Course Code	Course Title	Course ID	L	T	P	Credits	TE	TI	PE	PI	Total
Discipline Specific Courses (DSC)											
240/BMRIT/CC/201	General anatomy-II – Theory		3	-	-	3	50	25	-	-	75
240/BMRIT/CC/202	General Physiology-II – Theory		3	-	-	3	50	25	-	-	75
240/BMRIT/CC/203	Basic physics including Radiological Physics- Theory		2	1	-	3	50	25	-	-	75
240/BMRIT/CC/204	Conventional radiography and equipment- Theory		2	1	-	3	50	25		-	75
240/BMRIT/CC/205	General Physiology-II- Practical		-	-	4	2	-	-	35	15	50
240/BMRIT/CC/206	Basic physics including Radiological Physics- Practical		-	-	4	2	-	-	35	15	50
240/BMRIT/CC/207	Conventional radiography and equipment- Practical		-	-	4	2	-	-	35	15	50
Minor (MIC) / Vocational Courses (VOC)											
240/BMRIT/MI/201	General anatomy-II – Practical		-	-	4	2	-	-	35	15	50
Multidisciplinary courses(MDC)											
240/BMRIT/MD/201	Yoga		2	-	-	2	35	15	-	-	50
Ability Enhancement Couse (AEC)											
240/BMRIT/AE/201	Personality Development & Soft Skills		2	-	-	2	35	15	-	-	50
Skill Enhancement Course (SEC)/ Internship/Dissertation											
240/BMRIT/SE/201	Basic in Computer & Information Sciences- Practical.		-	-	4	2	-	-	35	15	50
Value Addition Course(s)											
240/BMRIT/VA/201	Extracurricular Activity		-	2	-	2	35	15	-	-	50
Total Credits						28	**Total Marks**			700	

Ms. Kalpana Bankoti Bisht Mr. Pramod Kumar md. Imtiyaz Ansari Dr. Garima Srivastava Dr. Himanshu Thukral

4th SEM BMRIT

Course Code	Course Title	Course ID	L	T	P	Credits	TE	TI	PE	PI	Total
Discipline Specific Courses (DSC)											
240/BMRIT/CC/401	Physics of newer imaging modalities- Theory		4	-	-	4	75	25	-	-	100
240/BMRIT/CC/402	Clinical Radiography positioning-II- Theory		3	1	-	4	75	25	-	-	100
240/BMRIT/CC/403	Newer modalities imaging techniques including patient care- Theory		4	-	-	4	75	25	-	-	100
240/BMRIT/CC/404	Quality control in radiology and radiation safety- Theory		3	1	-	4	75	25	-	-	100
240/BMRIT/CC/405	Physics of newer imaging modalities- Practical		-	-	4	2	-	-	35	15	50
240/BMRIT/CC/406	Clinical Radiography positioning-II-Practical		-	-	4	2	-	-	35	15	50
240/BMRIT/CC/407	Newer modalities imaging techniques including patient care- Practical		-	-	4	2	-	-	35	15	50
240/BMRIT/CC/408	Quality control in radiology and radiation safety- Practical		-	-	4	2	-	-	35	15	50
Minor (MIC) / Vocational Courses (VOC)											
240/BMRIT/MI/401	Workshop- Theory		-	1	-	1	20	5	-	-	25
Skill Enhancement Course (SEC)/ Internship/Dissertation											
240/BMRIT/SE/401	Lab Visit		-	-	4	2	-	-	35	15	50
Value Addition Course(s)											
240/BMRIT/VA/401	Environmental Science - Theory		4	-	-	4	75	25	-	-	100
Total Credits						**31**	**Total Marks**			**775**	

6TH SEM

Course Code	Course Title	Course ID	L	T	P	Credits	TE	TI	PE	PI	Total
Discipline Specific Courses (DSC)											
240/BMRIT/CC/601	Quality assurance & radiation safety- Theory		4	-	-	4	75	25	-	-	100
240/BMRIT/CC/602	Hospital practice & care of patients- Theory		3	1	-	4	75	25	-	-	100
240/BMRIT/CC/603	Research Methodology &Biostatistics– II- Theory		3	1	-	4	75	25	-	-	100
240/BMRIT/CC/604	Quality assurance & radiation safety- Practical		-	-	6	3	50	25	-	-	75
240/BMRIT/CC/605	Hospital practice & care of patients- Practical		-	-	6	3	-	-	50	25	75
Minor (MIC) / Vocational Courses (VOC)											
240/BMRIT/MI/601	Work Shop		-	1	-	1	20	5	-	-	25
Skill Enhancement Course (SEC)/ Internship/Dissertation											
240/BMRIT/SE/601	Project Work- Practical		-	-	100	4	-	-	75	25	100
Total Credits						**23**	**Total Marks**			**575**	

Syllabus

Course Title: General Anatomy-II- Theory	
Semester: II Course code: 240/BMRIT/CC/201	Credits:03 DSC
No of sessions Lectures/Tutorial:45	Total Marks: 75
Course Pre-requisites:	Timing: 3 Hours

Instructions for paper setter: Examiner is requested to set **one compulsory and eight other questions, two from each unit.** The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

Course Introduction

Allied and healthcare professionals (AHPs) include individuals involved with the delivery of health or healthcare related services, with qualification and competence in therapeutic, diagnostic, curative, preventive and/or rehabilitative interventions.

They work in multidisciplinary health teams in varied healthcare settings including doctors, nurses and public health officials to promote, protect, treat and manage a person's physical, mental, social, emotional, environmental health and holistic well-being. The study ofanatomy helps them inputting into perspective the knowledge that they gain for better good of humanity.

Course learning Outcomes-

CLO-1 Enumerate the function of brain, Nervous system, motor system, blood supply of brain, anatomy of brain, cranial nerves, CSF formation and about spinal cord.

CL0-2 Enumerate auditory system. Demonstrate anatomy of urinary system, location of kidney.

CLO-3 Enumerate blood vessels of reproductive system. Enumerate hormone secretion of glands and blood

Course Pedagogy

The course pedagogy includes a comprehensive study including the study of general structures and the specialized organs in a manner aimed at being student friendly. Various clinical aspects are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, chart and poster making and model making aresome of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students. They are taught on simulators for a live feeling. The practical includes the study of structures through mannequins which helps in holding the interest of the students.

Course contents

Unit-1 Classification of nervous system

Nerve- structure, classification, microscopy with examples. Neurons, classification with examples. Simpler eflex arc.

Parts of a typical spinal nerve/Dermatome: Central nervous system -disposition, parts and functions Cerebrum, Cerebellum, Midbrain & brain stem Blood supply & anatomy of brain.

Unit 2

Spinal cord-anatomy, blood supply, nerve pathways Pyramidal, extra pyramidal system, Thalamus, hypothalamus, Structure and features of meninges Ventricles of brain, CSF circulation Development of nervous system & defects.

Unit -3 Cranial nerves -(course, distribution, functions and palsy) Sympathetic nervous system, its parts and components Parasympathetic nervous system Applied anatomy

Unit -4 Structure and function of Visual system, Auditory system, Gustatory system, Olfactory system, Somatic sensory system. Pelvic floor, innervations Kidney, Ureter, bladder, urethra. Reproductive system of male, Reproductive system of female.

