

Meenakshi Academy of Higher Education & Research



BACHELOR OF ALLIED HEALTH SCIENCES

B.Sc AHS

(Radiology and imaging Technology)

REGULATIONS AND SYLLABUS

(Regulation-2014)

Effective from the Academic Year

2014-2015

Principal
Faculty of Allied Health Sciences
Meenakshi Academy of Higher
Education & Research
Chennai - 600 078.

SL NO	TABLE OF CONTENTS	PG NO
I	Vision and Mission of Meenakshi Academy of Higher Education and Research	4
II	Vision and Mission of faculty of Allied Health Sciences	5
IV	Program Education Outcomes	6
V	Program Outcomes	7
V1	Program Specific Outcomes	8
VII	Regulations of the 2014	19-40
	1.Regulations Of The University	
	2.Short Title	
	3.Commencement	
	4.Title Of The Programme	
	5.Eligibility For Admission	
	6.Criteria For Selection	
	7.Age Limit For Admission	
	8.Eligibility Certificate	
	9.Registration	
	10.Duration Of The Programme	
	11.Commencement Of The Programme	
	12.Cut Off Dates For Admission To Examinations	
	13,Working Days In An Academic Year	
	14.Attendance Required For Admission To Examination	
	15.Submission Of Laboratory Record Note Book	
	16.Condonation Of Lack Of Attendance	
	17.Commencement Of Examinations	
	18.Revaluation Of Answer Scripts	
	19.Internal Assessment	
	20.Re-Admission After Break Of Study	
	21.Migration / Transfer Of Candidates	
	22.Marks Qualifying For A Pass	
	23.Classification Of Successful Candidates	
	24.Carry Over Of Failed Subjects	

	25.Branch Of Study	14
	26.Pattern Of Examination And Subjects Of Study	15-17
	27.Compulsory Rotatory Internship	40
	28.Programme Structure	41
VIII	Course Description (Subjects)	
	1. Applied Basic Sciences	19-40
	2. Radiology And Imaging Technology — Ii Year Mapping Courses With Program Outcomes And Program Specific Outcomes	41-50
	3. Radiology And Imaging Technology — III Year Mapping Courses With Program Outcomes And Program Specific Outcomes	51-61
	ELECTIVES	62-65
	1.Community Medicine	62-63
	2.Clinical Psychology	64-65
	4.Copo Mapping For B.Sc Ahs Radiology And Imaging Technology	66



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Meenakshi Academy of Higher
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MEENAKSHI ACADEMY OF HIGHER EDUCATION AND RESEARCH

FACULTY OF ALLIED HEALTH SCIENCES

BACHELOR OF ALLIED HEALTH SCIENCES

B.Sc AHS(Radiology and imaging Technology)

REGULATION-2014

VISION AND MISSION OF MAHER

Vision

To be a world-class institution, transforming society through value-based diverse programs and healthcare advancements, leading to the all-around development of human resources, knowledge, innovation, entrepreneurship, and research.

Mission

To become an institute of eminence by developing world-class professionals in the field of healthcare, science, liberal arts, technology and research with a focus on the societal good.

To create an enabling state-of-the-art infrastructure, intellectual capital and provide best-in-class learning experience with a freedom to innovate and invent.

To foster values and ethics so as to develop students and learners into responsible citizens of the Nation and the world.

**MEENAKSHI ACADEMY OF HIGHER EDUCATION AND RESEARCH
BACHELOR OF ALLIED HEALTH SCIENCES
B.Sc AHS(Radiology and imaging Technology)**

**REGULATION-2014
VISION AND MISSION OF FACULTY OF ALLIED HEALTH SCIENCES**

VISION

To be a world-class institution, transforming society through value-based diverse programs and healthcare advancements, leading to the all-around development of human resources, knowledge, innovation, entrepreneurship, and research.

Mission

- To prepare the young professionals who are committed in health care to excellence and innovation in health care.
- To develop and transmit knowledge of diverse aspects of health, health-care delivery and health research.
- To prepare the young emerging professionals who understand health from biological, behavioral, and population perspectives.
- To prepare the young emerging professionals who are committed in health care to excellence and innovation in health care.



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MEENAKSHI ACADEMY OF HIGHER EDUCATION AND RESEARCH
FACULTY OF ALLIED HEALTH SCIENCES
PROGRAMME OUTCOME
RADIOLOGY AND IMAGING TECHNOLOGY

PO1: Academic Education

Gain proficiency in fundamentals of radiology and imaging technology improve our understanding of factors imparting allied health sciences

PO2 : Knowledge

Acquire comprehensive basic knowledge of coordinated functions, anatomy of heart and patho physiology of diseases and apply them in Cases

PO3: Design and Development of Solutions

Improve knowledge to design solutions for complex problems in the associated fields and design digital imaging technology products or processes that meet the specified needs with appropriate consideration for specific diseases with specific considerations of patient .

PO4: Investigation

Analyse complex problems and investigate to develop solutions by using radiology and imaging technology based knowledge and research methods including digital imaging technology, analysis and interpretation of data, and use of diagnostic tools in effective development of clinical solutions

PO5: Communication

Improve appropriate language and interpersonal skills in communication of clinical outcomes and outputs, develop visual and graphical methods to communicate results effectively

PO6: Role in Society

Obtain knowledge in reasoning techniques to assess societal, health, safety, legal and cultural issues associated with use of radiology and imaging technology of allied health sciences and the consequent responsibilities of professionals involved in the use of the same.

PO7: Ethics Acquire knowledge on ethical principles associated with research methods, use of human models, patient information, research and literature data collection and use and commit to ensuring sustainability of resources

PO8: Technology Usage

Understand appropriate diagnostic technology, techniques, modern scientific diagnostic tools to analytically understand, predict and analyze the outcome of use of allied health sciences and develop therapeutic products that improve clinical practices

PO9: Environment and Sustainability

Obtain attitude toward products that are safe to the environment, is economically, environmentally and socially sustainable with a commitment to safeguard the future of life in the planet

PO10: Team Work

Implement the function effectively individually and in a team under multi-skilled, multi-cultural and multi-disciplinary settings

PO11: Project Management

Gain knowledge and understanding the principles and management techniques of radiology and imaging technology and apply these to ones own and teams work and also manage team based projects in real life environments, and leading to technological skills

PO12: Lifelong Learning


Engage in life long practical learning in the context of technological developments in allied health science and the changes that it brings about in the quality of human life

Programme Specific Outcome

PSO1: Students will know mechanisms of working of equipments used to support or assume the function of the Radiological procedures.

PSO2: Students will have skills to prepares and operates the Xray, CT and Ultrasound Equipments

PSO3: Students will know other sophisticated equipment as directed by healthcare physicians



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MEENAKSHI ACADEMY OF HIGHER EDUCATION AND RESEARCH
BACHELOR OF ALLIED HEALTH SCIENCES
B.Sc AHS(Radiology and imaging Technology)
REGULATION-2014

1.REGULATIONS OF THE UNIVERSITY

In exercise of the powers conferred by the Board of management, Meenakshi Academy of Higher Education And Research, Chennai hereby makes the following Regulations:

2.SHORT TITLE

These Regulations shall be called "THE REGULATIONS FOR THE BACHELOR OF SCIENCE IN ALLIED HEALTH SCIENCE DEGREE PROGRAMME OF MEENAKSHI ACADEMY OF HIGHER EDUCATION AND RESEARCH".

3.COMMENCEMENT

They shall come into force from the academic year 2014-15 onwards. The regulations and the syllabus are subject to modification by the standing academic board from time to time.

4.TITLE OF THE PROGRAMME

It shall be called Bachelor of Science in Allied Health Science

5.ELIGIBILITY FOR ADMISSION

Candidates should have passed the higher secondary school certificate examination (12 years of study) Or Senior school certificate of Indian school certificate examination (12 years of study)
Or Intermediate examination of an Indian university/Board or other recognised examining body with physics, chemistry, Biology and English.

6.CRITERIA FOR SELECTION

Students for B.Sc. Degree Programme (Allied Health Science) shall be admitted based on performance at the competitive Examinations held by this University.

7.AGE LIMIT FOR ADMISSION

Candidate should have completed the age of 17 years at the time of admission or would complete the age of 17 years on or before 31st December of the year of admission to the first year B.Sc. Degree programme.

8.ELIGIBILITY CERTIFICATE

No candidate shall be admitted to the B.Sc. Degree programme (AHS) unless the candidate has obtained and produced eligibility candidate issued by this university. The candidate has to make an application the university with the original and photo copies of the following documents along with the prescribed fee:

Higher secondary or equivalent examination mark sheet and Transfer certificate

Candidate should obtain eligibility certificate before the last date for admission as notified by the university

9.REGISTRATION

A candidate admitted to the B.Sc. Degree programme (AHS) of this university shall register by remitting the prescribed fees along with the application form for registration duly filled in and forwarded to this university through the head of the institution within the stipulated time.



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10.DURATION OF THE PROGRAMME

The period of certified study for the Programme of Bachelor of Science (Radiology and imaging technology) programme shall extend over a period of 3 academic years.

11.COMMENCEMENT OF THE PROGRAMME

ACADEMIC TERMS

First year B.Sc- 1st August to 31st July
Second Year B.Sc - 1st September to 31st August
Third Year B.Sc - 1st September to 31st August

12.CUT OFF DATES FOR ADMISSION TO EXAMINATIONS

The candidates admitted from 1st August to 30th September of the academic year be registered to take up their first year examination on 1st august of the next year. There will not be any admission after 30th September for the academic year.

13,WORKING DAYS IN AN ACADEMIC YEAR

The first academic year shall consist of not less than 240 working days

14.ATTENDANCE REQUIRED FOR ADMISSION TO EXAMINATION

No candidate shall be permitted to any one of the parts of B.Sc exam unless he/she has attended the programme in the subject for the prescribed and produces the necessary certificates of study and attendance from the institution.

A candidate is required to put in minimum of 80% of attendance in both and practical / clinical separately in each subject before admission examination.

A candidate, who has not completed the programme in any subject and not submitted the programme completion certificate from the head of the department will not be permitted to appear for the particular subject alone. Candidate has got adequate attendance in other subjects he/she permitted to appear for examination in those subjects.

Attendance earned by the student should be displayed on the notice board of the department monthly and a copy of the same sent to the university computerization and parents shall be informed regarding the short attendance of their wards through e-mail (if available) or by post by the institution.

15.SUBMISSION OF LABORATORY RECORD NOTE BOOK

At the time of practical/clinical examination each candidate shall submit to the examiners his/her laboratory note book duly certified by the head of the department as a bonafide record of the work done by the candidate. The practical record shall be evaluated by the concerned Head of the department (Internal Evaluation) and the practical record marks shall be submitted to the university 15 days prior to the commencement of the theory examinations

In respect of failed candidates the marks awarded for records at previous examination will be carried over to the next examinations. If a candidate desires he/she may be permitted to improve his/her performance by submission of fresh records.

