

**SADAKATHULLAH APPA COLLEGE (AUTONOMOUS)**  
**RAHMATH NAGAR - 627 011**  
**DEPARTMENT OF PHYSICS, B.Sc. Physics – Syllabus**  
**(Applicable for students admitted in June 2015 and onwards)**

<b>Semester</b>	<b>Subject</b>	<b>Title of paper</b>	<b>Subject code</b>	<b>Percentage change in syllabus</b>
1	C 1	Physical Optics and Lasers	15UPHC11	40
	C 2	Basic Physics	15UPHC12	No Change
2	C 3	Thermal Physics	15UPHC21	25
	C 4	Mechanics and Astrophysics	15UPHC22	10
	CP 1	Core Physics Practical – I	15UPHC2P	No Change
3	C 5	Electricity	15UPHC31	20
	AII1	Allied Physics – I	15UPHA31	10
	NME1	Basic Physics – I	15UPHN31	New Paper (100)
4	C 6	Electro Magnetism	15UPHC41	100 (New Paper)
	CP II	Core Physics Practical – II	15UPHC4P	20
	SBE2	Programming in C++	15UPHS41	10
	AII2	Allied Physics – II	15UPHA41	25
	AIIP	Allied Physics Practical	15UPHA4P	15

	NME2	Basic Physics – II	15UPHN41	New Paper(100)
5	C 7	Modern Physics & Spectroscopy	15UPHC51	40
	C 8	Basic Electronics	15UPHC52	No Change
	C 9	Energy Physics	15UPHC53	5
	CP III	Core Physics Practical – III	-	5
	CP IV	Core Physics Practical – IV	-	15
	CE1	A)Digital Electronics <b>OR</b>	15UPHE5A	5
		B)Biomedical Instrumentation	15UPHE5B	No Change
6	C 10	Quantum Mechanics and Statistical Mechanics	15UPHC61	No Change
	C 11	Communication Electronics	15UPHC62	15
	C 12	Project	15UPHP61	No Change
	CE 2	A) Introduction to Nanotechnology <b>OR</b>	15UPHE6A	20
		B) Computer Oriented Numerical	15UPHE6B	No Change



		Methods		

$$\% \text{ of Revision} = 580 / 2700$$

$$= 21.48 \%$$

# **SADAKATHULLAH APPA COLLEGE**

**(AUTONOMOUS)**

**(Reaccredited by NAAC at an 'A' Grade with a CGPA of 3.40 out of 4.00 in the III cycle An ISO 9001:2008 Certified Institution)**

**RAHMATH NAGAR, TIRUNELVELI- 11.**

**Tamilnadu**

## **DEPARTMENT OF PHYSICS**



### **CBCS SYLLABUS**

**For**

### **B.Sc. Physics**

**(Applicable for students admitted in June 2015 and onwards)**

**(As per the Resolutions of the Academic Council  
Meeting held on 23.02.2016)**



<b>B.Sc. (PHYSICS) – CBCS SYLLABUS (2015 – 2016)</b>		
<b>PART III – CORE, CORE ELECTIVE &amp; PROJECT</b>		
<b>I SEMESTER</b>		
<b>C1</b>	<b>PHYSICAL OPTICS AND LASERS</b>	<b>15UPHC11</b>
<b>Hrs/Week: 4</b>	<b>Hrs/Sem: 4x15= 60</b>	<b>Hrs./ UNIT : 12      Credit: 5</b>

**UNIT I Interference**

Conditions for interference – interference due to reflected light – Newton's rings – theory and experiment to find  $R$  and refractive index of liquid – Air wedge – theory and experiment 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.

**UNIT II Diffraction**

Fresnel and Fraunhofer classes of diffraction – 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 Principle and types of Lasers**

Basic principle of laser – characteristics of laser – Einstein's coefficients – population inversion – expression for threshold gain. Solid lasers – Ruby laser – Nd : YAG laser – Nd : YAG glass laser – Gas lasers – He – Ne laser – CO<sub>2</sub> laser – Liquid laser – dye laser.

**UNIT V Applications of lasers**

Laser drilling – laser welding – laser cutting – laser remote sensing – LIDAR – Raman LIDAR – Principle of Holography – recording and of reconstruction Hologram – characteristics of holograms – applications of Holography – applications of lasers in medicine and surgery.

**TEXTBOOKS:**

1. Optics and Spectroscopy – Murugesan and Kiruthiga Sivaprasath – (7<sup>th</sup> edition) – S.Chand & Co., New Delhi.
2. Laser Physics – S.Mohan, V.Arjunan & Selvarani, MJP Publishers, Chennai.

**REFERENCE BOOKS:**

1. Optics – Brijlal & Subrahmaniam – 23<sup>rd</sup> Edition – S.Chand & Co., New Delhi.
2. Atoms, Molecules and Lasers – KPR Nair – Narosa Publishing House, New Delhi.