Reference books:

- Sampath Madhyastha's Manipal manual of anatomy for allied health sciences
- Krishna Garg & Madhu Joshi's Practical anatomy work book
- Dixit's Atlas of Histology for Medical Students
- Basic Histology: A Color Atlas & Text
- Jana's Exam Oriented Practical Anatomy

Krishna's Anatomy Mnemonics

Course Title: GENERAL PHYSIOLOGY-II- Theory		
Semester:IICoursecode:240/BMRIT/CC/202	Credits:03	DSC
No of sessions Lectures/Tutorial:45	Total Marks: 75	
Course Pre-requisites:	Timing: 3 Hours	

Instructions for paper setter: Examiner is requested to set **one compulsory and eight other questions, two from each unit.** The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

Course Introduction

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. An enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care. The teaching of physiology aims to integrate their learning in sync with the understanding of the basic functions of the various organs in the body and their clinical aspect so that the knowledge gained can give them an edge in their field.

Course learning Outcomes.

CLO-1 EnumeratePhysiologyofkidney

CLO-2 Explain Physiology of lower Urinary tract

CLO-3 Label Physiology of the endocrine glands

CLO-4 Enumerate Physiology of reproductive system

Course contents-

Unit -1 PhysiologyofkidneyandurineformationGlomerularfiltrationrate,clearance, Tubular function, Ureter, bladder, urethra

Unit-2- Physiology of the endocrine glands-Hormones secreted by these glands, their Classifications and
function

Unit-3- Male- Functions of testes, pubertal changes in males, testosterone-action& regulations of secretion.

Unit 4 Female-Functions of ovaries and uterus, pubertal changes, menstrual cycle, estrogen and progesterone -action and regulation.

Reference Books:

1. C C Chatterjee's Human Physiology
2. C C Chatterjee's Practical Physiology for Paramedical Courses
3. CNChandra shekhar's Manipal Manual of Medical Physiology
4. R K Maurya's Medical Physiology

Course Title: Basic physics including radiological physics- Theory			
Semester: II	Coursecode:240/BMRIT/CC/203	Credits:03	DSC
No of sessions Lectures/Tutorial:45		Total Marks: 75	
Course Pre-requisites:		Timing: 3 Hours	

Instructions for paper setter: Examiner is requested to set **one compulsory and eight other questions, two from each unit.** The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

Course Objectives:

The purpose of this course is to provide an understanding of physical concepts and underlying various technological applications. This course also provides fundamental idea about circuit analysis, working principles of machines. In addition, the course is expected to develop scientific temperament and analytical skill in students, to enable them logically tackle complex engineering problems in their chosen area of application.

Course Learning Outcomes

CLO1- Use X-ray equipment and maintenance of equipment. Should know the Warm-up procedures of X-ray machine and cooling methods.

CLO2- To be able to know how to use X-Ray exposure switches.

CLO3-Demonstrate work flow Digital/II TV fluoroscopy equipment handling. Demonstrate Handling, care and maintenance of equipment & accessories

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day-to-day real world applications. It will not only help students to understand the fundamentals of applied physics but also improve skills and techniques for tackling practical problems.

Course contents

Unit- 1 Applied mathematics: Proportion: Direct proportion and inverse proportion, inverse square law with relevant examples, graphical representation of parameters that obey linear and exponential law: example of linear and semi log plotting. Electricity and Magnetism:

A.C. and D.C. power supply with examples, single phase and poly phase power supply,switches, fuses, circuit breakers, earthing etc. main voltage drop: causes andremedy, cables; low tension, high tension. DC circuit, Ohm's law, resistivity, series and parallel combination, EMF, Krichoffs law, heating effect of current, Ammeter, voltmeter, Galvanometer. Magnets and magnetic field,force on an electric currentin a magnetic field, force on electric charge movingin a magnetic field, magnetic field due to straight wire; force between two parallel wires, Ampere's law, electromagnet and solenoids.

Unit- 2: Rectification and Transformers: Thermionic emission; - variation of anode current with anode voltage and filament temperature; principle of rectification, wave form of half wave and

full wave current/voltage wave form; Rectifiers: Introduction, energy bands in solids, the semiconductor, p-type and n-type semiconductors, density of charge carriers and conductivity, p-n junction, p-n junction diode, p-n junction diode as rectifier (half- wave and full-wave rectifier), rectifiers relative merits and demerits; silicon, germanium diodes. Principles of transformer, Electromagnetic induction, transformer design, efficiency of transformer, source of power loss.

Unit 3: Electromagnetic radiation: Electromagnetic radiation spectrum, common properties of electromagnetic radiation;relationshipbetweenenergy,frequency,wavelengthandvelocity
e.g., X-rays and gamma rays. Properties of X-rays and gamma rays; General properties of X-rays, velocity, frequency etc., photographic effect, photochemical effect -discoloration of salts, heating effect, biological effect; ionization of gases e.g., air. Interaction of radiation with matter: Transmission through matter, law of exponential attenuation, half value layer, attenuation coefficients; interaction of radiation with matter, classical scattering, Compton scatter, photo electric absorption, pair production; practical aspects of radiation absorption and transmission through body tissues. Measurement of X-rays: Unit of quantity of radiation exposure- definition and application of 'roentgen', unit of quantity of radiation dose - definition and application of 'rad', 'gray' and 'rem';

Unit 4: Principle and application of ionizations chamber and ionization reader unit, film and densitometer, chemiluminescent dosimeter (TLD). X. Quality and quantity of X-rays: Specification andexplanation ofelectron volt (eV), kilovolt (kV) and half valuelayer (H.V.L) as an index of penetration of the radiation. 9. Basic radiation protection: Historical development, dose equivalent limit, international recommendations and current code of practice for the protection of radiation workersand the public againstionizingradiation arising from medical and dental use; protective materials, lead - impregnated substances; building materials, lead equivalents of protective, personal monitoring; film badge, pocketdosimeter TLD badges and their uses and relative merits.

Reference and Text Books-

Textbookofradiologyforresidentsandtechnicians- SKBhargava. Text book of radiation physics

Course Title: Conventional Radiography and equipment- Theory			
Semester: II	Coursecode:240/BMRIT/CC/204	Credits:03	DSC
No of sessions Lectures/Tutorial:45		Total Marks: 75	
Course Pre-requisites:		Timing: 3 Hours	

Instructions for paper setter: Examiner is requested to set **one compulsory and eight other questions, two from each unit.** The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

Course Objectives

The purpose of this course is to provide an understanding of physical concepts and underlying various technological applications. This course also provides fundamental idea about circuit analysis, working principles of machines. In addition, the course is expected to develop scientific temperament and analytical skill in students, to enable them logically tackle complex engineering problems in their chosen area of application.

Course learning Outcomes

CLO1- Able to know production of X-ray.

CLO2- Explain high tension circuits, meter and exposure timers.

CLO3-Able to know inter lockings ystems,control of scattered radiation.

CLO4-Able to know handling and mechanism of Fluoroscopy.

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day-to-day realworld applications. It will not only help students to understand the fundamentals of applied physics but also improve skills and techniques for tackling practical problems.

