GURU KASHI UNIVERSITY
PUNJAB - INDIA

Program Syllabus Booklet

Diploma in Medical Lab. Technology

(Code-803)

Session: 2021-22

GURU KASHI UNIVERSITY

University College of Paramedical Sciences (Code:8)

Diploma in Medical Lab Technology
(Code: 803)

Study Scheme

Semester: 1st

Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	A803101	Introductory Biology	T	3	1	0	4	50	50	100
2	A803102	Basic Chemistry	T	3	1	0	4	50	50	100
3	A803103	General Microbiology	T	3	1	0	4	50	50	100
4	A803104	Elementary Physics	T	3	1	0	4	50	50	100
5	A803105	Introductory Biology (Practical)	P	0	0	4	2	50	50	100
6	A803106	Basic Chemistry (Practical)	P	0	0	4	2	50	50	100
7	A803107	General Microbiology (Practical)	P	0	0	4	2	50	50	100
8	A803108	Elementary Physics (Practical)	P	0	0	4	2	50	50	100
Total No. of Credits				24						

Semester: 2nd

Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	A803201	Basic Principal of Biochemistry	T	3	1	0	4	50	50	100
2	A803202	Basic Haematology	T	3	1	0	4	50	50	100
3	A803203	Basics of Clinical Microbiology	T	3	1	0	4	50	50	100
4	A803204	Human Physiology and Health Education	T	3	1	0	4	50	50	100
5	A803205	Basic Principal of Biochemistry (Practical)	P	0	0	4	2	50	50	100
6	A803206	Basic Haematology(Practical)	P	0	0	4	2	50	50	100
7	A803207	Basics of Clinical Microbiology(Practical)	P	0	0	4	2	50	50	100
8	A803208	Human Physiology and Health Education(Practical)	p	0	0	4	2	50	50	100
Total No. of Credits				24						

Semester: 3rd										
Sr.	**Subject Code**	**Subject Name**	**Type of Subject T/P**	**(Hours Per Week)**			**No. of Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1	A803301	Anatomy & Physiology-I	T	3	1	0	4	50	50	100
2	A803302	Basic Computers and Inforamtion Science	T	3	0	0	3	50	50	100
3	A803303	Introduction to Quality and Patient Safety	T	3	0	0	3	50	50	100
4	A803304	Principles of Management	T	3	1	0	4	50	50	100
5	A803305	English and Communication Skills	T	3	0	0	3	50	50	100
6	A803306	Anatomy & Physiology I (Practical)	P	0	0	4	2	50	50	100
7	A803307	Basic Computers and Information Science (Practical)	P	0	0	4	2	50	50	100
8	A803308	Introduction to Quality and Patient Safety (Practical)	P	0	0	4	2	50	50	100
Total No. of Credits				23						

Semester: 4th										
Sr.	**Subject Code**	**Subject Name**	**Type of Subject T/P**	**(Hours Per Week)**			**No. of Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1	A803401	Human Anatomy & Physiology-II	T	3	1	0	4	50	50	100
2	A803402	Medical Microbiology	T	3	0	0	3	50	50	100
3	A803403	Haematology	T	2	1	0	3	50	50	100
4	A803404	Clinical Biochemistry	T	2	1	0	3	50	50	100
5	A803405	Histopathology	T	2	1	0	3	50	50	100
6	A803406	Human Anatomy & Physiology-II Practical	P	0	0	2	1	50	50	100
7	A803407	Medical Microbiology Practical	P	0	0	3	2	50	50	100
8	A803408	Haematology Practical	P	0	0	4	2	50	50	100
9	A803409	Clinical Biochemistry Practical	P	0	0	4	2	50	50	100
10	A803410	Histopathology Practical	P	0	0	4	2	50	50	100
Total No. of Credits				25						

Semester: 5th										
Sr.	**Subject Code**	**Subject Name**	**Type of Subject T/P**	**(Hours Per Week)**			**No. of Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1	A803501	Applied Bacteriology	T	2	1	0	3	50	50	100
2	A803502	Applied Haematology	T	2	1	0	3	50	50	100
3	A803503	Applied Clinical Biochemistry	T	2	1	0	3	50	50	100
4	A803504	Medical Parasitology & Virolgy	T	2	0	0	2	50	50	100
5	A803505	Immuno-Haematology/ Blood Banking	T	2	0	0	2	50	50	100
6	A803506	Immuno-Pathology & Cytopathology	T	3	0	0	3	50	50	100
7	A803507	Applied Haematology Practical	P	0	0	4	2	50	50	100
8	A803508	Applied Clinical Biochemistry Practical	P	0	0	4	2	50	50	100
9	A803509	Medical Parasitology & Virolgy Practical	P	0	0	4	2	50	50	100
10	A803510	Immuno-Haematology/ Blood Banking Practical	P	0	0	4	2	50	50	100
11	A803511	Immuno-Pathology & Cytopathology Practical	P	0	0	4	2	50	50	100
Total No. of Credits							26			

Semster 6th										
Sr.	**Subject Code**	**Subject Name**	**Type of Subject**	**(Hours Per Week)**			**No. of Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1	A803601	Professional Training/Internship (6 Months)	NA	NA	NA	NA	20	500	500	1000

	University College of Paramedical Sciences **DMLT**		
Course Title: INTRODUCTORY BIOLOGY			
Semester: I	**Course code: A803101**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 3/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODFULE 1-

Biology & Its Branches; Scientific methods in Biology; Scope of biology and career options in Medical Laboratory Sciences

MODULE 2-

Structure and function of tissues - epithelial, connective, muscular and nervous

MODULE 3-

1. Cell as a basic unit of life - discovery of cell, cell theory, cell as a self - contained unit; prokaryotic and eukaryotic cell; unicellular and multicellular organisms; Ultrastructure of prokaryotic and eukaryotic cell - cell wall, cell membrane - unit membrane concept (Fluid-Mosaic model); membrane transport; cellular movement (exocytosis, endocytosis); cell organelles and their functions- nucleus, mitochondria, plastids, endoplamasic reticulum, Gogli complex, lysosomes, microtubules, centriole, vacuole, cytoskeleton, cilia and flagella, ribosomes

2. Molecules of cell; inorganic and organic materials - water, salt, mineral ions, carbohydrates, lipids, amino acids, proteins, nucleotides, nucleic acids (DNA and RNA), Cell division: Binary fission, Cell cycle: Mitosis, Meiosis

MODULE 4-

1. Continuity of life - heredity, variation; mendel's laws of inheritance, chromosomal basis of inheritance; other patterns of inheritance - incomplete dominance, multiple allelism, quantitative inheritance.

