ROYAL GLOBAL UNIVERSITY
GUWAHATI

ROYAL SCHOOL OF MEDICAL AND ALLIED SCIENCES
(RSMAS)

(Bachelor of Science in Radiography and Advance Imaging Technology)

LEARNING OUTCOMES
based
CURRICULUM FRAMEWORK

BSc. RIT (3 Yr + 1 Yr Internship)

W.E.F AY: 2022-23

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1. PREAMBLE

i) Radiography and Advance Imaging Technology is a specialty in Allied Health Sciences where trained professionals work on diagnosing pathologies through medical imaging using ionizing and non-ionising radiation.

ii) It involves understanding of medical radiation physics, role of radiation in diagnostic radiology and imaging, hazards of radiation and protection of self, other personnel, patient and public from radiation. It provides hands on training of X-ray unit, DEXA, ultrasound, mammography, DSA, CT and MRI.

iii) Radiography and Advance Imaging Technology is a critical component of patient's treatment. Almost all departments rely on the radiological examinations for the diagnosis of pathologies and conditions. All the patients coming to radiology department have the right to receive optimum quality image with minimum radiation exposure consistent with good patient care.

2. INTRODUCTION

Radiography uses the science of radiation to produce images of tissues and organs. It is used by medical professionals to diagnose and treat medical conditions. The diagnostic side of radiography uses specialized equipment to create images, such as x-rays, that show the inside of the human body. X-rays can be recorded on a film or as a computerized image. Radiography can also be used to treat internal malignancies like tumours. A doctor who specializes in this area is called a radiologist, while an assistant is referred as a radiologic technologist. According to the American Society of Radiologic Technologists (ASRT), a radiologic technologist is part of a medical personnel team that is responsible for taking diagnostic images and performing radiation therapy treatments. These professionals are trained in a number of core areas that are important to radiography, such as patient positioning, human anatomy, patient care, radiation safety and protection, equipment handling and protocols etc.

3. LEARNING OUTCOMES FOR CURRICULUM FRAMEWORK

Learning Outcomes for Curriculum Framework i.e., LOCF is an initiative step introduced by UGC (University Grants Commission) to make the teaching-learning framework better and also to enhance the learning outcomes for students. The idea behind the implementation of LOCF is to pre-determine the outcomes that needs to be achieved by planning, mapping and measuring the student outcome. According to LOCF, the curriculum will be designed by the faculty of the respective courses which would help the students to learn about the subjects of their interest while simultaneously mapping their progress at progress with each step. The student learning outcomes would be defined in terms of knowledge, skills, understanding, graduate attributes, values and employability. The need for LOCF is to improve students' passion for learning new skills and adopting an innovative mindset. The aim of LOCF is to enhance the quality of higher education in India and encourage the students to gain the best skills and knowledge during their student journey. The learning cycle of the LOCF can be divided in three phases which is planning, execution and attainment phase, and the outcomes are set at three levels i.e. Course outcome (COs), Program outcomes (POs) and Program specific Outcome (PSOs).

4. GRADUATE ATTRIBUTES:

The 10 graduate attributes are as follows:

GRADUATE ATTRIBUTES		**DESCRIPTION**
GA 1	Disciplinary knowledge	To demonstrate technological proficiency in the health industry by utilizing the knowledge and skills required for a satisfactory diagnostic approach.
GA 2	Problem analysis	To acquire problem solving and initiative skills that contribute to productive and satisfactory outcomes.
GA 3	Problem solving	To develop and update knowledge required in dealing with various pathological investigations.
GA 4	Clinical/technical skill	To apply the skills and tools in the form of advanced and up to date modalities in diagnosis of various pathological conditions and research purpose.

GA 5	Team work	To obtain the ability to lead a team or develop team work behavior.
GA 6	Communication skills	To learn the ability to communicate various medical and technical concepts within the profession and the society including the ability of speak, listen, comprehend and document.
GA 7	Professionalism	To learn to exhibit professionalism by respecting the differences and diversity in work.
GA 8	Impacts on society and the environment	To apply the knowledge acquired during the course in the wellbeing of the patients and society at large.
GA 9	Ethics and equity	To apply ethical actions in professional and vocational situations.
GA 10	Life-long learning	To show commitment to a sustained and ongoing personal and career-related learning.

5. PROGRAMME LEARNING OUTCOMES

5.1 PROGRAMME OUTCOMES:

Students graduating with the degree B.Sc. (Radiography & Advance Imaging Technology) will be able to achieve the following:

PROGRAMME OUTCOMES	HEADER	DESCRIPTION
PO 1	Disciplinary Knowledge	Possess and acquire scientific knowledge to a health care professional
PO 2	Problem analysis	Possess qualities to solve real time problems depending on the patient scenario

PO 3	Problem solving	Possess skills to solve case related problems
PO 4	Clinical/technical Skill	Demonstrate and possess clinical skills to provide quality health care services
PO 5	Team Work	Demonstrate team work skills to support shared goals with the interdisciplinary health care team to improve societal health
PO 6	Communication skill	Communicate effectively and appropriately with the interdisciplinary health care team and the society
PO 7	Professionalism	Possess professionalism to carry out the duties as a radiographer
PO 8	Impacts on society and the environment	Possess knowledge and technicality to raise awareness for the benefit of the society
PO 9	Ethics and equity	Possess and demonstrate ethical values and professionalism within the legal framework of the society
PO 10	Life long learning	Display entrepreneurship, leadership and mentorship skills to practice independently as well as in collaboration with the interdisciplinary health care team

5.2 PROGRAMME SPECIFIC OUTCOMES:

Upon completion of this course the student should be able to:

PROGRAMME SPECIFIC OUTCOMES	DESCRIPTION
PSO 1	Know and demonstrate understanding of the concepts of physics and other
PSO 2	Capable of analyzing various situations and use proper technique applicable according to the need of the patient.
PSO 3	Develop the knowledge, skills and technology necessary for obtaining good quality images which will aid in the process of diagnosis.
PSO 4	Apply the various technical and analytical knowledge in creation of good radiographs and other high quality imaging films

6. Teaching Learning Process

Teaching and learning in this programme involves classroom lectures as well as tutorial and remedial classes.

6.1 Tutorial classes: Tutorials allow closer interaction between students and teacher as each student gets individual attention. The tutorials are conducted for students who are unable to achieve average grades in their weekly assessments. Tutorials are divided into three categories, viz. discussion-based tutorials (focusing on deeper exploration of course content through discussions and debates), problem-solving tutorials (focusing on problem solving processes and quantitative reasoning), and Q&A tutorials (students ask questions about course content and assignments and consolidate their learning in the guiding presence of the tutor).

6.2 Remedial classes: The remedial classes are conducted for students who achieve average and above average grades in their weekly assessments. The focus is laid to equip the students to perform better in the exams/assessments. The students are divided into small groups to provide dedicated learning support. Tutors are assigned to provide extra time and resources to help them understand concepts with advanced nuances. Small groups allow tutors to address their specific needs and monitor them. Following methods are adopted for tutorial and remedial classes:

- Written assignments and projects submitted by students
- Project-based learning
- Group discussions
- Home assignments
- Class tests, quizzes, debates organised in the department

- Seminars and conferences
- Extra-curricular activities like cultural activities, community outreach programmes etc.
- Field trip, excursions, study tour, interacting with eminent authors, etc.

7. SCHEME OF EVALUATION

	Component of Evaluation	Marks	Frequency	Code	Weightage (%)
A	**Continuous Evaluation**				
i	Weekly Assessment / Class test	Combination of any three from (i) to (v) with 5 marks each	1-3	C	25%
ii	Home Assignment		1-3	H	
iii	Project		1	P	
iv	Seminar		1-2	S	
v	Viva-Voce/Presentation		1-2	V	
vi	MSE	MSE shall be of 20 marks	1-3	Q/CT	
vii	Attendance	Attendance shall be of 5 marks	100%	A	5%
B	**Semester End Examination**		1	SEE	70%
	Project				**100%**

8. PROGRAMME STRUCTURE

BSc. Radiography And Advance Imaging Technology

Programme Structure

1ST SEMESTER (PART I)							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	RIT242C111	Anatomy-I	2	0	4	4	6
2	RIT242C112	Physiology-I	2	0	4	4	6
3	RIT242C113	Biochemistry-I	2	0	4	4	6
Skill Enhancement Course (SEC)							
4	RIT242S111	SEC-I: Medical Law and Ethics-I	0	0	4	2	4
Value Addition Course (VAC)							
5	RIT242V101	VAC-I	2	0	0	2	2
Ability Enhancement Compulsory Courses (AECC)							
6	CEN982A101	AECC 1: Communicative English I	1	0	0	1	1
7	BHS982A104	AECC 2: Behavioral Science I	1	0	0	1	1
Generic Elective							
8	RIT242G101	GE-I : Hospital Duty and Patient Care-I	3	0	0	3	3
	RIT242G102	GE-I : Medical Emergencies	3	0	0	3	3
9		GE-II	3	0	0	3	3
		TOTAL	**19**	**2**	**3**	**24**	**24**
2ND SEMESTER							
Sl. No	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	RIT242C211	Anatomy-II	2	0	4	4	6
2	RIT242C212	Physiology-II	2	0	4	4	6
3	RIT242C213	Biochemistry-II	2	0	4	4	6
Skill Enhancement Course (SEC)							
4	RIT242S211	SEC-II: Medical Law and Ethics-II	0	0	4	2	4

Value Addition Course (VAC)							
5	RIT242V201	VAC-II	2	0	0	2	2
Ability Enhancement Compulsory Courses (AECC)							
6	CEN982A201	AECC 3: Communicative English II	1	0	0	1	1
7	BHS982A204	AECC 4: Behavioral Science–II	1	0	0	1	1
Generic Elective							
8	RIT242G201	GE-III: Hospital Duty and Patient Care-II	3	0	0	3	3
	RIT242G202	GE-III: Microbiology	3	0	0	3	3
10		GE-IV	3	0	0	3	3
		TOTAL	**19**	**2**	**3**	**24**	**24**

3RD SEMESTER (PART II)							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	RIT242C301/311	Basic Physics	2	0	4	4	6
2	RIT242C312	General Radiographic Technique - I	0	0	8	4	4
Discipline Specific Elective (DSE) (any one)							
4	RIT242D301	DSE 1: Radiation Hazards & Protection	4	0	0	4	4
	RIT242D302	DSE 1: Pharmacology	4	0	0	4	4
Ability Enhancement Compulsory Courses (AECC)							
5	CEN982A301	AECC 5: Communicative English III	1	0	0	1	1
6	BHS982A304	AECC 6: Behavioral Science III	1	0	0	1	1
Generic Elective							

7	RIT242G301 RIT242G302	GE-V: Basics of Pathology GE-V: Orientation in Clinical Sciences	3	0	0	3	3
8		GE-VI	3	0	0	3	3
Internship							
9	RIT242C313	Clinical Posting	4	0	0	4	4
		TOTAL	**22**	**1**	**12**	**24**	**26**

4TH SEMESTER							
Sl.No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	RIT242C401	Physics of Radiology	3	1	0	4	4
2	RIT242C402	General Radiographic Technique-II	3	1	0	4	4
Discipline Specific Elective (DSE) (any one)							
3	RIT242D411	DSE 2: Techniques of General Radiography	0	0	8	4	8
	RIT242D412	DSE 2: Procedures of Microbiology	0	0	8	4	8
Skill Enhancing Course (SEC)							
5	RIT242S411	SEC-III: Computer Skills	0	0	4	2	4
Value Addition Course (VAC)							
6	RIT242V401	VAC-III	2	0	0	2	2
Generic Elective							
7	RIT242G401 RIT242G402	GE-VII : Basics of Ultrasound and ECG GE-VII: Medical Emergencies & Patient Care	3	0	0	3	3
8		GE-VIII	3	0	0	3	3
Ability Enhancement Elective Courses (AEEC)							

9	CEN982A401	AEEC 7: Communicative English IV	1	0	0	1	1
10	BHS982A402	AEEC 8: Behavioural Science IV	1	0	0	1	1
		TOTAL	**21**	**2**	**1**	**24**	**24**

5TH SEMESTER (PART III)							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	RIT242C501/511	Computed Tomography	2	0	4	4	6
2	RIT242C502	Radiographic Special Procedures	3	1	0	4	4
Discipline Specific Elective (DSE) (one from each set)							
3	RIT242D501	DSE 3: Darkroom Technique	4	0	0	4	4
	RIT242D502	DSE 3: Patient Assessment and Medication Administration	4	0	0	4	4
4	RIT242D513	DSE 4: Procedures of Special X-ray	0	0	8	4	4
	RIT242D514	DSE 4: Basic and Advanced Life Support	0	0	8	4	4
Value Addition Course (VAC)							
5	RIT242V501	VAC-IV	2	0	0	2	2
Ability Enhancement Compulsory Courses (AECC)							
6	CEN982A501	AECC 9: Communicative English-V	1	0	0	1	1
7	EVS982A503	AECC 10: Environmental Studies & Sustainable Development I	1	0	0	1	1
Internship							
8	RIT242C513	Clinical Posting	6	0	0	6	6
		TOTAL	**24**	**2**	**0**	**26**	**26**

6TH SEMESTER							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							

1	RIT242C601	Magnetic Resonance Imaging	3	1	0	4	4
2	RIT242C602	Basics of Radiotherapy	3	1	0	4	4
Discipline Specific Elective (DSE) (any three)							
3	RIT242D601	DSE 5: Fundamentals of Medical Terminology	4	0	0	4	4
	RIT242D602	DSE 5: Biostatistics and Research Methodology	4	0	0	4	4
4	RIT242D603	DSE 6: Techniques of Mammography & Fluoroscopy	4	0	0	4	4
	RIT242D604	DSE 6: Forensic Medicine	4	0	0	4	4
5	RIT242D605	DSE 7: Interventional Radiology	4	0	0	4	4
	RIT242D606	DSE 7: Medical Equipment Usage and Management	4	0	0	4	4
Skill Enhancing Course (SEC)							
9	RIT242S601	SEC-IV: Project	0	0	4	2	4
Value Addition Course (VAC)							
10	RIT242V6601	VAC-V	2	0	0	2	2
Ability Enhancement Compulsory Courses (AECC)							
11	CEN982A601	AECC 11: Communicative English-VI	1	0	0	1	1
12	EVS982A603	AECC 12: Environmental Studies & Sustainable Development II	1	0	0	1	1
		TOTAL	**24**	**1**	**1**	**26**	**26**

