

## BACHLOR OF SCIENCE IN PHYSICS

<b>S.No.</b>	<b>Name of the Subject</b>	<b>Marks</b>
<b>I year</b>		
1.	Hindi – I	100
2.	English – I	100
3.	Properties of Matter and Mechanics	100
4.	Heat and Sound	100
5.	Optics	
6.	Practical I	100
<b>II year</b>		
7.	Hindi – II	100
8.	English – II	100
9.	Electricity	100
10.	Basic Electronics	100
11.	Mathematical Physics	
12.	Practical II	100
<b>III year</b>		
13.	Electronics and Communication	100
14.	Atomic and Nuclear Physics	100
15.	Quantum Mechanics	100
16.	Environmental Physics	100
17.	Digital Electronics and Microprocessor	100
18.	Practical III	100

# **B.Sc. PHYSICS**

## **FIRST YEAR**

### **Paper – 1**

### **Hindi I**

### **Paper – 2**

### **ENGLISH PAPER – I**

#### **Detailed Text**

#### **PROSE**

1. In Prison – Jawaharlal Nehru
2. What is Science? – George Orwell
3. On Marriages – Nirad Chaudari
4. The Luncheon – N. Somerset Maugham
5. The Mourners – V. S. Naipaul
6. The Plane Crash – Juliane Koepcke
7. Better Late – R.K. Narayan

#### **POETRY**

1. Polonius' Advice to his Son – William Shakespeare
2. Every Town a Home Town - Kaniyan Purkunran
3. The Village Schoolmaster – Oliver Goldsmith
4. The Solitary Reaper – William Wordsworth
5. On his Blindness – John Milton
6. The Tyger – William Blake

#### **Non-Detailed**

**Text :** THE GIFTS AND OTHER STORIES abridged and simplified by Anthony Toyne – Oxford University Press, 1997.

The following stories

1. The Gifts – O. Henry

2. The Two Friends – Guy de Maupassant
3. The Bear Hunt – Leo Tolstoy
4. The Goblins and the Grave Digger – Charles Dickens
5. The Nightingale and the Rose – Oscar Wilde

## **GRAMMER**

1. Articles and Prepositions
2. Infinitives and Gerunds
3. Five basic sentence patterns (SV SVC, SVO, SVOO, SVOC(A))
4. Arranging the component parts so as to form a sentence
5. Language work at the end of all lessons
6. Language work at the end of all lessons
7. Question Tag, Active and Passive Voice
8. Degrees of Comparison

## **COMPOSITION**

1. Letter Writing (Formal and Informal)
2. Developing the hints
3. Comprehension
4. Writing Telegram
5. Completion of a passage
6. Precis Writing

## **Paper – 3**

### **PROPERTIES OF MATTER AND MECHANICS**

#### **UNIT – I**

Elastic moduli – relations connecting elastic moduli – Poisson's ratio – work done in stretching – twisting couple on a cylinder – work done in twisting – Rigidity modulus by static torsion – rigidity modulus and bending moment – uniform and non-uniform bending by beams – I section girders – Young's modulus by cantilever.

#### **UNIT – II**

Viscosity of a liquid – Poiseuille's method – Viscosity of highly viscous liquid by Searle's viscometer – variation of viscosity with temperature – Meyer's formula for the viscosity of gases – determination of viscosity of a gas by Rankine's method.

Osmosis : Osmosis and osmotic pressure – Laws of osmotic pressure – osmosis and vapour pressure of a solution – osmosis and freezing point of a solution – application of osmosis.

### **UNIT – III**

Surface tension and surface energy – excess of pressure inside a curved surface – application to cylindrical and spherical drops and bubbles – Quincke's method – surface tension and vapour pressure over a curved surface – formation of drops.

### **UNIT – IV**

Projectile : Path of a projectile – proof – range on an inclined plane. Impact : impulsive force – laws of impact – coefficient of restitution – impact of a smooth sphere on a fixed smooth plane – direct impact between two smooth spheres – Loss of K.E in direct impact – oblique impact between two smooth spheres – motion of two interacting bodies – reduced mass.

