ANDHRA KESARI UNIVERSITY

ONGOLE

Scheme of Examination , Syllabus and Model paper
For Under-Graduate Programme
Course: Bachelor of Vocation in Medical Laboratory Technology

Under Multiple Entry-Exit, Internship and CBCS in accordance with NEP-2020 w.e.f. 2024-25

ANDHRA KESARI UNIVERSITY, ONGOLE

Scheme of Examination for Under-Graduate Programme Under Multiple Entry-Exit, Internship and CBCS in accordance with NEP-2020 w.e.f. 2024-25 (in phased manner)

COURSE: BACHELOR OF VOCATION IN MEDICAL LABORATORY TECHNOLOGY

FIRST YEAR FOR CERTIFICATE IN BACHELOR OF VOCATION IN MEDICAL LABORATORY TECHNOLOGY

Semester	Course	Nomenclature of paper	Credits	Hours/ Weeks	Internal Marks	External Marks	Total Marks	Exam Duration
I	1	English Launguage-1	3	3	25	75	100	3 Hrs
	2	Launguage-2	3	3	25	75	100	3 Hrs
	3	Multi-Disciplinary Course	2	2	--	50	50	2 Hrs
	4	Skill Enhancement	2	2	--	50	50	2 Hrs
	5	Skill Enhancement	2	2	--	50	50	2 Hrs
	6	Introduction to Classical Biology	4	4	25	75	100	3 Hrs
	7	Introduction to Applied Biology	4	4	25	75	100	3 Hrs
II	1	English Launguage-1	3	3	25	75	100	3 Hrs
	2	Launguage-2	3	3	25	75	100	3 Hrs
	3	Skill Enhancement	2	2	--	50	50	2 Hrs
	4	Skill Enhancement	2	2	--	50	50	2 Hrs
	5	Minor	4	4	25	75	100	3 Hrs
	6	Microbiology-1	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
	7	Biochemistry-1	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs

SECOND YEAR FOR DIPLOMA IN BACHELOR OF VOCATION IN MEDICAL LABORATORY TECHNOLOGY

Semester	Course	Nomenclature of paper	Credits	Hours/ Weeks	Internal Marks	External Marks	Total Marks	Exam Duration
III	1	Multi Disciplinary Course	2	2	--	50	50	2 Hrs
	2	Minor	4	4	25	75	100	3 Hrs
	3	Skill Enhancement	2	2	--	50	50	2 Hrs
	4	Microbiology-2	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
	5	Pathology-1	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
	6	Biochemistry-2	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
	7	Pathology-2	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
IV	1	Minor	4	4	25	75	100	3 Hrs
	2	Minor	4	4	25	75	100	3 Hrs
	3	Skill Enhancement	2	2	--	50	50	2 Hrs
	4	Multi-Disciplinary	2	2	--	50	50	2 Hrs
	5	Human Anatomy-1	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
	6	Physiology-1	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
	7	Classical Laboratory Practics-1	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs

THIRD YEAR FOR DEGREE IN BACHELOR OF VOCATION IN MEDICAL LABORATORY TECHNOLOGY

Semester	Course	Nomenclature of paper	Credits	Hours/ Weeks	Internal Marks	External Marks	Total Marks	Exam Duration
V	1	Minor	4	4	25	75	100	3 Hrs
	2	Minor	4	4	25	75	100	3 Hrs
	3	Human Anatomy-2	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
	4	Physiology-2	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
	5	Clinical Laboratory Practices-2	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
	6	Routine Laboratory Techniques	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
	7	Environmental Education	2	2	--	50	50	2 Hrs
VI	Semester Internship with 12 Credits Student is eligible for Exit Option 3 with the award of Degree in respective major							

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FOURTH YEAR FOR HONOURS IN BACHELOR OF VOCATION IN MEDICAL LABORATORY TECHNOLOGY

Semester	Course	Nomenclature of paper	Credits	Hours/ Weeks	Internal Marks	External Marks	Total Marks	Exam Duration
VII	1	Basics of Clinical Hematology	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
	2	Microscopy and Cell Biology	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
	3	Immunohematology and Blood banking Technology	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs.
	4	Skill Enhancement (Vaccine Production Technology)	2	2	--	50	50	3 Hrs
	5	Skill Enhancement	2	2	--	50	50	3 Hrs
	6	OOTC	2	2	--	50	50	3 Hrs
	7	IKS	--	2	--	--	--	2 Hrs
	8	Skill Enhancement	2	2	--	50	50	2 Hrs
	9	Skill Enhancement	2	2	--	50	50	2 Hrs
VIII	1	Skill Enhancement (Advances in Microbiology)	2	2	--	50	50	2 Hrs
	2	Clinical Endocriminology and Tumor Marker	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
	3	Parasitology and Entomology	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	3 Hrs
	4	Positioning in Radiography	3	3	25	75	100	3 Hrs
		Practical	1	2	--	50	50	2 Hrs
	5	Skill Enhancement (Genetic Engineering)	2	2	--	50	50	2 Hrs
	6	OOTC	2	2	--	50	50	2 Hrs
	7	IKS	--	2	--	--	--	2 Hrs
	8	Skill Enhancement	2	2	--	50	50	2 Hrs
	9	Skill Enhancement	2	2	--	50	50	2 Hrs

SYLLABUS
I -Semester

Course: 1 INTRODUCTION TO CLASSICAL BIOLOGY

Hours/Week: 5
Credits: 4

Learning objectives

The student will be able to learn the diversity and classification of living organisms and understand their chemical, cytological, evolutionary and genetic principles.

Learning Outcomes

1. Learn the principles of classification and preservation of biodiversity
2. Understand the plant anatomical, physiological and reproductive processes.
3. Knowledge on animal classification, physiology, embryonic development and their economic importance.
4. Outline the cell components, cell processes like cell division, heredity and molecular processes.
5. Comprehend the chemical principles in shaping and driving the macromolecules and life processes.

Unit 1: Introduction to systematics, taxonomy and Ecology.

1.1. Systematics Definition and concept, Taxonomy Definition and hierarchy.
1.2. Nomenclature ICBN and ICZN, Binomial and trinomial nomenclature.
1.3. Ecology Concept of ecosystem, Biodiversity and conservation,
1.4-Pollution and climate change.

Unit 2: Essentials of Botany.

2.1. The classification of plant kingdom Eichler system of classification.
2.2. Vegetative parts of a Plant and physiological processes outlines of water & mineral absorption, Ascent of sap, transpiration, Photosynthesis, Respiration and Growth hormones.
2.3. Structure of flower Essential and Non Essential organs, microsporangium - structure of another, mega sporangium, structure of ovule, pollination & fertilization.
2.4. floriculture, landscaping & plant Nursery (Basics)

Unit 3: Essentials of Zoology

3.1. The classification of Kingdom Animalia and Chordata.
3.2 Heart, lung, kidney, Organ Systems & their functions in Humans; Hormones and Disorders
3.3 Developmental Biology Basic process of development (Game to genesis, Fertilization, Cleavage and Organogenesis)
3.4 Economic Zoology Sericulture, Apiculture, Aquaculture

Unit 4: Cell biology, Genetics and Evolution

4.1. Cell theory, Ultra structure of prokaryotic and eukaryotic cell.
4.2. Chromosomes and heredity Structure of chromosomes nucleosome, DNA & RNA.
4.3. Cell Cycle, Mitosis & Meiosis.
4.4. Mendel's laws & Darwin theory of evolution.

Unit 5: Essentials of chemistry

5.1. Definition and scope of Chemistry, applications of Chemistry in daily life. Branches of Chemistry.
5.2. Chemical bonds ionic, covalent, non covalent Vander Waals, hydrophobic, hydrogen bonds.
5.3. Green chemistry principles, prevention of waste, prevention of hazardous components,
5.4. Green synthesis of catechol, accident prevention & safety measures.

ACTIVITIES:

1. Make a display chart of the life cycle of non flowering plants.
2. Make a display chart of the life cycle of flowering plants.
3. Study of stomata
4. Activity to prove that chlorophyll is essential for Photosynthesis
5. Study of pollen grains.
6. Observation of pollen germination.
7. Draw the Ultra structure of Prokaryotic and Eukaryotic Cell
8. Visit to Zoology Lab and observe different types of preservation of specimens
9. Hands-on experience of various equipment Microscopes, Centrifuge, pH Meter, Electronic Weighing Balance, Laminar Air Flow
10. Visit to Zoo / Sericulture / Apiculture / Aquaculture unit
11. List out different hormonal, genetic and physiological disorders from the society.

References

1. Sharma O.P., 1993. Plant taxonomy. 2nd Edition. McGraw Hill publishers.
2. Pandey B.P., 2001. The textbook of botany Angiosperms. 4th edition. S. Chand publishers, New Delhi, India.
3. Jordan E.L., Verma P.S., 2018. Chordate Zoology. S. Chand publishers, New Delhi, India.
4. Rastogi, S.C., 2019. Essentials of animal physiology. 4th Edition. New Age International Publishers.
5. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, Evolution and Ecology. S. Chand publishers, New Delhi, India.
6. Satyanarayana U., Chakrapani, U., 2013. Biochemistry. 4th Edition. Elsevier publishers.
7. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand publishers, New Delhi, India.
8. Karen Timberlake, William Timberlake, 2019. Basic chemistry. 5th Edition. Pearson publishers.
9. Subrata Sen Gupta, 2014. Organic chemistry. 1ª Edition. Oxford publishers.