Total credit for the course: 24+24+24+24+26+26 = 148

12 MONTH OF OF ROTATIONAL INTERNSHIP

9.COURSE STRUCTURE FOR BRIT

SEMESTER	CORE COURSE (4 Cr)	**credit**	Ability Enhancement Compulsory Course (AECC) (1 Cr)	credit	Skill Enhancing Course (SEC) (2 Cr)	credit	Value Addition Course (VAC) (2 Cr)	Credit	Elective: Discipline Specific DSE (4 Cr)	Credit	Elective: Generic (GE) (3 Cr)	credit	Internship (Cr)	No of papers each semester	Total Credit
I	Anatomy - I	4	Comm. English – I	1	SEC-I	1	VAC-I	2	Nil	Nil	GE-1	3	Nil	9	24
	Physiology - I	4	Behavioural Science-I *	1							GE-2	3			
	Biochemistry - I	4													
II	Anatomy - II	4	Comm. English – II	1	SEC-II	1	VAC-II	2	Nil	Nil	GE-3	3	Nil	9	24
	Physiology - II	4	Behavioural Science-II *	1							GE-4	3			
	Biochemistry - II	4													
III	Basic Physics	4	CEN-III	1	Nil	Nil	Nil	Nil	DSE-1	4	GE-5	3	4	8	24
	General radiographic Technique I	4	BHS-III	1							GE-6	3			
IV	Radiographic Technique	4	Comm. English-IV	1	SEC-III	2	VAC-III	2	DSE-2	4	GE-7	3	Nil	9	24
	Physics of radiology	4	BHS-IV	1							GE-8	3			

V	Medical Radiation Physics	4	Comm. English -V	1	Nil	Nil	VAC-IV	2	DSE-3	4	Nil	Nil	6	8	26
	Radiographic Special Procedures	4	Environmental Studies & Sustainable Development 1	1					DSE-4	4					
VI	Diagnostic Imaging Technique	4	Comm. English – VI	1	SEC-IV	2	VAC-V	2	DSE-5	4	Nil	Nil	Nil	9	26
	Basics of Radiotherapy	4	Environmental Studies & Sustainable Development 2	1					DSE-6	4					
									DSE-7	4					

Total credit for the course: 24+24+23+24+23+24=148

1 Year Internship

DETAILED SYLLABUS FOR THE COURSE

SYLLABUS

(FIRST SEMESTER)

BSc. Radiography And Advance Imaging Technology

Programme Structure

Subject Name: ANATOMY - I (THEORY + PRACTICAL)		**Subject Code: RIT242C111**
L-T-P-C – 2-0-4-4	**Credit Units: 4**	**Scheme of Evaluation: TP**

Objective : This subject is designed to impart fundamental knowledge on the structure of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of anatomy.

Course Outcome:

Upon completion of this course the student should be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the different anatomical structures of the human body.	BT 1
CO 2	**Compare** various body systems and co-relate the anatomy among them all.	BT 2
CO 3	**Apply** different laws in assessing various pathological conditions.	BT 3
CO 4	**Apply** the knowledge of anatomy as necessary in the production of good quality images.	BT 3

Detailed Syllabus (Theory):

Modules	**Topics (if applicable) & Course Contents**	**Periods**

I.	**Introduction:** • Definition of anatomy and its divisions, Terms of location, positions and planes. • Cell and its organelles, Tissues & its classification, Glands.	**4**
II.	**Gastro-intestinal System:** • Parts of the GIT - mouth, pharynx, oesophagus, stomach • Abdominal cavity - divisions and regions • Liver • Pancreas • Spleen • Gall Bladder • Intestine (small and large)	**5**
III.	**Musculoskeletal system:** • Structure of Bone & its types. • Joints- Classification of joints with examples; details of synovial joint. • Axial skeleton & appendicular skeleton • Bones of appendicular skeleton • Bones of axial skeleton • Locomotor system - bone , cartilage, ligaments and tendons • Muscles & its types	**5**
IV	**Cardiovascular System:** • Arteries & veins, Capillaries & arterioles. • Heart- size, location, chambers, blood supply of heart, pericardium. • Systemic & pulmonary circulation. • Major blood vessels of Heart **Lymphatic System:** • Lymph & Lymph vessels. • Structure of lymph node, names of regional lymphatics, axillary and inguinal lymph nodes.	**10**
TOTAL		**24 hours**

Text Books :

1. Sembulingam, K., Sembulingam, P. (2012). Essentials of Medical Physiology, 6th Edition, New Delhi: Jaypee brothers medical publishers.

2. Wilson, J.W., Livingstone, K. C. (1987). Anatomy and Physiology in Health and Illness, 6th Revised Edition, New York: Churchill Livingstone.

Reference Books:

1. Tandon, O.P., Tripathi, R. (2011). Best and Tailor's Physiological basis of Medical Practice. 13th Edition. USA: Williams & Wilkins

2. Arthur, C. Guyton., Hall, E. J. (2011). Text book of Medical Physiology. 12th Edition. USA: Elsevier's.

3. Chatterrje, C. C. (2017). Human Physiology. 11th Edition. Kolkata: Academic Publishers.

4. Tandon, O.P., Tripathi, R. (2011). Best and Tailor's Physiological basis of Medical Practice, 13th Edition, USA: Williams & Wilkins

Detailed Syllabus (PRACTICALS):

Modules	Topics	Periods
I	• Introduction of the human body • To identify different levels of organisation and types of tissues • Study of compound microscope	10
II	• To identify different planes and cavities of the body • To iednitfy the division of the skeleton and the names of the indivisual bones • To idenitfy commonly used terms of movement • To idenitfy the quadrants and regions of the body	14
III	• To identify humerus • To identify radius • To identify ulna • To identify hand	14
IV	• To identify Clavicle • To identify Scapula	10
TOTAL		**48**

Text Books:

1. Ross and Wilson (2014), Anatomy and physiology in health and illness, 11th edition, Elsevier publications
2. Chaurasia BD, (2016), Human Anatomy , 7th edition, CBS publisher

References:

1. Frank. N. Nettar, Atlas of human Anatomy,7th Edition, Elsevier
2. Frederic H. Martini, Judi L.Nath, EdwinFB, Fundamentals of Anatomy and Physiology,9th edition, pearson publishers.
3. Gerard J TorTora and Bryan H Derrickson , principles of anatomy and physiology, 14th edition, Wiley Publications

Subject Name: PHYSIOLOGY - I (THEORY)		**Subject Code: RIT242C112**
L-T-P-C – 2-0-4-4	**Credit Units: 4**	**Scheme of Evaluation: TP**

Objective: This subject is designed to impart fundamental knowledge on the physiology and the functioning of the various systems of the human body. It also helps in understanding the homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of physiology.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Understand** the normal physiology of the human body and also the reaction of the body in respect to the surrounding.	BT 1
CO2	To **demonstrate** the understanding and scope of human physiology in real life situations.	BT 2
CO3	To **evaluate** how abnormal physiological conditions might affect normal human functioning.	BT 3
CO4	To **apply** the normal physiological knowledge in assessing abnormal functional findings.	BT 4

Detailed Syllabus (Theory):

Modules	Topics (if applicable) & Course Contents	Periods
I	**Blood** • Red Blood Cells- Functions, count, Physiological and pathological variations. Erythropoesis-stages • Hemoglobin-Functions, Physiological variations. • White Blood cells- Functions, count, morphology. • Platelets-count, morphology, functions. Hemostasis-Definition, Mechanism, clottingfactors. • Blood groups-ABO system, Rh system, Blood transfusion-Indication, transfusion reactions. • Anaemias-classification, effects of anaemia on body.	**6**
II.	**Gastrointestinal System** • Physiological Anatomy, functions of GIT. • Salivary Gland-functions of saliva. • Stomach- structure and functions, Gastric secretions-composition, functions, Mechanism • Pancreas- structure, functions, composition of Pancreatic juice. • Liver-Functions of liver. • Bile-Composition, functions. • Jaundice-Types and its causes. • Gall Bladder- Functions • Intestine- Movements of small and large intestine. • Digestion and Absorption of Carbohydrates, Proteins, Fats. • Hormones of GIT- Functions of Gastrin, Secretin, CCK-Pz.	8
III	**Cardiovascular System** • Heart-Physiological Anatomy, Nerve supply • Cardiac Cycle-Events –systole, diastole • Cardiac Output-Definition and factors affecting it. • Heart sounds-normal heart sounds, its causes, areas of auscultations. • Blood Pressure-Definition, normal value, Physiological variations, its measurement. • ECG- normal waves. • Shock-Definition, Types.	**10**
TOTAL		**24**

Text Book:

1. Sembulingam, K., Sembulingam, P. (2012). Essentials of Medical Physiology, 6th Edition, New Delhi: Jaypee brothers medical publishers.

2. Wilson, J.W., Livingstone, K. C. (1987). Anatomy and Physiology in Health and Illness, 6th Revised Edition, New York: Churchill Livingstone.

Reference Books:

1. Tandon, O.P., Tripathi, R. (2011). Best and Tailor's Physiological basis of Medical Practice. 13th Edition. USA: Williams & Wilkins

2. Arthur, C. Guyton., Hall, E. J. (2011). Text book of Medical Physiology. 12th Edition. USA: Elsevier's.

3. Tandon, O.P., Tripathi, R. (2011). Best and Tailor's Physiological basis of Medical Practice, 13th Edition, USA: Williams & Wilkins

4. Arthur, C. Guyton., Hall, E. J. (2011). Text book of Medical Physiology, 12th Edition, USA: Elseviers.

Detailed Syllabus (Practical):

Detailed Syllabus

Modules	Topics	Hours
I	Identification of some laboratory instruments	8
II	Determination of blood haemoglobin level	8
III	Determination of bleeding time	8
IV	Determination of clotting time	8
V	Blood smear preparation, staining and differential leukocyte count	10
VI	Blood pressure measurement	6
TOTAL		**48**

Text Books:

1. Guyton and Hall ,2011, Textbook of medical physiology ,12th edition, Elsevier publications
2. Sembulingam K (2012) , Essentials of Medical physiology, 6th edition, Jaypee Publications.

References:

1. Frederic H. Martini, Judi L.Nath, EdwinFB, Fundamentals of Anatomy and Physiology,9th edition, pearson publishers
2. Elaine N.Mareib, Essential of Human Anatomy and physiology, 10th edition, Pearson publishers.
3. Ross and Wilson (2014), Anatomy and physiology in health and illness, 11th edition, Elsevier publications

Subject Name: BIOCHEMISTRY- I (THEORY)		**Subject Code: RIT242C113**
L-T-P-C – 2-0-4-4	**Credit Units: 4**	**Scheme of Evaluation: TP**

Objective : The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Know** the basic biochemistry of carbohydrates, lipids and proteins	BT 1
CO2	**Understand** the basics of electrolytes and their importance	BT 2
CO3	**Apply** the acquired knowledge in the preparation of physical chemistry and organ function tests.	BT 3
CO4	**Analyse** the various reactions taking place in the human body at the molecular level.	BT 4

Detailed Syllabus (Theory):

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	**Carbohydrates**: Structure, Function and properties of Monosaccharides, Disaccharides and Polysaccharides. Homo & Hetero Polysaccharides, Mucopolysaccharides, Bacterial cell wall	6

	polysaccharides, Glycoprotein's and their biological functions	
II.	**Nucleic acids**: Structure and functions: Physical & chemical properties of Nucleic acids, Nucleosides & Nucleotides, purines & pyrimidines, biologically important nucleotides, Double helical model of DNA structure and forces responsible for A, B & Z – DNA, denaturation and renaturation of DNA.	**6**
III.	**Lipids**: Structure and functions –Classification, nomenclature and properties of fatty acids, essential fatty acids. Phospholipids, sphingolipids, glycolipids, cerebrosides, gangliosides, Prostaglandins, Cholesterol.	6
IV.	**Proteins:** Structure & Function. Structure and properties of Amino acids, Types of proteins and their classification, Forces stabilizing protein structure and shape. Different Level of structural organization of proteins, Protein Purification. Denaturation and renaturation of proteins. Fibrous and globular proteins. **Enzymes**: Nomenclature and classification of Enzymes, Holoenzyme, apoenzyme, Cofactors, coenzyme, prosthetic groups, metalloenzymes, mechanism of enzyme action, formation of enzyme-substrate complex, factors that affect enzyme activity-pH, temperature, inhibitors	**6**
Total		**24**

Text Book:

1. Nelson, D.L., Cox, M.M. (2017). Lehninger Principles of Biochemistry, 7th Edition; WH Freeman publishers.

2. Robert, K., Murry, Daryl., Granner, K., Victor, W.R. (2015). Harper's Biochemistry, 30th Edition, New Delhi: McGraw-Hill Education / Medical publishers.

Reference Book:

1. Rajagopal, G. & Tura, B.D. (2005). Practical Biochemistry for Medical students. 2nd Edition. Ahuja Publishing House.

2. Harold, Varley. (2005). Practical Biochemistry. 4th Edition. CBS publishers and distributors.

3. Jeremy, M. B., Stryer, L., Tymoczko, J., Gatto, G. (2019). Biochemistry, 9th Edition, New Delhi:WH Freeman publishers.