### **UNIT – V**

Centre of gravity : CG of a solid cone, hollow cone, solid hemisphere, hollow hemisphere and tetrahedron. Friction : Laws of friction, angle of friction, resultant reaction and cone of friction, equilibrium of a body on an inclined plane under the action of a force – centre of pressure – definition – Centre of pressure of a rectangular lamina and triangular lamina; Atmospheric pressure : Variation of atmospheric pressure with altitude – height of homogeneous atmosphere.

### **Text Books:**

1. Properties of matter by R. Murugesan (S.Chand)
2. Properties of matter by Brijlal and Subramanyam (S.Chand)
3. Mathur, D.S, Mechanics, Chand and Co.
4. Mechanics, Subramaniam et al, S. Viswanatham and Company.

**Reference Books :**

1. Elements of properties of matter by D.S. Mathur.
2. Goldstein, H, Classical Mechanics.

**Paper – 4**  
**HEAT AND SOUND**

**UNIT – I**

Thermometry – Platinum resistance thermometer with corrections – Thermoelectric thermometer.

Calorimetry : Definition of specific heat capacity – Determination of specific heat capacity of a liquid by Newton's law of cooling – Barton's Correction – Two specific heat capacities of a gas – Determination of  $C_p$  by Regnault's method – Determination of  $C_v$  by Johy's differential calorimeter.

**UNIT – II**

Equation of state : Vander Waal's equation – definition of critical constants and their determination from Vander Waal's equation.

Conduction : Definition of thermal conductivity – determination of thermal conductivity of a good conductor by Forbes's method – thermal conductivity of a poor conductor by Lee's disc method. Radiation : Stefan's law – Experimental determination of Stefan's Constant.

**UNIT – III**

Thermodynamics : Concept of entropy – Entropy of an ideal gas – Reversible and irreversible processes and their entropies – TS diagram – Carnot's theorem and its proof – Otto engine – Diesel engine – Third law of thermodynamics – Thermodynamic scale of temperature – its relation to perfect gas scale.

## **UNIT – IV**

Theory of vibration – theory of damped harmonic motion – theory of forced vibration and resonance – sharpness of systems; Normal modes of bounded system – harmonics – the quality of sound, Chladni's figure, vibration of a drum. Noise and music – Limits of human audibility – intensity – temperature scale, temperature and music instruments. Reflection – refraction – and diffraction of sound – acoustic impedance of a medium – Percutane reflection and refraction at a boundary – impedance matching for transducers – Diffraction of sound – principle of sonar – sound ranging.

## **UNIT – V**

Fourier Theorem – Fourier Series – Evaluation of Fourier co-efficient. Application to square and saw tooth waves – explanation of wave and group velocities. Applied acoustics : Transducers and their characteristics – recording and reproduction of sound – measurement of frequency velocity, waveform and intensity. The acoustics of halls – reverberation – Sabine's formula – derivation – determination of absorption coefficients. Ultrasonics – production and properties, detection and uses.

### **Text Books**

1. Heat and Thermodynamics by Brijlal and Subramaniam.
2. Heat and Thermodynamics by J.B. Rajam
3. A Textbook of sound by R.L. Saighal.
4. Sound by R. Murugesan.

## **Paper – 5**

### **OPTICS**

## **UNIT – I**

Geometrical optics : Convex lens – principal focus and focal planes – principal points and planes – nodal points and planes – Newton's formula for a convex lens system – Aberrations in lenses and optical instruments – Spherical aberration in lenses – methods of reducing Spherical aberration – aplanatic points in lenses – condition for minimum Spherical aberration in the case of two lenses separated by a distance – chromatic aberration in lenses –

condition for achromatism of two lenses in contact and out of contact – Huygen’s and Ramsden’s eye - pieces – construction and comparison.

## **UNIT – II**

Fresnel’s biprism – determination of wavelength of light and thickness of thin sheet of transparent material – interference in thin films due to reflected light – colours of thin films – Air wedge method of determination of diameter of a wire-test for optical flatness – Newton’s rings – experimental determination of refractive index of the material of the lens – and a given liquid – Michelson’s interferometer – determination of wavelength and thickness of a mica sheet.

