COLLEGE VISION AND MISSION

VISION

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

MISSION

M1: Quality Education:

To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices.

M2: **Research and Innovation:**

To foster value based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

M3: Employability and Entrepreneurship:

To inculcate the employability and entrepreneurial skills through value and skill based training.

M4: Ethical Values:

To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

DEPARTMENT OF MEDICAL LAB TECHNOLOGY

VISION AND MISSION

VISION

The bachelor of health science graduate is an individual, who has broad perspective of health and healthcare and brings innovation, critical thinking and lifelong learning skills into health care settings.

MISSION

M1: knowledge sharing:

- To develop and transmit knowledge of diverse aspects of health care delivery and health research

M2: Collaborative learning:

- To develop quality, bench marks information, dissemination, documentation, publication, communication and soft skills, feedback systems.

M3: Career Development:

- Recognizing that career development is a life-long process, the mission of Career and Professional Development is to educate and support students.

M4: Consistent Improvement:

- Strive for excellence in the scientific, professional and humanistic aspects of their chosen discipline.

DISTRIBUTION OF TEACHING HOURS FOR 1ST YEAR COURSES

Course	Lecture	Practicals	Total
ANATOMY	60	40	100
PHYSIOLOGY	60	40	100
BIO-CHEMISTRY	60	40	100
MICROBIOLOGY	60	40	100
PATHOLOGY	60	40	100
ENGLISH	25	25	50
COMPUTER SCIENCE	25	25	50
CLINICAL POSTING	-	300	300
Total	**350**	**550**	**900**

DISTRIBUTION OF MARKS FOR 1ST YEAR COURSES

Course Code	Course	Theory								Practicals						Grand Total	
		*EYE		**CAT		Viva		Total		*EYE		***CAT		Total			
		Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Theory+ Practical	
																Max	Min
U20CTAT11	ANATOMY	60	24	20	8	20	8	100	40	40	16	20	8	60	24	160	80
U20CTAT12	PHYSIOLOGY	60	24	20	8	20	8	100	40	40	16	20	8	60	24	160	80
U20MLTT13	BIO-CHEMISTRY	60	24	20	8	20	8	100	40	40	16	20	8	60	24	160	80
U20CTAT14	MICROBIOLOGY	60	24	20	8	20	8	100	40	40	16	20	8	60	24	160	80
U20CTAT15	PATHOLOGY	60	24	20	8	20	8	100	40	40	16	20	8	60	24	160	80
U20CTAT16	ENGLISH	-	-	-	-	-	-	-	-	-	-	50	25	50	25	50	25
U20CTAT17	COMPUTER SCIENCE	-	-	-	-	-	-	-	-	-	-	50	25	50	25	50	25
TOTAL		**-**	**-**	**-**	**-**	**-**	**-**	**500**	**200**	**-**	**-**	**-**		**400**	**170**	**900**	**450**

*EYE Examination, **CAT Internal Assessment in Theory (Test 15 marks + Attendance 5 marks)

***CAT Practicals (Test 10 marks + Attendance 5 marks+ record books 5Marks)

Minimum Marks for Pass is (i) 40% in Theory & Practicals separately.
(ii) 50% in aggregate of both Theory & Practicals combined.

Minimum Marks for Pass in Ancillary Subjects is 50%.

DISTRIBUTION OF TEACHING HOURS FOR 2ND YEAR COURSES

Course	Lecture	Practicals	Total
BIOCHEMISTRY	60	40	100
MICROBIOLOGY	60	40	100
PATHOLOGY	60	40	100
PHARMACOLOGY	30	-	30
ENVIRONMENTAL SCIENCE AND COMMUNITY MEDICINE	30	-	30
CLINICAL POSTING	-	1200	1200
TOTAL	**240**	**1320**	**1560**

DISTRIBUTION OF MARKS FOR 2ND YEAR COURSES

Course Code	Course	Theory								Practicals						Grand Total	
		*EYE		**CAT		Viva		Total		*EYE		***CAT		Total			
		Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Theory+ Practical	
																Max	Min
U20MLTT21	BIOCHEMISTRY	60	24	20	8	20	8	100	40	40	16	20	8	60	24	160	80
U20MLTT22	MICROBIOLOGY	60	24	20	8	20	8	100	40	40	16	20	8	60	24	160	80
U20MLTT23	PATHOLOGY	60	24	20	8	20	8	100	40	40	16	20	8	60	24	160	80
U20CTAT21	PHARMACOLOGY	-	-	50	25	-	-	50	25	-	-	-	-	-	-	50	25
U20CTAT22	ENVIRONMENTAL SCIENCE AND COMMUNITY MEDICINE	-	-	50	25	-	-	50	25	-	-	-	-	-	-	50	25
TOTAL		**-**	**-**	**-**	**-**	**-**	**-**	**400**	**170**	**-**	**-**	**-**	**-**	**180**	**72**	**580**	**290**

*EYE Examination, **CAT Internal Assessment in Theory (Test 15 marks + Attendance 5 marks)

***CAT Practicals (Test 10 marks + Attendance 5 marks+ record books 5Marks)

Minimum Marks for Pass is (i) 40% in Theory & Practicals separately.
(ii) 50% in aggregate of both Theory & Practicals combined.

Minimum Marks for Pass in Ancillary Subjects is 50%.

DISTRIBUTION OF TEACHING HOURS FOR 3RD YEAR COURSES

Course	Lecture	Practicals	Total
BIOCHEMISTRY	60	40	100
MICROBIOLOGY	60	40	100
PATHOLOGY	60	40	100
BIOSTATISTICS AND ETHICS	30	-	30
CLINICAL POSTING	-	1200	1200
TOTAL	**210**	**1320**	**1530**

DISTRIBUTION OF MARKS FOR 3RD YEAR COURSES

Course Code	Course	Theory								Practicals						Grand Total	
		*EYE		**CAT		Viva		Total		*EYE		***CAT		Total			
		Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Theory+ Practical	
																Max	Min
U20MLTT31	BIOCHEMISTRY	60	24	20	8	20	8	100	40	40	16	20	8	60	24	160	80
U20MLTT32	MICROBIOLOGY	60	24	20	8	20	8	100	40	40	16	20	8	60	24	160	80
U20MLTT33	PATHOLOGY	60	24	20	8	20	8	100	40	40	16	20	8	60	24	160	80
U20CTAT31	BIOSTATISTICS AND ETHICS	-	-	50	25	-	-	50	25	-	-	-	-	-	-	50	25
TOTAL		**-**	**-**	**-**	**-**	**-**	**-**	**350**	**145**	**-**	**-**	**-**	**-**	**180**	**72**	**530**	**265**

*EYE Examination, **CAT Internal Assessment in Theory (Test 15 marks + Attendance 5 marks)

***CAT Practicals (Test 10 marks + Attendance 5 marks+ record books 5Marks)

Minimum Marks for Pass is (i) 40% in Theory & Practicals separately.
(ii) 50% in aggregate of both Theory & Practicals combined.

Minimum Marks for Pass in Ancillary Subjects is 50%.

