SRI DHARMASTHALA MANJUNATHESHWARA COLLEGE, UJIRE-574240

(Autonomous)

(Re-Accredited by NAAC at 'A' Grade with CGPA 3.61 out of 4)

DEPARTMENT OF PHYSICS

Syllabus of
Bachelor's Degree in
Physics

(CREDIT BASED SEMESTER SCHEME)
2014–2017onwards.

Approved by the :BOS meeting held on 22nd Aug.2014
Academic Council meeting, held on 27th Sept. 2014

PHYSICS AS A DISCIPLINE

INTRODUCTION :

In any systematic academic exercise, the syllabus plays a pivotal role, establishing a strong platform on which the entire teaching learning process hinges around. Consequently it has to be developed through a carefully planned elaborate procedure involving all major considerations and incorporating current academic essentials which should empower a student to the challenges and opportunities of the contemporary academic environment.

Course Objectives

- To provide a structural framework for the study of the subject which should fit into the prescribed academic programme.
- To incorporate the current knowledge and subsequent developments in the subject which should enable a student build his career and seek better opportunities.
- It should help inculcate scientific spirit and values, contributing to the process of nation building.
- To provide an academic link between the topics studied earlier and the ones to be covered in the next level.
- The contents chosen and the depth of coverage must empower the learner to the opportunities that he chooses to take up as his career.

Expected outcome:

The carefully crafted syllabuswill augment the academic standard of the individual.

It will provide a basis both for his academic perusal as well as for career building.

It will also help the individual for the better understanding of the world around him and also will encourage himtake up research in the chosen field of interest.

The present syllabus has been finalised taking into account all the areas of concern

Experts were consulted for their views and guidanceregarding the syllabus. Syllabi of prominent universities and institutions offering similar courses also were referred to before finalising the present syllabus. Suggestions of the stake holders were taken into consideration before adopting the syllabus.

Finally the syllabus was approved by the Board of Studies and accepted by the academic council.

PAPER DESCRIPTION

Semester	Paper	Title
I Sem	S 161 (PaperI) PS 161 (Pract.I)	MECHANICS-I, WAVES & ACOUSTICS AND THERMAL PHYSICS
II Sem	S 261 (PaperII) PS 261 (Pract.II)	MECHANICS-II, PROPERTIES OF MATTER, DC AND AC CIRCUITS
III Sem.	S 361 (PaperIII) PS361 (Pract.III)	OPTICS-I , ELECTROMAGNETISM, ELECTRONIC DEVICES, POWER TRANSMISSION
IV Sem.	S 461 (PaperIV) PS 461(Pract.IV)	OPTICS-II , PHOTONICS,ENERGY CONSERN AND ANALOG ELECTRONICS
V Sem.	S 561 (PaperV) S 562(PaperVI) PS 561(Pract.V)	ATOMIC PHYSICS ,ORIGIN/ DEVELPMENTAL QUANTUM MECHANICS ASTROPHYSICS AND ENVIRONMENTAL PHYSICS NUCLEAR PHYSICS-1 CONDENSED MATTER PHYSICS-1 AND DIGITAL ELECTRONICS CONDENSED MATTER PHYSICS-II, MOLECULAR PHYSICS QUANTUM MECHANICS –II
VI Sem.	S661 (Paper VII) S 662 (PaperVIII) PS 661(Pract.VI)	NUCLEAR PHYSICS–II &III, BIOPHYSICS, GENERAL THEORY OF RELATIVITY AND COMMUNICATION ELECTRONICS

SCHEME OF EXAMINATION

Sl.No	Semester	Paper	Credits	Marks		
				IA	Sem End	Total
	I Sem	S 161 (PaperI) PS 161 (Pract.I)	2 1	20 10	80 40	100 50
	II Sem	S 261 (PaperII) PS 261 (Pract.II)	2 1	20 10	80 40	100 50
	III Sem.	S 361 (PaperIII) PS361 (Pract.III)	2 1	20 10	80 40	100 50
	IV Sem.	S 461 (PaperIV) PS 461(Pract.IV)	2 1	20 10	80 40	100 50
	V Sem.	S 561 (Paper V) S 562(PaperVI) PS 561(Pract.V)	2 2 2	20 20 20	80 80 80	100 100 100
	VI Sem.	S661 (Paper VII) S 662 (Paper VIII) PS 661(Pract.VI)	2 2 2	20 20 20	80 80 80	100 100 100
	Total		**24**	**240**	**960**	**1200**

B.Sc. (Physics) Course for all Semesters
Allotment of Marks for Practical for I, II, III&IV Semesters

(Max – 50 Credit = 01)

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a) Internal Assessment (Max. Marks 10)

Splitting:	Marks
Lab performance based on Continuous assessment	: 05
Model practical examination after completing the minimum number of experiments:	: 05

Total Marks. : 10

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b)Practical Examination

Practical ExaminationPaper of 3 hours duration paper (Max. Marks 40)

Formula	: 03
Setup/circuit/tabulation	: 05
Observations and no. of trials	: 14
Calculation and Graph	: 05
Result and accuracy with units	: 03
Class Record	: 10

Total Marks -Practical Exam 40 (Minimum marks for pass =14/40)

Class records shall be valued at the time of Practical Exam by the External Examiner in consultation with Internal Examiner.

Record marks:

Regularity and completing the minimum number = 05marks

Neatness / General impression = 05 marks

Total = 10 marks

Total Marks = Internal Assessment + marks Practical Exam

= Max. 10 + Max. 40 = 50

B.Sc.(Physics) Course for all Semesters
Allotment of Marks for Practical for V &VI Semesters

(Max – 50 Credit = 02)

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a)Internal Assessment (Max. Marks 20)

Splitting:	Marks
Lab performance based on Continuous assessment	: 10
Model practical examination after completing the minimum number of experiments:	:10
Total Marks.	:20

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b)Practical Examination

Practical ExaminationPaper of 3 hours duration paper (Max. Marks 40)

Formula	: 05
Circuit diagram / figure	: 05
Setup/circuit/tabulation	: 10
Observations and no. of trials	: 20
Knowledge about the experiment	: 10
Calculation and Graph	: 15
Result and accuracy with units	: 05
	: 70
Class Record	:10

Total Marks - Practical Exam : 80 (Minimum marks for pass =28 / 80)

Class records shall be valued at the time of Practical Exam by the External Examiner in consultation with Internal Examiner.