<b>I SEMESTER</b>			
<b>C2</b>	<b>BASIC PHYSICS</b>		<b>15UPHC12</b>
<b>Hrs/Week: 3</b>	<b>Hrs/Sem: 3x15= 45</b>	<b>Hrs./ UNIT : 9</b>	<b>Credit: 4</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 (Scale & Telescope) – uniform bending (Pin & Microscope) – 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, 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 applications.

**UNIT V Electronics**

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

**TEXTBOOKS:**

1. College Physics – Volume I & III – N. Sundararajan & others – United Publishers, Kodialbail, Mangalore – 575 003.
2. Text Book of Sound – Brijlal and Subrahmanyam – Vikas Publishing Pvt. Ltd, New Delhi.
3. Principles of Electronics – V.K.Mehta and Rohit Mehta – S.Chand & Co. Ltd. New Delhi.

**REFERENCE BOOKS**

1. Properties of Matter – R.Murugesan – S.Chand & Co. Ltd. New Delhi.
2. Text book of optics – Brijlal & Subrahmanyam – S.Chand & Co. Ltd. New Delhi.



II SEMESTER			
C3	THERMAL PHYSICS		15UPHC21
Hrs/Week: 4	Hrs/Sem: 4x15= 60	Hrs./ UNIT : 12	Credit: 5

### UNIT I Kinetic theory

Mean free path – Expression for mean free path – Brownian motion – Degrees of freedom and the ratio of specific heat capacities of mono, dia 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

Zeroth law of thermodynamics – First law of thermodynamics – Application of first law (Specific heat relation and adiabatic equation) – 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 .

### UNIT III Low temperature

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 – expression for the change in temperature.

### UNIT IV Transmission of heat

Types – 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 – Pressure of radiation – Stefan – Boltzmann law – Distribution of energy in black body spectrum – Wein's displacement law – Rayleigh – Jean's law – Planck's law – deductions from Planck's law .

### UNIT V Common thermodynamic applications

25 Practical applications of conduction of heat – Davy's safety lamp – applications of convection – Thermopile – Steam power plants – examples of cooling by evaporation – domestic refrigerator – ammonia ice plant – Air conditioning systems (summer and winter type)

#### TEXTBOOK:

Heat and Thermodynamics – Brijlal , Subrahmanyam and Hemne (revised edition 2010) – S.Chand & Co. Ltd. New Delhi.

#### REFERENCE BOOKS:

1. Heat & Thermodynamics – Brijlal & Subrahmanyam, S.Chand & Co. Ltd. New Delhi.
2. College Physics – Volume I & III – N.Sundararajan & others –United Publishers, Mangalore.
3. College Physics – Volume I – A.B.Gupta – Books and allied (P) Ltd, Kolkatta.



II SEMESTER			
<b>C4</b>	<b>MECHANICS AND ASTROPHYSICS</b>	<b>15UPHC22</b>	
<b>Hrs/Week: 3</b>	<b>Hrs/Sem: 3x15= 45</b>	<b>Hrs./ UNIT : 9</b>	<b>Credit: 4</b>

### UNIT I Frictional & Rotational motion

(Friction between solid surfaces – Coefficient of Static, Kinetic & Rolling friction – Laws of friction) – 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.

### 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 – coefficient 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 – 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.

#### TEXTBOOKS:

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 Subrahmanyam – S.Chand & Co. Ltd. New Delhi.
2. Mechanics & Electrodynamics – Brijlal and Subrahmanyam, S.Chand & Co. Ltd. New Delhi.



I & II SEMESTERS			
CP1	PHYSICS CORE PRACTICAL - I*		15UPHC2P
Hrs/Week: 3	Hrs/Sem: 3x15=45	Hrs./ UNIT : 9	Credit: 3

\* Examination at the end of II Semester

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

No change



<b>III SEMESTER</b>			
<b>C5</b>	<b>ELECTRICITY</b>		<b>15UPHC31</b>
<b>Hrs/Week: 3</b>	<b>Hrs/Sem: 3x15= 45</b>	<b>Hrs./ UNIT : 9</b>	<b>Credit: 4</b>

### **UNIT I Electrostatics**

Electric dipole – Field intensity at any point due to a dipole – Gauss's law and its proof – applications (spherical charge and plane sheet of charge distribution) – mechanical force experienced by a charged conductor – conservative nature of electric potential – parallel plate capacitor – effect of dielectric – partially filled dielectric capacitor.

### **UNIT II Current electricity**

Thevenin and Norton theorem – Wheatstone's bridge – sensitiveness of the Wheatstone's bridge – Meter bridge – Carey Foster's bridge – LR, RC and LCR series circuits – high resistance by leakage.

### **UNIT III Chemical effects of current**

Faraday's laws of electrolysis – electrolytic conduction – dissociation theory – conductivity in electrolyte – Kohlrausch bridge – ionic velocities and mobilities – experimental determination of ionic mobilities – reversible and irreversible cells (introduction only) – Gibbs Helmholtz equation.

### **UNIT IV Thermo electricity**

Seebeck, Peltier and Thomson effect – laws of thermo emf – Thermodynamics of a thermo couple – thermo electric power diagram – uses – applications – measurement of thermo emf by potentiometer – application of thermo electric effect – Boy's radiometer – pyrometer – thermopile.