SYLLABUS

I -Semester

Course: 2 INTRODUCTION TO APPLIED BIOLOGY

Hour/Weeks: 5

Credits: 4

Learning objectives

The student will be able to learn the foundations and principles of microbiology, immunology, biochemistry, biotechnology, analytical tools, quantitative methods, and bioinformatics.

Learning Outcomes

1. Learn the history, ultrastructure, diversity and importance of microorganisms.
2. Understand the structure and functions of macromolecules.
3. Knowledge on biotechnology principles and its applications in food and medicine.
4. Outline the techniques, tools and their uses in diagnosis and therapy.
5. Demonstrate the bioinformatics and statistical tools in comprehending the complex biological data.

Unit 1: Essentials of Microbiology

1.1. History and Major Milestones of Microbiology; Contributions of Edward Jenner, Louis Pasteur, Robert Koch.

1.2. Groups of prokaryotic microbes Bacteria (Structure, and Types), archaebacteria, Mycoplasma; Eukaryotic Microbes(outlines)

1.3. Applications of microorganisms in Food, Agriculture, Environment, and Industry.

1.4. Viruses plant virus TMV (Structure and Disease Symptoms) Animal virus - polio virus (Structure and Disease Symptoms) & Bacteriophage (Structure and Reproduction. Outlines)

Unit 2: Essentials of Biochemistry and Immunology

2.1. Biomolecules I

Introduction of carbohydrates & classification mono, di and Polysaccharides.
Lipids-Introduction, Structure & types and Biological importance.

2.2. Biomolecules II

Amino acids classification, properties, structure & functions.
Proteins classification, properties, structure & functions.

2.3. Biomolecules III

DNA Structure &Types, RNA-Structure & Types

2.4. Immune System -Immunity, types of Immunity, cells & organs of Immune Systems.

Unit 3: Essentials of Biotechnology

3.1. History, scope, and significance & branches of biotechnology.
3.2. Recombinant DNA Technology and Vectors-PBR322 & PUC18
3.3. Transgenic plants Uses and applications-B. T Cotton. Transgenic animals Dolly Sheep.
3.4. Environmental Biotechnology Bioremediation, Biofuels, Bio-fertilizers & Biopesticides.

Unit 4: Analytical Tools and Applications

4.1. Microscopy-Simple, compound and electron microscope.
4.2. Southern Blotting, Northern Blotting and western blotting
4.3. Electrophoresis
4.4. Monoclonal antibodies and Its applications. Applications in forensics-DNA Fingerprinting and PCR

Unit 5: Biostatistics and Bioinformatics

5.1. Data collection and sampling. Measures of central tendency Mean, Median, Mode.
5.2. Measures of dispersion Range, standard deviation, Basics of Chi-square Test and t-test
5.3. Introduction to Bioinformatics Genomics, Proteomics, types of biological databases - NCBI. EBI.
5.4. Accessing Nucleic Acid and Protein databases, NCBI, Genome Workbench

ACTIVITIES

1. Identification of a given organism as harmful or beneficial.
2. Observation of microorganisms from house dust under microscope.
3. Finding microorganisms from pond water.
4. Visit to a microbiology industry or biotech company.
5. Visit to a wastewater treatment plant.
6. Retrieving a DNA or protein sequence of a gene
7. Performing a BLAST analysis for DNA and protein.
8. Problems in biostatistics.
9. Field trip and awareness programs on environmental pollution by different types of wastes and hazardous materials.
10. Demonstration on basic biotechnology lab equipment.
11. Preparation of 3D models of genetic engineering techniques.
12. Preparation of 3D models of transgenic plants and animals.

REFERENCES

1. Gerard J., Tortora, Berdell R. Funke, Christine L. Case., 2016. Microbiology: An Introduction. 11th Edition. Pearson publications, London, England.
2. Micale, J. Pelczar Jr., E.C.S. Chan., Noel R. Kraig., 2002. Pelezar Microbiology. 5th Edition. McGraw Education, New York, USA.
3. Sathyanarayana U., Chakrapani, U., 2013. Biochemistry. 4th Edition. Elsevier publishers.
4. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand publishers, New Delhi, India.
5. R.C. Dubey, 2014. Advanced Biotechnology. S. Chand Publishers, New Delhi, India.
6. Colin Ratledge, Bjorn, Kristiansen, 2008. Basic Biotechnology. 3rd Edition. Cambridge Publishers.
7. U. Sathyanarayana, 2005. Biotechnology. 1ª Edition. Books and Allied Publishers pvt. ltd., Kolkata.
8. Upadhyay, Upadhyay and Nath. 2016. Biophysical Chemistry, Principles and Techniques. Himalaya Publishing House.
9. Arthur M. Lesk. Introduction to Bioinformatics. 5th Edition. Oxford publishers.
10. AP Kulkarni, 2020. Basics of Biostatistics. 2nd Edition. CBS publishers.

[NOTE: In the colleges where there is availability of faculty for microbiology and biotechnology, those chapters need to be handled by microbiology and biotechnology faculty. In other colleges, the above topics shall be dealt by the Botany and Zoology faculty.]

SYLLABUS
SEMESTER-2
COURSE-1BIOCHEMISTRY-1
Hour/Weeks: 5

Programme Learning Outcomes (PLOs) for UG courses Bachelor of Vocation in Medical Laboratory Technology

1. To develop critical thinking and problem solving.
2. To operate and maintain laboratory equipment, utilizing appropriate quality control and safety protocol.
3. To understand rigorous specimen handling protocols, prepare samples for analysis.
4. To make aware the students about human physiology and immunology.
5. To highlight the role of medical lab technician in the diagnosis of the disease.
6. To effect a transition of information and experiences learned in the MLT program to employment situations.

Biochemistry-1

After completing this course, the learner will be able to:
1. Demonstrate the knowledge of structure, function and inter- relationship of bio molecules.
2. Understand the integration of various aspects of metabolism and the irregularity pathways.
3. Know about the apparatus and re agents used in analytical and diagnostic section of biochemistry.
4. Teach about the concept to quality control.

UNIT I: Introduction to Medical Lab Technology, Role of Medical Laboratory technologists-ethics, responsibility, safety measures and hazards in clinical biochemistry, first aid (accidents).
Units of measurements, S.I. Units, measurement of volume, various volumetric apparatus (cylinders, flasks, pipettes), calibration of volumetric apparatus.

UNIT II:- Cleaning and caring of general laboratory glassware and equipment, preparation and storage of distilled water, preparation of re agent sand standard solutions, storage of chemicals and reagents, use of analytical balance, dry and moist heat radiation, filtration, autoclaving and chemical disinfection for sterilization.

UNIT III:-Introduction, aim and scope of Biochemistry. Elementary knowledge of inorganic chemistry atomic weight, molecular weight, equivalent weight, acid, bases.

UNIT IV:- Elementary knowledge of organic chemistry:
(a) Organic compounds
(b) Aliphatic and aromatic compounds

(c) Alcohols, Aldehydes, Ketones, Amines, Esters, Phenoletc.

UNIT V: - Viscosity principles and applications; sedimentation principles and applications; Radioisotopes and their use in Biochemistry, mole, molar, molar and normal solutions, pH measurement, buffer solutions, percent solutions, osmosis, dialysis, surface tension.

PRACTICAL: -

1. Organization of clinical laboratories
(a) Organizational Structure
(b) Functional Components
2. Study of laboratory ethics and responsibility of its workers.
3. Biohazards and Safety precautions.
4. First aid-knowledge of first aid procedures.
5. The calibration of volumetric apparatus
6. Study of cleaning and sterilization of glassware & equipments.
7. Preparation of normal, molar, molar and percent solutions.
8. Preparation of buffer solutions and determination of their pH.
9. The determination of pH using indicators.
10. The detection of changes in the confirmation of bovine serum albumin by viscosity measurements.
11. The effect of pH on the conformation of bovine serum albumin.
12. To study the phenomena of osmosis.
13. To study the phenomena of dialysis.

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SEMESTER-II
Course -II Microbiology-1
3 Hrs / Week

After completing this course, the learner will be able to:

1. To know the basics of microbiology and knowledge about the contributions of microbiologists.
2. Identify the microorganisms and the disease process as well as aseptic and sterile techniques.
3. Impart general insight into the history, bacterial genetics and serology.
4. Provide knowledge about the equipment used in microbiology and safety precautions

UNIT I

Basic principles and usage of Instruments:

General Instruments Distillation plant, Centrifuge machine, Analytical Balance, Hotplate, Magnetic Stirrer, Water Bath, Automatic dispenser and diluters, Deionizer.

Microbiological Instruments: pH-meter, Autoclave, Incubator, Hot air oven, Laminar Air flow, Colony counter, Muffle furnace, Refrigerator, Inoculator, Mc Intosh and Flides anaerobic jar.

UNIT II

Microscopy and Micrometery:

Microscopy: Study of compound microscope-magnification, numerical aperture, resolution and components of microscope. Dark ground illumination, care of microscope and common difficulties. Study of phase contrast, interference, fluorescent, polarising and electron microscope. Calibration of ocular micrometer and measurement of microorganisms.

UNIT III

Microbiology: Introduction to Microbiology, Discovery of microorganisms. Contribution of Robert Koch, Antonie Van Leeuwenhoek, Louis Pasteur, Bordet, Paul Ehrlich, Alexander Flemming, Elie Metchnikoff, Needham, Tyndall Janssen, Joseph Lister, Karl Landsteiner etc.

UNIT IV

Medical Microbiology: Scope & relevance and safety measures of Medical Microbiology. Role of medical microbiology in identification and management of various infectious diseases.

