



Single Major
B.VOC. Honours in Medical Image Technology (w.e.f. AY 2023-24)

COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Introduction to Human Anatomy	5	4
		2	Introduction to Human Physiology	5	4



B.VOC. MIT
Medical Image Technology (Regulations)

The aim & objectives of the program are to

1. Provide the profession and community with trained qualified technologist.
2. Provide education a comprehensive program that promotes problem solving, critical thinking and communication skills in the clinical environment.
3. Students will demonstrate quality patient care skills including professionalism and ethical behaviors as specified in the code of ethics.
4. Graduate students with specific skills necessary to be competent entry level.

Expected Programme outcome from the future graduate:

1. Should be able to undertake Radiography & Medical Imaging procedures independently.
2. Assist in specialized radiological procedures.
3. Able to do the image processing.
4. Should be able to handle all radiological and imaging equipment independently.
5. Should ensure radiation protection and quality assurance
6. Undertake care and maintenance of all radiological and imaging equipment
7. Able to evaluate images for technical quality
8. Able to identify and manage emergency situations.
9. Should have computer skills.
10. Should be able to provide empathetic professional patient care.
11. Able to demonstrate professional growth, sense of professionalism and desire to learn
12. Able to demonstrate the core values of caring, integrity and discovery.
13. To exhibit keen interest, initiative & drive in the overall development of the Department and 'Leadership Qualities' for others to follow.
14. He/she is expected to be confident and to perform all the duties diligently with utmost sincerity and honesty.
15. Any other duty/task/work assigned by any higher authority like Director, Dean, Medical Superintendent, Head of the Department from time to time; either in "Public Interest" or in the interest of upkeep / development of the Department / Institutions



SEMESTER-I
Introduction to Human Anatomy

Theory

Credits: 4

5 hrs/week

Course Objective:

Anatomy is a key component of all education programmes for MITs and should have a strong focus on organ position, orientation and relationships. The topics provide the student with an understanding of the structure and relationships of the systems and organs of the body which is essential in patient preparation and positioning. The radiographic anatomy component will enable MITs to evaluate images prior to reporting by the radiologist.

Learning outcomes of Course:

- Introduction to Sectional Anatomy & Terminology- Sectional planes, Anatomical relationships/terminology
- Anatomy of the upper thorax- Surface anatomy relationships, Bony structures and muscles, Blood vessels, Divisions of the mid-thorax, heart and great vessels- Lungs, heart and great vessels, Esophagus, CT/MRI Images of the Thorax - Normal and pathologic
- Anatomy of the Abdomen- Major organs and their accessories, Abdominal blood vessels, CT/MR Images of Abdomen - Normal and pathologic
- Anatomy of the Pelvis- Bony structures and associated muscles, Digestive and urinary systems, Reproductive Organs, CT/MR Images of the Male/Female Pelvis- Normal and pathologic
- Neuro Anatomy- Scan planes
- Brain - Cerebral hemispheres, Sinuses, Ventricles, Brainstem and associated parts, Arterial/venous systems, Basal ganglia, Cranial nerves, Spine- Vertebra and disc, Spinal cord and meninges Neck- Arterial/venous systems, Muscles, Glands and pharynx

UNIT - I

Introduction to Anatomy-

- Anatomical Terminologies, Anatomical positions.
- Anatomical Body Planes & Muscular Movements/Actions.
- Introduction to Anatomy of Embryological Surfaces.

Histology - Human cell Structures -

- Cell body, Physiological functions and Structural components.
- Tissues and Structures with classifications.
- Bone : Types , Ultrastructure of Bone , Nerve, Muscles.

Musculoskeletal System Anatomy -

Upper Extremity :-

- Osteology of Clavicle, Scapula and Humerus Bones.
- Osteology of Radius, Ulna and Carpal Bones.
- Anatomy of Shoulder joint, Elbow joint and Wrist joint.



UNIT - II

Introduction to Cranial Anatomy-

- Anatomy of Human Skull.
- Types of Lobes in Cranium And Cranial Surfaces.
- Cranial Sutures and its Classifications.
- Cranial bones and its Blood Supply.
- Facial bones and its muscular attachments.
- Anatomy of Temporomandibular joint - TMJ
- CNS - Central Nervous System, PNS - Peripheral Nervous System.
- Measures of Human vital signs and pulse regions.

UNIT - III

Regional Anatomy of Thorax & Cardiovascular System -

- Anatomy of human Heart & Thoraic wall / cavity.
- Clinical Anatomy of Ribs, Sternum , Diaphragm.
- Thoracic Intercoastal Muscles and Upper back Musculature/ Actions.

Clinical Anatomy of Respiratory- Tracts.

- Upper Respiratory Tract - Contents and Divisions.
- Blood Supply of Upper Respiratory Tract

Lower Respiratory Anatomy -

- Anatomical Contents and Divisions.
- Blood Supply of Lower Respiratory Tract.

Accessory Muscular Anatomy of Respiration

- Inspiratory and Expiratory muscles during Respiration Blood supply.

