Scheme of Examination
B. Sc. (Hons.) Physics Semester-V & VI for the sessions 2011-13

Paper No.	*Title*	Periods Per week (Hours)	Total Marks	Internal Assessment	Max. Marks
Phy-501	Mathematical Physics V	3	50	5	45
Phy-502	Electro-magnetic Theory-I	3	50	5	45
Phy-503	Statistical Physics-I	3	50	5	45
Phy-504	Physics of Materials -I	3	50	5	45
Phy-505	Electronics Devices: Physics and Application -I	3	50	5	45
Phy-506	Any one of the following * (a) Nano Technology (b) Environmental Physics	 3 3	 50 50	 5 5	 45 45
Phy-507	Physics Lab. V	6	75	--	75
Phy.508	Physics Lab.VI And Project	6	75	--	75
		Total Marks	450		

Semester-VI

Paper No.	*Title*	Periods Per week (Hours)	Total Marks	Internal Assessment	Max. Marks
Phy-601	Mathematical Physics VI	3	50	5	45
Phy-602	Electro-magnetic Theory-II	3	50	5	45
Phy-603	Statistical Physics-II	3	50	5	45
Phy-604	Physics of Materials –II	3	50	5	45
Phy-605	Electronics Devices: Physics and Application –II	3	50	5	45
Phy-606	Any one of the following * (a) Nano Technology (b) Environmental Physics	 3 3	 50 50	 5 5	 45 45
Phy-607	Physics Lab. VII	6	75	---	75
Phy.608	Physics Lab.VIII And Project	6	75	---	75
		Total Marks	450		

B.Sc.(Hons) Physics

Phy-501 (Semester-V) Mathematical Physics-V

Max. Marks : 45
Internal Assesment: 5
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 2 units. Eight questions will be set up. Four questions from each unit. Student will have to attempt at least two questions from each unit. A student has to attempt five questions in all. Question No.1 will be compulsory of 14 marks covering whole syllabus.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit I (A):Linear Vector Spaces and Matrices.

Introduction to groups, rings and fields.

Vector spaces and subspaces. Linear independence-basis and dimensions. Linear transformations. Algebra of linear transformations. Non-singular transformations. Isomorphism. Representation of linear transformations by matrices.

Unit II:

Matrix algebra Addition and multiplication null and unit matrices. Singular and non-singular matrices. Inverse of a matrix Eigenvalues and eigenvectors. Digitalization solution of coupled linear ordinary differential equations.

Special matrices: Hermitian and skew symmetric and antisymmetric, orthogonal and unitary matrices Similarly transformations and bilinear and quadratic forms. Trace of a matrix Cayley-Hamilton theorem. Function of a matrix.

Metric spaces. Inner product and metric concept.

Recommended Books

1 Mathematical Physics by **P. K. Chattopadhyay (T)**
2 Mathematical Physics by ***B. S. Rajput***
3 Mathematical Physics by ***Mathews and Walkers***
4 Mathematics for Physicists ***by Mary L Boas***.
5 Matrices and Tensors for Physicists by ***A. W. Joshi***

B.Sc.(Hons) Physics

Phy-502 (Semester-V) Electromagnetic Theory-I

Max. Marks : 45
Internal Assesment: 5
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 2 units. Eight questions will be set up. Four questions from each unit. Student will have to attempt at least two questions from each unit. A student has to attempt five questions in all. Question No.1 will be compulsory of 14 marks covering whole syllabus.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit- I

Maxwell equations. Displacement current, Vector and scalar potentials. Gauge transformations : Lorentz and Coulomb gauge. Boundary conditions at interface between different media. Wave equations. Plane waves in dielectric media.

Poynting theorem and Poynting vector. Energy density. Physical concept of electromagnetic (e.m) field momentum density and e.m field angular momentum density.

Unit -II

Reflection and refraction of a plane wave at a plane interface between dielectrics. Fresnel formulae. Total internal reflection Brewster's angle. Waves in conducting media. Metallic reflection (normal incidence). Skin depth.