16.CONDONATION OF LACK OF ATTENDANCE

Condonation of shortage of attendance up to a maximum of 10% in the prescribed eligible attendance for admission to an examination rests with the discretionary power of the Vice-chancellor. A candidate lacking in attendance shall submit an application in the prescribed form and remit the stipulated fee 15 days prior to the commencement of the theory examination.

The head of the department and head of the institution should satisfy themselves on the reasonableness of the candidate request while forwarding the application with their endorsements to the controller of examination who would obtain the Vice-chancellor's approval for admission to the examinations. No application would be


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reviewed if it is not forwarded through proper channel.

Condonation for lack of attendance shall be taken up for consideration under the following circumstances:
Any illness afflicting the candidate. (The candidate should submit to the head of the institution a medical certificate from registered medical practitioner soon after he/she returns – the institution after treatment.)
Any unforeseen tragedy in the family. (The parent/guardian should give in writing the reason for the ward's absence to the Head of the Institution
Any other leave the Head of the Institution deems reasonable for condonation 50% of marks in internal assessment is compulsory for condonation of lack of attendance.

17.COMMENCEMENT OF EXAMINATIONS

August 1st/February 1st. If the date of commencement falls on Saturdays, Sunday declared public holidays, the examination shall begin on the next working day.

18.REVALUATION OF ANSWER SCRIPTS

There shall be no revaluation of answers papers of failed candidates in any undergraduate examination. However, Re-totaling of failed subjects will be entertained on payment of the prescribed fee.

19.INTERNAL ASSESSMENT

A minimum of four written examinations shall be conducted in each subject during an academic year and the average marks of three best performances shall be taken into consideration for the award of internal assessment of mark

A minimum of three practical examinations shall be conducted in each subject during an academic year and an average of two best performances shall taken into consideration for award of international assessment marks.

A failed candidate in any subject should be provided an opportunity to improve his / her internal Assessment marks by conducting a minimum of two examinations, in theory and practical separately and the average may be considered improvement. If failed candidate do not appear for an improvement in failed subject (s) the internal marks awarded for the previous examination shall be carried over the subsequent appearance (s). The internal assessment marks (both in written and practical's taken together should be submitted to the University endorsed by the head of the Institution 15 days prior to the commencement of the theory examinations.

20.RE-ADMISSION AFTER BREAK OF STUDY

The calculation of the break of study of the candidate for readmission shall be calculated from the date of first discontinuance of the course instead of from the date of admission.

Candidates having break of study shall be considered for readmission provided, they are not subjected to any disciplinary action and no charges pending or contemplated against them.

All readmission of candidates are subjected to the approval of the Vice- Chancellor.

A candidate having a break of study more than 2 years and up to 5 years shall apply for the readmission condonation to the Academic officer of this University. The candidate may be readmitted to the beginning of the academic year of the programme. The candidate has to fulfil the attendance requirements of the University and shall be granted exemption in the subjects he has already passed.

Candidates having a break of study of 5 years and above from the date of discontinuance and more than two spells break will not be considered for readmission.

21.MIGRATION / TRANSFER OF CANDIDATES

Migration / Transfer of candidates from one recognized college to another recognized college of this university or from another University shall be granted as per the recommendation of the University regulations.



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- I) Migration may be considered in exceptional cases or Extreme compassionate ground.
- II) Death of a supporting guardian, illness of the candidate disability, disturbed condition as declared by govt. In the college area.

The combination of attendance shall be granted to a transfer for admission to the examinations of this university or payment of the necessary fee and satisfying the Nursing council of India regulations.

The applicant candidate should have passed first year Examination.

Migration during clinical programme of study shall not be allowed on any ground.

All migrations/transfers are allowed on payment of the prescribed fee.

All migrations/ transfers are subject to the approval of the Vice-chancellor.

22.MARKS QUALIFYING FOR A PASS

A candidate shall be declared to have passed the examination if he/she obtain 50% of all the marks in University Theory examination, 50% of the marks in University Practical examination and 50% aggregate in University Theory, Practical, Oral and Internal Assessment taken together.

23.CLASSIFICATION OF SUCCESSFUL CANDIDATES

A successful candidate who secures 75% and above of the marks in his/ her first appearance in all the subjects within the prescribed period will be declared to have passed in first class with Distinction.

A successful candidate who secures 75% and above of the marks in his/ her first appearance in a subject within the prescribed period will be declared to have passed in first class with Distinction in that particular subject.

A successful candidate who secures 60% and above of the marks in his/ her first appearance in all the subjects within the prescribed period will be declared to have passed in First class.

All other successful candidates shall be declared to have passed in Second class.

A candidate who fails in any subject can carry over the failed subject. However only three attempts are allowed in each subject including the 1st attempt.

A Candidate has to pass in theory and practical examination separately in each of the paper

If a candidate fails either in theory and practical examination has to reappear for both (theory and practical).

The candidate has to successfully complete the programme in 6 years (i.e.) double duration of the programme from the date of joining.

25.BRANCH OF STUDY

Bachelor of Science AHS in:

B.Sc Allied health sciences (Radiology and Imaging Technology)




Scheme of examination IST year

Section A	2 Essays (any 1)	1 x 6 Marks each	6 Marks	25 Marks	
	4 Short Notes (any 3)	3 x 3 Marks each	9 Marks		
	5 Ultra short notes	5 x 2 Marks each	10 Marks		
Section B	2 Essays (any 1)	1 x 6 Marks each	6 Marks	25 Marks	
	4 Short Notes (any 3)	3 x 3 Marks each	9 Marks		
	5 Ultra short notes	5 x 2 Marks each	10 Marks		
	Theory Total			50	Marks
	Practical			50	Marks
	Internal Assessment			30	Marks
	Viva - Voice			20	Marks
			Grand Total	150	Marks

Scheme of examination IInd & IIIrd year

Section A	2 Essays (any 1)	1 x 15 Marks each	15 Marks	50 Marks	
	6 Short Notes (any 5)	5 x 5 Marks each	25 Marks		
	5 Ultra short notes	5 x 2 Marks each	10 Marks		
Section B	2 Essays (any 1)	1 x 15 Marks each	15 Marks	50 Marks	
	6 Short Notes (any 5)	5 x 5 Marks each	25 Marks		
	5 Ultra short notes	5 x 2 Marks each	10 Marks		
	Theory Total			100	Marks
	Practical			50	Marks
	Internal Assessment			30	Marks
	Viva - Voice			20	Marks
			Grand Total	200	Marks



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I YEAR B.Sc AHS RADIOLOGY AND IMAGING TECHNOLOGY(PROG.CODE-707)

PROGRAMME STRUCTURE

Course Code	Course Name	Lecture Hrs/Week	Tutorial Hrs/Year	Practical Hrs/Week	Internal Assessment (Ia)	Internal Examination	External Assessment (Ea) University Examination				Gr To
							Theory	Viva	Practical	Total	
001	Anatomy	02	-	01	30		50	20	50	120	150
002	Physiology	02	-	01	30		50	20	50	120	150
003	Biochemistry	02	-	01	30		50	20	50	120	150
004	Pathology	02	-	01	30		50	20	50	120	150
007	General Physics	02	-	01	30		50	20	50	120	150
008	Radio diagnosis equipment	02	-	01	30		50	20	50	120	150
009	Principles of Management	01	-	-	30	100	-	-	-	-	130
010	Basics of Computer	01	-	-	30	100	-	-	-	-	130
011	English	01	-	-	30	100	-	-	-	-	130



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II YEAR B.Sc AHS RADIOLOGY AND IMAGING TECHNOLOGY(PROG.CODE-707)

PROGRAMME STRUCTURE

Course code	Subject	Lecture Hrs/Week	Tutorial Hrs/Year	Practical Hrs/Week	Internal assessment	Internal examination	University exam			Total Marks
							Theory	Theory	Practical (50)	
701	Clinical radiography	05	-	-	30	-	100	-	-	13
702	X ray film/ image processing techniques(including dark room techniques)	05	-	-	30	-	100	-	-	13
703	contrast and special radiography procedure	05	-	03	30	-	100	50	30	20


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Subject Code	Subject	Lecture Hrs/Week	Tutorial Hrs/Year	Practical Hrs/Week	Internal assessment	Internal examination	University exam	Total Marks
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III YEAR B.Sc AHS RADIOLOGY AND IMAGING TECHNOLOGY(PROG.CODE-707)


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						Theory	Theory	Practical (50)	Viva (20)	
704	Equipment of modern imaging modalities	05	-	-	30	-	100	50	20	200
705	Modern imaging techniques and recent trends in imaging	05	-	-	30	-	100	50	20	200
706	Quality control radio biology and radiation safety in radio diagnosis Imaging	05	-	03	30	-	100	50	20	200
707	ELECTIVES(select one) 1.Clinical Psychology	05	-	-	30	-	100	-	-	130
708	2.Community Medicine	05	-	-	30	-	100	-	-	130

PAPER I – ANATOMY SYLLABUS

Paper I – Anatomy



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Course Code	Course name	L hrs /wk	T hrs/wk	P hrs/wk	Total hours	IA	Theor y	Viva	Practica l	EA	Total
5001	ANATOMY	02	-	01	03	30	50	20	50	120	150

COURSE DESCRIPTION

The study of anatomy will include identification of all gross anatomical structures. Particular emphasis will be placed on description of bones, joints, muscles, the brain, Cardio-pulmonary and nervous systems, as these are related to the application of physiotherapy in patients.

COURSE OBJECTIVES

The objective of this course is the student will be able to demonstrate knowledge in human anatomy for the study and practice of physiotherapy.

To describe the various components of upper, lower extremity ,head and neck and thorax. In addition, the student will be able to fulfill with 75% accuracy (as measured written and oral internal evaluation) the following objectives of the course.

COURSE CONTENT:

Introduction to Anatomy

Basic Anatomical Terminology

Osteology -

Upper Limb - Clavicle, Scapula, Humerus, Radius, Ulna

Lower Limb - Hip Bone, Femur, Tibia, Fibula

Vertebral Column - Cervical, Thoracic, Lumbar & Sacral Vertebrae

Thorax - Thoracic Cage, Sternum, Ribs, Intercostal Space.

Respiratory System - Parts, Trachea, Bronchial Tree, Lungs, Pleura

Cardio Vascular System -

a) Heart - Surface anatomy, Chambers, Valves, Blood supply of the Heart Pericardium. Major Vessels of heart.

