VELS



INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)
PALLAVARAM - CHENNAI
ACCREDITED BY NAAC WITH 'A' GRADE
Marching Beyond 30 Years Successfully

B.Sc Radiology & Imaging Technology

Curriculum and Syllabus 2023

(Based on Choice Based Credit System (CBCS)
and
Outcome Based Education (OBE)
Effective from the Academic year
2023-2024

School of Allied Health Sciences

Vels Institute of Science, Technology and Advanced Studies (VISTAS)
School of Allied Health Sciences
Manjankaranai, Thiruvallur Dist.



SPECIFIC REGULATIONS FOR B.Sc CARDIAC CARE TECHNOLOGY PROGRAMME

1. **SHORT TITLE ANDCOMMENCEMENT:**

These regulations shall be called "Specific Regulations for the **B.Sc. Radiology & Imaging Technology**

Program of Vels Institute of Science Technology and Advanced Studies,

Deemed to be University u/s3 of UGC act 1956.These Regulations are applicable to the students who are admitted to the **B.Sc. Radiology & Imaging Technology** technology in this University.

As per the decision of the Academic Council of this University, these regulations have been prepared by adopting the regulations of the VISTAS.

2. **AIMS**

The aim of the undergraduate is to: **Radiology & Imaging Technology**

To provide holistic knowledge about clinical care, communication, membership of a multidisciplinary health care team, which is committed to professional excellence, social accountability, leadership quality about lifelong learning.

3. OBJECTIVES

On completion of the four years **B.Sc. Radiology & Imaging Technology** course the graduates will be able

to:

To provide in-depth knowledge of human anatomy, physiology, pathology, and imaging physics necessary for understanding diagnostic imaging procedures.

To train students in the safe and effective use of radiographic and imaging equipment including X-ray, CT (Computed Tomography), MRI (Magnetic Resonance Imaging), and Ultrasound.

To develop practical skills in performing diagnostic imaging procedures, including patient positioning, image acquisition, and basic interpretation under supervision.

To ensure understanding of radiation physics and the biological effects of radiation to promote safe practices and minimize exposure to patients and healthcare workers.

To in still knowledge of radiation protection standards and international guidelines to ensure safety and compliance in clinical settings.

To prepare students to assist radiologists in performing complex diagnostic and interventional procedures.

To train students in the maintenance and calibration of radiology equipment to ensure quality and accuracy of imaging.

To encourage ethical, professional, and compassionate behavior, especially in patient care and during diagnostic procedures.

To develop communication and teamwork skills for efficient interaction with radiologists, technicians, patients, and other healthcare professionals.

To enable students to manage patient care before, during, and after imaging procedures, ensuring comfort, dignity, and safety.

To promote awareness of current trends and advancements in imaging technologies and encourage lifelong learning and continuing education.

To prepare students for roles in hospitals, diagnostic centers, and research institutions as radiologic technologists, imaging specialists, or assistants in nuclear medicine and interventional radiology.

To lay a foundation for further specialization or postgraduate studies in imaging sciences, radiotherapy, or allied health fields.

ELIGIBILITY FORADMISSION

The minimum age for admission shall be 17 years on or before 31st December of the year

in which admission is sought.

A Candidate desiring to join the **B.Sc. Operation theatre and anesthesia technology** course should have passed the

HSC/CBSE/ISC or other equivalent examination with one of the following subject

combinations:

Physics, Chemistry, Biology & Mathematics

Physics, Chemistry, Botany & Zoology.

A candidate is required to obtain 50% in the Entrance exam conducted by the VISTAS

5. DURATION OF THE COURSE:

The duration of **B.Sc. Operation theatre and anesthesia technology** Degree course shall be 4Yearsfull-time

programme comprising 8 Semesters including internship (Three Year Curriculum +

One Year Internship) under Choice based Credit System.

6. MEDIUM OF INSTRUCTION:

English shall be the medium of instruction for all subjects of study and

examinations will be conducted only in English.

7. COMMENCEMENT OF THE COURSE:

The course shall commence from August of the academic year.

8. WORKING DAYS IN A SEMESTER:

Each semester shall consist of not less than 100 working days and each academic year shall have a total of 200 working days

9. REGISTRATION

A Candidate admitted to the course shall be registered by remitting the prescribed fees along with the Application form for registration duly filled within the stipulated dates.

10. COMMENCEMENT OF THE EXAMINATIONS:

Regular Semester Examinations will commence from last week of January and last week of July.

If the date of commencement of the examination falls on Saturday, Sunday or declared Public Holidays, the examination shall begin on the next working day.

11. COURSE INSTRUCTION & SCHEME OF EXAMINATION

SEMESTER 1

Sl.No.	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total	IA		UA		Total
										Theory	Practical	Theory	Practical	
			Hours	Credits	Hours	Credits	Hours	Credits	Credits					
1.1	Program Core Theory	General Anatomy Theory	45	3	30	1	-	-	4	25	-	75	-	100
1.2	Program Core Theory	General Physiology Theory	45	3	30	1	-	-	4	25	-	75	-	100
1.3	Program Core Theory	General Biochemistry Theory	45	3	30	1	-	-	4	25	-	75	-	100
1.4	Program Core-Lab	General Anatomy Practical	-	-	-	-	60	2	2	-	50	-	50	100
1.5	Program Core-Lab	General Physiology Practical	-	-	-	-	60	2	2	-	50	-	50	100
1.6	Program Core-Lab	General Biochemistry Practical	-	-	-	-	60	2	2	-	50	-	50	100
1.7	Program Elective	Medical Law and Ethics	30	2	-	-	-	-	2	75	25	75	-	100
1.8	Program Elective	Communication And Soft Skills	30	2	-	-	-	-	2	75	25	75	-	100
Total									**22**	**Total**				**800**

SEMESTER 2

Sl.No.	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total	IA		UA		Total
										Theory	Practical	Theory	Practical	
			Hours	Credits	Hours	Credits	Hours	Credits	Credits					
2.1	Program Core Theory	General Pathology Theory	45	3	30	1	-	-	4	25	-	75	-	100
2.2	Program Core Theory	General Microbiology Theory	45	3	30	1	-	-	4	25	-	75	-	100
2.3	Program Core Theory	General Pharmacology Theory	45	3	30	1	-	-	4	25	-	75	-	100
2.4	Program Core-Lab	General Pathology Practical	-	-	-	-	60	2	2	-	50	-	50	100
2.5	Program Core-Lab	General Microbiology Practical	-	-	-	-	60	2	2	-	50	-	50	100
2.6	Program Core-Lab	General Pharmacology Practical	-	-	-	-	60	2	2	-	50	-	50	100
2.7	Program Elective	Medical Terminology*	30	2	-	-	-	-	2	75	25	75	-	100
2.8	Program Elective	Basic Computers & Information Science*	30	2	-	-	-	-	2	75	25	75	-	100
Total									**22**	**Total**				**800**

SEMESTER 3

Sl.No.	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total	IA		UA		Total
										Theory	Practical	Theory	Practical	
			Hours	Credits	Hours	Credits	Hours	Credits	Credits					
3.1	Program Core Theory	General Physics, Radiation Physics & Physics of Diagnostic Radiology	45	3	30	1	-	-	4	25		75	-	100
3.2	Program Core Theory	X-ray Film / Image processing Techniques, including Dark Room	45	3	30	1	-	-	4	25		75	-	100
3.4	Program Core-Lab	General Physics, Radiation Physics & Physics of Diagnostic Radiology - Lab	-	-	-	-	60	2	2	-	50	-	50	100
3.5	Program Core-Lab	X-ray Film / Image processing Techniques, including Dark Room- Lab	-	-	-	-	60	2	2	-	50	-	50	100
3.6	Program Elective	Psychology*	30	2	-	-	-	-	2	75	25	75	-	100
3.7	Program Elective	Medical Physics *	30	2	-	-	-	-	2	75	25	75	-	100
3.8	Program Core	RIT Directed Clinical Education	-	-	-	-	120	4	4	50	50	-	-	-
Total									**20**				**Total**	**600**

SEMESTER 4

Sl.No.	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total	IA		UA		Total
										Theory	Practical	Theory	Practical	
			Hours	Credits	Hours	Credits	Hours	Credits	Credits					
4.1	Program Core Theory	Radiography Equipment's	45	3	30	1	-	-	4	25		75	-	100
4.2	Program Core Theory	Positioning Radiography and Contrast Procedures	45	3	30	1	-	-	4	25		75	-	100
4.3	Program Core-Lab	Radiography Equipment's Lab	-	-	-	-	60	2	2	-	50	-	50	100
4.4	Program Core-Lab	Positioning Radiography and Contrast Procedures Lab	-	-	-	-	60	2	2	-	50	-	50	100
4.5	Program Elective	Medical Sociology*	30	2	-	-	-	-	2	75	25	75	-	100
4.6	Program Elective	Basics And Advanced Life Support*	30	2	-	-	-	-	2	75	25	75	-	100
4.7	Program Core	RIT Directed Clinical Education	-	-	-	-	120	4	4	50	50	-	-	-
Total									**20**				**Total**	**600**

SEMESTER 5

Sl.No.	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total	IA		UA		Total
										Theory	Practical	Theory	Practical	
			Hours	Credits	Hours	Credits	Hours	Credits	Credits					
5.1	Program Core Theory	Basic and Advanced Ultra Sound Imaging	45	3	30	1	-	-	4	25		75	-	100
5.2	Program Core Theory	Basic and Advanced CT Scan	45	3	30	1	-	-	4	25		75	-	100
5.3	Program Core-Lab	Basic and Advanced Ultra Sound Imaging-Lab	-	-	-	-	60	2	2	-	50	-	50	100
5.4	Program Core-Lab	Basic and Advanced CT Scan-Lab	-	-	-	-	60	2	2	-	50	-	50	100
5.5	Program Elective	Environmental science and community medicine*	30	2	-	-	-	-	2	75	25	75	-	100
5.6	Program Elective	Hospital Products, Promotion, Sales & Public relations (or) Physician's Office Management	30	2	-	-	-	-	2	75	25	75	-	100
5.7	Program Core	RIT Directed Clinical Education	-	-	-	-	120	4	4	50	50	-	-	-
								Total	20				Total	600