Maxwell's equations in microscopic media (plasma) Characteristic plasma frequency. Refractive index. Conductivity of an ionized gas. Propagation of e.m. waves in ionosphere.

Book Prescribed

1 Electromagnetic by **B. B. Laud**
2 Classical Electricity and Magnetism by **Panofsky and Phillips**
3 Electromagnetic Theory and Electrodynamics by **Satya Prakash.**
4 Electromagnetic fields and Waves by **V. V. Sarwate.**
5 Electrodynamics by **Gupta S. L. , Singh S. P. and Kumar V**

B.Sc.(Hons) Physics

Phy-503 (Semester-V) Statistical Physics-I

Max. Marks : 45
Internal Assesment: 5
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 2 units. Eight questions will be set up. Four questions from each unit. Student will have to attempt at least two questions from each unit. A student has to attempt five questions in all. Question No.1 will be compulsory of 14 marks covering whole syllabus.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit- I : Classical Statistics

Entropy and thermodynamic probability. Maxwell Boltzmann distribution law. Partition function. Thermodynamic functions of finite number of energy levels. . Thermodynamic functions of an ideal gas. Classical entropy expression, Gibbs paradox. Law of equipartition of energy – applications to specific heat and its limitations.

Unit -II : Classical Theory of Radiation

Properties of thermal radiation, Kirchhoff's law, Stefan-Boltzmann law and Wien's displacement law

Quantum Theory of Radiation

Planck's law of black-body radiation. Deduction of Wien's radiation formula, Rayleigh-Jeans law. Stefan-Boltzmann law and Wien's displacement law from Planck's law.

Laser: working principle, thermal equilibrium of radiation, principle of detailed balance, Einstein's A and B coefficients, population inversion. Two-level and three-level systems.

Book Prescribed

1 Statistical Mechanics by **K. Huang**
2 Statistical Mechanics by **R. K. Patharia**
3 Statistical Mechanics by **B. K. Aggarwal and M. Eisner**
4 Statistical Physics by **Landaou and LifShitz**
5 Statistical Mechanics by **R. Kubo**

B.Sc.(Hons) Physics

Phy-504 (Semester-V) Physics of Materials-I

Max. Marks : 45
Internal Assesment: 5
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 2 units. Eight questions will be set up. Four questions from each unit. Student will have to attempt at least two questions from each unit. A student has to attempt five questions in all. Question No.1 will be compulsory of 14 marks covering whole syllabus.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit I : Crystal Structure

Amorphous and crystalline materials.

Lattice translation vectors. Lattice with a basis-central and non-central elements. Unit cell, reciprocal lattice. Types of lattices. Crystal diffraction : Bragg's law, diffraction of X-rays, atoms and geometrical structure factor.

S-ray diffraction methods – measurement of lattice parameter for cubic lattices.

Unit II: Elementary Lattice Dynamics

Lattice vibrations. Linear monoatomic and diatomic chains. Acoustical and optical phonons. Qualitative description of the phonon spectrum in solid Brillouin zones. Einstein and Debye theories of specific heat of solids T^3 law.

Magnetic Properties of Matter

Response of substances of magnetic field Dia, para and ferri and ferromagnetic materials. Classical Langevin theory of dia and paramagnetic domains. Quantum mechanical treatment of paramagnetism. Curle's law, Weiss's theory of ferromagnetism and ferromagnetic domains and discussionof B.H hysteresis. Qualitative discussion of ferrimagnets and ferrites.

Book Prescribed

1 Introduction to Solid State Physics by **C. Kittel**
2 Solid State Physics : Structure and Properties of Material by **M. A. Wahab**
3 Solid State Theory by **W. A. Harrison**
4 Solid State Physics by **H. E. Hall.**

B.Sc.(Hons) Physics

Phy-505 (Semester-V) Electronics Devices : Physics and Applications-I

Max. Marks : 45
Internal Assesment: 5
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 2 units. Eight questions will be set up. Four questions from each unit. Student will have to attempt at least two questions from each unit. A student has to attempt five questions in all. Question No.1 will be compulsory of 14 marks covering whole syllabus.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit I

Mesh analysis for d.c. and a.c. circuits: Nodal analysis duallty in networks. To Equivalent of a four terminal network. Thevenin and Norton theorem. Maximum power tranfer, superposition and reciprocity theorems. Z, Y, H parameters.

