ROYAL GLOBAL UNIVERSITY
GUWAHATI

ROYAL SCHOOL OF MEDICAL & ALLIED SCIENCES

(RSMAS)

DEPARTMENT OF RADIOGRAPHY & ADVANCE IMAGING TECHNOLOGY

COURSE STRUCTURE & SYLLABUS
(BASED ON NATIONAL EDUCATION POLICY 2020)

FOR

B.Sc. IN RADIOGRAPHY & ADVANCE IMAGING TECHNOLOGY
(4 YEARS SINGLE MAJOR)

W.E.F

AY - 2025– 26

BACHELOR DEGREE IN RADIOGRAPHY & ADVANCE IMAGING TECHNIQUE

PROGRAMME STRUCTURE

BRIT 1ST SEMESTER				
SL No	**SUBJECT CODE**	**NAMES OF SUBJECTS**	**COURSE LEVEL**	**CREDIT**
MAJOR COURSES				
1	RIT242M101/ RIT242M111	Human Anatomy-I(T&L)	100	3
2	RIT242M102/ RIT242M112	Human Physiology-I (T&L)	100	3
3	RIT242M103	Biochemistry-I (T)	100	3
INTERDISCIPLINARY COURSE				
4	IKS992K101	IKS-I	100	3
ABILITY ENHANCEMENT COURSE				
5	CEN982A101 / BHS982A102	Communicative English and Behavioral Science-I	100	2
SKILL ENHANCEMENT COURSE (SEC)				
6	RIT242S101	Hospital Duty & Patient Care I	100	3
VALUE ADDED COURSE				
7	VAC-1	To be selected from the pool of courses offered	100	3
SWAYAAM /MOOCS COURSE				
8		MOOCs course	100	3
TOTAL				**23**
BRIT 2ND SEMESTER				
MAJOR COURSES				
1	RIT242M201/RIT242M211	Human Anatomy-II (T&L)	100	3
2	RIT242M202/RIT242M212	Human Physiology-II	100	3
3	RIT242M203	Biochemistry-II(T)	100	3

INTERDISCIPLINARY COURSE				
4	IKS992K201	IKS-2	100	3
ABILITY ENHANCEMENT COURSE (AEC)				
5	CEN982A201 &BHS982A202	Communicative English and Behavioral Science-II	100	2
SKILL ENHANCEMENT COURSE (SEC)				
6	RIT242S201	Hospital Duty & Patient Care-II	100	3
VALUE ADEED COURSE				
7	VAC-2	Selected from the pool of courses offered	100	3
SWAYAAM /MOOCS COURSE				
8		MOOCs course	100	3
TOTAL				**23**
BRIT 3RD SEMESTER				
MAJOR COURSE				
1	RIT242M311	Basic Physics (T&L)	200	4
2	RIT242M302	Physics of Radiology	200	4
3	RIT242M313	Radiographic Technique I	200	4
INTERDISCIPLINARY COURSE				
4		Selected from the pool of courses offered	200	3
ABILITY ENHANCEMENT COURSE (AEC)				
5	CEN982A301&BHS982A302	Communicative English and Behavioral Science-III	200	2
SKILL ENHANCEMENT COURSE (SEC)				
7	RIT242S301	Medical, Law & Ethics	200	3
SWAYAAM /MOOCS COURSE				
8		MOOCs course	200	3
TOTAL				**23**

BRIT 4TH SEMESTER				
MAJOR COURSES				
1	RIT242M401	Radiation Hazards & Protection	200	4
2	RIT242M412	Radiographic Technique II	200	4
3	RIT242M403	Techniques of Mammography & Fluoroscopy	200	3
4	RIT242M414	Special Radiographic Procedures	200	4
ABILITY ENHANCEMENT COURSE (AEC)				
5	CEN982A401 &BHS982A402	Communicative English and Behavioral Science-IV	200	2
SWAYAAM /MOOCS COURSE				
6		MOOCs course	200	3
TOTAL				**19**
BRIT 5TH SEMESTER				
MAJOR COURSES				
1	RIT242M501	Computed Tomography	300	4
2	RIT242M502	Darkroom Technique	300	4
3	RIT242M513	Computer Skills	300	4
4	RIT242M504	Basics of Ultrasound and ECG	300	4
CLINICAL POSTING				
5	RIT242M524	Clinical Posting	200	4
Total				**20**
BRIT 6th SEMESTER				
MAJOR COURSES				
1	RIT242M601	Magnetic Resonance Imaging	300	4
2	RIT242M602	Orientation in Clinical Sciences	300	4
3	RIT242M603	Basics of Radiotherapy	300	4

4	RIT242M604	Interventional Radiology	300	4
5	RIT242M605	Biostatistics & Research Methodology	300	4
TOTAL				**20**
BRIT 7TH SEMESTER				
MAJOR COURSES				
1	RIT242M711	Techniques of Routine X-rays	400	4
2	RIT242M712	Techniques of Special X-rays	400	4
3	RIT242M713	Techniques of Computed Tomography	400	4
4	RIT242M714	Techniques of Ultrasound	400	3
5	RIT242M715	Techniques of Mammography & Fluoroscopy	300	3
TOTAL				**18**
BRIT 8TH SEMESTER				
MAJOR COURSES				
1	RIT242M811	Techniques of MRI	400	7
2	RIT242M812	Techniques of Hybrid Imaging	400	7
3	RIT242M821	Research Project/Dissertation	400	12
TOTAL				**24**

Level: Semester I

Title of the Paper: HUMAN ANATOMY- I	
Subject Code: RIT242M101/RIT242M111	**Course Level: 100**
Scheme of Evaluation: Theory + Practical	
L-T-P-C: 2-0-2-3	**Total credits: 3**

Course Objectives:

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 Outcomes

On successful completion of the course, the students will 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 4

COURSE OUTLINE:

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.	**10**

	● **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)	
II	**Respiratory system:** ● Parts of Respiratory system; Structure of nose, nasal cavity, larynx, trachea, lungs, pleura, bronchopulmonary segments.	**10**
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	**14**
IV	● **Cardiovascular System:** ● Arteries & veins, Capillaries & arterioles. ● Heart- size, location, chambers, blood supply of heart, pericardium. ● Systemic & pulmonary circulation. ● Major blood vessels of Heart	**10**
TOTAL		**44**

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.

CREDIT DISTRIBUTION		
THEORY/TUTORIAL	**PRACTICUM**	**EXPERIENTIAL LEARNING**
30 NCH	**30 NCH**	**30 NCH** **Lab visit** **- Home assignments** **- Projects**

ANATOMY-I LAB

Credit: 1

Objectives: The objective of the course is to introduce students to the practical gained regarding the anatomy of various structures and the histological appearance of various organs of the human body. Identification of the upper limb bones and their features.

DETAILED SYLLABUS:

Modules	Topics (if applicable) & Course Contents	Periods
I.	• Introduction of the human body • To identify different levels of organisation and types of tissues • Study of compound microscope	**4**

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	**6**
III	• To identify humerus • To identify radius • To identify ulna • To identify hand	**10**
IV	• To identify Clavicle • To identify Scapula	**10**
TOTAL		**30**

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.

