Bachelor of Vocation (Radiology & Medical Imaging Technology)

B.Voc. (RMIT) Syllabus

II Semester				
S. No.	**Course Code**	**Subject**	**Type of Course**	**Credits**
1	BVRMIT-201	Human Anatomy & Physiology-II	Skill	4
2	BVRMIT-202	Patient positioning & clinical Radiography	Skill	4
3	BVRMIT-203	Special Radiographic Procedure	Skill	4
4	BVRMIT-204	Dark room techniques	Skill	2
5	BVRMIT-205	Radiation Physics	Skill	3
6	BVRMIT-206	**Communication Skills - I**	General	3
7	BVRMIT	**Computing Skill – I**	General	3
8	**BVRMITP-201**	**Vocational Practical**	**Skill**	**13**

BVRMIT- 201 HUMAN ANATOMY AND PHYSIOLOHY II

UNIT 1

1.Cardiovascular System

Heart-size, location, chambers, exterior & interior, Blood supply of heart, Systemic & pulmonary circulation, Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial, artery, superficial palmar arch, femoral artery, internal iliac artery, Peripheral pulse, Inferior venacava, portal vein, portosystemic anastomosis, Great saphenous vein, Dural venous sinuses, Lymphatic system- cisterna chyli& thoracic duct, Histology of lymphatic tissues, Names of regional lymphatics, axillary and inguinal lymph nodes in brief.

2.Gastro-intestinal System

Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands Waldeyer's ring), Oesophagus, stomach**,** small and large intestine, liver, gall bladder, pancreas Radiographs of abdomen.

3. Respiratory System

Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments, Histology of trachea, lung and pleura, Names of paranasal air sinuses.

4. Peritoneum: Description in brief

UNIT 2

1.Urinary System

Kidney, ureter, urinary bladder, male and female urethra, Histology of kidney, ureter and urinary bladder.

2.Reproductive System

Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology), Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology), Mammary glandgross.

3. Endocrine Glands

Names of all endocrine glands in detail on pituitary gland, thyroid gland, parathyroid gland, suprarenal glad (gross & histology).

4. Nervous System

Neuron, Classification of NS, Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross & histology), Meninges, Ventricles & cerebrospinal fluid, Names of basal nuclei, Blood supply of brain, Cranial nerves, Sympathetic trunk & names of parasympathetic ganglia

5. Sensory Organs

Skin: Skin-histology, Appendages of skin, Eye: Parts of eye & lachrymal apparatus, Extra-ocular muscles & nerve supply, Ear: parts of ear- external, middle and inner ear and contents

UNIT 3

Cardiovascular System

Respiratory System

Excretory System

UNIT-4

Reproductive System

Endocrine System

Lymphatic System

BVRMIT-202 CLINICAL RADIOGRAPHY

UNIT 1

1. Upper extremity - basic views

2. Lower extremity (including pelvis) - basic views

3. Chest including thoracic age and sternum

4. Spine - Cervical, dorsal, lumbar, lumbo-sacral (including functional views).

5. Skull – including trauma cases

6. Facial bones (nasal bones, zygoma, orbits, maxilla)

7. Mandible, Temporo-Mandibular Joints, Mastoids, petrous temporal bones

8. Abdomen - erect, supine, lateral decubituS

UNIT 2

Soft tissue radiography : Larynx, pharynx, nasopharynx, thoracic inlet

Dental radiography

Foreign body localization

High kV technique

Macroradiography

UNIT 3

1.General Pediatric Radiography

Special needs of patient and radiographer – equipment considerations (use of dedicated equipment and accessories) Technical considerations - the need to modify "adult" techniques – selection of exposure factors – image quality considerations – radiation protection of the patient - special techniques peculiar to children as follows : – Anorectal malformation – contrast study,intersex disorders - contrast study – esophageal atresia – pre/post op. – intussusception – congenital dislocation of hip – scoliosis – Leg–length measurements – assessment of bone age – non accidental injury – radiography of babies in incubators

2. Geriatric radiography

Understanding patient profile - possible difficulties during radiography – Technical considerations – need to carry out standardised projections in unconventional position – equipment and accessories – exposure factor considerations in view of variations in skeletal tissue – special care

UNIT 4

1.Operation theatre radiography

Operative cholangiography – orthopaedic procedures – pre-operative chest. Strict observation of asepsis – preparation of radiographer and equipment/accessories – careful safe use of mobile and fluoroscopic equipment – radiation protection – patient care – protection of theatre staff – rapid availability of radiographic image

2.Trauma/Emergency Radiography

Limb fractures - Fracture of thoracic cage, spine, skull – GIT obstruction – lung collapse – pleural effusion – pneumo-thorax. Selection of suitable X-Ray equipment – patient position radiographic projections and sequence for each patient – modification of routine positioning, X-Ray tube and film – radiation protection – patient care

BVRMIT-203 SPECIAL RADIOGRAPHIC PROCEDURE.