### **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 – Kirchhoff's law in a.c. – application of Kirchhoff's law – Owen's bridge – Anderson bridge – series and parallel circuits.

### **TEXTBOOK:**

Electricity and magnetism – R. Murugesan (Revised edition 2008), S. Chand & Co. Ltd. New Delhi.

### **REFERENCE BOOKS:**

1. Electricity and magnetism – D.C. Tayal, Himalaya Publishing Home, Mumbai - 400 004.
2. Electricity and magnetism – Brijlal and N. Subramaniyan. Ratan Prakashan Mandir, Professor Colny, Agra - 2.
3. Electricity and magnetism – Ubald Raj & Jose Robin, Indira Publication, Marthandam, K.K. Dist., T.N.



III & IV SEMESTERS			
CP2	PHYSICS CORE PRACTICAL - II*		15UPHC2P
Hrs/Week: 3	Hrs/Sem: 3x15=45	Hrs./ UNIT : 9	Credit: 3

**\*Examination at the end of VI semester**

1. Determination of refractive index of glass – Newton's rings ✓
2. Grating – Normal incidence – Spectrometer ✓
3. Spectrometer Grating – Oblique incidence ✓
4. Axial coil – determination of magnetic moment of a magnet ✓
5.  $m$  &  $B_H$  - Deflection Magnetometer & Vibration Magnetometer Tan C method ✓
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 Axial Coil method
14. Carey Foster Bridge Determination of specific resistance ✓



<b>IV SEMESTER</b>			
<b>C6</b>	<b>ELECTRO MAGNETISM</b>	<b>15UPHC41</b>	
<b>Hrs/Week: 3</b>	<b>Hrs/Sem: 3x15= 45</b>	<b>Hrs./ UNIT : 9</b>	<b>Credit: 4</b>

**UNIT I Magnetic properties of materials**

Permeability –susceptibility –classification of magnetic materials –Langevins’s theory of dia and para magnetism – Weiss theory of ferro magnetism – BH curve –Ballistic method – Hysteresis – energy loss – importance of hysteresis

**UNIT II Magnetostatics**

Magnetic vector potential – magnetic field for a long straight current carrying wire –magnetic scalar potential – application – magnetic shell – potential at any point due to a magnetic shell – magnetic potential due to circular magnetic shell Ampere’s theorem(Hall effect) – quantitative analysis of Hall effect – application of hall effect

**UNIT III Electromagnetic induction**

Faraday’s law of electromagnetic induction – Vector form – self inductance –self inductance of a long solenoid – Rayleigh bridge – Anderson bridge – mutual inductance – mutual inductance between two coaxial coil –experimental determination of mutual inductance – coefficient of coupling.

**UNIT IV Magnetic effects of electric current**

Cork screw rule – right hand thumb rule – definition for B – Biot savort’s law – Ampere’s law – magnetic field due to current in a straight conductor and circular coil – magnetic field due to a solenoid

**UNIT V Generators and motors**

Three phase ac generator – advantages – different types of three phase connection – ac dynamo – two phase ac generator – DC dynamo –Field excitation – DC motor – Three phase ac generator – y connection – phase and voltage relationship – Delta connection .

**TEXTBOOK:**

1. Electricity and magnetism – R.Murugesan (Revised edition 2008), S.Chand & Co. Ltd. New Delhi.

**REFERENCE BOOKS:**

3. Electricity and magnetism – D.C.Tayal, Himalaya Publishing Home, Mumbai - 400 004.
4. Electricity and magnetism – Brijlal and N.Subramaniyan, Ratan Prakashan Mandir, Professor Colny, Agra - 2.
4. Electricity and magnetism – Arora ,Saxena and Prakash, Pragathi Prakashan, Meerut.



V SEMESTER			
C7	MODERN PHYSICS & SPECTROSCOPY		15UPHC51
Hrs/Week: 6	Hrs/Sem: 6x15= 45	Hrs./ UNIT : 18	Credit: 6

### UNIT Atomic structure, X-rays & Relativity

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 & spin motion of the electron – Stern Gerlach experiment – Zeeman effect – experimental arrangement for the normal Zeeman effect – Diffraction of x rays – Bragg's law and Bragg's spectrometer – characteristics and x ray spectra – Mosley's law and its significance – Fundamental frames of reference – Michelson – Morley experiment – Einstein's concept of relativity – Special theory of relativity – Lorentz transformation equations – Equivalence of mass & energy.

### UNIT II Nucleus & Radioactivity

General properties of the nucleus – 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 & its characteristics – liquid drop model – nuclear transmutations – Natural radio activity – alpha, beta, gamma rays – properties – Soddy fajan's displacement law – natural radioactive series – law of radioactive disintegration – Half life period – mean life period – units of radio activity – radio carbon dating

### UNIT III 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.



**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 MOSSBAUER 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 MOSSBAUER spectroscopy – applications.