Level: Semester I

Title of the Paper: HUMAN PHYSIOLOGY-I

Subject Code: RIT242M102/RIT242M112	**Course Level: 100**
Scheme of Evaluation: Theory + Practical	
L-T-P-C: 2-0-2-3	**Total credits: 3**

Course Objectives

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 Outcomes

On successful completion of the course the students will 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 with 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:

MODULE	TOPICS & COURSE CONTENT	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, clotting factors. • Blood groups-ABO system, Rh system, Blood transfusion- Indication, transfusion reactions. Anaemias-classification, effects of anaemia on body.	10
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.	14

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
IV	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 curveand factors affecting it. • Transport of Carbon-Dioxide- Forms of transportation. • Hypoxia-Definition, types, effects of hypoxia. • Cyanosis-Definition and types. Artificial Respiration- CPR	10
	Total	**44**

Text Books:

1. Arthur, Guyton,Textbook of Medical Physiology, Mosby. 3rd Edition
2. Sembulingam.K,Human Physiology- Vol. 1&2 ,MedicalAllied, 7th Edition.

Reference Books:

3. Chaudhari, S.K ,Concise Medical Physiology, New CentralAgency,Calcutta, 4th Edition
4. Tortora&Grabowski,Harper Collins, Principals of Anatomy and Physiology, Gobal Edition.

CREDIT DISTRIBUTION		
THEORY/TUROTIAL	**PRACTICUM**	**EXPERIENTIAL LEARNING**
30 NCH	**30 NCH**	**30 NCH** **Lab visit** **- Home assignments** **- Projects**

PHYSIOLOGY-I LAB

Credit: 1

Course Objectives: The objective of the course is to learn about various vitals in normal & the alterations in the physiology of the human body.

DETAILED SYLLABUS:

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	Identification of some laboratory instruments	6
II	Determination of blood hemoglobin level	10
III	Determination of bleeding time Blood pressure measurement	4
	Determination of clotting time	10

IV	Blood smear preparation, staining and differential leukocyte count	
	TOTAL	30

Text Book:

1. Alison,G.Anne,W.(2014). Ross and Wilson Anatomy and Physiology in Health and Illness. Elsevier Health; UK,13th edition.
2. Sembulingam. K, Human Physiology- Vol. 1&2 ,Medical Allied, 7th Edition.

Reference Books:

1. Arthur, Guyton, Textbook of Medical Physiology, Mosby. 4th Edition

Level: Semester I

Title of the Paper: BIOCHEMISTRY-I	
Subject Code: RIT242M103	**Course Level: 100**
Scheme of Evaluation: Theory	
L-T-P-C: 3-0-0-3	**Total credits: 3**

Course Objectives

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

Course Outcomes

On successful completion of the course, the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the basic biochemistry of carbohydrates, lipids and proteins	BT 1
CO2	**Understand** the basics of electrolytes and their importance	BT 2

CO3	**Understand** the basics of biophysics	BT 2
CO4	**Analyzation** of physical chemistry and organ function tests	BT 4

COURSE OUTLINE:

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Cell**: Morphology, structure & functions of cell, cell membrane, Nucleus, chromatin, Mitochondria, Endoplasmic Reticulum, Ribosomes.	5 **hours**
II.	**Carbohydrates**: Definition, chemical structure, functions, sources, classifications, Monosaccharides, Disaccharides, Polysaccharides, mucopoloysaccharide and its importance, glycoproteins **Carbohydrate Metabolism**: Glycolysis, TCA cycle, Glycogen metabolism, Gluconeogenesis, Maintenance of Blood Glucose. Diabetes Mellitus and its complications.	**15 hours**
III.	**Proteins**: Definition, sources, amino acids, structure of protein, their classification, simple protein, conjugated protein, derived proteins and their properties. **Protein Metabolism**: Transamination, Deamination, Fate of ammonia, urea synthesis and its inborn errors.	**15 hours**
IV.	**Nucleic Acid** : Basic idea of structure of DNA & RNA Functions of DNA and RNA **Water and Electrolyte**, Fluid compartment, daily intake and output sodium and potassium balance	**5 hours**
Total		**40**

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.

CREDIT DISTRIBUTION		
THEORY/TUTORIAL	**PRACTICUM**	**EXPERIENTIAL LEARNING**
60 NCH		**30 NCH** **- Lab visit** **- Home assignments** **- Projects**

Level: Semester I

Title of the Paper: HOSPITAL DUTY & PATIENT CARE-I	
Subject Code: RIT242S101	**Course Level: 100**
Scheme of Evaluation: Theory	
L-T-P-C: 3-0-0-3	**Total credits: 3**

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	**Demonstrate** understanding of hospital protocols, roles, and responsibilities in various healthcare settings.	BT 1
CO2	**Apply** standard procedures for basic patient care, including hygiene, nutrition, mobility assistance, and vital signs monitoring.	BT 2

CO3	**Exhibit** effective communication and interpersonal skills while interacting with patients, families, and healthcare professionals.	BT 3
CO4	**Follow** infection control practices, patient safety measures, and ethical guidelines during hospital duty.	BT 4

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	**15 hours**
II.	Quality Management Biomedical waste management Basic care needs Laboratory safety	**10 hours**
III.	Vital signs	10 **hours**
IV	Communication Care of patient Patient rights and responsibilities Negligence Comfort positions for patient	10 **hours**
TOTAL		**45**

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.

CREDIT DISTRIBUTION		
THEORY/TUTORIAL	**PRACTICUM**	**EXPERIENTIAL LEARNING**
60 NCH	**-**	**30 NCH**
		Laboratory Visit **Home Assignment** **Project work**

Title of the Paper: Introduction to Effective Communication	
Subject Code: CEN982A101	**Course Level: 100**
Scheme of Evaluation: Theory	
L-T-P-C: 1-0-0-1	**Total credits: 1**

Course Objective: To understand the four major aspects of communication by closely examining the processes and outlining the most effective ways to communicate with interactive activities.

Course Outcomes: On successful completion of the course the students will be able to

CO	Course Outcome	Blooms Taxonomy Level
CO 1	**List** the elements and processes that make for successful communication and **recognise** everyday activities that deserve closer attention in order to improve communication skills	**BT 1**
CO 2	**Contrast** situations that create barriers to effective communication and **relate** them to methods that are consciously devised to overcome such hindrance	**BT 2**

CO 3	**Apply** language, gestures, and para-language effectively to avoid miscommunication and **articulate** one's thoughts and build arguments more effectively	**BT 3**

Detailed Syllabus		
Units	**Course Contents**	**Periods**
I	Introduction to Effective Communication • Listening Skills o The Art of Listening o Factors that affect Listening o Characteristics of Effective Listening o Guidelines for improving Listening skills	**5**
II	• Speaking Skills o The Art of Speaking o Styles of Speaking o Guidelines for improving Speaking skills o Oral Communication: importance, guidelines, and barriers	**5**
III	• Reading Skills o The Art of Reading o Styles of Reading: skimming, surveying, scanning o Guidelines for developing Reading skills	**5**
IV	• Writing Skills o The Art of Writing o Purpose and Clarity in Writing o Principles of Effective Writing	**5**

Textbooks:

1. Rizvi, M. Ashraf. (2017). Effective Technical Communication. McGraw-Hill.
2. Chaturvedi, P. D. and Chaturvedi, Mukesh. (2014). Business Communication. Pearson.
3. Raman, Meenakshi and Sharma, Sangeeta. (2011). Technical Communication: Principles and Practice (2nd Edition): Oxford University Press.

Credit Distribution		
Lecture/Tutorial	**Practicum**	**Experiential Learning**

15 hours	-	10 hours - Movie/ Documentary /Podcasts screening - Peer teaching

Title of the Paper: Behavioral Science I
Subject Code: BHS982A104 **Course Level: 100**
Scheme of Evaluation: Theory
L-T-P-C: 1-0-0-1 **Total credits: 1**

Course objectives: To increase one's ability to draw conclusions and develop inferences about attitudes and behaviour, when confronted with different situations that are common in modern organizations.