Basic semiconductor physics – p and n type semiconductors, energy level diagram, conductivity and mobility, pn junction fabrication 9simple idea). Barrier formation in pn junction diode, current flow mechanism in forward and reverse biased diode (recombination, drift and saturation of drift velocity).

Unit II

Single pn junction devices (physical explanation, current voltage characteristics and one or two applications0 Two terminal devices-rectifier diode, Zener diode, photo diode, LED, solar cell and varactor diode. Three-terminal devices-junction field effect transistor (FET), unijunction transistor (UJT) and their equivalent circuits.

Two junction devices p-n-p and n-p-n transistors, physical mechanism of current flow, active, cutoff and saturation regions. Transistor in active region and equivalent circuit.

Book Prescribed

1 Introduction to Semiconductor Devices by **M. S. Tyagi**

2 Semiconductor Electronics by **A. K. Sharma, New Age International Publisher (1996)**

3 Optical Electronics by **Ajay Ghatak and K. Thygarajan, Cambridge Univ. Press**

4 Semiconductor Device- Physics and Technology by **S. M. Sze, Wiley (1985)**

5 Measurement, Instrumentation and Experimental Design, in Physics and Engineering by **M. Sayer and A. Mansingh, Prentice Hall, India (2000)**

B.Sc.(Hons) Physics

Phy-506 (a) (Semester-V) Nano Technology

Max. Marks : 45
Internal Assesment: 5
Time : 3 Hrs.

1. The syllabus is divided into 2 units. Eight questions will be set up. Four questions from each unit. Student will have to attempt at least two questions from each unit. A student has to attempt five questions in all. Question No.1 will be compulsory of 14 marks covering whole syllabus.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit- I

Free electron theory (qualitative idea) and its features, Idea of band structure, Metals, insulators and semiconductors, Density of states in bands, Variation of density of states with energy, Variation of density of states and band gap with size of crystal.

Unit -II

Electron confinement in infinitely deep square well, confinement in two and one dimensional well, Idea of quantum well structure, Quantum dots, Quantum wires.

Text and Reference Books:

1. Nanotechnology Molecularly designed materials by **Gan -Moog Chow, Kenneth E. Gonsalves, American Chemical Society**
2 Quantum dot heterostructures by **D. Bimerg, M. Grundmann and N.N. Ledenstov, John Wiley & Sons, 1988.**
3 Nano technology : :molecular speculations on global abundance by **B.C. Crandall, MIT Press 1996.**
4 Physics of low dimensional semiconductors by **John H. Davies, Cambridge Univ. Press 1997.**
5 Physics of Semiconductors nano structures by **K.P. Jain, Narosa 1997**.
6 Nano fabrication and bio system : Integrating materials science engineering science and biology by **Harvey C. Hoch, Harold G. Craighead and Lynn Jelinskii, Cambridge Univ. Press 1996.**
7 Nano particles and Nano structured films ; Preparation characterization and applications Ed. J.H. **Fendler, John Wiley & Sons 1998.**

B.Sc.(Hons) Physics

Phy-506 (b) (Semester-V) Environmental Physics

Max. Marks : 45
Internal Assesment: 5
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 2 units. Eight questions will be set up. Four questions from each unit. Student will have to attempt at least two questions from each unit. A student has to attempt five questions in all. Question No.1 will be compulsory of 14 marks covering whole syllabus.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit -I Essentials of Environmental Physics

Structure and thermodynamics of the atmosphere, Composition of air, Greenhouse effect Transport of matter, energy and momentum in nature, Stratification and stability of atmosphere. Laws of motion, hydrostatic equilibrium, General circulation of the tropics, Elements of weather and climate of India.

