Semester I

First Paper : Biological & Environmental Science

45 Lectures **60 Marks**

1. Introduction :

   Terminology of special branches of Biology. Different body parts, Living, Non-Living & Dead Organism Macro (Plant, Animal & human) Organism, Cell, Tissue, Organ & Organ Systems, Micro Organism.

2. Cytology & Histology :

   Names of techniques used for study of structures and dimensions of organs, tissues, cells, cell components, molecules and atoms, Classification, structure and functions of human tissues, structure and function of cell membranes. Active and passive transport in membrane, physical properties of protoplasm (cytoplasm and nucleus), classification, structure (shape, size, numbers) and organization (composition) of cell.

3. Environmental Physics :

   Process governing ocean atmosphere system, monitoring remove sensing and modeling of atmospheric and oceanic process. Green house gases, global warming and climate changes.

4. Computer Fundamentals :

   Hardware and Software, Flow chart, Algorithmic, Data type, Memory (Primary and Secondary memory).

Books :

1. Human Physiology vol. I & II - C.C. Chatterjee
2. Biophysics - R.N. Roy
3. Biophysics - Medhu Arora
4. Biophysics - P. K. Banerjee
5. Biophysics - G. R. Chatual

6. Biophysics - N. Gautham
7. Essential of programming in C - S. Parth asarathy
8. Evolution of Vestebrates - E. H. Colbert
9. Ecology Environmental Science - J. S. Singh
10. Zoology for Degree students - V. K. Agarwal

Semester I

Second Paper : Analytical Physics I

45 Lectures **60 Marks**

1. Biomechanics :

Biophysics of Muscle Power, Strength of Bone, Biodynamics, Locomotion Land, in air, in water.

Study Laminar Flow, Turbulence, Viscosity, Reynold Number, Newtonian and Non-Newtonian Fluid, Continuity Equation, Viscous Resistance, Bernoullie Equation.

2. Bioacoustics and Bio-optics :

Wave motion, pressure wave characteristics of sound, biophysics of hearing (human ear), acoustic spectra, principle of audiometric, Doppler Effect, Echo and Reverberation.

Characteristics of light, phenomenon of light spreading, spectrum, polarization, Brewster's optical rotation and polarimeter optical defects of eye and their correction, biophysics of vision, resolving power and visual field of eye, binocular and spectral sensitivity of vision, comparison of camera and eye, Seotopic and Photopic conceptions.

3. Biophysics of gas transport :

Ideal Gas Equation, Partial Pressure, Vapour Pressure,

Convective Transport, Diffusion of Gases (Fick's Law) Gas Exchange (In Lungs and Tissue). Physiology of Respiration, Work of Breathing.

4. Biothermal properties :

Human Thermal Regulation System, Surface Skin Temperature as a Kind of Biological Rhythms, Hygrometry, Humidity, Production of Very Low Temperature. Air Conditioner and Air Cooler, Thermodynamic Qyantities, Punctions and Laws, Entropy and Disorder, Chemical Potential.

Books :

1. Mechanics - Saxena - Prasad-Singh
2. Mechanics - Agarwal & Prakash
3. Mechanics - J.C. Upadhyay
4. Thermal Physics - Singh-Prasad-Saxena
5. Thermal Physics - B. K. Agarwal
6. Optics - Devraj Singh
7. Optics - N. Subrahmaniyam & Brij Lal

Semester II

First Paper : Biological & Environmental Science

45 Lectures **60 Marks**

1. Biomolecules :

   Introduction, function (role) in nature, organism and structures carbohydrates, lipids, proteins, nucleic-acids, enzymes a aminoacides, Introduction, function in nature and organis classifications of minerals, water vitamins and hormones.

2. Molecular Biology & Molecular genetics :

   Nuclerie-acids (DNA, RNA), Introduction, structure,

function, damage and repair, Replication; Transcription, Translation, Genetics mappin and genetic codes. Genetics (Problems and prospects), Synthesis an isolation of gene.