Course Outcomes: On completion of the course the students will be able to :

CO1: Understand self & process of self exploration

CO2: Learn about strategies for development of a healthy self

CO3: Apply the concepts to build emotional competencies.

Detailed Syllabus:

Modules	Course Contents	Periods
I	**Introduction to Behavioral Science** Definition and need of Behavioral Science,Self: Definition components, Importance of knowing self, Identity Crisis,Gender and Identity, Peer Pressure, Self image: Self Esteem, Johari Window ,Erikson's model.	4
II	**Foundations of individual behavior** Personality- structure, determinants, types of personalities. Perception: Attribution, Errors in perception. Learning- Theories of learning: Classical, Operant and Social	4

III	**Behaviour and communication.** Defining Communication, types of communication, barriers to communication, ways to overcome barriers to Communication, Importance of Non-Verbal Communication/Kinesics, Understanding Kinesics, Relation between behaviour and communication.	**4**
IV	**Time and Stress Management** Time management: Introduction-the 80:20, sense of time management, Secrets of time management, Effective scheduling. Stress management: effects of stress, kinds of stress-sources of stress, Coping Mechanisms. Relation between Time and Stress.	**4**
Total		**16**

Text books

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management; Pfeiffer &Company
- Blair J. Kolasa, Introduction to Behavioural Science for Business, John Wiley & Sons Inc
- K.Alex, Soft skills; S.Chand

Title of the Paper: IKS-I

Subject Code: IKS992K101 **Course Level: 100**

Scheme of Evaluation: Theory

L-T-P-C: 2-1-0-3 **Total credits: 3**

Course objectives:

This Foundation course is designed to present an overall introduction to all the streams of IKS relevant to the UG program. It would enable students to explore the most fundamental ideas that have shaped Indian Knowledge Traditions over the centuries.

Course Outcomes:

On completion of this course students will be able to :

CO	Contents	BT Level
CO1	Recall the rich heritage of Indian knowledge systems	**BT level 1**

CO2	Describe the contribution of Indian knowledge systems to the world	**BT level 2**

CO3	Demonstrate knowledge of sociocultural and ethnolinguistic diversity that constitutes the soul of Bharatvarsha	**BT level 3**
CO4	Apply traditional knowledge and techniques in day-to-day life	**BT level 4**

Module	Course Contents	Periods
I	**Introduction to Indian Knowledge Systems (IKS):** About Indian Knowledge System; Definition of Indigenous/ Traditional Knowledge; Scope, and Importance of Traditional Knowledge. **Ancient India- Bharat Varsha:** People of Ancient Bharat Varsha; Our great natural heritage: The great Himalayas and the rivers; The civilizations of the Sindhu-Ganga valley, and the Brahmaputra valley; Our coastal plains; Our Nature: Forests and Minerals; Ancient Indian Traditional Knowledge and Wisdom about nature and climate.	15

Module	Course Contents	Periods
II	**Indian Heritage of Knowledge:** Ancient Indian Knowledge: The Vedas and its components-the Vedangas Ancient Indian books and treaties: The Sastras.; The Great Indian Epics: The Ramayana and The Mahabharata Epics and religious treaties of ancient Assam: Introduction to Madhav Kandali's Ramayan and Srimanta Sankardev's Dasam Skandha Bhagavat of the Puranas; Ancient Traditional Knowledge-The Agamas ; The ancient Buddhist knowledge: Tripitaka: Vinaya, Sutta and Abhidhamma Pitaka **Languages and language studies in India**: What is linguistics?; Script and Language; Alphabet of the Indian; languages Varnamala: Origin, Evolution, and phonetic features; Languages of India; Important texts of Indian languages: Skills Siksha, Expression/Prounciation-Nirukta, Grammer-Vyakarana, Poetic rhythm- Chandas;Paninian Grammar: A Brief Introduction **Introduction to Fine Arts and Performing Arts of India:** Ancient Indian classical music and dance forms: The Science of	15

	Dramas- Natyasastra and the Science of Music-Gandharva-Veda; Aesthetics in Indian Art and Culture; Folk music and traditional dance forms of the Northeast.	
III	**Indian Science & Technology:** Ancient India's contribution to Mathematics - Number System. Algebra and Arithmetic, Geometry and Trigonometry; Origin of Decimal system in India; nomenclature of numbers in the Vedas. Zero and Infinity. Sulba-sutras. Contribution of Brahmagupta and Sridhar Acharya to Mathematics. Important texts of Indian mathematics. **Indian Astronomy:** Planetary System. Motion of the Planets; Velocity of Light; Eclipse. Astronomy. Navagrahas. Important works in Indian Astronomy. Aryabhata and Nilakantha: Contribution to Astronomical Studies **Indian Metal Works:** Mining Techniques. Types of Metals. Tools & Techniques for Metal Smelting with examples. Metalworks in pre- modern India: Special reference to NE India.	15
IV	**Contribution of Ancient India to Health Sciences:** Traditional Indigenous systems of medicines in India: - Ayurveda and Yoga; Elements of Ayurveda: Gunas and Doshas, Pancha Mahabhuta and Sapta-dhatu; Concept of disease in Ayurveda; Ayurvedic lifestyle practices: Dinacharya and Ritucharya; Important Ayurvedic Texts; Hospitals in Ancient India; Ayurveda: Gift of India to the modern world.	15
Total		**60**

Textbooks Books:

1. Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavan RN. (2022), Introduction to Indian Knowledge System: Concepts and Applications. PHI Learning Private Ltd.

2. Mukul Chandra Bora, Foundations of Bharatiya Knowledge System. Khanna Book Publishing

Reference Books:

1. Baladev Upadhyaya, Samskrta Śāstrom ka Itihās, Chowkhambha, Varanasi, 2010.
2. D. M. Bose, S. N. Sen and B. V. Subbarayappa, Eds., A Concise History of Science in India, 2nd Ed., Universities Press, Hyderabad, 2010.
3. Astāngahrdaya, Vol. I, Sūtrasthāna and Śarīrasthāna, Translated by K. R. Srikantha Murthy, Vol. I, Krishnadas Academy, Varanasi, 1991.
4. Dharampal, The Beautiful Tree: Indian Indigenous Education in the Eighteenth Century, Dharampal Classics Series, Rashtrotthana Sahitya, Bengaluru, 2021.

J. K. Bajaj and M. D. Srinivas, Indian Economy, and Polity in Eighteenth-century Chengalpattu, in J. K. Bajaj ed., Indian Economy and Polity, Centre for Policy Stu

Level: Semester II

The experiential learning sessions may include:
• Field Visits: Organizing visits to historical sites, museums, traditional craft centers, and other places relevant to Indian knowledge systems. • Interactive Sessions: Engaging students in discussions with experts and practitioners in various fields of Indian knowledge systems to gain insights and practical knowledge. • Online Lecture Series: Providing the students with online lectures by distinguished experts in the field of the Indian Knowledge System. • Hands-on Activities: Providing opportunities for students to participate in activities related to traditional arts, crafts, music, dance, agriculture, etc., to understand the practical aspects of Indian knowledge systems. • Practical Demonstrations: Conducting workshops or sessions to demonstrate traditional practices, such as yoga, Ayurveda, Vastu Shastra, etc., for the students.