## **UNIT – III**

Diffraction – Fresnel’s explanation for rectilinear propagation of light-zone plate-Fresnel’s diffraction at a straight edge – Fraunhofer diffraction at a single slit, double Slit and N slits – Plane diffraction grating – wavelength – determination – Resolving power – Rayleigh’s criterion – resolving power of telescope, microscope, prism, grating – comparison of prism and grating spectra. Polarisation – Huygen’s explanation of double refraction in uniaxial crystals – polarizing prisms – quarter and half wave plates – production and detection of a plane, circularly and elliptically polarized light – optical activity – specific rotatory power – Fresnel’s explanation- Sp Rotatory power by Laurent’s half-shade polarimeter.

## **UNIT –IV**

Non-linear optics : History of fibreoptics – fibre characteristics and classification – Mode theory of fibres – transverse mode and hybrid mode – linearly polarized mode – Single mode fibre – multimode fibre – fibre losses – absorption, scattering, bending losses – core and cladding losses – Dispersion in fibres (elementary ideas only)

## **UNIT – V**

Optical fibre communication system – analog optical fibre communication system – Digital Optical fibre communication system – advantages of Optical fibre communication system – requirements of communication light sources (lasers) – different types of modulation and demodulation (elementary ideas only).

## **Reference Books**

1. Brijlal and Subrahmanian – A text book of light.
2. Vasudeva D.N. – A text book of light
3. Ajoy Ghatak – Optics (2<sup>nd</sup> Edition)
4. Dr. S. Arumugam – Semiconductor Physics and Optoelectronics
5. Kennedy and Davis – Electronic Communication System.

## **SECOND YEAR**

### **Paper – 6**

### **Hindi I**

### **Paper – 7**

### **ENGLISH PAPER – II**

#### **Detailed Text**

#### **PROSE**

8. A Visit to India – Julian Huxley
9. University Days – James Thurber
10. I Have a Dream – Martin Luther King
11. The Story Teller – H.H. Munro (Saki)
12. George Bernard Shaw – Bertrand Russel
13. Only then shall we find Courage – Albert Einstein

#### **POETRY**

7. The Day is Done – Henry Wadsworth Longfellow
8. King Arthur's Farewell – Alfred Tennyson
9. O Captain! My Captain! – Walt Whitman
10. My Last Duchess – Robert Browning
11. Ode to a Nightingale – John Keats



## 12. Lochinvar –Walter Scott

### **Non-Detailed**

A collection of One Act Plays -

1. Remember Ceasar – Gordon Daviot
2. The Proposal – Anotn Chekov
3. The Miracle Merchant – Saki
4. The Stepmother – Arnold Bennet
5. The Mahatma – Rama Sarma

### **GRAMMER**

1. Relative Clauses
2. Conditional Sentences
3. Modal auxiliaries
4. Reported Speech
5. Transformation of Sentences
  - a. Affirmative, Negative and Interrogative Sentences
  - b. Simple, Compound and Complex Sentences
6. a,b,r clauses
7. Correction of Sentences based on
  - a. Subject, Verb and Concord
  - b. Tenses
  - c. Articles and Prepositions.
  - d. Question Tags

### **COMPOSITION**

7. Paraphrasing
8. Dialogue Writing
9. Report Writing
10. Note Making
11. General Essay
12. Expansion of Idea.

**Paper – 8**  
**ELECTRICITY**

**UNIT – I**

Electrostatics : Mechanical stress on unit area of a charged conductor – application to electrified soap bubble – Potential energy stored in unit volume of a medium surrounding a charged body.

Capacitor : Capacitance of a capacitor – Spherical and cylindrical capacitors – energy of a charged capacitor – Loss of energy due to sharing of charges – force of attraction between the plates of a charged capacitor – quadrant electrometer – Measurement of potential, ionization current and dielectric constant.

