B. Voc. (Medical Imaging Technology)
SEMESTER- II

S. No.	Component	Title of The Paper	Paper Code	Credits	Marks (Theory)		Marks (Practical)		Total
					External Assessment	Internal Assessment	External Assessment	Internal Assessment	
1.	Skill Paper - 1	Human Anatomy & Physiology Part-II (Theory)	BVMI211CCT	04	70	30	---	---	100
		Human Anatomy & Physiology Part-II (Lab)	BVMI211CCP	02	---	---	35	15	50
2.	Skill Paper - 2	Contrast & Special Radiography Procedures (Theory)	BVMI212CCT	04	70	30	---	---	100
		Contrast & Special Radiography Procedures(Lab)	BVMI212CCP	02	---	---	35	15	50
3.	Skill Paper - 3	Modern Radiological & Imaging Equipment (Theory)	BVMI213CCT	04	70	30	---	---	100
		Modern Radiological & Imaging Equipment (Lab)	BVMI213CCP	02	---	---	35	15	50
4.	Non-Skill Paper - 4	Radiography & Image Processing Techniques (Theory)	BVMI214CCT	03	70	30	---	---	100
		Radiography & Image Processing Techniques(Lab)	BVMI214CCP	01	---	---	35	15	50
5.	Non-Skill Paper - 5	Environmental Studies (Theory)	UGBT201AET	04	70	30	---	---	100
6.	Non-Skill Paper - 6	Soft skill & Personality Development (Theory)	BVMI215CCT	04	70	30	--	--	100
		Total		**30**					**800**
Mandatory Non CGPA Courses									
7.	Non-Skill Paper - 7	Islamiat (Theory)	UGIS201NCT	02	35	15	---	---	50
		Total		**02**					**50**

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SEMESTER-II

(Skill Paper - 1)Human Anatomy & Physiology Part-II (Theory)

Credits – 04

Unit I:

Anatomy of Nervous system, structure of Neurons, parts, Classification, of CNS, Structure of Human brain, (HIND,MID & FORE BRAIN), Location, functions, & covering of brain, Spinal cord structure, functions, PNS, ANS, Sense organs, spinal & Cranial nerves.

Unit II:

Excretory system, parts, kidneys, Structure, Location, & functions, ureter, Urinary bladder, Urethra, (Male & Female), structure & function of Nephron.

Unit III:

Reproductive system, parts, of reproductive system, male -testis, Vasdeference, Epidedymis, Prostrate, Duct system, Accessory organs, Structures & morphology.
Female Uterus, Fallopian tubes, Ovaries, Duct system, Accessory organs, Mammary Glands.

Unit IV:

Endocrine system, all endocrine glands, their functions, Thyroid, Para thyroid, Pituitary, Adrenal glands, & Islets of Pancreas, Supra renal glands, Structures.

PHYSIOLOGY

Unit I:

Types & functions of neurons & neuroglia, classification, properties, of neurofibers, myelinogenesis, resting membrane, potential action, potential excitability, conductivity, all or none law, neuromuscularjunction, structures, & transmission, blockers, myasthenia gravis, EEG, CSF, functions, circulation, composition, lumbar puncture.

Unit II:

Functions of kidneys, structure & types nephrons, Juxtayglomulular, apparatus, structures, & functions, definition of GFR, normal values, mechanism of urine formation, functions affecting GFR, Re-absorption, tubular, mechanism of re-absorption, properties & composition of normal, & abnormal urine, Micturition, cytourethrogram, Diuretics, action of ADH, Aldosteron, & PTH on Kidney.

Unit III:

Reproductive system, functions of male & female reproductive system, Semen secretion, composition, factors, influencing abnormalities, Oligozospermia, functions of Testosterone, spermatogenesis, female reproductive system, functions of Estrogen, Progestron, Oogenesis, Ovulation, Menstrual cycle, Menstrual fluid, Pregnancy, changes, Pregnancy tests, Parturition, Location, factors affecting, composition of breast milk, Contraceptive methods.