Title of the Paper: HUMAN ANATOMY II	
Subject Code: RIT242M201/RIT242M211	**Course Level: 100**
Scheme of Evaluation: Theory + Practicum	
L-T-P-C: 2-0-2-3	**Total credits: 3**

Course Objectives

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 Outcomes

On successful completion of the course the students will 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

COURSE OUTLINE:

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	● **Lymphatic System:** ● Lymph & Lymph vessels. ● Structure of lymph node, names of regional lymphatics, axillary and inguinal lymph nodes.	**10**
II.	● **Urinary System:** ● Parts of Urinary system, location and gross structure of kidney, ureter, urinary bladder, urethra.	14

	● **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.	
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	10
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.	10
TOTAL		**44**

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.

CREDIT DISTRIBUTION		
THEORY/TUTORIAL	**PRACTICUM**	**EXPERIENTIAL LEARNING**
30 NCH	**30 NCH**	**30 NCH** **Lab visit** **- Home assignments** **- Projects**

ANATOMY-II PRACTICUM

Total credits: 1

DETAILED SYLLABUS

Modules	Topics (if applicable) & Course Contents	Periods
I	- To identify Femur - To identify Tibia - To identify Fibula - To identify foot	10
II	To identify the pelvic bones	6
III	To identify the bones of the skull	4
IV	To identify the vertebral bones To identify the bones of the rib cage	10
TOTAL		**30**

Textbooks:

1. Ross and Wilson (2014), Anatomy and physiology in health and illness, 11th edition, Elesevier publications.

2. Chaurasia BD, (2016), Human Anatomy, 7th edition, CBS publisher.

References:

3. Frank. N. Nettar, Atlas of Human Anatomy,7th Edition, Elsevier
4. Frederic H. Martini, Judi L. Nath, Edwin FB, Fundamentals of Anatomy and Physiology,9th edition, Pearson publishers.

Level: Semester II

Title of the Paper: HUMAN PHYSIOLOGY-II	
Subject Code: RIT242M202/RIT242M212	**Course Level: 100**
Scheme of Evaluation: Theory + Practicum	
L-T-P-C: 2-0-2-3	**Total credits: 3**

Course Objectives: 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 outcomes

On successful completion of the course the students will 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

Course

Outline :

MODULE	TOPICS & COURSE CONTENT	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	10
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	**14**

	○ Male Reproductive System-Stages of spermatogenesis, function of Testosterone ▪ Female Reproductive System-Ovulation, menstrual cycle, functions of Estrogen andprogesterone	
III	Central Nervous System ○ Structure of neuron, functions of nervous system. ○ Classification and properties of nerve fibres ○ Synapse- structure and types ○ Receptors-Definition, classification, properties, Reflex Arc ○ Functions of Hypothalamus ○ Functions of Cerebellum and Basal Ganglia ○ Functions of Cerebral Cortex ○ Autonomic Nervous System- Actions of sympathetic and parasympathetic systemand their comparison. ○ Special Senses-Eye-structure, functions of different parts, Visual acuity,Refractive errors ○ Ear-structure, functions, General mechanics of hearing.	**10**

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.	**10**
TOTAL		**44**

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.

CREDIT DISTRIBUTION

THEORY/TUTORIAL	PRACTICUM	EXPERIENTIAL LEARNING
30 NCH	**30 NCH**	**30 NCH** **Lab visit** **- Home assignments** **- Projects**

PHYSIOLOGY-II PRACTICUM

Credit: 1

DETAILED SYLLABUS

MODULE	TOPICS & COURSE CONTENT	PERIODS
I	Qualitative test for ABO Grouping	4
II	Determination of Platelet count	6
III	Determination of Erythrocyte Sedimentation Rate	10
IV	Determination of Haematocrit	10
	TOTAL	30

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

Level: Semester II

Title of the Paper: BIOCHEMISTRY-II	
Subject Code: RIT242M203	**Course Level: 100**
Scheme of Evaluation: Theory	
L-T-P-C: 3-0-0-3	**Total credits: 3**

Objective: This syllabus has been formulated to impart basic 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 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.	BT3

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I.	● Lipids ● Definition and classification of lipids ● Classification of Fatty acid ● Examples and functions of common lipid (phospholipids, glycolipids, steroids) ● Lipid Metabolism ● ß oxidation of fatty acid ● Ketone bodies ● Ketosis and ketoacid osis	15
II.	● ● Vitamins ● Definition and classification according to solubility ● Source and function of individual vitamins ● Deficiency	15
III	● Minerals ● Individual minerals – calcium, phosphorus, iron, magnesium fluslide, copper, selenium, molybdenum etc. - their sources, function and properties.	15
IV	● Enzymes ● Definition and classification of enzyme ● Basic idea of co-enzyme, iso-enzyme ● Mechanism of enzyme action ● Factors affecting enzyme action.	15
TOTAL		**60**

Text Book:

1. Chaurasia BD, (2016), Human Anatomy, 7th edition, CBS publisher.
2. Sembulingam. K, Human Physiology- Vol. 1&2 ,Medical Allied, 7th Edition.

Reference Books:

1. Frank. N. Nettar, Atlas of Human Anatomy,7th Edition, Elsevier
2. Ross and Wilson (2014), Anatomy and physiology in health and illness, 11th edition, Elsevier publications

CREDIT DISTRIBUTION		
THEORY/TUTORIAL	**PRACTICUM**	**EXPERIENTIAL LEARNING**
60 NCH	**-**	**30 NCH**
		Laboratory Visit **Home Assignment** **Project work**

Level: Semester II

Title of the Paper: Hospital Duty & Patient Care-II	
Subject Code: RIT242S201	**Course Level: 100**
Scheme of Evaluation: Theory	
L-T-P-C: 3-0-0-3	**Total credits: 3**

COURSE 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

On successful completion of the course the students will 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

COURSE OUTLINE:

MODULE	TOPICS & COURSE CONTENT	PERIODS
I.	● First aid ● Artificial respiration - CPR ● Hygiene ● Bleeding control	**10**
II.	● 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**

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.

CREDIT DISTRIBUTION		
THEORY/TUTORIAL	**PRACTICUM**	**EXPERIENTIAL LEARNING**
60 NCH	**-**	**30 NCH**
		Hospital Visit **Home Assignment** **Project work**

Title of the Paper: Communicative English II	**Course: AEC2**
Subject Code: CEN982A201	**Course Level: 100**
Scheme of Evaluation: Theory	
L-T-P-C: 1-0-0-1	**Total credits: 1**

Course Objectives

To introduce the students to the various forms of technical communication and enhance their knowledge in the application of both verbal and non-verbal skills in communicative processes. **Course Outcomes**

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Identify** the different types of technical communication, their characteristics, their advantages and disadvantages.	**BT 1**
CO 2	**Explain** the barriers to communication and ways to overcome them.	**BT 2**
CO 3	**Discover** the means to enhance conversation skills.	**BT 3**

CO 4	**Determine** the different types of non-verbal communication and their significance.	**BT4**

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I	**Technology Enabled Communication** Communicating about technical or specialized topics, Different forms of technology-enabled communication tools used in organisations Telephone, Teleconferencing, Fax, Email, Instant messaging , Blog, podcast, Videos, videoconferencing, social media	**4**
II	**Communication Barriers** Types of barriers: Semantic, Psychological, Organisational, Cultural, Physical, and Physiological. Methods to overcome barriers to communication.	**4**
III	**Conversation skills/Verbal Communication** Conversation – Types of Conversation, Strategies for Effectiveness, Conversation Practice, Persuasive Functions in Conversation, Telephonic Conversation and Etiquette Dialogue Writing, Conversation Control.	**4**
IV	**Non-verbal Communication** Introduction; Body language- Personal Appearance, Postures, Gestures, Eye Contact, Facial expressions Paralinguistic Features- Rate, Pause, Volume, Pitch/Intonation/ Voice/ modulation Proxemics , Haptics, Artifactics, Chronemics	**4**
	Total	**16**

Texts:

1. Rizvi, M. Ashraf. (2017). Effective Technical Communication. McGraw-Hill.

2. Chaturvedi, P. D. and Chaturvedi, Mukesh. (2014). Business Communication.Pearson.
3. Raman, Meenakshi and Sharma, Sangeeta. (2011). Technical Communication: Principles and Practice (2nd Edition): Oxford University Press.