Record marks:

Regularity and completing the minimum number = 05 marks

Neatness / General impression = 05 marks

Total = 10 marks

Total Marks = Internal Assessment + marks Practical Exam

= Max. 20 + Max. 80 = 100

I SEMESTER - Paper I
MECHANICS-I, WAVES & ACOUSTICS AND THERMAL PHYSICS
Teaching Hours : 3hrs per week

Rationale/Learning objectives:

- To introduce the concept of Vectors in the study of mechanics
- To make students aware of conservation laws in physics which are the basic requirement in other fields of science like engineering and technology
- To introduce the concept of waves and oscillations which find applications in everyday life
- Thermal physics gives a brief account of application of thermodynamics in the working of machines and to estimate the efficiency of engines

Unit I

MECHANICS- I

Derivative of a vector: Derivative of a vector, derivative of A+B,A-B,A.B and AXB.(mention only) Definition of instantaneous velocity and acceleration. Derivative of a planar vector of constant magnitude but changing direction.Planar motion- Radial and Transverse component of velocity and acceleration.Deduction of results of uniform circular motion.

Rotational dynamics of a rigid body :Angular momentum, kinetic energy. Moment of inertia and radius of gyration (Review)Theorem of moment of inertia – parallel and perpendicular axes theorems with proof. Calculation of MI of regular shaped bodies - rectangular lamina, thin rod, circular disc (about different axes). Problems

Conservation Laws :Importance and symmetry aspects of the laws in general.

(i)Law of conservationof linear momentum: Application: Motion of a rocket-multistage rockets and their advantages Statement for mutually interacting systems. Center of mass, reduced mass. Elastic, oblique collisions in C.M. and Lab frames. Value of scattering angle.(problems).

(ii) Law of conservation of angular momentum: Statement-Relation between angular momentum and torque.Kepler's Laws, Law of areas. Central forces-Conservative force field.Conservative nature of central force field. Examples for central force motion, uniform circular motion. Simple harmonic motion (problems)

iii) Conservation of Energy: Definition of potential energy in a conservative force field. Deduction of the principle of conservation of energy . Applications: Vertical oscillations of the light loaded spring. (problems**)**

Unit II

WAVES AND ACOUSTICS

Progressive waves: Differential equation of wave motion. Expression for velocity of longitudinal waves in a fluid.Longitudinal vibrations in a rod (Qualitative).Velocity of transverse vibrations in a string.Expression for frequency of fundamental and overtones.Shock waves. Dispersion of waves .Introduction to Fourier series (Qualitative).

Applied acoustics

i) Basics: Noise, Music , Musical Scale, Temperament and Cladney's figure.

ii)Acoustics of buildings: Reverberations time , Sabin'es formula and requisites' of good acoustics

iii)Ultrasonics and itsapplications:Introduction Production–Magnetostrictionand Piezoelectric oscillators ,Applications-Sonar, Non destructive testing-industrial and medical applications.

iv)Infrasonics and Applications

v)Recording& reproduction of sound: Methods Mechanical ,Electromagnetic recording-Hard disc, Optical recording and Digital CD, DVD, Blue Ray .

Acoustic measurements: Pressure level, Intensity level, Power level, units–bel ,decibel Sound field, Sound level meter-applications

Unit III

THERMAL PHYSICS : Thermodynamics :First law of Thermo dynamics, Heat engine, Carnot's engine, Carnot cycle. Efficiency of Carnot's engine.Reversibility of Carnot's engine.Second law of thermodynamics.Claussius' statement.Refrigerator-coefficient of performance. - (Review)

Otto cycle /engine efficiency, Diesel cycle / engine efficiency. Two stroke and four stroke engines-comparison,Claussius-Clepeyron first latent heat equation and applications (Problems)

Entropy: Concept of entropy.General expression for the change of entropy of a perfect gas .Isothermal and adiabatic process *in T-S diagram. Change* in entropy in reversible and irreversible process on T-S diagram. Entropy and disorder. Principle of increase of Entropy .Third Law of thermodynamics Thermodynamic function, Helmholtz function, Gibbs function and condition for Thermodynamic equilibrium (problems)

Physics of low temperature : Critical temperature and pressure. Porous plug experiment.Joule-Kelvin effect.Expression for temperature of inversion.Principle of regenerative cooling..Cooling by adiabatic demagnetization.Sterlingcryo-engine.Applications of cryogenics in NMR , MRI and rocket fuel

Books for References:

1. Mechanics-J C Upadhyaya;Ramprasad&Sons Agra.
2. Mechanics-R Shankarnarayana;SulthanChand&Co.
3. Newtonian Mechanics-A P French;ThomasNelson&Sons
4. Classical Mechanics-K N SrinivasRao;UniversitiesPress,India
5. Classical Mechanics-Rana&Joag ;Tata McGraw Hill
6. Mechanics and Theory of Relativity-A N Matveev;MIRPublishers,Moscow
7. Berkeley Physics Course Vol.1;Mechanics-Kittel;Tata Mc Grew Hill
8. Physics 5th Edn.-Halliday, Resnick and Krane; John Wiley (Asia)
9. Berkeley Physics Course Vol.III-Waves-Crawford;McGraw Hill
10. Waves & Oscillations-Brijlal & Subramanyam; S Chand & Co.
11. Waves and Oscillations-A.P.French;ArnoldHeinman India
12. Text Book of Sound –M. Gosh S Chand and Co
13. Text Book of Sound – Brijlal & Subramanyan S Chand and Co
14. Fundamentals of Acoustics – 4thEdn, Kinsler&Fray; JohnWiley.Asia
15. Text Book of Acoustics by R MurugationSulthan Chand and Co

16. Heat and Thermodynamics-Brijlal&Subramaniyam;S Chand & Co.
17. Heat and Thermodynamics-D S Mathur; Sulthan Chand and Co
18. Heat and Thermodynamics-M W Zemansky,Sears&Dittman,6th Edn. McGraw Hill.
19. Thermal Physics-C Kittel& Kroemer;2nd Edn; CBS Publishers, New Delhi.
20. Berkeley Physics Course Vol.V- by Rief(For Thermal Physics)

PS 161 : PRACTICALS-I Note: A minimum of 8 experiments should be done

1. Collision in two dimension and verification of conservation laws
2. Torsion Pendulum- MI of irregular body
3. Fly wheel-MI and mass of the wheel
4. Verification of theorems of MI-Law of perpendicular axis and Law of parallel axis.
5. Frequency of ac using sonometer
6. Helmholtz resonator
7. Sonometer -unknown frequency by comparison method
8. Kundt's tube
9. Specific heat by cooling
10. Thermocouple-measurement of unknown temperature (MP/BP)
11. Stefan's Boltzmann law verification
12. Experimental determination of Stefan's constant

Open ended experiments/ Projects:

Note: Any one or two of the following experiments may be include

1. To study the conservation of energy of a ball rolling down an incline pane using double inclined plane
2. To study the conservation energy with a simle pendulum
3. To study the factors [like area of surface, nature of surface, material of the container] on the rate of cooling of a liquid.
4. Effectiveness of materials as heat insulators.
5. To compare the effectiveness of different materials as absorbers of sound.
6. Study of damped oscillation.