**UNIT – II**

Carey Foster's Bridge – Thermo electricity – Peltier coefficient and Thomson coefficient – Application of thermodynamics to thermocouple thermoelectric power – Thermoelectric diagrams and uses. Acid and alkali accumulators – standard Cadmium cell – Gibbs – Helmholtz equation – Calculation of e.m.f of a Daniel cell as a reversible cell (solid state cells)

**UNIT – III**

Magnetic field intensity due to a solenoid carrying current – Effect of iron core in a solenoid – Moving coil ballistic galvanometer – Damping correction – Uses of B.G. Determination of about 'C' and 'M'. Expression for self inductance of a coil- Expression for mutual inductance of a pair of coaxial coils – Coefficient of coupling – Induction coil and its uses.

**UNIT – IV**

Transient current : Growth and decay of current in a circuit containing inductance L and resistance R with steady e.m.f. – Growth and decay of charge in a capacitance – resistance circuit Determination of high resistance by leakage – Growth and decay of charge in a LCR circuit – Conditions for the discharge to be oscillatory – Frequency of oscillation.

## **UNIT – V**

Power factor and current values in AC circuits containing series and parallel resonant circuits. RMS, average value of current and emf – power in AC circuits – power factor in LR and CR circuits – AC and DC Motors. Types of windings – series, parallel and compound windings – transformers – Three phase, delta and star connections – choke – skin effect.

### **Text Books**

1. Brijlal and Subrahmanyam – Electricity and Magnetism
2. Tewari KK – Electricity and Magnetism.
3. Sehgal, Chopra and Sehgal – Electricity and Magnetism.
4. Duggal and Chhabra – Electricity and Magnetism

### **Reference Book**

1. Vasudeva D.N., Fundamentals of Electricity and Magnetism.

## **Paper - 9**

### **BASIC ELECTRONICS**

#### **UNIT – I**

Semiconductor diode as rectifier – bridge rectifier – efficiency – ripple factor – filter circuits – capacitor filter – choke input filter – Pi-filter - Zener diode – Zener effect and Avalanche effect – Zener diode application as voltage stabiliser – Tuner diode – Tuner effect – characteristics. Transistor – working (pnp/npn) biasing of a transistor – fixed bias- collector base bias – self bias- thermal stability.

#### **UNIT – II**

FET – construction and working – characteristics of FET- parameters – comparison of FET with bipolar transistor – MOSFET – enhancement and depletion mode – description and working – UJT – construction and working – equivalent circuit and characteristics of UJT – SCR – construction and working – equivalent circuit and V-I characteristics – SCR as a Switch – Diac and Triac.

### **UNIT – III**

Amplifiers – different current components in a transistor circuit – Classification – classes A, B, C and voltage & power amplifiers – two – port representation of a transistor – equivalent circuit using h-parameters – determination of h-parameters – typical h-parameters values for a transistor – detailed analysis of a transistor amplifier using h-parameters - FET amplifier.

### **UNIT – IV**

Oscillators (analysis using h-parameters only): concept of feedback – Hartley and Coipitt oscillators – audio – oscillators – determination of frequency and condition for frequency stabilisation in each case – crystal oscillator.

### **UNIT – V**

DC amplifiers – Darlington pair – differential amplifier – CMMR – Operational amplifiers – Integration, differentiator, inverter, summer and comparator – operational amplifier as analog computer – detailed discussion. Transducers - elementary ideas only – classification based on electrical properties – Tachometer and flowmeter - Piezo – electric transducer.

### **References:**

1. G.K. Mittal – Applied Electronics
2. Mathur & Kulshrestha – Electronics Devices Applications & ICs.
3. Badge – Singh – Applied Electronics
4. Gupat & Kumar – Handbook of Electronics
5. B.L Thereja – Basic Electronics – Solid State
6. Allen Motterhed – Electronic Devices & Circuits

## **Paper – 10**

### **MATHEMATICAL PHYSICS**

#### **UNIT – I**

Vector Fields: Orthogonal curvilinear coordinate systems – expression for gradient divergence, curl and laplacian. Tensors : General co-ordinate transformation – scalars – Tensors of higher rank – Tensor notation – Einstein's summation convention – Kronecker Delta and the Levi-Civita tensor in three dimensions – Derivation of various relationships in vector algebra and vector calculus using tensor notation.