SEMESTER 6

Sl.No.	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total	IA		UA		Total
										Theory	Practical	Theory	Practical	
			Hours	Credits	Hours	Credits	Hours	Credits	Credits					
6.1	Program Core Theory	Basic and advanced MRI	45	3	30	1	-	-	4	25		75	-	100
6.2	Program Core Theory	Interventional radiological procedures and basic angiography	45	3	30	1	-	-	4	25		75	-	100
6.3	Program Core-Lab	Basic and advanced MRI- Lab	-	-	-	-	60	2	2	-	50	-	50	100
6.4	Program Core-Lab	Interventional radiological procedures and basic angiography- Lab	-	-	-	-	60	2	2	-	50	-	50	100
6.5	Program Elective	Healthcare and Basic principles*	30	2	-	-	-	-	2	75	25	75	-	100
6.6	Program Elective	Bio Medical Statistics and research methodology*	30	2	-	-	-	-	2	75	25	75	-	100
6.7	Program Core	RIT Directed Clinical Education	-	-	-	-	120	4	4	50	50	-	-	-
								Total	20				Total	600

SEMESTER 7 & 8

Sl.No.	Category	Course Titles	Hours/Credits				Maximum Marks				Total
							IA		UA		
			Theory	Tutorial	Practical	Total	Theory	Practical	Theory	Practical /Viva	
7.1	Project	Project	-	2	-	2	-	50	-	50	100
7.2	Internship	Internship	-	40	-	40	-	50	-	50	100
						42	**Total**				**200**

* Indicate the maximum CIA is 100 marks & Minimum 50 marks (no university exam)

12. SUBMISSION OF LABORATORY RECORD NOTE BOOKS:

At the time of practical examination, each candidate shall submit to the examiners his / her laboratory note books duly certified by the Head of the Department as a bonafide record of the work done by the candidate.

13. INTERNAL ASSESSMENT:

a) A minimum of two written internal assessment examinations shall be conducted in each subject during a semester and the Best / Average marks of two examinations shall be taken into consideration for the award of internal marks.

b) A model practical examinations shall be conducted in each subject (wherever practical have been included in the curriculum) shall be taken into consideration for award of internal marks in practical.

c) Tests will be conducted giving sufficient time for preparation.

d) No repeat, reschedule and postponement of the assessment date is permitted. Students shall compulsorily attend any two continuous assessments

14. ATTENDANCE REQUIRED FOR ADMISSION TO EXAMINATIONS:

(a) No candidate shall be permitted to appear for the University examinations, unless he/she attends the course for the prescribed period.

(b) Every candidate is required to put in a minimum of 80% of attendance both in theory and practical separately in each subject for admission to the examination.

(c) A candidate lacking in the prescribed attendance in any subject in theory and/or practical shall not be admitted to the entire examination.

15. CONDONING LACK OF ATTENDANCE:

1. Condoning of shortage of attendance up to a maximum of 10% in the prescribed eligible attendance for admission to year end examination rests with the discretionary power of the Vice Chancellor. A Candidate lacking in attendance should submit an application in the prescribed form and remit the stipulated fee,

15days prior to the commencement of the theory examination, The Head of the Department should satisfy himself on the reasonableness of the candidate's request while forwarding the application of the candidate to the Controller of Examinations, who would obtain the Vice–Chancellor's approval for admission to the examination. No application would be accepted if it is not forwarded through proper channel.

2. Condoning lack of attendance should be taken up for consideration under the Following circumstances:-

a) Any illness affecting the candidate Candidates should submit a medical certificate from registered medical practitioners.
b) Any unforeseen tragedy in the family. The parents/guardian should give in writing about what had happened.
c).Participation in National Service Scheme and other co-curricular activities representing the University

16. RE-ADMISSION AFTER BREAK OF STUDY:

A separate regulation is available for all the UG/PG courses of this university for the readmission of candidates after a break of study

17. INTERNSHIP:

1. Internship means 8 hours of integrated clinical duties.
2. Internship should be carried out as 8 Hours per day @ 48 hours per week
3. Students will be supervised by the Faculties & well Trained Professionals during Internship.
4. Internship will be started after passing in the third year Examination**.**

18. YEAR END EXAMINATIONS:

1. Commencement of the Examination will be in January / July
2. If the date of commencement falls on Saturdays, Sundays or declared public holidays, the examination shall begin on the next working day.
3. The duration of the examination of each subject is 3hours.

Carryover of failed subjects.

A candidate has to pass in theory and practical examinations separately in each of the subject. If a candidate fails in either theory or practical of the subjects, he/she has to reappear for both the Theory and Practical.

The candidate if fails can be permitted for admission to next year.

The candidate shall have to clear all the previous examination before appearing for the Sixth Semester

examination.

19. REVALUATION/RETOTALLING OF ANSWER PAPERS:

There is provision for revaluation of the answer papers of failed candidates in any examination. However, the failed candidates cannot apply for retotalling.

20. CREDITS:

Credits will be assigned on the basis of the lectures (L) /tutorials (T) Clinical Training (CR) /laboratory work (P) /Research Project (RP) and other form of learning in a 15-20 week schedule.

L- One credit for one hour lecture per week (1 credit = 15 hours)

P/T – One credit for every two hours of laboratory or practical (1 credit = 30 hours)

CR – One credit for every two hours of Clinical Training/Clinical Rotation/Posing (1 credit = 30 hours)

RP – One credit for every two hours of Research Project per week – Max Credit 20-25 (1 credit =30 hours)

21. GRADING SYSTEM:

Based on the performance, each student shall be awarded a final grade at the end of the semester

for each course. Absolute grading is used byconverting the marks to grade, based on pre-determined

class intervals.

UGC 10-point grading system is used with pass grade modified.

Letter grade	Grade point	Range of marks
O (Outstanding)	10	85% & above
A+ (Excellent)	9	80-

		84.99%
A (Very Good)	8	75- 79.99%
B+ (Good)	7	65- 74.99%
B+ (Good)	6	60- 64.99%
C (Average)	5	50- 59.99%
P(Pass)	-	>50%
F (Fail) / RA (Reappear)	0	<50%
AB (Absent)	0	0

1. A candidate is declared to have pass in a course if he /she secures a minimum 50% marks the

university theory & practical Examinations separately & 50% in aggregate of university

theory/practical & Internal assessment put together

Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average

(CGPA):

SPGA is the weighted average of the grade points obtained in all courses by the student

During the semester

SGPA Computation:

$$SGPA = \frac{\sum in (Ci \times (GP)}{\sum n C1}$$

Where Ci - credits for the course, (GP)i - the grade point obtained for

the ith course , n – total number of courses and the sum is over all the courses

taken in that semester, including those in which the students has secured "F"

and "Ab" grades.

CGPA Computation:

Computation of CGPA:

CGPA is calculated with SGPA of all semesters to two decimal points and is indicated in final

grade in mark card/transcript showing grades of all 8 semesters and their courses/subjects

22. CLASSIFICATION OF SUCCESSFUL CANDIDATES

The CGPA arrived at the completion of the course shall be the criteria for the classification of successful candidates as below:

Letter grade	Grade point	Range of marks
O (Outstanding)	10	85% & above
A+ (Excellent)	9	80-84.99%
A (Very Good)	8	75-79.99%
B+ (Good)	7	65-74.99%
B+ (Good)	6	60-64.99%
C (Average)	5	50-59.99%
P(Pass)	-	>50%
F (Fail) / RA (Reappear)	0	<49.99%
AB (Absent)	0	0

a) Successful candidates who secure 75% marks and above as a course aggregate in

the first appearance taking University theory, practical, project / dissertation

evaluation and viva shall alone be awarded Distinction. This will also apply for

award of University rank.

Successful candidates who secure 60% marks and above as a course aggregate in

the University theory, practical, project/dissertation evaluation and viva shall be

awarded First Class.

c) All others who secure 50-59% in gross percentage will be classified to have passed in Second Class

23. PATTERN OF QUESTION PAPER FOR UNIVERSITY EXAMINATON

EXAMINATION QUESTION PAPER PATTERN

Essay	**2 x 15**	**=30 Marks**
Short Notes	7 x 5	=35Marks
Short Answers	5 x 2	=10 Marks
Total		75 marks

Internal Split up – Theory

1. **Continuous Assessment: 10 Marks**
2. **.Internal Assessment: 15 marks**
3. **Two Sessional Exams per Course**

SNO	CONTINOUS ASSESMENT	MARKS
1	Attendance	5
2	Assignment	5

Internal Split up – Practical

1. **Continuous Assessment: 20 Marks**
2. **2. Model Practical Examination: 30 Marks**

SNO	CONTINOUS ASSESMENT	MARKS
1	Seminar	10
2	Record note book	10

24. GRACE MARKS

Maximum of 8 grace marks for each subject is permitted, and grace marks should not exceed 8 marks in each subjects.

25. MARKS QUALIFING FOR PASS

A candidate is declared to have passed in a course if he/she secures a minimum of 50% marks

in university theory and practical examinations separately and 50% in aggregate of University

theory /practical and internal assessment put together

SYLLABUS CORE COURSES

SEMESTER -I

GENERAL ANATOMY

Course description:

A study of the anatomical structure of the human body

.• Bodystructure will be studied byorgan systems.

• Form-function relationships with emphasison clinically relevant anatomy.

• The laboratory studywill involve observing and learning from human skeletal collections and dissected cadavers and

• Preserved specimens.

Objectives:

At the end of the course the student should be able to:

• Describe the structure and functions of the organ systems of the human body. • Describe how the organ systems function and interrelate.

• Learn basic technical terminology and language associated with anatomy. • Develop a self-identity of what it means to be "human".

Learning Objectives: Skills

• Identify the anatomical structure in the dissected specimen.

• Learn to correlate anatomical structures with relevant clinical conditions.

