

**Curriculum and Credit Framework  
As per NEP 2020**

**For**

**Bachelor in Medical Radiological & Imaging Technology (BMRIT)**

**(To be effective from the Academic Session 2023-24)**



**Faculty of Life Sciences  
Gurugram University, Gurugram  
(A State Govt. University Established Under Haryana Act 17 Of 2017)**

Dr. Anil Kumar	Dr. Anand Kumar	Dr. Anand Kumar	Dr. Anand Kumar



**Scheme of Programme**

**Semester 1**

Course Code	Course Title	Course ID	L	T	P	Credits	TE	TI	PE	PI	Total
<b>Discipline Specific Courses (DSC)</b>											
240/BMRIT/CC/101	GeneralAnatomy-I-Theory		2	1	-	3	50	25	-	-	75
240/BMRIT/CC/102	GeneralPhysiology-I- Theory		2	1	-	3	50	25	-	-	75
240/BMRIT/CC/103	AppliedPhysics- Theory		3	-	-	3	50	25	-	-	75
240/BMRIT/CC/104	ImageAcquisition,Processing& Achieving- Theory		3	-	-	3	50	25	-	-	75
240/BMRIT/CC/105	GeneralAnatomy-I- Practical		-	-	4	2	-	-	35	15	50
240/BMRIT/CC/106	GeneralPhysiology-I- Practical		-	-	4	2	-	-	35	15	50
240/BMRIT/CC/107	AppliedPhysics- Practical		-	-	4	2	-	-	35	15	50
<b>Minor (MIC) / Vocational Courses (VOC)</b>											
240/BMRIT/MI/101	Introduction toQuality And patient Safety- Theory		3			3	50	25	-	-	75
<b>Multidisciplinary courses(MDC)</b>											
240/BMRIT/MD/101	Music and Dancing- Theory		2			2	35	15	-	-	50
<b>Ability Enhancement Courses (AEC)</b>											
240/BMRIT/AE/101	English&CommunicationSkill- Theory		2			2	35	15	-	-	50
<b>Skill Enhancement Course (SEC)/ Internship/Dissertation</b>											
240/BMRIT/SE/101	BasicinComputer& InformationScience- Theory		3			3	50	25	-	-	75
<b>Value Addition Course(s)</b>											
240/BMRIT/VA/101	Digital Marketing		2			2	35	15	-	-	50
<b>Total Credits</b>						30	<b>Total Marks</b>			750	



Semester 3

Course Code	Course Title	Course ID	L	T	P	Credits	TE	TI	PE	PI	Total
<b>Discipline Specific Courses (DSC)</b>											
240/BMRI T/CC/301	Clinical Radiography positioning-I-Theory		4	-	-	4	70	30	-	-	100
240/BMRI T/CC/302	Modern Radiological & Imaging Equipment including-Theory		3	1	-	4	70	30	-	-	100
240/BMRI T/CC/303	Contrast & Special Radiography procedures-Theory		4	-	-	4	70	30	-	-	100
240/BMRI T/CC/304	Clinical radiography and positioning-I- Practical		-	-	4	2	-	-	35	15	50
240/BMRI T/CC/305	Modern Radiological & Imaging Equipment including physics – Practical		-	-	4	2	-	-	35	15	50
240/BMRI T/CC/306	Contrast & special Radiography procedures- Practical		-	-	4	2	-	-	35	15	50
<b>Minor (MIC) / Vocational Courses (VOC)</b>											
240/BMRI T/MI/301	Workshop(Telemedicine)		1	-	-	1	20	5	-	-	25
<b>Multidisciplinary courses(MDC)</b>											
240/BMRI T/MD/301	Short hand & Typing		2	-	-	2	35	15	-	-	50
<b>Skill Enhancement Course (SEC)/ Internship/Dissertation</b>											
240/BMRI T/SE/301	Medical Ethics & Legal Aspects- Theory		2	-	-	2	35	15	-	-	50
<b>Total Credits</b>						<b>23</b>	<b>Total Marks</b>			<b>575</b>	








Semester 5

Course Code	Course Title	Course ID	L	T	P	Credits	TE	TI	PE	PI	Total
<b>Discipline Specific Courses (DSC)</b>											
240/BMRI T/CC/501	Cross sectional anatomy and physiology - Theory		4	-	-	4	70	30	-	-	100
240/BMRI T/CC/502	Physics of advanced imaging technology- Theory		3	1	-	4	70	30	-	-	100
240/BMRI T/CC/503	Radiographic techniques of advanced imaging technology- Theory		4	-	-	4	70	30	-	-	100
240/BMRI T/CC/504	Cross sectional anatomy and physiology - Practical		-	-	4	2	-	-	35	15	50
240/BMRI T/CC/505	Physics of advanced imaging technology- Practical		-	-	4	2	-	-	35	15	50
240/BMRI T/CC/506	Radiographic techniques of advanced imaging technology- Practical		-	-	4	2	-	-	35	15	50
<b>Minor (MIC) / Vocational Courses (VOC)</b>											
240/BMRI T/MI/601	Regulatory requirements in diagnostic radiology & imaging act and rules- Theory		4	-	-	4	70	30	-	-	100
<b>Total Credits</b>						<b>22</b>	<b>Total Marks</b>			<b>550</b>	





**Semester 7& 8**

Course Code	Course Title	Course ID	L	T	P	Credits	TE	TI	PE	PI	Total
<b>Discipline Specific Courses (DSC)</b>											
240/BMRIT/C/701	Internship- Practical		-	-	-	40			-	-	
240/BMRIT/C/801	ResearchProject&Evaluation- Practical		-	-	-	5	-	-	200	-	200
<b>Total Credits</b>						<b>45</b>	<b>Total Marks</b>			<b>200</b>	

Mr. Indira Rajesh | Kalpana Dandekar | Dr. Ganga Salunke | Dr. H. Manoj Kumar  




**SYLLABUS**  
**FIRST SEMESTER**

<b>Course Title: GENERAL ANATOMY-I- THEORY</b>			
<b>Semester: I</b>	<b>Course code: BRT101T</b>	<b>Credits: 03</b>	<b>Core</b>
<b>No of sessions Lectures/Tutorial: 30</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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 of anatomy helps them in putting into perspective the knowledge that they gain for better good of humanity.

**Course Objectives**

This course is designed to provide the student the basic knowledge in anatomy. At the end of the course, the student should be able to:

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the human body.
2. Identify the microscopic structures of various tissues, and organs in the human body & correlate the structure with the functions.
3. Comprehend the basic structure and connections between the various parts of the central nervous system so as to analyse the integrative and regulative functions on the organs and systems.

**Course Learning Outcomes**

Upon successful completion of the course, the student should be able to:

**CLO1:** Understand the various organ structures with a backdrop of general anatomy (Remember & Understand)

**CLO2:** Compare the differences between the similar structures in the body and their relevance (Analyze)

**CLO3:** Learn to apply the knowledge of various structures to clinical aspect of diseases (Apply & Analyze)



**CLO4: Augment their learning by making models, charts and learning on simulators**

### **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 are some 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**

- 1. Introduction to Anatomical terms of the human body** - Basic anatomical terminology, anatomical position, anatomical planes, levels of organization in the body, organ systems, skeleton, cavities of the body.
- 2. Organization of the human body at the cellular level** - Structure of the cell comprising of cell membrane, cytoplasm, cell organelles, nucleus, cell extensions etc.
- 3. Organization of the human body at the tissue level** - Epithelial, Connective, Muscular & Nervous tissue.