II SEMESTER - Paper II
MECHANICS-II, PROPERTIES OF MATTER, DC AND AC CIRCUITS
Teaching Hours : 3hrs per week

Rationale/Learning objectives:

- The concept of frames of reference provides a platform in which normal physical laws are explained
- In special theory of relativity students are expected to relate the events taking place in one frame of reference with respect to the other using a set of equations
- In the topic properties of matter students are expected to learn the concept of strength of materials which are often used in construction industry. Similar applications comes in the topic properties of fluids also.
- As the modern world basically works on electrical energy the topic electrical circuits provides basic knowledge about the properties and working of electrical devices and systems.

Unit I

MECHANICS- I I

Motion in inertial and non inertial frames*:* Galilean transformation equations. Galilean principle of relativity.Galiliean invariance of space and time..Psuedo force with examples.Uniformly rotating frames of reference.Significance of centrifugal force and Coriolis force with examples.

Special theory of relativity: Search for absolute frame of reference – ether hypothesis. Michelson Morley experiment.Significance of the null result.Constancy of speed of light.Postulates of special theory of relativity.Invariance of length Lorentz transformation (Qualitative).Length contraction.Relativity of simultaneity.Time dilation, velocity addition theorem. Einstein's mass energy equivalence- (derivation based on photon gun experiment). Relativistic expression for kinetic energy.Relation between energy and momentum.Rest mass of the photon.

Elements of Satellite Motion: Orbital velocity. Time period of satellite-energy consideration and shape of orbits.Geostationarysatellites.Effects of injection conditions.Escapevelocity.Entry problems-perturbation of orbits.Remote sensing satellite. (problems)

Unit II

PROPERTIES OF MATTER

Mechanical properties of materials: Stress strain diagrams of materials. Necking and breaking strength. Elasticity and plasticity- graphical explanation. Creep, stress relaxation and fatigue. Thermal effect on stress and strain, practical applications, Expression for thermal stress. Design considerations-allowable stress-factor of safety.Application of elasticity (materials).Resistance of bent beams, columns pillars, struts, critical load-different cases.(problems)

Properties of solids: Elastic moduli , Poisons ratio, Relation between q,K,n and σ, limiting values of σ (no derivation -mention only)Bending moment, I section girder, Theory of light cantilever. Twisting couple on a cylinder**,** Torsion pendulum,

Properties of Fluids:

i) Surface Tension - Elementary ideas- (Review)Excess of pressure-inside liquid drop and liquid bubble. Work done in blowing the bubbles, Theory of drop weight method and interfacial tension Shape of drops. Variation of surface tension with temperature and impurity and contamination, Effect of evaporation and condensation (problems).

ii) Viscosity: Elementary ideas- (Review) Derivation of Poisuille's formula for the rate of flow of the liquid. Brownian motion.Superfluidity.Viscosity of gases. (problems).

Unit III

DC CIRCUITS

Transients : Growth and decayof current in a LR circuit- time constant. Charging and discharging in a CR Circuit- time constant. Oscillatory discharge of a LCR circuit Expression for the charge and current (Mention only) Condition for under damped , critically damped and over dampedoscillations. (problems).

Network Analysis: Simple circuit elements, Lumped and distributed elements, Passive and active elements, Node, branch, loop, path and mesh in an electrical network Ideal voltage source and Ideal current source. Source transformation. Colour coding. Kirchohoff's current and voltage lawsNetwork theorems - Superposition theorem, Thevenin'sand Norton's theorems, Maximum power transfer theorem.(problems). Applications- Impedance matching in electronic circuits.

AC CIRCUITS

Alternating Currents:j operator principles of superposition andphasoranalysis.Response of series LCR circuit to sinusoidal voltages using phasor.Graphical study of frequency response -condition of resonance- expression for Q factor – half power frequency -band width.LR and CR circuits as special cases of LCR circuit. Parallel LCR circuit-graphical study of frequency response-resonance-half power frequency and band width.(problems)

Filters: High and low pass filters using CR circuits-frequency response curves-cut off frequency-qualitative study of band pass filters.(problems).

Books for References:

1. Mechanics- J C Upadhyaya;Ramprasad & Sons Agra
2. Mechanics-R Shankarnarayana;Sulthan Chand & Co
3. Newtonian Mechanics-A P French;Thomas Nelson & Sons
4. Classical Mechanics-K N SrinivasRao;Universities Press,India
5. Mechanics and Theory of Relativity-A N Matveev; MIR Publishers, Moscow
6. Berkeley Physics Course Vol.1;Mechanics-Kittel;Tata Mc Grew Hill
7. Physics 5th Edn.-Halliday,Resnick and Krane;John Wiley (Asia)
8. Special relativity-A P French;ArnoldHeinemann,India
9. Special theory of relativity-Resnick;John Wiley (Asia).
10. Properties of matter- D S Mathur;S Chand & Co
11. Properties of matter-J C Upadhyaya;Ramprasad and Sons Agra
12. Physics-5th Edn.- Halliday, Resnick & Krane; John Wiely (Asia)
13. Electrical technology by Theraja.S Chand and Co

14. Electricity and Magnetism - D.N.VasudevaSulthanchand and co
15. Electricity and Magnetism-D.C.Tayal S Chand and Co
16. Electricity and Magnetism-Tareja S Chand and Co
17. Engineering Circuit analysis,6th Edn.-Hayt,Kemmerly&Durbin;TataMcGraw Hill
18. Electric Circuits-Alexander &Sadiku;McGraw Hill

PS 261: PRACTICAL-II

Note: A minimum of 8 experiments should be done.

1. q-by cantilever bending
2. q- by cantilever Oscillation
3. n- by Static torsion
4. Torsion pendulum -rigidity modulus
5. Searle's double bar- determination of q,n and σ
6. η – by Poiseuille's method
7. Surface Tension by drop weight method and interfacial tension
8. Comparison of viscosity of two liquids -Oswald's viscometer-(density using Hare's apparatus)
9. LR Circuit-transient response using CRO
10. CR circuit- charging and discharging
11. Verification of Superposition theorem.
12. Verification of Thevenin's and Norton's theorems .
13. Verification of Maximum power transfer theorem
14. Low pass and High pass filters

Open ended experiments/ Projects:

Note: Any one or two of the following experiments may be include

1. To determine the 'q' of different materials by using them as cantilevers
2. To compare the Young's moduli of different types of wood by the method of uniform bending
3. Viscosity of different liquids by capillary flow method or study of variation of viscosity with temperature

4. Comparitive study of Viscosity and Surface tension of water dissolved with detergent of different brands.

5. Study of frequency response of capacitor
6. Study of frequency response of inductor

Suggested activities

1. To determine the q of different materialist by using them as cantilevers
2. To compare the Young's modules of different specimen of rubber and compare them by drawing their elastic hysteresis curve .
3. To study the effect of nature of surface on emission and absorption of radiation
4. Verification Stefan's law of radiation using different bulbs to have a comparative study
5. To measure stellar distance by parallax method.
6. Viscosity for different liquids by capillary flow method or study of variation with temperature