UNIT V

Sterilization and Disinfection: Definition, mode of action and uses of various physical methods of sterilization heat, UV radiation, ionizing radiation, character affecting sterilization, autoclave control and sterilization. Indicators. Chemical disinfectants phenol and its compounds, alcohol, halogen, heavy metals and quaternary ammonium compounds, aldehyde, gaseous compounds. Use and abuse of disinfectants. Disinfectants, anti-septics chemotherapeutic agents, chemotherapeutic index, development of chemotherapy, antibiotics and effect of antibiotics on protein and nucleic acid synthesis and cytoplasmic membrane. Future development of chemotherapy.

PRACTICALS

1. Role of Microbiology Laboratory
2 Basic rules for specimen collection and handling,
transportation of specimen and safety regulations.
3. Laboratory Procedures in Microbiology:
(a) Disinfection and sterilization
(b) Laboratory culture

Study of Principle and Working of:

(a) Microscopes (all types)
(b) Distillation apparatus
(c) Centrifuge
(d) Balance
(e) De-ionizer
(f) Ph meter
(g) Autoclave
(h) Incubator

Oven Recommended Books/e-resources/LMS:

1. Textbook of Microbiology for Nursing Students, Anant Narayan Panikar
2. Textbook of Ophthalmology, Khurana
3. Textbook of Microbiology, Baveja.

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SYLLABUS
SEMESTER-3
Course-1 Pathology-1
3 Hrs / Week

After completing this course, the learner will be able to:
1. Learn about histopathology, classification of tissues and their functions.
2. Important awareness about recording of specimens and maintaining records.
3. Gain knowledge about the morphology and anatomy of human body.
4. Use of various equipments for histology.

UNIT I

Introduction to histopathology and laboratory organization, Introduction to anatomical terms and organization of human body. Tissues - Definitions, types, classification, location and functions.

UNIT II

Management and planning, receiving and recording of specimens, indexing, maintaining records, knowledge of maintenance and use of various equipments

UNIT III

Study of: Skeletal system, bones joints and muscles. Respiratory system. Cardiovascular system. Alimentary system mechanism and physiology of digestion and absorption.

UNIT IV

Study of: Liver structure and function. Urinary system. system. Female genital, Male genital system.

UNIT V

Study of: Nervous system. Spleen, lymphnode and R.E.system. Endocrine glands and their functions.

PRACTICALS

- Study of laboratory organization related to histology and cytology –basic terminologies and specimen handling.
- Use and care of equipments, laboratory supplies and management.
- Study of tissues.
- Study of all the systems with the help of model/charts.
- Study of bones.

Recommended Books/e-resources/LMS:

1. Textbook of Medical Laboratory Technology, Volume 1,3rd by Praful Ghodkar Edition
2. Textbook of Medical Laboratory Technology, Volume 2,3rd Edition by Praful Ghodkar
3. Medical Laboratory Technology (Volumel): Procedure Manual for Routine Diagnostic, Kanai Mukharjee Medical Laboratory Technology (Volume2): Procedure Manual for Routine Diagnostic, Kanai Mukharjee,
Medical Laboratory Technology (Volume3): Procedure Manual for Routine Diagnostic, Kanai Mukharjee.

SEMESTER-3
SYLLABUS
Course-2 Biochemistry-II
3 Hrs / Week

Course Learning Outcomes (CLO):

After completing this course, the learner will be able to:

1. Provide a good theoretical and practical education in understanding importance of water.
2. Understand the organization of a clinical laboratory including.
3. Lab information system, auto analyzers in laboratory for qualitative analysis.
4. Introduce various body fluids with their blood pH. Bio chemical composition and regulatory mechanism in
5. To provide knowledge about various body fluids with their importance in diagnosis of different diseases.

UNIT I

Water: Structure of water, solvents, properties of water, importance of water
Carbohydrates: Structure, classification and their functions in biological system.

UNIT II

Lipids: General structure of fatty acids and classification of lipids.
Aminoacids: Common structural features, physical and chemical properties, separation of amino acids and essential amino acids.
Proteins: Classification, structural organization and functions of proteins.

UNIT III

Enzymes: Definition, classification of enzymes, concept of active sites, general mode of action of enzymes, mechanism of enzyme activity, Coenzymes.

UNIT IV

Vitamins: Definition, classification of Vitamins. Importance of Vitamins, general mode of action of Vitamins, mechanism of Vitamins activity.

UNIT V

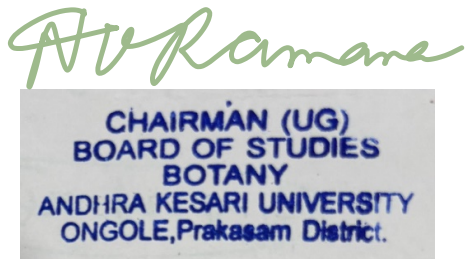
Nucleic acids: Structure, function and types of DNA and RNA, Nucleotides, Nucleosides, Nitrogen bases and role of Nucleic acids.
Porphyrins: A brief account of Porphyrins.

PRACTICALS

- To study the phenomenon of imbibitions of water.
- To study the phenomenon of diffusion of water.
- To study the phenomenon of plasmolysis and deplasmolysis.
- To determine the osmotic pressure of cell sap by plasmolytic method.
- To study the qualitative analysis of carbohydrates.
- To study the qualitative analysis of proteins.
- To study the qualitative analysis of fats &oils.
- To study the structure of DNA and RNA from model/charts.
- To study the effects of temperature, pH and substrate concentration on enzyme activity.

Recommended Books/e-resources/LMS:

1. Essentials of Biochemistry, Second Edition, Dr. (Prof) Satyanarayana
2. Essentials of Biochemistry, 2nd Edition, Dr. Pankaja Naik
3. Principles and Techniques of Biochemistry and Molecular Biology, 5Th Edition, Wilson & Walker
4. An Introduction to Chemistry 8th Edition by Mark Bishop...
5. Clinical Chemistry made easy, 1st Edition by Hughes Fundamentals of Clinical Chemistry, 7th Edition by Carl Burtis Tietz



SEMESTER-3
SYLLABUS
Course-3 Microbiology-II
3 Hrs/ Week

Course Learning Outcomes (CLO):

After completing this course, the learner will be able to:

Know the occurrence, spread and control of bacterial infections. Provide information about bacterial culture procedures, staining procedures and bio-chemical tests for identification of bacteria.

Know the occurrence, spread and control of mycological infections, culture methods required to perform micro-biological tests.

To learn general characters, life cycle and laboratory diagnosis of various medically important parasites.

CLO5 is based on practical component

To train the students with knowledge of medically significant isolates in mycology, parasitology, isolation methods and treatments.

UNIT I

Cultural Media: Liquid and solid media, container for media distribution of media in tubes, bottles and petridishes. Common ingredients of cultural media, synthetic media, peptone water, nutrient agar and broth, chocolate and blood agar, malt extract and broth, milk agar etc.

Special media for Neisseria, Corynebacterium, Mycobacterium & Entero bacteriaceae group.

UNIT II

Cultivation of bacteria: Instruments used, inoculation hood, laminar flow, culture procedure, incubation (aerobic and anaerobic). Isolation of pure culture and its preservation. Blood culture. Introduction and uses of culture, classification of cultures, antimicrobial sensitivity, anaerobic cultivation techniques.

Pure culture: Maintenance and preservation of pure cultures. Collection, transport processing and storage of clinical sample for microbiological analysis.

UNIT III

Anatomy of bacterial cell, intercellular components and their functions, bacterial reproduction, morphological study of bacteria and its appendages flagella, fimbriae, pili, capsule, spore and cysts.

UNIT IV

Classification and identification of bacteria: Biological groups, morphological and biological classification, DNA composition as a basis of classification system of identification-morphology, staining reactions, cultural characters, biochemical reactions, antigenic characters and Medical importance.

UNIT V

Typical growth curve, various phases of growth physiology of bacteria-catabolism and anabolism, Nutrition of microbes and physical conditions required for growth.

Effect of carbon, nitrogen, growth factors, vitamins, temperature, pH, osmotic pressure, oxygen and carbon dioxide on microbial growth.

PRACTICALS

1. Principle, construction and working of :Microscope, Laminar Air Flow
2. Study of bacterial cell morphology
3. Isolation of pure cultures and preservation.
4. Demonstration of staining procedures for Gram staining, endospore and capsules.
5. Classification and identification of bacteria with respect to Gram Staining.
6. Study of growth curve in Bacteria and yeast
7. Preparation of culture media and technique of as epic transfers.
8. Study of composition and preparation of stains.

Learning Resources

Recommended Books/e-resources/LMS:

1. Microbiology for Nursing and Allied Sciences. Dr. Arora2nd Edition
2. Text book of Microbiology for Nurses Anantnarayan! StEdition
3. Practical and Applied MicrobiologyAnuradhaDe4th Edition
4. Text Book of Microbiology Anantnarayan10th Edition
5. Text Book of Microbiology and Parasitology Praful Godkar1 StEdition
6. Medical Parasitology C.P.Baweja3rd Edition.

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ONGOLE,Prakasam District.

SEMESTER-3

Course-4 Pathology-II

3 Hrs / Week

After completing this course, the learner will be able to:

1. Provide knowledge about general principles, recording and labeling of histology specimens.
2. Gain knowledge about various fixatives for tissue embedding.
3. Enable the students to know about the working of microtome.
4. Learn about the methods of collection of museum specimens, preparation and their storage.

UNIT I

Introduction to Histopathology: General Principle, Reception, recording and labeling of histology specimens.