Unit IV:

Endocrine system, classification of endocrine gland, functions, properties, regulation of hormonal actions.pituitary gland- anterior, posterior, secretions, functions, regulation, hormones, dwarfism, acromegaly, gigantism, ADH, oxytosin, diabetes incipidus.thyroid hormone, hypo- hyper secretion, goiter, cretinism, myxoderma, grave' disease, secretion of hormones, & functions.adrenal gland, adrenal cortex, hormones, gluco corticoids, mineral corticiodes, sex steroides, functions of cortisol, aldosterone, androgens, Addisson's disease, Cushing's syndrome, Conn's syndrome, & adreno genital syndrome, adrenaline, non-adrenaline, pancreas hormones, insulin, glucogan, functions & actions.para thyroid gland (PTH), functions & actions, calcitonine, functions & actions, regulations. disorders of thymus, & pineal gland.

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SEMESTER-II

(Skill Paper - 1) Human Anatomy & Physiology Part-II (Lab/Practical)

Credits – 02

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1. Anatomy of brain & CNS
2. Anatomy of kidney & Nephron
3. Male reproductive system & different parts
4. Female reproductive system & different parts Uterus, Fallopian tubes ovaries mammary gland
5. Thyroid gland
6. Pituitary gland
7. Adrenal gland
8. Pancreas
9. Para thyroid gland

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SEMESTER-II

(Skill Paper - 2) Contrast and Special Radiography Procedures (Theory)

Credits – 04

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1. Contrast media and its classification.

2. Gastrointestinal Tract: Fluoroscopy, general considerations, responsibility of radiographers. Barium swallow. pharynx and oesophagus- Barium meal and follow through - Hypotonic duodenography - Small bowel enema.- Barium Enema routine projections for colon and rectum, colonic activators: double contrast studies; colostomy. Special techniques for specific disease to be examined. - Water soluble contrast media - e.g. gastrograffin studies.

3. Salivary glands: Routine technique, procedure - sialography.

4. Biliary system:

a. Plain film radiography. - Intravenous cholangiography.- Percutaneous cholangiography.

b. Endoscopic retrograde cholangio-pancreatography (ERCP).–Operative cholangiography.

c. Post-Operative Choangiography (T - tube Cholangiography).

5. Urinary system. Intravenous urography- Retrograde pyelography - Antegrade pyelography. Cystography and micturating cystouresthrography - Urethrography (ascending).

6. Female reproductive system: Hysterosalpingography.

7. Mammography: Mammography: Basic views, special views, wire localization. - Ductography.

8. Respiratory system: Bronchography: Awareness.

9. Dacrocystograpy: lacrimal duct system investigation

10. Macroradiography: General principles - Requirement - Equipment - Technique

11. Angiography; general angiography

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SEMESTER-II

(Skill Paper - 2) Contrast and Special Radiography Procedures (Lab/Practical)

Credits – 02

Practicals:

Positioning and imaging of all kinds of contrast & special radiographic procedures

IVP
MCU & RGU
DCG
Hysterosalpingography.

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SEMESTER-II

(Skill Paper - 3) Modern Radiological & Imaging Equipment (Theory)

Credits – 04

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1. Special equipment Portable and mobile x-ray units, dental x-ray machine, skull table mammographic device-Technical aspects of Mammography, modern x-ray tubes; Accessories; Resolution; Quality control; Application and role in medicine, digital radiographic equipment. DEXA and its applications in diagnostic radiology.

2. Computed radiography its principle, physics & equipment, Digital Radiography, Flat panel digital fluoroscopy and radiography system, Direct and indirect digital radiography and fluoroscopy systems, Digital radiography and computed radiography its advantages, disadvantages and applications.