Unit I:

Organization of the Human Body Introduction to the human body - Definition and sub divisions of anatomy- Anatomical position and terminology Regions and Systems of the body - Cavities of the body and their contents - Levels of organization of the body. Cell – Definition of a cell, shapes and sizes of cells - Parts of a cell – cell membranes cytoplasm, subcellular organelles and their main functions. Cell Division – Definition and main events that occur in different stages of mitosis and meiosis. Tissues – Tissues of the body - Definition and types of basic tissues - Characteristics, functions and locations of different types of tissues.

Unit II:

Systems of Support and Movement

1. Skeletal system Skeleton – Definition, axial and appendicular skeleton with names and number of bones, Types of bones. Parts of bones. Functions of bones. Name location and general features of the bones of the body. Joints – Definition and types of joints with examples. Axes and kind of movements possible. Name, location, type, bones forming, movements possible.

2. Muscular system Parts of the skeletal muscle. Definition of origin and insertion. Name and location of the skeletal muscles of the body. Origin, insertion, nerve supply and action of large muscles like sternocleidomastoid, pectoralis major, deltoid, Biceps brachii, Triceps brachii, gluteus, gastrocnemius and diaphragm.

Unit III:

Control Systems of the Body

1. Nervous system Sub-divisions of the nervous system, Spinal cord – Location, extent, spinal segments, external features and internal structure. Brain – Sub-divisions, location external features of medulla oblongata, pons, mid-brain, cerebellum and cerebrum. Meninges and spaces around them. Name and location of ventricles of brain and circulation of cerebrospinal fluid. Blood supply of the brain and spinal cord. Cranial nerves - Name, number, location and general distribution. Spinal nerves - Typical spinal nerve groups and number of spinal nerves. Name and location of cervical plexus and brachial plexus. Location and general distribution of the branches. Autonomic Nervous system – definition and functions

2. Sense organs Location and features ofthe nose, tongue, eye, ear and skin

3. Endocrine system Names of the endocrine glands. Location and features of pituitary, thyroid, parathyroid, suprarenal, pancreas, ovaries and testes. Names of hormones produced byeach gland.

Unit IV:

Maintenance of the Human Body

1. Cardio-vascular system Types and general structure of blood vessels. Structure and types of arteries and veins. Structure of capillaries. Shape, size, location, coverings, external and internal features of heart. Structure of heart wall, conducting system of the heart. Blood supply of the heart. The systemic arteries and veins. Name, location, branches and main-distribution of principal arteries and veins.

2. Lymphatic system Lymph, lymphatic vessels, name, location and features of the lymphatic organs.

3. Respiratory system Names of organs of respiration, Location and features of nose, pharynx, larynx, trachea, bronchi, lungs and pleura.

Unit V:

1. Digestive system Names of organs of digestion. Parts of alimentary canal and accessory organs. Location and features of mouth, pharynx, esophagus, stomach, small and large intestines. Location and features of salivary glands, pancreas, liver and gall bladder.

2. Urinary system Names of urinary organs, location and features of kidney, ureter, urinary bladder and urethra.

Unit VI:

1. Reproductive system Names of male and female organs of reproduction. Location and features of scrotum, testis, epididymis, vas deferens, seminal vesicle, ejaculatory duct, prostate gland, penis and spermatic cord. Location and features of uterus and its supports, uterine tube, ovary vagina vulva and breast.

Anatomical Regions Simple ideas about scalp, triangles of neck, axilla, cubital fossa, mediastinum, inguinal canal, femoral triangle, popliteal fossa.

Practicals and Demonstrations

1. Demonstration of dissected specimens.

Recommended books:

1. Ross and Wilson: Anatomy and Physiology in health and illness
2. B D Chaurasia: General human anatomy

GENERAL PHYSIOLOGY

Objectives of the course:

At the end of this course the students should be able to:

Comprehend basic terminologies used in the field of Human Physiology

- Define and describe basic Physiological Processes governing the normal functioning of the human body
- Applythis knowledge in their Allied Health Science practice

UNIT I

Ia. GENERAL PHYSIOLOGY Concept of Homeostasis - Cell structure and functions - Transport across membranes

Ib. NERVE & MUSCLE Nerve structure, classification of nerve fibres, Muscles-classification, structure, Neuro-Muscular junction (NMJ), Muscle contraction – mechanism, types.

Ic. BLOOD AND BODY FLUIDS Body fluid volumes, compartments, and composition - Blood composition and functions - Plasma proteins – Erythrocytes – Morphology and functions , Leucocytes – Morphology and functions, Platelets-Morphology and functions Blood groups.

UNIT II

IIa. DIGESTIVE SYSTEM Salivary glands- Nerve supply, functions of saliva, Gastric juice-composition & functions of gastric juice. Pancreatic juice – composition, functions and regulation of Pancreatic juice, Bile – composition, functions of bile & bile salts. Succusentericus and small intestinal movements, Deglutition, vomiting, functions of large intestine

IIb.SKIN Structure of sweat glands; temperature regulation

IIc. EXCRETORY SYSTEM Structure of Nephron and its blood supply, Juxta Glomerular Apparatus (JGA) Formation of urine- Filtration, Reabsorption & Secretion, Counter-Current mechanism, Micturition

UNIT III

IIIa. ENDOCRINE SYSTEM Hypothalamohypophyseal inter relationship - Anterior pituitary hormones and their functions - Posterior pituitary hormones and their actions - Thyroid hormones, biosynthesis and functions - Parathyroid hormones, functions Insulin, Glucagons, actions and Diabetes mellitus - Adrenal cortex hormones and their functions. Adrenal medullary hormones and their actions

IIIb. REPRODUCTION: Male reproductive organs - Spermatogenesis and Testosterone actions, Female reproductive organs - Menstrual cycle

UNIT IV

RESPIRATORY SYSTEM Structure of upper and lower respiratory tract. Muscles of respiration and Mechanism of respiration. Lung volumes and capacities – definitions, normal values, intra

Pulmonary and intra pleural pressures, surfactant Oxygen transport, Carbon-dioxide transport - Neural and chemical regulation of respiration - Hypoxia, cyanosis

UNIT V

CARDIOVASCULAR SYSTEM Cardiac muscle, action potential &conducting system of the heart, Cardiac cycle, ECG, heart sounds Cardiac output-Definition, factors regulating cardiac output and measurement of cardiac output. Blood pressure – Definition, measurement, factors maintaining B.P, Regulation of B.P, Regional circulation – Coronary and Cerebral

UNIT VI

VI a. NERVOUS SYSTEM Structure & Properties of Neuron - Nerve – Classification, injury - Types and properties of Receptors Synapse and synaptic transmission, Reflex and its properties , Spinal cord – Ascending & Descending tracts Thalamus, Basal ganglia, Cerebellum, Cerebral cortex, Hypothalamus & Cerebrospinal fluid - Autonomic nervous system.

VI b.SPECIAL SENSES Vision, Audition, Olfaction, Gustation

Practical:

1. Recording of Arterial Blood Pressure (BP)

Practical Demonstration:

1. Determination of RBC count
2. Determination of WBC count
3. Differential leucocyte count (DLC)
4. Determination of Hb, PCV & ESR.
5. Determination of Blood groups, Bleeding and clotting time.
6. Charts & Instruments - Spotters

Recommended Book

Basics of Medical Physiology (Third edition) by D. Venkatesh/ H.H. Sudhakar

GENERAL BIOCHEMISTRY

Objectives:

To have a knowledge about the chemistry and metabolism of various macromolecules-carbohydrate, protein and lipids

- To learn about enzymes, vitamins, minerals and nutrition
- To know the structure and function of Hemoglobins, Nucleic acids.
- To learn about the organ function tests like Liver Function Tests and Renal Function Tests.

Unit – I:

Carbohydrates – Classification of carbohydrates and their biological importance, reducing property of sugars.

Metabolism of Carbohydrates : Digestion and Absorption of carbohydrates, steps of Glycolysis and energetics,steps of TCA cycle and energetics, steps of Glycogen synthesis and breakdown, significance of HMP shunt pathway, definition and steps of Gluconeogenesis,Galactose metabolism , Diabetes mellitus , Galactosemia.

Bioenergetics: Importance of ATP, outline of respiratory chain

Unit – II:

Lipids – Classification of lipids, essential fatty acids, functions of cholesterol, triglycerides, and phospholipids

Metabolism of Lipids : Digestion and Absorption of lipids, steps of β oxidation of fatty acids, types and functions of lipoprotein, Lipid profile, hyper cholesterolemia

Haemoglobin: Structure and functions of Haemoglobin.

Unit – III:

Proteins – Classification of amino acids, structure of proteins, plasma proteins, immunoglobulins.

Metabolism of Proteins: Digestion and absorption of proteins, transamination, deamination, steps of urea cycle, Phenylketonuria, Alkaptonuria, Transmethylation, products derived from Glycine and tyrosine

Nucleic acids: Structure and function of DNA & RNA, Types of RNA

Unit – IV:

Enzymes: Definition, classification, coenzymes, factors affecting enzyme activity, Types and examples of enzyme inhibition.

Function Tests: Liver function tests, Renal function tests

Vitamins : Classification, Fat soluble vitamins: Functions, source, deficiency manifestations of vitamin A, D E and K, Functions and deficiency manifestations of vitamin C, co-enzymic forms and deficiency manifestations of B-complex vitamins.

Unit – V:

Nutrition: Basal metabolic rate (BMR), Specific Dynamic Action (SDA), Glycemic index, Dietary fiber, Balanced diet, Protein Energy Malnutrition (PEM).