Fixation and various fixatives-Mode of action and indication preparation.

Processing of histological tissues for paraffin-embedding. Embedding and embedding media, Vacuum embedding.

UNIT II

Equipment used in Histopathology:

(1) Tissue Processor

(2) Microtome-various types, their working principle and maintenance.

(3) Micro to me knives and knife-sharpening.

(4) Automatic slide strainer

(5) Freezing microtome

(6) Cryostat

UNIT III

Equipments using Techniques :

Section cutting, cutting faults and remedies.

Decalcification-Methods, advantages and disadvantages, various types -their mechanisms of action.

UNIT IV

Major techniques used in Histopathology;

Routine staining procedures, mounting and mounting media. Dye chemistry, theory and practice of staining. Solvent mordents, accelerators and accentuators. Use of controls in various staining procedures.

UNIT V

- Preparation of Haematoxylin and Eosine
- Methods of preparation, staining technique for rapid diagnosis
- Histo-chemical staining
- Cyto-chemical staining
- Collection of Museum specimens Preparation and storage, methods of mounting

PRACTICALS

- Histological study of all the systems.
- Preparation of stains.
- Microtomy.

Recommended Books/e-resources/LMS:

1. Textbook of Medical Laboratory Technology, Volume 1, 3rd Edition by Praful Ghodkar
2. Textbook of Medical Laboratory Technology, Volume2, 3rd Edition by Praful Ghodkar
3. Medical Laboratory Technology (Volumel): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
4. Medical Laboratory Technology (Volume2): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
5. 15. Medical Laboratory Technology (Volume3): Procedure Manual for Routine Diagnostic, Kanai Mukharjee

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SEMESTER - 4
HUMAN ANATOMY-1
3 Hrs / Week

TEACHING OBJECTIVES:

Anatomical Terminology: Students should be able to use and understand standard anatomical terms to describe body regions, directions, and structures.
Levels of Organization: Students should understand the hierarchical organization of the human body, from cells to tissues, organs, systems, and the whole organism.
Body Systems: Students should be able to identify and describe the major organ systems (e.g., skeletal, muscular, nervous, cardiovascular, respiratory, digestive, etc.) and their functions.
Anatomical Planes and Sections: Students should understand and be able to identify the different anatomical planes (sagittal, frontal, transverse) and sections used to visualize the body.
Skeletal System: Students should be able to identify the bones of the body, their articulations, and their functions.
Muscular System: Students should be able to identify the major muscles of the body, their origins, insertions, and actions.
Nervous System: Students should understand the structure and function of the brain, spinal cord, and peripheral nerves.
Cardiovascular System: Students should be able to identify the heart, blood vessels, and their functions in circulation.
Respiratory System: Students should be able to identify the structures of the respiratory tract and their roles in gas exchange

Learning Outcomes:

Identify and describe:
Major structures of the human body (cells, tissues, organs, systems).
The structural organization and functions of each body system.
The anatomical location and relationships of organs and structures.
The microscopic structure of tissues and organs.
The basic biological processes essential for maintaining homeostasis.
The key structural and functional changes to major body systems at different stages of the human lifespan.
Explain:
The relationship between structure and function in the human body.
How changes at the cellular level affect the function of tissues, organs, and body systems.
The role of the inflammatory process in maintaining body homeostasis during tissue injury, infection, and infectious disease.

COURSE-1 HUMAN ANATOMY-1
UNIT I

THE HUMAN BODY AS A WHOLE:

Definitions, Subdivisions of Anatomy, Terms of location and positions, Fundamental Planes, Vertebrate structure of man and organization of the body cells and tissues.

UNIT II

LOCOMOTION AND SUPPORT:

THE SKELETAL SYSTEM: Types of bones, structure of bone, divisions of the skeleton, Appendicular skeleton, Axial skeleton names of all the bones and their parts; joints -classification, types of movements with examples.

PRACTICALS : Demonstrations of all bones - showing parts.

Joints - X-rays of all normal bones and joints.

UNIT III

ANATOMY OF THE NERVOUS SYSTEM

CENTRAL NERVOUS SYSTEM: Spinal cord; Anatomy, functions reflex actions, Meninges, Main and Fundamental parts of Brain: Hind Brain, Midbrain Forebrain Brain, location, functions, coverings of brain.

Injuries to spinal cord and brain - excluded

UNIT IV

ANATOMY OF CIRCULATORY SYSTEM:

Heart size, location, coverings, chambers, blood supply, Blood vessels, General plan of circulation, pulmonary circuit - Names of arteries and veins and their positions

Only histology of lymphatic system - included

PRACTICAL: Demonstration to illustrate.

UNIT V

ANATOMY OF THE RESPIRATORY SYSTEM:

Organs of Respiratory System Nose-nasal cavity, Trachea, Bronchial Tree.

PNS & Larynx topics - excluded.

Pleurae and lungs, brief knowledge of parts and position.

PRACTICAL: Demonstration to illustrate.

Recommended Textbooks:

Reference 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), Textbook of Medical Physiology, Tenth Edition,

W.B. Saunders Company, London.

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SEMESTER - 4
COURSE-2 PHYSIOLOGY-1
3 Hrs/ Weeks

TECHING OBJECTIVES:

The teaching objectives of physiology aim to equip students with a comprehensive understanding of how the human body functions, encompassing normal physiological processes, the integration of organ systems, and the physiological basis of diseases, ultimately enabling them to apply this knowledge in clinical settings.

LEARNING OUTCOMES:

Basic Concepts: Students should be able to define fundamental physiological concepts and understand the mechanisms behind various bodily functions.

Organ Systems: Develop a thorough understanding of the structure and function of major organ systems (e.g., cardiovascular, respiratory, nervous, digestive) and their interactions.
Physiological Processes: Comprehend the mechanisms of homeostasis, including how the body maintains equilibrium and responds to changes in the environment.
Pathophysiology: Understand how physiological processes can be disrupted in disease states and the basis of common clinical conditions.
Interdisciplinary Nature of Physiology: Recognize the importance of integrating knowledge from other disciplines (e.g., chemistry, physics, genetics) to understand physiological processes.

SYLLABUS PAPER-2
PHYSIOLOGY-1
UNIT 1

HEMATOLOGY (16 hrs):

1. BLOOD: Composition, properties and functions of Blood.
2. RBC: Size, shape, functions, count, Physiological variations of RBC count Polycythemia, Erythropoiesis.
3. HAEMOGLOBIN: Function, concentration, Physiological variation of concentration, methods of determination of Hb.
4. WBC: Functions, production, life span, count, leukocytosis, Leukopenia, Leukemia, DLC.
5. PLATELET: Size, Shape, count, production, Functions, Thrombocytopenic Purpura, bleeding time, clotting time.
6. BLOOD GROUPS: ABO and Rh grouping, criteria of classification, Antigen and Antibodies, percentage of distribution, Determination of Blood groups. Landsteiner's Law, significance of Blood groups.

7. BLOOD TRANSFUSION: Indication, general qualities of a donor, matching of donor's blood with recipient's blood, universal donor and recipient concept. Blood grouping or typing, cross matching, mismatched blood transfusion causes and complications. Rh factor and Rh factor incompatibility transfusion and erythroblastosis of details.
8. HAEMOSTASIS: Vasoconstriction, platelet plug formation, blood coagulation Definition, clotting factors Mechanism of blood clotting Intrinsic and Extrinsic. Intravascular blood blotting, disorders of clotting, Vit. K deficiency bleeding, purpura, Hemophilia.
9. ANTICOAGULANTS: Classification, example and uses.
10. BLOOD BANK
11. BLOOD INDICES: Color index. MCH, MCV, MCHC.
12. ESR and PCV: Determination, definition, values, variations, factors affecting, significance.
13. BLOOD VOLUME: Normal value, determination of blood volume and regulation of blood volume.
14. LYMPH Lymphoid tissue formation, circulation, composition and functions of Lymph.

UNIT II

CARDIOVASCULAR SYSTEM (12 hrs):

1. Heart-brief description of function.
2. BLOOD PRESSURE: Definition, Normal values, physiological variations, factors affecting regulation of BP, Hypotension and Hypertension, Determination of BP.
3. PULSE: Jugular pulse, radial pulse.
4. HEART SOUNDS: Cause, characteristics and significance and phonocardiogram.
5. ECG: Definition, determination, significance, coronary circulation.

UNIT III

DIGESTIVE SYSTEM (8 hrs):

1. Functions of Digestive system. Physiological Anatomy of G.I.T. T.S. of Intestine, Nerve supply.
2. Saliva composition and Functions. Structure and functions of stomach. Properties, composition and functions of gastric juice. Functions of pancreas, composition, properties and functions of Pancreatic Juice. Functions of Liver, Properties, Composition and functions of bile. Gall bladder functions and its emptying; Jaundice. Functions of large intestine - composition and functions of succus entericus.
3. Defecation, stool, normal.

UNIT IV

RESPIRATORY SYSTEM (10 hrs):

1. Functions of Respiratory system, stages of Respiration.
2. Transportation of Respiratory Gases.
3. Transportation of O2: Direction, pressure gradient. Forms of transportation, Oxygenation of Hb. Quantity of O2 transported.
4. Transportation of CO2 Direction, pressure gradient, modes of transportation.
5. Spirometry: Spirogram, Spirometer.
6. LUNG VOLUMES: Tidal Volume, Inspiratory Reserve Volume, Expiratory Reserve Volume, Vital Capacity, Forced Expiratory Volume 1, Forced Expiratory Volume 2, Forced Expiratory Volume 3.