3. Vascular Imaging Equipment; Introduction, historical developments, Principle, Scanned projection radiography, digital subtraction angiography, applications and definition of terms,

4. Tomography: General principles. Estimation, selection of depth of layer. - Layer thickness required for different examination. Spacing oftarers. Types and advantages of various -movements. Choice of tomographic movement expositor factor. Sequential, horizontal and multi section tomography - Application of tomography to specific regions

5. Picture archiving and communication system (PACS)

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SEMESTER-II

(Skill Paper - 3) Modern Radiological & Imaging Equipment (Lab/Practical)

Credits – 02

Practicals:

Demonstration of basic procedures in all modern modalities.

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SEMESTER-II

(Non-Skill Paper - 4) Radiography & Image Processing Techniques (Theory)

Credits – 03

UNIT-1 Dark Room
The processing area. Dark room design, construction, illumination, entrance safe lighting-types. Room storage, shelving of films. Cleaning and maintenance.
Dark Room Planning: For A Small Hospital, for A Large Hospital Location of Dark Room and construction of Dark Room. Ventilation, Wall Protection Entrance to Dark Room - Single Door, Double Door, Labyrinth.

Dark Room: Instruction to Staff, Dry Bench, Drawer, Cupboard. Loading and Unloading Cassettes. Hangers, Types of Hangers and Storage of Hangers Wet Bench Cleanliness, Control of Dust, Dark Room Sink Hatches and Drier Safe Lights, Direct and Indirect, Uses, Factors Affecting Safelight Performance, Safelight Tests. Viewing Room, Film Dispensing.

UNIT 2
X-ray film and Image processing
Composition of single and double coated radiographic films, Screen & Non Screen films, structure of film, characteristic curve. Characteristics (speed, base + fog, gamma, latitude).
Effect of grain size on film response to exposure, interpretation of characteristics curve, latent image formation, process of film developing

UNIT-3 Developer, fixer, rinser components, replenisher.
Manual technique of developing film
Automatic film processor
Common errors in processing

UNIT-4 Factors affecting image quality
Meaning of radiographic image contrast, density, resolution, sharpness, magnification and distortion of image, noise and blur, radiographic illuminators and viewing conditions, visual acuity and resolution, quality assurance of the related equipment and its benefits with respect to visual assessment.

UNIT-5 Intensifying screens:
Structure and functions, common phosphors used types, screen mounting,
Care and maintenance of film screen contact.
Intensifying factor-speed and detail-crossover effect resolution-mottle-reciprocity-screen asymmetry cleaning.
New phosphor technology-influence of kilo voltage. Photo-stimulable phosphor Imaging.
Cassettes: Structure and function

Types-single, gridded, film holder-Design features and consideration with loading/unloading, Care and maintenance (cleaning).

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SEMESTER-II

(Non-Skill Paper - 4) Radiography & Image Processing Techniques (Lab/Practical)

Credits – 01

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1. Test to check the x-ray films and screen contact in the cassette
2. Test to check light leakage in the cassette.
3. To prepare a characteristic curve of a radiographic film
4. To check the effect of safe light on exposed as well as unexposed x- ray film

B. Voc. (Medical Imaging Technology)

SEMESTER-II

(Non - Skill -Paper - 5) Environmental Studies (Theory)

Credits – 04

Ability Enhancement Compulsory Courses (AECC-Environmental Studies)

Unit-I: Introduction to environmental studies

- Multidisciplinary nature of environmental studies; components of environment-atmosphere, hydrosphere, lithosphere and biosphere.
- Scope and importance; Concept of sustainability and sustainable development.

Unit-II: Ecosystems

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chain, food web and ecological succession. Case studies of the following ecosystems:

a) Forest ecosystem
b) Grassland ecosystem
c) Desert ecosystem
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit-III: Natural resources: Renewable and Non-renewable Resources

- Land Resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).
- Heating of earth and circulation of air; air mass formation and precipitation.
- Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit-IV: Biodiversity and Conservation

- Levels of biological diversity: genetic, species and ecosystem diversity; Biogeography zones of India; Biodiversity patterns and global biodiversity hot spots.
- India as a mega-biodiversity nation; Endangered and endemic species of India.