Vessels of Upper limb

Subclavian Artery - Parts, Branches

Axillary Artery - Parts, Branches

Brachial Artery, Radial artery, Ulnar artery

Basilic vein, Cephalic vein, Median Cubital vein

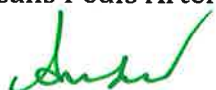
Cubital Fossa

Vessels of Lower limb

Femoral artery,

Popliteal artery

Dorsalis Pedis Artery,



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Saphenous veins, femoral vein
Muscular System Muscles of Thorax.
Muscles of upper limb (Arm & Forearm)
Muscles of Lower limb (Thigh & Leg)
Excretory System
Kidney, Ureter, Urinary Bladder, Structure of Nephron
Digestive System
Parts, Stomach, Liver, Pancreas, Situation, Functions
Endocrine System
Pituitary gland, Thyroid gland, Adrenal gland situation, functions
Reproductive System
Male Reproductive system – Parts, Situation, Functions Female Reproductive system 0 Parts,
Situation, Functions
Central Nervous System Outline of Brain and Spinal cord
Histology
Basic tissues Brief Epithelium Connective tissue Salivary glands Bone
Cartilage Muscle

B. Practicals :

Osteology Bones :
Side Identification, Prominent features, Muscle attachment
Organs – Heart, Lungs, Liver, Spleen, Stomach, Kidney.
Histology
Epithelium – Simple squamous epithelium Simple cuboidal epithelium
Simple columnar epithelium Transitional epithelium Bone
Cartilage
Hyaline cartilage Elastic cartilage White fibro cartilage Salivary glands
Serosal salivary gland Mucous salivary gland Mixed salivary gland Muscles
Skeletal Muscle Smooth Muscle Cardiac Muscle
Practical record compulsory for Osteology & Histology Total Hours : 80
Theory : 60
Practical : 20

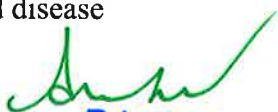
Prescribed Text Book

Manipal Manual of Anatomy for Allied Health Science programme Author
: Sampath Madhyastha

Edition : Third
Edition Publishers : CBS

COURSE OUTCOME

- CO1: Gain knowledge about various organs of the human body and their functions
- CO2: Acquire knowledge in structural and functional relationship of Multi organ system
- CO3: Proficiency on the investigation in the overall functions of each system
- CO4: Understand the competency of various skeletal muscles and identify various bones and their processes in detail based on their presence in the body
- CO5: Recall and reason out vital profiles that distinguishes altered functions of organ in human health and disease


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CO	PO												PSO1	PSO2	PSO3
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			
CO1	3	1	3	3	3	3	2	2	3	3	3	2	2	3	3
CO2	3	-	2	3	-	2	3	3	2	-	2	2	2	3	2
CO3	-	3	3	3	2	3	-	3	3	3	-	-	3	2	-
CO4	3	3	2	-	3	-	2	2	3	3	2	3	2	-	2
CO5	2	2	-	3	3	3	3	2	3	2	2	3	3	3	3
AVE	2.2	1.8	2	2.4	2.2	2.2	2	2.4	2.8	2.2	1.8	2	2.4	2.2	2



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PAPER II – PHYSIOLOGY

Course Code	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Total hours	IA	Theory	Viva	Practical	EA	Total
5002	Physiology	02	-	01	03	30	50	20	50	120	150

COURSE DESCRIPTION

This course which runs concurrently with the anatomy course helps the student to understand the basis of normal human physiology with special emphasis on the functioning of the cardiovascular, musculoskeletal and nervous system.

COURSE OBJECTIVES

To demonstrate an understanding of elementary human physiology.

To describe the physiological functions of each system of human physiology

The student will be able to fulfill with 75% accuracy (as measured by written and oral internal evaluation) the following objectives of the course.

COURSE CONTENT

THEORY:-

The cell - cell structure and functions of the various organelles, endocytosis, exocytosis and homeostasis, Acid base balance and disturbance of acid base imbalance.

Blood - composition of blood, functions of blood, Erythropoiesis, plasma protein, pathological and physiological variations of RBC structure, function and metabolism of hemoglobin, erythrocyte sedimentation rate, WBC, platelets, coagulation, coagulants, bleeding disorders, blood grouping.

Cardio vascular system- physiological anatomy of heart, functions of heart, conducting system of heart, cardiac cycle, cardiac output, heart sounds, ECG, Arterial blood pressure and its regulations, Applied physiology like hypertension, cardiac murmur.

Respiratory system - physiological anatomy of respiratory tract, non respiratory functions of respiratory system, Mechanism of respiration, lung volumes and capabilities, Artificial ventilation and cpr, regulation of respiration, respiratory movements and transport of respiratory gases or exchange of respiratory gases.

Excretory system - physiological anatomy of excretory system, non excretory functions of excretory system, urine formation, micturition reflex, renal disorders, renal dialysis.

Reproductive system - physiological anatomy of male and female reproductive system, process of spermatogenesis and oogenesis, menstruation, hormones of reproductive system.

Central nervous system - Functions of CSF, Significance of CSF analysis, blood brain barrier, transport of CSF.

Endocrine system - Functions of pituitary, thyroid, parathyroid, adrenal and pancreatic hormones.

Digestive system - physiological anatomy of GIT, digestion in the mouth, stomach and intestine, Absorption of food, role of bile in digestion.

Practical's:



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Compound microscope
 Determination of blood group
 Determination of bleeding time
 Determination of clotting time
 Estimation of hemoglobin-sahlis method
 Measurement of human blood pressure
 Determination of ESR- Westergren's method
 Determination of PCV
 Effect of posture on vital capacity
 ECG and its clinical importance
 Functions of saliva, gastric juice and pancreatic juice
 Dialysis (theory only)

COURSE OUTCOME

- CO1: Recognize functions of various structures in the body
- CO2: Understand the physiological functions of major organs and systems
- CO3: Acquire knowledge on normal physiological functions of living organisms and their parts
- CO4: Gain knowledge on the investigation in the physiological functions of each system
- CO5: Recognise disciplines of various structures in microscopic and macroscopic level

CO	PO												PSO1	PSO2	PSO3
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			
CO1	3	1	3	3	3	3	2	2	3	3	3	2	2	3	3
CO2	3	-	2	3	-	2	3	3	2	-	2	2	2	3	2
CO3	-	3	3	3	2	3	-	3	3	3	-	-	3	2	-
CO4	3	3	2	-	3	-	2	2	3	3	2	3	2	-	2
CO5	2	2	-	3	3	3	3	2	3	2	2	3	3	3	3
AVE	2.2	1.8	2	2.4	2.2	2.2	2	2.4	2.8	2.2	1.8	2	2.4	2.2	2



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III-BIOCHEMISTRY

CourseCode	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Totalhours	IA	Theory	Viva	Practical	EA	Total
5003	Biochemistry	02	-	01	03	30	50	20	50	120	150

COURSE DESCRIPTION:

The main goal of the under- graduate education in Biochemistry is to enable Paramedical student understand, envisage and explain life processes as molecular events and apply his basic knowledge and skills.

COURSE OBJECTIVES:

1. Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data; the ability to suggest experiments to support theoretical concepts and clinical diagnosis.
2. At the end of the course, the student should be able to make use of conventional techniques / instruments to perform biochemical analysis relevant to clinical screening and diagnosis
3. Analyze and interpret investigative data
4. Demonstrate the skills of solving clinical problems and decision making.

COURSE CONTENT

- I. Biomolecules and the cell: Major Complex Biomolecules of cells. Cell and Cell organelles. Prokaryotic and eukaryotic cell.
- II. Carbohydrates: Chemical structure. Function. Classification. Monosaccharides. Disaccharides, Polysaccharides. Homopolysaccharides, Heteropolysaccharides, Glycoproteins, Diabetes mellitus.
- III. Proteins: Amino acids, Classification. Structure. Properties. Structure of proteins, Determination of protein structure, Properties of proteins, Denaturation. Classification of proteins Antigen, Antibody. Types, Plasma proteins, Blood Clotting.

- IV. Lipids: Chemical structure, Functions. Classification, Fatty acids, Triglycerides, Phospholipids, Glycoproteins, Lipoproteins, Steroids, Amphipathic lipids, Bile Salts.
- V. Nucleic acids: Purines and pyrimidines. Structure of DNA. Watson and Crick model of DNA. Structure of RNA. Types of RNA, Gout.
- VI. Enzymes: Definition, Nomenclature, Classification. Factors affecting enzyme activity, Active site. Coenzyme. Enzyme inhibition. Mechanism of enzyme action. Units of enzyme. Isoenzyme. Enzyme pattern in diseases.
- VII. Vitamins & Minerals: Fat soluble vitamins [A, D, E, K] Water soluble vitamins---B--
- complex & vitamin C. Principal Elements [Calcium, Phosphorous, Magnesium, Sodium, Potassium, Chloride and Sulphur]. Trace elements, Calorific value of foods. Basal metabolic rate [BMR]. Respiratory quotient [RQ] Specific dynamic action [SDA].
Balanced Diet, Nitrogen Balance, Marasmus kwashiorkor, Dietary Fiber.
- VIII. Hormones: Classification, Mechanism of action. Hypothalamic hormones. Pituitary. Anterior, Posterior, Thyroid, Adrenal Cortex, Adrenal medulla, Gonadal hormones, Menstrual cycle, GI hormones.
- IX. Acids and bases: Definition, pH, Henderson Hassel Balch equation, Buffers. Indicators. Normality. Molarity. Molality
- X. BILE PIGMENTS JAUNDICE

COURSE OUTCOME

- CO1: Gain knowledge in determining various biochemical reactions
CO2: Understand the various metabolic activities and biological process
CO3: Recognize enzymatic activities required for metabolism of various biomolecules.
CO4: Proficiency in concepts of chemical reaction and reaction rate in biological systems
CO5: Acquire knowledge on the geometry and conformations of biomolecules

	PO													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	3	2	3	3	2	3	2	3	2	3	3
CO2	2	1	-	3	-	2	3	2	2	3	2	2	3	2
CO3	-	3	3	-	3	3	2	2	3	-	3	2	-	3
CO4	3	3	2	3	3	3	-	3	-	3	2	-	3	3
CO5	3	3	3	3	2	3	2	2	3	3	2	3	2	3
AVE	2	2.4	2	2.4	2	2.8	2	2.2	2.2	2.2	2.4	1.8	2.2	2.8



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PAPER IV- PATHOLOGY

CourseCode	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Totalhours	IA	Theory	Viva	Practical	EA	Tot
5004	PATHOLOGY	02	-	01	03	30	50	20	50	120	150

COURSE DESCRIPTION:

The Goal of teaching pathology is to provide undergraduate students comprehensive knowledge of the causes and mechanisms of disease, in order to enable them to achieve complete understanding of the natural history and clinical manifestations of the disease.

COURSE OBJECTIVES:

1. At the end of one and half years the student shall be able to describes the rationale and principles of technical procedures of diagnostic laboratory tests.
2. Interpret diagnostic laboratory tests and correlate with clinical and morphological features of Diseases.
3. Perform simple bedside tests on blood, urine and other biological fluid samples

COURSE CONTENT:

CELL INJURY – Causes, Mechanism and types of Cell injury; Necrosis; Apoptosis; gangrene; Pathologic calcification; fatty Amyloidosis.