UNIT V

ENDOCRINE SYSTEM (12 hrs):

1. HORMONE: Definition, Local and General Hormones, properties of Hormones, Endocrine glands of the body and their location,
2. PITUITARY: Situation, Master Endocrine Gland; Anterior and Posterior Parts, Anterior pituitary Hormones, functions and regulation of secretion of each of them, Dwarfism Acromegaly, Gigantism.
3. POSTERIOR PITUITARY: ADH, and Oxytocin-source, functions, diabetes insipidus.
4. THYROID GLAND: Physiological Anatomy and location, Hormones secreted, Physiological functions, endocrine disorders - Hypo and Hyper secretion - Goitre, Cretinism, Myxedema, Grave's disease.
5. ADRENAL GLAND: Adrenal Cortex Hormones secreted: Gluco corticoids, Mineralocorticoids, sex steroids, functions of cortisol and Aldosterone.
6. Endocrine Disorders - Addison's disease, Cushing's syndrome, Conn's syndrome, Adrenogenital syndrome.
7. ADRENAL MEDULLA: Functions of adrenaline and Nor-Adrenaline.
8. PANCREAS: Hormones of Pancreas: Insulin-functions and actions, Glucagon functions and actions. Regulation of blood glucose level; Diabetes Mellitus.
9. PARATHYROID GLAND: PTH functions and actions. Hypo and Hyper secretion of PTH, tetany.
10. CALCITONIN: Functions and actions, Regulation of blood calcium level.

PRACTICALS

Study of Microscope and its uses
Collection of blood and study of hemocytometry
Hemoglobinometry
Determination of specific gravity of blood
White Blood Cell Count
Red Blood Cell Count
Determination of Blood Groups
Leishman's staining and differential WBC count
Determination of Erythrocyte Sedimentation Rate

References:

1. Textbook of Physiology for BDS students by Dr. Jain
2. Textbook of Physiology for BDS students by Dr. Sambulingam

SEMESTER - 4
COURSE-3 CLINICAL LABORATORY PRACTICES-1
3Hrs / Week

TEACHING OBJECTIVES:

Mastery of Laboratory Techniques: Students should be able to perform various laboratory tests and procedures with accuracy and efficiency, including sample collection, processing, and analysis.
Equipment Operation and Maintenance: Understanding the operation, maintenance, and troubleshooting of laboratory equipment is crucial.

Quality Control and Assurance: Implementing and adhering to quality control measures to ensure the reliability and accuracy of laboratory results is essential.

Data Analysis and Interpretation: Students should be able to analyze laboratory data, identify patterns, and draw appropriate conclusions.

Proficiency in Specific Laboratory Areas: Depending on the specialization, students should gain expertise in areas like hematology, clinical chemistry, microbiology, immunology, or molecular diagnostics.

LEARNERS OUTCOMES:

Proficiency in Laboratory Procedures**:** Students should gain competence in performing a wide range of clinical laboratory tests, including hematology, clinical chemistry, microbiology, immunology, and molecular diagnostics.

Understanding Scientific Principles: They should demonstrate a solid grasp of the scientific principles underlying laboratory testing, including technical, procedural, and problem-solving aspects.

Instrumentation and Equipment: Students should be able to operate and maintain sophisticated biomedical instrumentation used in the clinical laboratory.

Quality Control and Assurance: They should understand and be able to implement quality control and assurance practices to ensure accurate and reliable test results.

Data Interpretation: Students should be able to interpret laboratory results and correlate them with clinical findings to aid in diagnosis and treatment.

SYLLABUS
PAPER - 3 CLINICAL LABORATORY PRACTICES -1

UNIT I

Laboratory Services :
levels of laboratories Primary level, Secondary level and tertiary level. Reference laboratories, Research laboratories and specific disease reference laboratories.

UNIT II

Infrastructure in the laboratories :
a) Laboratory space : Reception, specimen collection, quality water supply, power supply, work area, specimen / sample / slide storage, cold storage, record room, washroom, biomedical waste room, fire safety, etc.
b) Personnel in the laboratory: Qualifications as per NABL document.

UNIT III

Maintanance of Equipment:
a) Equipment: Listing, cleaning, maintenance, SOP, verification of performance: Internal quality control.

b) Reagents and materials: Purchase, maintenance, storage, use.

UNIT IV

Specimen Collection, storage and Transport : General guidelines of collection, labeling, handling, transportation storage of specimens. Care in handling specimens. Accession list, Worksheet, Reporting test results, Specimen rejection record, Recording of Laboratory data, Maintenance of records.

UNIT V

Standard operating Procedure:
Definition, format, text of SOP, types of SOP.

Practicals :-

Writing SOP of equipment maintenance, practical procedures done in the laboratory
Internal/External quality control
Sample collection, labeling, storage, transportation

References: -

1. ICMR (2008) guidelines for good clinical laboratory practices.
2. Hospital waste Management: Chapter 13. Park's Textbook of Preventive and Social Medicine; 18th Ed.
3. NIH: DAIDS guidelines for Good Clinical Laboratory Practice Standards; 2011.
4. WHO: Good Clinical Laboratory Practice (GCLP), 2009.

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SEMESTER - 5
COURSE-1 HUMAN ANATOMY-2
3 Hrs / Week

TEACHING OBJECTIVES:

Digestive System: Students should be able to identify the organs of the digestive tract and their roles in digestion and absorption.
Urinary System: Students should be able to identify the kidneys, ureters, bladder, and urethra and their roles in excretion.
Endocrine System: Students should be able to identify the major endocrine glands and their hormones and their functions.
Reproductive System: Students should be able to identify the organs of the reproductive system and their functions.
Embryology: Students should understand the basic principles of human development and the formation of organs and systems.
Variations and Anomalies: Students should be aware of common anatomical variations and congenital anomalies.
Radiographic Anatomy: Students should be able to correlate anatomical structures with their appearance in medical imaging (e.g., X-rays, CT scans, MRI).
Clinical Relevance: Students should understand the clinical significance of anatomical knowledge, including how anatomical knowledge is used in diagnosis and treatment.
Professionalism: Students should demonstrate professional behavior in the study of human anatomy, including respect for cadavers and anatomical specimens.

LEARNING OUTCOMES:

Explain: The relationship between structure and function in the human body. How changes at the cellular level affect the function of tissues, organs, and body systems. The role of the inflammatory process in maintaining body homeostasis during tissue injury, infection, and infectious disease.
Define: Anatomy and physiology. Key anatomical terms and concepts. Basic biological processes essential for maintenance of homeostasis.

SYLLABUS
HUMAN ANATOMY-2
UNIT I

ANATOMY OF THE DIGESTIVE SYSTEM:

Components of Digestive system, Alimentary tract, Anatomy of organs of Digestive System, Mouth, Tongue, Salivary glands, Liver, Biliary apparatus, Pancreas, Spleen-positions and brief functions.
PRACTICAL: Demonstration to illustrate

UNIT II

ANATOMY OF EXCRETORY SYSTEM AND REPRODUCTIVE SYSTEM

Kidneys - location, gross structure; ureters, Urinary bladder, Urethra.
Male Reproductive System:
Testis, duct system.
Female Reproductive System:
Ovaries, Duct system, Accessory organs.
PRACTICAL: Illustrations

UNIT III

ANATOMY OF THE ENDOCRINE SYSTEM:

Names of all endocrine glands and their positions.
Only Hormones of endocrine glands - included.
(Thyroid, Parathyroid, Pituitary and Adrenal glands, Gonads and Islets of pancreas)
Functions of endocrine glands - excluded.

UNIT IV

HISTOLOGY

IV. General Slides:
1. Hyaline Cartilage
2. Fibro Cartilage
3. Elastic Cartilage
4. T. S & L.S.Bone
5. Blood Vessels
6. Tonsils
7. Spleen
8. Thymus
9. Lymph node
10. Epithelial Tissue
11. Skeletal and Cardiac Muscle - Excluded
12. Peripheral nerve and optic nerve - Excluded

UNIT V

Systemic Slides:
1. G.I.T-Fundamental structure of G.I.T. & Liver, Stomach, Small intestine
2. R.S.Lung, Trachea
3. Kidney
4. Endocrines
Pituitary, Thyroid and Parathyroid
Adrenal
- Pancreas.
5. Reproductive System: Ovary, Testis
Uterus - Excluded,
Recommended Text Books:

Reference 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.

SEMESTER -5
COURSE-2 PHYSIOLOGY - 2
3Hrs / Week

TEACHING OBJECTIVES:

The teaching objectives of physiology aim to equip students with a comprehensive understanding of how the human body functions, encompassing normal physiological processes, the integration of organ systems, and the physiological basis of diseases, ultimately enabling them to apply this knowledge in clinical settings

LEARNING OUTCOMES:

Experimental Design and Analysis: Develop skills in designing experiments, collecting data, and interpreting physiological data.

Clinical Application: Apply physiological knowledge to understand and address clinical scenarios, including diagnosis and treatment.
Communication: Communicate physiological concepts effectively, both orally and in writing (e.g., journal-style reports).
Critical Thinking: Analyze physiological concepts critically, identify potential biases, and form well-supported conclusions.
Research Skills: Develop research skills, including literature review, data analysis, and interpretation of scientific findings.
Other Outcomes: Motivation for Lifelong Learning: Foster a sense of curiosity and motivation for continued learning and research in the field of physiology.
Teamwork and Collaboration: Develop skills in working collaboratively with others in scientific research and clinical settings.
Ethical Considerations: Understand the ethical implications of physiological research and practice.