Course contents

Unit- 1: Production of x-rays: X-ray tube, gas filled x-ray tube, construction working and limitations; stationary anode x - ray tube; construction, working, methods of cooling the anode, rating chart and cooling chart; rotating anode x - ray tube: construction, working rating chart, speed of anode rotation, angle of anode inclination, dual focus and practical consideration in choice of focus, anode heel effect, grid controlled x - ray tube; effect of variation of anode voltage and filament temperature; continuous and characteristics spectrum of x - rays, inherent filter and added filter, their effect on quality of the spectrum.

Unit- 2: High tension circuits: H.T. generator for x-ray machines, three phase rectifier circuits, three phase six rectifier circuit, three phase 12 rectifier circuit, high and medium frequency circuits; capacitance filter control and stabilizing equipment; mains voltage compensator,mainsresistancecompensator, compensationforfrequencyvariation,controlof tube voltage, kV compensator; high tension selector switch, filament circuit, control of tube current, space charge compensation.

Unit 3: Control of scattered radiation: Beam limiting devices: cones, diaphragms, light beam collimator, beam centering device, methods to verify beamcentering and field alignment; grids; design and control of scattered radiation, grid ratio, grid cut-off, parallel grid, focusedgrid,crossed grid, gridedcassettes, stationary andmoving gridpotterbuckydiaphragms, various types of grid movements; single stroke movement, oscillatory movement and reciprocatory movement.

Unit 4: Fluoroscopy: Fluorescence and phosphorescence - description, fluorescent materials used in fluoroscopic screens, construction of fluoroscopic screen and related accessories, tilting table, dark adaptation. image intensifier - Construction and working, advantages over fluoroscopic device, principles and methods of visualizing intensified image, basic principles of closed-circuit television camera and picture tube. Vidicon camera, CCD. Automatic brightness control, automatic exposure control, chamber selection duringfluoroscopy. Serial radiography: Manual cassette changer, rapid automatic film changer, basic principles of cine fluoroscopy and angiography use of grid controlled x-ray tube.

Reference and Text Books-

Text book of radiology for residents and technicians-SKBhargava. Text

book of radiation physics.

www.wikiedia.co.in

PRACTICALS

Course Title: GENERAL PHYSIOLOGY-II- Practical	
Semester: II Coursecode: 240/BMRIT/CC/205	Credits:02 DSC
Numberofsessions:60	Total Marks: 50
Course Pre-requisites:	Time: 4 Hours

1. To study circulatory system from charts and transverse section (TS) of artery and vein from permanent slides.
2. To study digestive system from chart sand T S of liver, spleen and pancreas from permanent slides.
3. Study of Urinary system(charts)
4. Study of Genital system (male & female) from charts and TS of testis and ovary from permanent slides.
5. To study nervous system (From models /charts)
6. To study various body fluids.
7. Other practical based on the theory paper.

Course Title: Basic physics including radiological physics- Practical	
Semester: II Course code:	Credits:02 DSC
Number of sessions:60	Total Marks: 50
Course Pre-requisites:	Time: 4 Hours

PRACTICAL

- X-Raytubesandaccessories,generalfeatures.
- PortableX-RayEquipment
- Imageintensifier,itsfeatures,spot film.
- Radiationprotectiondevices
- Effects ofkVandmAs.
- MaintenanceofX-rayequipmentandaccessories.
- MammographyX-Raytube
- DentalX-Rayunit.

ReferenceandTextBooks-

Text book of radiation physics.

www.wikiedia.co.in

Course Title: Conventional Radiography and equipment- Practical		
Semester: IICoursecode:240/BMRIT/CC/207	Credits:02	DSC
Numberofsessions:60	Total Marks: 50	
CoursePre-requisites:	Time: 4 Hours	

Practical

1. Production of x-rays: X-ray tube
2. Gas filled x-ray tube, construction working and limitations; stationary anode x - ray tube; construction, working, methods of cooling the anode, rating chart and cooling chart
3. High and medium frequency circuits; capacitance filter control and stabilizing equipment; mains voltage compensator.
4. Meters and exposure timers
5. Fluoroscopy: Fluorescence and phosphorescence - description, fluorescent materials used in fluoroscopic screens, construction of fluoroscopic screen and related accessories, tilting table, dark adaptation.
6. Care and Maintenance of X-ray equipment;General care; functional tests; testing the performance of exposure timers. assessing the MA settings, testing the available KV.
7. Measurement of focal spot of an x-ray tube, testing the light beam diaphragm, practical precautions pertaining to Brakes and locks, H.T. cables, meters and controls, tube stands and tracks as well as accessory equipment.

ReferenceandTextBooks-

Text book of radiology for residents and technicians-SKBhargava. Text book of radiation physics

Course Title: General Anatomy-II- Practical		
Semester: II Course code: 240/BMRIT/MI/201	Credits:02	MIC
Numberofsessions:60	Total Marks: 50	
Course Pre-requisites:	Time: 4 Hours	

ANATOMYPRACTICAL

1) Identification and description of all anatomical structures.

2) Demonstration of dissected parts

3) Demonstration of skeleton-articulated and disarticulated.

4) Surface anatomy: Surface landmark-bony, muscular and ligamentous. Surface anatomy of major nerves, arteries of the limbs.

Reference books:

- Sampath Madhyastha's Manipal of anatomy for allied health sciences

- Krishna Garg & Madhu Joshi's Practical anatomy work book
- Jana's Exam Oriented Practical Anatomy

Course Title: Yoga- Practical	
Semester: IICourse code: 240/BMRIT/MD/201	**Credits:02MDC**
No of sessions Lectures/Tutorial:30	**Total Marks: 50**
Course Pre-requisites:	**Timing: 2 Hours**

Course Title: Personality development & Soft skills- Theory	
Semester: IICourse code: 240/BMRIT/AE/201	**Credits:02AEC**
No of sessions Lectures/Tutorial: 30	**Total Marks: 50**
Course Pre-requisites:	**Timing: 2 Hours**

Instructions for paper setter: Examiner is requested to set **one compulsory and eight other questions, two from each unit.** The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

Objective: Basic Manners, Social Etiquette, Behavior, Relations and professional Grooming are required for all the students to be complete in their life skills.
Outcome: The students should be able to emit the correct Personal and professional Behavior at all times.

Skills Imparted: Personal, Professional, Interpersonal and Life Skills

SYLLABUS
Unit 1
Introduction on Life Skills.
Definition Inter-personal Skills
Expectation Audit
Uses and Application
Unit 2
Personal Grooming
Personal Hygiene
Dress Up
Left Brain / Right Brain
Unit 3
Personal Relation
Family Values
Social Values
Civic Values
Unit 4
Professional Grooming
Interpersonal Skills
Customer Relations
Personal Brand Building
Unit 5

Professional Etiquette
Internet Tool Kit
Unit 6
Practical Assignments
Viva

CourseTitle:BasicinComputer&InformationScience- Practical		
Semester:ICoursecode:240/BMRIT/SE/201	Credits:02	SEC
Numberofsessions:60	Total Marks: 50	
CoursePre-requisites:	Timing: 4 Hours	

Practical:

- Introduction to computer: Introduction, characteristics of computer, computer languages.
- Input output devices
- Central Processing Unit
- Storage Device
- Operation with Window
    i. Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, spell
    ii. Checking, printing the document file, creating and editing of table, mail merge.
- Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.

- Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.

Course Title: Extracurricular Activity- Practical	
Semester: IICourse code: 240/BMRIT/VA/201	Credits:02VAC
No of sessions Lectures/Tutorial: 30	Total Marks: 50
Course Pre-requisites:	Timing: 2 Hours

Instructions for paper setter: examiner is requested to set one compulsory and eight other questions, two from each unit. The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

An **extracurricular activity (ECA)** or cultural activities is an activity, performed by students, that falls outside the realm of the normal curriculum of university education. Such activities are generally voluntary (as opposed to mandatory), social, philanthropic, and often involve others of the same age.

Course learning outcomes

After completing this course, the learner will be able to know/understand:

CLO1- Importance of extra-curricular activities

CLO2- Benefits extra-curricular activities

CLO3- Enhance personal growth of student.

CLO4- it will contribute to improved academic performance

Course Contents

Unit I

Co-curricular and extra-curricular activities, importance of extracurricular activities

Unit II

The role of extracurricular activities in student development, benefits of extracurricular activities, best practices for implementing extracurricular activities

Unit III

Participation in extra-curricular activities. Advantages of participation, disadvantages of participation, requirements for activity participation, guidelines for dual-sport participation

Unit IV

Outcome of extracurricular activities

CourseTitle: **Yoga and meditation**			
Semester:II	**Coursecode:BMRIT 210T**	**Credits:02**	**Core**
Numberofsessions: 20		**Total Marks: 70**	
CoursePre-requisites:		**Timing: 3 Hours**	

Instructions for paper setter: Examiner is requested to set **one compulsory and eight other questions, two from each unit.** The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

CourselearningOutcomes

After completing this course, the learner will be able to know/understand:

CLO1- The basic concepts of yoga system

CLO2- The basic concept of mediation

CLO3- The basic steps of asana

CLO4- The relevance of yoga philosophy

Coursecontents

Unit I

Meaning, definition and nature of yoga

Chitta, cittavratti,and chittabhumi.

Unit II

Type of yoga: karma yoga, gyana yoga, bhakti yoga

Unit III

Astanga Yoga(yam, niyama,aasan, pranayam, pratyaahar, dharna, dhayan and samadhi)

Unit IV

Method, precautions and merit of the following Asana: Vajrasana: sirshasana: Makarasana: Bhujangasana etc.

FOURTH SEMESTER

Syllabus

Course Title: Physics of newer imaging modalities- Theory	
Semester:IVCoursecode:240/BMRIT/CC/401	Credits:04 DSC
No of sessions Lectures/Tutorial:60	Total Marks: 100
Course Pre-requisites:	Timing: 4 Hours

Instructions for paper setter: Examiner is requested to set **one compulsory and eight other questions, two from each unit.** The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

Course Objectives

This course is designed to provide the students the basic knowledge in Radiography with using newer modalities of radiology. At the end of the course, the student should be able to know about ultrasonography Computed Tomography, Generation of CT Scanner, Magnetic resonance imaging, fusion imaging PET, Contrast media using, handling and teleradiology.

Course learning Outcomes

CLO1 Able to know Computed Tomography its principle, various generations and advancements

CLO2. Able to know Magnetic Resonance Imaging- its principle, advancements and applications.

CLO3. Explain and able to know Ultrasonography, Color Doppler- its principle, advancements and applications. Digital Radiography and Digital subtraction angiography equipment- principle, advancements and applications.

CLO4. Able to know Fusion Imaging including PET-CT, PET- MRI. Digital Mammography, DEXA equipment- principle, advancements and applications.

CLO 5 Able to know teleradiology HIS, RIS and PACS, Image processing in digital radiography systems; Post processing techniques in console using CR, DR and flatpanel fluoroscopy systems

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day-to-day realworld applications. It will not only help students to understand the fundamentals of physics of mammography and CT scan/ultrasound/ PACSbut also improve skills and techniques for tackling practical problems.

Course Contents

Unit- 1 -Basic principle of CT scan, history of CT scan, EMI, advantages and disadvantages, Equipment description.

-Scanning principle, Image acquisition, Image reconstruction, Image manipulation, Image display and documentation, Scanning parameters. Advantages and disadvantages

Unit-2- History of MRI, Magnetism, Basic Principle, hardware etc, Types of Contrast agents used in MRI. Physical and physiological basis of magnetic relaxation, Image contrastand noise, Spin Echo, Inversion Recovery.

Unit-3 Applications and Apparatus for nuclear medicine, Application, Function and instrumentation. Definition, Applications, Clinical uses, advantages & disadvantages of PET- CT. Definition, Applications, Clinical uses, advantages & disadvantages of PET-MRI

Unit -4 Benefits vs risk or PET-CT and PET-MRI. Characteristics and half-life of Radionuclides Commonly used Radionuclides. Routine protocols Indication and contraindications ofPET. Patient preparation technique in PET Scan.

Books Recommended-

Clark's R

Radiography- Clark/ Text book of radiology for residents and technicians- SKBhargava Radiographic positioning- Garkal

Radiology- Specialinvestigation-Champman.

CT made Easy

www.wikiQedia.co.in

www.radioQedia.co.in

Course Title: Clinical Radiography Positioning-II- Theory	
Semester:IVCoursecode:240/BMRIT/CC/402	Credits:04 DSC
No of sessions Lectures/Tutorial:60	Total Marks: 100
Course Pre-requisites:	Timing: 4 Hours

Instructions for paper setter: Examiner is requested to set **one compulsory and eight other questions, two from each unit.** The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

Course Objectives

This course is designed to provide the students the basic knowledge in Radiography. Atthe end of the course, the student should be able to:

Course Learning Outcomes

CLO I- Explain the roleof radiographer and positioning ofvarious bodyparts, normal functioning of various organ systems of the body and their interactions.

CLO 2- Elucidatetheradiologicalaspects ofnormalgrowthanddevelopment.

CLO 3- Describethepatientresponseandadaptationstoenvironmentalstresses.

Course Pedagogy

Thecourse pedagogy includes acomprehensive studyincluding thestudyof gerieral structures and the specializedorgans in a manner aimed at being student friendly. Various clinical aspects are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, chart and poster making andmodel making aresome of themeasures for learning.Periodic and surprise tests aretaken to apprise and evaluate the students. They are taught on simulators for a live feeling. The practical includes the study of structures through mannequins which helps in holding the interest of the students.

Course contents-

Unit- 1: Radiography technique comprising of the complete. Radiography of Skull and Radiography of cranial bones; including special techniques for sella turcica, orbits,optic foramina, superior orbital fissure and inferior orbital fissure etc. Facial bones; Paranasal sinuses, Temporal bone and Mastoids. Dental Radiography: Radiography of teeth-intra oral,extra oral and occlusal view.

Unit -2: Abdomen: Preparation of patient. General abdominal radiography and positioning for fluid and air levels. Plain film examination. Radiography of female abdomen to look for pregnancy. Radiography in case of acute abdomen. Macro radiography: Principle, advantage, technique and applications. Stereography -Procedure -presentation, for viewing, stereoscopes.

Unit- 3: Localization of foreign bodies. Various techniques Ward /mobile radiography - electrical supply, radiation protection, equipment and instructions to be followed for portable/ward radiography.