**TEXTBOOKS:**

1. Modern Physics – R.Murugesan and Kiruthiga Sivaprasath – (15<sup>th</sup> Edition) – S.Chand & Co., New Delhi.
2. Atomic and nuclear Physics – Brijlal and Subrahmanyam, (Revised edition 2008), S.Chand & Co. Ltd. New Delhi.
3. Molecular structure and spectroscopy – G.Aruldas – 7<sup>th</sup> edition – Prentice Hall of India Private Ltd., New Delhi..

**REFERENCE BOOKS:**

1. Nuclear Physics – D.C.Tayal, Himalaya Publishing Home, Mumbai - 400 004.
2. Optics and Spectroscopy – R.Murugesan and Kiruthiga Sivaprasath – S.Chand & Co., New Delhi.
3. Molecular Spectroscopy – Banwell – 5<sup>th</sup> edition – Tata McGraw Hill Company Ltd., New Delhi.



V SEMESTER			
<b>C8</b>	<b>BASIC ELECTRONICS</b>		<b>15UPHC52</b>
<b>Hrs/Week: 5</b>	<b>Hrs/Sem: 5 x 15 = 75</b>	<b>Hrs./ UNIT : 15</b>	<b>Credit: 5</b>

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

LED – LED voltage and current – advantages – multicolor LEDs – applications of LEDs – photo diode – characteristics – 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.

### **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.

#### **TEXTBOOKS:**

1. Principles of Electronics – V.K. Mehta and Rohit Mehta – S. Chand & Co. Ltd., New Delhi – 110055.
2. Electronics – Sanjay Sharma – S.K.Kataria & Sons, Daryaganj, New Delhi – 110 002.

#### **REFERENCE BOOKS:**

1. College Physics – Volume III – N. Sundararajan & others – United Publishers, Mangalore.
2. Electronic principles – sixth edition – Albert Paul Malvino.

B.Sc. (Physics) Syllabus (2015-18) – Core, Core Elective and Project





<b>V SEMESTER</b>		<b>15UPHC53</b>
<b>ENERGY PHYSICS</b>		
<b>C9</b>	<b>Credit: 5</b>	
<b>Hrs/Week: 5</b>	<b>Hrs/Sem: 5 x 15 = 75</b>	<b>Hrs./ UNIT : 15</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 – Vertical 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 – Classification of Biogas plants – Materials used for Bio – gas Generation – Methods for maintaining Biogas production – fuel properties of Bio – gas – Bio – gas from plant wastes.

**TEXTBOOK:**

Non – conventional energy sources – G.D. Rai, Fourth Edition, Khanna Publishers, New Delhi.

**REFERENCE BOOKS:**

1. Solar energy – (Thermal conversion) – Revised edition – Suhatme – Tata McGraw Hill Company Ltd., New Delhi.
2. Solar Energy Utilisation – G.D.R AI 5<sup>th</sup> edition – Khanna Publishers, New Delhi.

B.Sc. (Physics) Syllabus (2015-18) – Core, Core Elective and Project



V SEMESTER			
CE1 A	DIGITAL ELECTRONICS		15UPHE5A
Hrs/Week: 5	Hrs/Sem: 5 x 15 = 75	Hrs./ UNIT : 15	Credit: 6

### UNIT I Number systems – Codes, Addition and Subtraction and Boolean algebra

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, signed magnitude numbers, 2's compliment method – Boolean laws and theorems.

### UNIT II Basic Logic Gates, Half & full adders, subtractors, Karnaugh map – parity

Basic logic gates (OR, AND, NOT, NOR, NAND, EX – OR), NAND and NOR as universal gates – Demorgan's laws, – Half adder, full adder, half subtractor, full subtractor – Karnaugh 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 – flipflops – RS flipflop – implementation of RS flip flop using NOR, NAND gates – clock pulses – clocked RS, D flipflop, JK flipflop – JK master – slave 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 – Decade Counters.

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

D/A converter – variable resistor network & binary R – 2R ladder type – A/D converter – Successive Approximation type – Dual Slope type – A/D Converter using Voltage – to – Time Conversion – Over – sampling A/D Converters. – Multiplexers – demultiplexers – Decoder – BCD to decimal decoder – seven segment decoders – encoders – decimal to BCD encoder – ROM – Programmable ROMS – RAMS.

#### TEXTBOOKS:

1. Digital principles – A.P. Malvino & Donald P. Leach, Goutam Saha – TMH, New Delhi.
2. Modern Digital Electronics – R.P. Jain – TMH, New Delhi.

#### REFERENCE BOOKS:

1. Thomas L. Floyd, Digital Fundamentals, 8th Edition, Pearson Education Inc, New Delhi, 2003
2. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
3. S. Salivahanan and S. Arivazhagan, Digital Circuits and Design, 3<sup>rd</sup> Edition, Vikas Publishing House Pvt. Ltd, New Delhi, 2006.



V SEMESTER			
CE1 B	BIOMEDICAL INSTRUMENTATION	15UPHE5B	
Hrs/Week: 5	Hrs/Sem: 5 x 15 = 75	Hrs./ UNIT : 15	Credit: 6

### UNIT I 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 II Transducers

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

### UNIT III Bio potential recorders

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

### UNIT IV 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 V 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.