#### **Unit 2**

- 1. Blood** - Composition of blood, Features of red blood cells, white blood cells, platelets.
- 2. Lymphatic system** - Features of lymph vessels, lymphatic tissue & organs, lymphatics, spleen, tonsil, thymus.
- 3. Nervous system** - Central nervous system, brain, cerebellum, spinal cord, cranial nerves, autonomic nervous system.
- 4. Muscular system** - Skeletal muscle, cardiac muscle, smooth muscle, muscles of the body.
- 5. Skeletal system** - Features of bones, axial skeleton, appendicular skeleton.
- 6. Musculoskeletal system** - Joints of upper & lower limb.

#### **Unit 3**

- 1. Respiratory system** - Nose & paranasal sinuses, pharynx, larynx, trachea, lungs.
- 2. Cardiovascular system** - Heart & blood vessels.
- 3. Digestive system** - Oral cavity, pharynx, salivary glands, oesophagus, stomach, Small & Large intestine.
- 4. Urinary system** - Kidneys, juxtaglomerular apparatus, ureters, urinary bladder, urethra.

#### **Unit 4**

- 1. Introduction to genetics** - Features of chromosomes, DNA.
- 2. Reproductive system in females** - External & internal genital organs, breast.





3. **Reproductive system in males**-Penis, scrotum, testes, prostate gland.
  4. **Endocrine system**- Hormones, pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas.
  5. **Special senses**-Olfactory system, taste apparatus, external middle & internal ear, eye.
  6. **Skin**-Features of skin, hair, sebaceous glands, sweat glands, nails.
- The classes will be two theories and two practicals including the tutorials in a week

#### Course Assessment Scheme

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, make charts and posters, make models, and conduct quiz for the topics. Practical will be conducted with viva. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

#### Reference books:

1. Sampath Madhyastha's Manual of anatomy for allied health sciences
2. Krishna Garg & Madhu Joshi's Practical anatomy workbook
3. Dixit's Atlas of Histology for Medical Students
4. Basic Histology: A Color Atlas & Text
5. Jana's Exam Oriented Practical Anatomy
6. Krishan's Anatomy Mnemonics





<b>Course Title: GENERAL PHYSIOLOGY-I THEORY</b>			
<b>Semester: I</b>	<b>ICourse code: BRT 102T</b>	<b>Credits: 03</b>	<b>ICore</b>
<b>No of sessions Lectures/Tutorial: 30</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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 Objectives:

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

1. Explain the normal functioning of various organ systems of the body and their interactions.
2. Elucidate the physiological aspects of normal growth and development.
3. Describe the physiological response and adaptations to environmental stresses.
4. Know the physiological principles underlying pathogenesis of disease.

### Course Learning Outcomes

Upon successful completion of the course, the students should be able to:

**CL01:** Understand the various organ functions with a backdrop of general physiology (Remember & Understand)

**CL02:** Compare the differences between the similar functions in the body and their relevance (Analyze)

**CL03:** Learn to apply the knowledge of various physiological processes to clinical aspects of diseases (Apply & Analyze)

**CL04:** Augment their learning by making models, charts and learning on simulators (Synthesize, evaluate & create)

### 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 are some 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 and Duration

Course contents and duration: The classes will be two theories and two practical including the tutorials in a week.

### Course contents

#### Unit 1

1. **Introduction to physiology of the human body** - Composition of body, Homeostasis, Introduction to chemistry of life.
2. **Organization of the human body at the cellular level** - Function of lipids, carbohydrates, proteins & cell organelles.
3. **Organization of the human body at the tissue level** - Function of Epithelial, Connective, Muscular & Nervous tissues.

#### Unit 2

1. **Blood** - Haemopoiesis, haemostasis, coagulation of blood, blood transfusion.
2. **Lymphatic system** - Function of lymph vessels, lymphatic tissue & organs, lymphatics, spleen, tonsil, thymus.
3. **Resistance & immunity** - Innate immunity, acquired immunity, humoral & cell mediated immunity.

#### Unit 3

1. **Nervous system** - Properties of nerve fibres, function of neuroglia, synapse, CNS, CSF, brain, cranial nerves, demonstration of reflexes.
2. **Muscular system** - Properties of skeletal muscle, cardiac muscle, smooth muscle, muscles of the body.
3. **Skeletal system** - Functions of bones, axial skeleton, appendicular skeleton.
4. **Musculoskeletal system** - Movement in the joints of upper & lower limb.

#### Unit 4

1. **In lungs**, transport of gases between lungs & tissues, regulation of respiration.
2. **Cardiovascular system** - Heart & blood vessels: Systemic circulation, pulmonary circulation, ECG, cardiac output, blood pressure.
3. **Digestive system** - Process of digestion, function of oral cavity, pharynx, salivary glands, oesophagus, stomach, small intestine, large intestine, liver, gall bladder, pancreas.





4. **Urinary system** - Function of kidneys, juxtaglomerular apparatus, ureters, urinary bladder, urethra, physiology of urine formation, glomerular filtration, tubular reabsorption, water balance, micturition.
5. **Introduction to genetics** - Features of chromosomes, DNA, protein synthesis, dominant inheritance, recessive inheritance, sex-linked inheritance.
6. **Reproductive system - female**: Physiology of female reproductive system.
7. **Reproductive system - male**: Physiology of male reproductive system.
8. **Endocrine system** - Mechanism of action of hormones, function of pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas.
9. **Special senses** - Physiology of olfaction, taste, hearing, balance & vision.
10. **Skin** - Function of skin, hair, sebaceous glands, sweat glands, nails, temperature regulation.

#### Course References

1. PRAshalatha & GDeepa's Textbook of anatomy & physiology
2. NGeetha's Textbook of physiology

#### Reference Books:

1. CC Chatterjee's Human Physiology
2. CC Chatterjee's Practical Physiology for Paramedical Courses
3. CN Chandra Shekhar's Manipal Manual of Medical Physiology
4. RKMaurya's Medical Physiology

Dr. Indira K. Kulkarni | Dr. G. Srinivasulu | Dr. G. Srinivasulu  
 Associate Professor | Associate Professor | Associate Professor

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<b>Course Title: Applied Physics- Theory</b>			
<b>Semester : I</b>	<b>I Course code: BRT 103T</b>	<b>Credits:03</b>	<b>ICore</b>
<b>No of sessions Lectures/Tutorial: 30</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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.

## 2. Course Introduction

Applied physics is a science and bridge between physics and engineering. It is applied for particular technological or practical use. The course covers the study of the application of the theories and principles of science to practical purposes.

## 3. 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. The objectives are:

1. To understand the general scientific concepts required for technology
2. Understand the basic concepts of magnetic circuits, AC & DC circuits.
3. To gain knowledge about fundamentals of electronic components and devices.

## 4. Course Learning Outcomes

Upon successful completion of the course, the students should be able to (knowledge based):

- CL01: Understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life.
- CL02: Acquired the skills in handling scientific instruments, planning and performing in laboratory experiments.
- CL03: Realized how developments in any science subject helps in the development of other science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments.

## 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





**BASIC PHYSICS:** 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

**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.

#### Unit -2

**FUNDAMENTALS OF DC CIRCUITS:** Introduction to DC and AC circuits, Active and passive two terminal elements, Ohms law, resistivity, series and parallel combination, Voltage- Current relations for resistor, inductor, capacitor, Kirchhoffs laws, EMF.

