECHANICS AND STATISTICAL MECHANICS 11UCPH53</b>			
<b>Hrs/Week: 5</b>	<b>Hrs/Sem: 75</b>	<b>Hrs/Unit: 15</b>	<b>Credit: 5</b>

### UNIT I – Wave mechanics

Inadequacy of classical mechanics – black body radiation – specific heat capacity of solids – matter waves – expression for wave length – Davison and Germer experiment – G. P. Thomson experiment – wave packet and its motion – relation between group velocity and wave velocity – Heisenberg’s uncertainty principle – proof – applications.

### UNIT II – General formalism

Schrodinger’s time-independent wave equation - Schrodinger’s time-dependent wave equation – wave function and its interpretation – Normalization of the wave function – symmetric and asymmetric wave functions – probability current density – stationary states – fundamental postulates of quantum mechanics.

### UNIT III– Operators and their properties

Linear operators – identity operator – Hermitian operator – Ladder operator – Laplacian operator – momentum operator – K.E operator – Hamiltonian operator – eigen values and eigen functions of operators – uncertainty principle using operators – orbital angular momentum operator.

### UNIT IV – Bound state

Particle in a one dimensional box – normalization of wave function – particle in a three dimensional box – degeneracy – rigid rotator – linear harmonic oscillator

### UNIT V – Statistical mechanics

Probability – phase space – quantum states – micro states and macro states – fundamental postulates of statistical mechanics – thermodynamic probability – Boltzmann’s relation between entropy and probability – Maxwell-Boltzmann statistics – Bose-Einstein statistics – Fermi-Dirac statistics – comparison of the three statistics.

### TEXT BOOKS:

1. Quantum mechanics – S. P. Singh and M. K. Bagde
2. Statistical mechanics – Gupta and Kumar.
3. Modern Physics – Kakkani.

### REFERENCE BOOKS:

1. Quantum Mechanics - Mathews and Venkatesen
2. Introduction to Quantum Mechanics



<b>V SEMESTER</b>			
<b>CE 1 ( A )</b>	<b>PROGRAMMING IN C++</b>		<b>11UEPH5A</b>
<b>Hrs / Week : 4</b>	<b>Hrs / Sem : 60</b>	<b>Hrs / Unit : 12</b>	<b>Credits : 4</b>

### **UNIT I - Concepts of oops and C++**

Basic concepts of object-oriented programming, application of OOP, What is C++, application of C++ ,a simple C++ program , structure of C++ program , creating the source file, compiling and linking

### **UNIT II - Data types, control structure, functions and arrays**

Identifiers and keywords – constants – C++ operators – declaration of variables – manipulator functions. If, if – else and switch statement – loop statements (for, while, do-while) – breaking control statements (break, continue and go to) - Defining a function – types of functions, actual and formal arguments and default arguments. Array declaration – array initialization – multi dimensional arrays.

### **UNIT III - Classes, objects, constructors and destructors**

Specifying a class, defining member functions, nesting of member functions , arrays within a class, arrays of objects, Constructors, parameterised constructors, multiple constructors in a class, constructors with default arguments, copy constructor, destructors

### **UNIT IV - Operator overloading, inheritance**

Defining operator overloading, overloading unary and binary operators, rules for overloading operators. Defining derived class, single inheritance, multilevel inheritance, multiple inheritance, Hierarchical inheritance, hybrid inheritance

### **UNIT V - Pointers, File handling**

Introduction to pointers, Pointer to objects, pointer to derived classes, C++ streams, C++ stream classes, unformatted I/O operations, formatted console I/O operations, managing output with manipulators.

#### **TEXT BOOKS:**

1. Object oriented Programming with C++ - E. Balagurusamy

#### **REFERENCE BOOKS:**

1. Programming with C++ - D.Ravichandran
2. Programming with C++ - Robert Lofore

<b>V SEMESTER</b>			
<b>CE 1 ( B )</b>	<b>PROGRAMMING IN JAVA</b>		<b>11UEPH5B</b>
<b>Hrs / Week : 4</b>	<b>Hrs / Sem : 60</b>	<b>Hrs / Unit : 12</b>	<b>Credits : 4</b>

**UNIT I**

+Features of Java : History – Characteristics of Java - Developing and Running a Java Program – Structure of a java program – Variables – Features of java – Data types – Type Conversion and casting – arrays – operators – Bitwise Operators – Left shift , right shift – Unsigned right sift operators – relation – Boolean logic – ternary operators

**UNIT II**

Branching and Looping Statements: If, If-else, nested if else, if else if statement – Switch case- while loop- do while- for loop- break, continue and return statement- Classes methods and objects examples-declaring objects – methods in classes – constructors – this keyword - class structure

**UNIT III**

Extension to classes and methods: Methods overloading – passing objects to methods - passing arguments – returning objects – recursion – nested classes – string handling – command line execution – Inheritance: basic concepts – multilevel hierarchy – method overriding – abstract classes – Packages and Interfaces.

**UNIT IV**

Errors and Exception Handling: Compile time, runtime errors – exceptions – try and catch multiple catch- throw – java's built-in-exceptions. Multiple thread programming: java threads creating several threads – deadlock – controls on threads.

**UNIT V**

Input Output Operations: reading characters, sentences, writing to console, file processing, copying files Applets: Various applets: chkr, cs, de, font, ga, lbg, rc, rrc,sp, common.html file. Graphics and Text: lines, rectangles, ellipse, arcs, polygons, paintmode, fonts, text

**TEXT BOOK:**

Programming in java2 – R. Rajaram, SCITECH Publications (India) Pvt Ltd, Chennai 2001

**REFERENCE BOOKS:**

1. Java2 – Complete Reference, Tata McGraw Hill Publications
2. Thomaswu – An Introduction to Object Oriented Programming with Java, Tata McGraw Publications, 2001.