I-YEAR SYLLABUS

		L	P	Hrs
U20CTAT11	**ANATOMY**	**60**	**40**	**100**

HUMAN BODY AS A WHOLE

1. Anatomical position
2. Fundamental planes of the body
3. Anatomical terms (superior, inferior, medial, lateral, proximal and distal)
4. Organization of human body
5. Parts of microscope and its functions
6. Epithelium
    - Types
    - functional importance with examples

LOCOMOTOR SYSTEM

Skeletal system

1. Bone composition
2. Long bone
    - Parts
    - blood supply with clinical implication
3. Identify major bones of the body and their parts
4. Classification of synovial joints with associated movements
5. Articular surface of key joints in human body
6. Parts of a muscle and its arrangement
7. Classification of muscles with functional importance
8. Muscles of upper limb, lower limb and head and neck with actions

NERVOUS SYSTEM

Classification and components of nervous system

1. Spinal cord
    - Coverings
    - Extent
    - Organization of grey matter and white matter with clinical implication
2. Brainstem
    - Parts
    - Location of cranial nerve nucleus with functions
3. Cerebellum
    - Location
    - Parts
    - Functional subdivisions
    - blood supply and functions

4. Cerebrum
    - Surfaces
    - important sulci and gyro and functional correlation
5. Thalamus
    - location and functional correlation
    - Striatum, hippocampus and Amygdala – their location and function.
6. Cranial nerves
    - Names
    - location of nucleus with clinical correlation

CIRCULATORY SYSTEM

1. General plan of circulatory system
2. Difference between systemic and portal circulation
3. Microanatomy of artery and vein
4. Thoracic cavity
    - Bony cage
    - muscles – intercostal muscles,diaphragm
5. Mediastinum – sub-divisions, contents
6. Heart
    - Coverings
    - External features
    - Chambers
    - Blood supply
    - Nerve supply.
7. Major vessels of the heart
8. Veins of upper limb and lower limb - varicose veins and their importance
9. Lymphatic system – components, microanatomy of lymphoid organs(lymph node, tonsil, thymus,spleen)

RESPIRATORY SYSTEM

1. Nasal cavity, Para-nasal air sinuses, nasal septum, lateral wall of nose – location and functions
2. Pharynx – subdivision and structures present
3. Larynx – cartilages, muscles and nerve supply
4. Trachea and bronchial tree – extent, broncho-pulmonary segments and their clinical importance
5. Pleura – types, reflections, recesses and its clinical importance
6. Lung – location, relations, lobes, fissures, surfaces.

DIGESTIVE SYSTEM

1. Abdomen
    - Quadrants
    - Musculature of wall
    - Formation in guinal canal
    - Rectus sheath and their importance

2. Components of digestive system.
3. Mouth - Tongue, palate – Structure of tongue
4. Salivary glands – parotid, sub-mandibular – Brief anatomy and structure
5. Stomach
    - Position
    - Parts
    - Blood supply
    - Nerve supply
    - Lymphatic drainage
    - Relations &structure
6. Small intestine –subdivisions
7. Large intestine in general - sub-divisions, microscopic structure. Specific -caecum and appendix
8. Accessory organs of digestive system
    - Liver
    - Pancreas
    - Extra hepatic biliary apparatus -Gross features, relations, blood supply

EXCRETORY AND REPRODUCTIVE SYSTEMS

1. Kidney
    - Location
    - Parts
    - Relations and blood supply
2. Ureter & urinary bladder
    - Location
    - Parts
    - Relations and blood supply
3. Male reproductive system
    - Testis
    - Spermatic cord and its coverings
4. Female reproductive system
    - Ovary
    - Uterus – parts and supports
5. Accessory organs of reproduction
    - Prostate gland
    - Mammary gland

ENDOCRINE SYSTEM

1. List the endocrine glands and their location
2. Thyroid and parathyroid glands
    - Location
    - Relations
    - Blood supply
    - Functions & clinical importance
3. Pituitary gland

- Location
- Parts
- Relations
- Blood supply
- Functions & clinical importance

4. Supra renal gland
   - Location
   - Parts
   - Relations
   - Blood supply
   - Functions & clinical importance

REFERENCE BOOKS :

1. Basics in human anatomy for B.Sc. Paramedical courses, second edition – Priya Ranganath and Leelavathy
2. Anatomy & Physiology in health & illness,11edition - Ross &Wilson
3. Vishram Singh, “Clinical and Surgical Anatomy”, Elsevier Health Sciences, 2nd Edition, 2019.
4. Sampath Madhyastha, “Manipal Manual of Anatomy For Allied Health Sciences”, CBS Publishers & Distributors, 3rd Edition, 2020.
5. Richard Drake A. Wayne Vogl Adam Mitchell, “Gray’s Anatomy for Students – Companian Work Book”, Churchill Livingstone Publications, 4th Edition, 2019.
6. A K Detta,“Principles Of General Anatomy”, Current Books International , 8th Edition, 2018.
7. Nafis Ahmad Faruqi, “Human Osteology”, CBS Publishers & Distributors, 3rd Edition, 2018.
8. Inderbir Singh, “Human Histology”, Jaypee Publications, 9th Edition, 2019.

ANATOMY LAB

PRACTICALS - 40 hrs

1. Identification of the parts of the microscope.
2. Identification of the epithelium in a given histological slide.
3. Demonstrate the parts of the long bone.
4. Identification of the bones and joint of the body with the articular surfaces (skeleton or X-rays)
5. Identification of the important muscles in upper limb, lower limb and head and neck.
6. Identification of the parts of the brain (cerebrum, cerebellum, brainstem, spinal cord)
7. Identification of the cardiac chambers in a specimen.
8. Identification of the major vessels of heart – aorta and pulmonary trunk.
9. Identification of the cardiac field in chest X-ray.
10. Identification of the nasal cavity, naso pharynx, trachea, lung and pleura in a given specimen.
11. Identification of the lung shadow, costophrenic angle in a chest X-ray.
12. Identification of the stomach, pancreas, liver, small intestine and large intestine specimens.
13. Identification of the stomach, intestinal shadows in plain or contrast abdomen X – ray.
14. Identification of the kidney, Ureter and urinary bladder in specimen.
15. Identification of the renal pelvis, Ureter and urinary bladder in intravenous pyelogram
16. Identification of the thyroid gland in cadaveric specimen

U20CTAT12	PHYSIOLOGY	L	P	Hrs
		60	40	100

THE CELL

- Cell Structure and functions of the various organelles.
- Endocytosis and Exocytosis
- Acid base balance and disturbances of acid base balances (Alkalosis, Acidosis)

CARDIO VASCULAR SYSTEM

- Physiology of the heart
- Heart sounds
- Cardiac cycle
- Cardiac output.
- Auscultatory areas.
- Arterial Pressures,
- Blood Pressure
- Hypertension
- Electro cardiogram(ECG)

BLOOD:

- Composition of Blood, functions of the blood and plasma proteins, classification and protein.
- Pathological and Physiological variation of the RBC.
- Function of Hemoglobin
- Erythrocyte Sedimentation Rate (ESR).
- Detailed description about WBC •Total count (TC), Differential count (DC) and functions.
- Platelets–formation

RESPIRATORY SYSTEM:

- Respiratory movements.
- Definitions and Normal values of Lung volumes and Lung capacities.

EXCRETORY SYSTEM

- Normal Urinary output
- Micturition
- Renal function tests, renal disorders.

REPRODUCTIVE SYSTEM

- Formation of semen and spermatogenesis.
- Brief account of Menstrual Cycle ,oogenesis

CENTRAL NERVOUS SYSTEM

- Functions of CSF
- Reflexes.
- Sympathetic and parasympathetic outflow Impulse conduction
- Structure of neuron
- Degeneration and regeneration of nerve fibers Cerebral blood flow

ENDOCRINE SYSTEM

- Functions
- Pituitary
- Thyroid
- Parathyroid
- Adrenal
- Pancreatic Hormones

DIGESTIVE SYSTEM

- Physiological Anatomy of the GIT.
- Food Digestion in the mouth, stomach ,intestine
- Absorption of foods
- Role of bile indigestion.

SPECIAL SENSES

REFERENCE BOOKS:

1. Raj Kapoor," Physiology Practical Manual for Allied Health Sciences", CBS Publishers and Distributors Pvt Ltd, 3RDEdition.
2. Marya, "Medical Physiology", CBS Publishers and Distributors Pvt Ltd, 4thEdition.
3. CL Ghai, "Text Book of Practical Physiology", Jaypee Brothers Medical Publishers, 9thEdition.
4. Vidya Rattan, "Hand Book of Human Physiology", Jaypee Brothers,7thEdition.
5. Robin R. Preston &Thad Wilson, " Lippincotts Illustrated Reviews in Physiology", Lippincott Williams and Wilkins, 2nd Edition.