Unit -II Solar and Terrestrial Radiation

Physics of radiation, Interaction of light with matter, Rayleigh and Mie scattering, Laws of radiation (Kirchoffs law, Planck's law, Wien's displacement law, etc.), Solar and terrestrial spectra, UV radiation, Ozone depletion problem, IR absorption energy, balance of the earth atmosphere system.

Text and Reference Books

1. **Egbert Boeker & Rienk Van Groundelle** : Environmental Physics (John Wiley).
2 **J.T. Hougtion** : The Physics of Atmosphere (Cambridge University Press 1977).
3 **J. Twidell and J. Weir,** Reneable Energy Resources (Elbs, 1988).
4 **Sol Wieder**. An introduction to Solar Energy for Scientists and Engineers (John Wiley, 1982)
5 **R.N. Keshavamurthy and M. Shanker Rao** : The Physics of Monsoons (Allied Publishers, 1992).
6 **G.J. Haltiner and R.T. Williams** : Numerical Weather Prediction (John Wiley , 1980

B.Sc.(Hons) Physics

Phy-507 (Semester-V) Physics Laboratory V

Max. Marks : 75
Periods **per week : 6 Hrs.**
Time : 3 Hrs**.**

Laboratory report	15
Viva	15
Practical	40

Unit- I: Measurement of Magnetic Field and Related Parameters

1. Measurement of field strength B and its variation in a solenoid (determination or dB/dx).
2. Determination of B-H curve using ballistic galvanometer.
3. Determination of magnetic susceptibility for liquids and solids.

Unit -II: Polarisation

1. Polarisation of light by simple reflection (determination of variation of percentage reflection and degree of polarization with angle of incidence).
2. Determination of specific rotation for cane sugar solution.
3. Study of elliptically polarized light.

B.Sc.(Hons) Physics

Phy-508 (Semester-V) Physics laboratory –VI & Project

Max. Marks : 75
Periods per week : 6 Hrs.
Time : 3 Hrs.

Laboratory report	15
Viva	15
Practical	40

Unit I : Power supply

1. To design a semiconductor power supply of given rating using half wave a full wave or bridge rectifier and investigate the effect of C-filter.
2. To investigate simple regulation and stabilization circuits using zener diodes and voltage regulator Ics.

Unit II: Transistor Applications:

1. to study the various transistor biasing configurations.
2. To design of CE amplifier of a given gain (midgain) using voltage divider bias.
3. To design an oscillator of given specifications.
4. To study the characteristics of a FET and design a common source amplifier.

Operational Amplifier based Experiments.

1. To investigate the use of an op-amp as an integrator.
2. To investigate the use of an op-amp a differentiator
3. To design an analog circuit to simulate the solution of first/second order differential equation.
4. To design an op-amp oscillator.

B.Sc.(Hons) Physics

Phy-601 (Semester-VI) Mathematical Physics-VI

Max. Marks : 45
Internal Assesment: 5
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 2 units. Eight questions will be set up. Four questions from each unit. Student will have to attempt at least two questions from each unit. A student has to attempt five questions in all. Question No.1 will be compulsory of 14 marks covering whole syllabus.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit I: Cartesian Tensors

Transformation of co-ordinates. Tensorial character of physical quantities. Symmetric and anti-symmetric lasers, Contraction and differentiation, Pseudotensors, Kronecker and attemating tensors, Step function and Diract delta function.

Fourier transform . Fourier integral theorem, Sine and cosine transforms.

Unit II : Integral Transforms:

Convolution theorem, Solution of one dimensional diffusion and wave equations, Heat flow in an infinite and semi-in-finite rod.

Laplace transform, Transform of elementary functions, Derivatives and integrals, Unit step function, Periodic function, Translation substitution and convolution theorem, Solution of first and second order ordinary differential equations Solution of partial differential equations.

Evaluation of integrals using transforms.

