

SYLLABUS FOR BSC. MEDICAL TECHNOLOGY (RADIO-DIAGNOSIS & RADIOTHERAPY TECH)



Atal Medical & Research University

A state University established by the Govt of H.P

Syllabus of B.Sc. Medical Technology (Radiodiagnosis & Radiotherapy)

BSc 1st Year

Paper -I

Title: Anatomy and Physiology of Human body

Introduction to the body as a whole.

1. The cells, tissues of the body .

The cell : Structure and multiplication

Tissue: Types, structure, characteristics, functions

Epithelium

Simple : Squamous; cuboidal, columnar, ciliated.

Compound : Stratified transitional

Connective: Areolar, adipose, fibrous , elastic, cartilage, blood and bone

Muscle: Stratified(voluntary), smooth(involuntary),cardiac

Nervous

Fibrosis

Cell regeneration

Membranes: Mucous, serous, synovial

2. Osteology (including whole skeleton, bones and joints)

Development of bone (osteogenesis): cells involved

Types and functions of bone, types of joints and various movements.

a) Axial skeleton:

Skull : cranium, face, air sinuses

Vertebral column : regions movements and vertebral characteristics.

Sternum

Ribs

b) Appendicular skeleton: bones involved-shoulder girdle and upper limb. Pelvic girdle and lower limb

c) Healing of bones: cellular activity

Factors that delay healing

d) Diseases of bones and joints

The Respiratory system:

Organs: Position and structure

Nose and nasal cavities

Functions: respiratory, olfactory

Pharynx

Larynx: vocal cord

Trachea, bronchi, lungs-lobes, lobules and pleura

Respiratory functions: External and internal respiration

Diseases of the Respiratory system.

Syllabus of B.Sc- I Medical Technology (Radiodiagnosis & Radiotherapy)

BSc 1st Year

Paper -II

Title: Elementary Radiation Physics

1. Elementary Mathematics

- a. Calculation of percentage, Profit & Loss, Simple interest, compound interest, time & work, Ratio & proportion, Surds, Indices, Logarithm, Inverse Square Law,
- b. Geometry of triangles, similar triangles, Properties of Triangles.
- c. Trigonometry: Height & Distance.
- d. Graphical Representation of Exponential and Inverse exponential functions, Linear and semi log graphs.

2. Basic Physics, Electrostatics, Magnetism & Current Electricity

- a. Units & Dimension, Newton's Laws of Motion, Velocity & Speed, Force, Momentum etc.
- b. Coulomb's Law, Electric field & potential, Capacitance, Ohm's Law, Heating effect of current, Biot-Savart law, Definition of Tesla and Gauss, Magnetic field due to circular coil. Elementary Principles of Magnetization of Materials by electric current, Electromagnets. Lorentz force. Magnetic flux. Electromagnetic induction, mutual and self-inductance. Transformer, Eddy current. Alternating Current, RMS and Average Current. Variation of Voltage and current in AC circuit consisting only Resistor, Only Induction and Only Capacitor. Power factor of the AC circuit.
- c. Instruments: Electrometer, Galvanometer, Ammeter, & Voltmeter
- d. Atomic Structure, Nucleus, Atomic No., Mass No., Electron orbit and energy levels, Isotopes and isobars, Radioactivity, Radioactive decay, Half-life, Particle radiation, Electromagnetic Radiation, Production of X-rays, Continuous X-ray spectrum, Bremsstrahlung radiation Characteristic X-rays, Filters, Quality of X-rays, Effect of voltage and current on the intensity of X-rays, Properties of X-rays.
- e. Interaction of Radiation with Matter : Photoelectric effect, Compton Effect, Pair production, Ionisation of matter, Energy absorbed from X-rays, X-rays Scattering, X-rays transmission through the medium, linear and mass attenuation co-efficient, HVT and T_{1/2}, Interaction of charged particle and neutrons with matter.

Syllabus of B.Sc-I. Medical Technology (Radiodiagnosis & Radiotherapy)

BSc 1st Year

Paper -III

Title: Radiography and Dark Room Techniques

SECTION A

1. The photographic process: Introduction, visible light, images, produced by radiation, light sensitive photography materials.