**AC CIRCUITS:** AC and D.C. power supply with examples, single phase and polyphase power supply, Sinusoids, Introduction to three phase systems - types of connections, relationship between line and phase values.

#### Unit- 3

**MAGNETIC CIRCUITS:** Introduction to magnetic Circuits-Simple magnetic Circuits-Faraday's laws, induced emfs and inductances, Galvanometer. Magnets and magnetic field, force on an electric current in a magnetic field, force on an 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

**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, 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.





<b>Course Title: Image Acquisition, Processing &amp; Achieving- Theory</b>			
<b>Semester : I</b>	<b>I Course code: BRT 104T</b>	<b>Credits:03</b>	<b>ICore</b>
<b>NoofsessionsLectures/Tutorial:30</b>		<b>Total Marks: 70</b>	
<b>CoursePre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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

- Demonstrate composition of film, screens, cassette, processing solution, the usage and effect of light.
- Perform best storage guidelines for film storage and handling.
- Select cassette size, Demonstrate Loading & unloading of films.

### CourseLearning Outcomes

Upon successful completion of the course, the students should be able to (knowledge based):

- CLO1:** Understood the basic concepts, fundamental principles, and the scientific theories related to films, screens.
- CLO2:** Acquired the skills in handling films screens and planning of dark-room and performing in laboratory experiments.
- CLO3:** Realized how developments in any radio-graphic image quality. How interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments.

### Coursecontents

**Unit-1.** 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 characteristic curve, latent image formation, process of film developing (composition of developer, Fixer and other processing solution), common errors and faults while processing (densitometry), automatic processing unit (processing cycle), developer & Fixer replenishment and silver recovery.

**Unit -2.** Film storage rules and guidelines, film handling and care (size, construction and function), types of intensifying screens 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.

**Unit -3.** Image formation, latent image, processing: manual processing, automatic processing. Developer, fixer, replenisher. Manual technique of developing film, Automatic film processor, common errors in processing.

**Unit -4.** Meaning of radiographic image contrast, density, resolution, 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. Introduction,** purpose and location of dark room, layout of dark room, entrance, pass box, hatch, hangers, safe light, criteria of safe light, safelight test.

**Course Pedagogy**

The course will use the mixed technique of interactive lectures, regular assignments. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained. It will not only help students to understand the fundamentals of imaging and Quality of Radiographs but also improve skills and techniques for tackling practical problems.

**Reference books:**

Textbook of radiology for residents and technician- SK Bhargava. Dark room procedure- MO and Chesney

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## PRACTICALS

<b>Course Title: GENERAL ANATOMY-I- Practical</b>			
<b>Semester : I</b>	<b>ICoursecode:BRT105P</b>	<b>Credits:02</b>	<b>ICore</b>
<b>Number of sessions: 40</b>		<b>Total Marks: 70</b>	
<b>CoursePre-requisites:</b>		<b>Timing: 3 Hours</b>	

### Practicals

1. Demonstrationofvariouspartsofbody
2. Demonstrationoftissuesofbody
3. Demonstrationofpartsofdigestivesystem
4. Demonstrationofpartsofrespiratorysystem
5. Demonstrationofpartsofskin
6. Demonstrationofpartsofexcretorysystem
7. Demonstrationofvariouspartsofcirculatorysystem(Demonstrationfrommodels)
8. Examinationofbloodfilmforvariousbloodcellsfromstainedslides
9. Bloodpressureestimation

### TextBooks:

1. P.RAshalatha&GDeepa'sTextbookofanatomy &physiologyby
2. B.D. Chaurasia'shumananatomy

### Referencebooks:

1. SampathMadhyastha's Manipalmanual ofanatomyforalliedhealthsciences
2. KrishnaGarg&MadhuJoshi'sPracticalanatomyworkbook
3. Dixit'sAtlasofHistologyforMedicalStudents
4. BasicHistology:AColorAtlas&Text
5. Jana'sExamOrientedPracticalAnatomy
6. Krishan'sAnatomyMnemonics





<b>Course Title: GENERAL PHYSIOLOGY-I Practical</b>			
<b>Semester : I</b>	<b>I Course code: BRT106P</b>	<b>Credits:02</b>	<b>ICore</b>
<b>Number of sessions: 40</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**Practical: demonstration/observation**

**Blood test:**

1. Microscope
2. Haemocytometer
3. Blood
4. RBC count
5. Hb
6. WBC count
7. Differential Count
8. Hematocrit demonstration
9. ESR
10. Blood group & Rh. Type
11. Bleeding time and clotting time.

**Digestion**

**Tests salivary digestions**

**Excretion**

- I. Examination of Urine
2. Specific gravity
3. Albumin
- n 4. Sugar
5. Microscopic examination for cells and cysts

**Respiratory System:**

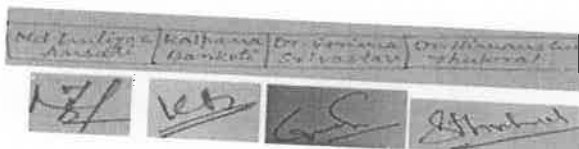
1. Clinical examination of respiratory system
2. Spirometry
3. Breath holding test

**Cardio Vascular System:**

- I. Measurement of blood pressure and pulse rate
2. Effect of exercise on blood pressure and pulse rate

**Course References**

1. PRAshalatha & GDeepa's Textbook of anatomy & physiology
2. NGeetha's Textbook of physiology





**Reference Books:**

1. CC Chatterjee's Human Physiology
2. CC Chatterjee's Practical Physiology for Paramedical Courses
3. CN Chandra Shekhar's Manipal Manual of Medical Physiology
4. RK Maurya's Medical Physiology

**Online references:**

Coursera subscription for online anatomy topics






<b>Course Title: Applied Physics- Practical</b>			
<b>Semester : I</b>	<b>I Course code: BRT 107P</b>	<b>Credits:02</b>	<b>ICore</b>
<b>Number of sessions: 40</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**Practical**

1. Speed of sound in a material medium
2. Intensity of sound
3. Heat: Heat capacity, heat transfer conduction, radiation, thermal conductivity.
4. Introduction to DC and AC circuits
5. AC Circuit
6. Magnetic Circuit
7. Other Practicals based on the theory paper

Mr. J. S. ...  
 Mr. ...  
 Dr. ...  
 Dr. ...








<b>Course Title: Introduction to Quality and Patient Safety- Theory</b>			
<b>Semester : I</b>	<b>I Course code: BRT108T</b>	<b>Credits: 03</b>	<b>ICore</b>
<b>No of sessions Lectures/Tutorial: 30</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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.

### 1. Course Introduction

As antibiotic resistant strains of bacteria are growing rapidly, making it difficult to cure such patients, the importance of sterilization and proper disposals is only way to prevent it. Well known saying, prevention is better than cure, the main objective of this course is to focus mainly on the preventive measures and quality assurance to the patients. This course emphasizes more on risk management principles and safe handling of disposals, basic emergency care and basic life support skills which can prove remedy in emergency cases.