Unit- 4: 0perationtheatre techniques: General precautions,Asepsisin techniques- Checking of mains supply and functions of equipment, selection of exposure factors, explosion risk, radiation protection and rapid processing techniques. Trauma radiography/Emergency radiography. Neonatal and Pediatric Radiography, Tomography and Tomosynthesis Dualenergy X-ray absorptiometry. Forensic Radiography

Books Recommended-

Clark's Radiography-Clark/ Text book of radiology for residents and technicians- s kbhargava

Radiographic positioning- Garkal

Radiology- Special investigation-champman.

www.wikipedia.eo.in//www.radiopedia.eo.in

Course Title: Newer Modalities Imaging Techniques including patient care- Theory	
Semester:IVCoursecode:240/BMRIT/CC/403	Credits:04 DSC
No of sessions Lectures/Tutorial:60	Total Marks: 100
Course Pre-requisites:	Timing: 4 Hours

Instructions for paper setter: Examiner is requested to set **one compulsory and eight other questions, two from each unit.** The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

Course Objectives

This course is designed to provide the students the basic knowledge in Radiography with patient care and code of ethics. At the end of the course, the student should be able to

Course Learning Outcomes

CLO 1- Understood about Introduction to hospital staffing and medical records and documentation.

CLO 2-Must know about Legal issues and Professional ethics.

CLO 3-HowtohandleandmustknowDepartmentalSafetyandInfection control

CLO 4-UnderstoodBodymechanicsandtransferringofpatient

Course Contents-

Unit- I: Interventional Radiography: Basic angiography and DSA: a. History, technique, patient careb. Percutaneous catheterization, catheterizationsites ,Asepsisc. Guidewire, catheters, pressure injectors, accessoriesd. Use of digital subtraction-single plane and bi-planeAll forms of diagnostic procedures including angiography, angioplasty, biliary examination, renal evaluation and drainage procedure. Central Nervous System: a. Myelography b. Cerebral studies c. Ventriculography Arthrography: Shoulder, Hip, Knee, Elbow 4. Angiography: a. Carotid Angiography (4 Vessel angiography) b. Thoracic and Arch Aortography c. Selective studies: Renal, SMA, Coeliac axis d. Vertebral angiography e. Femoral arteriography f. Angiocardiography Venography: a. Peripheral venography b. Cerebral venography c. Inferior and superior venocavography d. Relevant visceral phlebography 6. Cardiac catheterization procedures: PTCA, BMV, CAG, Pacemaker, Electrophysiology,

Unit- 2: Microbiology 1. Introduction and morphology - Introduction of microbiology, Classificationof microorganisms, size, shape and structure of bacteria. Useof microscope inthe study of bacteria.2. Growth and nutrition -nutrition, culture media, types of medium with example and uses of culture media in diagnostic bacteriology, antimicrobial sensitivity test Sterilization and disinfection principles and use of

equipments of sterilization namely hot air oven, autoclave and serum inspissation, pasteurization,anti-septic and disinfectants. Introduction to immunology, bacteriology, parasitology,mycology.

Unit-3: Hospitalprocedure:Hospitalstaffingandorganization;recordsrelatingto patient members of the staff; medico- legal aspects; accidents in the departments, appointments, organization; minimizing waiting time; out-patient and follow-up clinics; stock-taking and stock keeping. Care of the patient : FIRST contact with patients in the department; management of chair andstretcher patients andaidsforthis,management oftheunconscious patient; elementary hygiene; personal cleanliness; hygiene in relation to patients (for example clean linen and receptacles, nursing care; temperature pulse and respiration;essential care of the patientwho has a tracheostomy; essential care of the patient who has a colostomy; bedpans and urinals; simple application of a sterile dressing.

Unit- 4 First aid: Aims and objectives of first aid; wounds and bleeding, dressing and bandages; pressure and splints, supports etc. Shock; insensibility; asphyxia; convulsions; resuscitation, use of suction apparatus, drug reactions; prophylactic measures; administration of oxygen; electric shock; bums; scalds; hemorrhage; pressure points; compression band. Fractures; splints, bandaging; dressing, foreign bodies; poisons. 4. Infection: Bacteria, their nature and appearance; spread of infections; auto-infection or cross-infection; the inflammatory process; local tissue reaction, general body reaction; ulceration; asepsis and antisepsis. Universal precautions, hospital acquired infections- HIV, Hepatitis B, C, and MRSA etc. 5. Principles of asepsis: Sterilization - methods of sterilization; use of central sterile supply department; care of identification of instruments, surgical dressings in common use, including filamented swabs, elementary operating theatre procedure; setting of trays and trolleys in the radio imaging department (for study by radio imaging students only) 6.Departmental procedures: Department staffing and organisations; records relating to patients and departmental statistics; professional attitudes of the technologist to patients and other members of the staff, medico-legal aspects accidents in the department.

Books Recommended-

Clark's Radiography-Clark/ Text book of radiology for residents and technicians - s kbhargava

Radiographic positioning- Garkal

Radiology- Specialinvestigation-champman.

www.wikiQedia.co.in

www.radioQedia.co.in

Course Title: Quality control in radiology and radiation safety- Theory		
Semester: IVCoursecode:240/BMRIT/CC/404	Credits:04	DSC
No of sessions Lectures/Tutorial:60	Total Marks: 100	
Course Pre-requisites:	Timing: 4 Hours	

Instructions for paper setter: Examiner is requested to set **one compulsory and eight other questions, two from each unit.** The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

Course Objectives

ThiscourseisdesignedtoprovidethestudentsthebasicknowledgeinRadiography.At the end of the course, the student should be able to:

1-Radiation protection

2-Biological effects of radiation

3-Planning of radiation installation-protection primary &secondary radiation

4-Personnel monitoring systems

Course learning Outcomes

CLO I- Enumerate the guidelines of all respective organization. Enumerate the risk and effects of the radiation.

CLO2-Label& demonstrate how to use and care of all types of lead aprons

CLO3-DemonstratethehandlingandhowtouseTLD'sandbadgesasperguidelines

Course contents

Unit- 1: ObjectivesofqualityControl: Improve the quality of imaging there by increasing the diagnostic value; to reduce the radiation exposure; Reduction of film wastage and repeat examination; to maintain the various diagnostic and imaging units at their optimal performance. Quality assurance activities: Equipment selection phase; Equipment installation and acceptance phase; Operational phase; Preventive maintenance. Quality assurance programme at the radiological faculty level: Responsibility; Purchase; Specifications; Acceptance; Routine testing; Evaluation of results of routine testing;Quality assurance practical exercise in the X ray generator and tube; Image receptors fromprocessing; Radiographic equipment; Fluoroscopic equipment; Mammographic equipment; Conventional tomography; Computed tomography; Film processing, manual and automatic; Consideration for storage of film and chemicals; Faults tracing; Accuracy of imaging- image distortion for digital imaging devices. LASER printer calibration

Unit- 2:

Radiation safety in diagnostic Radiology 1. Radiation Quantities and Units: Radiation- Radioactivity- Sources of radiation - natural radioactive sources -cosmic rays' terrestrial radiation - -man made radiation sources. Units of radiation - Quality factor -Flux- Fluence-

Kerma- Exposure- Absorbed dose- Equivalent Dose- Weighting Factors-Effective Dose - Occupational Exposure Limits - Dose limits to public.