3. Computer Programming :

   Space and time complexicities, Concepts of Pre-processor, Integers, float, Character, Mathematical and logical operations, looping and switch case, Conditional and branching statements (if, if then and if then else).

4. Programming Language C++ :

   Development of Object-Orientated Programming, main ( ) function, Declaration statements and variables, Dealing with data, Pointer & Functions (basic of Array, String and Structure).

Books :

1. Genetics - P.S. Verma, U. K. Agarwal
2. Mollecular & cellular Biophysics - Tusopski
3. Methods in Modern B iophysics - Nolting
4. Bioinformatics - Gary Bensen, R. Page, Mills
5. Comprehensive Biotechnology - K. G. Romawat
6. Comprehensive Biochemistry - S.P. Dwivedi
7. Concept of Genetics - W.S. Khug
8. Data Structure in C - Tharoga
9. Computer Science - Sumitra Arora
10. Computational Biochemistry - C. Stantsal
11. Current topics in Computation Molecular Biology - T. Jiang, Xu.
12. Starting with C++ - T. Gaddis

Semester II

Second Paper : Analytical Physics & Biometrics

45 Lectures **60 Marks**

1. Biostatistics :

   Introduction to population, Sample, Variables, Parameter, State, Rang, Mean, Median & Mode. Variance, Standard Deviation, Z-test, X (Single, Joint and Conditional Bayes theorem). Permutation and Combination, Binomial Expansion, Random Variables, distributions (Gaussian & Poisson).

   Linear and quadratic equations, Ordinary & Partial differential equation.

2. Bioelectricity :

   Effect of direct and alternating current, High frequency effect of current, Protection against injury by electric current. Biological effect of non-ionizing radiations, methods for taking advantages of passive electric properties of tissues and organs.

3. Sensor and transducer :

   Mechano Transducer (Resistance, Capacitance, Inductance, Piez-electric effect). Thermal Transducers (Thermocouple and Thermopile, Infra-red Sensor). Lonization transducers, electrochemical transducer and Optical transducer.

4. Bioelectronics :

   Qualitative discussion of P-N junction, Switch mode power supply (SMPS) and BJT.

   Number system (Decimal, Binary, Octal and Hexadecimal). Boolean algebra and Boolean theorems. Logic operations

and logic gates. Minterms and Maxterm. Karnaugh Mapping.

Books :

1. Biostatistics - V.B. Rastogi
2. Biostatistics - S.G. Gupta, V. K. Kapoor
3. Bioinstrumentation & Biosenses - D.L. Wise
4. Bioinformatics - I. A. Khan
5. Operative Research - Taha
6. Operative Research - Kalavarty
7. Statistical Physics - F. Reif
8. Foundation of Electronics - Anil K. Singh,
9. Electronics Engineering - I. Bhagat

Semester III

45 Lecture 60 Marks

First Paper : Life Science

1. Digestive system : Details

   Structure and thnction of Alimentary canal and accessory digestive organs

   Problems and treatments

2. Respiratory system : Details

   Structure and function of respiratory organs

   Problems and treatments

3. Circulatory System : Details

   Study of blood, pigments, blood vessels (arteries and veins), Blood circulation, Structure and function of Heart Problems and treatments.

Books:

1. The Origin of Life - Opann, Al
2. Evolution - Savage, J.M.
3. The Problem of Biology - Maynard Smith, J.
4. Animal Ecology & Environmental - Singh, H.R.
5. Human Ecosystems - Claphanl
6. Crystallography of Solid State Physicists - Verma & Srivastava
7. Animal Physiology & Related Biochemitry - Singh,H.R.
8. Human Anatomy - T.S. hanganathan
9. Human Body -

Second Paper : Computational Physics

45 Lecture 60 Marks

1. Mathematical Modeling: Basic of logarithms, Linear Programming, simplex Method, Dual Problem, Hill climbing, search vector and Pattern search
2. Basics of Algorithm : Complexity Rule, Growth function (ϕ, 0, Ω functions) and Recurrence Relation
3. Data Analysis: Variance, Fundamental assumption of analsis of variance, Limitation of Method
4. Simulation: Definition of design of experiments, field experimentation, Complete Randomized Design (CRD).