VI SEMESTER			
C10	QUANTUM MECHANICS AND STATISTICAL MECHANICS		15UPHC61
Hrs/Week: 6	Hrs/Sem: 6 x 15 = 90	Hrs./ UNIT : 18	Credit: 6

### 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.

### TEXTBOOKS:

1. Quantum mechanics – 25<sup>th</sup> edition (2008) – Gupta, Kumar and Sharma – Jai Prakash Nath & Co., Meerut.
2. Statistical mechanics – Sathya Prakash Ram Nath Publctation, New Delhi.
3. Modern Physics – S.L.Kakani and Shubhra Kakani – Viva Books Private Ltd., New Delhi.

### REFERENCE BOOKS:

1. Quantum Mechanics – Mathews and Venkatesen, Second Edition, Tata Mcgraw Hill Educ. Pvt. Ltd., NewDelhi.
2. Quantum Mechanics Statistical Mechanics & Solid State Physics – S.P.Kuila, First Edition, Books and Allied (p) Ltd. Kolkata.

B.Sc. (Physics) Syllabus (2015-18) – Core, Core Elective and Project



<b>VI SEMESTER</b>		
<b>C11</b>	<b>COMMUNICATION ELECTRONICS</b>	<b>15UPHC62</b>
<b>Hrs/Week: 5</b>	<b>Hrs/Sem: 5 x 15 = 75</b>	<b>Hrs./ UNIT : 15</b>
		<b>Credit: 5</b>

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

Introduction to communication system - Need for modulation - (Signal to Noise ratio) - amplitude modulation (AM) - its frequency spectrum - AM transmitter (AM Superheterodyne receiver) - 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 - Generation and detection of Pulse Position Modulation - Pulse Code Modulation - frequency division multiplexing - time division multiplexing - telegraphy - Telemetry.

### **UNIT III Digital Communication**

Principle of digital communication - characteristics of data transmission circuits - digital codes - need and functioning of modem - Network organization - types of networks - network protocol - E-mail - Internet

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

Microwave links - principle and design - repeaters (Long Haul systems - submarine cables) - satellite communication - principle & characteristics - earth station - satellite construction - radar system - Radar performance factors - Doppler effect and its application to Radar - CW radar system - pulsed radar system.

### **UNIT V Optical Communication**

15  
Optical fibre - (Acceptance angle - Numerical aperture) - characteristics of optical fibre and advantages - fibre cables & losses - Fiber optic components and systems - source (Laser diode) - detector (PIN diode & APD) - Optical link - fibre testing - fusion splicing - mechanical splicing - optical connectors - optical communication receiver.

#### **TEXTBOOKS:**

1. Principles of Communication K.S. Srinivasan - Revised edition, 2008 - Anuradha Publications.
2. Communication Electronics - Louis E.Frenzel, 4<sup>th</sup> edition, TMH, New Delhi.

#### **REFERENCE BOOKS:**

1. Principles of communication systems - Taub & Schilling, TMH, New Delhi.
2. Principle of communication - K. MuraliBabu & K. VinothBabu, Lakshmi Publications.
3. Modern Electronic Communication - Jeffrey S.Beasley, Gary M. Miller, PHI Pvt. Ltd., New Delhi.
4. Optical Fibre communication - Gerd Keisser, 3<sup>rd</sup> edition, McGraw Hill, Singapore.

B.Sc. (Physics) Syllabus (2015-18) - Core, Core Elective and Project



VI SEMESTER		
<b>C12</b>	<b>PROJECT</b>	<b>15UPHP61</b>
<b>Hrs/Week: 5</b>	<b>Hrs/Sem: 5 x 15 = 75</b>	<b>Credit: 5</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 60% for the project and 40% for viva – voce.

**Evaluation scheme:**

The project will be evaluated by both Internal and External Examiners. Each Examiner will evaluate for 100 marks. The allocation of marks for project is as follows:

<b>Project</b>	<b>Internal</b>	<b>External</b>
Word of title	5	5
Objectives / Formulation including Hypothesis	5	5
Review of literature	10	10
Relevance of project to social needs	5	5
Methodology / Technique / Procedure adopted	20	20
Summary / Findings / Summation	5	5
Works cited / Annexure / Footnotes	10	10
<b>Total</b>	<b>60</b>	<b>60</b>



V & VI SEMESTERS		
CP3	PHYSICS CORE PRACTICAL - III*	15UPHC6P1
Hrs/Week: 3	Hrs/Sem: 3x15=45	Credit: 3

\*Examination at the end of VI semester

### NON ELECTRONICS

1. Cauchy's constants -
2. Hartmann's constants -
3. Determination of refractive index - i - i' curve ✓
4. Determination of refractive index I - i - d curve
5. Biprism - spectrometer ✓
6. High resistance by leakage method - B.G. ✓
7. Determination of mutual inductance - B.G. ✓
8. Comparison of mutual inductances - B.G. ✓
9. Thermo emf and thermoelectric power - M.G. ✓
10. Elliptical fringes - Young's modulus ✓
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 ✓