<b>VI SEMESTER</b>			
<b>C 8</b>	<b>DIGITAL ELECTRONICS</b>		<b>11UCPH61</b>
<b>Hrs / Week : 5</b>	<b>Hrs / Sem : 75</b>	<b>Hrs / Unit : 15</b>	<b>Credits : 5</b>

### **UNIT I - Number systems-Codes, Adder & Subtractor**

Decimal, binary, octal, hexadecimal numbers - conversion from one to another – ASCII code, Excess 3 code, BCD, Gray code - binary addition - subtraction, unsigned binary numbers, overflow, sign magnitude numbers, 2's compliment method.

### **UNIT II - Boolean algebra, Half & full adders, subtractors, Karnaugh map-parity**

Boolean algebra OR, AND, NOT, NOR, NAND, EX-OR gates, Demorgan's laws, Boolean laws and theorems-Half adder, full adder, half subtractor, full subtractor - Karnaugh map - 2 variable map, 3 variable map, 4variable map - methods of addressing a cell K map (2, 3, 4 variables) - preparation of truth table from the Karnaugh map - don't care conditions - parity generators – checkers.

### **UNIT III - Clocks, Flip-flops**

Introduction to 555 timer - astable multivibrator - monostable multivibrators – Bistable multivibrators – flipflop logic gates – flipflops - RS flipflop - implementation of RS flip flop using two NOR, NAND gates - clock pulses - clocked RS, JK flipflop - JK flipflop - JK master - slave flipflop - D flipflop - T flipflop.

### **UNIT IV - Registers and Counters**

Shift registers - serial in - serial out – serial in parallel out, parallel in-serial out, parallel in parallel out, Ring counters –Asynchronous counters - synchronous counters - up-down counters (Bi direction counters) - Mod counters (Counter no. 5 & 10).

### **UNIT V- D/A, A/D Conversion**

D/A converter - variable resistor network & binary ladder - A/D converter – simultaneous conversion – Multiplexers – demultiplexers – Decoder – BCD to decimal decoder - seven segment decoders – encoders - decimal to BCD encoder – ROM - Programmable ROMS – RAMS.

### **TEXT BOOKS:**

1. Digital principles - A.P. Malvino & Doald P.Leach

### **REFERENCE BOOKS:**

1. Digital fundamental - T.L. Floyd
2. Digital logic and computer design - Morris Mano

<b>VI SEMESTER</b>			
<b>C 9</b>	<b>MODERN PHYSICS</b>		<b>11UCPH62</b>
<b>Hrs / Week : 5</b>	<b>Hrs / Sem : 75</b>	<b>Hrs / Unit : 15</b>	<b>Credits : 5</b>

**UNIT I - Atomic structure**

The vector atom model - spatial quantization - spinning electron - quantum numbers - coupling schemes - L S coupling and JJ coupling - Pauli's exclusion principle - magnetic dipole moment due to orbital motion of the electron - magnetic dipole due to spin - Stern Gerlach experiment - fine structure of sodium D line - Zeeman effect - experimental arrangement for the normal Zeeman effect.

**UNIT II - X rays and Relativity**

Diffraction of x rays - Bragg's law and Bragg's spectrometer - characteristics and x ray spectra - Mosley's law and its significance - Compton effect theory & experimental verification - Fundamental forms of reference – Michelson-Morley experiment – Einstein's concept of relativity – Special theory of relativity- Lorentz transformation equations- Equivalence of mass & energy.

**UNIT III - Nucleus**

General properties of the nucleus - size, density, charge, spin, nuclear magnetic dipole moment - binding energy - B.E./A curve and its significance - mass defect -packing fraction - proton electron hypothesis - why electrons cannot be present inside the nucleus - proton neutron hypothesis - nuclear forces - characteristics of nuclear forces - liquid drop model - nuclear transmutations.

**UNIT IV - Radio activity**

Natural radio activity - alpha, beta, gamma rays - properties - Soddy fajan's displacement law - natural radio active series - law of radio active disintegration - Half life period - mean life period - units of radio activity - radio carbon dating - simple explanation of alpha decay - beta decay - beta ray spectrum - Gamma decay - nuclear isomers - Mossbauer effect and its applications.

**UNIT V - Nuclear reactors, particle accelerators and detectors**

Nuclear fission - energy released in fission - chain reaction - nuclear reactor - nuclear fusion - condition for fusion to take place - magnetic bottle - fusion reactor - detectors - G.M. counter - scintillation counter - ionization chamber -Wilson cloud chamber - accelerators -linear accelerator - cyclotron - synchrocyclotron – betatron.

**TEXT BOOKS:**

1. Modern Physics - R.Murugesan
2. Atomic and nuclear Physics -Brijlal and Subramaniam

**REFERENCE BOOKS:**

1. Nuclear Physics - D.C.Tayal
2. Modern Physics - J.B. Rajam

<b>VI SEMESTER</b>			
<b>CE 2 ( A )</b>	<b>MATERIAL SCIENCE</b>		<b>11UEPH6A</b>
<b>Hrs / Week : 4</b>	<b>Hrs / Sem : 60</b>	<b>Hrs / Unit : 12</b>	<b>Credits : 4</b>

### **UNIT I - CRYSTAL PHYSICS**

Crystalline solids and amorphous solids – fundamental definitions – symmetry elements – polymorphism and allotropy – nomenclature of crystal directions – Miller indices – crystalline imperfection – Bragg's law and crystal structure.

### **UNIT II - CONDUCTING MATERIALS**

Classical free electron theory – expression for electrical conductivity - factors affecting the conductivity of conductors - thermal conductivity – Weidmann – Franz law - different types of conducting materials.