4. Satyanarayan, U., Chakrapani, U. (2017). Biochemistry, 5th Edition; Elsevier India.

5. Rama, Rao. (2017). Textbook of Biochemistry, 10th Edition; UBS Publishers\' Distributors Pvt. Ltd.

Detailed Syllabus (Practicals):

Detailed Syllabus

Modules	Topics	Hours
I	Identification of some laboratory instruments	12
II	Determination of urine glucose	12
III	Qualitative test for Protein (precipitation reaction) Qualitative test for Protein (Heat and acid method)	24
Total		**48**

Text books:

1. Text book of Medical Biochemistry – MN Chaterjee, Rana Shinde.
2. Biochemistry, U.Sathyanarayana, Elsevier

References:

1. Lehinger Principle of Biochemistry, David L Nelson, 7th edition, WH freeman Publishers
2. Fundamentals of biochemistry,JL jain and Sanjay Jain,S Chand Publishers
3. Harper's Biochemistry,28th edition, Robert K Murray, Tata McGraw publishers

Subject Name: SEC– I (Medical, Law & Ethics-I)		**Subject Code: RIT242S111**
L-T-P-C – 0-0-4-2	**Credit Units: 2**	**Scheme of Evaluation: P**

Objective: The course provides an introduction to ethics generally and more specifically to medical ethics, examining in particular the principle of autonomy, which informs much of medical law. The course then considers the general part of medical law governing the legal relationship between medical practitioners and their patients. It considers the legal implications of the provision of medical advice, diagnosis and treatment. Selected medico-legal issues over a human life are also examined. These may include reproductive technologies, fetal rights, research on human subjects, organ donation, and the rights of the dying and the legal definition of death.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Define** ethics and its importance in the functioning of the hospital.	BT 1
CO2	**Outline** the various issues related to healthcare setup and also manage the hospital with the various issues that can arise from the legal perspective.	BT 2
CO3	**Recognize** and train the workforce to meet the challenges of changing dynamics in healthcare scenario in terms of the regulations that governs the operational aspects of the hospital.	BT 3
CO4	**Distinguish** the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice.	BT 4

Detailed Syllabus:

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I	Introduction: Basics of Medical Ethics, Values in medicine, ethical problems and the medical profession, goals of medical intervention, patient-doctor relationship	14
II.	Codes of Conduct: historical perspective, international codes of medical ethics- duties of physicians to the sick and to each other	10

III	Informed consent, right of patients- right to life, female foeticide, gender determination, reproductive technologies-adoption, AID, IVF, GIFT, SIFT, surrogacy, ICMR guidelines	12
IV	Introduction: Basic definition and goals, medical profession definition and criteria, clinical ethics, ethical problems, core curriculum for medical ethics and law, code of conduct, malpractice and negligence, UN principles of medical ethics, irrational drug therapy	12
TOTAL		**48**

Text Book:
1. Medical Ethics 2nd Edition, by CM Francis: Jaypee Brothers

Reference Books:
1. Clinical Ethics: A Practical Approach to Ethical Decisions in Clinical Medicine, 8th Edition, by Albert R. Jonsen, Mark Siegler, William J Winslade.
2. Textbook of Medical Ethics, Erich H. Loewy, M.D.

Subject Name: HOSPITAL DUTY AND PATIENT CARE – I		**Subject Code: RIT242G101**
L-T-P-C – 3-0-0-3	**Credits Units: 3**	**Scheme of Evaluation: T**

Objective: This syllabus has been formulated to impart basics knowledge on hospitals, record keeping and report writing, basic care, comfort, sign and symptoms and hygiene of patients.

Course outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Recall** the principles and functions of hospital management.	BT 1
CO2	**Explain and demonstrate** the concept of writing good reports and records.	BT 2

CO3	**Apply** the knowledge about quality management and disposal of bio medical waste.	BT 3
CO4	**Apply** the concept of basic care needs and maintaining personal and hospital hygiene to real life hospital situations.	BT 3
CO5	To **create** a patient friendly environment and give proper comfort and support during the various procedures.	BT 6

Detailed syllabus:

Modules	Topics (if applicable) & Course Contents	Hours
I.	• Hospitals - types and administration • Structural organisation of the Radiology department • Records and reports • Hospital Management and Human Resource • Ethical codes	**10**
II.	• Quality Management • Biomedical waste management • Basic care needs • Laboratory safety	**6**
III.	• Vital signs	10
IV	• Communication • Care of patient • Patient rights and responsibilities • Negligence • Comfort positions for patient	10
TOTAL		**36**

Textbooks:

1. Hospital Duty and Patient Care in Diagnostic Radiology – Dr. N. K. Karda, , Lalit Agarwal, J.B.D. Publication.
2. Patients Right – A Sampath Kumar (CBS Publication.

References:

1. Fundamentals of Hospital Practice and Patient care – Vyakarnam Nageswar, Paras medical books Pvt. Ltd.

2. Principles of Hospitals Practice and Patient Care – P Srinivasulu Reddy , Paras medical books Pvt. Ltd.

3. Hospital Supporting Services and System – Dr. M A George , Daya Publishing House.

4. Manual of First Aid – L. C. Gupta, Abhitabh Gupta , Jaypee Publication.

5. Patient Care Management – A. K. Mohiuddin, Red Flower Publication Pvt. Ltd

Subject Name: MEDICAL EMERGENCIES		**Subject Code: RIT242G102**
L-T-P-C – 3-0-0-3	**Credit Units: 3**	**Scheme of Evaluation: T**

Objective: The student demonstrates the ability to conduct a focused medical history and targeted physical examination appropriate to the patient's chief complaints and the history of the present illness and apply appropriate clinical pharmacological principles in the selection of drugs to treat common problems.

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO1	**Name** the different Gynaecological and Obstetrics emergencies.	**BT 1**
CO2	**Summarize** a full management plan for the different emergencies.	**BT 2**
CO3	**Develop** an assessment plan and discover the crises of the patient.	**BT 3**
CO4	**Simplify** the pathopgysiology, assessment and management of the different emergencies.	**BT 4**

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	**Behavioral Emergencies** • Psychiatric signs and symptoms • Assessment and management of behavioural emergencies	**10 hours**

	• Management and handling of hostile and violent patients.	
II.	**Gynecological emergencies - I** • Pathophysiology of various diseases • Assessment and management **Labor & Its Complications** • Complications of pregnancy and labor. • Trauma during pregnancy. • Normal Delivery and abnormal deliveries.	**14 hours**
III.	**Obstetrics:** • Review of anatomy of female reproductive system • Conception and gestation • Physiology of maternal changes during pregnancy. • Medical conditions that can be detrimentally affected by Pregnancy.	**10 hours**
IV.	**Endocrine emergencies, Allergic emergencies** • Review of Anatomy and physiology • Pathophysiology • Assessment and management **Gastro intestinal, Renal and urological emergencies** • Review of Anatomy and physiology • Pathophysiology • Assessment and management	**14 hours**
TOTAL		**48 hours**

Text Book:

1. Nancy Caroline's Emergency Care in the Streets, AAOS.

2. Clinical Obstetrics and Gynecology, by Sharmila Sharmila & Arun Babu

Reference Book:

1. Falcon Clinical Cases in Obstetrics And Gynecology History taking - Case Discussion - Viva Voice and Instrument by by Naseha Fatthima

2. Emergency Medical Services by SN Chugh.

SECOND SEMESTER

Bachelor Degree in Radiography and Advance Imaging Technology BRIT)

Subject Name: ANATOMY - II (THEORY + PRACTICAL)		**Subject Code: RIT242C211**
L-T-P-C – 2-0-4-4	**Credit Units: 4**	**Scheme of Evaluation: TP**

Objective: This subject is designed to impart fundamental knowledge on the structure of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of anatomy.

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the different anatomical structures of the human body.	BT 1
CO2	**Compare** various body systems and co-relate the anatomy among them all.	BT 2
CO3	**Apply** different laws in assessing various pathological conditions.	BT 3
CO4	**Apply** the knowledge of anatomy as necessary in the production of good quality images.	BT 3

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**

I.		**Respiratory system:** Parts of Respiratory system; Structure of nose, nasal cavity, larynx, trachea, lungs, pleura, bronchopulmonary segments.	**6**
II.		**Urinary System:** Parts of Urinary system, location and gross structure of kidney, ureter, urinary bladder, urethra. **Reproductive system:** • Parts of male reproductive system, gross structure of testis, vas deferens, epididymis, prostate. Parts of female reproductive system, gross structure of uterus, ovary, fallopian tube, mammarygland.	6
III		**Nervous system:** • Neuron, classification of NS. • Meninges, ventricles, CSF. • Gross features of cerebrum, midbrain, pons, medulla oblongata, cerebellum, name of basal nuclei. • Blood supply of brain, cranial nerves. • Spinal cord and spinal nerves. • Autonomic nervous system. • Visual & auditory pathways	8
IV		**Endocrine glands:** Name of all endocrine glands, gross structure & functions of pituitary gland, adrenal gland, thyroid gland and parathyroid gland. **Sensory Organs:** • Skin & its appendages. • Structure of eye & lacrimal apparatus, name of extraocular muscles. Structure of ear: external, middle & inner ear.	4
TOTAL			**24**

Text Book:

1. Sembulingam, K., Sembulingam, P. (2012). Essentials of Medical Physiology, 6th Edition, New Delhi: Jaypee brothers medical publishers.

2. Wilson, J.W., Livingstone, K. C. (1987). Anatomy and Physiology in Health and Illness, 6th Revised Edition, New York: Churchill Livingstone.

Reference Books:

1. Tandon, O.P., Tripathi, R. (2011). Best and Tailor's Physiological basis of Medical Practice. 13th Edition. USA: Williams & Wilkins

2. Arthur, C. Guyton., Hall, E. J. (2011). Text book of Medical Physiology. 12th Edition. USA: Elsevier's.

3. Tandon, O.P., Tripathi, R. (2011). Best and Tailor's Physiological basis of Medical Practice, 13th Edition, USA: Williams & Wilkins

4. Arthur, C. Guyton., Hall, E. J. (2011). Text book of Medical Physiology, 12th Edition, USA: Elseviers.

Detailed Syllabus (Practical):

Modules	Topics	Periods
I	- To identify Femur - To identify Tibia - To identify Fibula - To identify foot	16
II	- To identify the pelvic bones	6
III	- To identify the bones of the skull	10
IV	- To identify the vertebral bones	6
V	- To identify the bones of the rib cage	10
TOTAL		**48**

TextBooks:

3. Ross and Wilson (2014), Anatomy and physiology in health and illness, 11th edition, Elesevier publications.
4. Chaurasia BD, (2016), Human Anatomy, 7th edition, CBS publisher.

References:

4. Frank. N. Nettar, Atlas of Human Anatomy,7th Edition, Elsevier

5. Frederic H. Martini, Judi L. Nath, Edwin FB, Fundamentals of Anatomy and Physiology,9th edition, Pearson publishers.
6. Gerard J Tortora and Bryan H Derrickson, principles of a Anatomy and Physiology 14th edition, Wiley Publications

Subject Name: PHYSIOLOGY - II (THEORY + PRACTICAL)		**Subject Code: RIT242C212**
L-T-P-C – 2-0-4-4	**Credit Units: 4**	**Scheme of Evaluation: TP**

Objective: This subject is designed to impart fundamental knowledge on the physiology and the functioning of the various systems of the human body. It also helps in understanding the homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of physiology.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Understand** the normal physiology of the human body and also the reaction of the body in respect to the surrounding.	BT 1
CO2	To **explain** the understanding and scope of human physiology in real life situations.	BT 2
CO3	To **apply** the normal physiological knowledge in assessing abnormal functional findings.	BT 3
CO4	To **evaluate** how abnormal physiological conditions might affect normal human functioning.	BT 5

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**

I	**Respiratory System** • Physiological Anatomy, Functions of the respiratory system. • Types of respiration, respiratory membrane. • Lung volumes and capacities, vital capacity and factors affecting it. • Transport of Oxygen-Forms of transportation, Oxy-hemoglobin dissociation curve and factors affecting it. • Transport of Carbon-Dioxide- Forms of transportation. • Hypoxia-Definition, types, effects of hypoxia. • Cyanosis-Definition and types. • Artificial Respiration- CPR	6
II.	**Excretory System** o Kidneys-structure of nephron, functions of kidney o Glomerular filtration Rate(GFR) and factors affecting it o Counter Current Mechanism ▪ Bladder-its innervation, micturition reflex **Reproductive System** o Male Reproductive System-Stages of spermatogenesis, function of Testosterone ▪ Female Reproductive System-Ovulation, menstrual cycle, functions of Estrogen andprogesterone	**6**
III	**Central Nervous System** o Structure of neuron, functions of nervous system. o Classification and properties of nerve fibres o Synapse- structure and types o Receptors-Definition, classification, properties, Reflex Arc o Functions of Hypothalamus o Functions of Cerebellum and Basal Ganglia o Functions of Cerebral Cortex o Autonomic Nervous System- Actions of sympathetic and parasympathetic systemand their comparison. o Special Senses-Eye-structure,	**7**

	functions of different parts, Visual acuity,Refractive errors o Ear-structure, functions, General mechanism of hearing.	
IV	**Endocrine System** o Classification of Endocrine glands and their hormones. o Thyroid Gland-Physiological Anatomy, hormones secreted, functions, disorders- Hypo and hyper secretion of hormone. o Adrenal Gland-Adrenal Cortex-Physiological Anatomy, its hormones and functions. o Adrenal Medulla-Hormones, functions. o Pituitary Gland- Anterior and posterior pituitary hormones and their functions,disorders. o Pancreas- Hormones and their functions, Diabetes Mellitus-types, pathophysiology,signs and symptoms. • Parathyroid Gland- Hormones and their functions.	**5**
TOTAL		**24**

Text Book:

1. Sembulingam, K., Sembulingam, P. (2012). Essentials of Medical Physiology, 6th Edition, New Delhi: Jaypee brothers medical publishers.

2. Wilson, J.W., Livingstone, K. C. (1987). Anatomy and Physiology in Health and Illness, 6th Revised Edition, New York: Churchill Livingstone.

Reference Books:

1. Tandon, O.P., Tripathi, R. (2011). Best and Tailor's Physiological basis of Medical Practice. 13th Edition. USA: Williams & Wilkins

2. Arthur, C. Guyton., Hall, E. J. (2011). Text book of Medical Physiology. 12th Edition. USA: Elsevier's.

3. Chatterjee, C. C. (2017). Human Physiology. 11th Edition. Kolkata: Academic Publishers.

4. Arthur, C. Guyton., Hall, E. J. (2011). Text book of Medical Physiology, 12th Edition, USA: Elseviers.

Detailed Syllabus (Practicals):

Modules	Topics	Hours
I	Qualitative test for ABO Grouping	

		10
II	Determination of Platelet count	8
III	Determination of Erythrocyte Sedimentation Rate	10
IV	Determination of Haematocrit	10
V	Total Erythrocyte Count using a Hemocytometer	10
TOTAL		**48**

Text Books:

3. Guyton and Hall ,2011, Textbook of medical physiology ,12th edition, Elsevier publications
4. Sembulingam K (2012) , Essentials of Medical physiology, 6th edition, Jaypee Publications.