2. Photosensitive emulsions: The photographic latent image,
3. Film materials in X ray departments. History, structure of x-ray film, types of films.
4. Spectral sensitivity of film material, graininess of film material, speed and contrast of photographic materials.
5. Sensitometry: Photographic density, characteristic curves, features of the characteristic curve.
6. Variation in the characteristic curve with the development. Comparison of emulsions by their characteristic curves, Information from the characteristic curves.
7. The storage of film materials and radiograph: Storage of unprocessed films, storing of radiographs.
8. Intensifying screens and cassettes.
9. Luminescence: fluorescence and phosphorescence.
10. The fluorescent materials. Types of intensifying screens. Intensification factor. The influence of KV , scatter radiation . Detail, sharpness and speed size of the crystal, reciprocity failure.
11. Cassette design, care of cassettes, mounting of intensifying screens.
12. Care of intensifying screens ,tests to check screen film contact and leakage.
13. Film processing: Development. The nature of development. Manual, automatic. The PH scale.
14. The constitution of developing solutions and properties of developing chemicals.
15. The development time, factors in the use of a developer. Developers in processing systems.
16. Film processing: Fixing and role of fixing solution.Constituents of fixing solution and properties of it's constituents.
17. Fixers used in automatic processors. Factors affecting the use of fixers.
18. Regeneration of fixing solution. Silver recovery and it's various methods.
19. Rinsing, washing and drying. Objects of rinsing and washing methods employed. Methods of film drying.
20. Preparation of solutions and making stock solution.
21. Processing equipment:Materials for processing equipment, processors for manual operation, hangers, control of chemical temperature by heating and thermostable, immersion heaters as well as cooling methods.
22. Maintenance of automatic processors and common faults.
23. Dark room: Layout and planning. Dark room construction-nature of floor, walls, ceiling and radiation protection.
24. Type of entry, door design, dark room illumination
25. Dark room equipment and it's layout. Location of pass through boxes or cassette hatches.
26. Systems for daylight film handling. Daylight systems using cassettes and without cassettes .
27. The radiographic image: Component in image quality- density, contrast and details.

28. Unsharpness in the radiographic image. Various factors contributing towards unsharpness.
29. The presentation of the radiograph. Identification markers and orientation and documentary preparation.
30. Viewing accessories: Viewing boxes, magnifiers and viewing conditions.
31. Image Intensifier – Direct fluoroscopy, Principles of image intensification
32. Common film artifacts due to manufacturing as well as due to chemical processing.

SECTION B

1. Basics of electromagnetic radiation

2. Production of x-rays

3. X-ray tubes.

General features of x-ray tube. The fixed anode, rotating anode X-ray tube. Rating of x-ray tubes, focal spot. Methods of heat dissipation in X-ray tubes, common tube faults. Advances in X-ray tube

4. Basic interaction between x-ray and matter:

Coherent scattering, photoelectric effect, characteristic radiation, Compton scattering, pair production and photodisintegration.

5. X-ray generators:

Transformer, Rectification, Types of generators, Exposure timers.

6. Attenuation

Factors affecting attenuation, monochromatic radiation, polychromatic radiation. Scatter radiation and factors affecting scatter radiation

7. Filters and its types

8. X-ray beam restrictors

Types and functions

9. Grids

Types, functions, grid fault and performance, Air gap techniques

10. Factors effecting the quality of radiographic image

Syllabus of B.Sc-I. Medical Technology (Radiodiagnosis & Radiotherapy)

BSc 1st Year

Paper -IV

Title: Basic Principles of Radiotherapy

1. Structure and function of cell; cell division; tissue: definition and classification (Gross outline)
2. Effects of various radiation on normal tissues and malignant tumor: Early and late reaction on Skin, Mucous membrane, GI tract, Genito-urinary system, respiratory system, CNS

3. Application of radiotherapy in benign conditions
4. Application of radiotherapy in malignant condition
5. Single and multiple field techniques for all treatment sites (from Head to Feet) with appropriate immobilizing device(s).
6. Fix, Rotation, Arc and Skip therapy procedures.
7. Use of Rubber traction, POP, Orfit, Body Frame in treatment technique.
8. Evaluation of patient setup for simple techniques.
9. Use of Beam Modifying devices such as wedges, Tissue compensators, Mid Line Block (MLB) in the treatment of respective sites.
10. Customized shielding blocks and its properties.
11. Asymmetric jaws
12. Motorized wedges
13. Simulation procedures including CT simulation
14. The Cell, Effect of ionising radiation on Cell, Chromosomal aberration and its application for the biological dosimetry, Somatic effects and hereditary effects, stochastic and deterministic effects, Acute exposure and Chronic exposure, LD50/60. Role of RTT in managing the acute effects of radiation.