III SEMESTER - Paper III
OPTICS-I ,ELECTROMAGNETISM, ELECTRONIC DEVICES, POWER TRANSMISSION
Teaching Hours : 3hrs per week

Rationale/Learning objectives:

- As interference is a frequently found phenomenon in nature, its systematic study enables the students to understand the physical principles involved in it
- Laser has been a universal tool both in industry as well as lab systems its study strengthens the concepts behind the applications
- Electromagnetism is a basic theoretical concept which finds vast applications in electronics and communication
- In the chapter electronic devices, students get a better insight into how electrical devices work and how it can be used for everyday applications like charging devices where rectifiers are used
- Power transmission concept aims at providing a theoretical background for the establishment of electrical networks

Unit 1 :

OPTICS-I

Interference of Light: Division of wave front-examples-Biprism and Lloyd's mirror. Expression for band width (mention) and determination of λ using biprism.Division of amplitude Theory of interference at a thin transparent film by reflected light.Colour of thin films. Interference at an air wedge. Fringes of equal thickness, expression for fringe width. Theory of Newton's rings with reflected light-experiment to determine wavelength of light and refractive index of a liquid. Application of interference in lens coating.

Lasers : Stimulated emission, population inversion, Characteristics of LASER, He-Ne gas laser, semiconductor laser, Nd-Yag laser, laser applications in holography, communication, optical media - CD and DVD writing / reading and Photonics and medical applications.

Unit II :

ELECTROMAGNETISM

Scalar and Vector Fields: Scalar and Vector fields with examples. Gradient of a scalar function.Relation between field and potential.Divergence and curl of a vector. Gauss and Stokes' theorems.(problems)

Electromagnetic Theory: Equation of continuity-Mention of Maxwell's field equations-concepts of displacement current. Field equations in a medium-wave equations for field vectors and deduction of the expression for velocity. Relation between refractive index and permittivity.Statement and significance of Poynting's vector. Transverse nature of e.m. waves.

Dispersion : Normal and Anomalous Dispersions , Mention of Cauchy's. formula-for Normal dispersion -Cauchy's Constants.(problems)

Application of electromagnetism- Loud speakers,Piezo Buzzer .Microphones Condenser Microphone, Microwave generators-Magnetrons,Klystrons and waveguides.-Applications in induction Heaters . Microwave Ovens and Communications.

Unit III :

ELECTRONIC DEVICES AND POWER TRANSMISSION

Electronic devises:

Review of basic electronic devices PN junction, LED and Solar Cell

Rectification; Full wave rectification using bridge rectifier.ExpressionforVdc, ripple factor, efficiency of rectification, Percentage regulation, (problems)

Filters: Capacitor input© filter, Choke input(LC) filter, π filters.

Zener diode- Avalanche and zener break down .working of zenerdiode,forward and Reversebias characteristics curves –Applications

Opto electronic devices: Working , characteristic curves and applications of Photo diode , Photo transistor , Photo conductor (Photo resistor-LDR), LED and Solar cell. LCD-Action and applications.

BJT (npn)-. Definition of Alpha and Beta, Biasing – Fixed bias and its draw back, Voltage divider bias,(problems)

SCR- working and characteristics curves

JFET - working,characteristics curves. Comparison of BJT and J FET.

MOSFET – types -enhancement and depletion –working MOSFET characteristics curves –enhancement only MOSFET

Integrated circuit (IC) : Fabrication of small circuits..

Power Transmission: Principle of three phase power generation and transmission-its advantages. Energy loses in generation and transmission and methods of reducing them. Star and delta connections. Line and phase voltage-Line and phase current, relation between them, eddy currents, Theory of induction motor- Squirrel cage rotor, power factor in an a.c

Books for References:

1. A text book of optics –B.K. Mathur, Gopal printing press Kanpur
2. Optics-E. Hecht, 4thedn; Pearson education Asia
3. Fundamentals of optics- Jenkins & White 4thedn.McGraw Hill
4. Optics-Kakani S Chand and Co
5. Optics- Brijlal&Subrahmanyan S Chand and Co
6. Optics –Khanna&Gulati S Chand and Co

7. Optics-Brijlal&Subrahmanyan engineering Physics- Dr.S.P.Basavaraju
8. Modern Physics- MurugeshanSulthan Chand and Co
9. Electronics devices &circuits 8th edition- boylsted and Nashelsky; Prentice hall of India
10. Electronics devices 6thedn; Floyd,pearson education AsiaElectrical technology by
11. Theraja. S Chand and Co
12. Electricity and Magnetism-D.N.VasudevaSulthanchand and Co
13. Electricity and Magnetism- D.C.Tayal S Chand and Co
14. Electricity and Magnetism-Thareja B.L S Chand and Co
15. Fundumentals of Applied electromagnetics -F.T. Ulaby Prentice hall of India
16. Electromagnetic field theory fundumentals-Guru and Hiziroglu; Thomson Asia

PS 361: PRACTICAL-III

Note: A minimum of 8 experiments should be done.

1. Bi prism – determination of wavelength of sodium light
2. Air wedge – determination of thickness of paper strip
3. Newton's rings – determination of R
4. Measurement of Cauchy's constants
5. LASER line width and beam divergence
6. Study of LED characteristics and determination of Planks constant h
7. Zener diode as voltage regulator
8. Study of SCR Characteristics
9. Study of transistor characteristics (CE Mode)
10. Study of FET characteristics
11. Study of Photo diode/ Photo transistor characteristics
12. Study of solar cell characteristics

Open ended experiments/ Projects:

Note: Any one or two of the following experiments may be included

1. Variation of reverse current in a diode as a function of temperature
2. Study of transistor characteristics (CB/ CC Mode)
3. Study of time constant variation using transistor

IV SEMESTER - Paper IV
OPTICS-II, PHOTONICS,ENERGY CONSERN AND ANALOG ELECTRONICS
Teaching Hours : 3hrs per week

Rationale/Learning objectives:

- Diffraction and polarization concept finds wide application in optical devices like microscopes, telescopes and cameras
- Electrical current which flows through wires suffer from its resistance. It can be overcome by using photons moving through optical fibres
- The necessity of energy conservation plays a significant role as energy sources are getting depleted in a faster rate. The chapter energy conservation aims to discuss the different methods by which energy can be conserved.
- Power supplies amplifiers and oscillators have become essential parts of majority of electronic devices and hence the topic becomes significant in the understanding of how such devices function

Unit I

OPTICS-II

Diffraction of Light: Fresnel and Fraunhofer diffraction. Concept of Fresnel's theory of half period zones-rectilinear propagation of light.Fresnel diffraction-zone plate. Comparison between zone plate and convex lens.Cylindricalwavefront- diffraction at straight edge (Qualitative). Fraunhoferdiffraction by a single slit- diffraction maxima and minima. Theory of plane diffraction grating-normal incidence and minimum deviation methods.Dispersive power of a grating.Resolving power of a grating. Comparison of prism spectra and grating spectra. (problems)

Polarisation: (Plane of vibration and polarization. Double refraction. Optic axis. Principal section of a uniaxial crystal brief discussion). Huygen's theory of double refraction-oblique incidence - (optic axis in the plane of incidence, parallel to the surface and perpendicular to the surface). Principal Refractive indices of doubly refracting crystals. Propagation of plane waves in uniaxial crystal(Qualitative). Theory of retarding plates-half wave plate and quarter wave plate. Production and analysis of different types of polarized light-analytical treatment.