Minerals: Calcium, Phosphorus, Iron, iodine. Outline of PH homeostasis

Practical

1. Benedict's reagent
2. Barfoeds reagent
3. Foulgers reagent
4. Seliwanoff reagent
5. Fouchets reagent

Text books Recommended:

1. Textbook of Biochemistry for Paramedical Students by Dr.P.Ramamoorthy
2. Essentials of Biochemistry by U. Sathyanarayana

MEDICAL LAW AND ETHICS

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

Medical ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analysing, and attempting to resolve the ethical problems that arise in practice". Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum. Few of the important and relevant topics that need to focus on are as follows

1. Medical ethics - Definition - Goal - Scope, Introduction to Code of conduct
2. Basic principles of medical ethics

3. Confidentiality

4. Malpractice and negligence

5. Rational and irrational drug therapy

6. Autonomy and informed consent

7. Right of patients

8. Care of the terminally ill and Euthanasia

9. Organ transplantation

10. Sentinel events

RECOMMENDED BOOKS

- Medical ethics by C.M. Francis

COMMUNICATION AND SOFT SKILLS

1. Basic Language Skills: Grammar and Usage.

2. Business Communication Skills. With focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation.

3. Teaching the different methods of writing like letters, E-mails, report, case study, collecting the patient data etc. Basic compositions, journals, with a focus on paragraph form and organization.

4. Basic concepts & principles of good communication

5. Special characteristics of health communication

6. Types & process of communication

7. Barriers of communication & how to overcome

SEMESTER -II

PATHOLOGY

Learning Objectives

This module aims at providing an understanding of basic concepts of pathology including process of inflammation and features of various systemic diseases.

Unit I:

Introduction Concept of diseases, classification of lesions - Inflammation and repair - Cellular adaption, Cell injury, necrosis and gangrene

Hemodynamic disorders including hemorrhage, shock, embolism and thrombosis.

Unit II:

Infections Tuberculosis - Leprosy and Typhoid.

Unit III:

Deficiency diseases Anemias

Unit IV:

Tumor Pathology Tumors – Terminologies, Nomenclature. Differences between benign and malignant tumors Tumors – Etiology, pathogenesis and spread of tumors.

Unit V:

Systemic Disorders

Heart: Coronary Heart Disease (ischemic heart disease) including atherosclerosis Congenital and Valvular Heart Diseases

Respiratory System- Bronchial Asthma, Emphysema, Bronchiectasis

Bone and Joints – Autoimmune diseases, septic arthritis, osteomyelitis, rheumatoid arthritis

Diseases of the Kidney - Diseases of other parts of the Urinary System

Central Nervous System CNS infections

Muscle - Diseases of muscle including poliomyelitis, myopathies

Gastrointestinal System Diseases of Esophagus, Stomach and Intestine, Diseases of Liver and Pancreas.

Reproductive system-Diseases of uterus, cervix, ovaries and testis.

Learning Outcomes:

At the end ofthe module, the student must be able to

1. Describe the features of inflammation and cellular adaption, cell injury
2. Identify and describe the features ofhemodynamic disorders and deficiency diseases
3. Understand and describe the pathogenesis and pathology of various systemic disorders

Recommended Textbook:

Textbook of Pathology, Harsh Mohan, 3rd edition

Pathology Lab

Learning Objective

The Gross specimens and instruments relevant to the disease processes and diseases taught will be shown and explained.

Unit I: Gross Specimens

1. Gangrene Bowel
2. Tuberculosis of Lung
3. Lipoma
4. Squamous cell Carcinoma of Foot
5. Infective Endocarditis
6. Left Ventricular Hypertrophy
7. Osteoclastoma
8. Osteogenic Sarcoma
9. Osteomyelitis
10. Chronic Pyelonephritis-Kidney

Unit II: Haematology Instruments:

1. Sahli`sHaemoglobinometer
2. Sahli`s pipette
3. Westergren`s tube
4. Wintrobe`s tube
5. Neubauer`s Chamber
6. RBC pipette
7. WBC pipette

Recommended reading: Harsh Mohan- Practical Pathology

MICROBIOLOGY

Objective:

At the end of the semester the students should be able to

1. Know the concepts of sterilization and disinfection procedures and their applications.
2. Understand the basic principles of immunology.
3. Understand the basic fundamental aspects of bacteria, virus, fungus and parasites, and study the common disease caused by them.

Unit I

Historyand introduction to microbiology, study the morphology of bacterial cell and theirfunctions.

Unit II

Basic concepts about infection, (Source, portal of entry& spread) immunity, biomedical waste management and standard precautions

Unit III

Sterilization and disinfection procedures and their application.

Unit IV

Common bacterial, viral, fungal and parasitic pathogens and the diseases caused by them with preventive and treatment measures.

Unit V

Applied microbiology- Sexually transmitted diseases, hospital acquired infections, urinary tract infections, skin and soft tissue infections and anaerobic infections.

Recommended books

a. Prof C P Baveja - Text book of Microbiology.
b. Satish Gupte- Text Book of Microbiology

Microbiology Lab

Learning Objective

This module aims at providing practical knowledge in the recognition of common pathogenic organisms, infectious diseases and their lab diagnosis.

1. Spotters

a) Disposable syringe
b) Sterile cotton swab
c) Bacterial filters
d) Anaerobic jars
e) Gramstained smears showing grampositive cocci and gram negative bacilli

f) Gram stained smears showing Candida

g) Culture growth of Aspergillus and dermatophytes

h) Bacterial culture media plates (Blood agar, chocolate agar and MacConkey's agar)

i) Antibiotic susceptibility test

j) Ascaris lumbricoides

k) Taenia

2. Clinical case discussion with charts

a) Skin and soft tissue infections

b) Clostridial infections

c) Ring worm/ Tinea infections

d) Food poisoning

e) Gastroenteritis

Learning outcomes:

At the end of the module, the student must be able to have brief practical knowledge on infectious disorders.

Recommended reading

Practical Microbiology - Prof. C.P.Baveja

PHARMACOLOGY

Course Objectives:

1. To understand the terminologies and basic principles of pharmacokinetic and pharmacodynamic involved in the use of drugs.
2. To understand the pharmacological action and mechanism of action of common drugs used for different disease conditions.
3. To know the therapeutic uses and adverse effects of common drugs used for different disease conditions

UNIT 1: Introduction

General pharmacological principles-Definition-Routes of drug administration-Pharmacokinetics-Pharmacodynamics-Adverse drug effects

UNIT 2: Drugs acting on Autonomic Nervous System, Peripheral Nervous System andDrugs acting on Central Nervous system

General considerations-Cholinergic system & drugs-Anticholinergic drugs-Adrenergic drugs-antiadrenergic drugs-Drugs acting on autonomic ganglia.

Skeletal muscle relaxants-Local anaesthetics, General anaesthetics-Ethyl & Methyl alcohol-Sedatives, Hypnotics

Antiepileptic's-Antiparkinsonian drugs-Drugs used in mental illness-Opioid analgesics and Non opioid Analgesics

Nonsteroidal Anti-inflammatory drugs

UNIT 3: Cardiovascular drugs, Drugs affecting Blood & Blood formation and Drugs on Respiratory system

Cardiac glycosides, Antiarrhythmic drugs, Antianginal drugs, Antihypertensives and Diuretics, Haematinics, Erythropoietin,,Drugs affecting-coagulation,Fibrinolytic and Antiplatelet drugs,Treatment of cough and antiasthma tic drugs

UNIT 4: Antimicrobial drugs

General consideration-Antibiotics-Antibacterial agents-Ant tubercular drugs-Antifungal-Antileprotic-Antiviral-Antimalarial Antiamoebic-Antiprotozoal drugs-Cancer Chemotherapy, Antiseptic-Disinfectant-others.

UNIT 5: Hormones & related Drugs, Drugs used in Gastrointestinal diseases &Miscellaneous drugs

Corticosteroids, Antithyroid drugs and Drugs for Diabetes Mellitus,Treatment of Vomiting, Constipation, Diarrhoea and Treatment of peptic ulcer Vitamins, Vaccines,Sera and chelating agents.

Recommended books:

i. Prep Manual for Undergraduates in Pharmacology by Tara V Shanbag, 2nd edition

i. Pharmacology for Dental and Allied Health Sciences by PadmajaUdaykumar, 3rd edition

Pharmacology Lab

Learning Objective

This module is intended to discuss the various modalities of drug delivery and instrumentsrelevant to it.

Instruments:

Needles Intravenous, Intrathecal , Spinal, Intra arterial

Students Discussion Syringes: Tuberculin, Insulin, I.V cannula, Scalp. Vein set

Students Discussion Enema can, Inhalers, Spacers, Nebulizers

Students Discussion Tablets – Enteric coated, Sustained release, Sub-lingual

Students Discussion Capsules, Spansules, Pessary, Suppository

Students Discussion Topical Preparation, Ointment, Lotion, Powder, Drops – eye / ear

Charts:

Mechanism of action of drugs, adverse effects, toxicology

Spotters: drugs

Text books suggested for reading:

1. Text book of pharmacology for Dental &Allied Health Science 2rd edition PadmajaUdaykumar
2. Pharmacology for dental students Tara V Shanbhag, SmitaShenoy, VeenaNayak
3. Principles of pharmacology 2rd edition H.L.Sharma& KK Sharma

MEDICAL TERMINOLOGIES AND RECORD KEEPING

This course introduces the elements of medical terminology. Emphasis is placed onbuilding familiarity with medical words through knowledge of roots, prefixes, and suffixes. Topics include: origin, word building, abbreviations and symbols, terminology related to the human anatomy,reading medical or reports, and terminology specific to the student's field of study. Spelling is critical and will be counted when grading tests. Topics to be covered under the subject are as follows:

1. Derivation of medical terms.
2. Define word roots, prefixes, and suffixes.
3. Conventions for combined morphemes and the formation of plurals
4. Form medical terms utilizing roots,s uffixes, prefixes, and combining roots.
5. Interpret basic medical abbreviations/symbols.
6. Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system,nervous system,and endocrine system.
7. Interpret medical orders/reports.
8. Data entry and management on electronic health record system.

BASIC COMPUTERS AND INFORMATION SCIENCE

The students will be able to appreciate the role of computer technology. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing,Excel data work sheet and Power Point presentation.Topics to be covered under the subject areas follows:

1. Introduction to computer:Introduction, characteristics of computer, block diagram ofcomputer,generations of computer,computer languages.
2. Input output devices: Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices),output devices(monitors, pointers, plotters, screen image projector, voice response systems).
3. Processor and memory:TheCentralProcessingUnit(CPU),main memory.