UNIT - IV

Introduction to Regional Anatomy of Abdomen-

- Surface Anatomy - Anterior and Posterior Abdomen wall
- Over view Anatomy of - 1) Stomach.
2) Liver and Pancreas
3) Kidney and Urinary Bladder
- Location, Shape, features and blood supply.
- Male and Female Reproductive System.



UNIT - V

Introduction to Anatomy of Vertebral Column/ Spine.

- Surface Anatomy of Spine / Vertebral column, Cranial Nerves.
- Overview of Spinal Ligaments and Blood Supply.
- Clinical Conditions of Spinal Vertebral column.
- Introduction to Anatomy Surface View of Pelvis Bone / Cavity /Pelvic Girdle.
- Muscular Attachements of Pelvic Cavity.

Lower Extremity - Musculoskeletal Anatomy-

- Osteology of Femur.
- Osteology of Tibia and Fibula.
- Clinical Anatomy of Hip joint.
- Clinical Anatomy of Knee joint.
- Clinical Anatomy of Ankle joint.
- Anatomy of Tarsals & Metatarsals .
- Muscular Attachments of Hip Joints, Knee joints and Ankle Joints.
- Blood Supply in Lower Limb Anatomy.

Recommended Text Books:

1. Ellen. N .Marieb (2007), Essentials of Human Anatomy and Physiology, Eighth Edition Pearson Education, New Delhi.
2. *Arthur C. Guyton & John E. Hall (2006), Text Book of Medical Physiology, Tenth Edition,* W. B. Saunders Company, London.
3. B.D.CHARUSHIAS.



Introduction to Human Physiology

Theory

Credits: 4

5 hrs/week

COURSE OUTCOMES -

Through this course students should able to :-

CO₁ : Describe the Basics of Various Systems of Human Body.

CO₂ : Discuss the Normal Physiology of Different Systems of the Human Body.

CO₃ : State How Changes in Normal Physiology Lead to Cause Disease with Clinical Identification of Symptoms.

CO₄ : Analyse the Inter Dependency and the Interactions of Human Body Systems.

CO₅ : Illustrate the Ability of Integration in Physiology from the Cellular and Molecular level to the Organ System and Organismic level of Organization.

CO₆ : Establish the Relationship between the Anatomy of Different Body Parts with Functions and Related Disorders.

UNIT - I

Cell Physiology and Cardiovascular System :-

- Cell, Structural Components and Physiological Functions Endocytosis and Exocytosis.
- Acid - Base Balance (Alkalosis/ Acidosis).
- Membrane Permeability and Cell Transport.

Cardiovascular System :-

- Physiology and Functions of Heart
- Heart Sounds and Auscultatory Regions.
- Physiological Nerve Supply of Heart Cardiac Cycle
- Cardiac Output and Stroke Volume and factors affecting them with formula.
- Physiological Variations Heart Rate Regulations.
- Cardiac Conduction System.
- Preload and Afterload + O₂ delivery, uptake to tissue and Contractivity.
- Blood Pressure and its Classifications.
- Pulse Pressure Regions and Systolic + Diastolic.

UNIT - II

Hematological and Muscular Physiology:-

- Physiology of Lymph and Blood
- Physiology of Blood Cells: R B C, W B C Platelets.
- Physiological Functions of Homeostatic Mechanism & Haemoglobin.
- Blood Grouping and RH Factors.



Muscular Physiology :-

- Structural Properties of Skeletal Muscles.
- Changes during Muscular contractions and Changes during Skeletal Muscle Contractions.
- Neuromuscular Junction.
- Classification of Muscles and its Applied Physiology.

UNIT - III

Circulatory System Physiology :-

- ECG - Principles and Normal Range Study.
- Physiology of Cardiorespiratory System.
- Functions of Arterial and Venous Systems.
- The Lymphatic System.

Physiology of Respiratory System and Regulations :-

- Physiology and Mechanism of Respiration.
- Pulmonary Circulation and Respiratory Movements.
- Respiratory Volumes, Pressures + Capacities.
- Pulmonary Function Test (PFT) and ABG Analysis -(Arterial Blood Gas Analysis).

UNIT - IV

Physiology of Digestive System.

- Physiological Anatomy of Alimentary Canal.
- Regulations and Secretion of Saliva and Mastication Process.
- Physiology of Stomach and Pancreas.
- Functional Composition + Properties of Pancreas and Pancreatic Juices + Stomach + Gall bladder.
- Properties and Composition of Bile Juice.
- Physiological Anatomy of Small and Large Intestine.

UNIT - V

Physiology of Excretory System.

- Urinary Output and Micturition.
- RFT and Renal Disorders.
- Medial Endocrine System -Physiological Functions of Endocrine Gland.
- Regulation and Disorders of Pituitary Gland.
- Regulation and Disorders of Thyroid and Parathyroid Glands.
- Physiological Functions and Regulations + Disorders of → Adrenal Glands.
- Overview of Thymus and Pineal Gland.