**2. Course Objectives:** The main objective of this course is to teach students quality measures to provide patients with effective methods of treatment with more focus on proper handling of infected specimens and proper treatment with best sterilized and disinfected means to reduce the cross-infection scenario and nosocomial infections, which occurs due to poor handling of infected specimens and improper disposal means polluting environment too. Students are made to learn basic concepts of quality in health care and develop skills to implement sustainable quality assurance program. Introducing students to basic emergency care, infection prevention & control with knowledge of biomedical waste management and antibiotic resistance.

### 3. Course Learning Outcomes

Upon successful completion of the course, the student should be able to:

**CLO1:** Understood quality improvement approaches, NABH, NABL, JCI guidelines which purely focuses on the quality measures and proper handling of disposals providing quality facility to patients. (Understanding Based)

**CL02:** Understood basic life support skills which can save many lives in urgent cases. (Applying Based)

**CL03:** Understood proper disposals of biomedical waste, reducing risk of infection to waste handling personnel and cross infection which can occur due to improper handling of infected waste polluting surroundings too. (Applying Based)

**CL04:** Understood effective hand hygiene, prevention and control of common health care associated infections. (Remembering Based)

**CLOS:** Understood fundamentals of emergency management, disaster preparedness. (Remembering Based)

### 4. Course Pedagogy

This course will use mixed technique of interactive lectures, digital learning methodologies, regular assignments and power point presentations. Students will be made to prepare project reports by





interacting directly with laboratory personnel and visits to hospital to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day to day real world applications. This course will focus mainly on applying based methodologies, students will not be made limited to theory only, but hands on practices and analysing every aspect of the module by themselves.

### **CourseContents**

#### **Unit1.Quality assurance and Management**

Introduction, Quality improvement approaches, standards and norms, quality improvement tools, introduction to NABH guidelines.

#### **Unit2.BasicofEmergencycareandLifesupportskills**

Basic life support (BLS) following cardiac arrest, recognition of sudden cardiac arrest and activation of emergency response system, early cardiopulmonary resuscitation (CPR) and rapid defibrillation with an automated external defibrillator (AED)

#### **Unit3.Basicemergencycare**

First aid, choking, rescue breathing methods, ventilation including use of bag valve master (BVMs)

#### **Unit 4.BiomedicalWasteManagement**

Definition, waste minimization, BMW-segregation, collection, transportation, treatment and disposal (Including color coding); Liquid BMW, Radioactive waste, metals/chemicals/drug waste, BMW management and methods of disinfection, use of Personal protective equipment (PPE)

#### **Unit5.InfectionPrevention and Control**

Sterilization, Disinfection, Effective hand hygiene, use of PPE, Prevention and control of common health care associated infections, Guidelines (NABH) and JCI for hospital infection control.

#### **Unit6.Disasterpreparednessandmanagement**

Fundamentals of emergency management





## PRACTICALS (DEMONSTRATION ONLY)

1. Vital signs and primary assessment
2. Basic emergency care - first aid

### 7. Course References

Texts, Materials, and Supplies:

- Turgeon, Mary Louise. (2015). Clinical Laboratory Science, 7th ed. Maryland Heights, MO: Mosby. ISBN 9780323225458

Recommended Readings:

- Medical Dictionary
- Others**

1. disaster management setup in India - opcw.org

[www.opcw.org/sites/default/files/documents/event\\_photos/2010/tabletop\\_exercise\\_poland\\_no\\_v201](http://www.opcw.org/sites/default/files/documents/event_photos/2010/tabletop_exercise_poland_no_v201).

2. Biomedical waste management in India: Critical appraisal - NCBI-NIH

[www.ncbi.nlm.nih.gov/pmc/articles/PMC5784295](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC5784295)

3. Vital signs: Understanding what the body is telling us

<https://www.coursera.org/learn/vital-signs/>

4. Patient Safety and Quality Improvement

<https://www.coursera.org/learn/patient-safety>





<b>Course Title: Music &amp; Dancing- Theory</b>			
<b>Semester: I</b>	<b>J Course code: BMLS 109T</b>	<b>Credits: 02</b>	<b>J Core</b>
<b>No of sessions Lectures/Tutorial: 30</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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 Outcome-**

Demonstrate increased movement skills, concentration and physical control in performing movement for artistic expression.

**Music-**

**UNIT 1**

**Music: Concepts, Aims and Objectives**

- Concept of Music, types and importance of Music in present scenario
- History of Indian Music: Ancient, Medieval and Modern period.
- Aims and objectives of Music as a subject in the School curriculum.
- Bloom's Taxonomy and Instructional objectives in teaching of Music

**UNIT 2**

**Teaching Skills, Lesson Planning, Notation and Voice Culture of Indian Music**

- Micro-teaching skills: Meaning, Process, Utility, Merits, Limitations
- Introducing the Lesson
- Questioning
- Stimulus Variation
- Illustration with Examples
- Explaining

Lesson Planing: Meaning, Importance & types.

- Possibilities of notation for Indian Music: Critical study of Bhatkande and Vishnu





DigamberPulskar

□□Voice-culture-importance in Indian context

### UNIT 3

#### Teaching Methods, Qualities of Music Teacher, Motion and Rhythm, Aesthetics in Indian Music

Methods of teaching Music

Alankar - Geet Method

Demonstration – imitation Method

Project Method

Individual and Group Teaching Method

Qualities of Music Teacher-Gayak, Vadak and Avadyakar/composer.

Knowledge and Importance of Taal/Motion and Rhythm and its training

Aesthetics in Indian Music

### UNIT 4

#### Instructional Aids, Textbooks, Classical Music, Evaluations

Meaning and Importance of Audio-visual Instructional Aids in Teaching of Music

Textbooks: Meaning, Importance of textbooks in teaching of Music, Qualities of a good textbooks of Music

Importance of Classical Music, Suggestions for the popularization of Classical Music.

Evaluation in Music: Meaning, Purpose, Importance, Evaluation Devices-Oral, Written and Practical

**Tasks & Assignments: Any one of the following (10 marks)**

Tuning of the instrument related to the subject of the students.

Collection of Musical documents (Notes, Newspaper and Magazines Articles cutting).

Preparation of Project Report on the legends of Music.

Preparation of low cost teaching aids.

Any other project/ assignment given by the institution.





<b>Course Title: English &amp; Communication Skill- Theory</b>			
<b>Semester: I</b>	<b>J Course code: BRT 110T</b>	<b>Credits: 02</b>	<b>J Core</b>
<b>No of sessions Lectures/Tutorial: 30</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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 English and communication skills aim to integrate their learning in sync with the understanding of the basics of spoken English and communication techniques.

### Course Objectives:

1. This course trains the students in oral presentations, expository writing, logical organization and structural support.
2. By acquiring skills in the use of communication techniques the students will be able to express better, grow personally and professionally, develop poise and confidence and achieve success.

### Course Learning Outcomes

Upon successful completion of the course, the students should be able to:

**CLO1:** Understood the role of radiographer in personal and professional ethics.

**CLO2:** Understood the handling of patient with good language.

**CLO3:** Understood the importance of good communication with patient as a health care professional.

### Course Pedagogy

The course pedagogy includes a comprehensive study including the various communication skills in order to make the students more competent and skilled in its use and storage. Various aspects about the use for same in health care setups are discussed in relevance to the topic taught so as to relieve the monotony of the subject. Regular doubt clearing sessions, written assignments, quiz, presentations are some of the measures for learning. Periodic and surprise tests are taken to apprise and evaluate the students.

### Unit 1: Basics of Grammar-Part I

Vocabulary, Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words.