References:

4. Frederic H. Martini, Judi L.Nath, EdwinFB, Fundamentals of Anatomy and Physiology,9th edition, pearson publishers
5. Elaine N.Mareib,Essential of Human Anatomy and physiology, 10th edition, Pearson publishers.
6. Ross and Wilson (2014), Anatomy and physiology in health and illness, 11th edition, Elsevier publications

Subject Name: BIOCHEMISTRY- II (THEORY)		**Subject Code: RIT242C213**
L-T-P-C – 2-0-4-4	**Credit Units: 4**	**Scheme of Evaluation: TP**

Objective: The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**

CO 1	**Recall** the basic biochemistry of carbohydrates, lipids and proteins	BT 1
CO2	**Understand** the basics of electrolytes and their importance	BT 2
CO3	**Apply** the acquired knowledge in the preparation of physical chemistry and organ function tests.	BT 3
CO4	**Analyse** the various reactions taking place in the human body at the molecular level.	BT 4

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Cell: Morphology, Structure and Function of cell, Cell membrane, Nucleus, Chromatin, Mitochondria, Endoplasmic reticulum, Ribosome	9
II.	Hormones: Insulin, Glucagon, Thyroid hormone, Parathyroid hormone, Cortical hormones, Growth hormones. Mechanism of hormone action; Disease related to endocrine system-	**9**
III.	Vitamins and Minerals: Definition and classification according to solubility, source and function of individual vitamins, deficiency of vitamin and associated diseases. Individual mineral-Calcium, phosphorus, Selenium, Molybdenum etc., Sources and function of minerals	6
IV.	Techniques in Biochemistry: Electrophoresis of DNA and P protein, Spectroscopy, Colorimetry, Chromatography, Microscopy and Centrifugation	**6**
Total		**24**

Text Book:

1. Nelson, D.L., Cox, M.M. (2017). Lehninger Principles of Biochemistry, 7th Edition; WH Freeman publishers.

2. Robert, K., Murry, Daryl., Granner, K., Victor, W.R. (2015). Harper's Biochemistry, 30th Edition, New Delhi: McGraw-Hill Education / Medical publishers.

Reference Book:

1. Rajagopal, G. & Tura, B.D. (2005). Practical Biochemistry for Medical students. 2nd Edition. Ahuja Publishing House.

2. Harold, Varley. (2005). Practical Biochemistry. 4th Edition. CBS publishers and distributors.

3. Jeremy, M. B., Stryer, L., Tymoczko, J., Gatto, G. (2019). Biochemistry, 9th Edition, New Delhi:WH Freeman publishers.

4. Satyanarayan, U., Chakrapani, U. (2017). Biochemistry, 5th Edition; Elsevier India.

PRACTICAL

Detail Syllabus

Modules	Topics	Hours
I	Qualitative analysis of Carbohydrates using Fehling test.	12
II	Lipid profile test	16
III	Liver Function Test	12
IV	Kidney Function Test	8
TOTAL		**48**

Text books:

1. Text book of Medical Biochemistry – MN Chaterjee, Rana Shinde.
2. Biochemistry, U.Sathyanarayana, Elsevier

References:

1. Lehinger Principle of Biochemistry, David L Nelson, 7th edition, WH freeman Publishers
2. Fundamentals of biochemistry,JL jain and Sanjay Jain,S Chand Publishers

3. Harper's Biochemistry,28th edition, Robert K Murray, Tata McGraw publishers

Subject Name: HOSPITAL DUTY AND PATIENT CARE – II		**Subject Code: RIT242G201**
L-T-P-C – 3-0-0-3	**Credit Units: 3**	**Scheme of Evaluation: T**

Objective: This syllabus has been formulated to impart basics knowledge on Hospitals, First Aid, Record keeping and report writing, Basic care, comfort, sign and symptoms and hygiene of patients.

Course Outcome

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Recall** about the various important international and national organisations and agencies.	BT 1
CO2	**Understand** the importance of first aid.	BT 2
CO3	**Apply** the knowledge of drugs and use it to administer them through the different available routes.	BT 3
CO4	**Apply** the concept of personal and hospital hygiene in maintaining a clean and safe environment.	BT 3

Detailed syllabus :

Modules	**Topics (if applicable) & Course Contents**	**Hours**
I.	• First aid • Hygiene • Bleeding control	**10**
II.	• Emergency trolley • Drugs • Methods of drug administration • Injection techniques	**6**

III.	• Shock • Burn • Poisoning • Syncope • Choking • HAI	**10**
IV	• International Organisation for standardisation • Regulatory Authority for Nuclear and Radiation facilities • Environmental impact of radiation • Radiation hazard and radiation safety • Handling of patient during radiological examination	10
TOTAL		36

Textbook:

1. Hospital Duty and Patient Care in Diagnostic Radiology – Dr. N. K. Karda, , Lalit Agarwal, J.B.D. Publication.
2. Patients Right – A Sampath Kumar (CBS Publication.

References:

1. Fundamentals of Hospital Practice and Patient care – Vyakarnam Nageswar, Paras medical books Pvt. Ltd.
2. Principles of Hospitals Practice and Patient Care – P Srinivasulu Reddy , Paras medical books Pvt. Ltd.
3. Hospital Supporting Services and System – Dr. M A George , Daya Publishing House.
4. Manual of First Aid – L. C. Gupta, Abhitabh Gupta , Jaypee Publication.
5. Patient Care Management – A. K. Mohiuddin, Red Flower Publication Pvt. Ltd

Subject Name: MICROBIOLOGY		**Subject Code: RIT242G202**
L-T-P-C – 3-0-0-3	**Credit Units: 3**	**Scheme of Evaluation: T**

Objective: This syllabus has been formulated to impart basics knowledge on Hospitals, First Aid, Record keeping and report writing, Basic care, comfort, sign and symptoms and hygiene of patients.

Course Outcome

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Explain** how microbes affect our daily lives	BT 1
CO2	**Observe** and measure microbial growth	BT 2
CO3	**Apply** pure culture techniques	BT 4
CO4	**Create** core competencies in microbiology and manipulate bacteria genetically to address biological questions	BT 6

Detailed syllabus :

Modules	**Topics (if applicable) & Course Contents**	**Hours**
I.	• History of Microbiology - • Use of microscope in the study of bacteria – • Types of microscopes - compound microscope, • Phase contrast microscope • Electron microscope, fluorescent microscope • dark ground microscope. • Morphology of bacterial cell	**10**
II.	• Safety measures in laboratory • Sterilization and Disinfection: Physical Methods of Sterilization, Chemical Methods of Sterilization, Methods of Disinfection • Normal microbial flora of human body, role of normal flora • Biomedical waste management	**6**

III.	Introduction and morphological features of • Bacteria, • Fungi • Viruses • Parasites • Microbial pathogenicity	**10**
IV	• Brief Introduction of morphology • diseases associated with of Streptococcus pneumoniae, • Mycobacterium • Aspergillus • Tinea • Mycetoma • Cryptococcus.	**10**
TOTAL		**36**

Textbook:

1. Essentials of Medical Microbiology Jaypee Brothers Medical Publishers; Third edition

Reference Books:

2. Essentials of Microbiology -Elsevier India

Subject Name: MEDICAL LAW & ETHICS - II	**Subject Code: RIT242S2 11**
L-T-P-C – 0-0-4-2	**Scheme of Evaluation: P**

Objective: This syllabus has been formulated to impart the basic concept of Sterilization, medical ethics and professional ethical obligations.

Course outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**

CO 1	**Define** ethics and its importance in the functioning of the hospital.	BT 1
CO2	**Explain** the various issues related to healthcare setup and also manage the hospital with the various issues that can arise from the legal perspective.	BT2
CO3	**Recognize** and train the workforce to meet the challenges of changing dynamics in healthcare scenario in terms of the regulations that governs the operational aspects of the hospital.	BT 2
CO4	**Analyse** the quality of patient care by identifying and attempting to resolve the ethical problems that arise in practice.	BT3

Detailed syllabus:

Modules	**Topics (if applicable) & Course Contents**	**Hours**
I.	Medical ethics - Definition - Goal - Scope Introduction to Code of conduct Basic principles of medical ethics – Confidentiality Malpractice and negligence - Rational and irrational drug therapy Autonomy and informed consent - Right of patients Care of the terminally ill- Euthanasia Organ transplantation, ethics and law	**12**
II.	Medico legal aspects of medical records – Medico legal case and type-Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.	**12**
III.	Professional Indemnity insurance policy Development of standardized protocol to avoid near miss or sentinel events obtaining an informed consent.	12
IV	Basics of emergency care and life support skills Vital signs and primary assessment, Basic emergency care – first aid and triage, Ventilations including use of bag-valve-masks (BVMs), Choking, rescue breathing	12

	methods, One- and Two rescuer CPR, Using an AED (Automated external defibrillator), Managing an emergency including moving a patient	
TOTAL		48

Textbooks:

1. Medical Ethics, 3rd edition, CM Francis, Jaypee publishers
2. Textbook of bioethics for Health care professionals, Princy Louis palatty, Ashish Kumar U, Jaypee publishers

References:

1. Medical ethics: A very short introduction, Tony Hope, 114th edition, Oxford university press

2. Medical Law and ethics, 3rd edition, Pattinson, sweet and Maxwell publishers

THIRD SEMESTER

Bachelor Degree in Radiography and Advance Imaging Technology BRIT)

Subject Name: Basic Physics (Theory + Practical)		**Subject Code: RIT242C311**
L-T-P-C – 2-0-4-4	**Credit Units: 4**	**Scheme of Evaluation: TP**

Objective: This subject is designed to impart fundamental knowledge on the structure of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of anatomy.

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the different electrical equipments and the functions of each.	BT 1
CO2	**Demonstrate** the electrical connections of different electrical appliances.	BT 2
CO3	**Apply** the theoretical knowledge practically to check loose wires and correct faulty connections.	BT 4
CO4	**Create** different electrical circuits using different electrical and electronic appliances.	BT 6

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	**Fundamental of Electricity:** • Electric Charges & Units of Electric Charge. Coulombs Law, Electric Induction, Electric Potential & Potential Difference, Capacitance & Capacitors, Resistance. • Conductors, Insulators & Semiconductors, Electric Current, Ohm's Law & Kirchoff's Law, Circuit Laws	8

	(Combination of Potential Difference In Series & Parallel, Meters, Electrical Energy & Power, Heating Effect of A current. • The Magnetic Effects of An Electric Current (Electromagnetism), Electromagnetic Induction, Mutual Induction & self Induction. • Alternating Current, The A.C. Transformer theory, construction, types of transformers its practical aspects, transformer losses and regulation & rating, types of transformers used in x-ray equipment. • Thermionic emission, the vacuum diode, variation of anode current with anode voltage and filament temperature in the vacuum diode, the effect of gas in the diode, the thermionic gas diode. Meaning of rectification (full wave & half wave rectification). Principles of semiconductors, p-n junction diode, high voltage rectifier circuits (self rectifying circuit, half-wave pulsating voltage circuit, full-wave pulsating voltage circuit, shock-proofing.	
II.	**X-rays :** Conductivity of electricity through gases at low pressure, cathode rays-production & properties. Sources of electrons (discharge through gases, thermionic emission & photo electric emission), discovery of an electron, concept of electron volt.	4
III	**Mains Supply :** Generation of electrical energy, distribution of electrical energy, use of electrical energy, polyphase supplies, availability of different voltages, feeder cables, line voltage drop; mains switches, fuses, circuit breakers. earthing, insulation, high tension cables construction, design.	4

IV	**Diagnostic High Tension Circuits :** Self rectified, half-wave, full-wave, 4 rectifier, 3 phase, capacitor discharge, constant potential. main voltage compensation, mains resistance compensation, compensations for mains frequency variation. Control of tube voltage, kilovoltage compensation; filament circuit, control of tube current, space charge compensation. High tension (tube selector) switch. meters- function; use of shunts. Meters Commonly Found In Diagnostic X-Ray Equipment, Position In Circuits, Reading Meters.	8
TOTAL		**24**

Text Book:

1. Basic Medical Radiation physics – Stanton
Publisher-McGraw-Hill Inc.,US

Reference Books:

1. Christensen's Physics of Diagnostic Radiology – Christensen.
Publisher-Wolters Kluwer India Pvt. Ltd.

PRACTICALS

Modules	**Topics**	**Periods**
I	• Introduction to different electrical appliances	4

II	Basic electricity ----- i) To determine the resistance per cm of a given wire by plotting a graph for potential difference versus current ii) Determination of equivalent resistance of two resistors when connected in series and parallel. iii) Study the dependence of potential difference (V) across a resistor on the current (I) passing through it and determine its resistance. Also plot a graph between V & I. iv) To study steps of constructing a simple electrical circuit v) Identification of electrical equipments vi) To verify Kirchoff's current and voltage laws. vii) To determine the transformer ratio of a given transformer Viii) To study the behavior of half wave rectifier and full wave rectifier. ix) To plot the graph of forward and reverse bias characteristics of a SI-junction diode.	20
III	Basic Electronics ------ i) To determine the resistance of a galvanometer by half-deflection method. ii) To study the effect of voltmeter resistance on voltage measurement. iii) To determine the internal resistance of a cell using potentiometer. iv) To find the resistance of a give wire resistor using a meterbridge v) To study the variation of current with voltage across a conductor and hence verify Ohm's law.	16

IV	Magnetism ----- i) To determine the strength of magnetic field using Faraday's law of Electromagnetic induction	8
TOTAL		**48**

Text Books:

1. Christensen's Physics of Diagnostic Radiology – Christensen, Publisher-Wolters Kluwer India Pvt. Ltd.

References:

1.Basic Medical Radiation physics – Stanton, Publisher-McGraw-Hill Inc.,US

Subject Name: General Radiographic Technique-I		**Subject Code: RIT1242C32**
L-T-P-C – 0-0-8-4	**Credit Units: 4**	**Scheme of Evaluation: P**

Objective: This subject is designed to impart fundamental knowledge on the structure of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of anatomy.