2. Chromosomes - bacterial cell and eukaryotic cell; parallelism between genes and chromosomes; genome, linkage and crossing over; gene mapping; recombination; DNA as a genetic material - its structure and replication; structure of RNA and its role in protein synthesis

Suggested Readings:

1. Reece, J.B., Urry, L.A., Cain, M.L., Wasserman, S.A., Minorsky, P.V. & Jackson, R.B. (2011). Campbell Biology (9th Edition). Pearson Benjamin Cummings Publishers, San Francisco, USA.

2. Fried, G.H. & Hademenos, G.J. (2002). Schaum's Biology. Tata McGraw Hill Publications, New Delhi.

	University College of Paramedical Sciences **DMLT**		
Course Title: BASIC CHEMISTRY			
Semester: I	**Course code: A803102**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 3/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE1-

Solid State (Periods 12) Classification of solids based on different binding forces :molecular, ionic covalent and metallic solids, amorphous and crystalline solids(elementary idea),unit cell in two dimensional and three dimensional lattices, calculation of density of unit cell, packing in solids, packing efficiency, voids ,number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties, Band theory of metals ,conductors, semiconductors and insulators and n and p type semiconductors .

MODULE 2-

Solutions (Periods 12) Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, colligative properties – relative lowering of vapour pressure, Raoult's law , elevation 8 of B.P., depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Vant Hoff factor.

MODULE 3-

Electrochemistry (Periods 14) Redox reactions; conductance in electrolytic solutions, specific and molar conductivity variations of conductivity with concentration, Kohlrausch's Law, electrolysis and laws of electrolysis (elementary idea), dry cell – electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells. Relation between Gibbs energy change and EMF of a cell, fuel cells; corrosion.

MODULE 4-

Chemical Kinetics (Periods 12) Rate of a reaction (average and instantaneous), factors affecting rates of reaction: concentration, temperature, catalyst; order and molecularity of a reaction; rate law and specific rate constant, integrated rate equations and half life (only for zero and first order reactions); concept of collision theory (elementary idea, no mathematical treatment).Activation energy, Arrhenious equation.

MODULE 5-

Surface Chemistry (Periods 8) Adsorption – physisorption and chemisorption; factors affecting adsorption of gases on solids; catalysis :homogenous and ids and suspensions; lyophillic, lyophobic multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsions – types of emulsions.

MODULE 6-

General Principles and Processes of Isolation of Elements (Periods 8) Principles and methods of extraction – concentration, oxidation, reduction electrolytic method and refining; occurrence and principles of extraction of aluminium, copper, zinc and iron.

	University College of Paramedical Sciences **DMLT**		
Course Title: GENERAL MICROBIOLOGY			
Semester: I	**Course code: A803103**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 3/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1- Introduction to Microbiology

Definition, Brief history, importance of microbiology

MODULE 2- Structure of bacteria

Types of bacteria, Classification of bacteria on the basis of shapes, Anatomical structure of a bacterial cell including spores, flagella and capsules, Bacterial growth and nutrition of bacteria.

MODULE 3- Microscopy –

1. Principle and care, working of Simple microscope and compound microscope
2. Sterilization - definition
   - By dry heat,
   - Moist heat,
   - Autoclave & hot air oven- their structure, functioning, controls and sterilization indicators.
   - By radiation and filtration

MODULE 4- Antiseptics and disinfectants.

Definitions, types, properties, use of disinfectants and antiseptics

MODULE 5- Bacterial culture and culture techniques

Inoculations of culture media, aerobic and anaerobic culture, isolation of pure and mixed cultures.

MODULE 6- Staining techniques

Methods of smear preparation, Gram stain, Ziehl-Neelson's (Z-N) stain, Albert's stain.

RECOMMENDED BOOKS

1. Textbook of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
2. Practical Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
3. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworth – Heinemann; Oxford
4. Textbook of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House, Mumbai
5. Medical Laboratory Technology by Kanai Lal Mukherjee; Tata McGraw Hill, New Delhi
6. Medical Laboratory Manual for Tropical Countries Vol. I and II by Monica
7. Cheesbrough; Cambridge University Press; UK
8. Text Book of Microbiology by Ananthanarayan and Paniker; Orient Longman, Hyderabad
9. Text book of Medical Microbilogy by Cruckshiank Vol. I and II

	University College of Paramedical Sciences **DMLT**		
Course Title: ELIMENTRY PHYSICS			
Semester: I	**Course code: A803104**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 3/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1- SI UNITS

1. Need for measurement: units of measurement, system of units SI units.
2. Fundamental and derived units, length and time measurements.

MODULE 2- MAGNETIC EFFECTS OF CURRENT AND MAGNETISM

1. Concept of magnetic field, Oersted's experiment, Biot- Savart law and its application to current carrying circular loop.
2. Ampere's law and its applications to infinitely long, straight wire, straight and toroidal solenoids.

MODULE 3- ATOMS & NUCLEI

1. Alpha-particle scattering experiment, Rutherford's model of atom, Bohr model, Energy levels. hydrogen spectrum.
2. Composition and size of nucleus, atomic masses, isotopes, isobars, isotones Radioactivity-alpha, beta and gamma particles/rays and their properties, radioactive decay law.
3. Applications of radio activity.

MODULE 4- OPTICS

1. Reflection of light: spherical mirrors & its types.
2. Refraction of Light: lenses & its types.
3. Image formations, magnification & power of a lens, Refraction and dispersion of light through a prism.