V & VI SEMESTERS		
CP4	PHYSICS CORE PRACTICAL - IV	15UPHC6P2
Hrs/Week: 3	Hrs/Sem: 3x15=45	Credit: 3

**\*Examination at the end of VI semester**

### ELECTRONICS

- 1) Zener regulated power supply - ✓
- 2) Dual power supply - IC regulated ✓
- 3) Single stage amplifier - with and without feedback (Transistor biased)
- 4) Colpitt's oscillator ✓
- 5) Hartley oscillator ✓
- 6) Multivibrator - monostable - 555 ✓
- 7) Multivibrator - astable - 555 ✓
- 8) UJT characteristics ✓
- 9) Op - amp wein's bridge oscillator ✓
- 15 10) Differentiator & integrator using op - amp ✓
- 11) Half adder & full adder using ICs ✓
- 12) Universal building blocks NAND & NOR gates.
- 13) FET characteristics ✓
- 14) Verification of Adder, Subtractor using op - amp ✓



<b>VI SEMESTER</b>		
<b>CE2 A</b>	<b>INTRODUCTION TO NANOTECHNOLOGY</b>	<b>15UPHE6A</b>
<b>Hrs/Week: 5</b>	<b>Hrs/Sem: 5 x 15 = 75</b>	<b>Hrs./ UNIT : 15 Credit: 6</b>

### **UNIT I Fabrication of nanostructures**

Background and evolution of Nanotechnology – size of nano – 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 II 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 III 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 IV 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.

### **UNIT V Environmental implications of Nanotechnology**

Pollution prevention – Areas of Pollution prevention – Environmentally beneficial Nano Technology – Water Purification – Water decontaminator – Water desalination – Nano toxicology – Green Nano Technology – Positive and Negative aspects of N.T – Environmental implications of N.T.

#### **TEXTBOOKS:**

1. Nano technology – S. Shunmugam – MJP Publishers, Chennai.
3. Nano Biotechnology – Subbiah Balaji – MJP Publishers, Chennai.

#### **REFERENCE BOOKS:**

1. Nano technology – an introduction – Mark Ratner and Daniel Ratner – 3<sup>rd</sup> edition – Pearson Education – New Delhi.
2. Nano : The essentials – T. Pradeep – 4<sup>th</sup> edition – McGraw Hill Education – New Delhi.



<b>VI SEMESTER</b>			
<b>CE2 B</b>	<b>COMPUTER ORIENTED NUMERICAL METHODS</b>		<b>15UPHE6B</b>
<b>Hrs/Week: 5</b>	<b>Hrs/Sem: 5 x 15 = 75</b>	<b>Hrs./ UNIT : 15</b>	<b>Credit: 6</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
3. Numerical methods for scientific and engineering computation  
– M.K. Jain, S.R.K. Iyenkar, R. K Jain



<b>V &amp; VI SEMESTERS</b>		
<b>CEP</b>	<b>PHYSICS CORE ELECTIVE PRACTICAL</b>	<b>15UPHE6P</b>
<b>Hrs/Week: 3</b>	<b>Hrs/Sem: 3 x 15 = 45</b>	<b>Credit: 3</b>

**\*Examination at the end of VI semester**

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.  $\text{Sum} = 1 + 3 + 5 + \dots + n$ .
  - b.  $\text{Sum} = x - x^3/3! + x^5/5! - x^7/7! + \dots + (-1)^n x^n/n!$ .
  - c.  $\text{Sum} = 1 + 2^2 + 4^2 + \dots + n^2$
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  $m \times n$  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.	3. Type of account
2. Account name	4. Balance amount in the account
Member function	
1. To assign initial values	
2. To deposit an amount	

*No change*



<b>PART III - ALLIED II</b>		
<b>Allied Physics offered by Physics Department to B.Sc. Mathematics and B.Sc. Chemistry Students</b>		
<b>III SEMESTER</b>		
<b>AII 1</b>	<b>ALLIED PHYSICS - I</b>	<b>15UPHA31</b>
<b>Hrs/Week: 3</b>	<b>Hrs/Sem: 3x15= 45</b>	<b>Hrs./ UNIT : 9      Credit: 4</b>

**UNIT I      Elasticity**

Elastic moduli - Poisson's ratio - relation between elastic constants - Expression for bending moment - cantilever - expression for depression - experiment to find young's modulus (uniform bending) - expression for elevation - experiment to find young's modulus using microscope (non uniform bending) - expression for depression - experiment to find Young's modulus using scale and telescope

**UNIT II      Interference and Diffraction**

Young's experiment - Condition for interference - Additional phase difference due to dissimilar reflections - Colours of thin film - Air wedge - Thickness of wire - Fresnel and Fraunhofer diffraction - Plane transmission grating - Theory and experiment to find wave length by normal incidence method. Distinction between interference and diffraction bands.