**Unit- 2: Basics of Grammar-Part II**

Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms

**Unit- 3: Writing Skills**

Letter writing, Email, and Essay, Articles, and Memos, one- word substitutes, note making and Comprehension

**Unit-4: Writing and Reading**

Summary writing, Creative writing, newspaper reading

**Unit-5: Practical Exercise**

Formal speech, Phonetics, semantics and pronunciation Communication:

**Unit-**

**6: Introduction:** Communication process, Elements of communication, Barriers of communication and how to overcome them, Nuances for communicating with patients and their attenders in hospitals.

**Unit 7: Speaking:** importance of speaking efficiently; Voice culture, Preparation of speech. Secrets of good delivery, Audience psychology, handling, Presentation skills, Individual feedback for each student, Conference/Interview technique.

**Unit- 8; Listening:** importance of listening, Self-assessment, Action plan execution, Barriers in listening, Good and persuasive listening.

**Unit- 9: Reading:** What is efficient and fast reading, Awareness of existing reading habits, tested techniques for improving speed, improving concentration and comprehension through systematic study.

**Unit- 10; Non-Verbal Communication:** Basics of non-verbal communication, Rapport building skills using neuro- linguistic programming (NLP).





<b>Course Title: Basic in Computer &amp; Information Science- Theory</b>			
<b>Semester : I</b>	<b>I Course code: BMLS 111T</b>	<b>Credits:03</b>	<b>ICore</b>
<b>No of sessions Lectures/Tutorial: 30</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

### Course Objectives:

- The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation.
- The students will be able to appreciate the role of computer technology and some extent able to gain hand-on experience in using computers.

### Course Outcomes:

After successful completion of this course students will be able to:

- Do basic assembly of the desktop system
- Do effectively MS office
- Do use of internet in effective & meaningful way

### Course content-

#### Unit 1

1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
2. Input/output devices: Input devices (keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices (monitors, pointers, plotters, screen image projector, voice response systems).
3. Processor and memory: The Central Processing Unit (CPU), main memory.
4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.

#### Unit 2

1. Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).
2. 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, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.
3. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.

#### Unit 3

1. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
2. Introduction of Operating System: introduction, operating system concepts, types of operating system.
3. Computer networks: introduction, types of networks (LAN, MAN, WAN, Internet, Intranet),





- network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
4. Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
  5. Application of Computers in clinical settings

Dr. Jyoti Kulkarni	Dr. Anurag Dankoti	Dr. Anurag S. Jadhav	Dr. Anurag Thakur
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<b>Course Title: Digital Marketing- Theory</b>			
<b>Semester: I</b>	<b>J Course code: BMLS 112T</b>	<b>Credits: 02</b>	<b>J Core</b>
<b>No of sessions Lectures/Tutorial: 30</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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

Unit -1 Introduction to Digital Marketing	Principles of Digital Marketing; Digital Marketing Channels; Tools to Create Buyer Persona; Competitor Research Tools, Website Analysis Tools, etc.
Content Marketing	Content Marketing Concepts & Strategies; Planning, Creating, Distributing & Promoting Content; Optimize Website UX & Landing Pages; Measure Impact; Metrics & Performance; Using Content Research for Opportunities, etc.
Unit 2- Social Media Marketing	Introduction; Major Social Media Platforms for Marketing; Developing Data-driven Audience & Campaign Insights; Social Media for Business; Creation & Optimization of Social Media Campaigns, etc.
Search Engine Optimization	Search Engine Optimization Fundamentals; Keywords and SEO Content Plan; SEO & Business Objectives; Writing SEO Content; On-site & off-site SEO; Optimize Organic Search Ranking, etc
Unit 3- Web Analytics & Google Analytics	Google Analytics Tools; Web Analytics Tools, etc.
E-mail Marketing	Effective E-mail Campaigns; E-mail Plan; E-mail Marketing Campaign Analysis; Measuring Conversions & keeping up, etc.
Web Design	Web design, optimization of websites; Publishing a basic website; User-centred Design and Website Optimization; Design Principles and Website Copy; Website Metrics & Developing Insight, etc.
Introduction to CRM	Fundamentals to CRM; CRM Platforms; CRM Models; CRM Strategy, etc.
Unit- 4- Video Advertising	Basics of Video Advertising; Creating Video Campaigns; Measurement & Optimization; Creating & Managing a YouTube Channel; Targeting Video Campaigns, etc.
Digital Marketing Budgeting	Digital Marketing Budget & Plan; Resource Planning; Cost Estimating; Cost Budgeting; Cost Control



## THIRD SEMESTER

### Syllabus

<b>Course Title: Clinical Radiography and Positioning-I- Theory</b>			
<b>Semester: III</b>	<b>ICoursecode: BRT301T</b>	<b>Credits: 04</b>	<b>ICore</b>
<b>No of sessions Lectures/Tutorial: 40</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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 student the basic knowledge in Radiography. At the end of the course, the student should be able to:

- 1) Explain the role of radiographer and positioning of various body parts, normal functioning of various organ systems of the body and their interactions.
- 2) Elucidate the radiological aspects of normal growth and development.
- 3) Describe the patient response and adaptation to environmental stresses.

#### Course Learning Outcomes

**CLO 1-** Explain how to take good quality images with as low as radiation dose in upper limb and lower limb.

**CLO 2-** Enumerate immobilization technique and immobilization devices. Use positioning devices.

**CLO 3-** Work in clinical practice and know about patient care

**CLO 4-** Able to know and perform dental radiography

**CLO 5-** Able to know abdominal radiography.

#### 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 are some 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- I:** Upper limb: Technique for hand, fingers, thumb, wrist joint carpal bones, forearm, elbow joint, radioulnar joints and humerus supplementary techniques for the above.

E.g., Carpal tunnel view, ulnar groove, head of the radius, supracondylar projections. Lower





limb: Technique for foot, toes, great toe, tarsal bones, calcaneum, ankle joint, lower leg, knee, patella & femur. Supplementary techniques: Stress view for ligaments, a. Subtalar joint and talocalcaneal joint. b. Intercondylar projection of the knee. c. Tibial tubercle. d. Length measurement technique.

**Unit- 2:** Shoulder girdle and thorax: Technique for shoulder joint, scapular, clavicle, acromio clavicular joints, sternum, ribs, sterno-clavicular joint. Supplementary projections and techniques a. Recurrent dislocation of shoulder. b. Traumatic dislocation of shoulder. c. Cervical ribs.

**Unit 3:** Vertebral column: Technique for atlas-occipital joint, cervical spine, cervico thoracic spine, thoracic spine, thoraco-lumbar spine, lumbosacral spine, sacrum and coccyx. Supplementary techniques to demonstrate: a. Scoliosis. b. Kyphosis c. Spondylolisthesis d. Disc lesion e. Union of spinal graft. Adaptation of techniques to demonstrate specific pathologies. Pelvic girdle and hip region: Technique for whole pelvis. Ilium, ischium, pubic bones, sacra iliac joint, symphysis pubis, hip joint, acetabulum neck of femur, greater and lesser trochanter.

**Unit- 4:** Supplementary techniques- a. Congenital dislocation of hips b. Epiphysis of femur: c. Lateral projections for hip joints to show femoral head and neck relationship. Skeletal survey: Skeletal survey for metabolic bone disease, metastases, hormonal disorder, renal disorders. 8. Skull: Basic projections for cranium, facial bones, nasal bones and mandible. Technique for a. Petrous temporal for mastoids. Internal auditory canal. - Accessory nasal sinuses. b. Temporomandibular joint. - Orbits and optic foramen. - Zygomatic arches. c. Styloid process. - Pituitary fossa. - Jugular foramen.