4. Scattering of light-blue colour of the sky and reddish appearance of the sun at sunrise and sunset.
5. Microscope & their Magnifying Powers

6. Photo chromatography

RECOMMENDED BOOKS

1. Elementary Physics by FranklinHerman Ayres

2. Exercise in Elementary Physics by Charle R.

3. Particle Physics in Laboratory by Alexander & Studiniken

	University College of Paramedical Sciences **DMLT**		
Course Title: INTRODUCTORY BIOLOGY (Practical)			
Semester: I	**Course code: A803105**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 4**	
Course Pre-requisites:		**Number of sessions:**	

1. Study of Mitosis and Meiosis through animal cells (Grasshopper).

2. Study of osmosis and diffusion.

3. Study of Epithelial, Muscle, Nerve and mammalian blood cells through permanent or temporary cells.

	University College of Paramedical Sciences **DMLT**		
Course Title: BASIC CHEMISTRY (PRACTICAL)			
Semester: I	**Course code: A803106**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours:4**	
Course Pre-requisites:		**Number of sessions:**	

1. Cleaning of the laboratory glass ware.
2. Preparation of distilled water
3. Principle, working and maintenance of pH meter.
4. To prepare 0.1 N NaoH solution.
5. To prepare 0.2N HCl solution.
6. To prepare 0.1 molar H2SO4
7. To prepare 0.2 Molar Sodium carbonate solution.

	University College of Paramedical Sciences **DMLT**		
Course Title: GENERAL MICROBIOLOGY (PRACTICAL)			
Semester: I	**Course code: A803107**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 4**	
Course Pre-requisites:		**Number of sessions:**	

1. Demonstration of safety rules (universal precautions) in a microbiology laboratory
2. Preparation of cleaning agents and techniques of cleaning of glass and plastic ware.
3. Sterilization by autoclave and hot air oven
4. Handling and use of compound microscope
5. Staining techniques: Gram, Albert's, Ziehl – Neelson's
6. Demonstration of motility (Hanging drop method)
7. Preparation and sterilization of various culture media (Nutrient agar, Nutrient broth, Blood agar, Chocolate agar, Mac-Conkey agar, Lowenstein-Jensen Media
8. Aerobic and anaerobic culture methods
9. Antimicrobial susceptibility testing by Stokes disc diffusion method

	University College of Paramedical Sciences **DMLT**		
Course Title: ELIMENTARY PHYSICS (Practical)			
Semester: I	**Course code: A803108**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 4**	
Course Pre-requisites:		**Number of sessions:**	

DEMONSTRATION OF-

1-BASIC PHYSICS

2-SOUND

3-HEAT

4-FUNDAMENTALS OF DC CIRCUITS

5-AC CIRCUITS

6-MAGNETIC CIRCUITS

7-RECTIFICATION

	University College of Paramedical Sciences **DMLT**		
Course Title: BASIC PRINCIPLE OF BIOCHEMISTRY			
Semester: II	**Course code: A803201**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial:3/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1- Spectrophotometry and colorimetry

a) Introduction
b) Theory of spectrophotometry and colorimetry
c) Lambert`s law and Beer`s law
d) Applications of colorimetry and spectrophotometry

MODULE 2- Photometry

a) Introduction
b) General principles of flame photometry
c) Limitations of flame photometry
d) Instrumentation
e) Applications of flame photometry
f) Atomic absorption spectroscopy – Principle & applications

MODULE 3- Chomatography

Introduction, definition, types of chromatography

a) Paper Chromatography : Introduction, principle, types ,details for qualitative and quantitative analysis, application

b) Thin layer chromatography: Introduction, experimental techniques, application of TLC, limitations, High performance thin layer chromatography

c) Column chromatography: Introduction, principle column efficiency, application of column chromatography

d) Gas chromatography: Introduction principle, instrumentation, application

e) Ion exchange chromatography: Introduction, Definition and principle, cation and anion exchangers, application

f) Gel Chromatography: Introduction Principle and method, application and advantages

MODULE 4- Electrophoresis: Introduction, principle, Instrumentation, types of electrophoresis - paper and gel electrophoresis ,application

Suggested readings:

1. Practical Clinical Biochemistry by Harold Varley
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by Chaterjee Shinde
7. Principal of Biochemistry by Lehninger

8. Biochemistry by Voet & Voet
9. Biochemistry by Stryer

	University College of Paramedical Sciences **DMLT**		
Course Title: BASIC HAEMATOLOGY			
Semester: II	**Course code: A803202**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial:3/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1- Introduction to Haematology:

(a) Definition (b) Importance (c) Important equipment used.

MODULE 2- Laboratory organization and safety measures in haemotology Laboratory

MODULE 3-Introduction to blood, its composition, function and normal cellular components

MODULE 4- Formation of cellular components of blood:

a) Erythropoiesis (b) Leucopoiesis (c) Thrombopoiesis
b) Collection and preservation of blood sample for various haematologicalinvestigations

MODULE 5- Definition, principles & procedure, Normal values, Clinical significance, errors involved, means to minimize errors for the following: Haemoglobinometry, Total leucocytes count (TLC), Differential leucocytes count (DLC), Erythrocyte Sedimentation Rate (ESR), Packed cell volume/ Haematocrit value, Red cell Indices (RCI), Absolute Eosinophil count, Reticulocyte count, Platelet count

MODULE 6- Preparation of blood Films: ypes. Methods of preparation (Thick and thin smear/ film)

Staining techniques in Haematology (Romanowsky's stains) : Principle, composition,preparation of staining reagents and procedure of : Giemsa, Leishman, Wright's, Field's, JSB

Suggested Readings:

1. Text book of Medical Laboratory Technology by Paraful B. Godkar

2. Medical laboratory Technology by KL Mukherjee Volume-I

3. Haematology for students Practitioners by RamnikSood

4. Hand book of Medical Laboratory Technology(IInd edition) by V.H. Talib

5. Haematology (International edition)EmmanuelC.BesaHarwal Publisher

6. Practical Haematology by JB Dacie

7. Practical Haematology(8th edition) by Sir John

8. Clinical Haematology by Christopher A. Ludlam

9. Clinical Diagnosis &Management by Laboratory methods(20th edition) by John bernardHenary

10. Medical Laboratory Technology Methods &Interpretation(5th edition) by RamnikSood Punjab Technical University B.Sc. Medical Laboratory Sciences, Batch 2011

11. Atlas of haematology(5th edition)by G.A. McDonald

12. A Manual of Laboratory & Diagnostic Tests(6th edition)by Frances Fischbach

13. Haematology (Pathophysiological basis for clinical practice) by Stephen M. Robinson

	University College of Paramedical Sciences **DMLT**		
Course Title: BASICS OF CLINICAL MICROBIOLOGY			
Semester: II	**Course code: A803203**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial:3/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1- Introduction to Microbiology
Definition, Brief history, importance of microbiology

MODULE 2- Structure of bacteria

Types of bacteria, Classification of bacteria on the basis of shapes, Anatomical structure of a bacterial cell including spores, flagella and capsules, Bacterial growth and nutrition of bacteria.

MODULE 3- Microscopy –

1. Principle and care, working of Simple microscope and compound microscope

2. Sterilization - definition
   - By dry heat,
   - Moist heat,
   - Autoclave & hot air oven- their structure, functioning, controls and sterilization indicators.
   - By radiation and filtration

MODULE 4- Antiseptics and disinfectants.

Definitions, types, properties, use of disinfectants and antiseptics

MODULE 5- Bacterial culture and culture techniques

Bacterial culture and culture techniques, Inoculations of culture media, aerobic and anaerobic culture, isolation of pure and mixed cultures.

MODULE 6- Staining techniques

Methods of smear preparation, Gram stain, Ziehl-Neelson's (Z-N) stain, Albert's stain.

RECOMMENDED BOOKS

10. Textbook of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
11. Practical Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
12. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworth – Heinemann; Oxford
13. Textbook of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House, Mumbai
14. Medical Laboratory Technology by Kanai Lal Mukherjee; Tata McGraw Hill, New Delhi
15. Medical Laboratory Manual for Tropical Countries Vol. I and II by Monica
16. Cheesbrough; Cambridge University Press; UK
17. Text Book of Microbiology by Ananthanarayan and Paniker; Orient Longman, Hyderabad
18. Text book of Medical Microbilogy by Cruckshiank Vol. I and II

	University College of Paramedical Sciences **DMLT**		
Course Title: HUMAN PHYSIOLOGY AND HEALTH EDUCATION			
Semester: II	**Course code: A803204**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 3/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1- Introduction to human body, its anatomy and physiology

Elementary tissues of body and their classification along with brief description.

1. Digestive System:

Organs of digestion, histology of the digestive organs (stomach, small intestine, liver, pancreas), Process of digestion, Absorption and assimilation of food

2. Respiratory System, Organs of respiration and their histology (lungs and trachea), Respiration (Definition and Mechanism)

MODULE 2- The skin (Structure and functions)

1. The excretory system, Organs of excretion (kidneys, ureter, bladder), Histology of kidney and its functions, Formation of urine and its composition, Structure of nephron
2. Circulatory system, Composition and functions of blood
3. The heart anatomy and physiology, the chambers of heart, various vessels and valves, Circulation of blood, The blood pressure, Arteries and veins, Lymph and lymphatic system

MODULE 3- Nervous System

1. Central nervous system (Brain and Spinal cord)
2. Peripheral nervous system (cranial and spinal nerves)
3. The reflex action and reflex arc
4. The transmission of nerve impulse
5. The sense organs (eye, ear, tongue and nose); structure and functions

MODULE 4- Muscular System

1. Brief description of skeletal, smooth and cardiac muscles, Muscular contraction, Muscle Fatigue, Some important muscles of body
2. Skeletal System- The skeleton, important bones and their brief description, Articulation of Bones - joints
3. Endocrine System- Short description of various endocrine glands and their functions

MODULE 5- Reproductive System

Male and female reproductive system- Histology of Gonads, The ovarian cycle and ovulation, Fertilization Fertility control

Suggested Readings:

1. Anatomy & Physiology by Ross and Wilson
2. Anatomy and Physiology: Understanding the Human Body by Clark
3. Anatomy and Physiology for nurses by Evelyn Pearce
4. Anatomy and Physiology for nurses by Sears
5. Anatomy and Physiology for nurses by Pearson
6. Anatomy and Physiology by NMurgesh

	University College of Paramedical Sciences **DMLT**		
Course Title: BASIC PRINCIPLE OF BIOCHEMISTRY			
Semester: II	**Course code: A803205**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 4**	
Course Pre-requisites:		**Number of sessions:**	

PRACTICAL

a) To demonstrate the principle, working & maintenance of spectrophotometer.
b) To demonstrate the principle, working & maintenance of colorimeter.
c) To demonstrate the principle, working & maintenance of flame photometer.
d) To demonstrate the principle, procedure of paper chromatography.
e) To demonstrate the principle & procedure of Gas chromatography.
f) To demonstrate the principle & demonstration of TLC.
g) To demonstrate the principle & procedure of column chromatography.
h) To demonstrate the principle & procedure of Electrophoresis.