### **UNIT III - MAGNETIC MATERIALS**

Different types -classical theory of diamagnetism – Langevin's theory of para magnetism - Weiss theory of para magnetism - domain theory of ferro magnetism – hard and soft materials - magnetic recording materials -floppy disks -magnetic tapes.

### **UNIT IV - DIELECTRIC MATERIALS**

Definition in dielectrics - different types - different types of polarization - frequency and temperature effect - dielectric loss - local field – Clausius Mossotti relation – dielectric break down - classification of insulating materials – applications.

### **UNIT V - OPTICAL MATERIALS**

Optical absorption in metals – optical absorption in dielectrics - display devices and display materials - phosphorescence and fluorescence - different phosphors used in CRT screens - Liquid crystal as display material - twisted nematic display – construction and working of LED - LED materials-photo conductivity and photo conducting materials - Shape Memory Alloys (SMA) or Smart materials.

### **TEXT BOOKS:**

1. Material science – Dr.M.Arumugam
2. Material science – Raghavan
3. Material Science for Electronics Engineers – P.K. Palanisamy

### **REFERENCE BOOKS:**

Introduction to Solid State Physics - Charles Kittel

<b>VI SEMESTER</b>			
<b>CE 2 ( B )</b>	<b>NUMERICAL METHODS</b>		<b>11UEPH6B</b>
<b>Hrs / Week : 4</b>	<b>Hrs / Sem : 60</b>	<b>Hrs / Unit : 12</b>	<b>Credits : 4</b>

### **UNIT I - Solutions of Numerical Algebraic and Transcendental equations**

Bisection method – Successive approximation method – Regular falsi method – Newton Raphson method.

### **UNIT II - Solutions of simultaneous linear equations**

Gauss elimination method – Gauss Jordan modification – Gauss Jacobi method – Gauss seidal method

### **UNIT III - Interpolation**

Newton's forward interpolation method - Newton's backward interpolation method – Interpolation method for unequal intervals – Lagrange's method – Inverse interpolation.

### **UNIT IV - Numerical Differentiation and Integration**

Newton Gregory's forward interpolation formula for derivatives – Newton Gregory's Backward interpolation formula for derivatives – Trapezoidal rule – Simpson's 1/3 rule.

### **UNIT V - Numerical solutions of differential equations**

Taylor series method – Runge kutta second order and fourth order method - predictor and corrector method – Milne's predictor – corrector method

### **TEXT BOOK:**

Numerical methods for scientific and engineering computation – Dr. M.K. Venketaraman

### **REFERENCE BOOKS:**

1. Computer Oriented Numerical methods - V. Rajaraman
2. Numerical methods for scientific and engineering computation - M.K. Jain, SR.K Iyenkar, R. K Jain

<b>V &amp; VI SEMESTER</b>		
<b>CORE PRACTICAL – III (EXAM. END OF VI SEM.)</b>	<b>11UCPH6P1</b>	
<b>Hrs/Week: 3</b>	<b>Hrs/Sem:45</b>	<b>Credit: 4</b>

### NON ELECTRONICS

1. Cauchy's constants
2. Hartmann's constants
3.  $i - i'$  curve
4. Oblique incidence – grating
5. Biprism – spectrometer
6. High resistance by leakage method – B.G.
7. Determination of mutual inductance and comparison of mutual inductances – B.G
8. Verification of Thevenin's and Norton's theorems
9. Thermo emf and thermoelectric power – M.G.
10. Elliptical fringes
11. Absolute capacity and figure of merit – B.G.
12. Conversion of a galvanometer into ammeter and voltmeter
13. Planck's constant – Photocell
14. B.H. curve – Hysteresis

<b>V &amp; VI SEMESTERS</b>		
<b>CORE PRACTICAL – IV (EXAM. END OF VI SEM.)</b>	<b>11UCPH6P2</b>	
<b>Hrs / Week : 3</b>	<b>Hrs / Sem : 45</b>	<b>Credits : 4</b>

### **ELECTRONICS**

- 1) Zener regulated power supply
- 2) Dual power supply
- 3) Single stage amplifier – with and without feedback
- 4) Colpitt's oscillator
- 5) Hartley oscillator
- 6) Multivibrator - monostable-555
- 7) Multivibrator - astable-555
- 8) Characteristics of Opto-Electronic Devices (LDR & Photo-Voltaic Cell)
- 9) Characteristics of Opto-Electronic Devices (LED & Photo – Transistor)
- 10) Differentiator & integrator using op-amp
- 11) Half adder & full adder using ICs
- 12) NAND as universal building blocks
- 13) NOR as universal building blocks
- 14) FET characteristics
- 15) Verification of Adder, Subtractor using op-amp



<b>V &amp; VI SEMESTERS</b>		
<b>CORE ELECTIVE</b>	<b>PRACTICAL I (EXAM. END OF VI SEM.)</b>	<b>11UEPH6P</b>
<b>Hrs / Week : 2</b>	<b>Hrs / Sem : 30</b>	<b>Credits : 2</b>

1. To read any two numbers through the key board and to perform simple arithmetic operations (i.e. addition, subtraction, multiplication and division) and display the result using Cin and Cout functions. Use do-while loop.
2. To find the sum of the series using for loop.
  - a. Sum = 1 + 3 + 5 + .....n.
  - b. Sum  $x - x^3/3! + x^5/5! - x^7/7! + \dots xn/n$ .
  - c. Sum = 1 + 2<sup>2</sup> + 4<sup>2</sup> + .....n<sup>2</sup>
3. To find the factorial of a number by using function declaration with/ without using the return statement.
4. To read a set numbers from a standard input device and to find out the largest number in the given array using function declaration. Also sort them in the ascending or the descending order.
5. To read the elements of the given two matrices of order m x n and to perform the matrix addition and display the transpose of the result.
6. Determination of thickness of a wire by air wedge method.
7. Determination of  $m$  and  $B_H$  using inheritance.
8. To generate a series of Fibonacci numbers using constructor where the constructor member function has been defined in the scope of class definition out of the definition using the scope resolution operator.
9. To read the following information from the keyboard in which basic class consists of  
Name, Roll No. and sex. The derived class contains the data member's height and weight. Display the contents of the class using inheritance concept.
10. An OOP to find the period of a pendulum of given length L, in a gravitational field  
Accept the required values using the keyboard. Also display the results.
11. Develop a program in C++ to calculate the Young's modulus of a material from the  
data obtained from uniform bending method.
12. Define a class to represent a bank account  
Data members
  1. Name of the depositor.
  2. Account name
  3. Type of account
  4. Balance amount in the account
 Member function
  1. To assign initial values
  2. To deposit an amount