Recommended Text Books:

Reference books:

1. Cohen, Memmler: Structure & Function of Human Body, Lippincott Williams & Wilkins; Tenth edition (2012).
2. Waugh: Ross & Wilson Anatomy & Physiology in health and illness Penguin Books Ltd (2010).
3. Tortora: Anatomy & Physiology, John Wiley & Sons (2012).
4. Venkatesh D: Basics of Medical Physiology for Nursing, LWW (2009).
5. Hall J: Guyton Textbook of Medical Physiology. Elsevier (2012).
6. Tandon: Best & Taylor's Physiologic Basis of Medical Practice (2011).

Adikavi Nannaya University, Rajamahendravaram

Introduction to Human Anatomy

1st Semester Model Paper

Common for B. Voc., CCM&MIT

MaxMarks:70M

I. CHOOSE THE RIGHT ANSWER

30X1 =30M

1) Which part of the sternum articulates with clavicle

- a) Manubrium
- b) Body of Sternum
- c) Xiphoid process
- d) sternal angle

2) What structure attached to clavicle at trapezoid line

- a) Conoid ligament
- b) Trapezoid ligament
- c) Pectoralis Major
- d) Sternocleidomastoid

3) What is the name given to the concave depression on costal surface of scapula

- a) subscapular fossa
- b) Intrascapular fossa
- c) Suprascapular fossa
- d) Glenoid fossa

4) Which body landmark represents attachment site of Biceps brachii short head

- a) Coracoid process
- b) Glenoid fossa
- c) Acromion process
- d) Supraglenoid tubercle

5) Which of the following muscle is not attached to greater tuberosity of humerus

- a) Supraspinatus
- b) Infraspinatus
- c) Teres minor
- d) Subscapularis

6) Which nerve is most likely to be damaged in surgical neck fracture of humerus

- a) radial nerve
- b) Musculocutaneous nerve
- c) Median nerve
- d) Axillary nerve

7) Which of the following parts is not located on proximal aspect of radius

- a) Styloid process
- b) Head
- c) neck
- d) Radial tuberosity

8) Which area of ulna articulates with head of radius

- a) Trochlear notch
- b) Radial notch
- c) Olecranon notch
- d) Radial notch

9) Which of the following is not located in proximal row of carpal bones

- | | |
|-------------|--------------|
| a) Lunate | b) Trapezium |
| c) Pisiform | d) Scaphoid |

10) Wrist joint is formed by articulation between Radius and proximal carpal bones. What type of synovial joint is it.

- | | |
|----------------|--------------------|
| a) pivot joint | b) Saddle joint |
| c) Hinge joint | d) Ellipsoid joint |

11) Which of the following factors does not increase stability of shoulder joint.

- | | |
|-------------------------|----------------------------|
| a) Rotator cuff muscles | b) Ball & socket mechanism |
| c) Glenoid labrum | d) Glenohumeral ligament |

12) Which of the following bones contribute to the volume of the skull.

- | | |
|-------------|-------------|
| a) Sphenoid | b) Ethmoid |
| c) Parietal | d) Lacrimal |

13) Which Cranial suture joins the parietal bones

- | | |
|--------------------|--------------------|
| a) Coronal suture | b) Sagittal suture |
| c) Lambdoid suture | d) Frontal suture |

14) How many pairs of inferior nasal concha bones are present in the facial compartment

- | | |
|------|------|
| a) 4 | b) 2 |
| c) 8 | d) 6 |

15) Which of the following is not attached to the temporomandibular joint

- | | |
|---------------------|-----------------------|
| a) Mandibular Fossa | b) Mandibular head |
| c) Styloid process | d) Articular tubercle |

16) Which of the Cranial nerves innervates the orbicularis oculi muscle

- | | |
|---------------------|---------------------|
| a) Optic nerve | b) Facial nerve |
| b) Trigeminal nerve | d) Oculomotor nerve |

17) Through which valve does blood enter the right ventricle from the right atrium.

- | | |
|--------------------|--------------------|
| a) Mitral valve | b) Aortic valve |
| c) Pulmonary valve | d) Tricuspid valve |

18) Which of the following is the terminal branch of the gastroduodenal artery?

- a) Right Gastric artery
- b) Left Gastric artery
- c) Right Gastroepiploic
- d) Left Gastroepiploic

19) Where in the abdomen is the liver predominantly located?

- a) Right hypochondrium
- b) Epigastrium
- c) Right Flank
- d) Subhepatic space

20) Which structure encloses the kidney and adrenal gland?

- a) Renal capsule
- b) Perirenal fat
- c) Renal fascia
- d) Periosteum

21) Kidneys share close anatomical relations to many abdominal visceral organs. Which organ is located anterior to the left kidney?

- a) Liver
- b) Duodenum
- c) Hepatic duct
- d) Spleen

22) Which of the following ligaments is unique to the thoracic spine?