	University College of Paramedical Sciences **DMLT**		
Course Title: BASIC HAEMATOLOGY (PRACTICAL)			
Semester: II	**Course code: A803206**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours:4**	
Course Pre-requisites:		**Number of sessions:**	

1. Demonstration of Equipments used in clinical Haematology.

(a) Microscope (b) Blood Cell counter (DLC) (c) Sahli's apparatus (d) Calorimeter

2. Hb Estimation (a) Sahli's method (b) Cyanmethahaemoglobin method (c) Oxyhaemoglobin method

3. Total leukocyte count

4. Preparation of smear and staining with Giemsa and Leishman stain.

5. Differential leucocytes count

6. Platelets count

7. Reticulocyte count

8. Absolute Eosinophil count

9. Calculation of Red cell indices (RCI)

10 ESR (Wintrobe and Westergren method)

11. Packed cell volume (Macro & Micro)

	University College of Paramedical Sciences **DMLT**		
Course Title: BASICS OF CLINICAL MICROBIOLOGY (PRACTICAL)			
Semester: II	**Course code: A803207**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours:4**	
Course Pre-requisites:		**Number of sessions:**	

1. Demonstration of safety rules (universal precautions) in a microbiology laboratory
2. Preparation of cleaning agents and techniques of cleaning of glass and plastic ware.
3. Sterilization by autoclave and hot air oven
4. Handling and use of compound microscope
5. Staining techniques: Gram, Albert's, Ziehl – Neelson's
6. Demonstration of motility (Hanging drop method)
7. Preparation and sterilization of various culture media (Nutrient agar, Nutrient broth, Blood agar, Chocolate agar, Mac-Conkey agar, Lowenstein-Jensen Media
8. Aerobic and anaerobic culture methods
9. Antimicrobial susceptibility testing by Stokes disc diffusion method

	University College of Paramedical Sciences **DMLT**		
Course Title: HUMAN PHYSIOLOGY & HEALTH EDUCATION (PRACTICAL)			
Semester: II	**Course code: A803208**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours:4**	
Course Pre-requisites:		**Number of sessions:**	

1. Demonstration of human cell from slides/charts.

2. Demonstration of cell division i.e. mitosis and Meiosis from permanent mounted slides.

3. Demonstration of various tissues from permanent slides. (i) Epithelial tissue (ii) Connective tissue. (iii)Muscular tissue (iv) Nervous tissue

4. Demonstration of individual bone.

5. Demonstration of respiratory system from chart.

6. Pear expiratory flow rate (PEFR)

7. Demonstration of cardiovascular system form chart.

8. Electro cardio gram (ECG)

9. Demonstration of eye, nose, ear and tongue from model and charts.

10. To study and count spleenocytes from mammalian spleen.

	University College of Paramedical Sciences **DMLT**		
Course Title: Anatomy & Physiology I			
Semester: III	**Course code: A803301**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 3/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

Module 1

1. **Introduction to Anatomical terms of the human body** - Basic anatomical terminology, anatomical position, anatomical planes, levels of organization in the body, organ systems, skeleton, cavities of the body.
2. **Organization of the human body at the cellular level** - Structure of the cell comprising of cell membrane, cytoplasm, cell organelles, nucleus, cell extensions etc.
3. **Organization of the human body at the tissue level** - Epithelial, Connective, Muscular& Nervous tissue.

Module 2

1. **Blood** - Composition of blood, Features of red blood cells, white blood cells, platelets.
2. **Lymphatic system** - Features of lymph vessels, lymphatic tissue & organs, lymphatics, spleen, tonsil, thymus.
3. **Nervous system** - Central nervous system, brain, cerebellum, spinal cord, cranial nerves, autonomic nervous system.
4. **Muscular system** - Skeletal muscle, cardiac muscle, smooth muscle, muscles of the body.
5. **Skeletal system** - Features of bones, axial skeleton, appendicular skeleton.
6. **Musculoskeletal system** - Joints of upper & lower limb.

Module 3

1. **Respiratory system** - Nose & paranasal sinuses, pharynx, larynx, trachea, lungs.
2. **Cardiovascular system** - Heart & blood vessels.
3. **Digestive system -** Oral cavity, pharynx, salivary glands, oesophagus, stomach, small intestine, large intestine, liver, gallbladder, pancreas.

4. **Urinary system** - Kidneys, juxtaglomerular apparatus, ureters, urinary bladder, urethra.

Module 4

1. **Introduction to genetics** - Features of chromosomes, DNA.
2. **Reproductive system in females** - External & internal genital organs, breast.
3. **Reproductive system in males** - Penis, scrotum, testes, prostate gland.
4. **Endocrine system** - Hormones, pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas.
5. **Special senses** - Olfactory system, taste apparatus, external middle & internal ear, eye.
6. **Skin** - Features of skin, hair, sebaceous glands, sweat glands, nails.

Module 5 (Physiology)

1. **Introduction to physiology of the human body** –Composition of body, Homeostasis, Introduction to chemistry of life.
2. **Organization of the human body at the cellular level** – Function of lipids, carbohydrates, proteins & cell organelles.
3. **Organization of the human body at the tissue level** – Function of Epithelial, Connective, Muscular & Nervous tissues.

Module 6

1. **Blood** – Haemopoesis, haemostasis, coagulation of blood, blood transfusion.
2. **Lymphatic system** – Function of lymph vessels, lymphatic tissue & organs, lymphatics, spleen, tonsil, thymus.
3. **Resistance & immunity** – Innate immunity, acquired immunity, humoral & cell mediated immunity.

Module 7

1. **Nervous system** – Properties of nerve fibres, function of neuroglia, synapse, CNS, CSF, brain, cranialnerves, demonstration of reflexes.
2. **Muscular system** – Properties of skeletal muscle, cardiac muscle, smooth muscle, muscles of the body.
3. **Skeletal system** – Functions of bones, axial skeleton, appendicular skeleton.
4. **Musculoskeletal system** – Movement in the joints of upper & lower limb**.**

Module 8

1. **Respiratory system** – Physiology of respiration, pulmonary function tests, gas exchange in lungs, transport of gases between lungs & tissues, regulation of respiration.
2. **Cardiovascular system** - Heart & blood vessels: Systemic circulation, pulmonary circulation, ECG, cardiac output, blood pressure.