<b>VI SEMESTER</b>		
<b>P</b>	<b>PROJECT</b>	<b>11UPPH61</b>
<b>Hrs / Week : 5</b>	<b>Hrs / Sem : 75</b>	<b>Credits : 2</b>

**OBJECTIVES:**

At the end of the semester the students should be able to:

1. Identify the potential areas of research in his/her field;
2. Collect data from various sources including the internet, analyze them, make new connections and link them to life.
3. Read and write originally and usefully.

**GUIDELINES:**

1. The project may be done individually or in groups not exceeding five per group.
2. The minimum length of the project should be 30 pages in A4 size.
3. Marks for the project report will be 100 divided as 80% for the presentation of project and 20% for viva-voce.

<b>PART III - ALLIED MATHEMATICS</b> <b>(FOR B.Sc. PHYSICS &amp; CHEMISTR MAJORS)</b> <b>(2011 - 2014)</b>
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<b>I SEMESTER</b>			
<b>A I – P I</b>	<b>STATISTICS, DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS</b>	<b>11UAMA11</b>	
<b>Hrs /Week : 6</b>	<b>Hrs/ Sem : 6 x 15 = 90</b>	<b>Hrs./ Unit : 18</b>	<b>Credits : 5</b>

**UNIT I**

Measures of Central Tendency – simple average – Mean, Median & Mode – Geometrical mean and Harmonic mean.

**UNIT II**

Measures of dispersion range - quartile deviation - standard deviation and mean deviation – coefficient of variation.

**UNIT III**

First order higher degree Differential equations - Solvable for p, x and y - Clairaut's form – linear differential equations with Constant coefficients - particular integrals of the form,  $f(x) e^{ax}$ ,  $x^n$ ,  $e^{ax} x^n$

**UNIT IV**

Linear differential equations with variable coefficients - homogenous equations -equations reducible to homogenous equations - method of variation of parameters.

**UNIT V**

Vector differentiation – gradient - curl – divergence - solenoidal and irrotational vectors - formulae involving gradient, curl and divergent.

**TEXT BOOKS:**

1. Statistics by Dr S. Arumugam and Issac, New Gamma Publications
2. Differential Equations and Applications by Dr. S. Arumugam, New Gamma Publications, Edition 2008
3. Differential Equations and Vector Calculus by Joseph A Mangaladoss – Presi - Persi Publications – Edition 2004
  - UNIT 1 : Text Book 1 - Chapter 2
  - UNIT II : Text Book 1 - Chapter 3
  - UNIT III : Text Book 2 - Chapter 1 - SEC 1.7 and Chapter 2 - SEC 2.3
  - UNIT IV : Text Book 2 - Chapter 2 - SEC 2.4, 2.5
  - UNIT V : Text Book 3 - Chapter 1

**REFERENCE BOOK:**

Differential Equations & Applications by Sankaranarayanan & others

<b>II SEMESTER</b>			
<b>A I – P II</b>	<b>ALGEBRA &amp; CALCULUS</b>		<b>11UAMA21</b>
<b>Hrs /Week : 6</b>	<b>Hrs/ Sem : 6 x 15 = 90</b>	<b>Hrs./ Unit : 18</b>	<b>Credits : 5</b>

**UNIT I**

Every equation  $f(x) = 0$  of degree  $n$  has  $n$  roots - Relation between roots and coefficients - Symmetric functions of roots in terms of coefficients.

**UNIT II**

Sum of the  $r^{\text{th}}$  powers of the roots – Newton’s theorem - Reciprocal equations.

**UNIT III**

Transformation of equations – Descarte’s rules of signs – Rolle’s Theorem  
Approximate solutions of numerical equations using Newton’s method and Horner’s method.

**UNIT IV**

Pedal equatuions - Curvature – Radius of Curvature in Cartesian, parametric & polar co-ordinates – Evolute - Circle and centre of curvature

**UNIT V**

Beta and Gamma functions

**TEXT BOOKS:**

1. Set Theory & Theory Of Equations, Dr.S.Arumugam & Issac New Gamma Publishing House, 2006 Edition
  2. Calculus, Dr.S.Arumugam & Issac, New Gamma Publishing House, 2006 Edition
- UNIT I : TEXT BOOK 1 - CHAPTER 5 - SECTION 5.1, 5.2  
 UNIT II : TEXT BOOK 1 - CHAPTER 5 - SECTION 5.3, 5.4  
 UNIT III : TEXT BOOK 1 - CHAPTER 5 - SECTION 5.5, 5.7,5.10  
 UNIT IV : TEXT BOOK 2 - PART I - CHAPTER 3 - SECTION 3.3, 3.4  
 UNIT V : TEXT BOOK 2 - PART II - CHAPTER 4

**REFERENCE BOOKS:**

1. Classical Algebra by Joseph A. Mangaladoss.
2. Algebra Volume I & II by T.K.Manicavachagom pillay, T.Natarajan & K.S.Ganapathy

PART III - ALLIED CHEMISTRY			
III SEMESTER			
AII – P 1	ALLIED CHEMISTRY - I		11UACH31
Hrs / Week : 4	Hrs / Sem : 60	Hrs / Unit : 12	Credit : 4

#### UNIT I - NUCLEAR CHEMISTRY

**Objective:** To study the nuclear stability and nuclear reaction.

Fundamental particles of Nucleus – isotopes, isobars, isotones and isomers – differences between chemical reactions and nuclear reactions. Fusion and fission and its applications – Radio active series, group displacement law – Mass defect Radioactive equilibrium,  $\beta^-$  electron capture – Applications of radio isotopes, carbon dating, rock dating and medicinal applications.