PHYSIOLOGY LAB

PRACTICAL – 40 hrs

1. Microscope
2. Estimation Hemoglobin
3. Blood grouping
4. BT and CT
5. RBC count
6. WBC count
7. PCV
8. ESR
9. Osmotic fragility
10. DLC
11. Measurement of Pulse,HR,RR,Temperature,SPo2
12. Measurement of Blood pressure and auscultate Heart sounds
13. Spotters

U20MLTT13	BIOCHEMISTRY	L	P	Hrs
		60	40	100

INTRODUCTION TO LABORATORY CELL,ETC

a) Laboratory glassware:
Types of glasswares, uses of different types of pipettes ,beakers, flasks,funnels,reagent bottles,petri dishes,test tubes, reflux condenser and dispensers.Washing and cleaning of glasswares .

b) Basic laboratory equipments:
Uses of Tripod scans ,wire glaze,test tube racks, Bunsen burner and dessicator.

c) Water baths, Incubator and hot air oven

d) Water :
Types of water and their uses in laboratory. Principle, use and maintenance of water distillation plants

e) Weighing machines

f). Laboratory safety practices

CHEMISTRY OF CARBOHYDRATES:

Definition and classification of carbohydrates. Physical and chemical properties and the biologic importance of carbohydrates.

CHEMISTRY OF LIPIDS :

Definition and classification of lipids. Properties and biomedical importance of fatty acids, phospholipids, lipoproteins, cholesterol and eicosanoides.

CHEMISTRY OF PROTEINS:

Classification and properties of amino acids. Classification and functions of proteins. Plasma proteins and their functions.

INTRODUCTION TO NUCLEIC ACIDS:

Chemistry of purines, pyrimidines, nucleosides, nucleotides. Structure and functions of DNA. Types and biological role of RNAs.

ENZYMES:

Classification of enzymes with examples. Coenzymes. Factors affecting enzyme activity. Units of enzyme measurement. Isoenzymes and clinical enzymology

NUTRITION:

Calorific value, respiratory quotient, BMR, specific dynamic action, energy requirements, nutritional importance of carbohydrates, lipids and proteins, malnutrition.

VITAMINS AND MINERALS

Types, sources, functions and deficiency manifestations of fat soluble vitamins.
Types, sources, functions and deficiency manifestations of water soluble vitamins.
Sources, functions and clinical importance of calcium, iron, zinc, copper and iodine

BIOPHYSICS:

Fundamental concepts of biophysical phenomena like osmosis, dialysis, colloidal state, viscosity, absorption, surface tension and their application in relation to the human body.

CENTRIFUGATION:

Working principles, types and application of centrifugation.

PHOTOMETRY:

Working Principles and application of photometry, and atomic absorption, Spectrophotometry

ELECTROPHORESIS:

Working principles and applications of Electrophoresis. Principle and uses of Agarose Gel, Cellulose Acetate, capillary and PAGE.

CHROMATOGRAPHY:

Working principles and applications of Chromatography. Principle, instrumentation and uses of Paper Chromatography, TLC, Ion Exchange, Affinity Gel Filtration, Gas Chromatography and HPLC.

REFERENCE BOOKS:

1. Allan Gaw," Clinical Biochemistry – An Illustrated Colour Text", Churchill Livingstone, 3rd edition
2. Nanda Maheshwari, "Clinical Biochemistry ", Jaypee brothers medical publishers, 2nd edition
3. Victor Rodwell,"Harper's Illustrated Biochemistry", McGraw-Hill Education, 31st edition
4. DmVasudevan, "Text Book of Biochemistry", Jaypee Brothers Medical Publishers , 9th edition
5. Harold Varley, "Practical Clinical Biochemistry",CBS, 6thedition

BIOCHEMISTRY LAB

PRACTICALS – 40 hrs

1. Preparation of solutions: Standard solutions, working solutions, calculation of concentrations
2. Acidimetry and alkalimetry: Preparation of different types of buffers, determination of pH by pH papers, indicators and pH meters
3. General reactions and identification of carbohydrates
4. General reactions of proteins, colour reaction of amino acids
5. Demonstration of electrophoresis of serum proteins and Hb
6. Demonstration of paper chromatography and calculation of Rf value
7. Verification of Beer-Lamberts law Quantitative experiments

U20CTAT14	MICROBIOLOGY	L	P	Hrs
		60	40	100

GENERAL BACTERIOLOGY

- **History of Microbiology:** Theory of biogenesis and a biogenesis pioneers in Microbiology (Robert Koch, Louis Pasteur, Joseph lister, Paul enrich, and Koch Postulates.
- **Morphology of bacteria:** Classification based on shape, Anatomy of the bacterial cell, defective forms of bacteria, Bacterial appendages, Bacterial Spore
- **Physiology of bacteria:** Autotrophs, Heterotrophs, Bacterial growth and replication, Bacterial Growth curve, Bacterial count, Bacterial nutrition, Factors affecting the growth.
- **Sterilization & Disinfection:** Introduction, Physical methods, Chemical methods, methods of sterilization and disinfection of medical and laboratory equipments, Disinfection of clinical samples and environmental surfaces in laboratory and hospitals, Testing fordis infectant.
- **Culture media:** Introduction, basal media, synthetic media, special media with emphasis on their uses.
- **Culture methods:** Aerobic and Anaerobic culture methods.

IMMUNOLOGY

- Infection - types, Route, source of infections, vector, factors affecting virulence, Exotoxins endotoxins
- Antigen – types factors affecting antigencity
- Antibodies (Immunoglobulin's)- general properties, IGg, IGA, IGM,IGE,IGD
- Immunity- Innate immunity, Factor affecting & mechanisms of innate immunity Acquired immunity, active & passive
- Ag – Ab reactions – general properties, slide & tube agglutination, precipitation (slide flocculation) prozone phenomeno, coombs test, immune fluorescence assay, Elisa (direct &Indtect) , Immuno chromatography , Applications of Antigen antibodies reactions
- Immune system - cells of lymphoreticular system- lymphocytes, phagocytes structure and functions
- Immune response – humoral& cell mediated immune response, monoclonal antibodies factor affecting anti bodies, adjuvants ,immuno suppressive agents, interleukins , immunological tolerance
- Hypersensitivity- Types- immediate &delayed , Type I, IV Hypersensitivity

SYSTEMIC BACTERIOLOGY

Bacterial infections – morphology, pathology, clinical feature, lab diagnosis, treatment prevention including immune prophylaxis of the following pathogens. No description of culture characters and biochemical reactions

- Staphylococcus
- Streptococcus
- Enterococcus
- Pneumococcus
- C.diptheriae
- Clostridium tetani

- Clostridiumperfringens
- Mycobacterium tuberculosis
- Mycobacteriumleprae
- E.coli
- Klebshiella Pneumoniae
- Salmonella typhi
- Pseudomonas saeruginosa
- Treponema pallidum
- Vibreo cholera

VIROLOGY

- Introduction and General properties of viruses morphology and general characters susceptibility to physical chemical agents , viral heamaggluations , cultivations of viruses , cytopathic effects
- Morphology, pathology, clinical feature, lab diagnosis, treatment prevention including immune prophylaxis of the following pathogens:
    - Herpes simplex
    - Varicella zoster
    - Dengue
    - Rabies
    - Hepatitis A,B,C
    - H.I.V
    - Influenza virus
    - Corona virus
    - Measles , mumps & rubella

MYCOLOGY

Introduction – Morphology, General characteristics, classifications, outline of lab diagnosis,Morphology Pathology, clinical feature, lab diagnosis, treatment prevention of the following pathogens

- Candida
- Cryptococcus
- Aspergillus spp

PARASITOLOGY

Introduction, General Characteristics ,Classifications, Brief description of Morphology, Pathogenesis, Lab diagnosis, Prevention of the following Parasites:

- E.Histolytica
- Giardia
- Malarial Parasite
- Roundworm
- Hookworm

APPLIED MICROBIOLOGY

- BMWM
- Immunization
- H.A.I & H.I.C
- Standard Precaution

REFERENCE BOOKS:

1. Richard A Harvey , “Lippincotts Illustrated Reviews In Microbiology”, Lippincotts Williams & Wilkins, 3rd Edition.
2. Thao Doan, “Lippincotts Illustrated Reviews Immunology”, Lippincotts Williams & Wilkins, 2nd Edition.
3. Apurba Sastry, “Textbook Of Essentials Of Practical Microbiology”, Jaypee Brothers,
4. 1st Edition.
5. Baveja, “Textbook Of Practical Microbiology, Arya Publications”, 4thEdition.
6. JayaramPanikar,“ Textbook Of Microbiology”, Orient Black swan Pvt Limited, 9th Edition.
7. Baveja, “Textbook Of Microbiology”, Arya Publications, 6thEdition.
8. Baveja, “Textbook Of Parasitology” , Arya Publications, 4thEdition

MICROBIOLOGY LAB

PRACTICALS – 40 hrs

1. Microscope – compound ,DGM, Florescence Microscope
2. Morphology of bacteria
3. Motility – hanging Drop & WET MOUNT
4. Sterilization &Disinfection - Demonstration of equipments and methods
   - Hot air oven, autoclave, ETO, heap filter, syringe filter physical & biological indicators of sterility
   - Packing of glassware and instruments for sterilizations
   - Visit to CSSD
5. Demonstration and use of Centrifuge, & distillation still
6. Preparation of smear from specimen and simple staining
7. Grams stain
8. Culture media
9. Slide and tube agglutination
10. Immuno chromatography
11. Study of bacteria pathogens
    - Staphylococcus
    - Streptococcus
    - Pneumococcus
    - C.diptheriae
    - Clostridium tetani
    - Clostridium perfringens
    - Mycobacterium tuberculosis
    - Mycobacterium leprae
12. Serological test (ASO, CRP, RAF, Widal, VDRL, HIV, HBV ,Dengue)
13. Study of fungal pathogens
    - Candida
    - Dermatophytes
14. BMWM
15. PPE
16. Standard precautions
17. Examination of stools for parasites
    - E. histolytica
    - G.lamblia
    - Roundworm
    - Hook worm
    - Strongyloides

U20CTAT15	PATHOLOGY	L	P	Hrs
		60	40	100

Introduction to Pathological Terms,techniques
Cellular adaptations
Inflammation (Acute & Chronic) Transudate & Exudate
Wound healing and repair.

HEMODYNAMICS

- Oedema
- Thrombus
- Emboli
- Shock

IMMUNOLOGY

- Hypersensitivity reactions
- HIV
- Transplant rejection
- SLE

NEOPLASIA

- Benign and malignant tumors
- In situ growth
- Familial cancers
- Metastasis

GENETICS

- Chromosome aberrations
- congenital &developmental anomalies

ENVIRONMENTAL

- Radiation injury
- Nutritional deficiencies

INFECTIONS

- Leprosy
- Syphilis
- Tuberculosis
- Malaria
- Filaria

Anaemia and lab investigations
Blood grouping & cross matching
WBC disorders – Leukemias

BLEEDING AND PLATELET DISORDERS

- BT (bleeding time)
- CT (clotting time)
- PT (prothrombin time)
- APTT (activated partial thromboplastin time)

RESPIRATORY SYSTEM

- Asthma
- COPD
- Pneumonia & Lung tumours
- pneumoconiosis

CVS (CARDIO VASCULAR SYSTEM)

- Atherosclerosis
- Aneurysms
- Hypertension
- Myocardial Infarction
- Rheumatic heart disease
- Infective endocarditis

GIT (gastro intestinal tract)

- Peptic ulcer
- Carcinoma Stomach
- Amoebiasis
- Typhoid
- TB Intestine
- Carcinoma Intestine

HEPATOBILIARY

- Liver abscess
- Hepatitis
- Cirrhosis
- Chole Cystitis
- Tumours of liver & gall bladder

RENAL

- Nephrotic syndrome
- Nephritic syndrome
- Renal calculi
- Renal failure
- RCC (renal cell carcinoma)
- CPN (chronic poly nephritis)

BREAST

- Benign lesions of breast
- Carcinoma breast

FGT

- Carcinoma cervix and endometrium
- Ovarian tumours
- PCOD (polycystic ovarian disease)
- Leiomyoma

CNS (central nervous system)

- Hydrocephalus
- Meningitis
- Encephalitis
- Cerebro vascular Disease

ENDOCRINE

- Diabetes
- Thyroid disorders

EYE

- Infections
- Tumors
- Metabolic diseases

BONE

- Osteomyelitis
- Arthritis
- Osteoporosis
- Bone tumours

REFERENCE BOOKS:

1. Nayak Ramadas,"Textbook Of Pathology For Allied Health Sciences" ,Jaypee Brothers 1st Edition.
2. Nanda Maheshwari, "Clinical Pathology/Hematology and Blood Banking" (For DMLT Students), Jaypee Brothers, 3rd Edition.
3. Nayak Ramadas, "Histopathology Techniques & Its Management", Jaypee Brothers, 1st Edition.
4. Ramnik Sood, "Concise Book of Medical Laboratory Technology Methods and Interpretations", Jaypee Brothers, 2nd Edition.
5. Dacie&Lewis, "Practical Hematology", Elsevier Health – Uk, 11thEdition.
6. Lippincotts Illustrated Reviews in Pathology.

PATHOLOGY LAB

PRACTICALS – 40 hrs

1. Urine Examination
2. Hemoglobin Estimation
3. Blood Grouping
4. Peripheral Blood Smear staining
5. Differential count
6. Gross Pathology
7. Microscopic Slides
8. Instruments

U20CTAT16	ENGLISH	L	P	Hrs
		25	25	50

COMMUNICATION

- Communication at the workplace
- Human needs and communication “Mind mapping” Information communication

COMPREHENSION PASSAGE

- Reading purposefully
- Understanding what is read
- Drawing conclusion
- Finding and analysis

EXPLAINING

- How to explain clearly
- Explaining procedures
- Giving directions

WRITING BUSINESS LETTERS

- How to construct correctly Formal language, Address, Salutation
- Body and Conclusion

REPORT WRITING

- Reporting an accident
- Reporting what happened at a session
- Reporting what happened at a meeting

PRACTICAL

- The clinical experience in the wards and bedside nursing will provide opportunity for students to fulfill the objectives of learning language
- Assignment on writing and conversation through participation in discussion debates seminars and symposia. The students will gain further skills in task oriented communication.

REFERENCE BOOKS:

1. Selva Rose. 1997, Career English for Nurses. Published by: Orient Blackswan Ltd
2. Oxford advanced Leaners Dictionary, 1996
3. Quirk Randolph and Greenbaum Sidney, 1987. A University Grammar of English, Hong Kong: Longman group (FE) Ltd/Pearson.
4. Thomson A.J. and Maituiet A.V. 1987, A Practical English Grammar, Delhi: Oxford University Press.
5. Gimson A.C.1989, An Introduction to pronunciation of English. Hodder Arnold; 4th Revised edition (1 May 1989).
6. O'Connor J.D, 1986. Better English pronunciation. Cambridge: University Press
7. By water F.V.A. 1982, Proficiency Course in English. London: 1- lodder and Strongliton.
8. Roget S.P. 1960, Thesaurus of English Words & Phrases, London: Lowe & Brydone Ltd. 1960.

U20CTAT17	COMPUTER SCIENCE	L	P	Hrs
		25	25	50

TYPING TEXT IN MS WORD

- Inserting tables in a document.
- Formatting the text–using different font sizes, bold, italics
- Bullets and numbering
- Pictures, file insertion
- Aligning the text and justifies
- Choosing paper size
- Adjusting margins
- Header and footer, Inserting page No's in a document Printing a file with options
- Using spell check and grammar

CREATING TABLE IN MS EXCEL

- Cell editing–Using formulas and functions Manipulating data with excel
- Using sort function to sort numbers and alphabets
- Drawing graphs and charts using data in Excel–Auto formatting–Inserting data from other work sheets.