Books:

1. Pharmaceutical Mathematics with Application to Pharmacy : P. Gowta
2. Mathematical Statistics: M Eay and others (Ram Prasad Pub.)
3. Algorithm Design and Analysis: Sahni
4. Introduction to Algorithm: Thomas H. Cormen and others (MIT Pub.)
5. Algorithm Design and Analysis: Upadhaya
6. Algorithm Design and Analysis: Udit Agarwal
7. Design & Analysis of Acqurithm : A. A. Puntambekar
8. Data Structure : Reema Thareja
9. Data Structure : A. K. Bhaumik
10. Unear Equation : G. L. Peterson
11. Mathematical Physics : H. R. Das
12. Operation Research : S. Kalavarthy
13. Operation Research : H. A. Tana

Sem IV

First Paper : (Life Science-II & Computational Physics II)

45 Lecture **60 Marks**

1. Excretory System : Details

   Structure and thnction of Excretory organs, excretory waste fonnation

2. Nervous System : Details

   Sense Organs, structure and function of nerve, transmission of nerve impulse, reflexes

3. Endocrine System : Details

   Structure and function of endocrine glands.

4. Computer Programming : Fundamental of Computer Programming, Computer Fundamentals, Busic of MATLAB, Working in Command window, display format Useful commands for Managing variables, creating one and two dimensional array.

5. MATLAB : Programming in MATLAB, Script Files, Function und Function Files, logical operators, Conditional statements, coding of Differential Equations and their three dimensional Plots.

Books:

1. The Origin of Life - Oparin, A.I
2. Evolution - Savage, J.M.
3. Animal Ecology & Environmental - Singh, H.R.
4. Human Ecosystems, - Clapham
5. Crystallography of Solid State Physicists - Verma & Srivastava
6. Animal Physiology & Related Biochemitry - Singh,H.R.

7. MATLAB: An Introduction with Application - Amos Gilat
8. MATLAB - Rudra Pratap
9. Animal Physiology & Biochemistry - R. A. Abarwal
10. MATLAB - Jaydeep chakravorty
11. MATLAB - A. K. Tyagi
12. Optical Computing - M.A. Karim

Semester - IV

Second Paper : Biospectroscopy

45 Lecture **60 Marks**

1. Visible & U- V spectroscopy : e-m radiation, regions of the spectrum, hydrogen atom spectrum, spectrum of molecular hydrogen, ultraviolet photoelectron spectroscopy (UPES) and x-ray photoelectron spectroscopy (XPES)
2. IR spectroscopy : Diatomic molecule, FTIR principle and instrumentation
3. Raman spectroscopy : Classical and quantum theory of Raman effect, Raman spectrometer, Structure determination from Raman and IR spectroscopy.
4. Fluorescence spectroscopy: Absorption, Re-emission, Fluorescence, Phosphorescence, fluorescence spectrometer.
5. Circular Dichroism (CD) spectroscopy: Use of CD spectroscopy in structural biology

   Micro-wave & Radio-wave spectroscopy: Rotation of molecules, Chemical analysis through microwave spectroscopy.

Books:

1. Biological Spectroscopy - J.D.Cambel & R.A Dwek.
2. Molecular Cell Biology - James Daniel
3. Modern Physics - Raj Kumar
4. Modern Physics - R. Murugeshan
5. Modern Physics - Beiser
6. Modern Physics - Sewag Moses
7. Mass Spatro meter - G. Siuzadak
8. Modern Biophysics - A. R. Fersht
9. Organic Spectrascopy - J. Singh
10. Modern Approach to Physical Chemistry Vol. I & II - R.C. Mukherjee V. Bhadauria

Sem V

First Paper : Medical Physics-I

45 Lectures 60 Marks

1. **Microbiology :**

Introduction to Microbiology : Louis Pasteur & Koch's postulates & Experiments, Prokaryotic and Eukaryotic Cell microorganisms, Moore's drawning, Phylogenetic tree (bacteria, protozoa, viruses, yeast, molds, parasitic worms, arthropods, etc.)