Unit- 3: Biological Effects of radiation: Ionization, excitation and free radical formation, hydrolysis of water, action of radiation on cell-Chromosomal aberration and its application for the biological dosimetry- Effects of whole body and acute irradiation, dose fractionation, effects of ionizing radiation on each of major organ system including fetus - Somatic effects and hereditary effects- stochastic and deterministic effects-Acute exposure and chronic exposure-LOSO - factors affecting radio sensitivity. Biological effects of non-ionizing radiation like ultrasound, lasers, IR, UV and magnetic fields.Radiation detection and Measurements: Ionization of gases- Fluorescence and Phosphorescence -Effects on photographic emulsion. Ionization Chambers - proportional counters- G.M counters-scintillation detectors -liquid semiconductor detectors -Gamma ray spectrometer. Measuringsystems -free airionizationchamber -thimbleion chamber -condenser chamber - Secondary standard dosimeters - film dosimeter - chemical dosimeter- Thermoluminescent Dosimeter.-Pocketdosimeter Radiation survey meter-wide range survey meter -zone monitor-contamination monitor their principle function and uses. Advantages &disadvantages of various detectors & itsappropriatenessof different detectors for different type of radiation measurement. Dose and Dosimetry, CT Dose Index (CTDI, etc.), Multiple Scan Average Dose (MSAD), Dose Length Product (DLP),Dose Profile, Effective Dose, Phantom MeasurementMethods, Dose for DifferentApplicationProtocols.

4. Radiation protection: Radiation protection of self and patient- Principles of radiation protection, time - distance and shielding, shielding - calculation and radiation survey - ALARA- personnel dosimeters (TLD and film batches) occupational exposure.

Radiation Hazard evaluation and control: Philosophy of Radiation protection, effects of time, Distance & Shielding. Calculation of Work load, weekly calculated dose to radiation worker & General public good work practice in Diagnostic Radiology. Planning consideration for radiology, including Use factor, occupancy factors, and different shielding material.

Unit- 4 First aid: Aims and objectives of first aid; wounds and bleeding, dressing and bandages; pressure and splints, supports etc. Shock; insensibility; asphyxia; convulsions; resuscitation, use of suction apparatus, drug reactions; prophylactic measures; administration of oxygen; electricshock; bums;scalds; hemorrhage; pressure points; compression band.Fractures; splints, bandaging; dressing, foreign bodies; poisons. 4. Infection: Bacteria, their nature and appearance; spread of infections; auto-infection or cross-infection; the inflammatory process; local tissue reaction, general body reaction; ulceration; asepsis and antisepsis. Universal precautions, hospital acquired infections- HIV, Hepatitis B, C, and MRSAetc. 5. Principles of asepsis: Sterilization - methods of sterilization; use of central sterile supply department; care of identification of instruments, surgical dressings in common use, including filamented swabs, elementary operating theatre procedure; setting of trays and trolleys in the radio imaging department (for study by radio imaging students only) 6.Departmental procedures: Department staffing and organisations; records relating to patients and departmental statistics; professional attitudes of the technologist to patients and other members of the staff, medico-legal aspects accidents in the department.

Books Recommended-

Clark's Radiography-Clark/ Text book of radiology for residents and technicians- s kbhargava

Radiographic positioning- Garkal

Radiology- Specialinvestigation-champman.

www.wikiQed a.co.in

www.radioQedia.co.in

Course Title: Physics of newer imaging modalities- Practical		
Semester:IVCoursecode:240/BMRIT/CC/405	Credits:02	DSC
Number of Session: 60	Total Marks: 50	
Course Pre-requisites:	Timing: 4 Hours	

Practical

1. Basic principle of CT scan.
2. EMI, advantages and disadvantages, Equipment's.
3. Applications and Apparatus for nuclear medicine, Application, Function and instrumentation.
4. Applications, Clinical uses, advantages & disadvantages of PET- CT.
5. Applications, Clinical uses, advantages & disadvantages of PET-MRI

Course Title: Clinical Radiography Positioning-II- Practical		
Semester:IVCoursecode:240/BMRIT/CC/406	Credits:02	DSC
Number of Session:60	Total Marks: 50	
Course Pre-requisites:	Timing: 4 Hours	

Practical

a. Allviewsandtechniques Abdomen:Gastro-intestinal tract, urinary tract
b. Skeletal Survey.

Books Recommended-

Clark's Radiography-Clark/ Text book of radiology for residents and technicians- s kbhargava Radiographic positioning-Garkal

Radiology- Special investigation-champman. www.wikipedia.eo.in//www.radiopedia.eo.in

CourseTitle:NewerModalitiesImagingTechniquesincludingpatientcare- Practical	
Semester:IVCoursecode:240/BMRIT/CC/407	Credits:02 DSC
Number of Session:60	Total Marks: 50
Course Pre-requisites:	Timing: 4 Hours

PRACTICAL

Newer Modalities Imaging Techniques including patient care

1. Medicalrecords anddocumentation
2. Legalissuesinradiologydepartment,PNDTAct
3. Professionalethics andCodeofconductofradiographer
4. Handlingofpatients:Seriouslyillandtraumatizedpatients,visuallyimpaired,hearing and speech impaired patients, mentally impaired patients, infectious patients
5. DepartmentalSafety
6. Infectioncontrol:skincare,donningofgowns,gloves,facemasks,headcaps,shoe covers.
7. Vitalssigns
8. Bodymechanicsandtransferringofpatient,drawsheetlift,useofslideboards, wheelchair to couch, couch to wheelchair, couch totable, threemenlift and four menlift.
9. Localanesthesia andgeneralanesthesia
10. Facilitiesregarding generalAnesthesiaintheX-raydepartment
11. Managementofadversereactionstocontrastmedia

BooksRecommended-

Clark's Radiography-Clark/ Text book of radiology for residents and technicians- S KBhargava

Radiographic positioning- Garkal

Radiology- Specialinvestigation-Champman.

www.wikiQedia.co.in

www.radioQedia.co.in

Course Title: Quality control in radiology and radiation safety- Practical		
Semester: IVCoursecode:240/BMRIT/CC/408	Credits:02	DSC
Number of Session:60	Total Marks: 50	
Course Pre-requisites:	Timing: 4 Hours	

PRACTICAL

1) Knowledge of all hazards, education of general Public by posters and seminars
2) Safety of women and children, pregnant women, safety of patient attendants, radiation workers and hospital staff, checking of lead aprons, leakage radiation from tube head, radiation survey in and around X-ray installation.
3) UseofTLDfilmbadges,GMcounters,Scintillationdetectors,Liquidscintillator, Pocket dosimeters and use of protective devices etc. Keeping of dose records of radiation workers, steps after high exposure report and investigations.
4) Biologicaleffectsofradiation-Thecelleffectofionizingradiationoncell.
5) Somaticeffectsandhereditary effect.Stochasticanddeterministic effect.