PREPARING NEW SLIDES USING MS POWERPOINT

- Inserting slides – Slide transition and animation – Using templates
- Different text and font sizes – Slides with sounds – Inserting clipart, pictures, tables and graphs– Presentation using wizards

INTRODUCTION TO INTERNET

Using search engine –Google search–Exploring the next using Internet Explorer and Navigator – Uploading and Download of files and images – Email ID creation

- Sending messages – Attaching files in E-mail ID
- Typing a text and aligning the text with different formats using MS-Word
- Inserting a table with proper alignment and using MS-Word
- Create email merge document using MS-word to prepare greetings for 10 friends
- Preparing a Slides how with transition, animation and sound effect using MS-PowerPoint
- Customizing the slides how and inserting pictures and tables in the slides using MS-PowerPoint
- Creating a work sheet using MS-Excel with data and use of functions
- Using MS-Excel prepare a worksheet with text, date time and data
- Preparing a chart and pie diagrams using MS-Excel

Using Internet for searching, uploading files, downloading files and creating E-mail ID

REFERENCE BOOKS:

1. Fundamentals of computers- V. Rajaraman-2004
2. Absolute beginners guide to computer basics-Michael Miller. Que Publisher, September 1, 2009.
3. Networking concepts and technology – by Deepak Kalkadia, Francesco DiMambro, Prentice hall publisher, May 25, 2007
4. Operation system concepts (8^{th} edition) by Abraham Silberschatz, Peter Baer Galvin, Greg Gangne, Wiley Publisher, Feb 13, 2009.
5. Microsoft office 2013 for Dummies – by Wallace Wang, July 31, 2013.

II-YEAR SYLLABUS

		L	P	Hrs
U20MLTT21	**BIOCHEMISTRY**	**60**	**40**	**100**

1. METABOLISM OF CARBOHYDRATES:

Digestion & absorption, metabolism of glucose, glycolysis, glycogen formation & breakdown, glycogen storage disease, maintenance of blood sugar levels, hormonal influence, diabetes mellitus, inter conversion of monosaccharide's.

2. METABOLISM OF LIPIDS:

Lipids-digestion & absorption of lipids, synthesis of fatty acids, oxidation of fatty acids, cholesterol synthesis, introduction to eicasanoids, prostaglandins.

3. METABOLISM OF PROTEINS:

Digestion of proteins, urea synthesis, creatine synthesis & degradation, Transamination, metabolism of amino acids

4. METABOLISM OF HEMOGLOBIN:

Structure of haem, biosynthesis , porphyrias , catabolism of haem, hemoglobin quaternary structure, structure of myoglobin, transport of gases, oxygen dissociation of curves, isohydric transport of CO2 fetal Hb, carboxyhaemo globin, methaemoglobin

5. METABOLISM OF NUCLEOTIDES:

Purines and pyrimidine metabolism

6. ENDOCRINOLOGY/HORMONES:

Role of biologically important hormones.Pituitary hormones, thyroid, adrenal cortex and medulla and sex hormones. Mechanism of control diseases and biochemical tests for under and over production.

7. **IMMUNOLOGY:**

Immune response, cells and organs of immune system, types and functions of immunoglobulins, humoral immunity, cell mediated immunity and immunoassay types and principles

PRACTICAL

- Analysis of normal urine
- Analysis of abnormal urinary contents
- Estimation of serum glucose, urea,creatinine
- Estimation of serum sodium, potassium and chloride
- Demonstration of hormonal assay by ELISA and CLIA.
- CSF analysis

REFERENCE BOOKS:

1. Clinical Biochemistry – An Illustrated Colour Text by Allen Gow
2. Clinical Biochemistry by Nanda Maheshwari
3. Manipal Manual of Clinical Biochemistry by Shivananda Nayak
4. Text Book Biochemistry for Medical Student by Dm Vasudevan, Sree Kumari, Kannan Vaidyanathan
5. Practical Clinical Biochemistry by Harold Varley
6. Textbook of Medical Laboratory Technology by Ramnik Sood
7. Medical Laboratory Technology by K.L. Mukerjee

		L	P	Hrs
U20MLTT22	**MICROBIOLOGY**	**60**	**40**	**100**

GENERAL BACTERIOLOGY:

- Culture media
- Culture methods
- Biochemical tests for identification of bacteria

IMMUNOLOGY:

- Agglutination
- Precipitation
- Elisa
- Immuno chromatography
- Immuno Florescence assay
- Auto immunity
- Hypersensitivity

SYSTEMIC BACTERIOLOGY:

- Neisseria meningitidis
- N.gonorrhoeae
- Esch.coli
- Klebsiella spp
- Proteus spp
- Salmonella spp
- shigella
- Pseudomonas
- Vibrio
- Haemophilus spp

VIROLOGY:

- Lab diagnosis of viral infections
- ARBO Viruses
- Influenza Viruses
- Hepatitis Viruses
- Mumps, Rubella, Measles

MYCOLOGY:

- Superficial mycoses
- Dermatophytoses
- Opportunistic mycoses

PARASITOLOGY (HELMINTHOLOGY)

- Tapeworms
  - T. saginata
  - T. solium
  - H.nana
  - E.granulosus
- Roundworm
- Hook worm
- Strongyloides
- Filariae
  - W.bancrofti
- Guineaworm

APPLIED

- Hospital acquired infections & control
- Infective syndromes
- Sample collection and transport

PRACTICALS

- Preparation of smear & staining of samples
  - Grams staining
  - Z.N staining Modified ZN staining Auramine Rhodamine staining for AFB
  - Giemsa staining
- Preparation of KOH mount of samples for fungus
- Preparation of saline & Iodine mounts of stool sample
- Preparation of culture media
- Processing of samples for bacterial culture &sensitivity
- Processing of samples for AFB culture
- Processing of samples for Fungal culture
- Performing of Biochemical test & Antibiotic susceptibility testing

REFERENCE BOOKS:

1. Lippincott's Illustrsted Reviews in Microbiology
2. Lippincott's Illustrsted Reviews in Immunology
3. Text Book of Essentials of Practical Microbiology - Apurba Sastry
4. Text Book of Practical Microbiology –Baveja
5. Text Book of Microbiology -Jayaram Panikar

		L	P	Hrs
U20MLTT23	**PATHOLOGY**	**60**	**40**	**100**

HISTOTECHNOLOGY:

- Tissue Preparation
- Receipt of specimens
- Labeling of specimens with numbering

FIXATION:

- Aims and functions of afixative
- Classification of fixatives
- Simple fixatives
- Compound fixatives
- Micro anatomical fixatives
- Cytological fixatives
- Histochemical fixatives
- Post -chromatization
- Fixation of specimens
- Fixation for individual tissues
- Dehydration
- Ethyl alcohol
- Acetone
- Isopropyl alcohol
- Dioxane
- Clearing (Dealcoholisation)
- Cedar wood oil
- Benzene
- Xylene
- Chloroform
- Embedding Media
- Paraffin wax
- Paraplast – Paraplast plus
- Gelatin
- Water soluble waxes
- Celloidin
- Techniques of impregnation
- Embedding or Blocking
- Type of mould
- Techniques of moulding
- Decalcifying Agents
- Selection of the tissues
- Determination of endpoint

- Neutralization of acid
- Washing
- Decalcifying agents
- Use of ion exchange resins
- Chelating agents
- Electrophoreticde calcification
- Treatment of hard tissues
- Section Cutting: Microtomes, Microtome knives, Sharpening of knives, Care of microtome knives - Techniques of section cutting - Mounting of Sections - Automatic Tissue Processor (Vacuum) - Application of Microwave Technology to Histology – Principle –Applications.