- a) All
- b) Costovertebral ligament
- c) Nuchal ligament
- d) Interspinous ligament

23) How many lumbar vertebrae are there?

- a) 7
- b) 5
- c) 12
- d) 4

24) Which vertebral segment has circular vertebral foramina?

- a) Cervical
- b) Thoracic
- c) Lumbar
- d) Coccyx

25) Which cervical vertebra does not have a bifid spinous process?

- a) C1
- b) C2
- c) C4
- d) C6

26) Which type of cartilage is superior and inferior aspects of each vertebral body?

- a) Hyaline
- b) Fibrocartilage
- c) Elastic
- d) Fibroelastic

27) Which bony landmark of proximal femur to have attachment of gluteal muscles

- a) Neck
- b) Greater Trochanter line
- c) Lesser Trochanter
- d) InterTrochanter Line

28) Which part of the tibia gives attachment to interosseous membrane

- a) Anterior border
- b) Posterior border
- c) Lateral Border
- d) Lateral Surface

29) Which of the following is correct classification of knee joint

- a) Hinge type synovial
- b) Plane type synovial
- c) Pivot type synovial
- d) Ball & socket synovial

30) Patella is formed within the tendon of which muscle

- a) Iliopsoas
- b) Abductor magnus
- c) Quadriceps femoris
- d) Semimembranosus

II. FILL IN THE BLANKS

10X1 = 10M

1. the distal radioulnar joint is formed by articulation between the _____ of the Radius and head of ulna.
2. The ulnar tuberosity marks the site of attachment of _____ muscle.
3. The frontal lobe of cranium represents the junction of _____ and _____ suture.
4. The Esophagus opens out into _____ of the stomach.
5. _____ Ligament attaches the liver to the anterior abdominal wall.
6. _____ joint articulates the lateral end of acromion & lateral end of clavicle.
7. Pancreas is located transphyllorically plane of _____ aspect.
8. _____ and _____ forms urine.
9. _____ Organs are located superiorly in greater pelvis.
10. _____ and _____ Arterials supplying vertebral column.

III. MATCH THE FOLLOWING

10X1 = 10M

- | | |
|-----------------------|------------------------|
| (a) 1) histology | a) Atrium |
| 2) Cephalic position | b) reproductive system |
| 3) Chamber of heart | c) study of Tissues |
| 4) respiratory muscle | d) Intercostal muscles |
| 5) Spermatozoa | e) Normal delivery. |

- (b) 1)8
- 2) 14
- 3)12
- 4)31
- 5)5

- a)Facialbones
- b)Cranialbones
- c)Spinalnerves
- d)Sacrum
- e)Thoracicribs

IV.TRUEORFALSE

10X1= 10M

- 1.Sagittalplanepasesperpendiculartothebody ()
- 2.OppositeactionofpronationinElbowissupination ()
- 3.Shoulderjointiscomposedofclavicleandscapulaofhumerus ()
- 4.poplitealfossaispresentposteriorlytotheelbowJoint ()
- 5.Headoffemurisarticulatingwithacetabulum ()
- 6.ThespacebetweenvertebraiscalledIVD(Intervertebraldisc) ()
- 7.Longestmuscleinupperbackisteresminor ()
- 8.CarotidArterysuppliesto thelower Extremity ()
- 9.pericarditisistheinnermostlayerofthehuman heart ()
- 10.thereare31 pairsofspinalvertebras ()

V.ANSWERTHEFOLLOWINGQUESTONS

10X1= 10M

- 1.Mentionanyfivehumanvital signs.
- 2.Writeanyfivemusclesofupper &lowerback-*
- 3.Klitethefourrotatorycuffmuscles
- 4.Nameany4upperlimbbloodsupply
- 5.Writedifferentregionsofvertebral column
- 6.Functionof liver?
- 7.Musclesofpelvic cavity
- 8.writeall the musclesofQuadriceps& hamstrings
- 9.ExplaintheosteologyofAnklejoint
- 10. writedowntheinternalgenitalorgansoffemalereproductivesystem.

I. CHOOSE THE RIGHT ANSWER

30X1=30M

1. Name the site where digestion of proteins occurs.

- (a) Pancreas
- (b) Rectum
- (c) Liver
- (d) Ileum

2. Stomach epithelial cells in the body secrete _____

- (a) Hydrochloric acid
- (b) Oxytocin
- (c) Adrenaline
- (d) Testosterone

3. Night blindness is generally a condition associated with the deficiency of which vitamin?

- (a) Vitamin B
- (b) Vitamin K
- (c) Vitamin B2
- (d) Vitamin A

4. _____ are functional units of food absorption.

- (a) Red blood cells
- (b) Small intestine
- (c) Villi
- (d) Aggregated lymphoid nodules

5. Where are the parotid glands located?

- (a) Below the stomach
- (b) Behind and above the pancreas
- (c) Below and in front of the ear canal
- (d) Underneath the armpit.

6. Humans have ____ lobes in the left lung.

- (a) 3
- (b) 2
- (c) 4
- (d) 1.