4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk,optical disk,masss to rage devices.
5. Introduction of windows: History, features, desktop, taskbar, icons on the desktop,operation with folder, creating shortcuts, operation with windows (opening, closing,moving,resizing,minimizing and maximizing,etc.).
6. Introduction to MS-Word: introduction, components of a word window, creating,opening and inserting files,editing document file,page setting and formatting the text,saving the document,spell checking,printing the document file,creating and editing of table,mail merge.
7. Introduction to Excel: introduction, about worksheet, entering information, saving work books and formatting,printing the worksheet,creating graphs.
8. Introduction to power-point: introduction,creating and manipulating presentation,views,formatting and enhancing text,slide with graphs.
9. Introduction of Operating System: introduction, operating system concepts, types of operating system.
10. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet,Intranet), network topologies (star, ring, bus,mesh, tree, hybrid),components of network.
11. Internet and its Applications: definition, brief history, basic services (E- Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
12. Application of Computers in clinical settings.

Practical on fundamentals of computers-
Learning to use MS office: MS word,MS Power Point,MS Excel.To install different software.

SEMESTER-III

GENRAL PHYSICS ,RDIATION PHYSICS PHYSICS OF DIAGNOSTIC RADIOLOGY - THEORY

OBJECTIVES:

- Expected to have basic knowledge on general physics, radiological physics & radiation physics.

UNIT –1

Basic Units, Heat, Acoustics etc. Basic concepts of power, work, force, energy - Einstein's formula - Electronics, Electricity & Magnetism, -electromagnetic waves - Units and measurements - temperature and heat-SI units of above parameters- Atomic structure- Nucleus - Atomic Number, Mass Number electron orbit and energy levels-Periodic table -Isotopes-Isobars-Ionisation and excitation.

UNIT-2

Electromagnetic induction: Electric charges-electric induction – electric potential-capacitance and capacitors. electrical energy and power - unit of current- resistance and Ohm's law - circuit laws - heating effect of current – sources of electrical energy - e.m.f. Magnetism-Magnetic effect of an electric current - applications of magnetic field. Electro-magnetic induction, laws of mutual induction and self induction. Alternating current-transformers theory and losses - practical aspects-reactance – resonance - impedance and power factors.

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UNIT-3

Interaction of X-and Gamma rays: Attenuation of X-ray or Gamma rays absorption and scattering-half value layer-coherent scattering-Photo electric absorption-compton scattering-pair production and photoelectric disintegration. X-Ray transmission through medium-linear and mass attenuation coefficients. HVT - TVT and interaction of charged particle and neutrons with matter. Interaction of X-and Gamma rays in body-fat-soft-tissue-bone-contrast medium- Total attenuation coefficient. Relative important of different types of interactions

UNIT-4

X-ray Tube: Anode & Cathode - Thermionic diode – X- ray valves and tubes – principle and practical aspects – semiconductors – triode valves – cathode ray oscilloscopes – X-ray circuits – self rectifying circuits – half wave pulsating voltage circuits – full valve pulsating voltage circuits - measurement of high voltage – control of KV circuit – mA circuit. X-ray beam quality.

UNIT-5

X-Ray Grids /Bucky- Scattered Radiation -Significance of scatter – Beam limiting devices.-Grid principle and structure – Types of Grids - vertical bucky- versatile bucky -Stationary grid, parallel grid, focused grid – crossed grid, moving grid – Potter Bucky Diaphragm Control of scattered radiation and grids/Bucky - Methods of minimizing formation of scatter radiation, types of grids and grid ratio- use of cones – diaphragm/ light beam devices - effectiveness of collimation - limitations of the primary beam/the light beam diaphargm -Effects of scatter radiation on radiograph image quality, patient dose and occupational exposure.

Text Books:

1. Physics for Radiography - Hay and Hughs
2. Ball and mores essential physics radiographers, IV edition, Blackwell publishing.
3. Basic Medical Radiation physics – Stanton.
4. Christensen's Physics of Diagnostic Radiology – Christensen.

Practicals

CONTENTS

- Demonstration of basic procedures with all radiographic equipment's
- Spotters
- Charts
-

X-ray Film / Image processing Techniques, including Dark Room

OBJECTIVES

- *Expected to have basic knowledge on Medical Physics and Electronics.*
- *To provide an introduction to concepts in radiation physics, radiation instrumentation, radiation safety*

- *To elaborate on operations of radiation detectors and radiographic film processing.*

UNIT-1

Radiation Physics X-Rays

- Electromagnetic radiations, waves and quanta, rectilinear propagation, inverse square law, general electromagnetic, spectrum, production and properties of X–rays; X- ray
- Spectrum: characteristic radiation and bremsstrahlung radiation. Effects of variations in the
- Tube potentials.

UNIT-2

X – Rays Measurements

- Methods of measuring x–rays ionization measurement – realization of line roentgen parallel plate chamber. Principles of integrating, direct reading and condenser dosimeters half value layer Pocket dosimeter, chemical dosimetry,
- Scintillation defectors, solid state detectors, Film dosimetry, TLD, GM counter ionization chamber, proportional counter.

UNIT-3

Dark Room Techniques

- Ideal dark room-construction-accessories-safelight, wet bench, dry bench, types of films, typesof hangers, Automatic film processor-analysis the various parts of the unit.
- Maintenance, required chemicals and monitoring, manual film processing-contents of developer and fixer-need of water bath, rinsing and various methods of drying.
- Types of films, manufacture of films, storage of films, film definition-density and contrast.
- characteristic curve, image defects, artifacts, film cassettes types of intensifying screens, Artifacts in Radiography.

Text Books:

1. X-ray Equipments for Radiographers,D. Noreen Chesney, Muriel O. Chesney, CBS publishers & distributors, third edition, 2005

2. Christensen's Physics of Diagnostic radiology, Thomas Curry, 4th edition, Lippincott Williams & Wilkins, 1990

RADIOLOGICAL PHYSICS AND DARK ROOM TECHNIQUES – PRACTICAL (UE)

CONTENTS

- Radiation survey
- Leakage radiation test

- Manual Film Processing
- Automatic film processing
- Effect of temperature on film processing
- Effect of pH on film processing

PSYCHOLOGY

UNIT 1: Basic Concepts of Psychology

Definition of Psychology, Origin of Psychology - Philosophical roots of psychology, Schools of Psychology –Structuralism – Gestalt – Functionalism – Behaviorism - Psychoanalysis – Humanistic. Fields of Psychology - Work of a psychologist – Applications of psychology.

UNIT 2: Learning principles and methods

Definition of learning, Factors In The Process of Learning Classical conditioning - Operant Conditioning – The principle of reinforcement and Punishment. Theory of learning. Cognitive learning- Latent learning, Insight learning, and Imitation.

UNIT 3: Motivation, Emotion, Memory and forgetting

Motivation - Definition of motivation – Theories of motivation - Physiological basis of motivation – Motivational factors in aggression – Self-actualization motivation. Emotion – Emotional expression –Theories of emotions. Kinds of remembering – Retrieval processes – The nature of forgetting – Two process theories of memory – Improving memory –Language and thought – Symbols and concepts – Structure – Forms of thought - Thinking and reasoning –

Concept formation.

UNIT 4: Development, Sensory Processes and Perception.

Erikson's stages of psychosocial development Lawrence Kohlberg's stages of moral development Freud's Stages of Psychosexual Development Physiological basis of behavior – The brain and nervous system –The sensory process , Some general characteristic of senses – Five senses ,Perception: Organization – The role of learning in perception – Perception and attention – Perceptual process.

UNIT 5: Intelligence & Personality

Theories of intelligence – Measuring Intelligence – Kinds of intelligence tests – Ability – Formation of aptitude and attitude – Aptitude tests –Creativity and its tests. Personality – Definition of Personality – Theories of Personality – Assessment of Personality. Social Factors Influencing Personality.

UNIT 6: Social Psychology

Definition, Nature, Subject Matter and Scope Of Social Psychology-Applications and Importance of Social Psychology, Groups: Definition and Type- Primary And Secondary Groups Social Interaction, Social and Inter-Personal Relations. Inter-personal attraction – Love and Companionship. Prosocial-behavior. Modes of empathy: self – other differentiation and development of empathy. Social influence: attitude and conformity. Definition - Characteristics and Classification of Crowd. Leadership: Definition and characteristics, Defense Mechanisms, frustration and conflict, sources of frustration and conflict, types of conflicts. Aggression and Types of aggression.

UNIT 6: Health Psychology

Definition of Health Psychology -Relating Health Psychology to other fields Clinical Health Psychology, Public Health Psychology, Community Health Psychology, Critical Health Psychology Abnormal Psychology: Concepts of normality and abnormality, causation of mental illness, neuroses, psychoses, psychosomatic disorders, measures to promote mental health.

Stress - Definitions- Models of Stress – Theories of Stress - Stress reactions – Coping and Stress Management techniques, Pain and its management - Psychological reactions of a patient to loss – Stages of Acceptance by Kubler-Ross.

REFERENCES:

1. Clifford T. Morgan, Richard a. King, John R. Weis and John Schopler,"**Introduction to Psychology" – 7th Edition**. Tata McGraw Hill Book Co. New Delhi, 1993.

2. Baron, R. A., & Byrne, D (2006), "**Social psychology"**, New Delhi: Prentice hall of India private limited.

3. Elliot Aronson, Timothy D. Wilson, Robin M. Akert, Samuel R. Sommers, **"Social psychology" 9th edition** published by Pearson education, Inc.,2006

4. Shelley E. Taylor. "**Health Psychology" Third Edition**. McGraw Hill International Editions, 1995.

5. Swaminathan, V.D, Latha Sathish, "**Psychology for Effective Living"**, Department of Psychology, University of Madras.
6. Coleman, James. 1980. "**Abnormal Psychology and modern life"**. New Delhi: Tata McGraw Hill Ltd.