References:

1. Hair, Dan O., Rubenstein, Hannah and Stewart, Rob. (2015). A Pocket Guide to Public Speaking. (5th edition). St. Martin's. ISBN-13:978-1457670404
2. Koneru, Aruna.(2017) Professional Communication. New Delhi: Tata McGraw Hill ISBN-13: 978-0070660021
3. Raman, Meenakshi and Singh, Prakash.(2012). Business Communication (2nd Edition): Oxford University Press
4. Sengupta, Sailesh.(2011) Business and Managerial Communication. New Delhi : PHI Learning Pvt. Ltd.

Title of the Paper: Behavioral Science II	**Course: SEC2**
Subject Code: BHS982A204	**Course Level: 100**
Scheme of Evaluation: Theory	
L-T-P-C: 1-0-0-1	**Total credits: 1**

Course objectives: To increase one's ability to draw conclusions and develop inferences about attitudes and behaviour, when confronted with different situations that are common in modern organizations.

Course outcomes: On completion of the course the students will be able to:

CO 1: Develop an elementary level of understanding of culture and its implications on personality of people.
CO2: Understand the concept of leadership spirit and to know its impact on performance of employees.
CO3: Understand and apply the concept of Motivation in real life.

Modules	Course Contents	Periods
I	**Culture and Personality** Culture: Definition, Effect, relation with Personality, Cultural Iceberg, Overview of Hofstede's Framework, Discussion of the four dimensions of Hofstede's Framework.	4
	Attitudes and Values Attitude's definition: changing our own attitudes, Process of cognitive dissonance Types of Values, Value conflicts, Merging personal and Organisational values	4

II		
III	**Motivation** Definition of motivation with example, Theories of Motivation (Maslow, McClelland's theory& Theory X and Y)	**4**
IV	**Leadership** Definition of leadership, Leadership continuum, types of leadership, Importance of Leadership, New age leaderships: Transformational & transactional Leadership, Leaders as role models.	**4**
Total		**16**

Text books:

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management; Pfeiffer &Company
- Blair J. Kolasa, Introduction to Behavioural Science for Business, John Wiley & Sons Inc.

Title of the Paper: Introduction to Indian Knowledge System - II

Subject Code: IKS992K201 **Course Level: 100**

Scheme of Evaluation: Theory

L-T-P-C: 2-1-0-3 **Total credits: 3**

Course objectives:

This Foundation course is designed to present an overall introduction to all the streams of IKS relevant to the UG program. It would enable students to explore the most fundamental ideas that have shaped Indian Knowledge Traditions over the centuries.

Course Outcomes:

On completion of this course, students will be expected to –

CO	Contents	BT Level
CO1	Recall traditional Indian knowledge traditions constituting Indian culture	BT level 1

CO2	Summarize differences between classical literature in Sanskrit and other Indian languages	BT level 2
CO3	Compare knowledge traditions originating in NE India	BT level 2
CO4	Appreciate the contribution of Indian Knowledge Systems to the world	BT level 3

Module	**Course Contents**	**Periods**
I	**Indian Classical Literature** Indian Classical Literature: A Brief Introduction; Ancient Indian Spritual Poetics-Kavya: Contribution of Kalidasa **Diversity and Indian Culture**: Diversity and Indian Culture; Indigenous Faith and Religion; Preservation of culture and indigenous knowledge **The Purpose of Knowledge:** Understanding Self-Awareness and Spirituality; Indian concept and purpose of Knowledge and Education; Understanding Spirituality and Materialism: Para and Apara Vidya	15

Module	Course Contents	Periods
II	**Methodology of Indian Knowledge System**: Shruti and Smriti traditions; Intoduction to Shastras; Manuscriptology: The art and science of documenting knowledge; Repositories of ancient manuscripts with special reference to the Norteast India. **Indian Architecture and Town Planning**: Introduction ancient Indian architecture; Sthapatya-Veda: An Introduction; Indigenous tools & techniques for town planning & Temple Architecture. Lothal, Mohan Jo Daro; Temple Art: Lepakshi Temple, Jagannath Puri Temple, Konark Sun Temple; Vernacular architecture of Assam: Special reference to Brahmaputra Valley	15
III	**Indian Agriculture**: Agriculture: Significance in Human Civilization; Sustainable Agriculture; Historical significance of agriculture and sustainable farming in India;Step Cultivation of India: Special reference to Northeast India; Wet rice cultivation of Assam. **Indian Textiles**: What is Textile?; Tradition of cotton and silk textiles in India; The historical contribution of textile and weaving to the Indian economy; Varieties of textiles and dyes developed in different regions of India with special reference to Northeast India	15
IV	**Indian Polity and Economy**: Understanding Kingdom and Chiefdom; Role of a king; The Indian idea of a well-organized polity and flourishing economy; The Chakravarti System: Administrative System of Ancient Bharatvarsha; Village administrative system: Northeast India; Arthashastra: Brief synopsis **The outreach of Indian Knowledge System across Geographical Boundaries:** Indian Languages; Scripts; Linguistics; Ayurveda; Yoga and Meditation; Textile; Decimal value place system-based arithmetic, Algebra and Astronomy	15
Total		**60**

Textbooks Books:

1. Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavan RN. (2022), Introduction to Indian Knowledge System: Concepts and Applications. PHI Learning Private Ltd.
2. Mukul Chandra Bora, Foundations of Bharatiya Knowledge System. Khanna Book Publishing

Reference Books:

1. Baladev Upadhyaya, Samskrta Śāstrom ka Itihās, Chowkhambha, Varanasi, 2010.

Level: Semester III

Title of the Paper: Basic Physics	**Course: Major**
Subject Code: RIT242M311	**Course Level: 200**
Scheme of Evaluation: Theory	
L-T-P-C: 2-0-4-4	**Total Credits: 4**

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**	**Bloom's Taxonomy Level**
CO 1	**Remember** the different electrical equipment's 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 3
CO4	**Create** different electrical circuits using different electrical and electronic appliances.	BT 4

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 (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. ● Transistors and its types ● 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 circuits	8

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 :** • Capacitor discharge, constant potential. main voltage compensation, mains resistance compensation, compensations for mains frequency variation. . 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**

Textbook:
1. Basic Medical Radiation physics – K Thalayan, Jaypee Brothers Medical Publishers Ltd.

Reference Books:
1.Christensen's Physics of Diagnostic Radiology – Christensen publisher-Wolters Kluwer India Pvt. Ltd.