7. The lungs are protected by:

- (a) Sternum
- (b) Rib cage
- (c) Backbone
- (d) All of the above

8. Which blood type is a universal donor?

- (a) AB-
- (b) AB+
- (c) O-
- (d) More than one of the above

9. Which of the following organelle is called 'power house of Cell'

- (a) Mitochondria
- (b) Endoplasmic reticulum
- (c) Liposome
- (d) Ribosome

10. Most abundant blood cells in the human body are

- (a) WBCs
- (b) RBCs
- (c) Platelets
- (d) Plasma Cells

11. The amount of urine output from urinary bladder is –

- (a) 100ml
- (b) 300ml
- (c) 400ml
- (d) 200ml

12. The normal range of human blood pressure-

- (a) 140/60 mm Hg
- (b) 120/80 mm Hg
- (c) 170/30 mm Hg
- (d) 150/80 mm Hg

13. The anatomical shape of STOMACH in our body is –

- (a) Pear shape
- (b) Oval shape
- (c) J shape
- (d) Inverted doam shape

14. Which Pulse artery is present in our wrist –

- (a) Femoral artery
- (b) Popliteal Artery
- (c) Radial artery
- (d) Carotid artery

15. Dorsalis pedis artery checks the pulse in –

- (a) Neck region
- (b) Groin region
- (c) Wrist region
- (d) Ankle region

16. Instrument used in auscultation of heart sounds –

- (a) Monitor
- (b) Stethoscope
- (c) Ventilator
- (d) Pulse oximeter

17. Instrument used in monitoring pulse rate

- (a) Ventilator
- (b) Sphygmomanometer
- (c) Pulse oximeter
- (d) Thermometer

18. Which of the following is a condition of # -

- (a) LIGAMENTS tear
- (b) Fibro cartilaginous tear
- (c) Fracture
- (d) Dislocation

19. Abbreviation of CPR -

- (a) Cardiac percussion respiration
- (b) Chronic pulmonary response
- (c) Cardio pulmonary resuscitation
- (d) Cardiac pulmonary rate

20. Which system supply blood AWAY from heart-

- (a) Veins
- (b) Nerves
- (c) Arteries
- (d) Blood vessels

21. Oxygenated blood is carried out by

- (a) Superior vena cava
- (b) Nerves
- (c) Arteries
- (d) Veins

22. Hypoxia states lack of -

- (a) Fluids
- (b) Blood
- (c) Oxygen
- (d) Pleura

23. Presence of ischemia is caused by -

- (a) Sebem
- (b) Blood
- (c) Imbalance hormones
- (d) Oxygen

24. Which of the following is a diastolic BP-?

- (a) Contraction Valve
- (b) Relaxing valve
- (c) Pumping valve
- (d) Refilling valve

25. Which of the following is cardiac output optimal range -

- (a) 6L / minute
- (b) 7L/ minute
- (c) 5L/ minute
- (d) 8L/ minute

26. Select the following auscultatory region -

- (a) Bicuspid valve
- (b) Super vena cava
- (c) Inferior vena cava
- (d) Aorta and pulmonary Valve

27. Abbreviation of AV node in Conduction system of heart -

- (a) Arterial valve node
- (b) Auscultator valve node
- (c) Atrioventricular node
- (d) Asystemic-ventricle node

28. What is the life period of RBC-

- (a) 150 days
- (b) 170 days
- (c) 120 days
- (d) 100 days

29. Which of the following is also called alimentary canal -

- (a) Reproductive system
- (b) Respiratory system
- (c) Digestive system
- (d) Endocrine system

30. Which type of cells are useful in electrical impulsive communication

(a) Epithelial cells

(b) Nerve cells

(c) Muscular cells

(d) Connective cells

II. ANSWERS THE FOLLOWING QUESTIONS

10X1= 10 M

1. Define preload and afterload?
2. Define cardiac cycle ?
3. Write the steps involved in transport of cell permeability?
4. Write the factors affecting cardiac output?
5. Write the Principles of ECG ?
6. Check the upper respiratory tracts?
7. Different between pulmonary and systemic circulation?
8. Functions of adrenal glands?
9. Write the sex hormones of male and female reproductive system?
10. Write the abdominal and visceral organs of human body?

III. TRUE OR FALSE

10X1=10M

1. Molecule transport from high to low concentrations is called osmosis.
2. Amount of blood ejected from each ventricles per month is called cardiac cycle
3. Amount of blood pumped by each ventricle Per minute is stroke volume.
4. Urinary bladder is used in synthesis and storage of the bile juice and pancreatic juice.
5. The superior opening aspect of stomach is called Cardiac.
6. Nucleus pulposus and Annulus fibrosus are the material present between the intervertebral disc space .
7. Sacrum is a 5 fused bone structure in pelvic cavity with.
8. Right side aspect of lungs had three lobes – upper , middle and apex lobes
9. Gases exchange of gases and purification of oxygen takes place in alveolar region
10. SCM is a expiratory muscle used during respiration.