#### **UNIT – II**

Differential equations and spatial functions – second order differential equation – series solutions – generating functions – Rodrigue's formula – Recurrence relations and orthogonality property for Bessel, Legendre, Hermite and Laguerre functions – spherical harmonics.

#### **UNIT – III**

Complex variables – Functions of a complex variable – analytic functions – Cauchy Reimann conditions – singular points – multi valued functions and branch points – Cauchy's integral theorem and formula – Taylor and Laurent expansions – Residue theorem and its applications.

#### **UNIT – IV**

Laplace and Fourier Transforms : Laplace Transform – inverse Laplace transform – application to differential equations – application to integral equations. Fourier Transform : Indefinite Fourier Transform – Finite Fourier Transform – Fourier Integral Theorem – Convolution Theorem – simple applications – Dirac Delta functions – heat flow and wave equations.

#### **UNIT – V**

Group Theory : Definition of a group, subgroups class, coset – Lagrange’s theorem – Invariant, subgroup – Representation of a group – unitary representations – Reducible and Irreducible representations – Schur’s Lemmas -Orthogonality theorem – character of representation – character table – reduction of Kronecker product of  $t_{uv}$  representations – simple applications to symmetry groups and molecular vibration –  $C_{2v}$ ,  $C_{3v}$  and  $C_{4v}$  point groups.

### Reference Books

1. Mathematical Physics - B.D. Gupta
2. Mathematical Physics - Rajput
3. Mathematical Physics - P.K. Chattopadhyay
4. Group Theory - Rama KV, (TMH)
5. Vector and tensor analysis - MR. Spiegel (Schaum series)

## THIRD YEAR

### Paper - 11

### LECTRONICS & COMMUNICATION

#### UNIT – I

**Modulation** : Definition – type of modulation – AM, FM, PM – Expression for amplitude voltage – Wave form of amplitude modulated Wave – Collector of modulation circuit – Single side band generation – Balanced modulator – AM transmitter – Block diagram and explanation – frequency modulation – expression for frequency modulated voltage – side band in FM-FM production by oscillator method expression for face modulation – pulse code modulation – pulse amplitude modulation – pulse with modulation.

**Demodulation** : Definition – diode detection for AM signals – SSB detection – FM detection – Foster – Seely discriminator.

#### UNIT – II

Antennas – Requirements – Characteristic of antennas – dipole-directivity Bandwidth  
– half wave folded dipole  $\lambda/4$  grounded and Yagi Uda antenna.

**Satellite communication** : satellite orbits - geo-stationary orbit – transmission path losses – Multiple access methods – dish antenna – receivers – cableTV networks.

### UNIT – III

**Radio Receivers:** Straight receivers – T.R.F receivers – super – Heterodyne receivers  
– block diagram – explanation of each stage. FM receivers – Block diagram AGC –  
Communication receivers.

### UNIT – IV

TV – image orthicon – Plumb icon – vidicon – scanning – interlaced scanning –  
composite video signal – Synchronization – horizontal and vertical sync-pulses – modulation  
of audio and video signals in TV – Bandwidth – vestigial side band (VSB) transmission –  
block diagram of TV transmitter and receiver – Color TV – Principles of additive and  
subtractive color mixing – chromaticity diagram – color TV camera – generating R,G,B  
signals – compatibility and reverse compatibility of color and mono chrome requirements.

### UNIT – V

**Radar:** Principles of radar – Radar range equation – Transmitting system-antenna  
scanning – parabolic reflector – radar receiver – display(PPI) – ILS – moving target  
indicators – diplexer – radar signal detector – application of radar – beacons.

Opto – Electronics devices – photo-conductive cell – solar cell – photo-transistor –  
BI-polar – FET – Laser – LED – LCD – consultation and working.