Recommended Books

1 Mathematical Physics by P. K. Chattopadhyay (T)

2 Mathematical Physics by *B. S. Rajput*

3 Mathematical Physics by *Mathews and Walkers*

4 Mathematics for Physicists *by Mary L Boas.*

5 Matrices and Tensors for Physicists by *A. W. Joshi*

B.Sc.(Hons) Physics

Phy-602 (Semester-VI) Electromagnetic Theory-II

Max. Marks : 45
Internal Assesment: 5
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 2 units. Eight questions will be set up. Four questions from each unit. Student will have to attempt at least two questions from each unit. A student has to attempt five questions in all. Question No.1 will be compulsory of 14 marks covering whole syllabus.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit -I

Polarization of e.m. waves. Description of linear, circular and elliptical polarization.

Propagation of e.m waves in anisotropic media Symmetric nature of dielectric tensor. Fresnel's formula. Light propagation in uniaxial crystal. Double refraction. Nicol prism. Production of circularly and elliptically polarized light. Babinet compensator. Analysis of polarized light.

Unit -II

Wave guides. Coaxial transmission line. Modes in rectangular wave guide Energy flow and attenuation in wave guides, Rectangular resonant caves.

Planar optical wave guides Planar dielectric wave guide, condition of continuity at interface. Phase shift on total reflection, eigenvalue equations, phase and group velocity of the guided waves, field energy and power transmission.

Book Prescribed

1 *Electromagnetic by B. B. Laud*
2 *Classical Electricity and Magnetism by Panofsky and Phillips*
3 *Electromagnetic Theory and Electrodynamics by Satya Praksh.*
4 *Electromagnetic fields and Waves by V. V. Sarwate.*
5 *Electrodynamics by Gupta S. L. , Singh S. P. and Kumar V*

B.Sc.(Hons) Physics

Phy-603 (Semester-V) Statistical Physics-II

Max. Marks : 45
Internal Assesment: 5
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 2 units. Eight questions will be set up. Four questions from each unit. Student will have to attempt at least two questions from each unit. A student has to attempt five questions in all. Question No.1 will be compulsory of 14 marks covering whole syllabus.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit -I : Bose Einstein Statistics

B.E. distribution law. Thermodynamic functions of an ideal weakly degenerate gas Strongly degenerate Bose gas, Bose-Einstein condensation properties of liquid He (qualitative description). Radiation as photon gas Bose's derivation of Planck's law. Thermodynamic functions of photon gas.

Specific heat of hydrogen: quantization of rotational and vibration motion, ortho and para hydrogen.

Unit -II : Fermi-Dirac Statistics.

Fermi-Dirac distribution law, Fermi energy. Thermodynamic functions of an ideal weakly degenerate Fermi gas. Strongly degenerate Fermi gas, Electron gas in a metal, specific heat of metals, Richardson's equation of thermionic emission.

Third law of thermodynamics. Absolute definition of entropy. Consequences of third law, unattainability of absolute zero.

Book Prescribed

1 Statistical Mechanics by **K. Huang**
2 Statistical Mechanics by **R. K. Patharia**
3 Statistical Mechanics by **B. K. Aggarwal and M. Eisner**
4 Statistical Physics by **Landaou and LifShitz**
5 Statistical Mechanics by **R. Kubo**

B.Sc.(Hons) Physics

Phy-604 (Semester-VI) Physics of Materials-II

Max. Marks : 45
Internal Assesment: 5
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 2 units. Eight questions will be set up. Four questions from each unit. Student will have to attempt at least two questions from each unit. A student has to attempt five questions in all. Question No.1 will be compulsory of 14 marks covering whole syllabus.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit I: Dielectric Properties of Materials.

Polarization, Local electric field at an atom. Depolarization field, Lorentz fields of dipoles inside a cavity.

Dielectric constant and polrizability: Electric susceptibility, polarizability, Clausius-Mosotti equation. Qualitative discussion of ferroelectric properties of materials and P-E hysteresis loop.