IV. FILL IN THE BLANKS

10X1=10M

1. Lack of or destruction of RBC is called -----.
2. Narrowing of blood stream or blood vessels due to plaque is called -----
3. The movement of molecules in cell permeability is opposite to concentration gradient is called -----
4. The proteins like ----- and ----- are the function of liver .
5. The thread like structure present internally in the renal pyramid is called -----.
6. The process of chewing of chyme In oral cavity Is called
- 7.,..... And are the structural components of human cell.
8. 'lub' and 'dub' denoted by S1 and S2 are the..... of cardiac system .
9. and are the floating ribs of thoracic cavity with no anterior attachments .
10. In excretory system of human body , purification and filtration of blood and waste products is functioned by organ called
11.

V. MATCH THE FOLLOWING :

10X1=10M

- | | |
|------------------------|----------------------|
| 1. Pericarditis | (a) Lungs |
| 2. Pleural effusion | (b) Contraction |
| 3. Systolic BP | (c) Heart |
| 4. Bilirubin count | (d) Calf muscle |
| 5. Second heart muscle | (e) Liver |
| 1. Endometrium | (a) Digestive system |
| 2. Dura mater. | (b) Ovarian cyst |
| 3. Metabolic waste | (c) Female |
| 4. Spermatozoa | (d) Brain |
| 5. PCOD | (e) Fructose source. |



ADIKAVI NANNAYA UNIVERSITY: RAJMAHENDRAVARAM
Single Major B.Voc. Medical Image Technology (w.e.f:2023-24A.B)

Programme: B.VOC. Honours in Medical Image Technology (Major)

w.e.f. AY 2023-24

COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
1	II	3	Radiological Physics & Darkroom Techniques including post processing Techniques.	3	3
			Radiological Physics & Darkroom Techniques - Lab.	2	1
		4	Fundamentals of Biomedical Instruments	3	3
			Fundamentals of Biomedical Instruments - Lab.	2	1



II SEM

Paper -3 Radiological Physics & Darkroom Techniques Including Post Processing Techniques

Theory

Credits: 3

3 hrs/week

Unit - I

- 1 Basic Physics Matter and energy, Units and Measurement, System of units, Force, work, Power and energy
- 2 Applied Mathematics Elementary use of Algebraic Symbols and Signs, Measurement of angles, Graphical representation of data
- 3 Heat Heat and Temperature, Heat transfer, Black Body radiation, Thermal conductivity
- 4 Electricity & Magnetism Electrical Charges, Law of Electrical charges, Capacitance, Capacitor, Electrical induction, Ohms Law, Conductor, Insulator and Semiconductor, Alternative current, Direct current, Circuit laws, Serial and parallel connection, Magnetism Laws, Magnets and its types, Magnetic Lines of force.

Unit - II

1. Rectification And Transformers Rectification and its types, Rectifier Circuit, Transformer principle, construction, Types, Transformer Ratios, Transformer Losses, Efficiency
2. Electromagnetic Radiation Electromagnetic spectrum, Properties of Electro Magnetic Radiation
3. Atomic Structure Atomic Models, Structure of Atom, Atomic Number, Mass number, Isotopes, Ionization and Excitation
4. Radioactivity Type of Radiation, Alpha, Beta and Gamma radiation, Radioactive Isotopes, Half Life periods.

Unit - III

1. Production of X Ray Thermionic emission, Characteristic X ray, Bremsstrahlung Radiation, Construction and working of X ray tube, Heil effect, Anode angle, Cloud charge, Properties of X rays, Dual Focus, Rating chart/Cooling chart.
2. Interaction of X-ray With Matter Classical Scattering, Compton Scattering, Photo Electric Effect, Pair Production, Photo Nuclear Disintegration .
Appreciation and application of all the factors
3. Radiographic Film: Structure of film emulsion-film, characteristics (speed, base, latitude)-effect of grain size on film response to exposure, interpretation of characteristics curve-Grain technology Gelatin-Basic film types-Film formats and packing, Direct exposure duplited films-Single coated emulsions-Films for specialized process. Structure, properties, handling, film wrappings. Handling of exposed and unexposed films. Types, applications, advantages/limitations of different types, safe light requirements.
4. Sensitometer: Photographic density-characteristic curve-information from the characteristic curve-speed Vs definition. Storage of X-ray film.



Unit - IV

1. Control of scattered radiation: Methods of minimizing formation of scatter radiation, effectiveness of grids-grid ratio-preventing scattered radiation, use of cones, diaphragm light beam devices and effectiveness of collimation in reducing effects of scatter. Effects of scatter radiation on radiograph image quality, patient dose and occupational exposure.

2. Intensifying screens: Structure and functions, common phosphors used-types, screen mounting, care and maintenance of film screen contact. Intensifying factor-speed and detail crossover effect-resolution-mottle-reciprocity-screen asymmetry-cleaning. New phosphor technology-influence of kilo voltage. Photo-stimulable phosphor Imaging.