**UNIT III      Polarisation**

Double refraction - Nicol prism - Brewster's law - Production and analysis of plane, circular and elliptically polarised light, half wave and quarter wave plate - Optical activity - specific rotation (definition)

**UNIT IV      Transport Phenomena**

Mean free path - expression for mean free path (Zeroth order approximation) Transport phenomena - Viscosity, thermal conductivity, diffusion

**UNIT V      Transfer of Heat**

Conduction - Coefficient of thermal conductivity - definition - Thermal conductivity of a bad conductor - Lee's Disc experiment - **Convection** - Newton's law of cooling - **determination of specific heat capacity of liquid - Radiation - Stefan's law - Planck law.**

**REFERENCE BOOKS:**

1. Properties of matter - Brijlal & Subrahmanyam - S.Chand & Co. - New Delhi.
2. College Physics - Volume 1 - A.B.Gupta - Books and Allied (P) Ltd. - Kolkatta - 700010.
3. Heat and Thermodynamics Brijlal & Subramaniyam S.Chand &Co. - New Delhi.
4. A Text book of Optics Brijlal , Subrahmanyam & M.N.Avathanu - S.Chand & Co. - New Delhi.

Allied II - Physics - offered by Physics Department to  
B.Sc. Mathematics and B.Sc. Chemistry Students



<b>PART III - ALLIED II</b>			
<b>Allied Physics offered by Physics Department to B.Sc. Mathematics and B.Sc. Chemistry Students</b>			
<b>IV SEMESTER</b>			
<b>AII 2</b>	<b>ALLIED PHYSICS - II</b>		<b>15UPHA41</b>
<b>Hrs/Week: 3</b>	<b>Hrs/Sem: 3x15= 45</b>	<b>Hrs./ UNIT : 9</b>	<b>Credit: 4</b>

### UNIT I Relativity and Wave Mechanics

Frame of reference - Galilean transformation - Postulates - Lorentz transformation - de Broglie's theory of matter waves - Expression for de Broglie wavelength - Davison and Germer experiment

### UNIT II Nuclear Physics

Nuclear structure - Properties of nucleus - Packing fraction - Binding energy - BE/A curve - Nuclear forces - Nuclear stability - Liquid drop model.

### 25 UNIT III Electricity & Electromagnetism

Charge - Current - Potential difference - Resistance & Resistivity - Ohm's law - Kirchoff's law - Potentiometer - Principles - Calibration of Voltmeter - Capacitance - Self induction - self inductance of toroidal solenoid - determination of Rayleigh method - mutual inductance between coils - determination of mutual induction using B.G.)

### UNIT IV Basic Electronics

(Semi - conductor diode - Diode Characteristics) - (Zener diode characteristics - Regulation with Zener diode) - Bridge rectifier - Biasing of transistor - RC amplifier.)

### UNIT V Digital Electronics

Basic logic gates - NOR, NAND gates - EX - OR gate - Boolean equations and logic circuit from table - NOR and NAND gates as universal building blocks - Binary adder - Half adder - Full adder

### REFERENCE BOOKS:

1. Modern Physics - R.Murugesan and Kiruthiga Sivaprasath - (15<sup>th</sup> edition) - S.Chand & Co., New Delhi.
2. Electricity & Magnetism - R.Murugesan. 8<sup>th</sup> edition - S.Chand & Co., New Delhi.
3. Introduction to Integrated Electronics, Digital and Analog - V.Vijayendran - S.Viswanathan Pvt. Ltd., Chennai.

Allied II - Physics - offered by Physics Department to  
B.Sc. Mathematics and B.Sc. Chemistry Students



III & IV SEMESTERS		
AII P	ALLIED PHYSICS PRACTICAL*	15UPHA4P
Hrs/Week: 3	Hrs/Sem: 3 x 15 = 45	Credit: 3

\* Examination at the end of IV semester

1. Young's modulus - Uniform bending (Pin and Microscope) ✓
2. Young's modulus - Non Uniform bending (scale and Telescope) ✓
3. Young's modulus - Cantilever - depression ✓
4. Lee's disc - K of card board ✓
5. Verification of Newton's law of cooling ✓
6. Spectrometer Grating - Oblique incidence ✓
7. Newton's rings - Radius of curvature -  $\mu$  ✓
8. Air wedge - thickness of wire ✓
9. Calibration of Voltmeter .....? ✓
10. Characteristics of Zener diode ✓
11. Basic logic gates OR, NOT & AND ✓
12. Transistor Characteristics (CE mode) ✓

Allied II - Physics - offered by Physics Department to  
B.Sc. Mathematics and B.Sc. Chemistry Students



III SEMESTER			
<b>SBE 1</b>	<b>INTRODUCTION TO COMPUTERS</b>		<b>15UPHS31</b>
<b>Hrs/Week: 3</b>	<b>Hrs/Sem: 3x15= 45</b>	<b>Hrs./ UNIT : 9</b>	<b>Credit: 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 - RAM , types of RAM, ROM , types of ROM & Secondary storage devices - Classification of secondary storage - Mass storage devices - operating system - types of operating system - modern operating systems.

### **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

### **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 - Web browsers.

### **TEXTBOOKS:**

1. Windows XP in easy steps - Harshad Kotecha -Revised edition - DreamTech Press - New Delhi.
2. Introduction to Computer Science - IITL Education Solutions Limited - 5<sup>th</sup> Impression - Pearson Education South Asia.