2. **Immune system**

Introduction to Immune system: Viral Activation of Immunity; IgG, IgM & IgA, Humeral Immunity, Virus - Induced Immunopathology.

3. Diseases

Classification, cause and symptoms : Tuberculosis, Cholera, Typhoid, Diphtheria, Pneumonia, Meningitis, Gonorrhoea, Tetanus.

4. Molecular Diagnostic:

Venereal Disease Research Laboratory test (VDRL) Mechanism, Anti-HIV-Antigen/Antibody combination test; ELISA, ELISA Dongle Western blot, Nucleic Acid test. Polymerase Chain Reaction (PCR)-component and limitation of PCR and RT-PCR.

Books:

1. Protein Biochemistry and Biotechnology by Gary Walsh, Wiley : 2nd ed. 2001

2. Introduction to Protein Science, Architecture, Function and genomics by Lesk AM, Oxford University Press, USA; 1 ed. 2004.

3. Biomedical Genetics : D. Roy

4. Bioinformatics : K. Kakollu

5. Bioinformatics : A. D. Banevans

Sem V

Second Paper : Biophysical Technique - I

45 Lectures **60 Marks**

1. Sonography

Introduction & Principle of Ultrasonography, Echo, Doppler, High resolution sonography And Applications.

2. Chromatography

Introduction & Principle of Chromatography, Classification, HPLC and Applications. Chromatography: Theory, operations and applications of partition, Adsorption, Gel permeation, Ion exchange and Affinity chromatography, Chromatography on paper, thin layer and column. Gas-liquid and high performance liquid chromatography techniques : hydrophobic interaction chromatography, covalent chromatography, DNA-cellulose chromatography, Hydroxyapatite chromatography aad Reverse phase chromatography

3. Electrophoresis

Introduction & Principle of Electrophoresis, Classification and Applications. Electrophoresis : Theory, operations and application of Electrophoresis, Electrophoresis on paper, cellulose and gel. Sodium dodecyl sulphate-

polyacrylamide gel Electrophoresis (SDS-PAGE). Disc electrophoresis in polyacrylamide gel. Electrical parameters in electrophoresis. Agarose gel electrophoresis. Electrophoretic transferSouthern, Northern and Western. Isoeletric focusing. Combined electrophoresis and chromatography- Finger printing. Homochromatography Pulse field electrophoresis.

4. Auto Analyser

Introduction & Principle of analyser, Classification and Applications. CBC, Blood analysis electron microscope, Principle, application and limitation in operational procedures, X-ray microanalysis. EKFT/LFT, HbA1C.

Books:

1. Polypeptides and Protein Structure by A.G. Walton Elsevier Science Ltd. 1981
2. Protein Biochemistry and Biotechnology by Gary Walsh, Wiley; 2nd ed. 2001
3. Introduction to Protein Science. Architecture, Function and genomics by Lesk AM, Oxford University Press, USA; 1 ed. 2004.
4. Dynamics of Proteins & Nucleic Acids by J. A. McCammon and S.C. Harvey Cambridge University Press, 1988.
5. Research Methods for the Biosercucle - D. Holmes

Sem. V

Third Paper (Evolutionary Computation)

45 Lecture **60 Marks**

1. **Artificial Neural Network :**

Introduction, history, structure and function of single neuron, neural net architectures, neural learning, use of neural networks, Learning algorithms, Basic principle of backpropagation.