BASICS IN MEDICAL PHYSICS AND ELECTRONICS

UNIT 1: Laser Nature of light-Reflection-Refraction-Total internal reflection-Optical fibers-Applications in Medicine – Laser-Principles-Action-Types of laser, Basic principles of laser in Medical Application – ArgonIron laser photo coagulator-Photo thermal-Photochemical application-Applications of laser in Medicine-Laser hazards and safety measures

UNIT 2: Radiation Physics Introduction to nuclear physics and radioactivity, Radioactive radiations – X-ray, production of x-ray, Properties of x-ray radiations – Biological effects of radiation, Radiation damage in matter, Radiation protection principles, radiation detection and measurement – Ultrasound and generation of ultrasound.

UNIT 3: Introduction to Imaging Technique Principles of Microscope: Simple microscope and compound microscope-Radiography: Making and X-ray image-Fluoroscopy. CT Scans, MRI – Ultrasonagraphy: Ultrasound picture of Body-A-ScanM-Scan-Ultrasound diathermy-Phonocaridography – Radio isotopes: Uses of Radio isotopes – 99mTc Generator – Scintillation detectors – Application of scintillation detectors – Gamma Camera – Positron Camera

UNIT 4: Semiconductor devices Principles of diodes and Transistors – Integrated circuits – Amplifiers – Basic configuration and types – differential and operational amplifiers – Waveform generators – Timer – A/D and D/A converters – Active filters – Transducers – Basic configuration and types.

UNIT 5: Biopotential Recording Systems Introduction to bioelectric potential – Electrodes and surfaces – Biopotential amplifier – Frequency ranges of various biopotential signals – Working principles of bio potential recording systems – Electrocardiography – Electroencephalograph – Electromyography.

REFERENCE BOOKS:

1. New Understanding physics for advanced level – Jim Breithauput.

2. Advanced Physics for you by Keith Johnson, Simmons hewett, Sue holt, John miller

3. Christensen's Physics of diagnostic Radiology by Thaomas S. Curry III, M.D., Robert C Murry, Jr. Phd., Dow Dey, Phd.

4. Applied Electronics, A. Subramanyam, The National Publishing co., Madras (1996).

5. Design and Development of Medical Electronic Instrumentation, David Prutchi and Michael Norris, John Wiley & Sons (2005). Allied Health Sciences Radiology & Imaging Technology

RIT Directed Clinical Education

Unit – 1: Darkroom Techniques – Understanding the design, lighting, and ventilation of the darkroom; handling and storage of X-ray films; and common artifacts in film processing.

Unit – 2: Manual Film Processing – Step-by-step procedures of developing, fixing, washing, and drying X-ray films; chemical composition and maintenance of processing solutions; and quality control in manual processing.

Unit – 3: Radiography Equipment – Overview of X-ray tubes, generators, collimators, grids, and control panels; principles of radiation production and image formation; and safety measures in equipment handling.

Unit-4: Computed Radiography (CR) – Working principles of imaging plates (IP), photostimulable phosphor technology, image processing in CR readers, and advantages over conventional film-screen systems.

Unit-5: Digital Radiography (DR) – Introduction to flat-panel detectors (FPD), direct and indirect DR systems, image acquisition, processing, storage, and integration with PACS.

Unit – 6: Quality Assurance and Image Optimization – Factors affecting image quality, contrast, and resolution; common digital artifacts and corrections; and radiation safety protocols in modern imaging systems.

SEMESTER - IV

RADIOLOGY EQUIPMENTS – THEORY

OBJECTIVES:

- Expected to have basic knowledge on medical physics and electronics
- To develop in depth knowledge on radiological physics
- To develop exhaustive ideology of instrumentation and controls involved in radiology equipment

.

UNIT-1

Radiological Physics, Apparatus

Introduction to general properties of radiation and matter. Fundamentals of nuclear physics and radioactivity, production of x-rays, Contrast, Artefacts in radiography, Interaction of x-rays and gamma rays with matter and their effects on irradiatedmaterials.
Interaction of x-rays with patients, radiation protection, Quality assurance, Miniature radiography, macro radiography and magnification techniques; Distribution of electric power; Mains-compensators-stabilizers-single phase-three phase mobile supply cable capacity, voltage drop-main switches, fuses earthing-effects of frequency Variations

UNIT-2

Transformers, Control of output

Construction-closed or open-core-voltage and power relations, functions of core-losses and regulations copper losses, iron losses-hysteresis and inherent regulations. Types of transformers high insulation transformers-condenser effect; Resistance control of primary transformer control of primary (acute transformer) dual control-continuous central

UNIT-3

HT General Circuits and Distribution, X-ray Tubes

Valve and metal rectifiers-mechanical rectifiers-self-suppression types of generators radiographic half- phases condenser-therapeutic- pulsating, HT distribution-bus bars stress shield chokes,

UNIT-4

Instruments and Controls, Accessories

Milliammeters – milliampere - second meter-kilovolt meters-direct and pre reading layout ofcontrol desk contractor automatic and interlocked controls-exposure switches (clock work electronics, synchronous electric photoelectric). Mammography, Digital radiography, OPG, craniostat, Mobile X-ray, X-ray equipment for operation theaters,

Dual energy X-ray absorptiometry; Moving grids, stationary grids curved and flat grids-focused and non-focused grids. Bucky tables, stands and pedestals, screening stands, serial devices, diaphragms, cones and applicators

UNIT-5

Fluoroscopy

Basic principle-assembly image intensifiers-camera-filters, magnification DSA- the angiographic room-the generators-the X-ray tube-image intensifier-cine camera and associated optics-the television chain-cine film selection-processing and viewing digital fluoroscopy-Radiation safety.

Text Books:

1. X-ray Equipments for Radiographers,D. Noreen Chesney, Muriel O. Chesney, CBS publishers & distributors, third edition, 2005

2. Christensen's Physics of Diagnostic radiology, Thomas Curry, 4th edition, Lippincott Williams & Wilkins, 1990

Reference Books:

1. First Year Physics for Radiographers – George Hay, 2nd edition, Baillière Tindall, 1978.

2. Equipment in Diagnostic Radiology, E. Forster, Springer science and Business media, 2012.

3.X-ray Equipments for Radiographers, Noreen Chesney & Muriel Chesney, 3rd edition, Blackwell Scientific Publications, 1984

RADIOLOGY EQUIPMENTS - PRACTICAL

CONTENTS

- Testing X-raybeam and light beam alignment.
- Magnification techniques with constant SID
- Magnification Techniques with constant OID
- Beam Alignment Test
- Focalshot test
- Grid alignment test

POSITIONING RADIOGRAPHYAND CONTRAST PROCEDURES THEORY

UNIT-I

Practice on the patient

Age, subject types and sex, anatomical landmarks-postural variations-erect and horizontal technique- respiratory movement and diaphragm level-regional densities-preparations-and immobilization of patient- pathological conditions-injuries, fractures and dislocations congenital, localized views-periodic examinations-use of dry bones-positioning terminology identification systems; The position of the patient, the relative position of the tube to the patient and to all the exposure factors**.**

UNIT-II

Upper limb, Lower limb and Pelvic Girdle

Techniques for hand-fingers-thumb-wrist joint-forearm-elbow joint-humerus - shoulder joint and sterno- clavicular joint; Techniques for foot-calcaneum-ankle joint-leg-kneejoint- patella-and femur (lower two thirds); Techniques for pelvic-iliac fossa-ischium and sacro iliac joint.

UNIT-III

Vertebral column, Bones of Thorax and skull

Techniques for Atlanto-occipital articulation, cervical vertebrae, cervico-thoracic thoracic junction, vertebrae, lumbar vertebrae, lumbosacral articulation, sacrum, coccyx; Techniques for sternum, ribs (upper and lower); Techniques for cranium, facial bones, sella turicica, temporal Bone and optic foraminae sinuses, mandible and temporo mandible joint.

UNIT-IV

Abdomen

Routine and radiographs on acute condition; Bedside radiography-techniques for acute chest conditions-
intestinal obstruction, abdominal perforations-vertebral injuries-skull injuries-fractures immobilized. Theatre
radiography-introduction to C-arm image intensifier-exposure and training.

UNIT-V

CONTRAST PROCEDURE

Barium swallow-Barium meal series-Barium enema-double contrast barium enema, small bowel enema, double and single contrast, ERCP, PTBD, sonograms, fistulograms, mammograms, IVU, retrograde pyelogram, MCU, AUG, Opposing Urethrogram. Sialogram, darocystogram, HSG, T-Tube cholangiogram, operative cholangiogram (on table in theatre), Radiographic image processing.

Text Books:

1. Clark's Positioning in Radiography, A. Stewart Whitley, Charles Sloane, Graham Hoadley, Adrian D. Moore,12th edition, CRC Press, 2010.

2. Diagnostic Radiography, Glenda Bryan, 4th edition, SPCK Publishing, 1991.

Reference Books:

1. Clark's Positioning in Radiography, A. Stewart Whitley, Charles Sloane, Graham Hoadley, Adrian D. Moore,12th edition, CRC Press, 2010.
2. Diagnostic Radiography, Glenda Bryan, 4th edition, SPCK Publishing, 1991.

POSITIONING RADIOGRAPHY AND CONTAST PROCEDURES –PRACTICAL

OBJECTIVES:

Expected to have basic knowledge on anatomy, physiology and pathology.

1. To inculcate knowledge on various radiographic anatomy based on disease conditions.
2. To elaborate on various procedures and positioning involved in radiologic imaging.