Practicals: (Radiology Section)

1. Radiation protection
2. Radiography techniques & views
 - i) Skeletal system:
 - a. Upper limb with special reference to hand, wrist joint and elbow joint, supplemental techniques for carpal tunnel, scaphoid bone fracture, head of radius and supracondylar projection.
 - b. Lower limb which includes all the bones with special reference to ankle joint, knee joint, patella, techniques for calcaneum bone, supplementary techniques for flat intercondylar notch and femur and metatarsal etc.
 - c. Shoulder girdle and thorax.
 - d. Vertebral column with special techniques for cervical spine, intervertebral joints foramina. Lumbosacral joint.
 - e. Pelvic girdle and hip region.
 - ii) Respiratory system - chest radiography for both lungs, apical, lordotic and oblique views, techniques to demonstrate fluid levels, effusion in the thoracic cavity decubitus AP and lateral views.

Syllabus of B.Sc-II. Medical Technology (Radiodiagnosis & Radiotherapy)

BSc 2nd Year

Paper -I

Title: Anatomy and Physiology of Human body.

1. Types of cells, tissues, bones and joints.
2. **Heart and blood vessels(Circulatory system)**
 Blood vessels: arteries, veins capillaries, sinusoids, structures and functions.
 Heart : Position, structure and functions.
 Circulation of blood: Pulmonary, systemic, portal, main blood vessels , their origins and . distribution. Disease of blood vessels and heart and conditions of the system .
3. **The lymphatic system:**
 The parts of the lymphatic system.
 Lymph channels: Capillaries, vessels ducts structure and functions.
 Lymph nodes: position, structure and functions
 Lymphatic tissues: Tonsils, adenoids, intestinal nodules.
 Spleen :position, structure and functions , diseases and conditions of the system.
4. **The digestive system:**
 Elementary tract structure.
 Mouth, pharynx , salivary glands , oesophagus , stomach , , liver , gall bladder , small intestine, large intestine: Position, structure and functions of the organs.
 Digestion and absorption, metabolism of carbohydrates. Protein and fats . Diseases and conditions of the system.
5. **The Urinary system:**
 Parts of the urinary system.
 Position, structure and functions.
 Kidneys, ureters , urinary bladder and urethra.
 Formation and composition of urine.
 Water and electrolyte balance.
 Disease and condition of the system.
6. **The reproductive system:**
Female reproductive system
 External genitalia: position, structures and functions.
 Perineum
 Internal organs: position and structures.
 Vagina, uterus, uterine tubes, ovaries.
 Menstrual cycle: Stages, hormone control , ovulation
 Breasts(Mammary glands)
 Changes: puberty in pregnancy, during lactation
Male reproductive system
 Scrotum , testes , epididymis: position , structure and functions .

Spermatogenesis

Spermatic cords , seminal vesicles.

Ejaculatory ducts: position, structure and functions

Functions of male reproductive system puberty

Diseases of female and male reproductive system.

7. **Endocrine system:**

Endocrine glands:

Pituitary and hypothalamus: Position and structures

Thyroid gland , parathyroid glands.

Adrenal(suprarenal) glands.

Pancreas : position and types of cells

Hormone : secretion , function and control pineal gland

Common terms and diseases related to the system.

8. **Sensory system**

Ear

External, middle and inner ear

Physiology of hearing and disease of ear

Eye

Sight and eye : Position, structure, sclera, cornea , choroid , ciliary body.

Iris, lens, retina, optic nerves

Physiology of sight and diseases of the eye

Smell

Olfactory nerves, origins, distribution .

Physiology of smell

Sense of taste.

9. **The Nervous system :**

Neurons: Structure, types and properties.

Central nervous system: neuron , neuralgia meninges.

Ventricles of brain, C.S.F

Brain, spinal cord : Structures, functions peripheral nervous system.

Spinal and cranial nerves: origin distribution and functions .

Common diseases of the system

10. **Skin:**

Structures of skin

Epidermis, dermis

Functions of skin

Hypothermia

Wound healing: Primary and secondary diseases of skin.

60

Syllabus of B.Sc-II. Medical Technology (Radiodiagnosis & Radiotherapy)

BSc 2nd Year

Paper -II

Title: Radiation Physics Including Radiation protection

Radiation Physics

Radioactivity, Flux, Fluence, Kerma, Exposure, Absorbed Dose, Equivalent Dose, Weighting Factors, Effective Dose, Natural Background Radiation, Occupational Exposure Limits, Dose limits to Public.