HANDLING AND EMBEDDING OF TINY TISSUE BIOPSIES INTRODUCTION:

- Labeling of Tissues
- Fixation and Cutting of Small Biopsies
- Renal biopsies
- Intestinal biopsies
- Skin biopsies
- Muscle biopsies
- Other tissues
- Orientation of Tissue Blocks

STAINING TECHNIQUES:

Routine staining techniques - Special Stains.

INTRODUCTION TO HEMATOLOGY:

- What is a blood
- Components of blood
- Functions of blood
- Components of Blood

MAINTENANCE AND EQUIPMENTS OF HEMATOLOGY LAB:

- Introduction to a microscope
- Parts of a microscope
- Centrifuge

AUTOMATED CELL COUNTER:

- Urine Analyser
- Maintenance of equipments in the hematology lab -Coagulometer
- Responsibilities of a lab technologist

PRINCIPLES OF PATIENT CARE ASSESSMENT OF A PATIENT AND BRIEF HISTORY COLLECTION:

Collection of blood, sputum, urine and stool specimens, packing of equipments for CSSD, Develop specific goals and plans to priorities, organise, and accomplish work

BLOOD BANK SERVICES:

Blood Grouping Introduction- Human Blood Group system- ABO Subgroups- Red Cell Antigen- Natural Antibodies-Rh System- Rh Antigens & Rh Antibodies-Hemolytic Disease of Newborn & Prevention- Principal of Blood grouping, antigen-antibody reaction-Agglutination, Haemagglutination, Condition required for antigen antibody reaction- Blood grouping techniques, Cell grouping, Serum grouping-Methods for ABO grouping. Slide & Tube Method, Cell grouping, Serum grouping, Rh grouping by slide & tube method-Difficulties in ABO grouping- Rouleaux formation, how it interfere with Blood grouping-Auto agglutinins - Antiserum used in ABO test procedures, Anti –A, Anti-B Anti- AB Antiserum-Inheritance of the Blood groups-Control, A&B Cells preparation, Auto control-Medical applications of Blood groups.

BLOOD TRANSFUSION PRINCIPAL & PRACTICE OF BLOOD TRANSFUSION:

Blood Transfusion service at District level- Guide lines for the use of Blood, Appropriate use of Blood, Quality Assurance-Antilogous Blood Transfusion practices-Objectives of Quality Assurance in Blood Transfusion services, Standard operating procedures for usage, donation & storage of blood, screening of donor, compatibility testing, safety, procurement of supplies.

BLOOD DONATION:

Introduction -Blood donor requirements - Criteria for selection & rejection-Medical history & personal details -Self-exclusion-Health checks before donating blood-Screening for TTI. 4. Blood Collection -Blood collection packs-Anticoagulants-Taking & giving sets in Blood transfusion-Techniques of collecting blood from a doctor- Instructions given to the donor after blood donation-Adverse donor reaction.

TESTING DONOR:

Blood Screening donor's blood for infectious agents - HIV, HCV, HBV, Trepanoma palladium, Plasmodium, HTLV-Bacterially contaminated Blood.

BLOOD DONOR RECORDS BLOOD DONATION RECORD BOOK:

Recording results- Blood donor card- Documentation in blood bank- Types of documents. Blood bank temperature sheet. Blood bank stock sheet. Blood transfusion request form-Record Maintenance- Period of record archival- Process information by compiling, coding, categorizing, calculating, tabulating, auditing or verification of data- The standard protocol for documenting the data in the patient’s files and in the computer for future records- Evaluate the completeness of patient data- Monitor quality control data to rapidly identify analytical deficiencies- Document errors and note the remedial actions they havetaken

EXAMINATION OF URINE:

- Introduction
- Formation of urine\
- Collection of Urine
- Special type of collection ofurine
- Biohazard management
- Components of routine urine analysis - Colour - Clarity - Odour -Volume
- Chemical Examination - Sugar in Urine - Tests for Sugar In Urine

- Benedict'sTest
- Fehling's test – Chemi strip method - Protein in Urine - Test for Protein in Urine
- Heat and Acetic Acid Test
- Sulpho salicylic Acid Test
- Heller'sTest.
- Heat and Acetic Acid Test
- Ketone Bodies in Urine
- Test for Ketones in Urine
- Rothera's Test
- Gerhardt's test
- Bile in Urine
- Test for Bilirubin
- Fouchet'sTest
- Test for Bile salts
- Hay's Test - Blood in Urine - Test for Hematuria
- Benzidine Test
- Guaiacum Test
- Gregersen's Test

MICROSCOPIC EXAMINATION OF URINE:

- Crystals Found In Urine
- Crystals Found In Acid Urine
- Uric Acid &Urates
- Calcium oxalates in Crystals
- Cystine Crystals
- Leucine and tyrosine crystals
- Drug crystals - Crystals Found In Alkaline Urine
- Ammonium magnesium phosphates
- Dicalcium phosphates
- Calcium carbonate
- Ammonium biurate
- Casts In Urine
- Cells in Urine:- Red Blood cells, Pus cells, Epithelial cells, Spermatozoa, Bacteria,Tumour cells Examination of stool: physical, chemical & microscopic examination

PRACTICAL

Histopathology:

Fixatives

- Processing Of the Tissues Including Bone
- Embedding
- Section Cutting
- Staining & mounting Special stains
- Handling and embedding of tiny tissue biopsies

- Frozen section technique : Equipments & Procedures

SPECIMEN COLLECTION AND PREPARATION:

- Staining Procedure and Mounting
- Preparation of Fluids for Cytological Examination
- Paraffin section cutting.
- H & E staining Special staining
- PAS staining, principle & uses .Reticulin
- PTAM
- Vangieson
- Amyloid stain, pearlstain
- Melanin bleach & masson's Fontana AFB staining (TB andLeprosy)
- Papstaining
- MGG staining for NAC
- Museum techniques
- Preparation of mounting medium & mounting of specimen

CLINICAL PATHOLOGY :

- Examination of Urine – Physical, chemical and microscopic
- Examination of Body fluids: Semen Analysis, Stool Examination

HEMATOLOGY:

- Collection of Blood Samples
- Obtaining peripheral Blood Smear
- Staining Of Blood Smear
- Obtaining Cell Counts – RBC, WBC, Platelets both manual and automated
- Absolute Eosinophils Count
- Estimation of Haemoglobin
- Packed Cell Volume, Erythrocyte Indices
- Reticulocyte Count
- Differential Count
- BleedingTime
- Clotting Time
- PT
- APTT

REFERENCE BOOKS:

1. Nayak Ramadas,"Textbook Of Pathology For Allied Health Sciences" ,Jaypee Brothers 1st Edition.
2. Nanda Maheshwari, "Clinical Pathology/Hematology and Blood Banking"(For DMLT Students), Jaypee Brothers, 3rd Edition.
3. Nayak Ramadas, "Histopathology Techniques & Its Management", Jaypee Brothers, 1st Edition.
4. Ramnik Sood, "Concise Book of Medical Laboratory Technology Methods and Interpretations", Jaypee Brothers, 2nd Edition.
5. Dacie&Lewis, "Practical Hematology", Elsevier Health – Uk, 11thEdition.
6. Lippincotts Illustrated Reviews in Pathology

		L	P	Hrs
U20CTAT21	**PHARMACOLOGY**	**30**	**-**	**30**

INTRODUCTION

Routes of administration , Pharmacokinetics , Pharmacodynamics , Drugs acting on Autonomic nervous system.