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the routine and special projections for all the different parts of the human body	BT 1
CO2	**Explain** different radiographic projections taken for different body parts	BT 2
CO3	**Apply** the knowledge of anatomy in producing accurate radiographs	BT 3

CO4	**Create** good quality accurate radiographs by using multiple projection knowledge for particular body part	BT 6

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Upper-limb:** • Routine projections for the whole Hand, Fingers, Wrist Joint, Forearm, Elbow Joint and Humerus. Supplementary projections for scaphoid, carpal tunnel ball catchers projections, head of the Radius, Supracondylar Fracture and Olecranon Process. **Lower limb:** Routine Projections For The Whole Foot, Toes, Calcaneum, Ankle Joint, Leg, Knee-Joint, Patella and Femurs. Supplementary Projections For Talo-Calcaneal Joint, Forced Projections For Torn Ligaments, Flat Feet, Club Feet, Intercondylar Projections For Loose Bodies In The Knee, Axial Projection For Patella.	14
II.	**Pectoral Girdle and Thorax:** • Routine Projections For Shoulder Joint, Scapula, Acromio-Clavicular Joint, Clavicle, Sternoclavicular Joint, Sternum and Ribs. • Supplementary Projections For The Axial Projections of Clavicle, Bicipital Groove Carotid Process, Classification of Tendons, Subluxation, Upper Ribs and Axillary Ribs. **Pelvic Girdle and Hip Region:** • Routine Projections For The Whole Pelvis, Sacro-Ileac Joints, Hip Joint and Neck of Femur. Supplementary Projections For The Greater and Lesser Trochanters of Femur. Frog Leg Projection, Ischeum Symphysis Pubis, Ileum, Accetabulum and Congential Dislocation of Hip Arthrodesis.	14

III	**Abdomen:** Kub, Erect Abdomen and Decubitus Projection, Supplementary Projections For Acute Abdomen.	8
IV	**Chest:** • Routine Projections For Lungs, Cardia and Diaphragm. • Supplemantary Projections For Opaque Swallow, Thoracic Inlet, Soft Tissue Neck, Decubitus, Apicugrams, Paediatric Cases.	12
TOTAL		**48**

Text Book:

1. Seeram E. Computed Tomography: Physical Principles, Clinical Applications, and Quality Control,4th edition, Elsevier Health Sciences.
2. Radiation protection, Euclid seeram, Lippincott Williams and wilkins

Reference Books:

1. Grol R, Wensing M, Eccles M, Davis D, editors. Improving patient care: the implementation of change in health care, 2nd edition, Wiley & Blackwell publishers
2. Radiation protection in Medical radiography, E Rusell,Mary Alice, 7th edition, Elsevier

Subject Name: Radiation Hazards & Protection		**Subject Code: RIT242D301**
L-T-P-C – 4-0-0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objective: This subject is designed to impart fundamental knowledge on the structure of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of anatomy.

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the core concepts and principles of radiation protection	BT 1
CO2	**Demonstrate** various methods of protection with the help of all the protective devices	BT 2
CO3	**Apply** the knowledge of radiation dosimetry in calculating doses received by a particular type of radiation	BT 3
CO4	**Analyze** reasons of high radiation dose in an area and use the principles and methods to reduce the dosage	BT 4

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Introduction to Radiation Protection, Units & Quantities- Primary, secondary radiation, need for radiation protection, Exposure, Absorbed dose, absorbed dose equivalent, Effective dose, air KERMA, Radiation weighting factor, Tissue weighting factor, MPD. Aim & Principle of Radiation Protection- Concept of ALARA, Cardinal Principle, ICRP regulation, Radiation Protection in: Radiography, CT, Fluoroscopy, Mammography, Ward radiography, radiation shielding	12
II.	Radiation monitoring: Personnel – Film badge, TLD, OSLD, pocket dosimeter, Area monitoring Devices. • Radiobiology: Radiolysis of water, Direct & Indirect effects of radiation, Stochastic, Deterministic effects, Somatic, Genetic effects, dose relationship, Antenatal exposure. 10 day rule, 14 day rule, 28 day rule, structural shielding, work load, use factor, occupancy factor.	12
III	Quality Control and Assessment in Radiology: Quality Assurance and quality control of Modern Radiological and	12

		Imaging Equipment which includes Digital Radiography, Computed Radiography, CT scan, MRI Scan, Ultrasonography and Tele-radiology and PACS related Care and maintenance of diagnostic equipment: General principles and preventive maintenance for routine - daily, Weekly, monthly, quarterly, annually: care in use, special care of mobile equipment.	
IV		Role of Radiographer in Planning, QA & Radiation Protection: Role of technologist in radiology department - Personnel and area monitoring. ICRP, NRPB, NCRP and WHO guidelines for radiation protection, pregnancy and radiation protection. NABH guidelines, AERB guidelines, PNDT Act and guidelines	12
TOTAL			**48**

Text Book:

1. Bontrager KL, Lampignano J. Textbook of Radiographic Positioning and Related Anatomy., 8th edition, Elsevier Health Sciences
2. Brant WE, Helms CA, editors. Fundamentals of diagnostic radiology. Lippincott Williams & Wilkins; 2012

Reference Books:

1. Frank ED, Long BW, Smith BJ. Merrill's Atlas of Radiographic Positioning and Procedures, 4th edition,. Elsevier Health Sciences
2. Radiology for undergraduates and general practioners, Hariqbal singh, Jaypee publishers

Subject Name: General Pharmacology		**Subject Code: RIT242D302**
L-T-P-C – 3-1-0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objective: This subject is designed to impart fundamental knowledge on the structure of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of anatomy.

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the concepts of pharmacodynamics, pharmacokinetics, classification and the principles of drug administration	BT 1
CO2	**Describe** drugs used in de-addiction, emergency, deficiency of vitamins and minerals, poisoning, and various body systems	BT 2
CO3	**Explain** the chemotherapy of specific infections and infestations and nurses responsibilities	BT 2
CO4	**Apply** the knowledge of pharmacology in raising awareness of common drugs used in alternatives system of medicine	BT 3

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology, nature and source of drugs, essential drugs concept and routes of drug administration, Agonists, antagonists(competitive and non competitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy. b. Pharmacokinetics- Membrane transport, absorption, distribution, metabolism and excretion of drugs .Enzyme induction, enzyme inhibition, kinetics of elimination	12
II.	Pharmacology of drugs acting on central nervous system a. Neurohumoral transmission in the C.N.S.special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine. b. General anesthetics and pre-anesthetics. c. Sedatives, hypnotics and centrally acting muscle relaxants. d. Anti-epileptics e. Alcohols and disulfiram	10

III	Pharmacology of drugs acting on peripheral nervous system a. Organization and function of ANS. b.Neurohumoral transmission,co-transmission and classification of neurotransmitters. c. Parasympathomimetics, Parasympatholytics, Sympathomimetics, sympatholytics. d. Neuromuscular blocking agents and skeletal muscle relaxants (peripheral). e. Local anesthetic agents. f. Drugs used in myasthenia gravis and glaucoma	12
IV	a. Pharmacodynamics- Principles and mechanisms of drug action. Receptor theories and classification of receptors, regulation of receptors. drug receptors interactions signal transduction mechanisms, G-protein–coupled receptors, ion channel receptor, transmembrane enzyme linked receptors, transmembrane JAK-STAT binding receptor and receptors that regulate transcription factors, dose response relationship, therapeutic index, combined effects of drugs and factors modifying drug action. b. Adverse drug reactions. c. Drug interactions (pharmacokinetic and pharmacodynamic) d. Drug discovery and clinical evaluation of new drugs -Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance.	14
TOTAL		**48**

Text Book:

1.Kulkarni SK Handbook of Experimental pharmacology – Vallabh Prakahan

Reference Books:

1. Rang H. P., Dale M. M., Ritter J. M., Flower R J, Rang and Dale's Pharmacology, Chrchil Livingstone Elsevier.

Subject Name: Basics of Pathology		**Subject Code: RIT242G301**
L-T-P-C – 3-0-0 -3	**Credit Units: 3**	**Scheme of Evaluation: T**

Objective : This syllabus has been formulated to impart basics knowledge on cell and tissue abnormalities and associated diseases and various terminologies of diseases, basic understanding of diseases and their pathogenesis

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Comprehend** the basis of pathologic processes	BT 1
CO2	**Explain** pathologic processes that apply to individual patients, as well as to the general patient population	BT 2
CO3	**Analyse** laboratory and clinical data	BT 4
CO4	**Evaluate** laboratory data for clinicopathologic correlation	BT 5

Detailed Syllabusc

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Definitions / Terminology : A. Disease. ---- 1. Acute 2. Chronic B. Inflammation and repair -----acute inflammation (features, causes, vascular and cellular events), chronic inflammation (features, causes, types, classification with examples) C. Infectious diseases ---- bacterial, viral , fungal, mycobacterial, parasitic	12

	D. Growth disturbances --- atrophy, hypertrophy, aplasia, hyperplasia, metaplasia, dysplasia, agenesis, carcinogenesis E. Genetic disorders ---- basic concepts of genetic disorders and some common examples related ionising radiations. F. Pathogenesis G. Etiology H. Diagnosis --- 1. Signs (objective) 2. Symptoms (subjective) I. Prognosis J. Indications for procedure K. Manifestations of pathology L. Relevance to radiographic procedures 1. Technical considerations 2. Patient consideration	
II.	Classifications (Definitions, Examples, Sites, Complications, Prognosis) A. Mechanics B. Chemicals C. Thermals Radiation	4
III	Causes of Diseases (Process, Examples) • Pathological • Traumatic • Surgical • Healing process • Complications Genetics (caused by or contribution by genetic factors) vs. heredity	8
IV	Radiologic pathology A. Skeletal	12

	B. Digestive C. Respiratory D. Urinary E. Reproductive F. Circulatory G. Endocrine Nervous	
TOTAL		**36**

Text Book:

1.Robbins Basic Pathology (Robbins Pathology) Elsevier; 10th edition

Reference Books

2. Pathology: Implications for the Physical Therapist, Saunders; 4th edition

Subject Name: Orientation in Clinical Sciences		**Subject Code: RIT242G302**
L-T-P-C – 3-0-0-3	**Credit Units: 3**	**Scheme of Evaluation: T**

Objective: This course has been formulated to develop knowledge on radiographic projection commonly encounter.

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** diseases of various body systems and how they manifest clinically and histopathologically	BT 1
CO2	**Explain** essential basic pathological processes to the pathogenesis of common and important diseases	BT 2

CO3	**Demonstrate** an understanding of how knowledge of pathological processes can be utilised in the investigation, management and prevention of disease	BT 2
CO4	**Apply** the concepts and knowledge of different diseases in treating patients	BT 3

Detailed Syllabus:

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	• Pericarditis , Valvular diseases , Rheumatic Heart Disease , Heart failure, Bronchitis , Emphysema , Bronchitis , Pneumonia , Tuberculosis , Pleura effusion , Phenumo thorax	10
II.	○ Aclasia cardia , Peptic ulcer , Intestinal obstruction, Crohn's disease, Ulcerative colitis , Pancreatitis, Portal Hypertension , Ascitis, Cirrhosis , Cholecystitis ,Melena , Appendicitis • Cholelithiasis , Peritonitis , Suprahrenic Abscess , Appendicitis , Benign Hypertrophy prostate	6
III	• Hematuria , UTI , Hydronephrosis , Horse shoe Kidney , Hydrocele , Glomerulo nephritis , Nephrotic Syndrome , Urinary calculi , Polycystic Kidney disease , Renal failure	6
IV	• Fracture, Type, Mechanism, Healing, Delayed Union, Non-complication , Injuries of the shoulder girdle, Dislocation of shoulder Injuries of the carpal , Dislocation of Hip , Femur, Tibia, Ankle, calcaneum ,Acute & chronic osteo arthritis, Rheumatoid arthritis , Paget's Disease , Ankylosing spondylitis , Club foot , Bone Tumor-Benign Malignant , Perthes diseases	14
TOTAL		**36**

Text Book:

1. Bontrager KL, Lampignano J. Textbook of Radiographic Positioning and Related Anatomy., 8th edition, Elsevier Health Sciences

Reference Books:

1. Grainger & Allison's Diagnostic Radiology E-Book. Elsevier Health Sciences.
2. Frank ED, Long BW, Smith BJ. Merrill's Atlas of Radiographic Positioning and Procedures, 4th edition, Elsevier Health Sciences

FOURTH SEMESTER

Bachelor Degree in Radiography and Advance Imaging Technology BRIT)

Subject Name: Physics of Radiology		**Subject Code: RIT242C401**
L-T-P-C – 3-1-0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objective: This syllabus has been formulated to impart basics knowledge on principles of radiation physics and modern physics in radiology.

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the key concepts of physics	BT 1
CO2	**Demonstrate** the structure and functions of a modern day x-ray tube	BT 2
CO3	**Apply** various principles of physics in the generation high and low frequency x-rays as per need	BT 3
CO4	**Analyze** various equipments to identify faulty systems and fix them as per need	BT4

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	• Structure of atom , Bohr's atomic model • Electromagnetic waves and their properties • Electromagnetic spectrum and Spectrum of white light • History of X-rays • Production of x-ray & its properties • Interaction of x-ray with matter Attenuation	12
II.	• X-Ray Tubes • Construction of various x-ray tube & handling • Filament design • Fixed and rotating anode, faults in X-Ray tubes, Grid Controlled X-Ray Tube, • Mammography X-Ray Tube. • Heavy Duty X-Ray Tube, Micro-Focus X-Ray Tube • Tube heat Ratings and methods of heat dissipation • Line Focus principle, Anode Cooling chart • Tube overload indication, X-Ray Tube over Load Protection Circuits • Grid • Heel effect Beam limiting devices	14
III	• Introduction & Handling of Portable and Non-Portable equipment Maintenance and care of all X-Ray equipment and accessories	8
IV	• Basics of radioactivity • Ionising Radiation and its quantities and units. • Interaction quantities , Linear attenuation co-efficient, mass attenuation co-efficient	14

	• Thermionic emission and properties of X-Rays. • Physics of X-ray spectra - charactristics and brehmstrahlung x-rays • Factors upon which x-ray emission depends, soft and hard x-rays • Coherent scattering- Thomson scattering, Rayleigh Scattering, Photoelectric absorption, pair production, photo disintegration	
TOTAL		**48**

Text Book:

1. Textbook of radiology Physics, Hariqbal singh, Roshan Lodha jaypee publishers
2. Fundamental Physics of Radiology (Varghese Publishing House) by Meredith W.J. & Massey J B
3. Christensen's physics of diagnostic radiology, 4th edition

Reference Books:

1. Holmberg O, Malone J, Rehani M, McLean D, Czarwinski R. Current issues and actions in radiation protection of patients.
2. Radiation physics for Nuclear Medicine edited by Marie Clarie, Christoph Hoeschen, Springers.