Detection and measurement of radiation-Ionisation of gases, Fluorescence and phosphorescence, Effect on photographic emulsion, Ionisation chambers, Proportional Counters, G.M.Counters, Scintillation Detectors, Liquid scintillator, Pocket Dosimeters, TL Dosimeters and their use in personnel monitoring badges. Advantages and disadvantages of various detectors, appropriateness of different types of detectors for different types of radiation measurement.

Radiation Protection

1. Radiation Hazard evaluation and control-Philosophy of radiation protection, Effect of Time, Distance and Shielding, Calculation of workload, Calculation of Weekly dose to the radiation worker and general public, good work practices in diagnostic radiology and/or radiotherapy practices (including teletherapy and Brachytherapy), Planning consideration for radiology and/or radiotherapy installation including work load, use factor & occupancy factors, effect of different shielding material.

2. Radiation Emergency Preparedness - Safety and security of radiation sources, case histories of emergency situations and preparedness, equipment and tools including role of Gamma Zone Monitor, Regulatory requirements and prevention of emergency, Preventive maintenance and Safety Culture, Role of RTT in handling radiation emergencies.

3. Regulatory requirements

National Regulatory Body, Responsibilities, organization, Safety Standards, Codes and Guides, Responsibilities of licensees, registrants and employers and Enforcement of Regulatory requirements

4. Demonstration:

- i. Time, Distance and Shielding, measurement of HVT & TVT
- ii. Familiarization of radiation survey meters and their functional performance checks
- iii. Radiological Protection Survey of Radiotherapy, Simulator and CT Simulator Installations
- iv. QA on X-ray, Simulator and Radiotherapy Equipment(s)
- v. Procedures followed for calibration of measuring and monitoring instruments

61

Syllabus of B.Sc-II. Medical Technology (Radiodiagnosis & Radiotherapy)

BSc 2nd Year

Paper -III

Title: Basic Radiographic Techniques

Section A:

- i. **Skull:** Radiography of cranial bones, sella turcica, orbit, optic foramina, superior fissure and inferior orbital fissure
- ii. **Facial bones :** Paranasal sinuses. Temporal bone.
- iii. **Dental Radiography:** Radiography of oral, extraoral and occlusal view.
- iv. **Abdomen & KUB radiography.**
- v. **Macroradiography** advantage, technique and applications.
- vi. **Ward mobile Radiography**
- vii. **Operation Theatre radiography**

Section B:

- i. **Computed Radiography:** principle and applications
- ii. **Digital Radiography:** principle and applications. Advantages & disadvantages over CR
- iii. **Diagnostic ultrasound:** It's principle, applications and role of medicine. Various types of transducers and definition of terms an cross sectional anatomy
- iv. **Mammography**
- v. **IVP and urography**
- vi. **Barium studies:**
- vii. Barium swallow, barium meal , barium meal follow through and barium enema : procedures, requirement, indications , contraindications and contrast media used.
- viii. **Radiation protection**

Definition of radiation hazards maximum permissible dose and annual limit of intake(A permissible dose levels on and around sealed source housing and installation principles of radiation protection and MPD's of different ICRP rules , stochastic and non stochastic effects. Important 'ALARA' physical principles of design and planning of radiation installation.Radiation survey and personal monitor devices, film badges, TLD badges and pocket dosimeters.

Syllabus of B.Sc-II. Medical Technology (Radiodiagnosis & Radiotherapy)

BSc 2nd Year

Paper -IV

Title: Equipment for Radiotherapy including Newer Development

1. Brachytherapy- Design features, Radiation sources, Technique, High dose-rate (HDR),Low dose-rate (LDR),Pulsed dose-rate (PDR), and various types of applicators.
2. Teletherapy Machines & Accessories:



- a. Telecobalt Machines
 - b. Medical linear accelerators.
 - c. Tomotherapy
 - d. Machine properties.
 - e. Beam directing, modifying and defining devices.
 - f. Other accessories.
3. Principles of positioning and immobilization
- a. Positioning aids-Breast boards, Lung boards, Belly boards, Head-and-neck fixation devices, Vacuum packs, Stereotactic systems
 - b. Internal organ motion control- Bite blocks, Gating systems, Active breathing control, Diaphragm compression, Prostate immobilization, Tracking systems. Laser/ positioning systems
 - c. Marking systems
 - d. Isocentre determination
 - e. Reference points
 - f. Treatment couch
 - g. Image acquisition for planning (and/or verification)
 - h. Modalities for image acquisition for planning
 - i. Simulation- Conventional Simulation, CT Simulation, Virtual Simulation
4. Physical parameters of dosimetry such as Percentage Depth Dose, Tissue-Air Ratio, Tissue Maximum Ratio