PRACTICAL

1. Contrast procedures
2. Film Criticism
3. Handling patient
4. Pre-medication and post-medication
5. Crash cart
6. Spotters / Chart
7. Radiographic materials

BASIC AND ADVANCED LIFE SUPPORT

- BLS TRIAGE
- Primary survey Secondary survey
- Airway & Ventilatory managementShock
- Central & peripheral venous access Thoracic trauma – Tension pneumothorax
- Other thoracic injuries

- Abdominal trauma – Blunt injuries Abdominal trauma – Penetrating injuries Spine and spinal cord trauma
- Head trauma Musculoskeletal traumaElectrical injuries Thermal burns
- Cold injury Pediatric trauma
- Trauma in pregnant womenWorkshop BLS
- Workshop cervical spine immobilizationImaging studies in trauma
- The universal algorithm for adult ECC
- Ventricular fibrillation/Pulseless ventricular tachycardia algorithm Pulseless electrical activity (PEA) / asystole algorithm Bradycardia treatment algorithm
- Tachycardia Treatment algorithmHypotension / Shock
- Acute myocardial infarction Pediatrics Advanced life support
- Defibrillation
- Drugs used in ACLS Emergency cardiac pacingAED
- Techniques for oxygenation and ventilation

MEDICAL SOCIOLOGY

UNIT 1: NATURE AND SCOPE OF SOCIOLOGY

Definition, Historical background, subject matter of sociology, Nature and scope, Importance,Sociology of India, Relationship of sociology with other social sciences

UNIT 2: FUNDAMENTAL CONCEPTS OF SOCIOLOGY

Society and Individual, Community, Social structure and functions of Institutions, Association, Organization, Social system, social order, Social control, social groups, Social Process, Social change,

UNIT 3: CLASSICAL THINKERS AND THEIR CONTRIBUTIONS

Auguste comte, Emile Durkheim, Karl Marx, Max Weber, Herbert Spencer

UNIT 4: SOCIOLOGY OF INDIA

Characteristics of Indian society, Racial linguistic, Religious and demographic, Hindu social organization-ashramas, varnas, dharma and karma, purushartha, Caste system, Problems of SC&ST, Sanskritisation, Westernization and Modernization,

UNIT 5: ANTHROPOLOGY AND CULTURAL ANTHROPOLOGY

Definition of anthropology, Subfield of anthropology, Cultural Anthropology yesterday and today,Anthropological Perspectives, Early Anthropologist

Environment and culture, Kinship, Clan Ethno methodology, Gender, Subsistence and Exchange, Social Organization and evolution of political system.

Reference:

- Bottomore.T.B., Sociology: A guide to problems and Literature,1971,Random House
- Gisbert P. Fundamentals of sociology,3rd Edition,2004,Orient Longman publications
- Neil J.Smelser,Handbook of sociology,1988.sage publication
- Johnson R.M,Systematic Introduction to Sociology,1960,Allied Publishers
- Cultural Anthropology,Barbara D.Miller,2006 Pearson/Allyn and Bacon Co
- C.N.ShankarRao., Introduction to Sociology, 2008, S.CHAND & Company Publications.
- . C.N.ShankarRao., Sociology of India, S.CHAND & Company Publications

RIT Directed Clinical Education

Unit-1: Positioning Radiography and Contrast Procedures – Principles of patient positioning for routine and special radiographic examinations; types, indications, and administration of contrast media; and techniques for enhanced imaging of the gastrointestinal, urinary, and vascular systems.

Unit-2: Radiological Positioning – Standard positioning techniques for skull, spine, chest, abdomen, and extremities; evaluation of image quality; and methods to reduce motion and positioning errors.

Unit-3: Mammography – Basics of breast imaging, equipment specifications, positioning techniques, radiation dose considerations, and the role of mammography in early breast cancer detection.

Unit-4: Fluoroscopy – Real-time imaging principles, equipment components, radiation protection measures, and applications in gastrointestinal, orthopedic, and interventional procedures.

Unit-5: Specialized Imaging Techniques – Advanced radiographic methods, including angiography, myelography, and hysterosalpingography; patient preparation, procedural steps, and post-procedure care.

Unit-6: Quality Control and Radiation Safety – Image quality assessment, artifact recognition, radiation dose optimization, and adherence to safety protocols in contrast studies and fluoroscopic procedures.

SEMESTER-V

BASIC AND ADVANCED ULTRASOUND IMAGING – THEORY (UE)

OBJECTIVES:

Expected to have basic knowledge on human anatomy, physiology and Basic Positioning in radiography

- To develop in depth knowledge on physics involved in Ultrasound imaging.
- To develop exhaustive ideology of various advanced techniques for ultrasound imaging.

UNIT-I

- Ultrasound physics: Ultrasound units, Transducer techniques for imaging different
- Anatomic areas, Different types of Transducer, Ultrasound artifacts.

UNIT-II

- Ultrasound anatomy, Patient Preparation, Biologic effects and safety, Contrast agents in
- Ultrasound Quantities ultrasound densitometry.

UNIT-III

- Doppler physics-Doppler artifacts-doppler techniques-tissue harmonic imaging, seascape
- imaging-Hybrid Imaging-Thermography
- UNIT-IV
- 3D and 4D Ultrasound Imaging, patient preparation for Doppler, Vascular sonography

UNIT-IV

- Musculoskeletal sonography, basic echocardiography, interventional sonography.

Text Books:

1. Diagnostic Ultrasound, Carol M. Rumack, 4 th edition,
2. Elsevier/Mosby, 2011. Clinical Doppler Ultrasound
3. Paul L. Allan, 3rd edition, Elsevier Health Sciences, 2013.

Reference Books:

1. Diagnostic Ultrasound, Carol M. Rumack, 4 th edition, Elsevier/Mosby, 2011.
2. Clinical Doppler Ultrasound Paul L. Allan,
3. 3rd edition, Elsevier Health Sciences, 2013.

BASIC AND ADVANCED ULTRASOUND IMAGING - PRACTICAL

OBJECTIVES:

- Expected to have basic knowledge on anatomy, pathology and basic physics of ultrasound imaging
- To inculcate knowledge on various ultrasound imaging techniques.
- To elaborate on Advanced Ultrasound imaging techniques.

CONTENTS:

- USG abdominal imaging.
- USG Neck imaging
- Doppler evaluation
- Advanced Ultrasound Imaging
- Spotter / Image discussion

BASIC AND ADVANCED COMPUTED TOMOGRSAPHY- THEORY

OBJECTIVES:

Expected to have basic knowledge on human anatomy, physiology and basic positioning in radiography.

- To inculcate knowledge on Physics and instrumentation of CT.
- To elaborate on various procedures and protocols in CT imaging.

UNIT-I

- Basic principle of CT scan, Generation of CT, Image formation in CT, Image
- quality, Hounsfield
- Detectors used in CT, X-ray tube.
- Patient preparation, Imaging techniques for Head, Chest, Abdomen and other
- Parts

UNIT-II

- Contrast media in CT scan, Artifacts in CT, Image documentation, Safety regulation

UNIT-III

- Basics of spiral CT scan, advantages of spiral CT scan, Electron beam CT, patient preparation-CT (aortogram, selective angiogram head, neck and peripheral angiography).

UNIT-IV

- 3D processing and reconstruction-Different Rendering mode used in 3D Reconstruction-HRCT-image documentation-image filing-documental maintenance.

Text Books:

1. Computed Tomography: Physical Principles, Clinical Applications, and Quality Control, Euclid Seeram, 4th edition, Elsevier Health Sciences, 2015

Reference Books:

2. Computed Tomography - Essentials of medical imaging series, Stewart C. Bushong, illustrated edition, McGraw Hill Professional, 2000

BASIC AND ADVANCED COMPUTED TOMOGRAPHY – PRACTICAL

OBJECTIVES:

- Expected to have basic knowledge on anatomy, pathology and Positioning.
- To inculcate knowledge on basic CT imaging protocols and parameters involved.
- To elaborate on the CT imaging techniques and protocols to diagnose various diseases.

1. Brain scanning Protocol
2. CT Chest scanning Protocol
3. CT Abdomen scanning Protocol
4. CT Angiography Protocol
5. Image processing in workstation
6. CT Biopsy Protocol

ENVIRONMENTAL SCIENCE AND COMMUNITY MEDICINE UNIT-I

- Natural Resources: Introduction, multi-disciplinary nature of environmental studies,
- Earth Resources and Man, Renewable and Non-Renewable Resources, Water Resources,
- Mineral Resources: Food Resources: Effects of modern agriculture, Fertilizer/ pesticide
- problems, Water logging, and salinity, Energy Resources.

- Ecosystems: Concept of an Ecosystem, Structure and Functions of an Ecosystem, Producers, Consumers and Decomposers, Cycles in The Ecosystem

- Pollution: Definition, Causes, Effects and Control Measures of Air Pollution, Water Pollution, Pollution, Marine Pollution, Noise Pollution, Thermal Pollution, Nuclear hazards, Solid Waste Management role of Individuals in Pollution Prevention.

- Social Issues: Human, Population and Environment: From Unsustainable To Sustainable
- Development, Urban Problems Related To Energy, Water Conservation, Rain Water Harvesting, global warming, acid rain, ozone layer depletion, nuclear accidents and nuclear holocaust.

- Concept of health &disease: Concept of health, Definition of health, Philosophy of health-
- Dimension of health - Concept of wellbeing, Spectrum of health, Responsibility of health - Determinates of health & Indicators of health - Concepts of disease & Concepts of cessation – Natural history of disease – Iceberg phenomenon-concept of control- concept of prevention-Modes of Intervention, Changing pattern of disease.

- Epidemiology: Definition & Explanation, Aims, Epidemiologic approach, Basic measurement in epidemiology & tools of measurement – of Mortality , Epidemiologic methods – Descriptive epidemiology – Analytical epidemiology -Cohort study – Experimental epidemiology – RCT- Association & Caution Uses of epidemiology (Criteria for judging causality) – Infection disease epidemiology Definitions Dynamic of disease transmission & Mode of Transmission – Disinfection – Definitions Types Agents used Recommended disinfection procedures – Investigation of an epidemic.

- Environmental & health: Definition & Components (environment sanitation environmental
- sanitation)

- Water: Safe & Whole some water Requirements Uses source of water supply (sanitary well) – Purification (1).Large scale purification, (2). Small scale purification – Water quality – Special treatment of water Air: Composition the air of occupied room discomfort. Air pollution & its effects. Prevention & Control of air pollution Ventilation: Definition Standards of ventilation Types of Ventilation. Light, Noise & Radiation, Meteorological environment, Housing, Disposal of waste Excreta disposal.