CREDIT DISTRIBUTION		
THEORY/TUTORIAL	**PRACTICUM**	**EXPERIENTIAL LEARNING**
60 NCH	**30 NCH**	**30 NCH** - **Lab visit**

		- **Home assignments** - **Projects**

Level: Semester III

Title of the Paper: Physics of Radiology	**Course: Major**
Subject Code: RIT242M302	**Course Level: 200**
Scheme of Evaluation: Theory	
L-T-P-C: 3-1-0-4	**Total Credits: 4**

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 equipment's 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 • Physics of X-ray spectra – characteristic and bremsstrahlung x-rays • Factors upon which x-ray emission depends, soft and hard x-rays • Interaction of x-ray with matter • Coherent scattering- Thomson scattering, Rayleigh Scattering, Photoelectric absorption, pair production, photo disintegration • Attenuation	14
II.	• X-Ray Tubes • Construction of various x-ray tube & handling • Cathode and Filament design • cathode • 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 • Thermionic emission	10
TOTAL		**48**

Text Book:

1. Textbook of Radiology Physics, Hariqbal singh, Roshan Lodha jaypee publishers
2. 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.

CREDIT DISTRIBUTION		
THEORY/TUTORIAL	**PRACTICUM**	**EXPERIENTIAL LEARNING**
90 NCH	**-**	**30 NCH** **Group discussion** **Quiz** **Home assignments** **Projects**

Level: Semester III

Subject Name: General Radiographic Technique-I	**Course: Major**
Subject Code: RIT242M313	**Course Level: 200**
Scheme of Evaluation: Theory	
L-T-P-C: 0-0-8-4	**Total Credits: 4**

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	14

	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.	
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.

Level: Semester III

Title of the Paper: Medical Law & Ethics	**Course: Major**
Subject Code: RIT242M304	**Course Level: 200**
Scheme of Evaluation: Theory	
L-T-P-C: 3-0-0-3	**Total Credits: 3**

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	12
II.	Codes of Conduct: historical perspective, international codes of medical ethics- duties of physicians to the sick and to each other	6
III	Informed consent, right of patients- right to life, female foeticide, gender determination, reproductive technologies- adoption, AID, IVF, GIFT, SIFT, surrogacy, ICMR guidelines	6
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		36

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.

CREDIT DISTRIBUTION		
THEORY/TUTORIAL	**PRACTICUM**	**EXPERIENTIAL LEARNING**
60 NCH	**-**	**30 NCH** **Seminar** **Home assignments** **Case Study**

Title of the Paper: CEN-III- Fundamentals of Business Communication	**Course: AEC**
Subject Code: CEN982A301	**Course Level: 200**
Scheme of Evaluation: Theory and Practical	
L-T-P-C: 1-0-0-1	**Total Credits: 1**

Level: Semester III

Course Objective: The aim of the course is to develop essential business communication skills, including effective writing, speaking, and interpersonal communication, to enhance professional interactions, collaboration, and successful communication strategies within diverse corporate environments.

Course Outcomes: On successful completion of the course the students will be able to:

CO	Course Outcome	Blooms Taxonomy Level
CO 1	Define and list business documents using appropriate formats and styles, demonstrating proficiency in written communication for various business contexts.	**BT 1**
CO 2	Demonstrate confident verbal communication skills through persuasive presentations, active listening, and clear articulation to	**BT 2**
	engage and influence diverse stakeholders.	

CO 3	Apply effective interpersonal communication strategies, including conflict resolution and active teamwork, to foster positive relationships and contribute to successful organizational communication dynamics	**BT 3**

Detailed Syllabus		
Units	**Course Contents**	**Periods**
I	**Business Communication: Spoken and Written** • The Role of Business Communication • Classification and Purpose of Business Communication • The Importance of Communication in Management • Communication Training for Managers • Communication Structures in Organizations • Information to be Communicated at the Workplace • Writing Business Letters, Notice, Agenda and Minutes	**5**

II	**Negotiation Skills in Business Communication**
	• The Nature and Need for Negotiation
	  o Situations requiring and not requiring negotiations
	• Factors Affecting Negotiation
	  o Location, Timing, Subjective Factors
	• Stages in the Negotiation Process
	  o Preparation, Negotiation, Implementation
	• Negotiation Strategies
		5

III	**Ethics in Business Communication** • Ethical Communication • Values, Ethics and Communication • Ethical Dilemmas Facing Managers • A Strategic Approach to Business Ethics • Ethical Communication on Internet • Ethics in Advertising	**5**

IV	**Business Etiquettes and Professionalism** • Introduction to Business Etiquette • Interview Etiquette • Social Etiquette • Workplace Etiquette • Netiquette	**5**

Textbook:

1. Business Communication by Shalini Verma
2. "Business Communication" by Meenakshi Raman and Prakash Singh, published by Oxford University Press.

References:

1. Business Communication by PD Chaturvedi and Mukesh Chaturvedi
2. Technical Communication by Meenakshi Raman and Sangeeta Sharma

Credit Distribution		
Lecture/Tutorial	**Practicum**	**Experiential Learning**
15 hours	-	10 hours - Group Discussion - Presentation - Quiz - Case Study

Title of the Paper: Behavioural Sciences -III	**Course: AEC**
Subject Code: BHS982A304	**Course Level: 200**
Scheme of Evaluation: Theory and Practical	
L-T-P-C: 1-0-0-1	**Total Credits: 1**

Level: Semester III

Course objectives: To increase one's ability to draw conclusions and develop inferences about

attitudes and behaviour, when confronted with different situations that are common in modern organizations .To enable the students to understand the process of problem solving and creative thinking.

Course outcomes: On completion of the course the students will be able to:

CO	Course Outcome	Blooms Taxonomy Level
CO 1	Understand the process of problem solving and creative thinking.	**BT 1**
CO 2	Develop and enhance of skills required for decision-making.	**BT 2**

Modules	Course Contents	Periods
I	**Problem Solving Process** Defining problem, the process of problem solving, Barriers to problem solving(Perception, Expression, Emotions, Intellect ,surrounding environment)	**4**
II	**Thinking as a tool for Problem Solving** What is thinking: The Mind/Brain/Behaviour Critical Thinking and Learning: -Making Predictions and Reasoning. -Memory and Critical Thinking. - Emotions and Critical Thinking.	**4**
III	**Creative Thinking** - Definition and meaning of creativity, - The nature of creative thinking :Convergent and Divergent	**4**

	thinking, - Idea generation and evaluation (Brain Storming) - Image generation and evaluation. - The six-phase model of Creative Thinking: ICEDIP model	
IV	**Building Emotional Competence** Emotional Intelligence – Meaning, components, Importance and Relevance Positive and Negative emotions Healthy and Unhealthy expression of emotions	**4**
Total		**16**

Text books:

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3,Management; Pfeiffer &Company
- Blair J. Kolasa, Introduction to Behavioural Science for Business, John Wiley & SonsInc.