### Reference:

1. Gupta – Kumar – Hand book of electronics.
2. BL Thereja – Basic Electronics.
3. B.Gob – Basic TV and Video system (McGraw – Hill)
4. Aravind.M.Dhake – Television Engineering.
5. Kannedy – Electronics communication System(McGraw – Hill)
6. Gulati – Monochrome and Color TV

**Paper – 12**  
**ATOMIC AND NUCLEAR PHYSICS**

**UNIT – I**

Quantum theory of light – Photoelectric emission – laws – experimental study – Lenard, Richardson and Compton methods – Photoelectric equation – Verification by Millikan's method – Compton effect – change in wavelength – experimental determination – electron theory of metals – thermal and electrical conductivities – Sommerfeld's atom model – relativistic variation of electronic mass – application to fine structure of H-alpha line.

**UNIT – II**

Vector atom model – various quantum numbers – L-S and J-J coupling – Pauli's exclusion principles – electronic configuration elements and periodic table – magnetic dipole moment of an electron due to orbital and spin motion – Bohr magneton – Stern and Gerlach's experiment – interpretation of result – selection rules – intensity rules – interval rule – Fine – Structure of sodium lines – Landé's 'g' factor.

**UNIT – III**

Zeeman effect – Larmor's theorem – Debye's explanation for normal Zeeman effect – Anomalous Zeeman effect – theoretical explanation – experimental verification of theory – Measurements of the atomic magnetic moment – Paschen – Back effect Stark effect – Experimental study – Stark pattern of H-line.

**UNIT – IV**

**Neutron:** Mass, Charge, decay, spin & magnetic moment – sources of neutron – neutron collimator – neutron detectors – classification of neutrons – absorption of neutrons diffraction.



**Nucleus:** General properties of nucleus – determination of nuclear radius – isotope structure method, mirror nuclei method, mirror nuclei method & neutron interaction method – Binding energy & nuclear stability – nuclear composition – proton – electron hypothesis, proton – neutron hypothesis – nuclear forces – their characteristics – meson theory of nuclear forces (qualitative study) – nuclear models – liquid drop model & weissacker's semi empirical mass formula – nuclear shell model.

#### **UNIT – V**

**Nuclear Detectors:** Cloud chamber – bubble chamber – nuclear emulsions – scintillation counter – their principle, construction, working, uses and limitations.

**Particle accelerators:** synchro – cyclotron – betatron - electron synchrotron – their principles, construction, working, uses & limitations.

#### **Reference:**

1. R.Murugesion – Modern Physics
2. Gosagan, V and Nagarathnam, N - Optics
3. Atomic and Nuclear physics – Brijlal and Subramanian.
4. Modern Physics – Murugesan.R
5. Nuclear Physics – Tayal
6. Atomic Physics – Rajam JB.

### **Paper – 13**

## **QUANTUM MECHANICS**

#### **UNIT – I Quantum Mechanics**

Matter waves – Wave packets – phase velocity & group velocity – Heisenber's uncertainty principle – illustration – Gamma ray – Microscope & Diffraction of electrons by a slit. Schrodinger's – Wave equation & its derivation.

#### **UNIT – II**

Wave function – Physical signification of wave function – well behaved wave function. One dimensional motion – particle in a box – eigen function & eigen values – barrier

penetration & tunneling probability – linear harmonic oscillator – energy levels & eigen functions.

### **UNIT – III**

Three dimensional problems – rigid rotator – separation of variables – rotational energy levels & eigen functions. Hydrogen atom-separation of variables Azimuthal, Polar & Radial equation – energy level & eigen functions- Quantum numbers.

### **UNIT – IV Relativity**

Reference frames – inertial & non-inertial frames – Galileon transformation – Newtonian relativity – concept of ether – Michelson – Morley experiment – interpretation of negative results.

Einstein's special theory of relativity and its postulates – Lorentz transformation equation – length contraction & time dilation – relativity of simultaneity – addition of velocities.

### **UNIT – V**

Variation of mass with velocity – mass energy equivalence – Space – time diagram – explanation of length contraction & time dilation using space – time diagram. Principles of equivalence – Gravitational red shift – General theory of relativity – prediction of general theory.