#### UNIT II - INDUSTRIAL CHEMISTRY

**Objective:** To know the idea about fuels, fertilizers and water.

Fuels – Classification - gaseous fuels like water gas, producer gas, liquefied petroleum gas, gobar gas, compressed natural gas. Fertilizers - classification-urea, ammonium sulphate, superphosphate, triple super phosphate, potassium nitrate-manufacture and uses- biofertilizers and their advantages.

Hardness of water: temporary and permanent hardness, disadvantages of hard water – Softening of hard water – Zeolite process, demineralization process and reverse osmosis - sterilisation of water for domestic use by chlorine, Ozone and UV light. Water quality parameters and their standard values.

#### UNIT III - AMINO Acids

**Objectives:** To Know the chemistry of proteins and aminoacids.

Different classifications, properties of amino acids. Optical activity, isoelectric point & zwitter ion -Reaction due to amino group, carboxylic acid group - Action of heat on alpha, beta and gamma amino acids. Classification of proteins based on shape, solubility, composition and biological function - Biological actions of proteins Primary, secondary, tertiary quaternary structure of proteins (elementary treatment only).

#### UNIT IV - Lipids

**Objectives:** To Know the chemistry of lipids

Definition and classification of fatty acids - Saturated, unsaturated and cyclic fatty acids. Triacylglycerol. Acid number, iodine number and saponification number. Saponification and rancidity. Occurrence and functions of phospholipids - lecithin, Cholesterol-structure, colour reaction, biochemical function and biological importance.

#### UNIT V - Nucleic Acids

**Objective:** To study the structure and functions of Nucleic acids.

Bases-structure of purines, pyrimidines bases which commonly occur in nucleic acids, structure and biochemical function of nucleosides, deoxy nucleosides nucleotides, deoxy nucleotides. Watson and Crick DNA structure - RNA – Different types (mRNA, tRNA & rRNA) and structure of tRNA only. Genetic code – Triplet code of 20 amino acids.

#### REFERENCE BOOKS:

1. Nuclear chemistry – Gopalan
2. Industrial Chemistry – B.K. Sharma
3. Bio-Chemistry – Jain

IV SEMESTER			
<b>AI – P 2</b>	<b>Allied Chemistry - II</b>		<b>11UACH41</b>
<b>Hrs / Week : 4</b>	<b>Hrs / Sem : 60</b>	<b>Hrs / Unit : 12</b>	<b>Credit : 4</b>

### UNIT I - CO-ORDINATION CHEMISTRY – THEORY AND APPLICATION

**Objectives:** To understand co – ordinate bonding in molecules and the theories related to this bonding. Also to know the chelation and its applications.

Definition of terms – Classification of ligands – Nomenclature - Chelation – EDTA and its applications – Werner’s theory – Effective atomic number, Pauling’s theory – Postulates – Application to  $(Ni(CO_4))$ ,  $(Ni(CN)_4)^{2-}$ ,  $(Co(CN)_6)^{3-}$  - merits and demerits of Werner and Pauling’s theory. Application of co – ordination compounds in qualitative and quantitative analysis and in pharmaceutical industries.

### UNIT II – CARBOHYDRATES

**Objectives:** To understand the chemistry of carbohydrates such as glucose, fructose, Starch.

Classification – Preparation and reactions of glucose and fructose. Ascending and descending the series – Discussion of open and ring structure of glucose – mutarotation – interconversion of glucose to fructose and vice versa – Preparation and properties and structure of sucrose. General properties and uses of starch and cellulose.- Differences between starch and cellulose, Structure of starch and cellulose

### UNIT III – PROTEINS

**Objectives:** To know the chemistry of proteins and amino acids.

To understand the peptide linkages in these biopolymers.

Amino acids – classifications, proteins – classification according to composition, functions and shape – Denaturation and colour reactions of proteins – structure of proteins – Nucleic acids – DNA and RNA – their components and their biological functions.

### UNIT IV – ELECTROCHEMISTRY

**Objectives:** To understand the principle of electrochemical reactions.

To appreciate the behaviour of electrolytes.

Specific conductance, Ionic conductance, molar conductance, Equivalent conductance. Definition of pH and its determination by colorimetric method – Buffer Solution – Henderson’s equation – Application of pH and buffer in biological systems Galvanic cells – EMF and electrode potential – reference electrodes – electrochemical series and its applications – different types of cells – primary cell, secondary cell and fuel cells – Corrosion and its prevention.

### UNIT: V ANALYTICAL CHEMISTRY

**Objectives:** To understand the principles of chemical analysis qualitative and quantitative.

To know separation techniques and spectroanalytical techniques.

Introduction to Qualitative and Quantitative analysis Principle of volumetric analysis – Error analysis – types of errors minimizing errors – accuracy and precision P Methods of expression precision, mean, median, mean deviation, standard deviation and confidence limit.

Chromatographic separations – Principles and application of column, paper, thin layer and ion exchange.

### REFERENCE BOOKS:

1. Inorganic Chemistry – Madan, Tuli and Malik
2. Organic Chemistry – I.L. Finar
3. Bio-Chemistry - Jain
4. Analytical chemistry – Gopalan
5. Physical chemistry – Puri and Sharma

III & IV SEMESTERS		
A II P	Allied II PRACTICAL (Exam. at the end of IV Sem.)	11UACH4P
Hrs / Week: 2	Hrs / Sem : 60	Credit : 2

### QUALITATIVE ANALYSIS

Analysis of a simple salt containing one anion and one cation .