- Threats to biodiversity: Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and informational value.

Unit-V: Environmental Pollution

- Environmental pollution: types, causes, effects and controls; Air, water, soil, chemical and noise pollution
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste.
- Pollution case studies.

Unit-VI: Environmental Policies & Practices

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture.
- Environment Laws: Environment Protection Act: air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; International agreements; Montreal and Kyoto protocols and conservation on Biological Diversity (CBD). The Chemical Weapons Convention (CWC).
- Nature reserves, tribal population and rights, and human wildlife conflicts in Indian context.

Unit-VII: Human Communities and the Environment

- Human population and growth: Impacts on environment, human health and welfare.
- Carbon foot-print.
- Resettlement and rehabilitation of project affected persons; case studies,
- Disaster management: floods, earthquakes, cyclones and landslides.
- Environmental movements: Chipko, Silent valley, Bishnios of Rajasthan.
- Environmental ethics: Role of Indian and other religions and culture in environmental conservation.
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Unit-VIII: Field work

- Visit to an area to document environmental assets; river/forest/flora/fauna, etc.
- Visit to a local pollution site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems-pond, river, Delhi ridge, etc.

Suggested Readings:

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.

2. Gadgil. M., & Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson. B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P.H. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, r. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
7. McCully, P.1996. Rivers no more: the environmental effects of dams (pp.29-64). Zed Books.
8. McNeil, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum, E.P., Odum, h.T. & Andrews, J.1971. Fundamentals of Ecology. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
11. Rao, M.N. & Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.
12. Reven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.
13. Resencranz, A., Divan, S., & Noble, M.L. 2001 Environmental law and policy in India. Tripathi 1992.
14. Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.
15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian subcontinent.
18. Warren, C.E. 1971. Biology and Water Pollution Control. WB Saunders.
19. Wilson, E.O. 2006. The Creation: An appeal to save life on earth. New York: Norton.
20. World Commission on environment and Development. 1987. Our Common Future. Oxford University Press.
21. www.nacwc.nic.in
22. www.opcw.org

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SEMESTER-II

(Non - Skill Paper - 6) Soft skill & Personality Development (Theory)

Credits – 04

Objective: On completion of the course, the students will be able to listen to lectures, public announcements, news on TV, radio and engage in telephonic conversation to communicate effectively and accurately in English used as spoken language for various purposes.

UNIT- I: Listening Skills:

Barriers to listening; effective listening skills; feedback skills. Attending telephone calls; note taking. Activities:Listening exercises-Listening to conversation, News and TV reports.Taking notes on a speech/lecture.

UNIT-II : Speaking and Conversational Skills:

Components of a meaningful and easy conversation; understanding the cue and making appropriate responses; forms of polite speech;asking and providing information on general topics. The study of sounds of English, stress and intonation. Situation based Conversation inEnglish.

UNIT- III : Essentials of Spoken English:

Activities, Making conversation and taking turns, Oral description or explanation of a common object, situationor concept,Giving interviews.

UNIT- IV

Oral Presentation with/without aud iovisualaids. Group Discussion. Listening to any recorded or live material and asking oral questions for listening comprehension.

BooksRecommended:

- SoftskillsTrainingAworkbookto develop skills for employmentbyFredrickH.Wentz
- PersonalityDevelopmentandSoft skills, Oxford University PressbyBarunK.Mitra

- Class room technique to improve the softskills
- Surprise writing on current issues
- General grooming sessions to face the interview
- Group discussions
- Motivational classes to improve communication and confidence power

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SEMESTER-II

(Non-Skill Paper - 7) ISLAMIYAT (Theory)

Credits – 02