2. **Genetic Algorithm : Introduction,**

The basic (binary) Genetic algorithm, Genetic operators - Selection, Crossover, Mutation, Different types of selection strategies, Real-coded Genetic Algorithm, Applications of Genetic Algorithms.

3. **Structure Determination of Protein & DNA**

Concepts and strategies of protein structure predication, methods of secondary structure prediction, methods of protein tertiary structure prediction. Structure visualization tool - RasMol. Structural studies of DNA and proteins using absorption of ultraviolet light. Reporter groups. Absorption of polarized light. Instrumentation and application of microspectrophotometry, densitometry, cytophotometry, UVand polarized UV microspectrophotometry, Flame photometry and atomic absorption spectrophotometry.

4. **Denaturation and Renaturation of DNA.**

Protein evolution from exon shuffling, Recombination, and transposons: Holiday model for general recombination, recombiatnion of circular DNA, duplex forms, Transposons (as mobile genetic elements), insertion sequences, composite transposons, rearrangement of DNA; Retroposons, life cycle, integration into chromosomes. Denaturation of DNA double helix takes place by the following denaturating agents. Denaturation by Temperature, absorption of UV-light, specific optical

rotation, viscosity; Chemical agent, effect of Ph; Renaturation by cooling, log plot (Cot)

Books :

1. Intriduction to algoritlun : Thomson H Cormen
2. Genetic Algorithms: David E. Goldberg, Addison-Wesley
3. Gene IX, by Benzamin Lewin, Oxford University Press 2007.
4. Molecular Biology and Biotechnology 4th edition by J.M. Walker and R. Rapley, Panimp Publishing.
5. Deep Learning : Ian Goodfellow.
6. Fundamental of Neurvas Network : L. Fausett.
7. Neural Network Fuzzy logic & Genetic AG : Rajasekaran
8. Fazzy logic & Neural Network : Chennakesava R. Alavala
9. Fazzylogic : A. K. Bhargava
10. Neural Network Design : M.T. Hagan

Sem VI

First Paper (Medical Physics-II)

45 Lecture 60 Marks

1. Diagnosis of Diseases

Introduction to Diagnosis of Diseases in various organ system using Protein in diseases diseases of protein aggregation, Serpins: Serine Protease Inhibitors--conformational diseases, cancer and protein structures. Ultrasonic Electrocardiography, Block diagram of electrocardiograph; The ECG leads, effects of artefacts on ECG recording, vector cardiography. Electroencephalography; Block diagram of EEG, Electrode

locations, The normal EEG, clinical value of the EEG. Electromyography; Block diagram of EMG, clinical value of the EMG. Electroretinography: Superconducting quantum interference device (SQUID).

2. **Community health**

Introduction to Community health: Revitalization, capacity building and core concepts underlying community health. Trend of health care delivery, cost effective, high quality & innovative system of health care.

3. **Instruments used in medical Science (OT & ICU):**

Centrifuge, Microscope Binocular, Incubator, Hot air sterilizer, Bacteriological light, Tracheotomy Set, Fibre Bronchoscope, Ventilator ICU, Pulsoximeter, Patient Monitor, ICU & anaesthesia, Oxygen Concentrator. Physical Principle and applications of MRI, CT, PET Scanning - Cancer.

4. **Low Temperature in Biology and Medicine:**

Cryogenic fluids, storage and cryosurgical systems, Safety with cryogenics, Biological freezing, freeze-thawing cycle, freezing injury in cells and tissues, intra and extra cellular crystallization, mechanical effects of freezing, Biochcmical consequences of freezing, preservation of biological tissues and living organism, Advantage of cryosurgery.

Books :

1. Medical Physics by J R. Cameron and J.G. Skofronick, John Wiley New York, 1978.
2. Molecular cloning by Maniatis, Cold Spring Harbor Laboratory 1982.