SYLLABUS
PHYSIOLOGY - 2
UNIT I

NERVOUS SYSTEM (12hrs):

1. Functions of Nervous System in brief of all parts of CNS
2. EEG
3. CSF: formation, circulation, properties, composition and functions; lumbar puncture.

UNIT II

SPECIAL SENSES (6hrs):

1. VISION: functions of different parts of the eye. Refractive errors of eye and correction. Field of vision. Structure and functions of retina, Pupillary reflexes, color vision: color blindness, tests for color blindness.
2. HEARING: functions of outer, middle and inner ear, Deafness and Tests for deafness. Rinne's test. Weber's test.

UNIT III

Excretory System: Excretory Organs (10 hrs):

1. KIDNEYS: Functions of kidneys,
2. Functional unit nephron.
3. Mechanism of Urine Formation: GFR,

4. Selective Re absorption, substances reabsorbed, glucose, urea, amino acids, chlorides, H ions etc.
5. Properties and composition of normal urine, urine output. Names & Abnormal constituents in urine, Micturition, Cystourethrogram.
6. Diuretics, Renal Function Tests
7. Actions of ADH, aldosterone, PTH on kidneys.

UNIT IV

REPRODUCTIVE SYSTEM (6 hrs):

1. Functions of Reproductive system in male and female.
2. Semen secretion, composition, factors influencing, abnormalities, Oligozoospermia.
3. Ovulation, Menstrual cycle, Menstrual Fluid.
4. Pregnancy, Pregnancy tests.
5. Lactation factors affecting- composition of breast milk.

UNIT V

Muscle & Nerve Chapter - Included

PRACTICALS

Determination of packed cell volume
Calculation of Blood Indices
Fragility Test for R.B.C
Determination of Bleeding Time
Determination of Clotting Time
Blood Pressure Recording
Examination of arterial pulse included
Artificial Respiration
Determination of Vital Capacity

References:

1. Textbook of Physiology for BDS students by Dr. Jain
2. Textbook of Physiology for BDS students by Dr. Sambulingam

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SEMESTER - 5
COURSE-3 CLINICAL LABORATORY PRACTICES – 2
3 Hrs / Week

TEACHING OBJECTIVES:

Communication and Interpersonal Skills: Effective communication with healthcare professionals, patients, and laboratory staff is essential.
Problem-Solving and Critical Thinking: Students should be able to apply critical thinking skills to analyze problems and find solutions.
Professionalism and Ethical Conduct: Adherence to professional standards, codes of ethics, and regulatory requirements is paramount.
Teamwork and Collaboration: Working effectively as part of a healthcare team is essential.
Lifelong Learning and Professional Development: Recognizing the need for continuous learning and professional development is important for staying current with advancements in the field.
Patient Safety: Prioritizing patient safety and adhering to safety protocols is a fundamental responsibility.
Confidentiality: Maintaining patient confidentiality is a critical ethical obligation.

LEARNING OUTCOMES:

Ethical and Professional Behavior:
They should demonstrate ethical and professional conduct in all aspects of their work, including patient interactions, communication with healthcare professionals, and adherence to laboratory regulations.
Confidentiality and Data Security:
Students should understand and uphold the principles of patient confidentiality and data security.
Communication Skills: They should be able to communicate effectively, both orally and in writing, with patients, healthcare professionals, and the public.
Teamwork and Collaboration: They should be able to work effectively as part of a healthcare team, collaborating with other professionals to provide optimal patient care.
Lifelong Learning: Students should demonstrate a commitment to lifelong learning and professional development, staying abreast of advancements in the field.
Safety and Compliance: They should understand and comply with all relevant laboratory safety regulations and standards.

SYLLABUS
CLINICAL LABORATORY PRACTICES – 2
UNIT I

Safety in Laboratories : General safety measures, biosafety precautions, levels of biosafety laboratories: BSL1, BSL2, BSL3, BSL4.

UNIT II

Ethical considerations : Non maleficence, beneficence, risk minimization, institutional arrangement, ethical review, transmission of ethical values, voluntariness, compliance.

UNIT III

Quality assurance: Internal and external quality assessment.

UNIT IV

Bio waste management.

UNIT V

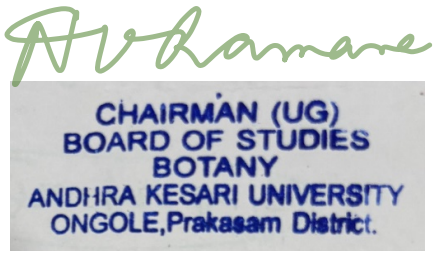
Accidents and emergencies in the laboratory.

Practicals:-

1. Bio waste management
2. Bio safety

References: -

1. ICMR (2008) guidelines for good clinical laboratory practices.
2. Hospital waste Management : Chapter 13. Park's Text Book of Preventive and Social Medicine; 18th Ed.
3. NIH : DAIDS guidelines for Good Clinical Laboratory Practice Standards; 2011.
4. WHO :Good Clinical Laboratory Practice (GCLP), 2009.



SEMESTER - 5
COURSE -4 ROUTINE LABORATORY TECHNOLOGY
3 Hrs / Week

TEACHING OBJECTIVES:

Proficiency in Techniques: Students should gain proficiency in essential laboratory techniques, including sample collection, processing, and analysis.

Equipment Handling: Students should be able to confidently and accurately use laboratory equipment, including microscopes, pipettes, and other instruments.

Data Collection and Analysis: Students should learn to collect, record, and analyze data accurately and efficiently, using appropriate methods and tools.

LEARNING OUTCOMES:

Proficiency in Equipment Operation: Demonstrate competence in using and maintaining common laboratory equipment, including microscopes, centrifuges, spectrophotometers, and automated analyzers.

Sample Handling and Preparation: Accurately collect, prepare, and process samples for various laboratory tests, adhering to standard operating procedures (SOPs).

Quality Control: Understand and perform quality control procedures to ensure the accuracy and reliability of laboratory results.

Data Analysis and Interpretation: Accurately record and interpret laboratory data, identifying normal and abnormal findings, and relating them to relevant disease processes.

Troubleshooting: Identify and resolve common technical issues and equipment malfunctions, seeking appropriate assistance when necessary.

Understanding of Scientific Principles: Demonstrate a foundational understanding of the scientific principles underlying common laboratory techniques and procedures.

Safety and Ethical Conduct:

Laboratory Safety: Adhere to strict safety protocols and procedures, including the proper handling of chemicals, biological materials, and equipment.

Patient Confidentiality: Understand and maintain the confidentiality of patient information and laboratory results.

Ethical Conduct: Demonstrate ethical behavior and integrity in all aspects of laboratory work.

Professional Development:

Communication Skills: Effectively communicate laboratory results and findings to other healthcare professionals and patients.

Teamwork: Collaborate effectively with other laboratory personnel and healthcare professionals.

Continuous Learning: Demonstrate a commitment to ongoing professional development and staying current with advancements in laboratory technology and techniques.

Syllabus
Routine laboratory technology

UNIT -1

Routine Hematological Tests : Determination of hemoglobin concentration, determination of hematocrit, enumeration of formed elements, calculations of red blood cell indices MCV, MCH and MCHC, Automated systems in hematology, study of blood smear, reticulocyte count, erythrocyte sedimentation rate (ESR), eosinophil count, and platelet count.

UNIT II

Urine Examination: Urine analysis, routine examination of urine, rapid chemical tests of urine.
Clinical significance, specimen collection, laboratory investigations.

UNIT -III

Stool Examination: Gross examination, physical examination of stool, determination of pH, chemical examination of feces, microscopic examination of stool specimen.
Clinical significance, specimen collection, laboratory investigations.

UNIT-IV

Semen Examination
Semen analysis: Routine examination of semen, quantitative determination of semen fructose, interpretation of results, Sperm count, motility, viability, HOS test.

UNIT-V

Sputum Examination: Indication, collection, transport, preservation for different types of sputum analysis.
Physical, chemical and microscopic examination of sputum and its significance.

PRACTICALS:
1 To prepare of the 0.1N HCl.
2 To prepare the different concentration of solutions.
3 To prepare different bulbs required in the laboratory.
4 To determine the nature of the given solution.
5 To find out the normality of given solution.
6 Routine examination of urine physical examination of urine.
7 Determination of specific gravity of urine by urinometer and refracto meter.
8 Chemical examination of urine.
9 Microscopic examination of urine.
10 Physical and chemical examination of semen.
11 Microscopic examination of semen.
12 HOS test for sperm coiling
13 Physical examination of stool.
14 Chemical examination of stool.
15 Microscopic examination of stool.

Reference :

1. The Short Textbook of Medical Laboratory for Technicians - Satish Gupte (3rd Edition)
2. MCQ'S in Medical Laboratory Technology - Puneet Munjal & Samriti Sethi (Saurabh Publishers)
3. Textbook of Medical Laboratory Technology - Praful B. Godkar & Darshan P.Godkar (Standard Edition)

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SEMESTER - VI

Long Term Internship/Semester Internship

SEMESTER - 7

Course - 1 Basics of Clinical Haematology

Objective

The curriculum of haematology aims to prepare the students in basic understanding of the composition of blood, waste management, instrumentation, techniques and methods of estimating different parameters.