#### **References:**

1. Concept of Modern Physics – Arthur Belser
2. Quantum Mechanics Singh & Bagde (S Chand & co)
3. Modern Physics – R.Murugesan. (S Chand & co)
4. Modern Physics – JB Rajam.
5. Modern Physics – Seghal & Chopra.
6. Relativity – Resnick.

## **Paper – 14**

### **ENVIRONMENTAL PHYSICS**

#### **UNIT – I**

**Essentials of Environmental Physics :** Structure and thermodynamics of atmosphere – composition of Air. Green house effect – Transport of matter, energy and momentum on nature – stratification and stability of atmosphere – laws of motion – hydrostatic equilibrium – general circulation of 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 (Kirchhoff, Planck, Beer, Wien, etc.) – solar and terrestrial spectra – UV radiation – Ozone depletion problem – IR absorption – Energy balance of earth atmosphere system.

## **UNIT – III**

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 sea breeze – Puffs and plumes – Gaseous and particulate matter – Wet and Dry deposition – Dispersal – mechanism of Air and Water pollutants – Mixing height and turbulence – Gaussian plume models – Dispersion models – Environmental degradation – Thermal and Radio active pollution – Nuclear radiation - Health hazards and safety.

## **UNIT – IV**

Environmental change and remote sensing – Energy sources and combustion processes – Renewable sources of energy – Solar energy – Wind energy – Bio energy – Hydropower, Fuel cells, Nuclear energy – forestry and bio-energy – Deforestation – degradation of soils – Agriculture and land use changes – Changing composition – of local, regional global environment – remote sensing techniques.

## **UNIT – V**

**Global and Regional Climate:** Elements of weather and climate – stability and vertical motion of Air – Horizontal motion of Air and Water – Pressure gradient forces, viscous forces, and inertia forces – Reynolds's number – enhanced green house effect – Energy balance – a zero – dimensional green house model – global climate models – Cloud radiative feedback and ice albedo feedback process – Projections of global climate changes –

down scaling techniques – future scenarios of Indian climate – introductory modeling – elements of chaos – LORENZ model.

**References:**

1. Egbert Boeker and Rienk van Groundelle, Environmental Physics (John Wiley)
2. J.T.Houghton, The Physics of Atmosphere Resources (ELBS, 1988)
3. J.T Widell and J.Weir, Renewal Energy Resources (ELBS, 1988)
4. Sol wieder, An introduction to Solar Energy for Scientists and Engineers( john Wiley, 1982)
5. RN Keshavamurthy and M.Shanker Rao, The Physics of Monsoons(Allied Publishers, 1982)
6. G.J.Haltiner and RT Williams, Numerical Wether Prediction (John Wiely, 1980)

**Paper – 15**

**DIGITAL ELECTRONICS AND MICROPROCESSOR**

**UNIT – I**

Integrated circuits – TTL and MOS logic circuits – Gating Networks Logic design: Flip – Flops – Transfer circuits – Clocks – shift registers – Counters – State diagrams and State tables – Magnitude comparator – Programmable Arrays of Logic cells.

**UNIT – II**

Elements of ALU Design and implementation of Binary Address (Half and Full) and Subtractors – BCD Adder – Multiplexer – encoder – decoder – Floating point number systems – Arithmetic operations with Floating point numbers.

**UNIT – III**

Input – output Interface modules – I / O versus Memory Bus – Isolated versus memory – mapped I / O – Asynchronous Data Transfer – Priority Interrupt – Direct Memory Access (DMA) – Input Output Processor (IOP) : CPU – IOP communication – Memory Organization : Memory Hierarchy – Main memory – Auxiliary Memory – Associative memory – Cache memory - Virtual memory.

**UNIT – IV**

Microcomputers, Microprocessor and Assembly Language – Microprocessor Architecture and Microcomputer systems: Micro processor architecture and its operations – Memory – Input and Output – The 8085 MPL – 8085 based Micro computer – Memory Interfacing.

**UNIT – V**

The 8085 programming Model – Addressing Techniques – 8085 Instruction – Code conversion – BCD arithmetic operations.