Optical Activity: Fresnel'sTheory.Biquartz. Rotatory dispersion-polarimeter using biquartz. Babinet's compensator. (problems).

Unit II :

PHOTONICS Fibre optics-Introduction ,principle of working ,critical angle of propagation,acceptance angle, fractional refractive index change, Numerical aperture, Condition for propagation, Modes of propagation and v number. Typesopticalfibres, Applications (problems)

Atom laser- Introduction, Bose-Einstein condensation, methods of cooling atoms, atom lasers, difference between atom laser and optical laser, Applications

New frontiers of energy and energy conservation: Energy crisis, energy alternatives-Solar, Wind,Bio gas,Tidal, Geo thermal energy. Energy conservation techniques in electrical devices

Unit III :

ANALOG ELECTRONICS

Amplifiers: Classification of amplifiers, h– parameter model of BJT – Small signal CE amplifier (with voltage divider bias) – AC and DC equivalent circuits, DC and AC load lines, h-parameter equivalent circuit (CE). Amplifier calculations-current gain, voltage gain, input resistance and output resistance, frequency response.

Operational amplifier (OPAMP) : BJT differential amplifier – Dual input, balanced output (qualitative). Concept of an ideal amplifier.OPAMP characteristics (IC -741), Applications – inverting and non inverting amplifiers with feedback.expression for voltage gain, input and output resistances. (no derivation). Frequency response of IC -741 (qualitative)

Oscillators : Block Diagram for feedback network, +ve and –ve feedback. Barkhausen criterion for oscillation in electronic circuits.Wein bridge oscillator using OPAMP – expression for the frequency of oscillation.Astablemultivibrator –derivation for frequency (problems).

Regulated Power Supply

Block diagram of regulated power supply and explanation

Voltage regulation-line and load regulation

Voltage regulators**:** Voltage regulators using zener diode, OPAMP and series transistor (npn) Expression for out put voltage (problems) Three terminal IC regulators. (problems) Fixed voltage and variable voltage regulated power supply.

Books for Reference:

1. A text book of optics –B.K. Mathur, Gopal printing press Kanpur
2. Optics-E. Hecht, 4thedn; Pearson education Asia
3. Fundamentals of optics- Jenkins & White 4thedn.McGraw Hill
4. Optics-KakaniS Chand and Co
5. Optics- Brijlal & SubrahmanyanS Chand and Co
6. Optics –Khanna & GulatiS Chand and Co
7. Optics-Brijlal&Subrahmanyan engineering Physics- Dr.S.P.BasavarajuS Chand and Co
8. Modern Physics- MurugeshanSulthan Chand and Co
9. Electronics devices &circuits 8th edition- boylsted and Nashelsky; prentice hall of India
10. Electronics devices 6thedn; Floyd, Pearson education Asia
11. OPAMP and linear integrated circuits.3rdedn,- R.A. Gayakwad;prentice hall of India
12. Operational amplifiers & linear integrated circuits 6thedn RF Coughlion& FF Driscoll; Pearson education Asia
13. Operational amplifiers & linear ICs 2ndedn- David A Bell ;prentice hall of India
14. Principle of Electronics by V.K. Mehtha&ShaluMehthaS Chand and Co
15. Non-Conventional energy sources G.D. Rai – Khanna Publications
16. Frontiers of Energy- Alternative Energy resources by Kruger(Poul) Prentice Hall

PS 461 : PRACTICALS-IV

Note : A minimum of 8 experiments should be done

1. Diffraction Grating-Minimum deviation
2. Diffraction Grating-Normal incidence method
3. Resolving power of Grating
4. Diffraction at a straight wire
5. Particle size-diffraction using LASER
6. Polarimeter-Specific Rotation of sugar solution
7. Brewster's angle measurement using LASER
8. Construction and study of Full wave Rectifier
9. CE-Amplifier –Frequency response
10. Inverting , Non Inverting and differential amplifier using OPAMP
11. Wien Bridge Oscillator using OPAMP
12. Frequency response of IC-741
13. Astablemultivibrator using IC-555

Open ended experiments / Projects:

Note: Any One or Two of the following Experiments may be included

1. Measurement of Wavelength of Laser(violet/blue/green/red) using diffraction grating
2. Diffraction at a single slit using two razor blades and measurement of wavelength of light
3. Study of transistor as switch

Suggested activities :

1. Field visit to fibre optics communication systems.
2. Construction of filters and power supplies.
3. Maintenance of Laboratory electronics equipments

V SEMESTER - Paper V
ATOMIC PHYSICS ,ORIGIN/ DEVELPMENTAL QUANTUM MECHANICS ASTROPHYSICS AND ENVIRONMENTAL PHYSICS
Teaching Hours : 3hrs per week

Rationale/Learning objectives:

- The theory of atomic physics provides a theoretical foundation for the understanding of phenomenon of the microworld.
- Quantum mechanics has become a standard concept in all branches of science in general.
- Astrophysics provides an insight into the world of stars and galaxies.
- Environmental physics is essential for climate modeling.

Unit I:

ATOMIC PHYSICS

Motion of charged particle in electric and magnetic fields.e / m of electron by Thomson's method. Charge of the electron by Millikan's oil drop experiment.

Atomic Spectra: Review of atom models, vector atom model, space quantization, quantum numbers l and m_l, electron spin – quantum numbers s and m_s. Pauli's exclusion principle. Spectroscopic notation of energy levels of single and two electron systems. L-S and J-J coupling schemes. Magnetic moment due to orbital motion, magnetic moment due to spin motion.Total magnetic moment.Stern- Gerlach experiment- experimental procedure and interpretation of result.Spin-orbit coupling.Expression for the spin orbit interaction energy (qualitative).Fine structure.Separation of sodium lines. Normal Zeeman effect, Expression for Normal Zeeman effect, Expression for Zeeman shift (on the basis of vector atom model) determination of e/m of electron using Zeeman effect, Anomalous Zeeman effect (qualitative). (Problems)

Unit I:

ORIGIN/DEVELPMENTAL QUANTUM MECHANICS

Statistical physics: Necessity for statistical approach in physics, Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics. Microscopic and macroscopic states – probability concept- Comparison of MB,FD and BE statistics

Radiation: Distribution of energy in the black body spectrum.Steafan, Boltzmann law of radiation. Derivation of Planck's law.Deduction of Wien's law and Rayleigh- Jean's law from Planck's law.(problems).