#### Anions:

- |              |             |             |              |
|--------------|-------------|-------------|--------------|
| 1. Carbonate | 2. Sulphate | 3. Nitrate  | 4. Chloride  |
| 5. Oxalate   | 6. Borate   | 7. Fluoride | 8. Phosphate |

#### Cations:

- |              |              |             |           |
|--------------|--------------|-------------|-----------|
| 1. Lead      | 2. Copper    | 3. Cadmium  | 4. Nickel |
| 5. Manganese | 6. Strontium | 7. Ammonium |           |

#### Note:

- Elimination should be avoided.
- Interfering radicals with cations of group III, IV, V may be avoided.

### VOLUMETRIC ANALYSIS

#### Acidimetry - alkalimetry:

- Estimation of Sodium Hydroxide – Sodium carbonate standard and HCl link.
- Estimation of Sulphuric Acid – Oxalic acid standard and Sodium hydroxide link.
- Estimation of  $\text{Na}_2\text{CO}_3$  – Sodium carbonate standard and HCl Link.

#### Permanganometry:

- Estimation of Ferrous iron – Ferrous ammonium sulphate standard and  $\text{KMnO}_4$  link.
- Estimation of Sodium Oxalate – Oxalic acid standard and  $\text{KMnO}_4$  link .
- Estimation of Oxalic acid – FAS standard and  $\text{KMnO}_4$  link .

#### Dichrometry:

- Estimation of  $\text{K}_2\text{Cr}_2\text{O}_7$  – standard  $\text{K}_2\text{Cr}_2\text{O}_7$  and Thio link
- Estimation of Copper – Standard potassium dichromate and sodium thiosulphate link

#### Complexometry:

- Estimation of Zinc by EDTA method – Standard Zinc sulphate and EDTA link

## PART IV- SKILL BASED ELECTIVE

<b>I SEMESTER</b>			
<b>SBE 1</b>	<b>COMPUTER BASICS</b>		<b>11SEPH11</b>
<b>Hrs / Week : 3</b>	<b>Hrs / Sem : 45</b>	<b>Hrs / Unit : 9</b>	<b>Credits : 2</b>

### **UNIT I - Introduction to computers**

Introduction – Characteristics of Computers – Evolution of Computers – Generations of Computers – classification of Computers – The Computer system – Applications of Computers

### **UNIT II - Peripheral devices & operating System**

Input devices – output devices – Primary memory & Secondary storage devices - operating system

### **UNIT III - Computer Programming**

Introduction – developing a program – Algorithm – Flowchart - Pseudo code – program testing & debugging – Unstructured Programming – Structural Programming – Characteristics of a Good Program – Programming languages (Machine, Assembly & High-level languages).

### **UNIT IV - Windows XP**

What is windows – starting windows XP – The Desktop – start button – log off/Turn off the computer – structure of window – moving a window – maximizing , minimizing and restoring a window – closing a window – standard buttons on toolbar – folder options – copying and moving files/folders - deleting files/folders – creating a new file/folder – rename a file/folder – install and uninstall programs – starting and closing program – starting a program using run – printer setup – printing documents

### **UNIT V - Internet**

Introduction – Evolution of internet – Basic internet terms – Getting connected to internet – Internet applications ( world wide web, E-mail, Internet Telephony & video conferencing ) – How E-Mail works – Searching the web.

#### **TEXT BOOKS:**

1. Windows XP in easy steps – Harshad Kotecha
2. Introduction to Computer Science – IITL Education Solutions Limited

#### **REFERENCE BOOKS:**

1. Computer fundamentals and windows with internet technology - N .Krishnan



<b>II SEMESTER</b>			
<b>SBE 2</b>	<b>ENERGY PHYSICS</b>		<b>11SEPH21</b>
<b>Hrs / Week : 3</b>	<b>Hrs / Sem : 45</b>	<b>Hrs / Unit : 9</b>	<b>Credits : 2</b>

### **UNIT I - Energy**

Energy consumption - Energy consumption as a measure of prosperity –World production and reserves of commercial energy sources-India's production and reserves of commercial energy sources - need for alternative energy sources - different non-conventional renewable energy sources - advantage of non-conventional renewable energy sources.

### **UNIT II - Solar Radiation and Collectors**

Solar radiation at the earth's surface - beam and diffused solar radiation - attenuation of beam radiation by absorption and scattering - solar radiation geometry-declination, hour angle, altitude angle (solar altitude), zenith angle, the slope, day length - Flat plate collectors - liquid collector - air collector - concentrating collectors - line focusing collectors - Fresnel's lens collector - point focusing collector (paraboloidal type) - Advantages and disadvantages of concentrating collectors over flat-plate collector.

### **UNIT III - Solar Energy Storage & Applications**

Thermal storage - sensible heat storage, water storage, packed bed exchanger storage, latent heat storage (phase change energy storage) - solar pond -Principle of operation and description of non-convective solar pond - extraction of thermal energy from solar pond - solar water heating (hot water supply system) - natural circulation solar water heater - forced circulation - space heating (passive heating only) - solar distillation - solar furnace & solar cooking.

### **UNIT IV Wind Energy**

Introduction - Nature of the wind - Wind energy conversion - Site selection considerations - Basic components of a Wind Energy Conversion Systems (WECS) - Advantages & Disadvantages of WECs – Wind energy collectors - Horizontal Axial machines – Applications of wind energy.

### **UNIT V Energy from Biomass**

Biomass as a source of energy – Photosynthesis – Methods for obtaining energy from Biomass – Biomass conversion – Biofuels – Bio-gas generation – Materials used for Bio-gas Generation – fuel properties of Bio-gas – Classification of Bio-gas plants.