**Unit- 5:** Dental Radiography: Technique for intra oral full mouth, occlusal projections, extra oral. projections including orthopantomography, Supplementary techniques. Upper respiratory system: Technique for post nasal airways, larynx, trachea, thoracic inlet - Valsalva manoeuvre. - Phonation. Lungs and Mediastinum.

**Unit- 6:** Technique for routine projections: Projections: Antero-posterior, obliques, lordotic, apical projection, use of penetrated posteroanterior projection. - Expiration technique. - Technique for pleural fluid levels and adhesions. Abdominal viscera: For plain film examination, Projection for acute abdomen patients. Technique to demonstrate.

#### **Books Recommended-**

Clark's Radiography - Clark

Radiographic positioning - Garkal

[www.wikiO.edia.co.in](http://www.wikiO.edia.co.in)





<b>Course Title: Modern radiological &amp; imaging Equipment including physics- Theory</b>			
<b>Semester: III</b>	<b>ICourse code: BRT302T</b>	<b>Credits: 04</b>	<b>ICore</b>
<b>No of sessions Lectures/Tutorial: 40</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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 of mammography and computed radiography and DSA. Should able to scanning also in mammography, computed radiography and DSA.

### Course learning Outcomes

**CLO1-** Perform the procedure of mammography scanning.

**CLO2-** Enumerate and able to know the principle of computed radiography.

**CLO3-** Able to know and perform vascular imaging with PACS

### 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 but also improve skills and techniques for tackling practical problems.

### Course contents

**Unit -1** Mammography, History of mammography, Mammographic equipment, Mammographic radiation dose and exposure Dedicated mammographic unit and its special features, Types of mammograph Routine Mammographic Positioning & Views with additional views and technical considerations; Wire localization in mammography.

**Unit- 2** Special equipment: Portable and mobile x-ray units, dental x-ray machine, skull table Generator, x-ray tubes; Accessories; Resolution; Quality control; Application and role in medicine. digital radiographic equipment, digital subtraction techniques. Tomography: Body section radiography, basic principle and equipment, multi section tomography, various types of tomographic movements, Dual energy x-ray absorptiometry (DEXA), stats can.

**Unit- 3** 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, disadvantage; and applications.

**Unit- 4** Vascular hanging Equipment: Introduction, historical developments, Principle, scanned projection radiography, digital subtraction angiography, applications and definition of terms. 4. Picture archiving and communication system (PACS).





<b>Course Title: Contrast &amp; Special Radiography Procedures- Theory</b>			
<b>Semester: III</b>	<b>ICoursecode: BRT303T</b>	<b>Credits: 04</b>	<b>ICore</b>
<b>No of sessions Lectures/Tutorial: 40</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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 systematic investigations with using contrast media and image intensifier.

**Course learning outcomes-**

**CLO1-** Explain indication, contraindication and reactions of contrast media.

Demonstrate how to take in minimum numbers of exposures in each special investigation.

**CLO 2-** Demonstrate the positioning and technique of the special studies.

**CLO3-** Explain the technique of all GIT study according to investigation.

**CLO4-** Demonstrate surface anatomy. To be able to know the technique behind the radiography.

**Course contents**

**Unit- 1:** Special radiographic procedures Responsibility of Radiographer during Radiological Procedures. Preparation of Patient for Different Procedures. Contrast Media - Positive and Negative, Ionic & Non-Ionic Adverse Reactions to Contrast Media and Patient Management Emergency Drugs in the Radiology Department Emergency Equipments in the Radiology Department Aseptic technique Indications, contraindications, basic techniques and relationship to other techniques of the following special procedures

**Unit- 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 b. Salivary glands: Routine technique, procedure - sialography c.

**Unit- 3:** Biliary system: Plain film radiography Intravenous cholangiography Percutaneous cholangiography Endoscopic retrograde cholangio-pancreatography (ERCP) Operative cholangiography post-Operative cholangiography (T - tube Cholangiography)

**Unit 4:** Urinary system: Intravenous urography Retrograde pyelography Antegrade pyelography Cystography and micturating cystourethrography Urethrography (ascending) Renal puncture

**Unit 5:** Female reproductive system: Hysterosalpingography. Respiratory system: Bronchography: Awareness. h. Sonography: Routine technique and procedure.





**Unit-6 Multipleradiography. Uses of soft tissue radiography. 1. High VRadiography:**

General principles Relation to patient dose Change in radiographic contrast. Scatter elimination; beam collimation; grid ratio. Speed and type of grid movement. Radiographic factor; application and uses. m. Localization of foreign bodies: General location principles. Ingested; inhaled; inserted; embedded foreign bodies. Foreign bodies in eye. Preparation of the area to be investigated. Appropriate projection for all Techniques to locate non-opaque foreign body.





## PRACTICAL

<b>Course Title: Clinical Radiography and Positioning-I- Practical</b>			
<b>Semester: III</b>	<b>I Course code: BRT 304P</b>	<b>Credits: 02</b>	<b>ICore</b>
<b>Number of Session: 40</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

### PRACTICAL

#### Regional Radiography:

- All Views of Hip and Pelvis: Theatre procedure for Hip, Pinning and Reduction, Pelvis, Sacro-iliac Joint, Pelvis Bone, Acetabulum.
- All Views and techniques of Vertebral Column: Cervical Spine, Thoracic spine, Lumbar spine, Sacrum, Coccyx
- All views and techniques Abdomen: Gastro-intestinal tract, urinary tract Skeletal Survey.

#### Books Recommended-

Clark's Radiography - Clark

Radiographic positioning - Garkal

[www.wikiQ.edia.co.in](http://www.wikiQ.edia.co.in)

[www.radioQ.edia.co.in](http://www.radioQ.edia.co.in)





<b>Course Title: Modern radiological &amp; imaging Equipment including physics- Practical</b>			
<b>Semester: III</b>	<b>ICourse code: BRT305P</b>	<b>Credits: 02</b>	<b>ICore</b>
<b>Number of Session: 40</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**Practical**

- 1) X-Ray tubes and accessories, general features.
- 2) Portable X-Ray Equipment.
- 3) hanged intensifier, its features, spot film.
- 4) Radiation protection devices
- 5) Effects of kV and mAs.
- 6) Maintenance of X-ray equipment and accessories.
- 7) Mammography X-Ray tube
- 8) Dental X-Ray unit.

**Books Recommended-**

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

Radiographic positioning- Garkal

Dr. J. Singh Banseri	Dr. Kalpana Barkoti	Dr. Santana Sulastari	Dr. Anand Shukla
			



<b>Course Title: Contrast &amp; Special Radiography Procedures- Practical</b>			
<b>Semester: III</b>	<b>ICoursecode: BRT 306P</b>	<b>Credits: 02</b>	<b>ICore</b>
<b>Number of Session: 40</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**PRACTICAL**

- Radiography in various positions for all the special radiological procedures, using contrast media
- Identification of various films for all the special radiological procedures, using contrast media and related pathologies

**Books Recommended-**

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

bhargava Radiographic positioning- Garkal

Radiology- Special investigation- champman.