3. DNA cloning by Glover, Oxford University Press, 1995, 1996.

4. Medical Physics by J. R. Cameron and J.G. Skofronick, John Wiley New York, 1978.

5. Modern Bioelectricity by Marino, A.A. Marcel Dekker Inc. New York 1998.

6. Principles of Appied Biomedical Instrumentation by Geddes, L.A. ahd Baker, L.E. John Wiley

7. The Essential Physics Of Medical Imaging by J.T. Bushberg et al., Lippincott Williams & Wilkins, Philadelphia, USA, 2002.

8. Cryobiology by Meryman, J.T. Academic Press, New York, 1966.

9. Unclev Standing Cryobiolohy : G. P. Garg, M. Prakesh

10. Preventive & Social Medicine : K. Park

Sem VI

Second Paper : Biophysical Technique - II

45 Lecture **60 Marks**

1. **Radiography & Radiotherapy:**

Digital radiography: computed radiography, charged couple devices, flat panel detectors, and digital mammography. Computed tomography: Introduction to tomography, First generation CT scanner, Image reconstruction, Five generation of CT scanners, Spiral CT, Image quality, Image artefacts, and quality assurance.

Radiation units : Units of measurement of radioactivity. Units of exposure, units of measurement of dose, does

equivalent. Radiation dosimetry for external radioactive source and internally deposited radioactive source Introduction, classification of radiation in radiobiology, cell cycle and cell death irradiation of cells, type of radiation damage, cell survival curves, measurements of radiation damage in a tissue, normal and tumour cells, therapeutic ratio, oxygen effect, relative biological effectiveness, dose rate and fractionation, radio protectors and radio sensitizers.

2. **X-ray Crystallography:**

Concept of crystallization; Parameters governing crystallisation: Crystallisation of proteins and nucleic acids; Analysis of diffraction data. Analysis of structure of proteins, nucleic acids, DNA-RNA and triple helical complexes.

3. **NMR & ESR :**

NMR Spectroscopy: Nuclear spin and the splitting of energy levels in a magnetic field, Relaxation processes (Spin - lattice relaxation and spin - spin relation), Chemical shift, spin-spin coupling. Structure of biomolecules using NMR spectroscopy.

ESR SPECTROSCOPY Magnetic moment of unpaired electrons, Basic Resonance Condition,. Hypertine interaction , Application of ESR spectroscopy in dose measurements for sterilization of medical goods and detection of irradiated foods.

4. **LASER & MASER :**

Biophysics of laser & Maser, laser tissue interaction, Different types of laser; Biomedical applications in surgery

and therapy, photocoagulative effect and its use to control gasteric haemorrhage, CO2 laser.

Books :

1. Molecular cloning by Maniatis, Cold Spring Harbor Laboratory 1982.
2. DNA cloning by Glover, Oxford University Press, 1995,1996.
3. Genome analysis - a practical approach by Davis KE. Oxford University Press, 1988.
4. Molecular Biotecl mology, Principal cmd applications of recombinant DNA by Glick and Pastemak ASM Press: 3 edition 2003.
5. Biochemistry - 3re edition by Lubert Stryer , W.H.FreeMall and Company 1995.
6. RadiationDosimetry by Frank Herbert Attix, Wiley Interscience Publication, John Wiky.

Sem VI

Third Paper (Environmental Physics)

45 Lectures **60 Marks**

1. Solar & Terrestrial Radiation :

Radiation: basic Laws-Rayleigh and Mie scattering, multiple scattering, radiation from sun, solar constant, effect of clouds, surface and planetary albedo, net radiation budget. Green house gases and global warming.

2. Global & Regional Climate :

Cloud formation and precipitation processes, Rossby Richardson, Reynolds and, Froude number. Basic theory of Indian Monsoon.

Dynamic Meteorology: Basic equation and fundamental forces, Pressure, gravity, central and coriolis forces, continuity equation in Cartesian and isobaric coordinates, Momentum equation in Cartesian and spherical coordinates; scale analysis, inertial £lov", geostrophic and gradient winds, thermal winds. Circulation, vorticity and divergence;.