INFLAMMATION – Acute inflammation- cellular and vascular events; chemical mediators of inflammation; Chronic inflammation; Systemic effects of inflammation; granulomatous inflammation.

WOUND HEALING– Terms repair and regeneration; primary wound healing; secondary wound healing; factors affecting wound healing; complications. **CIRCULATORY DISTURBANCE**–

Thrombosis; embolism; shock; edema. **INFECTIONS-TB:** Leprosy; syphilis; HIV; typhoid; malaria opportunistic infections.

GENETIC DISORDER- Karyotyping; Down syndrome; Klinefelter's syndrome; Turner' syndrome.

CVS DISEASES– Infective endocarditic; rheumatic heart disesease; aneurysm; Atherosclerosis; angina pectoris; myocardial infarction; congenital heart disease- TOF, ASD, VSD, PDA; coarctation of aorta.

RESPIRATORY DISEASES– Asthma; COPD; ARDS; pneumonia; lung abscess;

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lung cancer; pneumoconiosis.

RENAL DISEASES– Glomerulonephritis; nephrotic syndrome;
Urinary tract infection; renal stone; renal failure.

CELLULAR ADAPTATION– Atrophy, hypertrophy, hyperplasia;
metaplasia. **NEOPLASIA**-definition; difference between benign and
malignant; causes of cancer; metastasis.

HYPERSENSITIVITY REACTIONS– type I, II,
III, IV

REFERENCES: Harsh Mohan for dental student.

COURSE OUTCOME:

CO1: Gain knowledge in the patho physiological changes in a human system

CO2: Analyse and investigate the changes in the human system that can be tagged for
acquiring information about normal and abnormal condition.

CO3: Acquire and articulate knowledge and science relevant to pathological
processes.

CO4: Establish competency in analysis of disease conditions and their causes.

CO5: Recognize the pathological conditions of major organs and structure

CO	PO												PSO1	PSO2	PSO3
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			
CO1	3	1	3	3	3	3	2	2	3	3	3	2	2	3	3
CO2	3	-	2	3	-	2	3	3	2	-	2	2	2	3	2
CO3	-	3	3	3	2	3	-	3	3	3	-	-	3	2	-
CO4	3	3	2	-	3	-	2	2	3	3	2	3	2	-	2
CO5	2	2	-	3	3	3	3	2	3	2	2	3	3	3	3
AVE	2.2	1.8	2	2.4	2.2	2.2	2	2.4	2.8	2.2	1.8	2	2.4	2.2	2

Paper-V General Physics, Radiation Physics & Physics of Diagnostic Radiology

Course Code	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Total hours	IA	Theory	Viva	Practical	EA	Total
5007	General Physics, Radiation Physics & Physics of Diagnostic Radiology	02	-	01	03	30	50	20	50	120	150

1. Basic concepts: 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.

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.

3. Radioactivity: Natural and artificial radioactivity-alpha decay-beta decay and spectra —gamma emission-positron decay electron capture and internal conversion-Exponential decay-Half life- Unit of activity-specific activity. Nuclear Fission-Nuclear reactor. Radiation sources-Natural and artificial-production of radio isotopes- reactor produced isotopes-Fission products-Gamma ray source for Medical uses.

4. 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.

5. Physics of Diagnostic Radiology : 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.

X-Ray generators and circuits-Filament current and voltage, X-Ray circuits -primary circuit-auto transformer-switch and timers- principle of automatic exposure control and practical operation - filament circuit -high voltage circuits - half wave & full wave rectification –three phase circuits. Types of generators, 3 phase, 6 and 12 pulse circuits- falling load generators-capacitors discharge and grid control systems.

X-ray tables - floating top table & variable height table.

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 diaphragm -Effects of scatter radiation on radiograph image quality, patient dose and occupational exposure.

X-Ray Cassettes & intensifying screens: Fluorescence — constituents of intensifying screens — types of screens-intensification factors-speed of screen-screen unsharpness. Cassette-construction- types of cassettes- use of fluorescent screen in radiology, effect of screen in reduction of patient dose.

Practical

Practical involving not less than 20 numbers must be prescribed to the students. The title and nature of practical may be framed by the respective institution conducting the course. Study with charts, models & power point presentations Atomic structure, X-ray tubes, X-ray circuits involving students to present and discuss.

Topics:-

1. Congruence of Radiation and Optical field and beam.
2. Determination of focal spot size of diagnostic X-ray tube.
3. K.V. and Exposure time testing.
4. Linearity testing of the Timer.
5. Consistency of M.A. loading.
6. Consistency of Radiation Output.
7. Evaluation of Total filtration of the tube.
8. Film screen contact testing.
9. Table top Exposure rate measurement in fluoroscopy.
10. Radiation protection survey, in and around of diagnostic installations.



Reference Books

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

COURSE OUTCOME

CO1: Obtain facts and fundamental concepts of all techniques related to radiology physics

CO2: Proficiency in radiological basics including all related instruments

CO3: Acquire the information related to dosages and safety measures.

CO4: Effectively recognize various instruments used its uses in clinical practice

CO5: Summarize the do's and don't's of careful handling of instruments

CO	PO												PSO1	PSO2	PSO3
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			
CO1	2	2	2	3	2	3	3	2	3	2	3	2	3	3	3
CO2	2	1	-	3	-	2	3	2	2	3	2	2	3	2	2
CO3	-	3	3	-	3	3	2	2	3	-	3	2	-	3	3
CO4	3	3	2	3	3	3	-	3	-	3	2	-	3	3	3
CO5	3	3	3	3	2	3	2	2	3	3	2	3	2	3	3
AVE	2	2.4	2	2.4	2	2.8	2	2.2	2.2	2.2	2.4	1.8	2.2	2.8	2.8

Paper-VI Radio Diagnosis Equipments, Maintenance and Quality Control

Course Code	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Total hours	IA	Theory	Viva	Practical	EA	Total
5008	Radio Diagnosis Equipments, Maintenance and Quality Control	02	-	01	03	30	50	20	50	120	150

1. X-ray machines - X-Ray tube: historical aspects - early

X-Ray tubes (coolidge tubes) -construction of X-Ray tubes, requirements for X-Ray production (electron source, target and anode material), anode angulation and rotating tubes- tube voltage, current - space charge -tube envelop and housing - cathode assembly, X-Ray production efficiency, advances in X-Ray tubes, Common factors affecting thermionic emission -specialized types- grid controlled and high speed tubes. Inherent filtration, radiation leakage and scattered radiation. Heat dissipation methods- Interlocking and X-Ray tube overload protection -tube rating, heat units -operating conditions, maintenance and Q.A procedures.

2. Portable/Mobile X-ray units- Equipment for mobile radiography-principle- uses- mobile image intensifiers- Capacitor discharge unit- advantages and limitations -positioning differences- skill in using mobile units — radiation protection.- mobile units types- differences- cordless mobiles-selection of equipment.

3. Fluoroscopy: Fluoroscopic equipment-Direct fluoroscopy

The serial changer (spot film device) - Fluoroscopic screen - fluoroscopic image -factors affecting the Fluoroscopic image. Image intensifier tubes - principle construction and function regarding intensified image- cine flurography-mode of operation - Types of day light film handling system- optical coupling and methods of viewing- Automatic brightness control- tilting tables - over and under couch tubes-safety features. The television process - television camera tube- the Cathode ray tube - Television image - CCTV. Quality assurance tests for fluoroscopic equipment

4.Computed Radiography (C.R) -equipment parts - advances- principle of imaging - applications - advantages & disadvantages.

5.Digital Radiography— principle - photostimulable phosphors- image acquisition-digital spot imaging - equipment parts —advances-imaging — advantages & disadvantages. Picture characteristics - archiving possibilities-transfer system and designs- Image recording devices-laser imager and multiformatter-Future developments.

6. Mammogra phy - ba sic principle, equipment & image acquisition-conventional & digital mammostudies Mammotomogram.

7. Dental Radiography — Equipment Basics —types of

equipments- Intra oral radiography unit-orthopantomograph unit -imaging techniques- Dental films-film types and processing.Tomography: Theory of tomography — multi section radiography- Tomography equipment-Basic requirements and controls, attachments. Computed tomography — Scanning principle
Reconstruction of image — storing the image —viewing the

8. image — evaluation of the image. Types of movements and applications-Effect on image of variation in focus object distance- Object film distance, exposure angle, and tube movement pattern.

9. Computed Tomography- Basic physics — Tomography principle - detectors technology-digital fundamentals- Basic data acquisition concepts -Scanning principle - basics of plain studies- Image reconstruction- artifacts- contrast studies,-special procedures
image quality-storing the image — viewing the image — evaluation of the image- Equipment for computed tomography — Table, scanning ,gantry X-Ray generator — CT control console. Scanner types -technologic considerations of sequential /spiral volume zoom - computer hard ware of software— CT computer and image processing system- Options and accessories for CT systems.-Tools for use in CT guided Interventional procedures-Dosimetry- Future developments.

10.Angiography Equipments- Basic physics and principle of image acquisition-conventional angio- DSA-Cardiac Cath lab. Equipments- advantages-limitations — Dosimetry — Maintenance.

Practicals

Demonstration of basic procedures with all radiographic equipment

Reference Books

1. X-Ray Equipment Maintenance and Repairs Work book for Radiographers anRadiological Technologists Produced by the WHO Dept. of Essential Health Technology Series. Ian R. Mc Clelland, Publisher- WHO, 2

2. Quality Assurance Workbook for Radiographers & Radiologic Technologists, Peter J. Lloyd, Nonserial Publication, WHO

Course Outcome

CO1: Explain first aid techniques for various emergency conditions

CO2: Demonstrate triage during an emergency outcome.

CO3: Differentiate circuits of all instruments

CO4: Point out the accessories required for each instrument

CO5: Provide better support during a lifesaving condition with knowledge on life support and resuscitation



CO	PO												PSO1	PSO2	PSO3
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			
CO1	2	2	3	3	2	3	3	2	3	2	3	2	-	3	3
CO2	-	1	3	3	2	3	3	3	2	-	2	2	3	3	3
CO3	2	3	2	-	-	3	3	2	-	3	2	-	3	2	3
CO4	3	3	-	3	2	2	3	3	3	3	-	3	2	3	2
CO5	2	3	2	3	3	3	2	2	3	3	2	3	2	3	-
AVE	1.8	2.4	2	2.4	1.8	2.8	2.8	2.4	2.2	2.2	1.8	2	2	2.8	2.2


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**PAPER VII- PRINCIPLES OF
MANAGEMENT**

Course Code	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Total hours	IA	Theory	Viva	Practical	EA	Total
5009	PRINCIPLES OF MANAGEMENT	01	-	-	01	30	100	-	-	-	130

COURSE DESCRIPTION

This course is designed to enable students to acquire in-depth understanding of management of hospital services, management of services and educational programmes.

COURSE OBJECTIVES

1. Understand the principles and functions of management
2. Understand the elements and process of management
3. Appreciate the management of nursing services in the hospital and community.