BooksRecommended-

Clark's Radiography- Clark/ Text book of radiology for residents and technicians- s kbhargava

Radiographic positioning- Garkal

Radiology-Specialinvestigation-champman.

www.wikipedia.co.in//www.radiopedia.co.in

Course Title: Environmental Science- Theory	
Semester:IVCoursecode:240/BMRIT/VA/401	Credits:02 VAC
No of sessions Lectures/Tutorial:60	Total Marks: 100
Course Pre-requisites:	Timing: 4 Hours

Instructions for paper setter: Examiner is requested to set **one compulsory and eight other questions, two from each unit.** The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

Course Objectives

The broad objectives of this courseare

- Togainanunderstandingoftheconceptsfundamentaltoenvironmentalscience
- Tounderstandthecomplexityofecosystemsandpossiblyhowtosustainthem
- Tounderstandtherelationshipsbetweenhumansandtheenvironment.
- Tounderstandmajor environmentalproblemsincludingtheircausesandconsequences.

Course outcome- The student will be made aware of our environment in general, Natural Resources, Ecosystems, Environmental Pollution, and social issues related to environment, Human Population and the Environment and understanding the Hospital Environment.

CourseContents

Theclasswouldmeettwiceina weekforaperiodof10weeksapprox.

Unit1.Introduction

Definitionandscopeand importance ofmultidisciplinarynatureof environment. Needfor public awareness.
Natural Resources and associated problems, use and over exploitation, case studies of forest resources and water resources.

Unit 2.Ecosystems

ConceptofEcosystem,Structure,interrelationship,producers,consumersanddecomposers, ecological pyramids-biodiversityand importance. Hotspots of biodiversity

Unit3.EnvironmentalPollution

Definition, Causes, effects andcontrol measures ofair pollution, Water pollution, Soilpollution, Marine pollution, Noisepollution, Thermal pollution, nuclear hazards, Solid waste management: Causes, effects and control measure of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies, Disaster management: Floods, earthquake, cyclone and landslides.

Unit4.SocialblemishesandtheEnvironment

From Unsustainable to Sustainable development, urban problems related to energy, Water conservation, rain water harvesting, water shed management Resettlement and rehabilitationof people; its pros and concerns. Case studies, Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Casestudies, Wasteland reclamation, Consumerism andwaste products. Environment Protection Act, Air (Prevention and Control of Pollution) Act. Water (Prevention and control of pollution) Act.Wildlife Protection Act,Forest Conservation Act,Issues involved inenforcement of environmentallegislation Public awareness.
Human Population and the Environment, Population growth, variation among nations.Population explosion-Family Welfare Programme. Environment and human health, Human Rights, Value Education, HIV/AIDS. Women and child Welfare. Role of Information Technology in Environment and human health. Case studies.UnderstandingtheHospitalEnvironment

ReferenceBooks:

Reference1: Jadhav, H &Bhosale, V.M., 1995. EnvironmentalProtection and Laws. Himalaya Pub. House, New Delhi.

Reference 2: Gadi R..Rattan, S., 2006. EnvironmentalStudies, KATSON Books, New Delhi.

Reference3:McKinney,M.L.&School,R.M.,1996.EnvironmentalScienceSystems& Solutions, Web enhanced edition.

Papers:

- Beckerman, W. (1992). Economic growth and the environment: Whose growth? Whose environment? *World Development, 20(4),* 481-496.
- Lorente, D.B., Shahbaz, M., Roubaud, D., Farhani, S. (2018) How economic growth, renewable electricity and natural resources contribute to CO2 emissions? *Energy Policy, 113(C), 356-367.*
- Kumar Reddy D.H., Lee S.M. (2012) Water Pollution and Treatment Technologies, *J Environ Anal Toxicol, 2(5)* el 03.

Syllabus

Course Title: Quality assurance & radiation safety- Theory	
Semester :VICoursecode:240/BMRIT/CC/601	Credits:04 DSC
No of sessions Lectures/ Tutorial: 60	Total Marks: 100
Course Pre-requisites:	Timing: 4 Hours

Instructions for paper setter: Examiner is requested to set **one compulsory and eight other questions, two from each unit.** The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

COURSEOBJECTIVES-

AERB safety code and ethics

Patient protection- Safe work practice in diagnostic radiology-

Radiation emergencies- situation handling.

Course learning outcomes-

CLO1- Enumerate howtoworkasperttheAERBsafetyguidelineinclinical setup.

CLO2-Demonstrateradiationprotectionandpatient care

CLO3-Enumerateradiationemergencies&radiationprotectionandpatientcare

Course contents

Unit 1: Quality Assurance and quality control of Modem Radiological and Imaging Equipment which includes Digital Radiography, Computed Radiography, CT scan, MRI Scan, Ultrasonography and PACS related.

Unit 2: Image artifacts their different types, causes and remedies, Newer Radiation safety protocols and recent advances inradiation safety including AERB guidelines

Unit-3: National & international agencies, AERB, BARC, ICRP, WHO, IAEA and their role.

Unit-4; 4AERB safety code and ethics: Built in safety specifications for diagnostic x-ray, fluoroscopy and CT units, Specifications for radiation protection devices-room layout. Operational safety-Radiation protection programme- Personnel requirements and responsibilities-regulatorycontrols.

Radiation emergencies- situation handling, safety and prevention-legal requirements recent developments in radiation safety related topics.

BooksRecommended-

Textbookofradiologyforresidentsandtechnicians-s k Bhargava

www.wikioedia.co.in//www.radiooedia.co.in

Course Title: Hospital Practice and care of patients-Theory		
Semester: VI Coursecode:240/BMRIT/CC/602	Credits:04	DSC
No of sessions Lectures/Tutorial:60	Total Marks: 100	
Course Pre-requisites:	Timing: 4 Hours	

Instructions for paper setter: Examiner is requested to set **one compulsory and eight other questions, two from each unit.** The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

COURSEOBJECTIVES-

Thiscourseisdesignedtoprovidethestudentsthebasicknowledgeinradiography.At the endofthe course, the student should be able to-

Course learning Outcomes-

CLOl Introductiontohospitalstaffing,medicalrecordsanddocumentation

CLO 2 Understood the Legal issues, Professional ethics.**CLO**

3Must knowDepartmental Safetyand Infection control **CLO** 4

Body mechanics and transferring of patient

CoursePedagogy

The course pedagogy includes a comprehensivestudy including the study of general structuresand the specialized organs ina manner aimed at being student friendly.Various clinical aspects are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, chart and poster making and model makingare some of the measuresfor learning. Periodicand surprise tests are taken to apprise and evaluatethe students.They aretaught onsimulators for a live feeling. Thepractical includes thestudy ofstructures through mannequinswhich helps in holding theinterest of thestudents.

Coursecontents

Unit 1: Hospital staffing and administration, records, professional, ethics, co-operation with other staff and departments, Departmental organizations. Handling of the patients, seriously ill and traumatized patients, visually impaired, speech and hearing impaired, mentally impaired, drug addicts and non-English speaking patients. Understanding patient needs - patient dignity of inpatient and out patients. Interaction with the patient's relativesand visitors.

Unit2; Methods of effective communication- verbal skills, body language, professional appearance, visual contact etc. Elementary personal and departmental hygiene, dealing with receptacles, bed pans and urinal etc. General preliminaries to the exam.