[www.wikipedia.co.in/www.radiopedia.co.in](http://www.wikipedia.co.in/www.radiopedia.co.in)





<b>Course Title: Medical Ethics and Legal Aspects- Theory</b>			
<b>Semester: II</b> <b>205T</b>	<b>I Course code: 307BMLS</b>	<b>Credits: 02</b>	<b>I Core</b>
<b>No of sessions Lectures/Tutorial: 20</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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 laws and ethics to follow as health professionals. After completion of the course the students will be able to: Understand the various definitions

**Course outcome-** Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical Science, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

### Course Contents

#### Unit- 1

Role, Definition and Interaction with the patients and healthcare professionals, Ethical, Moral, and Legal Responsibilities, Patient safety and quality, restraint policies and role of health professionals. Biomedical waste Management, medical records and reports.

#### Unit-2

Medical terminology- The course employs a body systems-oriented, word-analysis approach to learning medical terminology.

#### Unit- 3

The goal of the class is to prepare students for the terminology they might encounter in their subsequent coursework, in their clinical rotations and ultimately in their roles as health care professionals.

#### Books Recommended

[www.wikiOedia.in](http://www.wikiOedia.in)





## FIFTH SEMESTER

### Syllabus

<b>Course Title: Cross Sectional anatomy and Physiology- Theory</b>			
<b>Semester: V</b>	<b>Course code: BRT 501T</b>	<b>Credits: 04</b>	<b>ICore</b>
<b>No of sessions Lectures/Tutorial: 40</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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 of anatomy helps them in putting into perspective the knowledge that they gain for the better good of humanity.

#### Course learning outcomes-

**CLO 1** identify cross-sectional anatomy in the sagittal, coronal and axial planes on CT and MR images.

**CLO 2** Describe anatomical structural relationships. Recognize normal anatomy and build a personal resource system for future study.

**CLO 3.** Locate and identify pertinent cerebral, upper thorax, mid-thorax, and abdominal anatomy. On CT and MR images, identify anatomical structures of the body and of the head.

**CLO 4** Distinguish between arterial and venous anatomy of the entire body's vascular system. Classify the various sections of anatomical regions and their associated parts.

#### 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 are some 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:** Introduction to Sectional Anatomy & Terminology - Sectional planes, Anatomical relationships/terminology.

**Unit 2;** Anatomy of the upper thorax - Surface anatomy relationships, Bony structures and muscles, Blood vessels. Divisions of the mid-thorax, heart and great vessels - Lungs, heart and great vessels, Esophagus

**Unit 3:** CT/MRI Images of the Thorax - Normal and pathologic. Anatomy of the Abdomen - Major organs and their accessories, Abdominal blood vessels CT/MR Images of Abdomen - Normal and pathological

**Unit 4:** Anatomy of the Pelvis - Bony structures and associated muscles, Digestive and urinary systems. Reproductive Organs CT/MR Images of the Male/Female Pelvis - Normal and pathologic. Neuro Anatomy - Scan planes. Brain - Cerebral hemispheres, Sinuses, Ventricles, Brainstem and associated parts, Arterial/venous systems, Basal ganglia, Cranial nerves Spine - Vertebra and disc, Spinal cord and meninges Neck - Arterial/venous systems, Muscles, Glands and pharynx

### Text Books:

- PRAshalatha & GDeepa's Textbook of ANATOMY & PHYSIOLOGY by
- B.D. Chaurasia's HUMAN ANATOMY

### Reference books:

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









## Course contents

**Unit 1 Basic Computed Tomography-** Basic principles of CT, generations of CT, CT instrumentation, image formation in CT, CT image reconstruction, Hounsfield unit, CT image quality, CT image display Advanced Computed Tomography Helical CT scan: Slip ring technology, advantages, multi detector array helical CT, cone -beam geometry, reconstruction of helical CT images, CT artifact, CT angiography, CT fluoroscopy, HRCT, post processing techniques: MPR, MIP, Min IP, 3D rendering: SSD and VR, CT Dose, patient preparation, Imaging techniques and protocols for various parts of body, CT contrast enhanced protocols CT angiography- (Aortogram, selective angiogram head, neck and peripheral) image documentation and Filing, maintenance of equipment and accessories.

**Unit 2: Advanced technique & instrumentation of MRI** a. Basic Principles: Spin - precession -relaxation time-pulse cycle-T1 weighted image - T2 weighted image-proton density image. b. Pulse sequence: Spin echo pulse sequence-turbo spinecho pulse sequence - Gradient echo sequence -Turbo gradient echo pulse sequence - Inversion recovery sequence - STIR sequence -SPIR sequence -FLAIR sequence -Echo planar imaging -Advanced pulse sequences.

**Unit 3: MR Instrumentation:** Types of magnets -RF transmitter -RF receiver -Gradient coils -shim coils -RF shielding -computers. d. Image formation: 2D Fourier transformation method - K-space representation- 3D Fourier imaging - MIP. e. MR contrast media - MR angiography- TOF & PCA -MR Spectroscopy -functional MRI

**Unit 4: Ultrasonography** a. Basic Acoustics, Ultrasound terminologies: acoustic pressure, power, intensity, impedance, speed, frequency, dB notation: relative acoustic pressure and relative acoustic intensity. b. Interaction of US with matter: reflection, transmission, scattering, refraction and absorption, attenuation and attenuation coefficients, US machine controls, US focusing.

Production of ultrasound: Piezoelectricity, Medical ultrasound transducer: Principle, construction and working, characteristics of US beam. d. Ultrasound display modes: A, B, M. Real-time ultrasound: Line density and frame rate, Real-time ultrasound transducers: mechanical and electronic arrays, ultrasound artifacts, ultrasound recording devices, and Distance, area & volume measurements of Techniques for imaging different anatomic areas, ultrasound artifacts, biological effects and safety example- Doppler Ultrasound- Patient preparation for Doppler, Doppler artifacts, vascular sonography.

### 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.co.in//www.radiopedia.co.in](http://www.wikipedia.co.in//www.radiopedia.co.in)





MRI made easy

CT made easy

<b>Course Title: Radiographic techniques of advanced imaging technology – Theory</b>			
<b>Semester: V</b>	<b>ICourse code: BRT 503T</b>	<b>Credits: 04</b>	<b>ICore</b>
<b>No of sessions Lectures/Tutorial: 40</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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 Computed Tomography imaging and Magnetic resonance imaging investigations with using contrast media and imaging instrumentation Generation of Quality assurance and control.

### **Course learning outcomes-**

**CLO-1** Able to know scanning of MSK, Vascular and cardiopulmonary system. Enumerate- distinguish all types of bones, joints and connective tissue

**CLO2-** Explain the history and generations CT/MRI

Perform the scan and demonstrate all technical aspects and protocols

**CLO 3-** Explain different types of Artifacts and correction. Demonstrate the QA and QC doing himself and take care of QA & QC papers

**CLO4** Able to know USG and Doppler techniques

### **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 physics of mammography and CT scan/ultrasound/ PACS but also improve skills and techniques for tackling practical problems with patient handling in MRI scans also.

### **Course contents**

**Unit 1** Ultrasonography/Doppler studies: Techniques of sonography- selection- Preparations- instructions and positioning of patient for TAS, TVS, TRUS, neck USG





and extremities-patientcare and maintenance protocols clinical applicationsdisplay methods - quality image reproducible extend -biopsy procedures, assurance to patients.