Practicals: Radiology Section

Radiography techniques & views

- i) Skeletal system:
 - a. Upper limb with special reference to hand, wrist joint and elbow joint, supplemental techniques for carpal tunnel , scaphoid bone fracture, head of radius and supracondylar projection.
 - b. Lower limb which includes all the bones with special reference to ankle joint, knee joint, patella, techniques for calcaneum bone, supplementary techniques for flat intercondylar notch and femur and metatarsal etc.
 - c. Shoulder girdle and thorax.
 - d. Vertebral column with special techniques for cervical spine, intervertebral joints foramina . Lumbosacral joint.
 - e. Pelvic girdle and hip region.
 - f. Skull views-All views of skull, paranasal sinuses, face

- ii) Respiratory system - chest radiography for both lungs, apical, lordotic and oblique views, techniques to demonstrate fluid levels, effusion in the thoracic cavity decubitus AP and lateral views.
- iii) Xray abdomen, KUB
- iv) Radiography in IVU ,RGU and MCU
- v) Radiography in Barium studies
- vi) Mammography views
- vii) Dental Radiography
- viii) Ward /Mobile Radiography
- ix) Trauma/Emergency/Paediatric Radiography
- x) Operation theatre radiography



Syllabus of B.Sc-III Medical Technology (Radiodiagnosis & Radiotherapy)

BSc 3rd Year

Paper –I

Title: Radiotherapy Planning and Quality Control

1. Quality assurance (QA) refers to the systematic activities implemented in a quality system so that quality requirements for a product or service will be fulfilled. It is the systematic measurement, comparison with a standard, monitoring of processes and an associated feedback loop that confers error prevention and provides accuracy of treatment. The following topics will be covered: Accessories and tools used for QA tests in Radiotherapy such as Front pointer, Back pointer, Laser Alignment etc. Optical and radiation field congruence, Beam shaping blocks, Beam shaping jaws, Delineator/Diaphragm movements, Isocentre alignment, Patient support system, Beam on and off mechanisms, Technician's role in QA tests on telecobalt /Linear Accelerator / Brachytherapy/ Gamma knife/Simulator/CT Simulator machines.
2. Historical developments in Radiotherapy, Physical components of Telecobalt Unit / Linear Accelerator Unit / Remote After Loading Brachytherapy Unit / Gamma Knife Unit / Simulator /Brachytherapy units and their descriptions, Various types of sources used in Radiotherapy and their properties, Physics of Photons, electrons, protons and neutrons in radiotherapy, Physics of Bolus and Phantom materials, Compensators, Wedges, Shielding Blocks, Patient immobilization devices, Port film, processing and development, Special techniques in Radiotherapy such as SRS, SRT, IMRT, IGRT and Tomotherapy.
3. Conformal Radiotherapy: Principles of 3 D treatment.
4. Recent developments in radiotherapy and treatment techniques

Syllabus of B.Sc-III Medical Technology (Radiodiagnosis & Radiotherapy)

BSc 3rd Year

Paper -II

Title: Equipment for Radiodiagnosis Including Newer Development and Quality Control

1. Computed Tomography: Historical developments , its principle and applications, various generations and definitions of terms and cross sectional anatomy.
-MDCT
-Dual energy CT
- Dose reduction techniques in CT
- Advances in CT
2. MRI : Principle , applications , its advantages over computed tomography or ultrasonography. Its limitations and uses and cross sectional anatomy.
Basic MRI sequences
3. DEXA - Principle and applications
4. Digital Subtraction Angiography- Principle and applications
5. Quality Assurance in Radiodiagnosis : Aim of quality assurance in medical care.
Contents of a

5. Wedges-tissue compensator-irregular field-SSD&SAD technique-oblique field-arc-rotational and moving field
6. Mantle field-irregular field-Hemi body irradiation-whole body irradiation-total body skin irradiation
7. Cell kinetics, Cell cycle control mechanisms, Tumour biology, The five 'R's of radiobiology, Tissue structure and radiation effect, The Linear Quadratic (LQ) model, Tumour control probability (TCP), Normal Tissue Complications Probability (NTCP) models, Acute and late side effects, Sensitizers/protectors/side effect reduction, Fractionation, Treatment combinations, Treatment scheduling
8. Imaging methods, Staging and grading, TNM staging system, other commonly used systems, Treatment intent- radical, adjuvant, palliative, Non-malignant diseases, Primary management of malignancy.
9. Treatment techniques in skin tumor, breast cancer, maxillary antrum and pituitary tumor, bone tumor, lung tumor, head and neck cancer, treatment techniques of malignant and non-malignant condition of eye, large field irradiation techniques in ovarian and kidney tumors tele and brachytherapy techniques of different stages of CA cervix uteri with special emphasis on HDR and LDR brachytherapy and 3 field technique, cancer of esophagus and bladder.