UNIT-1

Urinary system imaging (IVU, MCU, RGU) Revision of anatomy and physiology, clinical indications and contraindications - patient preparation - contrast media used and dosage - physiological process by which urinary tract is outlined film sequence (projection and timing), normal anatomy on films, additional techniques, radiation protection, care of patient during and after examination. Pathological conditions of urinary system : kidneys, ureter, urinary bladder, urethra.

UNIT 2

Gastrointestinal tract imaging (Barium swallow, Barium meal upper GI, Barium meal follow through, Barium enema, small bowel enema, distal colography, defaecography).Revision of anatomy and physiology - clinical indications and contraindications - contrast media used : preparation and dosage - patient preparation – preparation of equipment – control of radiographic and fluoroscopic equipment – film sequence – radiographic projections – radiation protection – patient management – after care of patient – radiographer's role in the team. Pathological conditions of the GI tract.]

UNIT 3

Biliary system (PTC, ERCP, T-Tube cholangiography, per-op. cholangiography) Revision of anatomy and physiology – clinical indications and contraindications – contrast media – patient preparation – film series - radiation protection – patient care - normal anatomy. Pathological conditions of biliary system. [D] Sialography and sinography Anatomy - Clinical indications and contraindications – patient preparation – contrast media and dosage – injection procedure – techniques for radiographic projections - radiographic appearances – radiation protection – patient care

UNIT 4

Hysterosalpingography (HSG) Revision of anatomy and physiology – clinical indications and contraindications – contrastinjection-projections – radiation protection – patient care Procedures which are obsolete or rarely

Myelography :indications and contraindications – contrast used – patient preparation – injection technique – film sequence – projections – patient care • Pelvimetry

Oral cholecystography/intravenous cholangiography

Dacrocystography

Arthrography

Discography

BVRMIT 204 IMAGE PROCESSING TECHNIQUES

UNIT-1

Dark room design and accessories Site

Layout and safe light compatibility

UNIT-2

X-Ray film and Image processing Composition of single and double coated radiographic films, structure of emulsion, film 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 (composition of fixer, developer and other processing solution), common errors and faults while processing (densitometry), automatic processing (processing cycle), developer replenishment, silver recovery and economics. Image intensifiers and cassettes (structure and function) ; types of image intensifiers and relative advantage, loading and unloading of cassettes and their care/maintenance ; effects of kV and mA on variation of emitted radiation intensity, determination of relative speeds, film contrast, film screen contact. Film storage, handling.

UNIT-3

Cassettes Structure and function Types - single, gridded, filmholder. Design features and consideration with loading/unloading Care and maintenance (cleaning)

Grid Purpose and function, effect on radiation exposure, use of grid, structure and material,stationary, parallel, focused, cross-hatch Moving grids. Purpose, advantages, disadvantages.

UNIT 4

Intensifying screens Structure and functions, common phosphors used for determination of relative speeds, types, screen mounting, care and maintenance of film screen contact.

BVRMIT-205 Radiation physics

UNIT 1

Sound

The nature and propagation of sound wave (the characteristics of sound, wave theory), speed of sound in a material medium, intensity of sound, the decibel, Interference of sound waves, beats, diffraction, Doppler's effect, Ultrasonic wave, production of ultrasonic wave (piezo-electric effect) in ultrasonography. Use of principle of Doppler's effect in Diagnostic radiology (e.g. Echo, blood flow measurement).

Heat

Definition of heat, temperature, Heat capacity, specific heat capacity, Heat transfer-conduction, convection, radiation, thermal conductivity, equation for thermal conductivity (k), the value of k of various material of interest in radiology, thermal expansion, Newton's law of cooling, Heat radiation, perfect black body, Stefan law, application in diagnostic radiology (Heat dissipation in both stationary and rotating X-Ray tubes).

UNIT 2

Electrostatics

Electric charge (positive and negative charge), Coulomb's law, Electric field, electric potential and potential difference, equipotential lines, the eV (electron volt), Electric potential due to a point charge, Capacitance, dielectric, Capacitor, series and parallel combination of capacitors, energy stored on capacitor, charging and discharging of capacitors, use of capacitors in diagnostic radiology (e.g Mobile X-Ray generators, radiation detectors etc.).

UNIT 3

Electricity and Magnetism

DC circuit, Ohm's law, resistivity, series and parallel combination, EMF, Krichoff's law, heating effect of current, Ammeter, voltmeter, Galvanometer. Magnets and magnetic field, force on an electric current in a magnetic field, force on electric charge moving in a magnetic field, magnetic field due to straight wire ; force between two parallel wires, Ampere's law, electromagnet and solenoids.