**Unit 2** CT scan studies acquisition/ protocols /techniques: CT of head and neck - thorax - abdomen - pelvis - Musculo skeletal system -spine - PNS. Anatomy - clinical indications and contraindications -patient preparation -technique -contrast media-types, dose, injection technique; timing, sequence - image display -patient care -utilization of available techniques & image processing facilities to guide the clinician- CT anatomy and pathology of different organ systems

**Unit 3** MRI Scanners: Methods of MRI imaging methods -Head and Neck ,Thorax, Abdomen, Musculoskeletal System imaging - Clinical indications and contraindications- types of common sequences effects of sequence on imaging -Protocols for various studies- slice section- patient preparation-positioning of the patient -patient care-calibration - paramagnetic agents and dose, additional techniques and recent advances in MRI- image acquisition-modification of procedures in an unconscious or un co-operative patient plain studies- contrast studies -special procedures- reconstructions- 3D images- MRS blood flow imaging,diffusion/perfusionscans - strength and limitations of MRI.

**BooksRecommended-**

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

Radiographic positioning- Garkal

Radiology-Specialinvestigation-champman.

[www.wikipedia.co.in//www.radiopedia.co.in](http://www.wikipedia.co.in/www.radiopedia.co.in)

MRImadeeasy

CT made easy





<b>Course Title: RESEARCH METHODOLOGY &amp; BIostatISTICS-I- Theory</b>			
<b>Semester: V</b>	<b>Course code: BRT 504T</b>	<b>Credits: 04</b>	<b>Core</b>
<b>No of sessions Lectures/Tutorial: 40</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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. Although 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, though the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long-term treatment ensures return to normal life. The basic knowledge of research methodology will help them in their chosen profession and will be of immense use in the same.

### Course Objectives:

This course is designed to provide the students the basic knowledge in research process and Bio-statistics. At the conclusion of the course, the students will have the knowledge of data collection, statistical application and finally, presentation of the statistical data. The first part shall be conducted in second semester and second part shall be covered in third semester.

### Course Learning Outcomes:

Upon successful completion of the course, the students should be able to:

**CLO1:** Understand the need of research in clinical field of Radiology.

**CLO2:** Understand the difference between the various types of research methodologies.

**CLO3:** Understand the various types of data collecting methods.

**CLO4:** Understand and learn about the knowledge of research to be used in clinical areas.

### 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 to 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:** 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, 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 2:** Introduction of epidemiology, Descriptive epidemiology, Experimental and non-experimental research designs, Screening, Sampling methods, biological variability, normal distribution

**Unit 3:** 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 Misrani





<b>Course Title: Regulatory requirements in diagnostic radiology &amp; imaging act and rules- Theory</b>			
<b>Semester: V</b>	<b>I Course code: BRT505T</b>	<b>Credits: 04</b>	<b>I Core</b>
<b>No of sessions Lectures/Tutorial: 40</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**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-**

AERB safety code and ethics

Patient Protection- Safe work practice in diagnostic radiology-

Radiation emergencies- situation handling.

### **Course learning outcomes-**

**CLO1-** Enumerate how to work as per the AERB safety guideline in clinical setup.

**CLO2-** Demonstrate radiation protection and patient care

**CLO3-** Enumerate radiation emergencies & radiation protection and patient care

### **Course contents**

**Unit 1:** Regulatory Bodies & regulatory Requirements: International Commission on Radiation Protection (ICRP) / National Regulatory body (AERB - Atomic Energy Regulatory Board) - Responsibilities, organization, Safety Standard, Codes and Guides, Responsibilities of licenses, registrants & employers and Enforcement of Regulatory requirements.

**Unit 2:** Role of Radiographer in Planning, QA & Radiation Protection: Role of technologist in radiology department - Personnel and area monitoring., Setting up of a new X- Ray unit, staff requirement, AERB specifications for site planning and mandatory guidelines - Planning of X-ray rooms, dark rooms - Inspection of X-Ray installations- Registration of X- Ray equipment installation- Certification

**Unit 3:** Evaluation of workload versus radiation factors - Occupational exposure and protection Tools/devices. ICRP, NRPB, NCRP and WHO guidelines for radiation protection, pregnancy and radiation protection. NABH guidelines, AERB guidelines, PNDT Act and guidelines

### **Books Recommended-**

Textbook of radiology for residents and technicians- s k bhargava

[www.wikipedia.co.in//www.radiopedia.co.in](http://www.wikipedia.co.in//www.radiopedia.co.in)





<b>Course Title: Cross Sectional anatomy and Physiology- Practical</b>			
<b>Semester:V</b>	<b>ICoursecode:BRT506 P</b>	<b>Credits:02</b>	<b>ICore</b>
<b>NumberofSession:40</b>		<b>Total Marks: 70</b>	
<b>CoursePre-requisites:</b>		<b>Timing: 3 Hours</b>	

**Practical**

1. Bony structures and muscles, Blood vessels.
2. Divisions of the mid-thorax, heart and great vessels- Lungs, heart and great vessels, Esophagus.
3. CT/MRI Images of the Thorax - Normal and pathologic. Anatomy of the Abdomen- Major organs and their accessories, Abdominal blood vessels CT/MR Images of Abdomen- Normal and pathologic.
4. Reproductive Organs CT/MR Images of the Male/Female Pelvis- Normal and pathologic. Brain - Cerebral hemispheres, Sinuses, Ventricles, Brainstem and associated parts.
5. Others practical based on the theory paper.

**TextBooks:**

- Prashalatha & GDeepa's Textbook of ANATOMY & PHYSIOLOGY by
- B.D. Chaurasia's HUMAN ANATOMY

**Reference books:**

- Sampath Madhyastha's Manipal manual of anatomy for allied health sciences
- Krishna Garg & Madhu Joshi's Practical anatomy workbook
- Dixit's Atlas of Histology for Medical Students





<b>Course Title: Physics of advanced imaging technology- Practical</b>			
<b>Semester: V</b>	<b>ICourse code: BRT507P</b>	<b>Credits: 02</b>	<b>ICore..</b>
<b>Number of Session: 40</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**PRACTICAL:**

- 1) Physics, scanning principle and image formation in USG, CT and MRI
- 2) Identification of different parts of MR scanner
- 3) Applications of various procedures in well-equipped Hospitals and Diagnostic Centers.

**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.co.in//www.radiopedia.co.in](http://www.wikipedia.co.in//www.radiopedia.co.in)

MRI made easy CT made easy





<b>Course Title: Radiographic techniques of advanced imaging technology- Practical</b>			
<b>Semester: V</b>	<b>I Course code: BRT 508P</b>	<b>Credits: 02</b>	<b>I Core</b>
<b>Number of Session: 40</b>		<b>Total Marks: 70</b>	
<b>Course Pre-requisites:</b>		<b>Timing: 3 Hours</b>	

**PRACTICAL**

- 1) Physics, scanning principle and image formation in CT/MRI/USG
- 2) Identification of different parts of CT/MRI/USG scanner
- 3) Applications of various procedures in well-equipped Hospitals and Diagnostic Centers
- 4) Quality control of CT /MRI

**Books Recommended-**

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

Radiographic positioning- Garkal

Radiology-Special investigation-champman.

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Nd. Jandiyaz / Karpava / Dr. Srinivas / Dr. H. Srinivas  
A. S. / B. S. / C. S. / D. S.

*[Handwritten signatures]*