3. **Digestive system** – Process of digestion, function of oral cavity, pharynx, salivary glands, oesophagus, stomach, small intestine, large intestine, liver, gallbladder, pancreas.
4. **Urinary system** – Function of kidneys, juxtaglomerular apparatus, ureters, urinary bladder, urethra, physiology of urine formation, glomerular filtration, tubular reabsorption, water balance, micturition.
5. **Introduction to genetics** - Features of chromosomes, DNA, protein synthesis, dominant inheritance, recessive inheritance, sex linked inheritance.
6. **Reproductive system– female**: Physiology of female reproductive system.
7. **Reproductive system – male**: Physiology of male reproductive system.
8. **Endocrine system** - Mechanism of action of hormones, function of pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas.
9. **Special senses** - Physiology of olfaction, taste, hearing, balance & vision.
10. **Skin –** Function of skin, hair, sebaceous glands, sweat glands, nails, temperature regulation.

Text Books:

1. P.R Ashalatha& G Deepa ‘s Textbook of anatomy & physiology by
2. B.D.Chaurasia’s human anatomy

Reference books:

1. SampathMadhyastha’sManipal manual of anatomy for allied health sciences
2. Krishna Garg &Madhu Joshi’s Practical anatomy workbook
3. Dixit’s Atlas of Histology for Medical Students
4. Basic Histology: A Color Atlas & Text
5. Jana’s Exam Oriented Practical Anatomy
6. Krishan’s Anatomy Mnemonics

	University College of Paramedical Sciences **DMLT**		
Course Title: Basic In Computer& Information Science			
Semester: III	**Course code: A803302**	**Credits:03**	**Core**
No of sessions Lectures / Tutorial: 3		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

Module 1

1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
2. Input output devices: Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).
3. Processor and memory: The Central Processing Unit (CPU), main memory.
4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.

Module 2

1. Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).
2. Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.
3. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.

Module 3

1. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
2. Introduction of Operating System: introduction, operating system concepts, types of operating system.
3. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
4. Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
5. Application of Computers in clinical settings.

RECOMMENDED BOOKS

1. Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi

2. Information Technology for Management by Henery Lucas, 7th edition, Tata Mc Graw Hills, New Delhi
3. Computers Fundamentals Architecture and Organisation by B Ram, revised Edition, New Age International Publishers, New Delhi
4. Computers Today by SK Basandara, Galgotia publication Pvt ltd. Daryaganj, New Delhi.
5. Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
6. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
7. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
8. Fundamentals of Information Technology by Leon and Leon;Vikas PublishingHouse Pvt. Ltd., Jungpura, New Delhi
9. On Your Marks - Net…Set…Go… Surviving in an e-world by Anushka Wirasinha, Prentice Hall of India Pvt. Ltd., New Delhi
10. Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar

	University College of Paramedical Sciences **DMLT**		
Course Title: Introduction To Quality and Patient Safety			
Semester: III	**Course code: A803303**	**Credits:03**	**Core**
No of sessions Lectures / Tutorial: 3		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

Module 1. Quality assurance and Management

Introduction, Quality improvement approaches, standards and norms, quality improvement tools, introduction to NABH guidelines.

Module 2. Basic of Emergency care and Life support skills

Basic life support (BLS) following cardiac arrest, recognition of sudden cardiac arrest and activation of emergency response system, early cardiopulmonary resuscitation (CPR) and rapid defibrillation with an automated external defibrillator (AED)

Module 3. Basic emergency care

First aid, choking, rescue breathing methods, ventilation including use of bag valve master (BVMs)

Module 4. Biomedical Waste Management

Definition, waste minimization, BMW-segregation, collection, transportation, treatment and disposal (Including color coding), Liquid BMW, Radioactive waste, metals/chemicals/drug waste, BMW management and methods of disinfection, use of Personal protective equipment (PPE)

Module 5. Infection Prevention and Control

Sterilization, Disinfection, Effective hand hygiene, use of PPE,Prevention and control of common health care associated infections, Guidelines(NABH) and JCI for hospital infection control.

Module 6. Disaster preparedness and management

Fundamentals of emergency management

7.Course References

Texts, Materials, and Supplies:

• Turgeon, Mary Louise. (2015). Clinical Laboratory Science, 7th ed. Maryland Heights, MO: Mosby. ISBN 9780323225458

Required Readings:

• Turgeon, Mary Louise. (2015). Clinical Laboratory Science, 7th ed. Maryland Heights, MO: Mosby. ISBN 9780323225458

Recommended Readings:

• Medical Dictionary

Others

1.disaster management set up in india - opcw.org
www.opcw.org/sites/default/files/documents/event_photos/2010/tabletop_exercise_poland_nov201..

2.natural disasters: hospital management | 2015-10-22 | ahc ...
www.reliasmedia.com/articles/136571-natural-disasters-hospital-management

1. Biomedical waste management in India: Critical appraisal - NCBI - NIH
   www.ncbi.nlm.nih.gov/pmc/articles/PMC5784295

2. Vital signs: Understanding what the body is telling us
   https://www.coursera.org/learn/vital-signs/
3. Patient Safety and Quality Improvement
   https://www.coursera.org/learn/patient-safety

	University College of Paramedical Sciences **DMLT**		
Course Title: Principles of Management			
Semester: III	**Course code: A803304**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 3/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1- Ethical Principles and standards for a clinical laboratory professional
Duty to the patient, Duty to colleagues and other professionals, Duty to the society

MODULE 2- Good Laboratory Practice (GLP) Regulations and Accreditation
Introduction to Basics of GLP and Accreditation, Aims of GLP and Accreditation,Advantages of Accreditation, Brief knowledge about National and International Agencies for clinicallaboratory accreditation

MODULE 3- Awareness / Safety in a clinical laboratory
General safety precautions, HIV: pre- and Post-exposure guidelines, Hepatitis B & C: pre- and Post-exposure guidelines, Drug Resistant Tuberculosis.
Patient management for clinical samples collection, transportation and preservation, sample accountability
Purpose of accountability, Methods of accountability.