Subject Name: General Radiographic Technique-II		**Subject Code: RIT242C402**
L-T-P-C – 3-1-0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objective: This course has been formulated to develop knowledge on radiographic projection commonly encounter in clinical environment

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**

CO 1	**Remember** the routine and special projections for all the different parts of the human body	BT 1
CO2	**Explain** different radiographic projections taken for different body parts	BT 2
CO3	**Apply** the knowledge of anatomy in producing accurate radiographs	BT 3
CO4	**Create** good quality accurate radiographs by using multiple projection knowledge for particular body part	BT 4

Detailed Syllabus

Modules	• **Topics (if applicable) & Course Contents**	**Periods**
I.	**Skull:** • Routine Projections For Craniumand Facial Bones. • Supplementary Projections For Trauma, Towne's & Method, Sella, Turcica, Optic Foramina, Jugular Foramina, Temporal Bones, Mastoids Petrous Bone, Zygomatic Arches, Orbits, Maxillae, Nasal Bones, Mandible, Temporomandibular Joints.	12
II.	**Vertebral Column:** • Routine Projections For The Greater Occiptal Joint, Cervical Spine, Cervico Thoracic Junction, Thoracic Spine, Lumbar Spine, Lumbo Sacral Region, Sacrum and Coccyx. Supplementary Projections For The Intervertebral Foramina, Posterior Arch of Atlas, Flexion and Extension of Cervical Spine, Scoleosis, and Kyphosis, Sacro Illeac Joint.	12
III	**Nasal Sinuses:** • Techniques For Frontal, Maxillary, Ethmoidal and Sphenoid Sinuses, Erect and Horizontal Projections For Fluid Levels. **Teeth:** • Routine Projections of All Teeth- Intra Oral and Extra Oral Projections.	12

	• Supplemantary Projections For Localisation of Roots, Children, Edentulous Subjects and Use of Occlusals and Bitewings, Orthopantomography.	
IV	**CR and DR :** • Application of CR, its instrumentations, DRY and Laser printer, CR Printer's application. • DICOM, Application, Functions, Features and its advantages. • Automatic processor, Application, principal. Working technique, work load handling in automatic processor. • Radiological Information Systems	12
TOTAL		**48**

Text Book:

1. Atlas of breast imaging with Mammography, ultrasound and MRI correlations, Col.CS Pant, 2nd edition, Jaypee Publishers

Reference Books:

1. Fundamentals of Mammography, Sue Williams, Linda Lee, 2nd edition, Elsevier
2. Introduction to ultrasound. Zwiebel WJ, Sohaey R, Saunders publishers

Subject Name: Procedures of General Radiography		**Subject Code: RIT242D411**
L-T-P-C – 0-0-8-4	**Credit Units: 4**	**Scheme of Evaluation: P**

Objective: This course has been formulated to develop knowledge on radiographic projection commonly encounter in clinical environment in practical aspect.

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the routine and special projections for all the different parts of the human body	BT 1
CO2	**Explain** different radiographic projections taken for different body parts	BT 2
CO3	**Apply** the knowledge of anatomy in producing accurate radiographs	BT 3
CO4	**Create** good quality accurate radiographs by using multiple projection knowledge for particular body part	BT 4R

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	**Radiography- Plain Views of Upper Limb: Hands** • Fingers • Thumb • Wrists • Forearm • Elbow • Humerus **Radiography-Plain Views of Lower Limb:** • Foot • Toes • Tarsus & Oscalcis • Ankle • Tibia, Fibula & Patella • Knee Joint • Femur • Hip Joint	12

	• Pelvis & Sacro-Ilic Joit	
II.	**Radiography- Plain Views of Shoulder:** • Shoulder Joint • Acromio- Clavicular Joint • Scapula Various Views and Projections • Clavicle • Sterno-Clavicular Joint	10
III	**Radiography of Vertebrae:** • Cervical Spine Upper, Cervical Spine Lower • Cervico-Thoracic, Cervico-Middle • Thoraco Lumbar • Lumboo-Sacral • Sacrum & Coccyx • Ribs Upper & Lower • Sternum	12
IV	**Radiography of Skull Plain Views:** • Ap, Lateral & Towns • Sinuses, Mandible,Teeth Mastoids. **Radiography of Chest:** • Lungs & Trachea; Heart-Diaphragm • Radiography of G.I. Tract • Plain X-Rays Abdomen- Erect; liver, Spleen	14
TOTAL		**48**

Text Book:

1.Textbook of pathology, Harsh mohan, 8th edition, Jaypee publishers

2.General and Systemic Pathology, James underwood, Simon Cross,5th edition, Elsevier

Reference Books:

1. Text book of Medical Laboratory Technology – Praful B. Godkar, Darshan P Godkar.
2. Theory and practice of Histopathological Techniques, John D Bancroft

Subject Name: Procedures of Microbiology		**Subject Code: RIT242D412**
L-T-P-C – 0-0-8-4	**Credit Units: 4**	**Scheme of Evaluation: P**

Objective : This syllabus has been formulated to impart basics knowledge on Hospitals, First Aid, Record keeping and report writing, Basic care, comfort, sign and symptoms and hygiene of patients.

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Explain** how microbes affect our daily lives	BT 1
CO2	**Observe** and measure microbial growth	BT 2
CO3	**Apply** pure culture techniques	BT 4
CO4	**Create** core competencies in microbiology and manipulate bacteria genetically to address biological questions	BT 6

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	1. Use and care of microscope 2. Common examination: Smear, Blood, Moulds and Yeasts. 3. Quick card tests for Malaria, Dengue	8

II.	Mycology – Superficial mycoses, Subcutaneous mycoses, Dermatophytes Systemic mycoses, Opportunistic fungi Parasitology- Protozology – entamoeba histolytics, Balantidium coli, giardia, malaria, leishmania Helminthology – Cestodes-taenia, echinococcus, D. latum, H. nana, trematodes-Schistosoma, Fasciola, Nematodes- ascaris, hookworm, trichuris, dracunculus, filarial worms	12
III	Virology— General properties of virus, cultivation of virus, pox virus, herpes virus, adeno virus, paramyxo virus, oncogenic virus, HIV, Parvo virus, Viral haemorrhagic fevers, SARS, Rotavirus, Norwalk Virus, Astro virus, Corona virus	12
IV	While giving care in the wards the students will practice collection of samples and processing of sterilization, immunization, chemotherapy and maintenance of personal and environmental hygiene. Observation visit to incinerator, posting in CSSD and infection control department	16
TOTAL		**48 hours**

Text Book:

1. Essentials of Medical Microbiology Jaypee Brothers Medical Publishers; Third edition

Reference Books:

2. Essentials of Microbiology -Elsevier India

Subject Name: Basics of Ultrasound and ECG		**Subject Code: RIT242G401**
69		
L-T-P-C – 3-0-0-3	**Credit Units: 3**	**Scheme of Evaluation: T**

Objective: This subject is designed to impart fundamental knowledge on the structure of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of anatomy.

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the principles and concepts of ultrasonography and the physics behind the generation of images	BT 1
CO2	**Explain** and demonstrate various procedures guided by ultrasound	BT 2
CO3	**Apply** the anatomical and technical knowledge to find out the cause of illness	BT 3
CO4	**Create** awareness of the value and benefits of ultrasound among patients, health care providers and insurers	BT 6

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	• Principle & history of Ultrasound, advantages and disadvantages of ultrasound, Types of Ultrasound, Equipment description • Mode of USG & its type	8
II.	• Indication and Clinical Application • Physics of ultrasound imaging, Physics of transducers, construction & its type, Physics of Doppler USG & its type • Ultrasound tissue characterization Potential for three dimensional ultrasound	6

III	• Artifacts in ultrasound • Comparison of ultrasound equipment Computerization of data, Image recording, Ultrasound jelly & Safety of ultrasound • USG Contrast Media-Types of Ultrasound Contrast media and its advantages Care & maintenance QA & QC & USG equipment	14
IV	• Echocardiography • Equipment, Introduction, indication and image formation. Uses of colour Doppler in echocardiography and equipment description with transducer.	8
TOTAL		**36**

Text Book:

1. Textbook of diagnostic ultrasonography. Hagen-Ansert SL. Mosby Elsevier

Reference Books:

1. Introduction to ultrasound. Zwiebel WJ, Sohaey R, Saunders publishers
2. Handbook of ultrasound, GS Garkal, 2nd edition, Jaypee Publishers

Subject Name: Medical Emergency & Patient Care		**Subject Code: RIT242G402**
L-T-P-C – 3-0-0-3	**Credit Units: 3**	**Scheme of Evaluation: T**

Objective: This subject is designed to impart fundamental knowledge on the structure of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of anatomy.

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:

SI NO	COURSE OUTCOME	BLOOMS TAXONOMY LEVEL
CO 1	**Remember** the role of the emergency department in the health care system	BT 1
CO2	**Demonstrate** a focused history and physical examination	BT 2
CO3	**Explain** effective, empathetic communication with patients and their family	BT 2
CO4	**Apply** the knowledge of CPR and other such methods to perform procedural skills pertaining to emergency medicine	BT 3

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	• Introduction to Emergency Services Organization of Emergency Department • Guidelines in Emergency & Clinical Monitoring • Fluid Therapy and Blood Transfusion • Airway Management • Cardiopulmonary Resuscitation • Principal of Mechanical Ventilation	6
II.	• Handling of Different Emergencies Cardiogenic Shock • Congestive Cardiac Failure & Myocardial Infarction • Head Injuries • Vasovagal Syncope, Seizer, Epilepsy, Conjunctival and Corneal Foreign Body • Foreign Body in Nose & in Ear, • Epistaxis, • Asthma • COPD, • Haemoptysis • Rib Fracture • Food Poisoning, • Diarrhea, • Urine Retention, • Hypo & Hyperthermia	10

III	• Fundamentals of Patient Care Concept of health & Illness • Health Determinants • Concept of Patients & Their Types • Patient Centred Care & Fundamentals of Communications, • Reporting & Recording of Patients • Rights of Patients • Concepts of Disease & Its Types • Trauma	8
IV	• Patient Care • Associated Units & Departments Ambulatory Units • Critical Care Units • Paediatric, Neonatal Intensive Care Unit (NICU) • Emergency Department • Inpatient Units • Haematology/Oncology and Immunology Unit ,Orthopaedic Unit, Psychiatry Unit ,Neurology and Neurosurgical Unit, Renal, Dialysis Unit, Gastroenterology/Endocrinology Unit • Radiology Department, Surgical Units, Cardiac Catheterization Lab, Operating Room • Post Anaesthesia Care Unit • Managing patients with disabilities • Geriatric Care & Care of Critically Patients, Tracheotomise Patients. • Nutritional Support in ICU	12
TOTAL		**36**

Text Book:

1. Manual of First Aid – L. C. Gupta, Abhitabh Gupta , Jaypee Publication.

2. Patient Care Management – A. K. Mohiuddin, Red Flower Publication Pvt. Ltd

Reference Books:

1.Hospital Duty and Patient Care in Diagnostic Radiology – Dr. N. K. Karda, , Lalit Agarwal, J.B.D. Publication.

2. Patients Right – A Sampath Kumar (CBS Publication.

FIFTH SEMESTER

5TH SEMESTER (PART III)							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	RIT242C501	Computed Tomography	3	1	0	4	4
2	RIT242C502	Radiographic Special Procedures	3	1	0	4	4
Discipline Specific Elective (DSE) (one from each set)							
3	RIT242D501	DSE 3: Darkroom Technique	4	0	0	4	4
	RIT242D502	DSE 3: Patient Assessment and Medication Administration	4	0	0	4	4
4	RIT242D503	DSE 4: Procedures of Special X-rays	0	0	8	4	4
	RIT242D504	DSE 4: Basic and Advanced Life Support	0	0	8	4	4
Value Addition Course (VAC)							
5		VAC-IV	2	0	0	2	2

Ability Enhancement Compulsory Courses (AECC)							
6	CEN982A501	AECC 9: Communicative English-V	1	0	0	1	1
7	EVS982A503	AECC 10: Environmental Studies & Sustainable Development I	1	0	0	1	1
Internship							
8	RIT242C513	Clinical Posting	6	0	0	6	6
		TOTAL	**24**	**2**	**0**	**26**	**26**

Subject Name: Computed Tomography		**Subject Code: RIT242C501**
L-T-P-C – 3-1-0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objective: This course has been formulated to develop knowledge on basic principles of Computed tomography, Radiographic projection and positioning.

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the historical facts related to computed tomography and its importance in the medical field	BT 1
CO2	**Understand** the basic principle of Computed tomography	BT 2
CO3	**Develop** the skill for producing images in computed tomography	BT 2
CO4	**Apply** the knowledge of protection and safety in CT scan to produce images maintaining the radiation safety	BT 4

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	• Introduction to Computed Tomography and Principle of Computed Tomography History, Advantage and Disadvantages of CT, Basic principle of CT , Generations of Computed Tomography- 1st generation, 2nd generation, 3rd generation, Slip ring technology, 4th generation, Electron beam CT, Dual Source CT, Flat Panel Detector CT Single and Multi slice Technology	10
II.	• Instrumentation-CT scanner gantry, Detectors & Data Acquisition System, Generator, Computer and image processing System Image display system, storage, recording and communication system, CT control console, Options and accessories for CT systems • Image Reconstruction- Basic principle, Reconstruction algorithms, Image reconstruction from projections, Types of data reconstruction Image Display and Image Quality Image formation and representation, Image processing, Pixel and voxel, CT number Window level and window width, Qualities, Resolution, Contrast, Sharpness, Noise properties in CT	16
III	• CT Artefacts- Classification, Types, Causes, Remedies	8

IV	• Patient preparation, patient positioning, performing all non-contrast and contrast computed tomography procedures • Radiation protection and care of patient during procedures including contrast media Management in CT • Various post processing techniques and evaluation of image quality and clinical findings. • Post procedural care of the patient	14
TOTAL		**48**

Text Book:

1. Step by step CT Scan by D Karthikeyan, Deepa Chegu (Jaypee Publishers)

Reference Books:

1.Textbook of Radiology for Residents and Technician, Satish K Bhargava, Sumeet Bhargava, Fifth edition, CBS Publishers & Distributors Pvt. Ltd.

2.Radiology 101, The Basics and Fundamentals of Imaging, 4th Edition, Wilbur L. Smith, Thomas A. Farrell.