Limitations of Classical theory &Evidence in support of quantum theory: Photoelectric effect, Einstein's equation(Mention only). Compton effect – expression for Compton shift. (using relativistic expressions for momentum and energy)

Wave properties of particles. De-Broglie waves, experimental verification by Davisson and Germer. Principle of electron microscope.Uncertainty principle, Gamma ray microscope. Three sets of uncertainty relations. Application of uncertainty relation.- estimation of width of spectral lines, impossibility of the existence of electron inside the nucleus.(problems)

Unit III:

ASTROPHYSICS

Stellar constellations - Zodiacal constellations and their significance Evolution and life cycle of stars-White dwarfs, Pulsars, Neutron stars and Black holes. Supernova explosion, Chandrasekhar limit (Review)

Measurement of stellar distances-Stellar parallax and red shift, Units of stellar distances.Definition of arcsec, parsec (pc), astronomical unit (AU), light year (ly) and their relationship.

Hubble's law.Radius of a star. Mass – Luminosity relationship and expression for lifetime of a star. H-R diagram, Main sequence stars and their general characteristics. Virial Theorem. Doppler effect of light.

Origin of Universe theories – steady state and big bang theories.Planck's length and time.Experimental evidence of Big-Bang, Penzias and Wilson experiment. Inflationary universe and its possible explanations

EVIRONMENTAL PHYSICS

Effect of atmosphere – Green house gases-IR radiation and the radiation effect- energy balance models and feedback effects -UV radiation-ozone layer-ozone depletion-the origin of atmospheres of terrestrial planets-Modification of the atmospheres of the terrestrial planets.

Physical principles involved in climate modeling-Radiative forcing and atmospheric structure and global circulation-the ocean- Thermohaline circulation-the temperature history of the earth, global climate model prediction in general

Books for Reference:

1. Introduction to atomic & nuclear Physics 5thedn; Semat&Albright Tata Mc Graw Hill
2. Modern Physics-Kenneth S Krene- John Wiley (Asia)
3. Concepts of modern physics 6thEdn- Beiser, - Tata Mc Grow Hill
4. Elements of spectroscopy(Atomic ,Molecular & Laser Physics-Gupta kumar& Sharma- PragathiprakashanaMeerath.
5. Modern physics- Bernstein, Fishbane and Gasirowicz; Pearson Education Asia
6. Introduction to atomic & Nuclear physics 5thEdnSemat&Albright;
7. Fundumentals of environment by N.K. MahapatraS Chand and Co
8. The Physics of Atoms &Quanta-6thEdn; Haken& Wolf; Springer Prentice Hall of India
9. Quantum Physics of Atoms, molecules, solids, nuclei and particles- Eisberg and resnick, 2ndedn; Jon Wiley Asia
10. Quantum Physics- A.P.French;Thomson Nelson &sons
11. Quantum Physics- E Wichman, Berkeley Physics Course Vol; II McGraw Hill
12. Quantum Physics- Gasorovicz; John Wiley Asia

13. Quantum mechanics- Statistical Physics and solid state Physics by SP Kulia.
14. Introduction to Astophysics by BaiddyanathBagu(PHI 1997)
15. Astronomy-The evolving universe III Edn;(Harper & Row, 1982) by Feilik M
16. Physics of astronomy (Mc.Millan) by DMC Gillivray
17. Astronomy a Physical prospective(2 Edn) Cambridge University Press
18. Cosmology- Space time &GravitationPimpale Prentice Hall
19. Dawn of the Universe by BimaNathS Chand and Co
20. Principles of environmental physics by John Monteith and Mike Unsworth
21. Environmental Physics by ClaresnithGoogle book publication
22. Fundamental of environmental physics by N K MahapatraS Chand and Co
23. Environmental problems and solutions by D K Asthana and MeeraAsthana
24. An introduction to environmental physics of soil and water sheds by Calvinron
25. Fundamental concepts in environmental studies by D DMishraS Chand and Co

VI SEMESTER - Paper VI
NUCLEAR PHYSICS-1 CONDENSED MATTER PHYSICS-1 AND DIGITAL ELECTRONICS
Teaching Hours :3hrs per week

Rationale /Learning Objectives:

- Condensed matter physics is a branch of modern physics which finds extensive applications in engineering, technology and research.
- It also provides the basis for the synthesis of semiconductors which find wide applications in electronics.
- Digital electronics provides the theoretical foundation construction and working of contemporary electronic devices.

Unit I :

NUCLEAR PHYSICS –I

Nuclear decay and spectra of nuclear radiation: Successive disintegration (A->B-> C) Radioactive equilibrium (transient and secular). Radioactive series.Radiocarbon dating. Determination of age of the earth .

Alpha decay, empirical relation between range and velocity, range and energy, Geiger – Nuttal relation. Tunnel effect (qualitiative) Beta ray spectra, Neutrino hypothesis, conditions for three types of beta decay. Gamma ray emission. Interaction of γ rays with matter.(Problems)

Nuclear Structure : Rutherford's alpha scattering formula (assuming expression for impact parameter) Nuclear constituents and Mention of general properties of the nucleus-nuclear radius, mass, charge, charge distribution, , binding energy, nuclear angular momentum and magnetic moment, quadrupole moment, isotopes, isobars, isotones, isomers, mirror nuclei. Dumpster's mass spectrograph.(Problems).

Nuclear models: Liquid drop model, semi empirical mass formula, Shell model (qualitative), magic numbers.

CONDENSED MATTER PHYSICS-I

Superconductivity: Discovery, Experimental observations:- transition temperature, critical field, critical current, Meissner effect, Isotope effect ,Type I and Type II super conductors, Josephson effect. BCS Theory High temperature superconductivity. Applications of superconductivity- Production of high magnetic field.Role of ceramic materials .

Specific Heat of Solids: Molar specific heat, Dulong –Petit law, its limitations, Einstein's theory of specific heat at low and high temperatures, its limitations, Debye's theory of specific heat at low and high temperatures assuming the modes of vibration in the frequency interval γ and γ +d γ, its limitations, concept of phonons comparison of Einsteins and Debye theories (problems)

Free electron theory of metals: Lorentz –Drude model. Concept of free electron, explanation of electrical resistance, expression for electrical conductivity,$\sigma = n e^2\tau /m$. deduction of ohm's law, limitations of classical theory,. Quantum free electron theory, expression for Fermi energy and average energy of electrons at absolute zero- mention of expressions about absolute zero. Statement for F(E) and <E> at T>0, Boltzmann tail. (problems).