#### **TEXT BOOK:**

1. Non-conventional energy sources - G.D. Rai, Fourth Edition, Khanna Publishers, 1996

#### **REFERENCE BOOKS:**

1. Solar energy - Thermal conversion – Suhatme
2. Solar Energy - Fundamentals & Applications

<b>III SEMESTER</b>			
<b>SBE 3</b>	<b>Laser and its applications</b>		<b>11SEPH31</b>
<b>Hrs/Week: 3</b>	<b>Hrs/Sem: 45</b>	<b>Hrs/Unit: 9</b>	<b>Credit: 2</b>

### **Unit – 1 – Principles of Lasers**

Basic principles of laser – characteristics of laser – emission and absorption of radiation – Einstein's coefficients – laser operation – expression for threshold gain – population inversion – active medium – optical feedback.

### **Unit – 2 – Optical resonator**

Resonators – types of resonators – cavity stability and ABCD matrix – stability diagram – modes of resonators – open planar resonator – laser threshold – Q-factor – Q-switching – coherence and directionality of lasers.

### **Unit – 3 – Types of laser**

Solid lasers – Ruby laser – Nd : YAG laser – Nd : YAG glass laser – semiconductor diode laser – Gas lasers – He-Ne laser – Argon ion laser – CO<sub>2</sub> laser – Liquid laser – dye laser.

### **Unit – 4 – Applications of lasers**

Laser drilling – laser welding – laser cutting – lasers in environmental analysis – laser remote sensing – LIDAR – Raman LIDAR.

### **Unit – 5 – Holography**

Holography principle – recording of Hologram – reconstruction of images – characteristics of holograms – applications of Holography – applications of lasers in medicine and surgery.

#### **TEXT BOOKS:**

1. Holography and its applications – Ostrosky.
2. Lasers and optical instruments – Nagabhushana and Sathyanarayana.

#### **REFERENCE BOOKS:**

1. Laser technology and applications – S. L. Marshall.
2. Laser and non linear optics – B. B. Laud.
3. Laser and its Applications – Jose Robin & Ubald Raj

IV SEMESTER			
<b>SBE 4</b>	<b>Introduction to Nanotechnology</b>	<b>11SEPH41</b>	
<b>Hrs/Week: 3</b>	<b>Hrs/Sem: 45</b>	<b>Hrs/Unit: 9</b>	<b>Credit: 2</b>

### **Unit – 1 – Nanotechnology – an overview**

Background and evolution of Nanotechnology – size of nano – opportunities – processes of making nanoparticles (briefly) – atoms, molecules, ion and their size – molecular recognition.

### **Unit – 2 – Fabrication of nanostructures**

Solid state synthesis – vapour phase synthesis – inert gas condensation – plasma based synthesis – flame based synthesis – spray pyrolysis – solution processing of nanoparticles – Sol gel processing – water-oil micro emulsion method.

### **Unit – 3 – Characterization on nanostructures**

Lithography techniques – electron beam lithography – Dip-pen lithography – photo lithography – thin film deposition – electro spinning – Atomic force microscope – FTIR – Differential scanning calorimetry – Scanning electron microscope – Transmission electron microscope.

### **Unit – 4 – Applications of nanotechnology**

Fabrication, properties and applications of quantum dots – quantum wires – quantum well – Fullerenes – carbon nano tubes – quantum point contact – nano crystals and their applications – nano electronics Moore's law – Nano circuitry.

### **Unit – 5 – Nano medicine and nano biology**

Basic concepts – nano biotechnological devices – applications nano biotechnology – biosensors – nano biosensors – applications of nano biosensors – nano DNA technology – building blocks of DNA – DNA sensors – Optical biosensors.

#### **TEXT BOOKS:**

1. Nano technology – S. Shunmugam.
2. Nano Biotechnology – Subbiah Balaji.

#### **REFERENCE BOOKS:**

1. Nano technology – an introduction – Mark Ratner and Daniel Ratner.
2. Nano : The essentials – T. Pradeep.

<b>V SEMESTER</b>			
<b>SBE 5</b>	<b>COMMUNICATION ELECTRONICS</b>	<b>11SEPH51</b>	
<b>Hrs / Week : 3</b>	<b>Hrs / Sem : 45</b>	<b>Hrs / Unit : 9</b>	<b>Credits : 2</b>

### **UNIT I - Radio communication system**

Introduction to communication system – Need for modulation – amplitude modulation (AM) – its frequency spectrum – AM transmitter – Frequency Modulation – its frequency spectrum - FM transmitter - comparison of AM and FM.

### **UNIT II - Pulse Communication**

Introduction – types of pulse modulation – Pulse Amplitude Modulation – Pulse Width Modulation – Pulse Code Modulation – frequency division multiplexing – time division multiplexing – telegraphy – Telemetry.

### **UNIT III - Digital Communication**

Principle – types of data transfer – characteristics – digital codes – modem – Network organization – types of networks – network protocol – E-mail – Internet

### **UNIT IV - Broad band Communication**

Microwave links – principle and design – repeaters – satellite communication – characteristics – earth station – satellite construction – radar system – CW radar system – pulsed radar system.

### **UNIT V - Optical Communication**

Optical fibre – characteristics of optical fibre – fibre losses - fibre testing – source (Laser diode) – detector (PIN diode & APD) – splicing – optical connectors – optical communication

#### **TEXT BOOKS:**

1. Principles of Communication K.S. Srinivasan
2. Communication Electronics - Jose Robin & Ubald Raj

#### **REFERENCE BOOKS:**

1. Electronics communication system – George Kennedy and Bernard Davis
2. Principle of communication system – Tananbank Schillins
3. Communication Engineering - Srinivasan
4. Optical Fibre communication – Gerd Keisser.