Level: Semester IV

Title of the Paper: Radiation Hazards & Protection	**Course: Major**
Subject Code: RIT242M401	**Course Level: 200**
Scheme of Evaluation: Theory	
L-T-P-C: 3-1-0-4	**Total Credits: 4**

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	Bloom's 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, exposure control for children, mentally and physically challenged patients and lactating mothers	12

III	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.	12
IV	Role of Radiographer in Planning, 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

CREDIT DISTRIBUTION		
THEORY/TUTORIAL	**PRACTICUM**	**EXPERIENTIAL LEARNING**
90 NCH	**-**	**30 NCH** - **Group Discussion** - **Seminar/presentations**

		- **Projects**

Title of the Paper: **General Radiographic Technique-II**	**Course: Major**
Subject Code: RIT242M412	**Course Level: 200**
Scheme of Evaluation: Theory	
L-T-P-C: 0-0-8-4	**Total Credits: 4**

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 &	12

	Method, Sella, Turcica, Optic Foramina, Jugular Foramina, Temporal Bones, Mastoids Petrous Bone, Zygomatic Arches, Orbits, Maxillae, Nasal Bones, Mandible, Temporomandibular Joints.	
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. ● Supplemantary Projections For Localisation of Roots, Children, Edentulous Subjects and Use of Occlusals and Bitewings, Orthopantomography.	12
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

Title of the Paper: **Techniques of Mammography & Fluoroscopy**	**Course: Major**
Subject Code: RIT242M403	**Course Level: 200**
Scheme of Evaluation: Theory	
L-T-P-C: 3-0-0-3	**Total Credits: 3**

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	10

		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.	
TOTAL			**48**

Textbooks:

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)

CREDIT DISTRIBUTION		
THEORY/TUTORIAL	**PRACTICUM**	**EXPERIENTIAL LEARNING**
60 NCH		**30 NCH** **- Lab visit** **- Home assignments** **- Projects**

Title of the Paper: Special Radiographic Procedure	**Course: Major**
Subject Code: RIT242M414	**Course Level: 200**
Scheme of Evaluation: Theory	
L-T-P-C: 0-0-8-4	**Total Credits: 4**

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, T-tube cholangiogram, Myelogram, Fistulogram, Polytrauma	14

Level: Semester IV

Title of the Paper: CEN IV – Employability and Communication	**Course: AEC**
Subject Code: CEN982A401	**Course Level: 200**
Scheme of Evaluation: theory and Practical	
L-T-P-C: 1-0-0-1	**Total Credits: 1**

Course Objectives: This course is designed to enhance employability and maximize the students' potential by introducing them to the principles that determine personal and professional success, thereby helping them acquire the skills needed to apply these principles in their lives and careers.

Course Outcomes: After the successful completion of the course, the students will be able to

CO	Course Outcome	Blooms Taxonomy Level
CO 1	**Demonstrate** understanding the importance of verbal and non-verbal skills while delivering an effective presentation.	**BT 2**
CO 2	**Develop** professional documents to meet the objectives of the workplace	**BT 3**

CO 3	**Define** and identify different life skills and internet competencies required in personal and professional life.	**BT 3**

Detailed Syllabus		
Units	**Course Contents**	**Periods**
I	**Presentation Skills** Importance of presentation skills, Essential characteristics of a good presentation, Stages of a presentation, Visual aids in presentation, Effective delivery of a presentation	**5**
II	**Business Writing** Report writing: Importance of reports, Types of reports, Format of reports, Structure of formal reports Proposal writing: Importance of proposal, Types of proposal, structure of formal proposals Technical articles: Types and structure	**5**
III	**Preparing for jobs** Employment Communication and its Importance, Knowing the four-step employment process, writing resumes, Guidelines for a good resume, Writing cover letters Interviews: Types of interview, what does a job interview assess, strategies of success at interviews, participating in group discussions.	5
IV	**Digital Literacy and Life Skills** **Digital literacy:** Digital skills for the '21st century', College students and technology, information management using Webspace, Dropbox, directory, and folder renaming conventions. Social Media Technology and Safety, Web 2.0. **Life Skills**: Overview of Life Skills: Meaning and significance of life skills, Life skills identified by WHO: self-awareness, Empathy, Critical thinking, Creative thinking, Decision making, problem-solving, Effective communication, interpersonal relationship, coping with stress, coping with emotion.	5

	Application of life skills: opening and operating bank accounts, applying for pan, passport, online bill payments, ticket booking, gas booking	

Keywords: Employability, business writing, presentation skills, life skills

Text:

1. Business Communication by PD Chaturvedi and Mukesh Chaturvedi

References:

1. Business Communication by Shalini Verma References:
2. Technical Communication by Meenakshi Raman and Sangeeta Sharma

Credit Distribution		
Lecture/Tutorial	**Practicum**	**Experiential Learning**
15 hours	-	10 hours - Movie/ Documentary screening - Field visits - Peer teaching - Seminars - Library visits

Title of the Paper: Behavioural Sciences -IV	**Course: AEC**
Subject Code: BHS982A304	**Course Level: 200**
Scheme of Evaluation: Theory	**L-T-P-C: 1-0-0-1**
Total Credits: 1	

Course objectives: To increase one's ability to draw conclusions and develop inferences about attitudes and behaviour, when confronted with different situations that are common in modern organizations.

Course outcomes: On completion of the course the students will be able to: CO1**:** Understand the importance of individual differences
CO2: Develop a better understanding of self in relation to society and nation CO3: Facilitation for a meaningful existence and adjustment in society

Modules	Course Contents	Periods
I	**Managing Personal Effectiveness** Setting goals to maintain focus, Dimensions of personal effectiveness (self disclosure, openness to feedback and perceptiveness), Integration of personal and organizational vision for effectiveness, A healthy balance of work and play, Defining Criticism: Types of Criticism, Destructive vs Constructive Criticism, Handling criticism and interruptions.	4
II	**Positive Personal Growth** Understanding & Developing positive emotions,Positive approach towards future, Impact of positive thinking, Importance of discipline and hard work, Integrity and accountability, Importance of ethics in achieving personal growth.	4

III	**Handling Diversity** Defining Diversity, Affirmation Action and Managing Diversity, Increasing Diversity in Work Force, Barriers and Challenges in Managing Diversity.	**4**
IV	**Developing Negotiation Skills** Meaning and Negotiation approaches (Traditional and Contemporary) Process and strategies of negotiations. Negotiation and interpersonal communication. Rapport Building – NLP.	**4**
Total		**16**

Text books:

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management; Pfeiffer &Company
- Blair J. Kolasa, Introduction to Behavioural Science for Business, John Wiley & Sons Inc.

Level: Semester V

Subject Name: Computed Tomography		**Subject Code: RIT242M501**
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

CREDIT DISTRIBUTION		
THEORY/TUTORIAL	**PRACTICUM**	**EXPERIENTIAL LEARNING**
60 NCH		30 NCH - Lab visit - Home assignments - Projects

Semester V

Subject Name: Darkroom Technique		**Subject Code: RIT242M502**
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 • Cleanliness, Control of Dust, Dark Room Sink • Hatches • Drier • Safe Lights, Direct and Indirect, Uses, Factors Affecting Safelight Performance, Safelight Tests	8

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 • Effects on Developing Time, Temperature, Agitation • Replenisher • Exhaustion	16

	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 • Types of Cassettes	16

	• 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)

Semester V

Title of the Paper: Computer Skills		Subject Code: RIT242M513
L-T-P-C: 0-0-8-4	**Total Credits: 4**	**Scheme of Evaluation: T**

Objective: The course is designed to aim at imparting a basic level appreciation programme for the common man. After completing the course the incumbent is able to the use the computer for basic purposes of preparing his personnel/business letters, viewing information on Internet, sending mails, using internet banking services etc. This allows a common man or
housewife to be also a part of computer users list by making them digitally literate. This would also aid the PC penetration program. This helps the small business communities, housewives to maintain their small account using the computers and enjoy in the world of Information Technology

Course Outcome:

Upon completion of the course student shall be able to:		
SI NO	**COURSE OUTCOME**	**Bloom's Taxonomy Level**
CO 1	**Define** the various parts of a computer, the basics of computer architecture and learn about the various components of computer architecture.	BT 1
CO2	**Learn** the different operating systems and learn their uses while handling the various softwares athat comes along with the machines.	BT 2
CO3	**Apply** the knowledge of MS word, excel and powerpoint in creating projects and presentations	BT 3
CO4	**Apply** the knowledge of computer skills in producing, editing and formating various images of the different modalities of the Radiology department in turn producing good quality images.	BT 4