Unit III :

DIGITAL ELECTRONICS

Boolean algebra: [Number system – Decimal Binary – Hexadecimal conversion (Basics), Logic gates – basic logic gates NOT, OR and AND using discrete components (TTL). Truth table] Boolean theorems, De-morgan'stheorem,Degital design-simplification of Boolean expression using Boolean algebra, sum of products, method of solving a digital problem. K-Map Realization of basic gate and XOR gate using NAND gate. Half adder and full adder circuits (problems)

Sequential logic circuits : Introduction to flipflops – RS, D, and JK Flip-flop. JK MS FF – Serial and parallel shift register using D Flipflop. Asynchronous binary counters using JK flipflops. Woking of a Decade counter, 4 bit binary counter. Displaying the counter output using BCD to seven segment decoder (Block diagram) and seven segment display.Multiplexing and de-multiplexing .

Digital computer organization fundamentals :- functional block diagram and brief explanation of the different sections.

Books for Reference:

1. Introduction to Solid Nuclear physics –C Kenneth S Krane ;John Wiley Asia
2. Introduction to Atomic and Nuclear Physics, 5thEdn., Semat& Albright; Chapman & Hall
3. Quantum Physics of atoms, molecules, solids, nuclei and particles – Eisberg and Resnick, 2nd Edition; John Wiley Asia
4. Nuclear Physics – Irving Kaplan; John Wiley
5. Solid state physics-H.C. Gupta; Vikas publishing house
6. Solid state physics-2ndedn; IBAC &Luth; Springer inernational
7. Solid state physics-S.O Pillai; New age International
8. Solid state physics& Electronics by AB Gupta and NurulHasan
9. Solid state physics-RK Puri& VK Babar; S Chand II edn
10. Modern physics by MurugeshanSulthan Chand and Co
11. Digital fundamentals;8thEdn Floyd; Pearson Publication
12. Digital design 3rdEdn;MorrisMano;PreniceHall of Asia

PS 561 : PRACTICALS-V

Note : A minimum of 8 experiments should be done

1. Specific charge of electron-Thomson's method
2. Temperature response of thermistor
3. Energy gap of forward biased p-n junction diode
4. Determination of Fermi Energy
5. Spectral response of LDR
6. Energy gap of photo diode
7. Millikan's oil drop experiment
8. Rydberg constant –Hydrogen spectrum/ Solar spectrum
9. Logic Gates OR,AND and NOT Gates using diode and transisters
10. Logic Gates using TTL
11. Logic Gates using NAND Gate IC 7400
12. NAND Gate charecteristics
13. Construction of half adder and full adder
14. Stefan's Boltzmann constant verification
15. Measurement of Planck's constant

Open ended experiments / Projects:

Note: Any One or Two of the following Experiments may be included

1. To study the effect of nature of surface on emission and absorption of radiation
2. Verification of Stefan's law of radiation using different electric bulbs to have a comparative study
3. Tomearure stellar distance by parallax method
4. Survey for background radiation using Environmental Dosimeter
5. Construction of multiplexer and demultiplexer circuits and study their action

VI SEMESTER - PAPER VII
CONDENSED MATTER PHYSICS-II, MOLECULAR PHYSICS
QUANTUM MECHANICS –II
Teaching Hours :3hrs per week

Rationale/Learning objectives:

- Nuclear physic provides essential understanding of the nuclear phenomenon, nuclear models and nuclear radiation. It also is essential in understanding the method of harnessing nuclear energy.
- The topic molecular spectra is essential in understanding the structure and interaction of molecules which find industrial applications.
- Quantum mechanics provides a vivid picture of the events taking place at the atomic and particle level. It also has widest ranges of applications

UnitI : CONDENSED MATTER PHYSICS-II

Band theory of solids : Origin of energy bands in solids, distinction between metals insulators and semiconductors, intrinsic semiconductors – expression for Fermi energy' conductivity of intrinsic semiconductors, variation of resistance with temperature, extrinsic semiconductors, Fermi level in forward and reverse biased P-N Junction.

Hall effect, expression for Hall coefficient and its significance. Measurement of Hall coefficient (Problems)

Physics of materials:

Dielectric properties of materials-Polarisability, Susceptibility, local field and dielectric constant, Ferro electricity& Piezoelectricity.

Magnetic properties of Materials: Diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism and ferrimagnetism

Nano technology :-Nanoscale systems , Nanomaterials- synthesis, properties - examples and applications - nanoelectonics, nanomedicin, and nano robotics.
Smart Materials: Their properties, example and applications. Problems.

X- Rays : Hard and soft X-rays. Continuous and characteristic X-ray spectra, Mosley's Law. X-ray Crystallograpy- Definition of a lattice, unit cell, seven crystal system. Miller indices, Bragg's law. Bragg's spectrometer- uses- to determine λ of X-rays,to study X-ray spectrum and crystal structure .Structure of NaCl&KCl (Problems)

Unit II:
MOLECULAR PHYSICS
Molecular spectra and Scattering: Different regions of molecular spectra. Pure rotational spectra of diatomic molecules.Vibrational- Rotational spectra of diatomic molecules. Raman effect, experimental observation ,quantum theory , characteristics of Raman lines and applications . Applications of molecular spectra .

Spectroscopic Techniques: N.M.R E.S.R spectroscopy, Atomic absorption spectroscopy, UV & IR spectroscopy, Raman spectroscopy, Photoluminasence-shift in photoluminasence with their applications.

ExperimentalTechniques: Xraydiffractometer, Scanning electron microscopy, Transmission electron microscopy Scanning tunneling microscopy, Fourier transform Infrared microscopy

UnitIII:
QUANTUM MECHANICS II
Classical mechanics as an approximation of quantum mechanics. Wave function, need to represent wave function in a complex form, Properties of wave function. Setting up of time dependent Schrodinger wave equation. To arrive at the time independent wave equation. Expectation values. Eigen values and eigen functions. Normalization of wave

functions.Solution of Schrodinger equation i) for a free particle ii) a particle in a box of infinite barrier. Graphs of Ψ and $1\Psi1^2$.- tunneling effect. Extension to three dimensional box. Expression for energy of linear harmonic oscillator (Mention only), zero point energy. (problems).

Linear Operators: Hermitian and unitary. Eigen values and eigen vector of Hermitian operators. Expectation values of operators, Normalization of eigen functions, orthogonality.