COURSE CONTENT:

A)PRINCIPLES OF MANAGEMENT

Development of management :- Definition of management contribution of F.W Taylor ,Henry Fayol and others

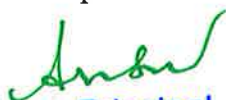
Functions of management : planning = organizing direct controlling Planning :- types of planning short – term and long term plans cooperate or strategic planning planning premises policies characteristics and source

principles of policy making strategies as different from policies procedure and methods limitations of planning

organizing:- Importance of organization hierarchy scalar chain Organization relationship line and staff relationship Functional relationship committee organization management committees department

Motivation:- Motivation theories Mc Gregors’s theory X andY Maslows’s and Herzberg’s theory porter and Lawler model of complex view of motivation Other theories Diagnostic signs of motivational

problems Motivational techniques Communication:- types of communication barrier of effective communication techniques for improved communication



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Directing:- Principles relating to direction process principles and theories of leadership leadership styles Delegation of authority
Controlling:- span of control factor limiting effective span of control
Super management, General managers, Middle managers and supervisors planning and corrective measures strategic control points
budgetary control types of budget
Co-ordination :- Co-ordination and co-operation Principles of co-ordination Techniques of co-ordination Organization charts and records Standard procedure instruction

B. PERSONNEL MANAGEMENT

- I. Objective of personnel management role of personnel manager in personnel manager in organization staffing and work distribution techniques job analysis description recruitment and selection process orientation and training coaching and counseling disciplining complaints and grievance termination of employees performance appraisal health and safety employees
- II. Consumer protection Act as applicable to health care services

FINANCIAL MANAGEMENT

Definition of financial management profit maximization set maximization short term financing – intermedium financing long term financing leasing as a source of finance C and security management – inventory management dividend policy valuation of shares financial management in a hospital third party payment on behalf of patients
Insurance:- health scheme and policy

COURSE OUTCOME:

- CO1: Obtain knowledge on the functioning of hospital
CO2: Proficiency in different areas of management
CO3: Gain knowledge in the latest concepts of management.
CO4: Acquire knowledge on the various clinical and non-clinical services .
CO5: Identify and work on ethical and legal aspects of hospital management.

CO	PO												PSO1	PSO2	PSO3
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			
CO1	2	2	3	3	2	3	3	2	3	2	3	2	-	3	3
CO2	-	1	3	3	2	3	3	3	2	-	2	2	3	3	3
CO3	2	3	2	-	-	3	3	2	-	3	2	-	3	2	3
CO4	3	3	-	3	2	2	3	3	3	3	-	3	2	3	2
CO5	2	3	2	3	3	3	2	2	3	3	2	3	2	3	-
AVE	1.8	2.4	2	2.4	1.8	2.8	2.8	2.4	2.2	2.2	1.8	2	2	2.8	2.2



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PAPER VIII- BASICS OF COMPUTER

Course Code	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Total hours	IA	Theory	Viva	Practical	EA	Total
5010	BASICS OF COMPUTER	01	-	-	01	30	100	-	-	-	130

COURSE DESCRIPTION

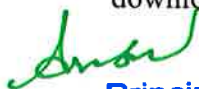
This course is designed for students to development basic understanding of uses of computer and its applications.

COURSE OBJECTIVES

1. Identify & define various concepts used in computer.
2. Identify & describe application of computer in nursing.
- 3 Describe & use the DOS & Windows
4. Describe & demonstrate skill in the use of MS-office.

COURSE CONTENT

- I. Introduction to computer I/O Device memories – RAM & different kinds of ROM- kilobytes, MB, GB, their conversions computer- medium, micro, mini computers Different corn languages number system binary & decimal conversions Different operating systems- MS- DOS Basics command- MD, MS, DIR, T and COPY CON commands networking – LAN ,WAN,MAN(basic ideas)
- II. Typing and texting MS-WORD – manipulating text formatting the using different fonts, font sizes , bold, italic bullets and numb picture ,file insertion aligning the text and justify choosing p size, adjusting margins ,header and footer , inserting page no's document printing a file with options using spell check and grammar find and replace mail merge inserting tables in a document. Creating table MX EXCEL- Cell editing using formulas functions manipulating data with excel using sort function to numbers and alphabets. Drawing graphs and charts using data in Auto formatting inserting data from other work sheets Preparing new slides using MS- POWERPOINT Inserting slides – transition and animation using templates Different text and font slides with sounds inserting clip arts, pictures, tables gr presentations wizards
Introduction to internet using search engine google search explorer the net using internet explorer and net scape navigator, uploading, downloading of files and images email id creation, sending messages,



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attaching files in email, introduction to “c” language, different variables, declaration usage writing small programme using function sub-functions
PRACTICAL

Typing a text and aligning the text with different formats using MS-WORD Inserting a table with proper alignment using formulas using MS- WORD Creating a mail merge document using MS- WORD to prepare greeting for 10 friends

Preparing a slide show with transition , animation and sound effect using MS- POWERPOINT

Customizing the slide show and inserting pictures and tables in the slides using MS- PWERPIONT

Creating worksheet using MS- EXCEL with data and use of functions. Using MS- EXCEL prepare a worksheet with text,date,time and data Preparing a chart and pie diagram using MS- EXCEL

Using internet for searching, uploading files,downloading files,creating e-mail Using C language writing programme using function

COURSE OUTCOME:

CO1: Gain knowledge to understand the application of computers in biomedical field

CO2: Communicate, investigate and design solutions and present effectively

CO3: Organize the team research for reliable quick output

CO4: Acquire knowledge on common computer applications in health care sector

CO5: Analyse overall computer based technical skills in hospitals

CO	PO												PSO1	PSO2	PSO3
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			
CO1	2	2	3	3	2	3	3	2	3	2	3	2	-	3	3
CO2	-	1	3	3	2	3	3	3	2	-	2	2	3	3	3
CO3	2	3	2	-	-	3	3	2	-	3	2	-	3	2	2
CO4	3	3	-	3	2	2	3	3	3	3	-	3	2	2	2
CO5	2	3	2	3	3	3	2	2	3	3	2	3	2	3	-
AVE	1.8	2.4	2	2.4	1.8	2.8	2.8	2.4	2.2	2.2	1.8	2	2	2.6	2



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PAPER IX –ENGLISH

Course Code	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Total hours	IA	Theory	Viva	Practical	EA	Total
5011	ENGLISH	01	-	-	01	30	100	-	-	-	130

COURSE DESCRIPTION

This course is designed to help the students acquire an understanding of the principles and methods of communication and teaching. It helps to develop skill in communicating effectively, maintaining effective interpersonal and human relations, develop basic skills in guidance and counseling, principles of education, teaching individuals and groups in clinical, community and health educational settings.

COURSE OBJECTIVES

1. Understand the effective communication process using various communication techniques with individuals groups and health team members.
2. Establishes effective interpersonal and human relations with patients, families and health team members.
3. Acquires knowledge on concepts, principles on guidance and counseling and develop basic skills for counseling patients, nursing students and nursing personnel.

COURSE CONTENT

Communication :- Role of communication definition communication classification of communication purpose communication major difficulties in communication barrier communication Characteristics of successful communication “the seven CS” Communication at the workplace and communication “Mind mapping” informal communication

Comprehension passage:-Reading purposeful Understanding what is read Drawing conclusion finding and analysis

Explaining:- How to explain clearly defining and giving reasons Explaining differences Explaining procedure giving directions

Writing business letters:- how to construct correct Formal language Address salutation Body conclusion

Report Writing:-Reporting an accident reporting when happened at a session Reporting what happened at a meeting



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COURSE OUTCOME:

- CO1: Gain knowledge on basics of English Language
- CO2: Proficiency skill in speaking and writing English
- CO3: Expertise in the phonetics of English Language
- CO4: Acquire core skills in grammar and vocabularies
- CO5: Emphasize essential skills required for effective written and oral communication and use nuances of presentation effectively

CO	PO														P
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	3	2	3	3	3	2	2	3	2	3	2	2	3	
CO2	3	3	3	2	2	3	3	3	2	3	2	2	2	3	
CO3	3	2	1	3	3	1	2	2	3	3	3	1	3	3	
CO4	-	3	-	3	1	3	-	1	3	2	-	2	3	-	
CO5	1	3	3	2	1	3	2	2	2	3	2	3	1	3	
AVE	2	2.8	1.8	2.6	2	2.6	1.8	2	2.6	2.6	2	2	2.2	2.4	



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Second Year
Paper - I - Clinical Radiography

Course Code	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Total hours	IA	Theory	Viva	Practical	EA	Total
5701	Clinical Radiography	05	-	03	08	30	-	100	50	170	200

COURSE DESCRIPTION

This course will provide an introduction to concepts in radiation physics radiation instrumentation, radiation safety and film processing so that the students can better understand the operations of radiation detectors and radiographic film processing.

COURSE OBJECTIVES

1. To provide an introduction to concepts in radiation physics, radiation instrumentation, radiation safety.
2. To elaborate on operations of radiation detectors and radiographic film processing Techniques, Preparations, Instructions, Positioning of patient for conventional and digital radiography in the imaging of following-

Conventional Non contrast radiography-

Extremities Radiography — Hand- Finger — MCP- Wrist joint- Forearm -Elbow joint — humerus -shoulder joint. Foot — Toes- Tarsal bones -Ankle joint - Knee joint — patella — tibia-femur Hip joint pelvis -sacroiliac joint.

Spine Radiography -Vertebral column — Atlanta occipital articulation- cervical spine- dorsal spine - lumbar spine — sacrum - vertebral canal- vertebral foramen.

Skull Radiography — general, sella — temporal bone — mastoid — optic foramen — Internal auditory canal — Superior and inferior orbital fissure — base of skull — facial bones — petrous apex — Zygomatic bone, nasal bone, sinuses of skull — mandible — Temporo- mandibular joint — Paranasal sinuses Radiography.

Chest Radiography: Basic views (PA & AP) - inspiratory & expiratory films- special chest views & their significance — larynx- trachea- thoracic inlet -Sternum - Ribs — Heart and great vessels — mediastinum -Diaphragm — double exposure technique.

Abdomen & Pelvic Radiography: All projection — the acute abdomen investigation.

Soft tissue radiography: Preparations, Instructions, Various techniques, positioning of patient for conventional and digital mammography, High and low KV Technique — differential filtration — multiple radiography — technique for steep range radiography — Duplication — arrangement of intensifying screen.



Stereo Radiography: Principle — tube shifting relation of patient correct making and viewing of stereo radiographs — application.

Macro radiography: Principle sizes of focal spot its limitation in its application.

High kv technique: technique & usefulness.

Foreign body localization: Preparation — Anatomical localization various projections — use of skin markers — Tangential projection uses — opaque — foreign bodies.

Dental radiography: types of equipments — techniques- indications-films-dental radiography in Trauma patients.