MODULE 4- Sample analysis
Introduction, Factors affecting sample analysis
Reporting results: Awareness about the following;
Basic format of a testreport, Reported reference range, Clinical Alerts, Abnormal results, Turnaround time, Results from referrallaboratories, Release of examination results, Alteration in reports

MODULE 5- Quality Management system
1. Introduction, Quality assurance, Quality control system, Internal and External quality control
2. Biomedical waste management in a clinical laboratory
3. Introduction and importance of calibration and Validation of Clinical Laboratory instruments
4. Introduction to Laboratory Information system (LIS), Hospital Information system (HIS) and financial management

MODULE 6- Ethics in Medical laboratoryPractice
Understanding the term_Ethics'
Ethics in relation to thefollowing:
Pre-Examination procedures, Examination procedures, Reporting of results, Preserving medical records
Access to Medical laboratoryRecords, Inventory Control

Suggested reading:

Medical Laboratories Management- Cost effective methods by Sangeeta Sharma, Rachna Agarwal, Sujata Chaturvedi and Rajiv Thakur

	University College of Paramedical Sciences **DMLT**		
Course Title: English & Communication Skill			
Semester: III	**Course code: A803305**	**Credits:03**	**Core**
No of sessions Lectures / Tutorial: 3		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

Module 1: Basics of Grammar- Part I

Vocabulary, Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words.

Module 2: Basics of Grammar – Part II

Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms

Module 3: Writing Skills

Letter writing, E mail, and Essay, Articles, and Memos, one word substitutes, note making and Comprehension

Module 4: Writing and Reading

Summary writing, Creative writing, newspaper reading

Module 5: Practical Exercise

Formal speech, Phonetics, semantics and pronunciation

Communication:

Module 6: Introduction: Communication process, Elements of communication, Barriers of communication and how to overcome them, Nuances for communicating with patients and their attenders in hospitals.

Module 7: Speaking: Importance of speaking efficiently; Voice culture, Preparation of speech. Secrets of good delivery, Audience psychology, handling, Presentation skills, Individual feedback for each student, Conference/Interview technique.

Module 8; Listening: Importance of listening, Self-assessment, Action plan execution, Barriers in listening, Good and persuasive listening.

Module 9: Reading: What is efficient and fast reading, Awareness of existing reading habits, tested techniques for improving speed, Improving concentration and comprehension through systematic study.

Module 10; Non Verbal Communication: Basics of non-verbal communication, Rapport building skills using neuro- linguistic programming (NLP).

RECOMMENDED BOOKS

1. English and Communication Skills, BookII
By Kuldip Jaidka, Alwainder Dhillon and Parmod Kumar Singla, Prescribed by
NITTTR, Chandigarh & Published By Abhishek Publication, 5759,
Sector17,
Chandigarh
2. Essentials of Business Communication by Pal and Rorualling; Sultan Chand and Sons
3. The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India
4. New Design English Grammar, Reading and Writing Skills by AL Kohli (Course A and course B), Kohli Publishers, 34
Industrial Area PhaseII,
Chandigarh,
5. New Design English Reading and Advanced Writing Skills for Class XI and XII by MK Kohli and AL Kohli; Kohli Publishers, 34
Industrial Area PhaseII,
Chandigarh,
6. A Practical English Grammar by Thomson and Marlinet
7. Spoken English by V Sasikumar and PV Dhamija; Tata McGraw Hill
8. English Conversation Practice by Grount Taylor; Tata McGraw Hill
9. Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi
10. Business Correspondence and Report Writing by RC Sharma and Krishna Mohan; Tata McGraw Hill Publishing Company Ltd.
New Delhi

	University College of Paramedical Sciences **DMLT**		
Course Title: Anatomy & physiology-I (Practical)			
Semester: III	**Course code: A803306**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours:4**	
Course Pre-requisites:		**Number of sessions:**	

Demonstration

Basic anatomical terminology, anatomical position, anatomical planes, levels of organization in the body, organ systems, skeleton, cavities of the body.

Lymphatic system - Features of lymph vessels, lymphatic tissue & organs, lymphatics, spleen, tonsil, thymus.

Nervous system - Central nervous system, brain, cerebellum, spinal cord, cranial nerves, autonomic nervous system.

Muscular system - Skeletal muscle, cardiac muscle, smooth muscle, muscles of the body.

Skeletal system - Features of bones, axial skeleton, appendicular skeleton.

Musculoskeletal system - Joints of upper & lower limb.

Respiratory system - Nose & paranasal sinuses, pharynx, larynx, trachea, lungs.

Cardiovascular system - Heart & blood vessels.

Digestive system - Oral cavity, pharynx, salivary glands, oesophagus, stomach, small intestine, large intestine, liver, gallbladder, pancreas.

Urinary system - Kidneys, juxtaglomerular apparatus, ureters, urinary bladder, urethra.

Introduction to genetics - Features of chromosomes, DNA.

Reproductive system in females - External & internal genital organs, breast.

Reproductive system in males - Penis, scrotum, testes, prostate gland.

Endocrine system - Hormones, pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas.

Physiology Practical

Blood test:

1. Microscope
2. Haemocytometer
3. Blood
4. RBC count
5. Hb
6. WBC count
7. Differential Count
8. Hematocrit demonstration
9. ESR
10. Blood group & Rh. Type
11. Bleeding time and clotting time.

Digestion

Test salivary digestions

Excretion

1. Examination of Urine
2. Specific gravity
3. Albumin
4. Sugar
5. Microscopic examination for cells and cysts

Respiratory System:

1. Clinical examination of respiratory system
2. Spirometry
3. Breath holding test

Cardio Vascular System:

1. Measurement of blood pressure and pulse rate
2. Effect of exercise on blood pressure and pulse rate

	University College of Paramedical Sciences **DMLT**		
Course Title: Basic In Computer& Information Science (Practical)			
Semester: III	**Course code: A803307**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 4**	
Course Pre-requisites:		**Number of sessions:**	

PRACTICAL

1. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
2. Introduction of Operating System: introduction, operating system concepts, types of operating system.
3. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
4. Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
5. Application of Computers in clinical settings.