Parasympathetic agents and blocking agents. Sympathetic agents and blocking agents Autocoids and respiratory system

- Non-steroidal anti-inflammatory drugs.
- Drugs for cough and bronchial asthma
- Respiratory stimulants and antihistamines Drugs acting on CNS
- Sedatives and hypnotics and alcohol
- General anaesthetics
- Anti-epileptics and Opioids

DRUGS ACTING ON PNS

- Smooth muscle relaxants
- Local anaesthetics Drugs acting on CVS
- Drugs for congestive cardiac failure
- Anti-hypertensive drugs
- Anti-arrhythmic drugs
- Anti-anginal drugs and diuretics
- Drugs used in treatment of shock Drugs acting on blood
- Anti-thrombotic drugs
- Anti-coagulants
- Fibrinolytic drugs
- Lipid lowering drugs
- Antimicrobial drugs Drugs acting on GIT

DRUGS USED FOR ENDOCRINE DISORDERS

- Insulin, oral hypoglycemic drugs Corticosteroids
- Thyroxine and anti-thyroid drugs

General concepts and resistance. Antibacterial drugs Antiviral drugs Anti-fungal drugs .Antiseptics and disinfectants Management of poisoned patients

REFERENCE BOOKS:

1. Lippincott's Illustrated Review's in Pharmacology -Seventh edition
2. Medical Pharmacology by Padmaja Uday Kumar- Seventh edition
3. Pharmacology for medical graduates by Tara Shanbhag – Fourth edition

U20CTAT22	ENVIRONMENTAL SCIENCE & COMMUNITY MEDICINE	L	P	Hrs
		30	-	30

ENVIRONMENTAL SCIENCE (15 hrs)

1. Introduction to environment
2. Sources, health hazards and control of environmental pollution
3. Water
4. The concept of safe and whole some water
5. The requirements of sanitary sources of water
6. Understanding the methods of purifications of water on small scale and large scale various biological

standards, including WHO guidelines for third world countries

7. Concept and methods for assessing quality of water.
8. Domestic refuse, sullage, human excreta and sewage their effects on environment and health, methods and issue related to their disposal.
9. Awareness of standards of housing and the effect of poor housing on health.
10. Role of arthropods in the causation of diseases, mode of transmission of arthropods borne diseases, methods of control

REFERENCE BOOKS:

1. Text book of Environmental studies for Under Graduate courses by Erach Barucha

COMMUNITY MEDICINE (15 hrs)

1. Epidemiology and Epidemiological Methods AIM / Approach /Rates/
2. Mortality / Morbidity and Disease transmission
3. Epidemiology of Communicable diseases
4. Epidemiology of Non-communicable diseases
5. Bio-medical waste Management
6. Disaster Management
7. Information, Communication and Health Education.
8. Screening for disease
9. History of Public Health
10. Organization of Health services
11. Health Care Delivery system

REFERENCE BOOKS:

1.Park's text book of Preventive and social Medicine – 23rdEdition(2015)
2.Community Medicine with recent advances by A.H. SuryaKantha
3.Short text book of preventive and social medicine by G.N.Prabhakar
4.Text book of community medicine – By Sunderlal.

III-YEAR SYLLABUS

		L	P	Hrs
U20MLTT31	**BIOCHEMISTRY**	**60**	**40**	**100**

PRINCIPLES OF LABORATORY MEDICINE:

- Biological reference interval (BRI), clinical decision interval (CDI) and reportable range
- Performance characteristics of an analytical process
- Principles, Procedures and statistics used in calibration procedures, Internal quality control and external quality assurance programme.
- Biomedical waste management
- Clinical Laboratory safety practices

LABORATORY AUTOMATION:

- General concepts used in automation of laboratory processes
- Automated instruments and specific applications of these concepts to selected instruments.

SAMPLE COLLECTION:

- Specimen collection, processing and handling in clinical laboratory.
- Sources of biological variation.

RENAL FUNCTION TESTS:

- Kidneys and their physiological role – Laboratory tests to assess
- Detect and monitor ,renal diseases.

LIVER FUNCTION TESTS:

- Laboratory tests and analytical methods used in identification
- Evaluation of hepatobiliary disorders

PANCREATIC AND GASTRIC FUNCTION TESTS:

- Stomach, pancreas and intestinal tract – procedure and tests used in the diagnosis and treatment of gastro intestinal diseases.

IMMUNOASSAYS:

- Principles of different types of immunoassays and their uses

HORMONE ASSAY:

- Techniques involved in hormonal assays, thyroid function test and adrenal function tests.

ONCOLOGY:

- Carcinogens, Nomenclature and properties of cancers, mechanism of carcinogenesis and tumor markers.

PRACTICAL:

1. Estimation of AST, ALT, GGT and ALP
2. Estimation of Total protein, albumin and AG ratio
3. Estimation of total, direct and indirect bilirubin
4. Estimation serum total, LDL, HDL cholesterol
5. Urine protein estimation
6. Estimation of serum calcium and phosphorous
7. Demonstration of ABG analysis

REFERENCE BOOKS:

8. Clinical Biochemistry – An Illustrated Colour Text by Allen Gow
9. Clinical Biochemistry by Nanda Maheshwari
10. Manipal Manual of Clinical Biochemistry by Shivananda Nayak
11. Text Book Biochemistry for Medical Student by Dm Vasudevan, Sree Kumari, Kannan Vaidyanathan
12. Practical Clinical Biochemistry by Harold Varley
13. Textbook of Medical Laboratory Technology by Ramnik Sood
14. Medical Laboratory Technology by K.L. Mukerjee

U20MLTT32	MICROBIOLOGY	L	P	Hrs
		60	40	100

SYST. BACTERIOLOGY

- Anthrax
- Non sporing anaerobes
- Actinomycetes
- Bordetella
- Brucella
- Borrelliae
- Leptospira
- Rickettsiae
- Chlamydiaea
- Mycoplasma & Urea plasma
- Campylobacter
- Helicobacter

VIROLOGY

- Bacteriophage
- Herpes simplex
- Herpes zoster
- CMV
- E. B Viruses
- Chikungunya
- Adeno virus
- Polio virus
- Corna viruses
- Nipa virus
- Rota viruses
- Oncogenic viruses

MYCOLOGY

- Subcutaneous mycoses
- Deep mycoses
- Mycotoxicosis
- Pneumocystis

PARASITIOLOGY

- Cryptosporidium
- Cyclospora
- Isospora
- Lieshmania
- coli
- Toxoplasma

- Pin worm
- Whip worm

ENTOMOLOGY

- Itch mite
- Ticks
- Lice

APPLIED MICROBIOLOGY

- Surveillance of hospital environment
- Bacteriology of water ,Air, Milk & Food

PRACTICALS

1. Staining techniques for bacteria, fungi and parasites
2. Specimen collection, Inoculation , isolation & Identification of common bacterial pathogens
3. Specimen collection, Inoculation, isolation & identification of common fungal pathogens
4. Specimen collection processing and identification of common intestinal parasites
5. Collection , packing and transport of specimens for viral pathogens for molecular biological testing (PCR / RT-PCR)
6. Collection processing of samples for MTB by molecular methods
7. Surveillance of hospital environment
8. Bacteriology of water ,Air, Milk & Food
9. Sterility check of blood bags and components
10. Sterility check of water samples

REFERENCE BOOKS:

1. Lippincott's Illustrsted Reviews in Microbiology
2. Lippincott's Illustrsted Reviews in Immunology
3. Text Book of Essentials of Practical Microbiology - Apurba Sastry
4. Text Book of Practical Microbiology –Baveja
5. Text Book of Microbiology -Jayaram Panikar

U20MLTT33	PATHOLOGY	L	P	Hrs
		60	40	100

FROZEN TECHNIQUE

- Introduction - Frozen Section – Overview - Use of Freezing Microtome – Fixation - Freezing Microtome - Fixing sections on slides - Staining of frozen sections (rapid staining) - Advantages and disadvantages - Frozen Sections Using Cryostat – Uses - The Cryostat - LEICA CM 1850 Cryostat - The components - Set up of instrument prior to operation - Operation of the Cryostat - Terminating work - Trouble shooting - Cleaning, disinfection, maintenance - Staining of Frozen Sections for Rapid Diagnosis.
- Introduction - Specimen Collection - Specimen samples - Fine needle aspiration cytology (FNAC) – Preservation - Fresh specimen - Prefixation refers - Preparation of Smears - Viscid Secretions - Body fluids – Sputum - Precautions against infections – Fixation - Fixation method falls into one of 3 categories - Alcohol fixatives - Unstained smears which require to be mailed to a cytology laboratory – Staining - Papanicolaou method –Maygrunwaldgiemsa (MGG) stain - Mounting - Destaining Procedures - Automation Mass screening methods for early detection of cancer, Sputum examination.