Practical

Practical involving patients not less than 10 numbers must be prescribed to students. The title and nature of practical may be framed by the respective institution conducting the course.

Reference Books:

1. Clark's Handbook for Radiographers — Charles Sloane, Ken Holmes & Craig Anderson, Hodder Educations, UK

Diagnostic Radiography — A concise practical Manual — Glenda J. Bryan (4th edn), Churchill Livingstone

Course Outcome

CO1: Demonstrate knowledge on ultra sound imaging

CO2: Differentiate different procedures .

CO3: Recognize various images as well as interpret them.

CO4: Compare the various images to understand abnormalities

CO5: Expertise in checking basic vital monitoring for patients

CO	PO														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	2	3	3	3	2	1	3	2	3	2	2	3	3
CO2	3	2	3	3	2	3	3	3	2	2	2	2	2	3	2
CO3	3	3	2	-	3	3	2	2	3	1	3	2	3	2	2
CO4	-	2	3	2	3	-	1	-	2	2	-	2	2	3	1
CO5	2	3	3	2	1	3	2	2	2	3	2	3	3	2	3
AVE	2.2	2.6	2.6	2	2.4	2.4	2	1.8	2.4	2	2	2.2	2.4	2.6	2.2

Paper - II

X-ray Film / Image processing Techniques(including Dark Room Techniques)

Course Code	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Total hours	IA	Theory	Viva	Practical	EA	Total
5702	X-ray Film / Image processing Techniques(including Dark Room Techniques)	05	-	03	08	30	-	100	50	170	200

COURSE DESCRIPTION

This course will provide an introduction to concepts in radiation physics radiation instrumentation, radiation safety and film processing so that the students can better understand the operations of radiation detectors and radiographic film processing.

COURSE OBJECTIVES

2. To provide an introduction to concepts in radiation physics, radiation instrumentation, radiation safety.
3. 2. To elaborate on operations of radiation detectors and radiographic film processing.

1. X-Ray film: X-ray film construction and film characteristics — Composition of single and double coated radiographic films -structure of emulsion- film characteristics; speed, base fog, gamma, latitude - effect of grain size on film response to exposure, interpretation of characteristics curve- exposure to x-rays.

2. Types of Radiographic Films: applications advantages/ limitations of different types Structure, properties of different parts- Film storage - handling -film wrappings- handling of exposed and unexposed films -safe light requirements.

3. Radiographic Image: Meaning of radiographic image contrast, density, resolution, sharpness, magnification and distortion of image, noise and blur. Primary radiological image formation- Image quality

unsharpness- resolution — fog and noise - use of contrast media- density- contrast — brightness-optical density measurements- Image recording devices.

4. Image processing— Film developing principles- acidity, alkalinity, pH, the processing cycle-process of film developing - development -developer solution- constituents of developer. Fixing- fixer solution- composition of fixer —washing — drying replenishment -checking and adjusting replenishment rates - other processing solution — effect of temperature and development time - film processing methods - common errors and faults while processing manual and automatic processing-latent image formation— silver recovery and economics.

5. Film archieving systems- Image recording devices-Laser imager/camera functioning. Multiformatter-Optical Disc. System Film archieving systems - MOD/disc/PACS etc.

6. Automatic processing - Automatic film handling systems - Automated Processors - equipment for Film Processing-functions of various components- film roller transport -transport time -film feed system-Importance and relation to temp, fixed and variable time cycles-Care and maintenance -cleaning routine and methods of cleaning

7. Radiographic illuminators: and viewing conditions, visual acuity and resolution.

8. Dark Room- Site — layout - dark room design- construction- processing area— illumination-safe light compatibility - entrance safe lighting — types- storage- shelving of films-cleaning and maintenance.

Practicals

Practical involving not less than 10 numbers must be prescribed to the students. The title and nature of practical may be framed by the respective institution conducting the course. Study with charts, models & power point presentations involving students to present and discuss.

Reference Books

1. Radiographic latent image processing — W. E. J Mckinney
2. Diagnostic Radiography — A concise practical Manual — Glenda J. Bryan (4th edn), Churchill Livingstone.

Course Outcome

CO1: Obtain facts and fundamental concepts of all techniques related to radiology physics

CO2: Proficiency in radiological basics including all related instruments

CO3: Acquire the information related to dosages and safety measures.

CO4: Effectively recognize various instruments used its uses in clinical practice

CO5: Summarize the do's and don't's of careful handling of instruments

CO	PO												PSO1	PSO2	PSO
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			
CO1	2	1	2	3	2	3	3	2	3	2	3	2	2	3	3
CO2	3	2	2	3	-	3	3	2	2	3	2	2	2	3	2
CO3	-	2	2	3	3	3	2	3	3	3	-	3	3	2	3
CO4	3	3	2	3	2	3	-	2	3	-	2	3	-	3	2
CO5	2	3	-	3	3	3	2	2	3	3	2	3	2	3	3
AVE	2	2.2	1.6	3	2	3	2	2.2	2.8	2.2	1.8	2.6	1.8	2.8	2.6



Paper III
Contrast & Special Radiography procedures

COURSE CODE	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Total hours	IA	Theory	Viva	Practical	EA	Total
5703	Contrast & Special Radiography procedures	05	-	03	08	30	-	100	50	170	200

COURSE DESCRIPTION

This course will cover the fundamental or radiography including radiographic techniques for individual systems, reproduction of radiographs and radiation protection.

COURSE OBJECTIVES

1. To develop understanding of various positioning methods for imaging a structure. To introduce the importance of positioning and procedures involved in Radiology.

Non-contrast Special radiography

1.Paediatric Imaging:

special needs of patient and radiographer- use of dedicated equipment and accessories-modified technical considerations - selection of exposure factors-image quality considerations — radiation protection of the patient - special techniques in children for contrast studies.

2.Geriatric radiography:

Equipment and accessories — exposure factor considerations in special care. Elderly patients profile - difficulties during radiography technical considerations-projections with unconventional special positioning

3.Trauma/Emergency Radiography:

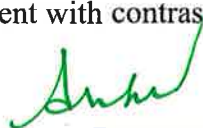
Selection of suitable X-Ray equipment — patient position - radiographic projections and sequence for each patient — modification of routine positioning— radiation protection — patient care.

4.Operation theatre radiography:

O.T procedures-Operative cholangiography — orthopaedic procedures —maintenance of asepsis — preparation of radiographer and equipment/accessories — careful safe use of mobile and fluoroscopic equipment — radiation protection — patient care — rapid availability of radiographic image-cooperation with OT staff- type of studies done -clinical applications - clinical applications- per operative radiographs- peroperative fluoroscopy studies -patient care-radiation protection of all staff.

Contrast radiography:

Radiological contrast media — classification — need for radiological contrast media - methods of administration-dosage- reactions to contrast media- role of radiographer in management of patient with contrast reaction.



For all contrast investigations: patient preparation, positioning, patient care during the study-post procedural patient care-types of contrast media used and dosage-alternative contrast, used-side effects and its identification-treatment of complication during the procedure -pathological conditions- indications and contraindications

- injection procedure —techniques for radiographic projections - radiographic appearances— radiation protection.

1. Sialogram
2. Barium studies- different types — Barium swallow Barium meal study of upper GIT, Barium meal follow through, Barium enema, small bowel enema, distal colography, defaecography.
3. Percutaneous Transhepatic Cholangiogram, ERCP, T-Tube cholangiography, per-operative cholangiography.
4. IVP-rapid sequence-infusion pyelography-high dose urography, Cystogram, Anterior Urethrogram RGU, MCU, RCP
5. Angiography, Diagnostic & therapeutic, venography, Lymphangiogram
6. Arthrography, Discography
7. Myelogram,
8. Hysterosalpingography.
9. Sinography
10. Fistulogram
11. Ductogram.

Practicals:

Practical involving patients not less than 10 numbers must be prescribed to the students. The title and nature of practical may be framed by the respective institution conducting the course.

Reference Books:

Text book of radiology for residents & technicians — 4th edition, Satish K. Bhargava
Radiological patient care —Jensen Chesney.

Atlas of dental and maxillofacial radiological imaging — Brownie

Course Outcome

CO1: Tell basics and principles of radiographic techniques and positioning of the patients.

CO2: Articulate the consequences of specific procedures adopted during radiographic examinations

CO3: Differentiate procedures/indications/contraindications for various radiographic examinations

CO4: Connect the knowledge gained in performing tests when assisting procedures

CO5: Argue the analysis of contrast procedures



THIRD YEAR

Paper I: Equipments of modern Imaging Modalities

COURSE CODE	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Total hours	IA	Theory	Viva	Practical	EA	Total
5704	Equipments of modern Imaging Modalities	05	-	03	08	30	-	100	50	170	200

COURSE DESCRIPTION

Expected to have basic knowledge on anatomy, pathology and basic physics of ultrasound imaging and Equipments of modern imaging Modalities

COURSE OBJECTIVES

- To inculcate knowledge on various ultrasound imaging techniques.
To elaborate on Advanced Ultrasound imaging techniques.

COURSE CONTENTS

- Mammography system:** History - Imaging requirements- Mammography system - construction/types accessories -tube, compression, grids, AEC etc.- nature of X-Ray beam suitable — accessories for immobilization - film processing - image quality - image recording devices -interventional procedures — accessories- biopsy equipment attachments - radiation dose- - mammo tomogram-Sonomammography-future developments.
- Ultrasonography/ Doppler systems:** Basic acoustics principle- Basic physics of sound propagation in different media, production of Ultrasound (piezoelectric effect), ultrasound terminologies — interaction of ultrasound with matter — ultrasound properties propagation in tissue, absorption, scattering, reflection and refraction- acoustic impedance — piezo electric effect — transducer — Pulsar — receiver —beam/sensitivity and gain - generators- A, B and M scanning & echo modes- transducers- techniques of sonography-equipment selection- display methods — ultrasound image formation - data storage and display — image and artifacts — doppler instrumentation — doppler equation — transducer — quality' assurance and performance tests — bio effects and safety considerations. Types of machines —portable systems- acoustic coupling agents-ingredients/preparation.
- CT scan systems:** History- generations of scanners-CT technology -helical/spiral & multi slice C.T- ultra fast scanners-system components - performance parameters - image quality and methods of image reconstruction- radiation dose measurements and technical aspects of Q.A - calibration and image acquisition.
- MRI Scanners:** History - basic physical principle - Physical principles -NMR signals— instrumentation- hard ware-MR system components- magnet system- Magnetic shielding- RF shielding- bio effects of MRI- site selection and safety -reconstruction system - different coils used -NMR signals advantage -imaging methods – pulse imaging sequences - spectroscopy parameters -calibration and image acquisition - reconstructions- 3D images- image contrast

factors affecting image quality artifacts - difference between CT and MRI images- host computer -viewing archiving- hard copy - image formation and storage device.