Unit II : Electrical Properties of Materials

Qualitative description of free electron theory and its inadequacies with reference to Hall effect and specific heat of electrons in a metal.

Elementary band theory-Bloch theorem, Kronig-Penney model, effective mass of electron, concept of hole. Band gaps, difference between conductors, semiconductors and insulators, intrinsic and action, conductivity in semiconductors, mobility of carriers (lattice & semiconductors (qualitative).

Book Prescribed

1. Introduction to Solid State Physics by **C. Kittel**
2. Solid State Physics : Structure and Properties of Material by **M. A. Wahab**
3. Solid State Theory by **W. A. Harrison**
4. Solid State Physics by **H. E. Hall**.

B.Sc.(Hons) Physics

Electronics Devices : Physics and Applications-II

Phy-605 (Semester-VI)

Max. Marks : 45
Internal Assesment: 5
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 2 units. Eight questions will be set up. Four questions from each unit. Student will have to attempt at least two questions from each unit. A student has to attempt five questions in all. Question No.1 will be compulsory of 14 marks covering whole syllabus.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit- I

Amplifiers – Only bipolar junction transistor, CB, CE and CC configurations. Single stage CE amplifier (biasing and stabilization circuits, Q-point, equivalent circuit, input impedance, output impedance, voltage and current gain). Class A, B. C amplifiers (definitions) RC coupled amplifiers (frequency response, Boe plot, amplitude and phase) Class B push-pull amplifier.

Feedback in amplifiers – Voltage feedback and current feedback Effect of negative voltage series feedback on input impedance, output impedance and gain, stability distortion and noise.

Unit -II

Oscillators – barkhausen criterion, Colpitts, phase shift and crystal oscillators.
Multivibrators and sweep circuits Basic circuits of astable, bistable and monostable multivibrators, Details of astable multivibrators (Derivation of time period). Sweep circuit using transistor as a switch and UJT (derivation of time period).

Book Prescribed

1 Introduction to Semiconductor Devices by **M. S. Tyagi, Tyal Wiley and Sons.**
2 Semiconductor Electronics by **A. K. Sharma, New Age International Publisher (1996)**
3 Optical Electronics by **Ajay Ghatak and K. Thygarajan, Cambridge Univ. Press**
4 Semiconductor Device- Physics and Technology by **S. M. Sze, Wiley (1985**)
5 Measurement, Instrumentation and Experimental Design, in Physics and Engineering by **M. Sayer and A. Mansingh, Prentice Hall, India (2000**)

B.Sc.(Hons) Physics

Phy-606 (a) (Semester-VI) Nano Technology

Max. Marks : 45
Internal Assesment: 5
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 2 units. Eight questions will be set up. Four questions from each unit. Student will have to attempt at least two questions from each unit. A student has to attempt five questions in all. Question No.1 will be compulsory of 14 marks covering whole syllabus.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit 1

Determination of particle size, Increase in width of XRD peaks of nanoparticles, Shift in photoluminescence peaks, Variations in Raman spectra of nano-materials.

Unit II

Different methods of preparation of nanomaterials, Bottom up : Cluster beam evaporation, Ion beam deposition, Chemical bath deposition with capping techniques and Top down : Ball Milling.

Text and Reference Books :

1. Nanotechnology Molecularly designed materials by **Gan -Moog Chow, Kenneth E. Gonsalves, American Chemical Society**

2 Quantum dot heterostructures by **D. Bimerg, M. Grundmann and N.N. Ledenstov, John Wiley & Sons, 1988.**

3 Nano technology: molecular speculations on global abundance by **B.C. Crandall, MIT Press 1996.**

4 Physics of low dimensional semiconductors by **John H. Davies, Cambridge Univ. Press 1997.**

5 Physics of Semiconductors nano structures by **K.P. Jain, Narosa 1997.**

6 Nano fabrication and bio system: Integrating materials science engineering science and biology by **Harvey C. Hoch, Harold G. Craighead and Lynn Jelinskii, Cambridge Univ. Press 1996.**

7 Nano particles and nano structured films ; Preparation characterization and applications Ed. J.H. **Fendler, John Wiley & Sons 1998**.