Detailed Syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I	**Computer Applications & Basics:** Introduction, Basic Applications of Computer, Components of Computer, Connecting Computer Components, Computer Hardware & Software **Introduction to Internet, WWW & Web Browsers:** Basics of Computer Networks, Internet, Search Engines, URLs, How to use Web Browser	14
II.	**Computer Operating System:** Basics of Operating System, Linux, Windows, Task Icons, Bars, System Settings, Setting Date & Time, File Management	10
III	**Word Processing:** Introduction, Printing a File, Document Creation & Editing, Saving, Text Formatting **Microsoft Excel & using Spreadsheets**: Introduction, Rows, Columns & Cells, Basics Excel Formulas and Functions	12
IV	**Communications & Collaboration:** Basics of Email, How to use Email, Instant Messaging, Format an Email **Making Small Presentation:** How to Create, Edit, Format, or Delete Slides, Make a Slideshow, Save a Presentation, Printing of Presentation	12
TOTAL		48

Text Book:

1. Computer Fundamentals: Concepts, Systems & Applications Sinha, P. K/ Sinha, P. 3rd ed BPB

Reference Books:

1. Objective Computer Awareness, Arihant Experts

2. Computer fundamentals : Concepts, Systems and Applications , Priti Sinha, Pradeep K Sinha

CREDIT DISTRIBUTION		
THEORY/TUTORIAL	**PRACTICUM**	**EXPERIENTIAL LEARNING**
	60 NCH	**30 NCH** **Lab visit** **Home assignments** **Projects**

Semester V

Subject Name: Basics of Ultrasound and ECG		**Subject Code: RIT242M504**
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 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

Semester V

Subject Name: Clinical Posting		**Subject Code: RIT242M524**
L-T-P-C – 0-0-8-4	**Credit Units: 4**	**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.

Level: Semester VI

Subject Name: Magnetic Resonance Imaging		**Subject Code: RIT242M601**
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 system, Operator interface Encoding, Data collection	6

	& 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

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.

Reference Books:

1. Catherine Westbrook, Carolyn Kaut Roth, John Talbot-MRI in Practice-Wiley-Blackwell

2. Catherine Westbrook - Handbook of MRI Technique-Wiley-Blackwell

Semester VI

Subject Name: Orientation in Clinical Sciences		Subject Code: RIT242M602
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.

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

Semester VI

Subject Name: Basics of Radiotherapy		**Subject Code: RIT242M603**
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.

Semester VI

Subject Name: Interventional Radiology		**Subject Code: RIT242M604**
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	14

	Advancement in interventional radiology	
III	Procedure: - • Coronary angiography & angioplasty, cardiac • Cardiac cauterization, image • Image-guided biopsy/fnac/drainage, four • Four vessel DSA & aortogram, embolic • Embolism agents, patient preparation, post-procedure care, the role of the radiographer in an interventional procedure	14
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

Semester VI

Subject Name: Biostatistics and Research Methodology		Subject Code: RIT242M605
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 bio-statistics 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	8

	in defining the problem.	
II.	• Research, sample design and data collection: Research Design: need and features of good design, types, basic principles of experimental design, developing a 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.	14
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.

SEMESTER VII

Subject Name: Techniques of Routine X-rays		**Subject Code: RIT242M711**
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.	8
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. 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

SEMESTER VII

Subject Name: Techniques of Special X-rays		**Subject Code: RIT242M712**
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 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	14

	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: Techniques of Computed Tomography		**Subject Code: RIT242M713**
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 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 and Principle of Computed Tomography, 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:

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

Subject Name: Techniques of Ultrasound		**Subject Code: RIT242M714**
L-T-P-C – 0-0-6-3	**Credit Units: 3**	**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 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: Techniques of Mammography & Fluoroscopy		**Subject Code: RIT242M715**
L-T-P-C – 0-0-6-3	**Credit Units: 3**	**Scheme of Evaluation: P**

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	10

	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.	
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)

Semester VIII

Subject Name: Techniques of MRI		**Subject Code: RIT242M811**
L-T-P-C – 0-0-14-7	**Credit Units: 7**	**Scheme of Evaluation: P**

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.	● Magnetic Resonance Imaging- anatomy, planning, positioning and contrast media ● Planning MRI studies of the Head, body including angiograms	10
II.	● Various contrast media used in MRI scanning – indications, dosage, advantages & ● disadvantages, safety screening, injection techniques ● Assessing adequacy of acquired MRI images	16
III	● Interpretation of MRI anatomical landmarks in acquired images	8

IV	• Quality assurance in MRI • Patient preparation and communication, including MRI safety instruction	14
	Total	**48**

Text Book:

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

Reference Books:

1. Catherine Westbrook, Carolyn Kaut Roth, John Talbot-MRI in Practice-Wiley-Blackwell

2. Catherine Westbrook - Handbook of MRI Technique-Wiley-Blackwell

Semester VIII

Subject Name: Techniques of Hybrid Imaging		**Subject Code: RIT242M812**
L-T-P-C – 0-0-14-7	**Credit Units: 7**	**Scheme of Evaluation: P**

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	**Understand** the principles of advanced radiological modality techniques like Mammography, PET CT, Gamma	BT 1

	Camera, Angiography, and Fluoroscopy	
CO2	**Interpret and** analyze and interpret imaging results from advanced radiological techniques, identify pathologies, and correlate findings with clinical presentations to aid in accurate diagnosis and treatment planning.	BT 2
CO3	**Ensure** safety protocols, radiation dose management, and quality assurance methods to optimize patient care and ensure safety during the use of advanced imaging technologies.	BT 2
CO4	**Apply** advanced radiological modalities in clinical settings and demonstrate competency in the practical use of Mammography, PET CT, Gamma Camera, Angiography, and Fluoroscopy.	BT 4

Detailed Syllabus

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Overview of advanced imaging techniques and their significance in modern medicine. Fundamentals of each modality: Mammography, PET CT, Gamma Camera, Angiography, and Fluoroscopy. Basic principles of radiology and radiation physics relevant to advanced imaging. Key components and technology behind each modality. Introduction to diagnostic imaging and clinical applications	12
II.	Mammography: Techniques, image acquisition, and interpretation for breast cancer detection. Quality control in mammography, positioning, and standard screening protocols. PET CT: Principles of Positron Emission	8

	Tomography (PET) and its integration with Computed Tomography (CT). Clinical applications of PET CT in oncology, neurology, and cardiology. Advanced concepts: tracer technology, radiation dose management, and safety protocols.	
III	Gamma Camera: Principles of Single Photon Emission Computed Tomography (SPECT) and its clinical applications in nuclear medicine. Image quality, instrumentation, and quality control in gamma camera-based imaging. Angiography: Types of angiography (e.g., coronary, cerebral, peripheral). Procedures, contrast agents, and safety measures in angiography.	14
IV	**Fluoroscopy**: Principles, techniques, and real-time imaging applications. Fluoroscope in interventional radiology and dynamic studies (e.g., GI tract, musculoskeletal systems). Patient safety and radiation dose management in fluoroscopic procedures.	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: Research Project / Dissertation		**Subject Code: RIT242M821**
L-T-P-C – 0-0-24-12	**Credit Units: 12**	**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.