5. Angiography and Cine Studies /DSA Angiography equipments history –Conventional angiography X-Ray equipment - Equipment construction-principle - DSA system basics - digital techniques -subtraction process-procedures for subtraction - care, choice and installation of the equipment – equipment, pitfalls and complications -pressure injectors- contrast media - accessories- catheters, guide wires-uses of serial imaging devices- cine camera - video-recorder - film processing-radiation protection.

6.Nuclear Medicine Equipments Nuclear Physics - basics in Nuclear Medicine- Nuclear medicine equipments - Gamma Cameras- rectilinear scanners- radioisotope generators-SPECT-CT & PET-CT- introduction-basic physics and principle involved- equipments basic structure— differences- fusion techniques- image formation-storage devices— advantageEi-limitations.

7. Recent Advances in Imaging Systems

Mobile units of Computer Radiography & Digital Radiography system. 3D14D Sonography systems 128 slice & higher slice C.T equipments.

3 Tesla & higher T MRI scanners Image processing & Display systems-Recent advances, concepts and applications in processing of images in digital form using computer based systems. Picture

8. Picture Archiving and Communication Systems (PACS)-newer advancements — updates - systems designs-transfer restrictions

Practical

Practical involving not less than 10 numbers must be prescribed to the students.

The title and nature of practical may be framed by the respective institution conducting the course.

COURSE OUTCOME

CO1: Explain first aid techniques for various emergency conditions

CO2: Demonstrate triage during an emergency outcome.

CO3: Differentiate circuits of all instruments

CO4: Point out the accessories required for each instrument

CO5: Provide better support during a lifesaving condition with knowledge on life support and resuscitation

Reference Books

Step by Step CT; Step by Step MRI and MRI made Easy for beginners

Govind B. Chavhan — Jaypee brothers and Medical Publishers (p) Ltd, New Delhi CT & MRI protocol — Satish K. Bhargava, CBS publishers. Text Book of Radiology for Residents & Technicians — 4th Edition — Satish K. Bhargava CBS publishers & Distributor (p) ltd.

CO	PO												PSO1	PSO2	PSO
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			
CO1	2	1	2	3	2	3	3	2	3	2	3	2	2	3	3
CO2	3	1	2	-	2	1	3	1	2	3	2	2	2	3	2
CO3	2	3	2	3	2	3	-	2	3	-	2	2	2	2	3
CO4	3	3	2	3	2	3	2	3	3	3	-	3	2	2	1
CO5	2	-	2	3	2	2	2	2	2	3	2	3	-	3	3
AVE	2.4	1.6	2	2.4	2	2.4	2	2	2.6	2.2	1.8	2.4	1.6	2.6	2.4



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PAPER-II-
Modern Imaging techniques and recent trends in imaging.

Course Code	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Total hours	IA	Theory	Viva	Practical	EA	Total
5705	Equipments of modern Imaging Modalities	05	-	03	08	30	-	100	50	170	200

COURSE DESCRIPTION

Expected to have basic knowledge on human anatomy, physiology and basic positioning in radiography. Modern Imaging techniques and recent trends in imaging

Course Objectives

1. To inculcate knowledge on Physics and instrumentation of Mammography.
2. To elaborate on various procedures and protocols in Ultrasound imaging.

1. Mammography:

The Mammography as a clinical diagnostic tool- immobilization and identification techniques- positioning techniques for various projections - exposure factors- Conventional & Digital studies- quality and advantage- diagnosis and screening- Characteristics of benign and malignant lesions — patient care — female attendant - interventional procedures - radiation dose- recent advances in mammography techniques - mamotomogram & Sonomammography procedures- advantages & limitations.

2. Ultrasonography/ Doppler studies:

Techniques of sonography-selection- Preparations - instructions and positioning of patient for TAS, TVS, TRUS, neck USG and extremities- patient care and maintenance protocols-clinical applications display methods —quality image reproducible extend -assurance to patients.

3. CT scan studies acquisition/ protocols /techniques:

CT of head and neck — thorax — abdomen — pelvis — mt tsculo skeletal system — spine — FNS. Anatomy — clinical indications and contraindications — patient preparation — technique —contrast media-types, dose, injection technique; timing, sequence - image display — patient care — utilization of available techniques & image processing facilities to guide the clinician-CT anatomy and pathology of different organ systems.

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



5. Angiography and Cine Studies /DSA Conventional / DSA studies- Abdominal, visceral, peripheral, cerebral and cardiac angiography - arterial/venous anatomy, physiology-clinical indications and contraindications -patient preparation-positioning of the patient -patient care-contrast media - types of contrast -dosage - accessories catheters, guide wires- pressure injection-control of radiographic and fluoroscopic equipment - exposure factors for serial programmes-programming-injection protocols- outline on each radiological procedure- radiographer's role-patient management before -during and after the procedure - venography- interventional angiography hepatobiliary, GIT, urology and vascular system- coils/stents etc- indications and contraindications - role of radiographer-radiation safety.

6. Nuclear Scintiscan procedures: SPECT-CT & PET-CT studies, protocols, Basics of common clinical Nuclear Medicine procedures/techniques—comparison with different structural imaging studies-advantages and limitations.

7. Recent Advances in Imaging Dynamic CT & MRI studies Per operative application of various imaging systems including detector probes application in Nuclear Medicine Imaging guidance in therapeutic procedures-IGRT, TACE & TARE etc.

Practical

Practical involving not less than 10 numbers must be prescribed to the students. The title and nature of practical may be framed by the respective institution conducting the course.

Reference Books

Concepts in Medical Radiographic Imaging — Marianne Tortoise

Radiographic Imaging - Derrick

Processing and Quality Control — William

Course Outcome

CO1: acquire skills on instrumentation, physics and handling of the CT equipment.

CO2: Demonstrate competency in handling patients in various CT imaging protocols.

CO3: Provide support in diagnosis based on post processing the CT images.

CO4: Interpret data from CT images.

CO5: Develop knowledge on image interpretation

CO	PO												PSO1	PSO2	PSO3
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			
CO1	2	1	2	3	2	3	3	2	3	2	3	2	2	3	3
CO2	3	1	2	3	2	3	3	2	2	3	2	2	2	3	2
CO3	2	-	2	-	2	3	2	2	3	3	2	-	3	2	3
CO4	3	3	2	3	2	3	-	2	3	3	2	3	2	3	2
CO5	2	3	2	3	2	3	2	2	3	3	2	3	2	3	3
AVE	2.4	1.6	2	2.4	2	3	2	2	2.8	2.8	2.2	2	2.2	2.8	2.6

PAPER-III

Quality Control Radiobiology and Radiation Safety in Radiodiagnosis Imaging

Course Code	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Total hours	IA	Theory	Viva	Practical	EA	Total
5706	Quality Control Radiobiology and Radiation Safety in Radiodiagnosis Imaging	05	-	03	08	30	-	100	50	170	200

COURSE DESCRIPTION

This course will cover the fundamental Quality Control Radiobiology and Radiation Safety in Radiodiagnosis Imaging

COURSE OBJECTIVES

To develop understanding of various quality control Radiation quantities
To introduce the importance of positioning and procedures involved in Radiology

1. Radiation Quantities and Units

Radiation- Radioactivity- Sources of radiation - natural radioactive sources -cosmicrays-terrestrial radiation - - man made radiation sources. Units of radiation - Quality factor - Flux-Fluence-Kerma- Exposure- Absorbed dose- Equivalent Dose- Weighting Factors- Effective Dose - Occupational Exposure Limits - Dose limits to public.

2. Biological Effects of radiation

Ionization, excitation and free radical formation, hydrolysis of water, action of radiation on cell -Chromosomal aberration and its application for the biological dosimetry- Effects of whole body and acute irradiation, dose fractionation, effects of ionizing radiation on each of major organ system including fetus -Somatic effects and hereditary effects- stochastic and deterministic effects-Acute exposure and chronic exposure-LD50 - factors affecting radio-- sensitivity. Biological effects of non-ionizing radiation like ultrasound, lasers, IR, UV and magnetic fields.



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3. Radiation detection and Measurements:

Ionization of gases- Fluorescence and Phosphorescence -Effects on photographic emulsion. Ionization Chambers – proportional counters- G.M counters- scintillation detectors – liquid semiconductor detectors – Gamma ray spectrometer. Measuring systems – free air ionization chamber – thimble ion chamber – condenser chamber – Victorian electrometer – secondary standard dosimeters – dosimeter – chemical dosimeter- thermoluminescent Dosimeter. -Pocket dosimeter- Radiation survey meter- wide range survey meter -zone monitor-contamination monitor-their principle-function and uses. Advantages & disadvantages of various detectors & its appropriateness of different detectors for different type of radiation measurement.

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

5. Q.A in Diagnostic Radiology Quality assurance (Q.A), acceptance testing and quality control tests in Radiology-Meaning of the terms used and aspects of a QA programme, equipment and staff requirements, benefits of QA procedures in an imaging department

–NABH guidelines. Verification of Optical & Radiation field congruence, Beam alignment, Focal spot size, Linearity of tube current mA and Timer, applied potential, HVT and total tube filter, Contact between film and intensifying screen, contrast resolution, Grid alignment, Special techniques like mammography, CT - CT Dose Modulation-Patient dose management.

6. Radiation Hazard evaluation and control

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

7. Regulatory Bodies & regulatory Requirements:

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

8. Role of Radiographer in Planning, QA & Radiation Protection: Role of technologist in radiology department - Personnel and area monitoring., Setting up of a new X-Ray unit, staff requirement, AERB specifications for site planning and mandatory guidelines – Planning of X-ray rooms, dark rooms – Inspection of X-Ray installations - Registration of X-Ray equipment installation- Certification -Evaluation of workload versus radiation factors – Occupational exposure and protection Tools/devices. ICRP, NRPB, NCRP and WHO guidelines for radiation protection, pregnancy and radiation protection.

COURSE OUTCOME

CO1: Learn about various guidelines on biosafety and ethical issues and apply knowledge gained while using biological organisms for experimental studies

CO2: Acquire knowledge about intellectual property rights and exposed to different tools to search and analyze the procedures involved in the protection

CO3: Gain awareness about IPRs to take measure for the protecting their ideas when they devise business strategies to assists in technology upgradation and enhancing competitiveness

CO4: Able to interpret basics of biosafety and bioethics in biomedical research

CO5: Translate the skills to analyze its impact on issues related to practice in biological sciences, research, innovation and the quality of human

Practical

Practical involving not less than 10 numbers must be prescribed to the students. The title and nature of practical may be framed by the respective institution conducting the course as follows-

1. Time, Dose, Shielding, Measurement of HVT & TVT
2. Familiarization of Radiation Survey meters and their functional performance checks
3. Radiological Protection Survey of Diagnostic X-Ray installation
4. Diagnostic Imaging: Quality Assurance — M. M Rehani
5. AERB safety requirements- Atomic Energy Act, Radiation protection rules.