Books for Reference:

1. Introduction to Solid state physics –C Kittel 7thedn ;John Wiley Asia
2. Solid state physics-H.C. Gupta; Vikas publishing house
3. Solid state physics-2ndedn; IBAC &Luth; Springer inernational
4. Solid state physics-S.O Pillai; New age inernational
5. Solid state physics& Electronics by AB Gupta and NurulHasan
6. Solid state physics-RK Puri& VK Babar; S Chand edn
7. Modern physics by Murugeshan
8. Quantum Physics- A.P.French;Thomson Nelson &sons
9. Quantum Physics- E Wichman, Berkeley Physics Course Vol; II McGraw Hill
10. Quantum Physics- Gasorovicz; John Wiley Asia

PAPER VIII
NUCLEAR PHYSICS–II&III, BIOPHYSICS, GENERAL THEORY OF RELATIVITY
AND COMMUNICATION ELECTRONICS
Teaching Hours :3hrs per week

Rationale/Learning objectives:

- Nuclear physics II and III topics deal with the mechanisms in which nuclear forces act, how one element can be converted into another and the principles involving the acceleration of particles.
- The study of cosmic rays and fundamental particles is an area of fundamental research.
- Communication electronics is the most significant field of modern electronics.

Unit I:

NUCLEAR PHYSICS–II

Nuclear forces: Characteristics of nuclear forces, Yukawa's theory, Exchange of mesons, estimation of meson mass using uncertainty principle.)

Artificial transmutation of elements: Rutherford's experiment, Q values of nuclear reaction. Threshold energy for endoergic reaction. Types of nuclear reactions. Transuranic elements.Cross section for nuclear reaction.
Discovery of neutron.Properties of the neutron.

Particle accelerators and detectors: Linear accelerator , Cyclotron , and Betatron . GM Counter, Principle of Semiconductor detector, Detection of neutrons (Problems)

Unit II:

NUCLEAR PHYSICS–III, BIOPHYSICSAND GENERAL THEORY OF RELATIVITY

Cosmic rays : Discovery, latitude, altitude and east west effects. Primary and secondary cosmic rays – composition, cosmic ray showers, Van Allen belts.

Fundamental Particles : Particles and antiparticles (qualitative discussion of Dirac's theory).Classification of fundamental particles. Basic interactions in nature, their strengths, ranges and quanta exchanged. Quark model.

Nuclear fission & Fusion: FissionReactors – Breeder reactor, Swimming pool type reactor. Four factor formula**.** Fusion – Thermonuclear reaction – plasma containment – Magnetic Bottle.

Biophysics- Bio electricity and magnetism measurements, nerve pulse transmission

General Theory of Relativity : Inertial and Gravitational mass. Principle of equivalence. Curved space and time .Brief account of Einstein's theoryof gravitation. Experimental tests for the general theory of Relativity

Unit III:

COMMUNICATION ELECTRONICS

Electronic Communication :Need for modulation – Amplitude modulation – derivation of expression for AM wave. Power relations (mention of expression), advantages and disadvantages of SSB transmission in AM. Qualitaitve discussion of FM. Comparison of AM and FM , Block diagram of AM and FM transmitters. Demodulation– Diode detector. Block diagram of AM receivers-Strait receiver drawbacks, Super heterodyne receiver , Block diagram of FM receiver. (Problems)

Cathode Ray Oscilloscope (CRO) :CRT working, time base signals, scanning principle, uses of CRO. LCD and LED monitors (qualitative). Problems.

Television :– Scanning principle types. CCD Camera, Digital Camera, CMOS in digital cam cords, Basics of black/white and Color TV - Transmission and reception.

Mobile communication techniques –GSM / CDMA , WILL , convergence in the network 3G and beyond .

Internet Basics,Modem-ADSL and SDSL

Satellite communication –explanation using block diagram, advantages and disadvantages.Mobile satellite communication.

Remote Sensing : Principle of remote sensing, Methods of data acquisition Applications of remote sensing . GPS and Terrain mapping

Suggested activities

Crystal Physics and defects in solids

Diffraction techniques– Powder photography, Laue method ,rotating crystal method Point defects, Skotky and Fresnel defects and their concentrations,line defects ,Dislocations Burger vectors Shear strength of single crystals Xray and microscopic techniques

Books for Reference:

1. Introductory Nuclear Physics-Kenneth S Krane: John Wiley (Asia)
2. Introduction to Atomic and Nuclear Physics, 5thEdn., Semat& Albright; Chapman & Hall
3. Quantum Physics of atoms, molecules, solids, nuclei and particles – Eisberg and Resnick, 2nd Edition; John Wiley Asia
4. Nuclear Physics – Irving Kaplan; John Wiley
5. Theory of relativity – Resnic
6. Physics for life science – Alan Cromer
7. Introduction to Atomic and Nuclear Physics 5thEdn – Semat&Albriht
8. Electronic communication 4thEdn. – Kennedy and Davis; Tata McGraw Hill
9. Electronic communication 6thEdn., Miller and Beasley, Prentice Hall of India
10. Mobile Communications – Jochen Schiller second edition, Pearson education 2003
11. Wireless Communications and networks – William Stallings, Pearson Education 2002
12. Wireless communication by Upenadalal

PS 661: PRACTICAL – VI

Note: *A minimum of 8 experiments should be done*

1. GM tube – characteristics
2. Half life of K^{40}
3. GM counter-verification of inverse square law for Gamma rays
4. Decay constant of radio isotope
5. Monto Carlo experiment
6. Analysis of square wave
7. IC Regulator characteristics
8. Construction of Full wave rectifier using bridge rectifier and study of effects
9. Construction and study of Regulated power supply using IC Three pin regulator
10. Construction and study of the action of Amplitude modulator using transistor
11. Verification of truth table of D-FF(7474) and Construction of 4 bit shift register
12. Verification of truth table of KJ FF (7476) and Construction of 4 bit binary counter
13. Construction of decade counter using counter decoder IC 7490

Open ended experiments/ Projects:

Note*: Any one or two of the following experiments may be included*

1. Carbon dating using GM counting systems
2. Construction and study of action of frequency modulator using IC
3. Study of characteristics of optical fibres using IFC Kit
4. Study of optical communication using OFC Kit

PATTERN OF QUESTION PAPER IN PHYSICS FOR ALL SEMESTERS (2010 ONWARDS)

The question paper will have TWO PARTS , viz , PART – A , PART – B and respectively.

PART – A

(Two questions from each unit of the syllabus and from different chapters should be given)

Short Answers	7 / 8	7x2 = 10 Marks	14

PART – B

Contains **THREE**units . Each UNIT contains TWO questions and TWO problems respectively from each unit of the syllabus.
ONE full question and ONE problem should be answered in each unit.

UNIT – I	Questions	½	--	1x17 = 17 Marks	
	Problems	½	--	1 x5 = 5 Marks	22
UNIT – II	Questions	½	--	1x17 = 17 Marks	
	Problems	½	--	1 x5 = 5 Marks	22
UNIT – III	Questions	½	--	1x17 = 17 Marks	
	Problems	½	--	1 x5 = 5 Marks	22

Total : 80

Instructions to Paper Setter:

1).The main questions in each unit must have THREE sub divisions
a) , b) and c) are of Marks 3, 5 and 9 respectively.

2). Sub-divisions a) , b) and c) must be chosen from different chapters of the same unit of the syllabus.