Learning Outcome

By the end of this course, the students will be able to

- Collect, process and preserve the blood samples
- Can efficiently perform routine investigations in clinical hematology laboratory

UNIT I

Introduction: Introduction to Haematology, Organization of laboratory and safety measures, Laboratory Safety guidelines, Important equipment used in haematology lab

UNIT II

Haematopoiesis : Erythropoiesis, Leucopoiesis, Thrombopoiesis, sites of hemopoiesis, Mechanism of hemopoiesis, stages of cell development, Blood and its composition, Anticoagulants, mechanism of action, types and uses, merits and demerits, effect of storage on blood cells

UNIT III

Sample Collection :Requirement, methods of collection, transport, preservation, and processing of various clinical Specimens, Blood collection for hematological investigations, Venipuncture, Capillary blood, Arterial blood, Precautions during collection, Vacutainer tubes, its type and uses, sample acceptance and rejection criteria.

UNIT IV

Hemoglobin : structure, function and types, Hemoglobinometry, Hemoglobin estimation by various methods, advantages and disadvantages, physiological and pathological variations on blood parameters, Hemocytometry, visual and electronic method, neubauer counting chamber, RBC count, WBC count, Platelets count, absolute cosinophil count, principle, procedure, calculation, significance, precautions involved during counting, absolute count of various WBCs. Physiological and pathological changes in values

UNIT V

Smear preparation : Preparation of thin and thick smears, staining of smears, Romanowsky dyes, preparation and staining procedures of blood smears, Morphology of normal blood cells and their identifications, differential leucocytes count by manual and automated method, physiological and pathological variations in value.

LIST OF PRACTICALS

1. To learn general laboratory safety rules
2. To demonstrate glass wares, apparatus and plastic wares used in laboratory
3. To prepare EDTA, Sod. Citrate & Sod. Fluoride anticoagulants and bulbs/vials used in laboratory
4. Demonstration of Vacutainer
5. To demonstrate method of blood collection
6. To separate serum and plasma
7. Demonstration of microscope.
8. Determination of Hemoglobin by various methods
9. Determination of TLC
10. Preparation of thick and thin smear
11. Determination of DLC
12. Determination of Total RBC
13. Determination of total platelet count
14. Determination of absolute leucocyte count

Text Books

- Sharma and Parashar. Dictionary of Biochemistry; CBS Publications
- Harold And Varley. Practical Clinical Biochemistry
- Laxmi Ahuja; Quick Review In Biochemistry; Asia Printograph

Reference Books

- A.C. Deb; Fundamentals of Biochemistry; New Central Book Agency
- Varun Kumar Malhotra; Handbook of Practical Biochemistry; Jaypee Brothers

Text Books:

- Godkar. B. Praful, (2016) Textbook of MLT, 3rd edition, Bhalani Publications
- Singh Tejinder, (2014), Atlas & Textbook of Haematology, 3rd edition, Avichal Publications
- Ochei J & Kolhatkar A(2000), Medical Laboratory Science: Theory & Practice, 3rd edition, Megraw Hill Education

Reference Books:

- Mukherjee L.K(2017), Medical Laboratory Technology, Vol. 1-3,3rd edition, Tata Mcgraw Hill Sood Ramnik, (2015),
- Text book of Medical Laboratory Technology, 2nd edition, Jaypee Publications
- **Web Links:**
- http://www.colby.edu/chemistry/BC176/CH1.pdf
- https://doctorlib.info/medical/biochemistry/3.html
- https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_students/Medical Bio chemistry.pdf

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SEMESTER - 7
COURSE-2 MICROSCOPY AND CELL BIOLOGY
3 Hrs / Week

Teaching Objectives:
Microscopy Objectives:
Understanding the Basics: Explain how microscopes work, including magnification and resolution.
Identify and describe the different parts of a microscope.
Compare and contrast different types of microscopy (e.g., light, electron).
Learn how to use a microscope effectively, including focusing and adjusting magnification.
Understand the limitations and advantages of different microscopy techniques.
Practical Skills: Prepare and examine microscope slides.
Identify and describe different cell types and structures.
Measure cell size using ocular and stage micrometers.
Interpret microscopic images and micrographs.
Understand the role of stains and dyes in microscopy.
Cell Biology Objectives: Understand the basic structure and function of different cellular components (e.g., organelles, membranes, macromolecules).
Learn about prokaryotic and eukaryotic cells, including their differences and similarities.
Understand how cells obtain and utilize energy.
Learn about the cell cycle and cell division (e.g., mitosis, meiosis).
Understand the importance of cells in living organisms and their role in various biological processes.
Advanced Objectives:
Learn about advanced microscopy techniques like fluorescence microscopy and confocal microscopy.
Understand the role of microscopy in research and diagnostics.
Be able to design and conduct simple microscopy experiments.
LEARNING OUTCOMES:
Microscopy:
Understanding Microscopy Principles: Identify and explain the function of different parts of a light microscope.
Understand the principles of light microscopy, including magnification and resolution.
Differentiate between light and electron microscopy and their applications.
Learn how to prepare and view microscopic slides of various cell types.
Microscopy Techniques:
Demonstrate proficiency in using a light microscope.
Understand the use of different objective lenses and oil immersion.
Identify and explain the limitations of microscopy techniques.

Cell Biology:
Cell Structure and Function:
Identify and describe the structures and functions of different cellular organelles (e.g., nucleus, mitochondria, endoplasmic reticulum).
Understand the structure and function of cell membranes and their role in transport.
Explain the role of the cytoskeleton in cell shape, movement, and organization.
Describe the basic components of prokaryotic and eukaryotic cells.
Cell Processes:
Explain the processes of cell division (mitosis and meiosis).
Understand cell signaling pathways and their role in cell communication.
Describe the mechanisms of energy production in cells (e.g., glycolysis, cellular respiration).
Explain the role of macromolecules (proteins, lipids, carbohydrates, and nucleic acids) in cell structure and function.

SYLLABUS

Microscopy and Cell Biology

UNIT I

Microscopy : Microscopy: Definition, principles, components, types and applications. Specimen preparation, staining and fixation.

UNIT II

Cell Structure: Structure and organization of Cell: Extra nuclear and nuclear. Types of cells (prokaryotic and eukaryotic); Plasma membrane: Structure, Osmosis, active and passive transport, endocytosis an exocytosis

UNIT III

Cell Organelles: Structure, types and functions of endoplasmic reticulum, mitochondria, Golgi Complex, Ribosomes, Lysosomes, Centrosomes. Nucleus: Structure and function of nuclear membrane, nucleolus and chromosomes.

UNIT IV

An elementary idea of cell transformation in Cancer. An elementary idea of cellular basis of immunity

UNIT V

Basics of Cancer Cell: Cancer: Definition, Signs and Symptoms, causes, risk factors, types of cancers, carcinogens, metastasis, cell cycle and check points.

PRACTICALS:

Classification up to orders, ecological notes and economic importance, some of the following:
Protozoa:
a. Examination of cultures of Euglena and Paramecium.
b. Slides: Amoeba, Trypanosoma, Monocystis,
c. Porifera: Sycon, Grantia, Euplectella, Hyalonema, Spongilla, Euspongia
d. Cnidaria (Coelenterata): Porpita, Velella, Physalia, Aurelia, RhizostomaMetridium, Millipora, Alcyonium, Hydra (W.M) Hydra with buds. Obelia (Colony and medusa), Sertularia, Plumularia.
e. Platyhelminthes: Dugesia, Fasciola, Taenia, Miracidium, sporocyst, Redia, Cerearia of Fasio, Scolexnottio, Tamate
f. Nematihelminthes: Ascaris. Wuchararia
g. Anilida: Earth Warm, Leach

h. Arthropoda: Peripatus, Prawn, Lobster, Cancer (Crab), Sacculina, Eupagurus (Hermit Crab), Lepas, Balanbus, Apis, Lepsima (Silver Fish), Schistocerca (Locust), Poeciloverus, (Ak Grasshopper, Gryllus(cricket), mamis (Praying mantis), scarabaeus (Dung beetle), Agrian (Dragon fly) Odontotermes
i. Mollusca: anodonta, Mytilus, Ostrea, cardium, Pholas, Solen. (Razorfish) poctten, Hailotis, Patella Aplysia, Dori,
j. Ehindermta: Seschiu, Ohrxa Ancon, Hehordata alanossus

CELL BIOLOGY

Paper chromatography
Gel electrophoresis through photographs or through research laboratories
Familiarity with TEM & SEM.
Study of different ultra structures of cell organelle through photographs.

Reference:

1.Celis JE (ed) (1998) Cell Biology: A Laboratory Handbook, 2nd edn. San Diego: Academic Press.
2.Lacey AJ (ed) (1999) Light Microscopy in Biology: A Practical Approach, 2nd edn. Oxford: Oxford University Press.
3.Paddock SW (ed) (1999) Methods in Molecular Biology, vol 122: Confocal Microscopy Methods and Protocols. Totowa, NJ: Humana Press.
4. Watt IM (1997) The Principles and Practice of Electron Microscopy, 2nd edn, Cambridge: Cambridge University Press.

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SEMESTER - 7
Course-3 Immunohematology and Blood Banking Technology

Objectives:

This course has been formulated to impart basic aspects of immunity, antigens, antibodies, various serological reactions, techniques and their utility in laboratory diagnosis of human diseases.

Learning Outcomes

The students will learn scientific approaches/techniques that are used to investigate various diseases.

UNIT I

Blood Banking : Basic Principles of Blood Banking, Antigen, Antibody, naturally occurring antibody, Complement, ABO & Rh blood group system, Methods of blood group determination, Forward and Reverse grouping, Slide & Tube method, Gel method

UNIT II

Other Blood Group system : Other blood group system such as Lewis, MNS, Kell, Duffy etc Anticoagulants and preservative used in blood bank Donor selection criteria, Blood collection and processing

UNIT III

Testing : Transfusion transmissible infectious disease screen, Coomb test, Cross matching. Compatibility testing, Antibody Screening & Identification, Grading of Reaction/Agglutination

UNIT IV

Blood Components : Blood components and its preparation, preservation, storage and transportation, Indications for different blood component transfusion, Blood transfusion reaction and its type, HDN Introduction of stem cell banking and bone marrow transplantation.