Reference Books:

1. Radiologic science for technologist — 9th edition (2008) Stewart Carlyle Bushong, Mosby Elsevier, UK.
2. Text Book of Radiological Safety — K. Thaylan (2010) Jaypee Brothers and medical Publishers, New Delhi.
3. Quality Control in Diagnostic Imaging J.E.Gray



PO

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	1	3	3	1	3	2	2	3	2	1	2	2	3	3
CO2	3	2	3	3	3	2	3	3	2	2	2	2	2	3	2
CO3	-	3	2	3	2	3	3	3	1	1	3	2	2	3	3
CO4	2	3	-	2	3	-	2	3	-	3	3	3	-	1	1
CO5	2	3	3	1	2	3	2	2	3	3	2	3	3	2	2
AVE	2	2.4	2.2	2.4	2.2	2.2	2.4	2.6	1.8	2.2	2.2	2.4	1.8	2.4	2.2



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**ELECTIVES (SELECT ONE)
COMMUNITY MEDICINE**

Course Code	Course name	L hrs/wk	T hrs/wk	P hrs/wk	Total hours	IA	Theory	Viva	Practical	EA	Total
5707	COMMUNITY MEDICINE	05	-	-	05	30	100	-	-	100	130

COURSE DESCRIPTION

The course deals with population or groups rather than individual patients. It is concerned with identification and assessment of health needs of the people, health problems affecting them and to devise appropriate measures

COURSE OBJECTIVES:

To demonstrate an understanding of the influence of social and environmental factors on the health of the individual and society.

To demonstrate an understanding of the principles of first aid and demonstrate skill in giving first aid treatment in emergencies that may be met in the community and in their practice as therapists.

COURSE CONTENT:

Outline the natural history of diseases and the influence of social, economic and cultural aspects of health and diseases.

Outline the various measures of prevention and methods of intervention especially for diseases with disability.

Outline the national care delivery system and the public health administration system and the central and state level, local trends and resource.

Outline selected national health programmes including current programmes (Eg. SSASarvaSikshaAbhiyan)

Define occupational health and list methods of prevention of occupational diseases and hazards.

Outline the Employees State Insurance scheme and its various benefits.

Describe the social security measures for protection from occupational hazards, accidents, diseases, and the workman's compensation act.

Outline the objectives and strategies of the national Family Welfare Programme

Define community based and institution based rehabilitation. Describe the advantage and disadvantages of institution and community based rehabilitation.

Describe the following communicable diseases with reference to reservoir, mode of transmission, route of entry and levels of prevention. a.

92Poliomyelitis, b. Meningitis, c. Encephalitis, d. Tuberculosis, e. Filariasis, f. Leprosy, g. Tetanus & h. Measles.

Describe the epidemiology of rheumatic heart disease, cancer, Chronic degenerative disease and cerebrovascular accidents.



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Outline the influence of nutritional factors such as protein Energy Malnutrition, Anaemia, Vitamin deficiency and minerals on disability.

List the principles of health education, methods of communication and role of health education in rehabilitation services.

Define the role of community leaders and health professionals in health education.

Outline the role of international health agencies in rehabilitation of the disabled.

Identify and give first aid in burns, fire accidents, road accidents, poisoning, drowning, insect bites and trauma due to a foreign body.

Identify various fractures and practice bandaging and splinting in care of fractures.

Describe the types of wounds, haemorrhages, shock and respiratory emergencies.

COURSE OUTCOME:

CO1 provide comprehensive health care to the people

CO2 deliver primary health care and essential services package

CO3 conduct epidemiological studies on common health problems

CO4 provide health care with appropriate attitudes

CO5 work as a member of health team, co-ordinate with national and international health organizations and national health programmes

CO	PO												PSO1	PSO2
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		
CO1	3	3	2	3	3	-	1	3	3	-	2	2	2	3
CO2	2	2	3	3	3	3	3	3	2	3	3	-	2	3
CO3	3	-	2	2	3	3	2	2	1	1	3	2	3	2
CO4	1	2	3	3	-	3	3	1	3	3	1	3	3	3
CO5	2	3	1	2	3	2	2	3	3	3	2	3	3	2
AVE	2.2	2	2.2	2.6	2.4	2.2	2.2	2.4	2.4	2	2.2	2	2.6	2.6



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CLINICAL PSYCHOLOGY

COURSE CODE	Course name	L	T	P	Total hours	IA	Theory	Viva	Practical	EA	Total
5708	CLINICAL PSYCHOLOGY	05	-	-	05	30	100	-	-	100	130

COURSE DESCRIPTION

The course aims to provide students with the bases in clinical physiology and associated methodology required to perform parts in placement training and at clinical physiological laboratories.

COURSE OBJECTIVES

To develop in depth knowledge on specific psychological factors and effects in physical illness and thus help them to have a holistic approaching their dealings with patients during admission, treatment, rehabilitation, and discharge

To develop exhaustive ideology of various Identify ego defense mechanisms and learn counseling techniques to help those in need. And help them to understand the reasons of non-compliance in patients and improve compliance behavior.

COURSE CONTENT

DEFINITION OF PSYCHOLOGY

Basic information in relation to following schools methods and branches.

Schools: Structuralism, functionalism, behaviorism, psychoanalysis, gestalt psychology, Methods, Branches, heredity and environment c. developmental theories and growth behaviour at Infancy, Early childhood, Middle childhood, Puberty (physiological and psychological changes), adulthood, middle age, and old age.

intelligence, motivation Social motives, emotions Definition.

personality: Definition, concepts, creativity, steps in creative thinking; problem solving, decision making, list the traits of creative people, delusions ,frustration - Definition sources, solution, conflict; Approach - approach, avoidance-avoidance, and approach - avoidance, solution

DEFINITION OF CLINICAL PSYCHOLOGY:

General and historical introduction to Abnormal Psychology, Psychology in relation to medicine, different schools. Methods of Clinical Psychology: Case History method, Interview Techniques, Clinical observation, Situational tests, Questionnaires. Concepts of normality and abnormality: Causes of abnormality, Criteria for abnormality. Broad classification of Current model of abnormal behavior - Medical model, Psychodynamic model, Behavioristic model & Humanistic model , and Cognitive model Functional units of mind: Id, ego and super ego - their functions and interactions. Role of Defense mechanisms in normal and abnormal behavior. Evaluation of attention and concentration, perception, memory, thinking etc. Intelligence and Mental Retardation: Intelligence test - Measurement of



57

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intelligence - children & adults (demonstrations) Mental Retardation and its psychosocial management.
Personality Assessment: Questionnaires, inventories, projective techniques Behavior techniques in
Therapy -application of
learning principles to modify
behavior Counselling: Definition, Aim, Difference between counselling and guidance, principles in
counselling, personality qualities of counselor's Psychotherapy: Basic Principles

HEALTH PSYCHOLOGY

Psychological reactions of a patient: reaction to loss, communications ,compliance ,emotional need
geriatric psychology specific psychological reactions and needs of geriatric patients c. pediatric
psychology - specific psychological reactions and needs of pediatric patients, . substance abuse -
psychological aspects of substance abuse: smoking, alcoholism, and drug addiction. compliance -nature,
factors contributing to non-compliance, methods of improving compliance. f. emotional needs g. geriatric
psychology -specific psychological reactions and needs of geriatric patients. h. paediatric psychology -
specific psychological reactions and needs of paediatric patients. k. substance abuse -psychological
aspects of substance abuse: smoking, alcoholism, and drug addiction. l. personality styles -different
personality styles of patients

Recommended Book(s) for Reference include:

1. Introduction to Psychology by Morgan and King

2. Psychology for Physiotherapists by Thangamani Ramalingam and Dibyendunarayan Bid

COURSE OUTCOME:

- CO1. The student is expected on completion of the course independently be able to carry out a diagnostic ECG and a simple spirometry.
- CO2. show active participation in work tests
- CO3. with reasonable safety interpret the most common ECG and spirometry findings.
- CO4. be able to apply safety and hygiene procedures at clinical physiological and nuclear medical work.
- CO5. be able to orally and in writing present compiled results of completed studies.



PO															
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	1	2	3	3	3	2	2	3	2	3	2	2	3	3
CO2	3	3	3	1	2	3	3	3	2	3	2	2	2	3	2
CO3	3	3	2	-	3	3	1	2	3	-	3	1	3	3	2
CO4	-	3	2	3	2	2	3	-	2	2	3	3	3	-	3
CO5	3	3	-	2	1	3	2	2	2	3	2	3	3	2	3
AVE	2.2	2.6	1.8	1.8	2.2	2.8	2.2	1.8	2.4	2	2.6	2.2	2.6	2.2	2.6



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(PROG.CODE-707)**

COURSE CODE	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
5001	2.2	1.8	2	2.4	2.2	2.2	2	2.4	2.8	2.2	1.8	2	2.4	2.2	2
5002	2.2	1.8	2	2.4	2.2	2.2	2	2.4	2.8	2.2	1.8	2	2.4	2.2	2
5003	2	2.4	2	2.4	2	2.8	2	2.2	2.2	2.2	2.4	1.8	2.2	2.8	2.8
5004	2.2	1.8	2	2.4	2.2	2.2	2	2.4	2.8	2.2	1.8	2	2.4	2.2	2
5007	2	2.4	2	2.4	2	2.8	2	2.2	2.2	2.2	2.4	1.8	2.2	2.8	2.8
5008	1.8	2.4	2	2.4	1.8	2.8	2.8	2.4	2.2	2.2	1.8	2	2	2.8	2.2
5009	1.8	2.4	2	2.4	1.8	2.8	2.8	2.4	2.2	2.2	1.8	2	2	2.8	2.2
5010	1.8	2.4	2	2.4	1.8	2.8	2.8	2.4	2.2	2.2	1.8	2	2	2.6	2
5011	2	2.8	1.8	2.6	2	2.6	1.8	2	2.6	2.6	2	2	2.2	2.4	2.4
5701	2.2	2.6	2.6	2	2.4	2.4	2	1.8	2.4	2	2	2.2	2.4	2.6	2.2
5702	2	2.2	1.6	3	2	3	2	2.2	2.8	2.2	1.8	2.6	1.8	2.8	2.6
5703	1.8	2.4	2.2	2.4	2.4	2.6	2	2	2	2.4	2	2.6	2	2.6	2.8
5704	2.4	1.6	2	2.4	2	2.4	2	2	2.6	2.2	1.8	2.4	1.6	2.6	2.4
5705	2.4	1.6	2	2.4	2	3	2	2	2.8	2.8	2.2	2	2.2	2.8	2.6
5706	2	2.4	2.2	2.4	2.2	2.2	2.4	2.6	1.8	2.2	2.2	2.4	1.8	2.4	2.2
5707	2.2	2	2.2	2.6	2.4	2.2	2.2	2.4	2.4	2	2.2	2	2.6	2.6	2.4
5708	2.2	2.6	1.8	1.8	2.2	2.8	2.2	1.8	2.4	2	2.6	2.2	2.6	2.2	2.6



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