COLLECTION OF BLOOD SAMPLES SPECIMEN

- Collection - Methods – vein puncture - Patient Identification - Site selection - Tourniquet application - Cleansing the Vein puncture site - Sample Collection - Specimen Collected by skin puncture - Collection from indwelling catheters- Use basic non-automated tests to assess blood cells- See and analyse details at close range- Collect, receive and conduct a pre-analytical processing of clinical laboratory specimens.

COAGULATION STUDIES

- Hemostasis - Definition, Basic concept and principle, Basic steps involved in Hemastasis. Coagulation - a. Basic Physiology, coagulation factors. b. Mechanism of blood coagulation. Extrinsic Pathway, Intrinsic Pathway. Regulators of blood coagulation. Role in Diseases, Bleeding disorders- . Platelet disorder - Thrombocytopenia - causes including aplastic anemia. DIC, ITP , Hemophilia

HEMATOLOGICAL DISORDERS

- Classification of Anemia : Morphological & etiological. Iron Deficiency Anemia: Distribution of body Iron, Iron Absorption, causes of iron deficiency, lab findings. Megaloblastic Anemia: Causes, Lab findings. Hemolytic Anemia: Definition, causes, classification & lab findings. Bone Marrow: Cell composition of normal adult Bone marrow, Aspiration, Indication, Preparation & Staining, Special Stain for Bone Marrow -Periodic Acid Schiff, Sudan Black, Myeloperoxidase. Leukemia : Classification, Blood Picture, Differentiation of Blast cells

BASIC HAEMATOLOGICAL DIAGNOSIS

Preparation of Blood Smears - Specimen - Advantages of EDTA blood - Disadvantages of EDTA blood - Blood Smear Method - Cover slip method - Spreader slide method - Wedge method - Characteristics of a Proper Wedge Film - Types of Smear - Thick Smear - Thin Smear - Common causes of a poor blood smear - Biological (in diseased condition) causes of a poor smear - Precautions - Drying of Smears - Staining Of the Blood Films - Preparation of Stains - Leishman's

- stain - Wright's Stain - Field's stain - Romanowsky stains - Steps for staining - Manual staining methods - Rack method - Dip method.
- Automated staining methods: - Platen type - Carousel type. Criteria for a good stain: Problem encountered during staining – Troubleshooting Total Cell Count – Rbc, Wbc, Platelets and Absolute Eosinophil Count, Estimation of Hemoglobin PCV & Erythrocyte Indices - M.C.V. - M.C.H - M.C.H.C - methods and process of estimation, Erythrocyte Sedimentation Rate [E.S.R.] - Westergren Method - Factors Influencing Sedimentation - Laboratory factors which influence ESR - Importance of ESR Reticulocyte Count , Differential Count , Bleeding time, clotting time, prothrombin time,

STORAGE, PRESERVATION & TRANSPORT

- Blood Storage of Blood and its components - Whole Blood - Platelets - Leucocytes - Plasma - Fresh Frozen Plasma- Anticoagulant & Preservatives –- Whole Blood - Red Cells - Red Cells Frozen State - High glycerol solution. - Low glycerol solution. – Changes in blood after storage-labeling of blood units-Gas refrigerator-Lay out of a blood bank refrigerator Packing and Transportation.

COMPATIBILITY TESTING PURPOSE

- Single tube compatibility techniques using AHG reagent.- Emergency compatibility testing-Difficulties in cross matching- Labeling & Issuing cross- matched blood.

BLOOD COMPONENTS

- Collection of blood components for fractional transfusion-Platelets packed Red Cell, Platelet rich Plasma, Platelets concentrate-Preparation of concentrated (packed) Red cells Techniques of preparation.

BLOOD TRANSFUSION REACTIONS

- Investigation of a Transfusion reaction-Hemolytic transfusion reaction-Actions to take when transfusion reaction occurs.

BODY FLUIDS

- Characteristics of Cerebrospinal Fluid. - Synovial fluid - Pleural fluid - Pericardial fluids - Peritoneal fluids-Semen analysis- physical, chemical & microscopic examination, sperm count, motility,

PRACTICAL'S

Blood bank services

- Screening of donors
- Preparation of anticoagulant fluids
- Grouping of blood.
- Cross matching of blood samples.
- Coomb's test, ELISA Test
- Screening of HbSAg. HIV and HCV and rapid kit methods
- Antiglobulin Test
- DCT
- ICT
- Saline Cross-Matching
- Albumin Cross Matching

- Enzyme Cross Matching
- Antiglobulin Test (Ahg)
- Bio safety Precautions and Guidelines
- ABO Blood Grouping Procedure
- Slide or Tile Method, Tube Method, Microplate Method, Micro-Typing System
- (Diamed/ Bio view), Automated or Semi-Automatic Instrumentation

HEMATOLOGY

- Collection of Blood Samples
- Obtaining peripheral Blood Smear
- Staining Of Blood Smear
- Obtaining Cell Counts – RBC, WBC, Platelets both manual and automated
- Absolute Eosinophils Count
- Estimation of Haemoglobin
- Packed Cell Volume, Erythrocyte Indices
- Reticulocyte Count
- Differential Count
- Bleeding Time
- Clotting Time
- PT
- Aptt

REFERENCE BOOKS:

1. Nayak Ramadas,"Textbook Of Pathology For Allied Health Sciences" ,Jaypee Brothers 1st Edition.
2. Nanda Maheshwari, "Clinical Pathology/Hematology and Blood Banking"(For DMLT Students), Jaypee Brothers, 3rd Edition.
3. Nayak Ramadas, "Histopathology Techniques & Its Management", Jaypee Brothers, 1st Edition.
4. Ramnik Sood, "Concise Book of Medical Laboratory Technology Methods and Interpretations", Jaypee Brothers, 2nd Edition.
5. Dacie&Lewis, "Practical Hematology", Elsevier Health – Uk, 11thEdition.
6. Lippincotts Illustrated Reviews in Pathology.

U20CTAT31	BIOSTATISTICS AND ETHICS	L	P	Hrs
		30	-	30

BIOSTATISTICS (15Hrs)

- Introduction to Statistics
- Scales of Measurement
- Collection and Presentation of data
- Measures of Central tendency
- Measures of Variation
- Probability
- Binomial and Normal distribution
- Sampling Methods
- Sample size determination
- Correlation and Regression
- Statistical Significance
- Non-Parametric tests
- Health Statistics including hospital statistics

REFERENCE BOOKS:

1. KR Sundaram, SN Dwivedi and V Sreenivas (2010): Medical Statistics, Principles and Methods, BI Publications Pvt Ltd, New Delhi, India.
2. A Indrayan (2008): Basic Methods of Medical Research, Second edition, AITBS Publishers, India.
3. NSN Rao and NS Murthy (2008): Applied Statistics in Health Sciences, First Edition, JAYPEE brothers medical publishers (P) Ltd, India.

MEDICAL ETHICS (15Hrs)

1. Medical ethics - Definition - Goal -Scope
2. Code of conduct - Introduction–Basic principles of medical ethics–Confidentiality
3. Malpractice and negligence
4. Rational and irrational drug therapy
5. Autonomy and informed consent Rights of patients
6. Care of the terminally ill Euthanasia
7. Organ transplantation
8. Medico legal aspects of medical records – Medical legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure- retention of medical records- other various aspects.

REFERENCE BOOKS:

1. Medical Ethics Manual-The Pocket Manual
2. The Medical Ethics Today The BMA's Handbook of Ethics and Law –The British Medical Associate