UNIT V

Role of different Agency : Apheresis, indications of hemapheresis, plasmapheresis, plateletspheresis, plasmapheresis, Quality control of reagents, equipments, blood components used in transfusion medicine. Role of NACO, Indian Red Cross Society, DGHS and blood transfusion services.

Practicals:

1. Blood Group determination
2. Blood collection and processing
3. Grading of Reaction
4. Blood compnents used in Medicine

Text Books :

Compendium of Trasfusion Medicine, Dr R N Makroo
Text book of Medical lab Technology, Praful B Godkar, IIIrd edition
Text book of Medical Lab Technology, Ramnik Sood, Jaypee Publishers
Text Book of Pathology, Harshmohan, 6th Edition
Practical Haematology, Dacie & Lewis, 11th edition

SEMESTER - 8

Course-1 Clinical Endocrinology and Tumor Marker

Objectives

This paper is framed to provide basic knowledge of hormones & toxic substances with their determination techniques as well as related disorders.

Learning Outcomes

Students would be able to perform collection, processing, staining and quality control in cytological diagnosis.

UNIT I

Hormones: Hormones, Classification of hormones, organs of endocrine system their secretion and function, regulation of hormone secretion, Mechanism of action

UNIT II

Thyroid Function: Thyroid function test: Thyroid hormones, biological function, hypothyroidism, hyperthyroidism, Determination of T3, T4, TSH, FT3, FT4, TBG, Disorder associated with thyroid dysfunction. Hormones of Parathyroid gland and their estimation,

UNIT III

Infertility: Infertility, types of infertility, test for female and male infertility Infertility profile: LH, FSH, TSH, Estrogen, Progesterone, Total Testosterone, Free testosterone, DHEA-S, 17- Ketosteroids, Prolactin, their estimation and clinical significance, reference range, hypo and hyper secretion, Triple Test, Quadruple Test

UNIT IV

Growth Hormones : Growth hormone, ACTH, Aldosterone, Cortisol their estimation and clinical significance, reference range, hypo and hyper secretion

UNIT V

Tumor Markers : Tumor markers, their types, significance and estimation, Advantages and disadvantages of tumor markers

Practicals:

1. Determination of T3, T4, TSH
2. Hormones of Estimation
3. Triple Test
4. Tumor Marking

Textbooks

Textbook of Biochemistry, DM Vasudevan, Jaypee Publishers
Textbook of Biochemistry, MN Chatterjea, Rana Shinde
Clinical Chemistry, Teitz
Clinical Chemistry, Bishop
Textbook of Medical Lab Technology, Praful B Godkar, IIIrd edition

SEMESTER - 8

Course-2 Parasitology and Entomology

3 Hrs / Week

Objectives

The course is designed to impart knowledge and skills required to learn various aspects and concepts about Parasitology and Entomology, the related diseases, their prevention and control.

Learning Outcomes

1. Outline the mode of transmission, pathogenesis and identification and control of helminths and protozoa
2. Describe pathogenesis, clinical signs and symptoms and complications of parasitic infections
3. Outline the treatment for various parasitic infections, giving the methods of prevention and control of infection at individual and community levels
4. General principles of immune reactions and immunodiagnosis of parasitic infections

UNIT I

Parasitology : Introduction: Parasitology methods, Types of parasites: ectoparasites, endoparasites, obligatory, facultative, accidental, permanent, temporary, pathogenic, non-pathogenic. Types of hosts: definitive, intermediate, paratenic (transfer), reservoir, accidental. Properties of parasites: depending upon infectiousness, establishment and transmission

UNIT II

Helminths and protozoa

Helminths: Tissue and intestinal nematodes, cestodes and trematodes, Protozoa: Tissue and intestinal protozoa. Trichomonas vaginalis. Diagnosis and chemotherapy of parasitic infections, reservoir of infection, mode of transmission, factors that facilitate the spread of disease, clinical features, control and prevention

UNIT III

Arthropods & Mosquitoes

Arthropods; Mosquitoes; Chrysops, House flies, Sand fly, Tse tse fly, Simulium & Biting midges; Brachycera. Musca, Stomoxys & Glossina, reservoir of infection, mode of transmission, factors that facilitate the spread of disease, clinical features, control and prevention

UNIT IV

Sarcophagidae, Calliphoridae & myasis: Fleas, Lice & Bugs: Ticks & Mites; Arthropods of Minor Medical Importance, reservoir of infection, mode of transmission, factors that facilitate the spread of disease, clinical features, control and prevention

UNIT V

Immunodiagnosis: Molecular-Based Approaches, Imaging Techniques and Endoscopy, Recent

Diagnostic Advances Using Nanotechnology

Practicals:

1. Determination of Parasites
2. Mode of Transmission
3. Using Nano Technology
4. Molecular Techniques.
5. Fecal and Blood sample analysis

Reference Book

1. Chatterjee, K. D. (2009). Medical Parasitology. 13th Edition. CBS Publishers & Distributors, New Delhi
2. Sullivan, J. T. (2009). Color Atlas of Parasitology. 8th Edition. Parasitology, San Francisco, CA
3. Despommier, D. D., Gwadz, R. W. and Hotez, P. J., Krogstad, D., Karapelou, J. W. (2012). Parasitic Diseases. 5th Edition Springer-Verlag New York, LLC
4. JANOVY, J., ROBERTS, L. S. AND NADLER, S. (2012) FOUNDATIONS OF PARASITOLOGY. 9TH EDITION. MCGRAW-HILL HIGHER EDUCATION, LONDON Service, M. (2012).
5. Medical Entomology for Students. 5th Edition. Cambridge University Press, Cambridge

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SEMESTER - 8

COURSE-3 POSITONING IN RADIOGRAPHY

3 Hrs / Week

1. Aim and objectives of Course: **POSITIONING IN RADIOGRAPHY**

- Students will acquire knowledge on pathological conditions-injuries, fractures and dislocations congenital
- Students has to know about positioning of Radiography on various parts of the body.

2. **Detailed Syllabus: (Five units with each unit having 12 hours of class work)**

UNIT I

Positioning Radiography - I

Skeletal System

Upper Limb : Techniques for hand-fingers-thumb-wrist joint-forearm-elbow joint-humerus shoulder joint and sterno-clavicular joint.

Lower Limb : Techniques for foot-calcaneum-ankle joint-leg-knee joint-patella-and femur (lower two thirds)

UNIT II

Pelvic Girdle : Techniques for pelvic-iliac fossa-ischium-and sacro iliac joint.

Vertebral Column :Techniques for Atlanto-occipital articulation, cervical vertebrae, cervicothoracic junction, thoracic vertebrae, lumbar vertebrae, lumbosacral articulation, sacrum

UNIT III

Coccyx

Bones of Thorax : Techniques for sternum, ribs (upper and lower).

Skull :Techniques for cranium, facial bones, sellaturcica, temporal Bone, martoidsand optic foraminae, sinuses, mandible and temporo mandible joint.

UNIT IV

Chest : Chest X-Ray, PA, AP lateral, decubitus etc.

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

UNIT V

Soft tissue radiography

Neck, abdomen, skull, mammogram

Details of Lab/Practical/Experiments/Tutorials syllabus:

1. X-ray beam alignment test
2. Determination of magnification by changing Source to Image Distance
3. Determination of magnification by changing Object to Image Distance
4. Radiation Protection Survey
5. Leakage radiation test
6. Positioning Radiography

References:

1. A guide to Radiological Procedures - 2nd edition, Stephan Chapman & Richard Nakielny, 1986.
2. Clark's Positioning in Radiography.
3. Merrill's atlas of radiographic positioning and radiologic procedures, 1,2& 3 Volumes.
4. Diagnostic radiography: A concise practical manual, Glenda J. Bryan, Churchill Livingstone, 1987.
5. Handbook of Medical Radiography - C. Ram Mohan
6. Radiological Procedures (A guideline) - Bhushan N. Lakkar

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Bachelor of Vocation in Medical Laboratory Technology

Under Multiple Entry-Exit, Internship and CBCS in accordance to NEP 2020 w.e.f. 2024-25

SEMESTER-MODEL PAPER

Theory Model Paper

Time-3 hrs MaxMarks-75

Instructions for Paper-Setter:

Section-A

Comprising short answer questions from the entire syllabus. All questions carry equal Marks. Each question carries Five marks.

Section- B

Comprising Essay answer questions from the entire syllabus. All questions carry equal Marks. Each question Carries Ten Marks. Two questions must be given from each Unit.

Section-A

Answer Any Five of the following 5X5=25 M

1. Unit-1
2. Unit-1
3. Unit-2
4. Unit-2
5. Unit-3
6. Unit-3
7. Unit-4
8. Unit-4
9. Unit-5
10. Unit-5

Section- B

5 X 10 = 50 M

Answer Any Five of the following

11.Unit-1
12.Unit-1

13.Unit-2

14.Unit-2

15.Unit-3

16.Unit-3

17.Unit-4

18.Unit-4

19.Unit-5

20.Unit-5

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Practical Model Paper

Time-3H

Max Marks - 50

1. Seminar/Demonstration	**30 M**
2. Lab Records	**10 M**
3. Viva-voce	**10 M**

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