3. Environmental Changes & Remote Sensing :

Themodynamics of dry and moist air : specific gas constant, Adiabatic and isoentropic processes, Entropy and Enthalpy, Moisture variable, virtual temperature; Clausius-claperyon equation, adiabatic process of moist air; thermodynamic diagram: Hydrostatics equation, variation of pressure with height, geopotential, standard atmosphere, altimetry, Vertical stability of atmosphere : Dry and moist air parcel and slice methods. lapse rate and stability, scale height, Tropical convection.

4. Indoor Environment :

Pollutants and contaminants of the in - house environment: problems of the environment linked to urban and rural lifestyles: possible adulterants of the food: uses and harms of plastics and polythene: hazardous chemicals, solvents and cosmetics.

Global Environmental issues: Global concern, creation of UNEP; Conventions on climate change, Convention on biodiversity: Stratospheric ozone depletion, dangers associated and possible solutions.

Books :

1. An Introduction to Dynamic Meteorology JAMES R. HOLTON 4th Edition Atmospheric Science (Second Edition)

2. An Introductory Survey, Author(s) : John M. Wallace and Peter V. Hobbs.
3. The Monsoons, P.K.Das, ISBN:8123711239/ 9788123711232

Biophysics & Bioinformatics

Skill Enhancement Course- Subject Specific

Sem. VI. "Radiation Biophysics"

(2 Credit)

Unit-I: Basics of Radiation Physics: Qualitative Discussion

Introduction about Radiation, Classification of Radiation - Ionizing and Non-ionizing, Radioactivc and Non-radioactive Radiation, Thermal Radiation, Rayleigh Lmv, Wein's Law, Stefan's Law, Planck's Radiation Law, Compton's Effect, Spectruni and Spectral Lines, pair production, characteristic radiation, properties in the view of the biomolecules,. Different Sources of Non- Ionizing Radiation and their Physical Properties, First Law of Photochemistry, Law of Reciprocity, Electrical Impedance and Biological Impedance.

Unit II : Basic Quantity and Units for Measurements

Radioactivity, law of Radioactivity, Specific Radioactivity, General Properties of Alpha, Beta and Gamma Radiations. Activity Concentration, Radon Emanation Factor, Porosity, Diffusion-Coetlicient-

(i) **Emission Related Quantities:** Radon Mass Exhalation Rate, Radon Surface Exhalation Rate, Radon Flux.

(ii) Specific Quantities: Potential Alpha Energy (PAE),

Potential Alpha Energy Concentration in Air (PAEC), PAEC Exposure, Equilibrium Equivalent Concentration (EEC), Equilibrium Factor.

Unit-III: Dosimetric Principles, Quantities and units

Lung dosimeter, Photon Fluence and Energy Fluence, Kerma, Cema, Absorbed Dose, Quantities used in Describing a Photon Beam, Photon Fluence and Rate, Energy Fluence and Rate, Inverse Square Law, Penetration of Photon Beam into a Phantom or Patient, Surface Dose, Buildup Region, Depth of Dose Maximum, Exit Dose, Percentage Depth Dose (PDD), Tissue Air Ratio (TAR), Tissue Maximum Ratio (TMR), Physics of Radiation Therapy (Qualitative Concept),The Biological Effect of Radiation Exposure: Exposure, Absorbed Dose, severt, Gray, rad, rem, Equivalent Dose (Biological Dose), Effective Dose, Dose Rate, Quality Factor.

Books :

1. Radiation Detection and Measurement by Glenn knol, John Wiley and Sons INC.
2. Radiation Physics for Medical Physicists (Biological and Medical Physics, Biomedical engineering)" by Ervin B Podgorsak, Springer.
3. Basics of Radiobiological Principle by Thayalan, Jaypee Brothers Medical Publisher.
4. Primer in Applied Radiation Physics by F. A, smith
5. Radiation biophysics by E. L. Alpen
6. Radiation Detection & measurement by G. F, Knoll