### **REFERENCE BOOKS:**

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



<b>IV SEMESTER</b>			
<b>SBE 2</b>	<b>PROGRAMMING IN C++</b>		<b>15UPHS41</b>
<b>Hrs/Week: 3</b>	<b>Hrs/Sem: 3x15= 45</b>	<b>Hrs./ UNIT : 9</b>	<b>Credit: 2</b>

**UNIT I Basics of programming, Concepts of OOPS and C++**

(Software and its Need, Types of Software – System software, Application software, System Software – Operating System, Utility Program, Algorithms, Flow Charts – Symbols, Rules for making Flow chart, Programming languages, Assemblers, Compilers and Interpreter.)

Basic concepts of object – oriented programming, application of OOP, What is C++, application of C++, a simple C++ program, structure of C++ program.

**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 – 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, parameterized 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.

**TEXTBOOKS:**

1. Object Oriented Programming with C++ – E. Balagurusamy – 4<sup>th</sup> edition – TMH, New Delhi.
2. Computer Fundamentals – B. Ram – 3<sup>rd</sup> edition – New Age International Publishers

**REFERENCE BOOKS:**

1. Programming with C++ – D. Ravichandran – 3<sup>rd</sup> edition – TMH, New Delhi.
2. Object Oriented Programming in C++ – Robert Lafore – 4<sup>th</sup> edition – Course Sams Publishing.

B.Sc. (Physics) Syllabus (2015-18) – Skill-based Elective Subjects



<b>B.Sc. (PHYSICS) – CBCS SYLLABUS (2015 – 2016)</b>			
<b>PART IV – Non-major Elective Subject offered by Physics</b>			
<b>Department to Other Major Students</b>			
<b>III SEMESTER</b>			
<b>NME1</b>	<b>BASIC PHYSICS – I</b>		<b>15UPHN31</b>
<b>Hrs/Week: 3</b>	<b>Hrs/Sem: 3x15= 45</b>	<b>Hrs./ UNIT : 9</b>	<b>Credit: 2</b>

**UNIT I Physics, Measurement, Kinematics and Laws of Motion**

Fundamental and derived units – Speed, velocity and acceleration – Mass and weight – Density – scalar and vectors – Force – Pressure – Newton's laws of motion; conservation of linear momentum and its applications – basic concepts of Projectile motion.

**UNIT II Dynamics of Rotational Motion**

Uniform circular and rotational motion – Centripetal force and its applications – Energy, work and power – Center of mass – moment of force, torque, angular momentum, conservation of angular momentum and applications..

**UNIT III Gravitation and Satellites**

Newton's law of gravitation– gravitational field – gravitational potential – Kepler's laws of planetary motion – escape velocity – Satellite motion – orbital velocity – geostationary satellite – applications of remote sensing – Indian Satellites.

**UNIT IV Properties of Solids and Liquids**

Stress – strain relationship, Hooke's Law, types of modulus – Pressure in a fluid, Pascal's Law and its applications, buoyancy (Archimedes Principle). Viscous drag – Newton's formula for viscosity, Coefficient of viscosity – units –stoke's law – stream line and turbulent flow –applications – Surface tension and its applications

**UNIT V Thermal Physics**

States of matter – molecular model – evaporation – Pressure changes. Thermal expansion of solids, liquids and gases – Measurement of temperature – thermal capacity – melting and boiling Point – Transfer of thermal energy: Conduction, Convection, Radiation – Consequences of energy transfer and its applications.



IV SEMESTER			
NME2	BASIC PHYSICS - II		15UPHN41
Hrs/Week: 3	Hrs/Sem: 3x15= 45	Hrs./ UNIT : 9	Credit: 2

### UNIT I Waves, Oscillations and Sound

Characteristics of wave - Periodic motion - Simple Harmonic Motion - free, forced and damped oscillations - resonance - Doppler's effect - Ultrasonics - applications

### UNIT II Electricity and Magnetism

Electric charge, fields and potentials - Coulomb's law - Ohm's law - resistor - capacitor - Kirchoff's laws - Alternating currents and transient response of LCR series circuits: Resonance, Q factor and damping factor - Magnetic fields - Magnetic materials - electromagnetic induction - Transformers.

### UNIT III Light

Electromagnetic waves, their characteristics and its applications.

Characteristics of light - phenomena: dispersion, scattering, reflection, refraction, total internal reflection. - lenses - defects in images - Optical instruments (kaleidoscope, periscope, Microscope, telescope) - Interference - Diffraction - Lasers and their applications.

### UNIT IV Atomic and Nuclear Physics

Atomic models - Nucleus - Properties - Isotopes - Nuclear fission and fusion - Applications. Radioactivity: Detection - Characteristics - Radioactive decay - half - life - Applications - Indian Nuclear Reactors.

### UNIT V Electronics:

Conductor - Insulator - Semi conductor - Diode (Applications like rectifier..) - Transistors - characteristics and applications - basic logic gates - Components of Computer System - Fibre optic communication - modem.

Non-major Elective Subject offered by Physics Department to other Major Students