<b>VI SEMESTER</b>			
<b>SBE 6</b>	<b>Biomedical instrumentation</b>		<b>11SEPH61</b>
<b>Hrs/Week: 3</b>	<b>Hrs/Sem: 45</b>	<b>Hrs/Unit: 9</b>	<b>Credit: 2</b>

### **Unit – 1 – Bio potential**

Transport of ions through cell membrane – resting and action potentials – bio potentials – bio electric signals and their characteristics – designing of medical instruments – components of bio medical instrumentation system.

### **Unit – 2 – Transducers**

Transducers – active transducers – Strain gauge – photo electric type resistive transducers – metallic wire transducer – capacitative transducer – piezoelectric ultrasonic type transducer

### **Unit – 3 – Bio potential recorders**

Characteristics of recording systems – electro cardiograph (ECG) – electro encephalo graphy (EEG) – electro myography (EMG) – electro retinography (ERG) – electro oculo graphy (EOG) – accuracy of recorders

### **Unit – 4 –Diagnostic instruments**

Blood flow meters – EM blood flow meter – principle and applications – ultrasonic blood flow meter – blood gas analyzer – pH meter – oximeter – digital thermometer – audio meter – angiography – applications of X-rays – electron microscope

### **Unit – 5 – Advances in biomedical instrumentation**

Computers in medicine – lasers in medicine – endoscope – nuclear imaging technique – CT scan – applications of computer tomography – medical applications of thermography – imaging system – magnetic resonance imaging

#### **TEXT BOOKS:**

1. Biomedical instrumentation – M. Arumugam.
2. Biomedical Instrumentation - Rekhs & Ravikumar

#### **REFERENCE BOOK:**

Hand book of biomedical instrumentation – R. S. Khandpur.

**PART IV – NON-MAJOR ELECTIVE PAPER OFFERED BY  
PHYSICS DEPARTMENT TO OTHER MAJOR STUDENTS  
(2011 -2012 ONWARDS)**

<b>III SEMESTER</b>			
<b>NME1</b>	<b>OFFICE AUTOMATION</b>		<b>11NEPH31</b>
<b>Hrs / Week: 3</b>	<b>Hrs / Sem: 45</b>	<b>Hrs / Unit: 9</b>	<b>Credits: 2</b>

**UNIT 1**

Introduction of Office 2000: Exploring common features in Office. Working with files. Editing in Office 2000, Selecting, moving and Copying – Fonts and font styles. Mastering the basics of Word Creating Word documents – Editing document Texts – applying Text enhancements. Aligning and Formatting, adding Lists, Numbers, Symbols, Date and time, Replacing and checking text, getting into print.

**UNIT II**

Word: Applying advanced formatting techniques: Formatting pages. Working with Columns, Constructing high quality tables, Creating outlines in Word. Working with complex Documents

**UNIT III**

Managing data with Word, creating customized Merge Documents, Publishing online forms, adding reference to documents, working together on documents.

**UNIT IV**

Excel: Creating Excel Worksheet: Entering and editing Cell entries, Working with numbers, changing worksheet layout, other formatting options, Printing in Excel, using functions and references, naming ranges, creating easy to understand charts, using custom and special effects, using financial and statistical functions. Tracking and analyzing data with Excel, auditing Worksheet.

**UNIT V**

PowerPoint: Creating Power Point presentation: Creating a Basic Presentation, building presentations, modifying visual elements, formatting and checking text, adding objects, applying transitions, animations effects and linking, preparing handouts, taking the show on the road.

**TEXT BOOK:**

Gini Courter & Anette Marquis – MICROSOFT OFFICE 2000 No Experience required, BPB Publications.

**REFERENCE BOOK:**

Stephn L. Nelson – Office 2000 The Complete Reference, Tata McGraw Hill publishing Company Limited.

<b>IV SEMESTER</b>			
<b>NME2</b>	<b>PHYSICS FOR COMPETITIVE EXAMINATIONS</b>	<b>11NEPH41</b>	
<b>Hrs / Week: 3</b>	<b>Hrs / Sem: 45</b>	<b>Hrs / Unit: 9</b>	<b>Credits: 2</b>

### **UNIT I - Mechanics, Properties of Matter And Sound**

Units and dimensions – Laws of motion with applications – force- momentum – work energy – power – rigid body rotation – gravitation – surface tension – viscosity – Bernouli's equation – with applications – Hooke's law – stress, strain – Elastic modulus – Theory of relativity.

Simple Harmonic Motion – vibrations of air columns, strings and rods – ultrasonic waves and their application – Doppler effect

### **UNIT II - Thermal Physics and Optics**

Thermometry - Specific heat of solids, liquids and gases – Transport phenomenon – Conduction, Convection and radiation – Blackbody radiation.

Optical instruments – defects in images- velocity of light – Interference – Diffraction – Scattering of light – Lasers and their applications.

### **UNIT III - Electricity and Magnetism**

Electric charge, fields and potentials – Coulomb's law- Ohm's law – resistor – capacitor – Krichoff's laws Alternating currents and transient response of LCR series and parallel circuits: Resonance, Q factor and damping factor – Magnetic fields – Magnetic materials – electromagnetic induction – Transformers – Thermo electric effects and their applications – Electromagnetic waves.

### **UNIT IV - Modern Physics**

Photo electric effect – wave nature of matter – Radioactivity – Nuclear fission and fusion – elementary particles and their classifications.

### **UNIT V - Electronics**

P – N junction diodes – Bipolar transistors – FET –SCR – UJT – Circuits for verification, clipping and clamping – applications – Transistor amplifier and oscillators – Logic gates.

### **REFERENCE BOOKS:**

1. Objective Physics by Kakkani
2. Physics for civil Services preliminary examination – Competition success review, Sudha Publications (p) Ltd, New Delhi