UNIT-4

Electromagnetic Induction

(A.C. Circuit) Induced EMF, Faraday's Law, Lenz's law, EMF induced in a moving conductor, changing magnetic flux produces electric field, Transformer, Inductance, Energy stored in a magnetic field, resonance in A.C circuit. Light Index of refraction, Snell's law, total internal reflection, lens law, rectilinear propagation of light, umbra and penumbra effect, use of principle of rectilinear propagation of light in radiology (e.g. magnification, patient positioning device, setting areas for exposure, etc.). Photometry : Total radiation flux, luminosity of radiant flux, Luminous flux : relative luminosity, luminous efficiency, Illuminance, Inverse square law, Lambert's cosine law. Electromagnetic waves Introduction, Maxwell's equation, electromagnetic waves, energy density and intensity, momentum, electromagnetic spectrum and radiation in Atomsphere

BVRMIT-206-BASIC OF HEALTH MARKET AND ECONOMY

Unit I

Health Care Market An Introduction : Main Problems in the Market for Health Care, Health Care and

Economic Basics, Analyzing Health Care Markets. Demand-Side Considerations: Demand for Health

and Health Care, Market for Health Insurance

Unit II

Supply-Side Considerations: Managed Care, Health Care Professionals, Hospital Services,

Confounding Factors Public Policy in Medical Care: Policies to Enhance Access, Policies to Contain

Costs, Medical Care Systems Worldwide,

UNIT-III

Health Sector in India: An Overview Health Outcomes; Health Systems; Health Financing

Evaluation of Health Programs Costing, Cost Effectiveness and Cost-Benefit Analysis; Burden of

Diseases ,Role of WHO , Health Care Budget: purpose, types & practices in Indian context.

UNIT-IV

Health Economics: Fundamentals of Economics: Scope & coverage of Health Economics, demand for

Health Sciences; Health as an investment, population, Health &Economic Development.

Tools of Economics-Concepts of need, demand, supply & price in Health Services.

Methods & Techniques of Economic Evaluation of Health Programmes: Cost benefit

&cost effective methods-output & input analysis.

Market, monopoly, perfect & imperfect competition. Health Financing from various sources – Public ,

Private, TPA.

Economics of Health Programmes for Nutrition, diet &population control, economics of abuse of

tobacco & alcohol, environmental influences on health and feeding.

Economics of Communicable (STDs & Malaria) & non-communicable (IHD & Cancers) diseases.

PRACTICALS:

BVRMITP-201 Practical Human Anatomy & Physiology-II

Human Anatomy-II (Practical)

Demonstration of:

- Nervous system from models.
- Structure of eye and ear
- Structural differences between skeletal, smooth and cardiac muscles.
- Various bones
- Various joints
- Various parts of male & female reproductive system from models

Human Physiology- II (Practical)

- To perform total platelet count.
- To perform bleeding time.
- To perform clotting time.
- To study about CSF examination.
- To study about intrauterine contraceptive devices.
- To demonstrate microscopic structure of bones with permanent slides.
- To demonstrate microscopic structure of muscles with permanent slides.

BVRMITP-202-Practical Patient positioning & clinical Radiography

X ray of Upper & Lower Extremities

- Hand
- Forearm
- Arm
- Thigh
- Leg
- Foot
- Shoulder Joints

- Basic & special projection
- Related radiological Pathology

Pelvis Griddle

- Basic & special projection
- Related radiological Pathology

Whole Spine Positioning

- Cervical spine
- Thoracic spine
- Lumbar spine, sacrum and coccyx

Paediatric Radiography

- Special Positioning Views for all the X-Rays.

Skull

- Cranial bones and facial bone
- Basic & special projections
- Related radiological Pathology

Neck, Thorax &Abdomen

- Basic & special projection
- Related radiological Pathology

KUB

- Basic & special projection
- Related radiological Pathology

BVRMITP-203 Practical Special Radiographic Procedure

- Radiography of Special radiological procedures,
- Using contrast media as per syllabus.
- Positioning, Patient preparation
- Assistance while performing procedures.

BVRMITP-204 Practical Dark room techniques

- X-ray Film / Image processing Techniques (including Dark Room Techniques)
- X-ray cassettes
- Intensifying screens
- X-ray films types – basic film structure, quality, choosing films for different studies
- dry & wet processing – Fixer –Developer –film processing, Methods, manual and automatic processing, conventional & modern image
- processing rooms, image processing equipments – types & maintenance

- day light systems
- Intensifying screen, Fluorescence -structure of Intensifying screens
- screen unsharpness etc.

BVRMITP-205 Practical Radiation Physics

- Study with charts, models & power point presentations
- Atomic structure,
- X-ray tubes,
- X-ray circuits involving students to present and discuss.
- Circuits demonstration by charts and ppt
- Electrostatic demonstration by charts and ppt
- Magnetics demonstration by charts and ppt