B.Sc.(Hons) Physics

Phy-606 (b) (Semester-VI) Environmental Physics

Max. Marks : 45
Internal Assesment: 5
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 2 units. Eight questions will be set up. Four questions from each unit. Student will have to attempt at least two questions from each unit. A student has to attempt five questions in all. Question No.1 will be compulsory of 14 marks covering whole syllabus.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit -I Environmental Pollution and Degradation

Elementary fluid dynamics. Diffusion, turbulence and turbulent diffusion. Factors governing air, water and noise pollution. Air and water quality standards. Waste disposal. Heat island effect. Land and see breeze. Puffs and plumes. Gaseous and particulate matters. Wet and dry deposition.

Unit -II Environmental Changes and Remote Sensing

Energy source and combustion processes Renewable sources of energy. Solar energy, wind energy, bioenergy, hydropower, fuel cells, nuclear energy. Forestry and bioenergy.
Elements of weather and climate. Stability and vertical motion of air. Horizontal motion of air and water. Pressure gradient forces. Viscous forces. Inertia forces. Reynolds number. Enhanced Greenhouse Effect. Energy balance ,a zero dimensional Greenhouse model, Global climate models.

Text and Reference Books

1. **Egbert Boeker & Rienk Van Groundelle** : Environmental Physics (John Wiley).
2 **J.T. Hougtion** : The Physics of Atmosphere (Cambridge University Press 1977).
3 **J. Twidell and J. Weir, Reneabl**e Energy Resources (Elbs, 1988).
4 **Sol Wieder**. An introduction to Solar Energy for Scientists and Engineers (John Wiley, 1982)
5 **R.N. Keshavamurthy and M. Shanker Rao** : The Physics of Monsoons (Allied Publishers, 1992).
6 **G.J. Haltiner and R.T. Williams** : Numerical Weather Prediction (John Wiley , 1980)

B.Sc.(Hons) Physics

Phy-607 (Semester-VI) Physics Laboratory VII

Max. Marks : 75

Time per week : 6 Hrs.

Time : 3 Hrs.

Laboratory report	15
Viva	15
Practical	40

Unit- I: Determination of Fundamental Constants:

1. Determination of Boltzmann constant by studying forward characteristics of a diode.
2. Determination of e/m by method of magnetic focusing or bar magnet.
3. Determination of Stefan's constant.

Unit -II: Measurements in Solid State Physics.

1. Measurement of resistivity as a function of temperature for a Ge crystal using four probe method (from room temperature to 200 C) and determination of energy gap.
2. Determination of Hall coefficient of a given sample.
3. Determination of PE hysteresis of a ferroelectric crystal.
4. measurement of magnetic susceptibility.
5. Ultrasonic grating.
6. Determination of wavelength of H-alpha emission line of hydrogen atom.
7. Determination of absorption lines in the rotational spectrum of iodine vapour.

B.Sc.(Hons) Physics

Phy-608 (Semester-VI) Physics laboratory –VIII & Project

Max. Marks : 75
Time per week : 6 Hrs.
Time : 3 Hrs.

Laboratory report	15
Viva	15
Practical	40

Unit -I: Modulation.

1. To study amplitude modulation using transistor.
2. To study a crystal rectifier.
3. To study pulse width/pulse position and pulse amplitude modulation using Ics.

Multivibrators and Sweep Circuits.

1. To study the characteristics of a UJT and design a single relaxation oscillator.
2. To design an astable multivibrator of given time period fail lisecond order).
3. To design a sweep of given amplitude and true.

Unit -II

Transducers.

1. To determine the coupling coefficient of a piezo-electric crystal.
2. To determine the characteristics of pn juction of a solar
3. To study the characteristics of a photo-diodes.

Networks.

1. To verify the Thevenin, Norton and maximum power transfer theorems.
2. Measurement of input and output impedance of an unknown network and making equivalent T and P circuit