Unit 3: Moving chair and stretcher, patient. Unconscious patient, general comfort and reassuranceforthepatient.Vitalsignsandoxygen-patient'sHaemostasiasstatus.Body andlines.

Unit4: First aid - shock, electrical shock, hemorrhage, bums, Asphyxia, fractures,loss of consciousness. Emergency treatment to the collapsed patient. Artificial respirationand resuscitation. Preparation of patient for general and special radiological examinations. Supervision of patients undergoing special examination.Administration of drugs andcontrast media. Aseptic and sterile procedures. Handling of infections patients in the department or in the ward. Regulation of dangerous drugs. Trolley set up for special x-ray examinations. Radiation hazardous and protective measures.

CourseReferences

1) PRAshalatha&GDeepa's TextbookofANATOMY&PHYSIOLOGY
2) NGeetha's Textbookofphysiology

ReferenceBooks:

3)CCChatterjee'sHumanPhysiology
4) CCChatterjee'sPracticalPhysiologyforParamedicalCourses
5)CNChandrashekhar's ManipalManualofMedicalPhysiology
6)RKMaurya'sMedicalPhysiology

Course Title: RESEARCH METHODOLOGY & BIOSTATISTICS-I- Theory	
Semester: VI Coursecode:240/BMRIT/CC/603	Credits:04 DSC
No of sessions Lectures/Tutorial: 60	Total Marks: 100
Course Pre-requisites:	Timing: 4 Hours

Instructions for paper setter: Examiner is requested to set **one compulsory and eight other questions, two from each unit.** The compulsory question should be of 14 marks and should cover entire syllabus. Student should attempt four other questions i.e. one from each unit.

CourseIntroduction

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amountof evidence suggests that the benefits of AHPsrange from improving accessto healthcare services to significant reduction in the cost of care, though the Indian healthcare system still revolves around thedoctor-centricapproach. The privatization of healthcare hasalso ledto anever-increasingout-of-pocketexpenditure bythepopulation. However, many examples assert theneed of skilled allied and healthcare professionals in thesystem, such as in the caseof stroke survivors, itisthesupport ofAHPs that significantly enhance their rehabilitationandlong-term treatment ensures return to normal life.The basic knowledge of research methodology will help them in their chosen profession and will beof immense use in the same.

CourseObjectives:

This course isdesigned to provide thestudents thebasic knowledge inresearch process and Bio-statistics.At the conclusion of the course, the students willhave the knowledge of data collection, statistical application andfinally, presentation ofthestatistical data.Thefirst part

shall be conducted insecond semester and second part shall becovered inthird semester

CourseLearning Outcomes:

Uponsuccessfulcompletionofthecourse, thestudents shouldbeableto:

CLOI: Understandtheneedsof researchinclinicalfieldofRadiology.

CLO2: Understandthedifferencebetweenthevarioustypesofresearchmethodologies.

CLO3: Understandthevarioustypesofdatacollectingmethods.

CLO4: Understandand learnaboutthe knowledgeofresearchtobeusedinclinicalareas.

CoursePedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening theirconceptualfound to applyingtheknowledgegainedtodifferentday-to-dayrealworld applications. It will not only help students to understand the fundamentals of applied physics but also improve skills and techniques for tackling practical problems.

Coursecontents

Unit 1: Need for Research in the field of cardiology. Introduction to research methods, conducting a literature review, Research design, Sampling methods, Data collection and data collection tools,

Unit 2: Data analysis: Quantitative and Qualitatively, Public health research, Issues in Research of research problems and writing research questions, Hypothesis, Null and Research Hypothesis, Type I and Type II errors in hypothesis testing

Unit 3: Introduction of epidemiology, Descriptive epidemiology, Experimental and non-experimental research designs, Screening, Sampling methods, biological variability, normal distribution

Unit 4: Bias and Confounding, Association and causation, Odds ratio and relative risk, sensitivity and specificity Data collection methods- Observation method, Interview method, Questionnaires and schedules Construction.

CourseReferences

1. ResearchMethodology:Kothari
2. MethodsinBiostatisticsbyB.K Mahajan
3. ProbabilityandStatisticsby Murray
4. ResearchMethodologybyS Mirani

PRACTICALS

CourseTitle:Qualityassurance&radiationsafety- Practical		
Semester:VICoursecode:240/BMRIT/CC/604	Credits:03	DSC
NumberofSession:90	Total Marks: 75	
CoursePre-requisites:	Timing: 6 Hours	

Practical

1. Quality Assurance and quality control of Modem Radiological and Imaging Equipment which includes Digital Radiography, Computed Radiography, CT scan, MRI Scan, Ultrasonography and PACS related.
2. Image artifacts their different types, causes and remedies.
3. Built in safety specifications for diagnostic x-ray, fluoroscopy and CT units, Specifications for radiation protection devices-room layout.
4. Operational safety-Radiation protection programmed, Personnel requirements and responsibilities-regulatorycontrols.
5. Radiation emergencies- situation handling, safety and prevention-legal requirements recent developments in radiation safety related topics.

BooksRecommended-

Textbookofradiologyforresidentsandtechnicians-s k bhargava

CourseTitle:HospitalPracticeandPatient Care-Practical		
Semester:VICoursecode:240/BMRIT/CC/605	Credits:03	DSC
NumberofSession:90	Total Marks: 75	
CoursePre-requisites:	Timing: 6 Hours	

PRACTICAL

Medicalrecordsanddocumentation

Legal issues in radiology department, PNDT Act Professional ethicsandCodeofconduct ofradiographer

Handling of patients:Seriously ill andtraumatizedpatients,visuallyimpaired,hearingand speech impaired patients, mentally impaired patients, infectious patients

DepartmentalSafety

Infectioncontrol: skincare,donningofgowns, gloves,facemasks, headcaps,shoecovers. Vitals signs

Bodymechanics and transferring of patient,draw sheet lift,useofslideboards, wheelchair to couch, couch to wheelchair, couch to table, three men lift and four men lift.

Firstaid:artificialrespiration,haemostasias

Local anesthesia and general anesthesia

FacilitiesregardinggeneralAnesthesiaintheX-raydepartment

Management of a1verse reactions to contrast media

CourseReferences

1) PRAshalatha&GDeepa's TextbookofANATOMY&PHYSIOLOGY
2) NGeetha's Textbookofphysiology

ReferenceBooks:

3)CCChatterjee'sHumanPhysiology
4) CCChatterjee'sPracticalPhysiologyforParamedicalCourses
5)CNChandra shekhar's ManipalManualofMedicalPhysiology
6)RKMaurya'sMedicalPhysiology

CourseTitle:Workshop- Theory	
Semester:VICoursecode:240/BMRIT/MI/601	Credits:01MIC/VOC
NoofsessionsLectures/Tutorial:	Total Marks: 25
CoursePre-requisites:	Timing:

CourseTitle:Project Work- Practical	
Semester:VICoursecode:240/BMRIT/SE/601	Credits:04 SEC
NoofsessionsLectures/Tutorial:100 Hrs. total	Total Marks: 100
CoursePre-requisites:	Timing: 100 Hours

PROJECTREPORT

Students have to carry out a research project (on any topic related to radiology) under the supervision of a faculty. The project report has to be prepared on the basis of the research work carried out. Theassessment is done onthebasis of thework done and the presentation and viva.