References:

1. Seeram E. Computed Tomography-E-Book: Physical Principles, Clinical Applications, and Quality Control. Elsevier Health Sciences; 2015
2. Kak AC, Slaney M. Principles of computerized tomographic imaging. Society for Industrial and Applied Mathematics; 2001

Subject Name: Special Radiographic Technique		**Subject Code: RIT242C502**
L-T-P-C – 3-1-0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objective: The aim of this course is to allow students to learn how to approach different radiographic positions for special procedures and apply the same in achieving the best possible images with minimum exposure.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the principle of contrast media, its the composition and adverse reactions	BT 1
CO2	**Explain** different kinds of special procedures based on the different systems of the human body	BT 2
CO3	**Apply** the anatomical knowledge in assessing patient condition and accordingly carrying out different procedures	BT 3
CO4	**Analyzing** different patients complicated situations and providing drugs to relieve the patient from life threating contrast reactions	BT 4

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	• Introduction to Radiographic Special Procedures Contrast Media- Application, types, safety aspects & administration, Reaction to contrast media and management of contrast reactions.	8
II.	• Gastrointestinal tract: Barium series :Barium swallow, Barium meal , Barium meal follow through(BMFT) , Barium enema	12

III	• Urinary system: Indications, contraindications procedure and technique of : Intravenous urogram (IVU), Micturating Cystourethrogram (MCU), Ascending Urethrogram (ASU)/ RGU , Hysterosalpingography (HSG), lithotripsy	14
IV	• Billiary tract: Oral cholecystography, Intravenous cholecystography, Percutaneous transhepatic choledochograohy, endoscopic retrograde choeldochopancreatography	14
TOTAL		**48**

Text Book:

1. Davies SG, Chapman S. Aids to radiological differential diagnosis, 6th edition, Saunders Publishers

Reference Books:

1. Frank ED, Long BW, Smith BJ. Merrill's Atlas of Radiographic Positioning and Procedures, 4th edition,. Elsevier Health Sciences
2. Snopek AM. Fundamentals of Special Radiographic Procedures-E-Book. Elsevier Health Sciences; 2013

Subject Name: Darkroom Technique		**Subject Code: RIT242D501**
L-T-P-C – 3-1-0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objective: This subject is designed to impart fundamental knowledge on the construction and the importance of a darkroom in a Radiology department. Students will also learn about the technique of processing and developing an x-ray film, the different types of films and chemicals used and the physics behind the formation of an x-ray image.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the planning and structure of a darkroom in a radiology department	BT 1
CO2	**Explain** the various types of equipment used and the differences between the conventional and modern types of equipment	BT 2
CO3	**Explain** the construction of the x-ray films, x-ray cassettes, and intensifying screens	BT 2
CO4	**Apply** the knowledge of image processing in creating radiographs of good quality	BT 3

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	**Dark Room Planning:** • For a Small Hospital, For a Large Hospital • Location of Dark Room • Construction of Dark Room • Ventilation • Wall Protection • Darkroom entrance	8
II.	**Dark Room:** • Instruction To Staff • Dry Bench • Hopper, Drawer, Cupboard • Loading and Unloading Cassettes • Hangers, Types of Hangers and Storage of Hangers • Printing • Wet Bench	8

	• Cleanliness, Control of Dust, Dark Room Sink • Hatches • Drier • Safe Lights, Direct and Indirect, Uses, Factors Affecting Safelight Performance, Safelight Tests	
III	**X-Ray Films :** • Glass, Cellulose and Ployester Bases • Structure of X-Ray Films- Emulsion, Gelatin, Base and Supercoating • Types of X-Ray Films • Single Coated, Duplitised • Spectral Sensitivity • Colour Sensitivity • Grainess of Films • Speed of Films • Screen & Non Screen Films • Various Formats of Films • Films For Special Procedures **Processing Methods:** • Preparation of Solution • Manual Processing Apparatus • Control of Temperature • Rapid Processing • Automatic Processor- Principle and Features, Water Supply, Use of Thermostat, Regeneration of Solutions, Maintenance. Advantage and Limitations, Processing of Cut Films and Roll Films. **Developer:** • Constituents • Characteristics • Manual and Automatic Processors	16

	• Effects on Developing Time, Temperature, Agitation • Replenisher • Exhaustion **Rinsing :** • Acid Stop-Bath • Methods • Objects **Fixer :** • Constituents • Characteristics • Manual and Automatic Processors • Fixing Time and Clearing Time • Factors Affecting Fixing Time • Replenisher1 • Exhaustion **Washing and Drying:** • Objects • Methods • Factors Affecting Washing and Drying • Wetting Agents • Comparison of Different Methods **Day Light Film Handling:** • Day Light System Using Cassettes • Day Light System without Cassette	
IV	**X-Ray Cassette:** • Construction of X-Ray Cassettes	16

	• Types of Cassettes • Mounting Intensifying Screens In Cassettes • Identification of Cassettes • Care of Cassettes **Intensifying Screens:** • Fluorescence-Phosphors • Phosphors Employed – Calcium Tungstate – Barium Fluochloride – Rare Earths • Construction of Intensifying Screens • The Influence of Kilovoltage In Different Phosphors • Intensification Factor • Resolving Power of Intensifying Screens • Speed of Screens • Screen Film Contact Tests • Types of Intensifying Screens • Advantages and Limitations of Intensifying Screens	
TOTAL		**48**

Text Book:

1. D.N. Chesney & M.O. Chesney: Radiographic Imaging (Cbs)

Reference Books:

1. I.C.R.P.: Protection of The Patient In Medical Radiography (Bergaman)
2. Derrick P, Roberts & Nigel L. Smith: Radiographic Imaging A Practical Approach (Churchill Livingstone)

Subject Name: Patient Assessment & Medication Administration		**Subject Code: RIT242D502**
L-T-P-C – 3-1-0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objective: This curriculum for patient medication program is designed to teach students about ways of exercising professional judgment and decision making while extending clinical support.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** various methods of attaining patient history and assessing vital signs	BT 1
CO2	**Demonstrate** safety in the administration of medications within the clinical practice.	BT 2
CO3	**Explain** the effective use of Documentation and Communication skills in administering medications.	BT 2
CO4	**Apply** the attained knowledge to identify appropriate clinical judgments related to safe medication administration.	BT 3

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	History taking • Techniques of history taking • Special assessment challenges • Vital signs • Head to toe physical examination • Limits of physical examination	14
II.	Patient assessment • Medical patient assessment • Trauma patient assessment	8

III	Data interpretation and special situations • Concepts formation • Data interpretation • Application of principle • Various communication matters • Documentation techniques • Verbal and non-verbal skills • Special interview situations	16
IV	Medical administration • Routes of medication administration • Calculating fluid infusion rates	8
TOTAL		**48**

Text Book:

1. Patient Assessment in Clinical Pharmacy, A Comprehensive Guide by Sherif Hanafy Mahmoud, Springer publications

Reference Books:

1. Medication administration (New releases for health science) by Lena L Deter, Delmar Cengage Learning.
2. Patient Assessment & Care Planning in Nursing 3rd Edition by Peter Ellis, Mooi Standing and Susan Roberts, LM.

Subject Name: Procedures of Special X-ray		**Subject Code: RIT242D503**
L-T-P-C – 0-0-8-4	**Credit Units: 4**	**Scheme of Evaluation: P**

Objective: The aim of this course is to allow students to be able of understand how to approach radiographic positioning for special procedures and also understand the importance of achieving the best possible images with minimum exposure.

Course Outcome:

Upon completion of the course, student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the principle of contrast media, its the composition and adverse reactions	BT 1
CO2	**Explain** different kinds of special procedures based on the different systems of the human body	BT 2
CO3	**Apply** the anatomical knowledge in assessing patient condition and accordingly carrying out different procedures	BT 3
CO4	**Analyse** different patients complicated situations and providing drugs to relieve the patient from life threating contrast reactions	BT 4

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Administration of contrast media through different routes: IV, oral, enema	8
II.	Gastrointestinal tract: Barium series :Barium swallow, Barium meal , Barium meal follow through(BMFT) , Barium enema	12
III	Urinary system: Indications, contraindications procedure and technique of : Intravenous urogram (IVU), Micturating Cystourethrogram (MCU), Ascending Urethrogram (ASU)/ RGU , Hysterosalpingography (HSG), lithotripsy	14
IV	Billiary tract: Oral cholecystography, Intravenous cholecystography, Percutaneous transhepatic	14

	choledochograohy, endoscopic retrograde choeldochopancreatography	
TOTAL		**48**

Text Book:

1.Davies SG, Chapman S. Aids to radiological differential diagnosis, 6th edition, Saunders Publishers

Reference Books:

1.Frank ED, Long BW, Smith BJ. Merrill's Atlas of Radiographic Positioning and Procedures, 4th edition,. Elsevier Health Sciences

2.Snopek AM. Fundamentals of Special Radiographic Procedures-E-Book. Elsevier Health Sciences; 2013

Subject Name: Basic & Advanced Life Support		**Subject Code: RIT242D504**
L-T-P-C – 2-0-4-4	**Credit Units: 4**	**Scheme of Evaluation: TP**

Objective: The aim of this course is to improve the skills and confidence of healthcare professionals to act in crises and improve outcomes for patients with life threatening conditions.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the importance of basic life support in healthcare	BT 1
CO2	**Understand** the general concepts of basic life support for children and adults	BT 2
CO3	**Identify** life threatening conditions and plan for rapid management	BT 3

CO4	**Prioritize** patients with life threatening conditions and make critical decision	BT 4

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	• Introduction: Objectives of BLS course, Provider manual, Age definitions • Chain of survival • Cardiac arrest or heart attack Debriefing	3
II.	• CPR	8
III	• Automated External Defibrillation for adults and children • General concepts • Using the AED Special considerations	5
IV	• First Aid • Aims and Objectives of First Aid • Contents of First aid kit • Types of first aid • First aid in emergency situations	8
TOTAL		**24**

Text Book:

1 BLS for Healthcare Providers: Students Manual by Jane Nwankwo

Reference Books:

2. Basic Life Support (BLS) Provider Manual, 2020 Guidelines by M. Masterbbjork (MD) and S. Meloni (MD), Medical Creations.
3. Basic Life Support- An Atlas Based Approach by Dr. Rakesh Kumar and Dr. Shakti Datt Sharma, Arya Publications.

Detailed Syllabus (PRACTICALS):

Modules	Topics	Periods

I	• Recognition and Management of Cardiac Arrest and Heart Attack • CPR – adults and pediatrics	8
II	• Recognition and Management – Bradycardia, Tachycardia	4
III	• Recognition and Management of choking – adults and pediatrics	4
IV	• Team dynamics in Basic life Support	8
TOTAL		**24**

Text Books:

1. Hsieh J. Computed tomography: principles, design, artifacts, and recent advances, 3rd edition, SPIE press.

References:

2. Seeram E. Computed Tomography: Physical Principles, Clinical Applications, and Quality Control,4th edition, Elsevier Health Sciences

Subject Name: Clinical Posting		**Subject Code: RIT242C503**
L-T-P-C – 0-0-12-6	**Credit Units: 6**	**Scheme of Evaluation: P**

Objective: The objective of this course is to educate the students and prepare them for future real-life situations and to enhance the delivery of health care in the Radiology Department.

1. Students will observe the basic functioning of the different modalities present in the Radiology department. They will be introduced to terminologies, equipments and techniques for preparation and management.

2. Students will gain additional skills in clinical preparation, interaction with patients and professional personnel. Students will apply knowledge from previous clinical learning experiences under the supervision of a senior technical officer.

3. Students will improve their skills in clinical procedures. Progressive interaction with patients and professional personnel are monitored a students practice in a supervised setting. Additional areas include problem-solving, identifying machine components and basic side-effect management.

4. The course provides students the opportunity to continue to develop advanced problem solving skill. Students will demonstrate competence in beginning, intermediate and advanced procedures.

BSc. Radiography And Advance Imaging Technology

6TH SEMESTER							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							

1	RIT242C601	Magnetic Resonance Imaging	3	1	0	4	4
2	RIT242C602	Basics of Radiotherapy	3	1	0	4	4
Discipline Specific Elective (DSE) (any three)							
3	RIT242D601	DSE 5: Fundamentals of Medical Terminology	4	0	0	4	4
	RIT242D602	DSE 5: Biostatistics and Research Methodology	4	0	0	4	4
4	RIT242D603	DSE 6: Techniques of Mammography & Fluoroscopy	4	0	0	4	4
	RIT242D604	DSE 6: Forensic Medicine	4	0	0	4	4
5	RIT242D605	DSE 7: Interventional Radiography	4	0	0	4	4
	RIT242D606	DSE 7: Medical Equipment Usage and Management	4	0	0	4	4
Skill Enhancing Course (SEC)							
9	RIT242S601	SEC-IV: Project	0	0	4	2	4
Value Addition Course (VAC)							
10		VAC-V	2	0	0	2	2
Ability Enhancement Compulsory Courses (AECC)							
11	CEN982A601	AECC 11: Communicative English-VI	1	0	0	1	1
12	EVS982A603	AECC 12: Environmental Studies & Sustainable Development II	1	0	0	1	1
		TOTAL	**24**	**1**	**1**	**26**	**26**

Subject Name: Magnetic Resonance Imaging **Subject Code: RIT242C601**

L-T-P-C – 3-1-0-4 **Credit Units: 4** **Scheme of Evaluation: T**

Objective: This course has been formulated to develop knowledge on basic principles of Computed tomography, Radiographic projection and positioning. This course has been

formulated to develop knowledge on working principle, instrumentation and clinical applications of MRI.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the history of different diagnostic modalities of radiology department, their inventors and other important facts on recent advancement	BT 1
CO2	**Understand** the working principle and physic behind the image formation in CT, MRI and BMD	BT 2
CO3	**Explain** the procedure of patient positioning and the technical aspects of each modality	BT 2
CO4	**Apply** the specific knowledge relating to that particular modality in the production of good quality image to aid in diagnosis	BT 4

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	• Introduction and Basic Principle of Magnetic Resonance Imaging History of MRI, Electricity & Magnetism, Laws of magnetism, Atomic structure, Motion within the atom, The Hydrogen nucleus, Precession, Larmor equation, Resonance, MR signal, Free induction decay signal, Relaxation, T1 recovery, T2 decay, Pulse timing& parameters.	4
II.	• MRI Hardware Introduction, Permanent magnets, Electromagnets, Super conducting magnets, Fringe fields, Shim coils, Gradient coils, Radio-frequency coils, the pulse control units, Patient transportation	6

	system, Operator interface Encoding, Data collection & Image formation Introduction, Gradients, Slice selection, Frequency encoding, Phase encoding, Scan timing, Sampling, data space, k-space, k-space filling and fast Fourier transformation.	
III	• MRI Artefacts Introduction, Phase miss-mapping, Aliasing or wrap around, Chemical shift artefact, Chemical misregistration, Truncation artefact/Gibbs phenomenon, Motion of the patient Magnetic susceptibility artefact, Magic angle artefact, Zipper artefact, shading artefact Cross excitation and cross talk MRI contrast agents • Flow Phenomena & MRI angiography Introduction, The mechanisms of flow, Time of flight phenomenon, Entry slice phenomenon, Intravoxel Dephasing. Flow phenomena compensation-Gradient moment rephrasing, Pre saturation, Even echo rephrasing, MR Angiography	8
IV	• Patient preparation, patient positioning, performing all non-contrast and contrast MRI procedures • Planning of different scanning planes, parameters and their tradeoffs & patient monitoring during the procedures. • Various post processing techniques and evaluation of image quality and clinical findings. • Post procedural care of the patient.	6
TOTAL		**24**

Text Book:

1.Christensen, Curry & Dowdey: An Introduction of Physics To Diagnostic Radiography (Lea & Febiger)

Reference Books:

1.Step by Step MRI by J Jagan Mohan Reddy , V Prasad Jaypee Publishers.