3. Cassettes: Structure and function-Types-single,Gridded, film holder-Design features and consideration with loading/unloading-Care and maintenance (cleaning).

4. Photo chemistry: Principles: Acidity, alkalinity, pH, the processing cycle, development, developer solution. Fixing, fixer solution, washing, drying replenishment, checking and adjusting-latent image formation--nature of development-constitution of developer development time-factors in the use of developer. Fixers constitution of fixing solution factors affecting the fixer-replenishment of fixer-silver conservation-Drying-developer and fixer for automatic film processor-rinsing-washing and drying. Replenishment rates in manual and automatic processing-Silver recovery-Auto and manual chemicals.

Processing: Manual processing-care of processing equipment-automatic processor-manual VS automatic processing Principles and typical equipment Microprocessor controlled-Cine processing-Daylight systems-Processing faults-maintenance.

Unit - V

1. Automatic Film Processor. 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).

2. Factors affecting Image Quality: Meaning of radio graphic image contrast, density, resolution, sharpness, magnification and distortion of image, noise and blur. Radio graphic illuminators and viewing conditions, visual acuity and resolution.

3. Components of image quality-unharness in radio graphic image contrast of the radio graphic image distinctness of the radio graphic image-size, shape and spatial relationships.

Presentation of radiography Opaque letters and markers-Identification of dental films preparation of stereo radio graphs-viewing conditions.

Monitor images Characteristics of the video image-television camera-imaging camera. Laser light and laser-laser imaging laser images-imaging plates-Dry cameras.

4. Processing room: Location of the dark room-dark room illumination-equipment and layout-X-ray viewing room-Day light processing-Daylight handling-daylight systems with cassettes-without cassettes.



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5. Dark Room Planning For A Small Hospital, for A Large Hospital Location of Dark Room and construction of Dark Room. Ventilation, Wall Protection Entrance to Dark Room - Single Door, Double Door, Labyrinth.



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Single Major
Model Question Paper
SEMESTER-II

Radiological Physics & Darkroom Techniques Including Post Processing Techniques

TIME : 3 Hrs

MAX.MARKS : 70

SECTION-A

ANSWER ANY 5 QUESTIONS.

(5X4 = 20 M)

1. Write about the Conductor, Insulator & Semiconductor.
2. Explain the Electromagnetic Radiation Spectrum.
3. Brief a note on Interaction of X-ray with Matter.
4. What is Photochemistry ? (Manual film processing method)
5. Explain the Laser light Imaging. (Flouroscopy)
6. Write about the Cassettes & Various methods of Screens (x-ray film, Intensifying Screen & Imaging plate).
7. Draw a neat diagram an Darkroom & Explain its working construction.
8. Explain about the Production of x-ray Thermionic Emission.

SECTION-B

ANSWER ALL THE QUESTIONS

5X10 = 50 M

9. Explain the Magnetism, its types and lines of magnetic forces.

OR

Detail note an OHM'S Law & Law of Electrical charges.

10. Brief note an Transformer Construction, types and losses.

OR

What is Radiation and what are the 3 types of Radiation with its uses.

11. What is X-Ray Spectra and its two methods of x-rays.

OR

Construction of X-Ray tube design.

12. What are the methods of controlling the Scattered Radiation.

OR

Explain about the film processing methods.

13. What are the factors affecting the Image Quality.

OR

What is Photo - Stimulable Phosphor Imaging Technology (Computed Radiography CR).



Details of Lab/Practical/Experiments/Tutorials syllabus:

Radiological Physics & Darkroom Techniques Including Post Processing Techniques

CREDITS: 01

Teaching Hours:2hr/w

Text books recommended Latest editions of the following books:

- The Physics of Radiology Harold Elford Johns & John Robert Cunningham.
- Christensen's Physics of Diagnostic Radiology – Thomas S curry, James E.
- Dowdey, Robert C. Murry
- Review of Radio logic Physics – Walter Huda and Richard M. Slone
- A practical approach to modern imaging equipment - Trefler. M
- Radiographic latent image processing – W.E.J Mckinney
- Photographic processing chemistry – L.F.A. Mason
- Physical and photography principles of medical radiography – Seeman & Herman Nuclear Physics by I. Kaplan

Text books recommended Latest editions of the following books:

- A Primer in Applied Radiation Physics by F A Smith
- Atomic Physics – J. B. Rajam
- Radio logic Science for Technologists, 9th Edition - Bushong
- Christensen's Physics of Diagnostic Radiology – Thomas S curry, James E. Dowdey, Robert C. Murry
- The Physics of Radiology Harold Elford Johns &John Robert Cunningham.