Practicals: Radiology Section

- i) Radiography techniques & views – All radiography done in 1st and 2nd year
- ii) CT: Equipment, Positioning, Planning and Acquisition
 - a. Head and Neck- Plain, Contrast, Cerebral and Neck Angiography
 - b. Chest- Plain, Contrast, Pulmonary Angiography
 - c. Abdomen and Pelvis- Plain, Dual phase, Triple phase contrast study
 - d. Peripheral Angiography
- iii) MRI: Hardware, Positioning, Planning and Acquisition of basic sequences
 - a. Brain: Plain, Contrast
 - b. Spine: Cervical, Dorsal, Lumbosacral
 - c. Abdomen: Plain, MRCP
- iv) DEXA: Acquisition and Interpretation

- 66
- Q.A programme i.e. phases of development of a radiological facility .
6. Artificial intelligence
 7. PACS

Syllabus of B.Sc-III Medical Technology (Radiodiagnosis & Radiotherapy)

BSc 3rd Year

Paper -III

Title: Radiological Procedures

1. Radiological procedures pertaining to salivary glands, lacrimal system, arthrography and hystero salphingography
-various requirements trolley set up, indications and contraindications, contrast media used.
2. Myelography-Techniques, contrast media used, indications and contraindications .
3. Intravenous cholangiography, T-Tube Cholangiography, peroperative cholangiography- indications and contraindications.
4. Interventional radiological procedures: PTC, PTBD, FNAC, Percutaneous nephrostomy, Biopsy (CT and USG guided)
 - Patient preparation
 - Trolley setup
 - indications and contraindications
5. Digital Subtraction Angiography:
Cerebral angiography, Abdominal angiography, Peripheral angiography, Bronchial angiography -All views to be taken, Patient preparation, trolley preparation
6. Radiation protection

Syllabus of B.Sc-III Medical Technology (Radiodiagnosis & Radiotherapy)

BSc 3rd Year

Paper- IV

Title: Radiotherapy and Brachytherapy Techniques in Malignant and Non-Malignant Diseases

1. 2D (radiography, fluoroscopic, USG), 3D (CT, MRI) and functional (PET/SPECT) imaging and their application in radiotherapy planning
2. Understand Gross Tumour Volume (GTV), Clinical Target Volume (CTV), Internal Target Volume (ITV), Planning Target Volume (PTV), Organs at Risk (OAR) delineation
3. Conduct image fusion at the treatment machine console, Do bony matching, Do soft tissue matching for estimating the preliminary data for applying shifts, Prepare documentation
4. Principles of: Four-dimensional (4D) planning and be familiarized with IMRT and IGRT planning.

Department of Community Medicine, IGMC Shimla

BSc 3rd Year

Paper-V

Title: Environment Science

Syllabus for Environment Education of BSC Paramedical Courses	
Section 1	1. Water Purification at household level
	2. Water Pollution – causes & its health impacts
	3. Swachh Bharat Abhiyan
	4. Air Pollution- causes & its health impacts
	5. Prevention & control of measure for air pollution
	6. Noise pollution- its effects & control measures
Section 2	
	1. Biomedical Waste management
	2. Radiation Exposure- its health effects & reduction measures
	3. E- waste Management
	4. Universal Precautions in Hospitals
Section 3	1. Biodiversity- its types & conservation
	2. Ecosystem – its structural & functional aspects
	3. Green House Effect
	4. Environment Health Education – Aims, objectives & its importance
	5. Methods of Environment Awareness in Community
Section 4	
	1. Natural resources- overexploitation & methods for its replenishment
	2. Population explosion – its impact & control measures
	3. Entomology & Pest Control
	4. Water Harvesting
	5. Climate Change & its impact
Text Books:	
	1. Environmental studies: Deepa Sharma, Bhupendra Singh Chabra
	2. Text book of Community Medicine: K Park

10

10