2. MRI in practice, 4th Edition by Catherine Westbrook, Carolyn Kaut Roth, John Talbot , Wiley-Blackwell.

Subject Name: Basics of Radiotherapy		**Subject Code: RIT242C602**
L-T-P-C – 3-1 -0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objective: This objective of the course is to impart basic knowledge of nuclear imaging and expose students to developments of recent technologies in the field of diagnosis.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the basic principles of radiotherapy and basics of radioactivity	BT 1
CO2	**Understand** the basic principle and advances of nuclear imaging and its diagnostic value	BT 2
CO3	**Explain** the procedures of producing different radionuclides using different nuclear reactors	BT 2
CO4	**Apply** the knowledge of radiotherapy in producing images of the target organs and treatment of certain diseases	BT 3

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**

I.	• Introduction to NMT and Radioactive Transformation Basic atomic and nuclear physics, History of radioactivity, Units & quantities, Isotopes, Isobars, Isomers, Radioactivity and half-life, Exponential decay ,specific activity, Modes of Radioactive decay, parent daughter decay.	12
II.	• Production of Radio nuclides Reactor produced radionuclide, Reactor principles; Accelerator produced radionuclide, Radionuclide generators	8
III	• Radio pharmacy & Handling & Transport of Radio-nuclides Cold kits, Radio pharmacy used in Nuclear medicine, Radiopharmaceuticals used in various procedures, Safe handling of radioactive materials, Procedures for handling spills	14
IV	• Equipments of Radiotherapy Gamma camera, PET, SPECT	12
TOTAL		**48**

Text Book:

1.Waterstram-Rich KM, Gilmore D. Nuclear Medicine and PET/CT-E-Book: Technology and Techniques. Elsevier Health Sciences; 2016

Reference Books:

1.Principle and practice of Nuclear medicine and correlative medical imaging, RD lele, Jaypee publishers.

2. Walter and Miller's Textbook of Radiotherapy, Radiation Physics , Therapy and Oncology, 8th Eight Edition, Paul Symonds, John A. Mills, Angela Duxbury.

Subject Name: Fundamentals of Medical Terminology		**Subject Code: RIT242D601**
L-T-P-C – 3-1 -0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objective: This course introduces students to the language of medicine.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the various medical terms	BT 1
CO2	**Recognize** frequently used laboratory tests, diagnostic and radiological procedures in each of the body systems	BT 1
CO3	**Recognize** primary pathological conditions for each of the body systems	BT 1
CO4	**Explain** questions about content of medical reports	BT 2

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	**Introduction to Medical Terminology** • Origin of medical terms Acronym Eponym Word parts Modern language	10

II.	**Body Structure** • Body organization Anatomic planes Abdominopelvic regions Body Positions Abdominopelvic quadrants Directional terms	14
III	**Terminology for body systems** • Anatomical terms • Disease and disorder terms • Surgical terms • Diagnostic terms • Abbreviations	14
IV	**Oncology** • Body structure • Disease and disorder terms • Surgical terms • Diagnostic terms • Abbreviations	10
TOTAL		**48**

Text Book:

1.Medical Terminology, An illustrated guide 8th edition, Barbara Jonson Cohen, Ann DePetris

Reference Books:

1.Medical terminology for dummies, Beverley Henderson, CMT-R, Jennifer Lee Dorsey.

2. Medical Terminology- A short course, 7th Edition, by Davi Ellen Chabner.

Subject Name: Biostatistics and Research Methodology		**Subject Code: RIT242D602**
L-T-P-C – 3-1-0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objective: The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings. The students will also be made aware of the need of biostatistics and understanding of data, sampling methods, in addition to being given information about the relation between data and variables.

Course Outcome: Upon completion of this course the student should be able to:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the principal concepts about biostatistics and research methodology	BT 1
CO2	**Recognize** the definition of statistics, the subjects and its relation with other sciences	BT 2
CO3	**Explain** the various process of data collection and sampling	BT 2
CO4	**Apply** the testing methods on formulating precise data relating to the particular research	BT 4

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	• Introduction: Introduction to research methodology: meaning, objectives of research, types of research, research approaches, significance of research, research process, criteria of good research, Defining research problem: selecting the problem necessity and techniques in defining the problem.	8
II.	• Research, sample design and data collection: Research Design: need and features of good design, types, basic principles of experimental design, developing a	14

	research plan. Sample design: criteria for selecting a sample procedure, characteristics of good sampling procedure types of sample design, selecting random samples. Methods of data collection: Collection of primary data, observation method, interview method, collection of data through questionnaire and schedules and other methods. Collection of secondary data, selection of appropriate method for data, collection, case study method, guidelines for developing questionnaire, successful interviewing, survey vs. experiment. Processing and analysis of data: data analysis (elements), statistics in research, measures of central tendency, dispersion, asymmetry, regression analysis, multiple correlation and regression, partial correlation, and association in case attributes.	
III	• Sampling Fundamentals: Definition, need, central limit theorem, sampling theory, the concept of standard error, estimation, estimating population mean, proportion, sample size and its determination.	14
IV	• Testing of hypothesis: Meaning basic concepts, important parametric tests, limitations of tests of hypothesis. Chi-square test: Applications, steps characteristics, limitations. Analysis of variance and co-variance: basic principles, techniques, applications, assumptions and limitations. Analysis of non-parametric tests	10
TOTAL		**48**

Text Book:

1.ABC of Research Methodology and Applied biostatistics by MN Parikh and Nithya Gogtay

Reference Books:

1.Comprehensive text book of Biostatistics and Research Methodology by Dr. S. Kartikeyan.

2. Introduction to Biostatistics (A Textbook of Biometry) by Dr. Pranab Kumar Banerjee , S Chand.

Subject Name: Techniques of Mammography & Fluroscopy		**Subject Code: RIT242D603**
L-T-P-C – 3-1-0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objective: This course has been formulated to Impart basic knowledge of breast imaging using mammography imaging, mineral density using BMD and other recent advancement related to them.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the historical facts related to mammography and its importance in the medical field	BT 1
CO2	**Understand** the basic principle of mammography and bone mineral density	BT 2
CO3	**Explain** the procedure for producing images in mammography and BMD	BT 3
CO4	**Apply** the knowledge of protection and safety in each modality to produce images maintaining the radiation safety	BT 4

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	• History of mammography and its applications	8

II.	• Mammography: Mammography Equipment's and Basic views in Mammography	14
III	• Clinical Practice Scanning protocol, Indication, Patient preparation, image quality and artifacts in and Mammography	14
IV	• Fluoroscopy and Image Intensifiers: Direct fluoroscopy, fluoroscopy image, fluoroscopic screen, explorators (serial changers, spot film devices) and accessories. Radiation protection including integrating timer. Tilting tables. Principles and Construction of Image Intensifiers, Television Camera Tubes and Cathode Ray Tubes. Recording the intensified image, methods of viewing the intensified image, equipment for fluorography and cine-fluorography. Radiographic and fluoroscopic tables, telecommand tables. • Equipment for Special Procedures: Special trolleys and chairs, portable and mobile x-ray units, cordless mobile x-ray equipment, capacitor discharge mobile equipment, cranial and dental equipment, skull tables, mammography, mass-miniature radiography, multi section cassettes, rapid cassette change, rapid film changer, magnification radiography, subtraction radiography.	10
TOTAL		**48**

Text Book:

1.Ross & Galloway: A Hand Book of Radigraphy (Lewis)

Reference Books:

1.Scarrow: Contrast Radiography (Schering Chemicals)

2.Vanderplasts : Medical X-Ray Technique (Mac Millan)

Subject Name: Forensic Science		**Subject Code: RIT242D604**
L-T-P-C – 3-1-0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objectives: This course has been formulated to make students familiar with the field of forensic science which includes investigating a crime by applying forensic science principles.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the history of forensic science, procedures of medico legal autopsy and documentation	BT 1
CO2	**Understand** the application of forensic science, photography and crime scene management	BT 2
CO3	**Explain** the techniques of forensic physics, forensic ballistics, chemistry and toxicology	BT 2
CO4	**Explain** the forensic dermatoglyphics and other impressions	BT 2

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	• History of forensic medicine, its definition, scope and its application • Medico legal autopsy- procedure, necessity, protocol and documentation	10
II.	• Evidence- preservation and dispatch the material for medico legal aspects • Record- all evidence and finding to be recorder	14

	• Medico legal autopsy- procedure, necessity, protocol and documentation	
III	• Disaster management- discussion on medico legal aspects • Legal hazards for medical professional • Act of commission • Act of omission	14
IV	• Negligence • Liabilities- civil, criminal etc • Advantage and disadvantage of the Act • Indemnity insurance for medical professional	10
TOTAL		**48**

Text Book:

1.Criminalistics: An Introduction to Forensic Science, Global edition by Richard Saferstein

Reference Books:

1.Forensic Science 4th edition, Andrew R.W. Jackson, Julie M. Jackson.

2. Textbook of Forensic Medicine and Toxicology, 2nd Edition Nageshkumar G Rao, Jaypee.

Subject Name: Interventional Radiology		**Subject Code: RIT242D605**
L-T-P-C – 3-1-0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objective: This course has been formulated to develop knowledge on current interventional radiology procedures including pulmonary angiography and vein embolization.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the role of intervention in medical imaging	BT 1
CO2	**Explain** the theory of operation, functioning and clinical application of different interventional procedures	BT 2
CO3	**Develop** the knowledge to train and educated other hospital staff about operating various interventional equipment	BT 3
CO4	**Apply** the knowledge to perform as a member of multidisciplinary team in a hospital setting	BT 3

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	• Introduction to interventional radiology • Need for interventional procedures Informed consent	10
II.	Equipment • History and overview of angiography, Basics of Angiographic equipment: Single and biplane angiographic equipment Angiographic Table, Image intensifier, Flat panel detector, Recording systems, • Cardiac resuscitation measures - ECG Pressure injector, Catheters, needles, stents, and other tools 3-D rotational angiography, Image processing, Patient monitor, ACT equipment Advancement in interventional radiology	14
III	Procedure: - • Coronary angiography & angioplasty, cardiac • Cardiac cauterization, image • Image-guided biopsy/fnac/drainage, four	14

	• Four vessel DSA & aortogram, embolic • Embolism agents, patient preparation, post-procedure care, the role of the radiographer in an interventional procedure	
IV	• Catheters, guide wires & stents • Venography • Vertebroplasty and kyphoplasty • RF ablation • Crash cart – emergency drugs	10
TOTAL		**48**

Text Book:

1. Kandarpa K, Machan L, editors. Handbook of interventional radiologic procedures. Lippincott Williams & Wilkins

Reference Books:

1. Bontrager KL, Lampignano J. Textbook of Radiographic Positioning and Related Anatomy-E-Book. Elsevier Health Sciences; 2013

2.Frank ED, Long BW, Smith BJ. Merrill's Atlas of Radiographic Positioning and Procedures, 4th edition,. Elsevier Health Sciences

Subject Name: Medical Equipment Usage & Management		**Subject Code: RIT242D606**
L-T-P-C – 4-0-0-4	**Credit Units: 4**	**Scheme of Evaluation: T**

Objective: This course has been formulated to let students understand the healthcare scenario in India and allow them to work within organizational systems and requirements as appropriate to one's role.

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**BLOOMS TAXONOMY LEVEL**
CO 1	**Remember** the role of medical equipment technicians in health care settings	BT 1
CO2	**Explain** the theory of operation, functioning and clinical application of medical devices	BT 2
CO3	**Develop** the knowledge to train and educated other hospital staff about operating various medical equipment	BT 3
CO4	**Apply** the knowledge to perform as a member of multidisciplinary team in a hospital setting	BT 3

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Personal protective equipments, Airway management equipments • Gloves, masks, goggle, apron etc • OPA, NPA, Suction machine, BVM	10
II.	Cardiac Life support equipment, Trauma life support equipment • ECG machine, cardiac monitor, pulse-oximeter, stethoscope, defibrillator, AED • Splint, bandage, cervical collar, spine board, scoop	14
III	Extrication equipments • Infant BVM, Infant ET tube, infant laryngoscope Communication devices • Mobile phone, radio, public addressing system	14

IV	Radiological equipments • Contrast media, pressure injector, needles • Cannula-different types, catheter-different types, speculum, forceps, syringes	10
TOTAL		**48**

Text Book:

1. Medical Equipment Management , Keith Willson- Keith Ison, Slavik Tabako

Reference Books:

1. Pocket Essential Medical Equipment by Norbert Banhidy, David Zharg, CRC Press

2.Fundamentals of Medical Practise: Management (Gateway to healthcare Management) by Stephen Wagner.

Subject Name: Project		**Subject Code: RIT242S601**
L-T-P-C – 0-0-4-2	**Credit Units: 2**	**Scheme of Evaluation: P**

Project will be given to a group of 3-5 students. Students will be given with a research topic within the field by the supervisor. Students have to do the experimental plan, summarize the results and present the result of the project.

Project includes use of relevant scientific literature according to the topic given, students should apply experimental methods, collect data for evaluation, use appropriate statistical tools if necessary, document results by writing report. Data collection and project work can be done parallel during the last semester classes.

Student's performance shall be evaluated on written project report, a written abstract and a presentation in the department. The faculty shall submit the assessment records of each student under his/her supervision to the HOD.