Hospital Products, Promotion, Sales & Public relations

Unit 1: Introduction to Hospital Products, Overview of medical imaging equipment, contrast agents, radiation protection products, and consumables used in radiology.

Unit 2: Medical Equipment Sales & Marketing, Strategies for marketing and selling radiology equipment, understanding customer needs, and competitive market analysis.

Unit 3: Promotion of Imaging Services, Role of advertising, digital marketing, and referral programs in promoting hospital radiology services.

Unit 4: Hospital Public Relations, Importance of PR in healthcare, patient communication, and handling media relations in radiology departments.

Unit 5: Customer Relationship Management (CRM), Building strong patient and physician relationships through service excellence and feedback mechanisms.

Unit 6: Regulatory and Ethical Considerations, Guidelines on ethical marketing, patient privacy (HIPAA, GDPR), and compliance with healthcare regulations.

Unit 7: Sales Techniques for Radiology Products, Negotiation skills, key account management, and B2B sales strategies for imaging technology and consumables.

Unit 8: Emerging Trends in Radiology Business
Impact of AI, telemedicine, and digital transformation on hospital product sales and marketing.

RIT Directed Clinical Education

Unit-1: CT Protocols – Understanding standardized CT scanning protocols for various body regions, including parameter optimization for image quality and radiation dose reduction.

Unit-2: Safety Aspects in Radiology – Radiation protection principles, ALARA (As Low As Reasonably Achievable) concept, and safety measures for patients and healthcare providers.

Unit-3: Patient Positioning – Techniques for proper patient positioning in X-ray, CT, and MRI

to ensure accurate imaging and diagnostic quality.

Unit-4: Contrast Studies – Types of contrast agents, indications, contraindications, and protocols for contrast-enhanced imaging in CT and MRI.

Unit-5: IV Insertion Techniques – Hands-on training in intravenous cannulation for contrast administration, including aseptic techniques and patient preparation.

Unit-6: Power Injector Usage – Principles, operational guidelines, and troubleshooting of automated contrast injectors for enhanced imaging efficiency.

Unit-7: Ultrasound Imaging Preparations – Patient preparation protocols for abdominal, obstetric, vascular, and musculoskeletal ultrasound examinations.

Unit-8: Biological Effects of Imaging – Understanding the potential biological effects of ionizing and non-ionizing radiation, along with risk assessment and mitigation strategies.

SEMESTER-VI

BASICS AND ADVANCED MRI - THEORY

OBJECTIVES:

Expected to have basic knowledge on human anatomy, physiology and Basic Positioning in radiography

- To inculcate knowledge on Physics and instrumentation of MRI.
- To elaborate on various procedures and protocols in MR imaging.

UNIT-I

Basic principle and concepts of MRI, the need for MRI, Role of hydrogen in MR Imaging Advantages and disadvantages of MRI.

UNIT-II

MRI architecture, magnet system and gradient system

UNIT-III

Patient screening before scanning, safety aspects

UNIT-IV

Types of magnets and RF coils, different types of pulse sequence, Fourier transformation, Inverse Fourier transformation, and K space imaging Image formation in MRI with & without gating image formation in MRI, maintaining image quality

UNIT-V

MR Angiography, (dynamic contrast MR angiography, phase contrast and TOF) Functional MRI, MR Spectroscopy, Recent advances in MRI and open MRI.

Text Books:

MRI in Practice, Catherine Westbrook, Carolyn Kaut Roth, John Talbot, 4th edition, John Wiley & Sons, 2011.

Reference Books:

Magnetic Resonance Imaging, Volume 1, David D. Stark, William G. Bradley, 3rd edition, Mosby, 1999.

BASICS AND ADVANCED MRI - PRACTICAL

OBJECTIVES:

Expected to have basic knowledge on anatomy, pathology and positioning.

To inculcate knowledge on Physics of MR imaging systems. To elaborate on the MR imaging techniques and protocols to diagnose various diseases.

- MRI Brain screening Protocol demonstration
- MRI Spine screening Protocol
- MRI Angiography Protocol
- MRI Musculoskeletal screening Protocol
- Image processing in work station.
- MR Advanced imaging Protocol

INTERVENTIONAL RADIOLOGICAL PROCEDURES AND BASIC ANGIOGRAPHY – THEORY

OBJECTIVES:

- Expected to have basic knowledge on Radiological anatomy, physiology and Basic
- Positioning in radiography

- To introduce the importance of Patient care and responsibilities of Technologist in
- Healthcare industry.

- To introduce various interventional radiology techniques and protocols.

UNIT-I

Procedure of image guided biopsies and drainage procedure

UNIT-II

Invasive Angiography and Venography,4 Vessel DSA, Aortogram, Selective Angiogram, Venogram

UNIT-III

Invasive Monitoring, Cardiac resuscitation measures, Plethysomography, Interventional Procedures, PTBD, Stenting, Management of shock, PTA + Stenting, stent graft, Embolisation Tips, drainage procedure.

UNIT-IV

Embolisation, GDC, Glue embolisation, Vertebroplasty, Direct puncture, Laser guided procedures, Adult and Pediatric Invasive Cardiology.

UNIT-V

Basics of cardiac catheterization, Coronary angiogram, Cardiac interventional procedures

Reference Books:

Interventional Radiology: A Practical Guide Radcliffe Series, Anthony F. Watkinson, Andy Adam, illustrated edition, Radcliffe Publishing, 1996

INTERVENTIONAL RADIOLOGICAL PROCEDURES AND BASIC ANGIOGRAPHY – PRACTICAL

OBJECTIVES:

- Expected to have basic knowledge on Radiological anatomy, physiology and Basic Positioning in radiography
- To introduce the importance of Patient care and responsibilities of Technologist in Healthcare industry
- To introduce various interventional radiology techniques and protocols.
- Catheter Intervention Procedures Protocol
- Equipment handling
- Image guided interventional procedure Protocol
- Image processing in work station

HEALTH CARE AND BASIC PRINCIPLES

1. Concept of Health Care and Health Policy Health in Medical Care Indigenous systems of Health Care & their relevance Framework for Health Policy Development

2. Health Organization Historical development of Health Care System in the third world & India Organization & Structure of Health Administration in India Type of Health Organization including International Organizations Private & Voluntary Health care provider Distribution of Health Care Services Health Care System in Public Sector Organization Health systems of Various Countries

3. Health Policy and National Health Programme National Health Policy Drug Policy National Health Programs (Malaria, T.B., Blindness, AIDS etc.) Evaluation of Health Programs (Developing indicators for evaluation) Medical Education & Health Manpower Development

3. Health Economics Fundamentals of Economics Scope & Coverage Demand for Health Services Health as an Investment Population, health of Economic Development

4. Methods & Techniques of Economic Evaluation of Health Program Cost Benefit & Cost Effective Methods

6. Household & Health Health Expenditure & Outcome Rationale for Government action Household capacity, income and schooling

7. Economics of Health Population based health services Economics of Communicable and Non Communicable diseases

8. Health Insurance

BIO-MEDICAL STATISTICS AND RESEARCH METHODOLOGY

1. What is statistics – Importance of statistics in behavioral sciences – Descriptive statistics and inferential statistics – Usefulness of quantification in behavioral sciences.

2. Measurements – Scales of measurements – Nominal, Ordinal, Interval and Ratio scales.

3. Data collection – Classification of data – Class intervals – Continuous and discrete measurements – Drawing frequency polygon – types of frequency polygon – Histogram. Cumulative frequency curve – Ogives – Drawing inference from graph.

5. Measures of central tendency – Need – types: Mean, Median, Mode – Working out these measures with illustrations.

6. Measures of variability – Need – Types: Range, Quartile deviation, Average deviation, Standard deviation, Variance – Interpretation. Normal distribution – General properties of normal distribution – Theory of probability – Illustration of normal distribution – area under the normal probability curve.

8. Variants from the normal distribution – skewness – Quantitative measurement of skewness – kurtosis – measurement of kurtosis – factors contributing for non-normal distribution.

9. Correlation – historical contribution – meaning of correlation – types: Product, moment, content correlation, variation of product, movement correlation, rank correlation, Regression analysis.

10. Tests of significance- need for – significance of the mean – sampling error – significance of differences between means – interpretation of probability levels – small samples – large samples.

RIT Directed Clinical Education

Unit 1: Introduction to Interventional Radiology, Overview of interventional radiology (IR), principles, scope, and clinical applications in diagnosis and treatment.

Unit 2: Basic Angiographic Techniques, Concepts of angiography, patient preparation, contrast media usage, catheterization techniques, and imaging protocols.

Unit 3: Common Interventional Procedures, Techniques and indications for procedures such as biopsies, drainages, embolization, angioplasty, and stenting.

Unit 4: Radiation Safety in Interventional Radiology, Radiation dose optimization, protective measures for patients and staff, and regulatory guidelines for IR procedures.

Unit 5: Fundamentals of MRI, Basic principles of MRI physics, pulse sequences, image formation, and safety considerations in MRI.

Unit 6: MRI Techniques & Protocols, scanning techniques for the brain, spine, abdomen, musculoskeletal, and vascular systems, including contrast-enhanced studies.

Unit 7: Advanced MRI Applications, Functional MRI (fMRI), diffusion-weighted imaging (DWI), spectroscopy, perfusion imaging, and cardiac MRI.

Unit 8: Future Trends in Interventional Radiology & MRI, Innovations in minimally invasive techniques, AI-assisted imaging, and the role of artificial intelligence in MRI and interventional procedures.

VII & VIII Semester

Project

Postings During One Year Internship (12 months)

Area	Time
Radiography, Plain and Contrast studies, Special Radiographic Procedures, Mammography and Dental Radiography	6 Months
Higher Modalities, CT, MRI, DSA, Nuclear Medicine (2 weeks)	6 Months

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