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II SEM

Paper -4 Fundamentals of Biomedical Instruments

Theory

Credits: 3

3 hrs/week

Aim and Objectives of the course:

To provide adequate knowledge on instruments and measuring techniques

1. Learning outcomes of Course

By the completion of the course the graduate should be able to:

- Understand the characteristics and standards of a medical device
- Demonstrate the principle and characteristics of different transducers
- Construct a measuring device for various applications
- Test the signals using analog instruments
- Differentiate various types of display device

2. Detailed Syllabus (Three units with each unit having 10 hours of class work)

Unit – 1

Basic Concept of medical Instrumentation

Terminology of Medicine and medical devices, Classification of biomedical instruments, General measuring system, Static and dynamic characteristics, Signals and Noises, Units and Standards, Basic electrical quantities, definition and units, Ohm's law, Kirchoff's laws, series and parallel circuits

Unit – 2

Transducers

Transducers – Principle, Types, Design of resistive, Capacitive, Inductive and Piezo electric transducers, Applications of transducers

Unit – 3

Measuring circuits

Bridges, DC Bridges, Design of Wheat stone Bridge, AC Bridges, Sources & Detectors, Design of AC Bridges for measuring inductance, & Capacitance, Errors and their compensation, applications in Bio medical Instruments

Unit – 4

Analog Instruments:

Principle, construction and working of Analog Ammeters, Voltmeters, Moving coil, Moving iron type meters, Galvanometer, Principle of operation, application of Analog multimeter, Digital Multimeter,

Unit – 5

Display and Recording Devices

Cathode ray oscilloscope – Block Diagram, CRT – Vertical and horizontal deflection systems, LCD, TFT (Thin film Transistor) technology, Medical Display systems - Multi-Channel displays (Digital Storage Oscilloscope)

Recommended Text Books: Reference books:

1. Earnest, O.Doeblin (2002), Measurement System Application and Design. McGraw Hill, NewYork.
2. Albert Helfrick and Cooper, W.D(2007),Modern Electronic Instrumentation and Measuring Techniques. Prentice Hall of India.
3. Sawhney.A.K. (2005), Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai and Sons



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Single Major
Model Question Paper
SEMESTER-II

FUNDAMENTALS OF BIOMEDICAL INSTRUMENTATION

Duration: 3 Hrs

Max. Marks: 70

SECTION -A

ANSWER ANY FOUR OF THE FOLLOWING

4×5=20

1. Write about signals and noise?
2. Write the characteristics of static and dynamic?
3. Explain about capacitive Transducer?
4. Explain about Ammeters and Voltmeters?
5. Explain about DC Bridges?
6. Write the applications in biomedical instruments?
7. Write about applications of AC and DC?
8. Give some examples of medical instruments used in medical laboratories

SECTION -B

ANSWER THE FOLLOWING QUESTIONS

3×10=30

- 9.A) Explain briefly about terminology of medicine and medical instruments
OR
B) Explain about classifications of bio- medical instruments in detail?
- 10.A) Explain different types of transducers
OR
B) What are inductive and piezoelectric transducers.
- 11.A) Explain briefly about design of wheat stone bridge
OR
B) Explain about design of AC bridges for measuring inductance and capacitance
12. A) Explain the construction of moving coil ammeter
OR
B) Compare advantages and disadvantages of digital multimeter over analog multimeter
13. A) Draw the block diagram of cathode ray oscilloscope and explain each block
OR
B) Write the advantages and disadvantages of digital storage oscilloscope over CRO



Fundamentals of biomedical instruments

Details of Lab/Practical/Experiments/Tutorials syllabus:

Credits :01

Teaching Hours:2hr/w

(Not less than six from the following experiments can be performed either in Software/
Hardware) (Multisim /Tina Pro or equivalent software can be used)

1. Verify Ohm's law
2. Verification of Kirchhoff's Laws
3. Calibration of Wien's Bridge
4. Calibration of Schering's Bridge
5. Calibration of Maxwell's inductance and Capacitance Bridge
6. Study the working and measurement of Voltage, Current using Digital Multimeter
7. Study the working of CRO
8. Verify the characteristics of Light Emitting Diode

7 Recommended Continuous Assessment methods:

• marks semester End Examinations and

25 Marks CIA

Details of Lab/ Practical /Experiments / Tutorials syllabus Credits - 01 2Hrs/Wk

1. Verification of Ohms' Law
2. Verification of Kirchhoff's law.
3. Calibration of Wien's Bridge
4. Calibration of Schering's Bridge
5. Calibration of Maxwell's inductance and capacitance bridge
6. Measurement using Multi meter and CRO
7. General Trouble shooting techniques of Regulated DC Power Supply
8. Study of general maintenance techniques of Power supply circuits.

Reference: <https://24x7mag.com/maintenance-strategies/alternative-equipment-maintenance/prevaling-attitudes/troubleshooting-medical-equipment/>

Allotment of marks to be followed for evaluation of the practical

- | | |
|---|----------|
| 1. Record----- | 05 Marks |
| 2. Day to day activity ---- | 15 Marks |
| 3.Circuit diagram and Tabular columns - | 10 Marks |
| 4. Procedure/Observation/ | 10 Marks |
| 5. Output/ Result | 05 Marks |
| 6. Viva----- | 05 Marks |

50 Marks