University College of Paramedical Sciences **DMLT**			
Course Title: Introduction to Quality & Patient Safety (Practical)			
Semester: III	**Course code: A803308**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 4**	
Course Pre-requisites:		**Number of sessions:**	

1. Biomedical waste management: Types of the waste generated Segregation
   Treatment
   Disposal

	University College of Paramedical Sciences **DMLT**		
Course Title: Human Anatomy & Physiology-II			
Semester: IV	**Course code: A803401**	**Credits:04**	**Core**
No of sessions Lectures / Tutorial: 3/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE -1. Classification of nervous system
Nerve – structure, classification, microscopy with examples. Neurons, classification with examples. Simple reflex arc.
Parts of a typical spinal nerve/Dermatome:Central nervous system – disposition, parts and functions Cerebrum, Cerebellum, Midbrain & brain stem Blood supply & anatomy of brain.
2. Spinal cord-anatomy, blood supply, nerve pathways Pyramidal, extra pyramidal system,Thalamus, hypothalamus, Structure and features ofmeninges Ventricles of brain, CSF circulation Development of nervous system & defects.

MODULE-2. 1-Cranial nerves – (course, distribution, functions and palsy) Sympathetic nervous system, its parts and components
2.Parasympathetic nervous system Applied anatomy

MODULE-3 Structure and function of Visual system, Auditory system, Gustatory system, Olfactory system, Somatic sensory system.Pelvic floor, innervations Kidney, Ureter, bladder, urethra.Reproductive system of male, Reproductive system of female

PHYSIOLOGY-

MODULE-4 Physiology of kidney and urine formation Glomerular filtration rate, clearance, Tubular function, Ureter, bladder, urethra

MODULE 5-Physiology of the endocrine glands – , Hormones secreted by these glands, their classifications and functions.
Adrenal, Gonads Thymus, Pancreas. Pituitary, Pineal Body, Thyroid, Parathyroid

MODULE 6-Male -Functions of testes, pubertal changes in males, testosterone -action & regulations of secretion.
Female -Functions of ovaries and uterus, pubertal changes, menstrual cycle, estrogens and progestron -action and regulation.

Course References

Text Books:

- PR Ashalatha & G Deepa ‘s Textbook of ANATOMY & PHYSIOLOGY by
- B.D.Chaurasia’s HUMAN ANATOMY

Reference books:

- Sampath Madhyastha’s Manipal manual of anatomy for allied health sciences

- Krishna Garg & Madhu Joshi's Practical anatomy workbook
- Dixit's Atlas of Histology for Medical Students
- Basic Histology: A Color Atlas & Text
- Jana's Exam Oriented Practical Anatomy
- Krishan's Anatomy Mnemonics

	University College of Paramedical Sciences **DMLT**		
Course Title: Medical Microbiology			
Semester: IV	**Course code: A803402**	**Credits:03**	**Core**
No of sessions Lectures / Tutorial: 3		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1-Introduction to Microbiology: Definition, history, relationship of microorganisms to man, safety in a microbiology laboratory.

MODULE 2- Morphology of Bacteria: Anatomy of a bacterial cell including spores, flagella and capsules

Growth and Nutrition of Bacteria: A typical growth curve and bacterial nutrition

Classification of micro-organisms with special reference to bacteria – general classification, biological classification

MODULE 3- Sterilization: Definition, sterilization by dry heat, moist heat (below, at and above 1000C) Autoclave, its structure and functioning, autoclave controls and sterilization indicators, sterilization by radiation and filtration

Antiseptics and Disinfectants: Definitions, types, properties and uses of disinfectants and antiseptics, In-use test

Microscopy: Structure and working of simple and compound microscope. Principles of dark field, fluorescent, phase contrast and electron microscope

MODULE 4- Staining Techniques: Methods of smear preparation, fixation, simple stains, grams stain, AFB staining, Albert's stain, Neisser's stain, staining of spores, capsules

Culture Media: Definition, Purpose, classification of culture media. Liquid and solid media, defined and synthetic media, routine laboratory media (Basal, enriched, selective, enrichment, indicator, transport and storage or preservation)

Bacterial Culture: Inoculation of culture media, aerobic and anaerobic culture, isolation of pure cultures and disposal of cultures

MODULE 5- Morphological and biochemical identification of bacteria by:

Microscopic morphology, Colony characteristics, Biochemicals, Carbohydrate Utilization test,

Catalase, oxidase, urease, coagulase, Indole, citrate, MR, VP, TSIA, Nitrate Reduction, Motility

MODULE 6- Morphological, cultural,biochemical characteristics and laboratory diagnosis of:

Staphylococci and Micrococci, Streptococci and pneumococci, Coryne bacterium diphtheria,

Enterobactereacae-I (E.Coli, Klebsiella,Enterobacter), Enterobactereacae-II (Salmonella, Shigella,Proteus)

Pseudomonas, Vibrio Cholerae, Neisseria, Mycobacteria, Clostridia, Treponema pallidum

Suggested readings:

1. Practical Medical Microbiology by Mackie and Mac. Cartney Volume 1 and 2
2. Text book of Microbiology by Ananthanarayanan
3. Medical Microbiology by Paniker& Satish Gupte
4. Medical laboratory Technology vol.I ,II, III by Mukherjee
5. District Laboratory Practice in tropical countries Vol II Microbiology by Monica Cheesbrough
6. Text book of Microbiology by Prescott

	University College of Paramedical Sciences **DMLT**		
Course Title: Haematology			
Semester: IV	**Course code: A803403**	**Credits:03**	**Core**
No of sessions Lectures / Tutorial: 2/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1- Introduction to Haematology

1.Apparatus and Instruments: Parts, functions principles and working of compoundmicroscope, centrifuge, water bath and cell counter

2.Cleaning of Glass Ware: General and volumetric apparatus cleaning

MODULE 2- Introduction to Blood

1.Erythropoiesis, Leucopoiesis, formation of platelets (Thrombopoiesis)

2.Definition, composition and functions of blood

3.Anticoagulants: Definition and various types along with their mode of action, merits and demerits of each

MODULE 3- Collection of Blood;

1. Collection of blood; venous and capillary, Various equipment used for collection of blood samples

2.Romanowsky Stains

3.Preparation and theory,Choice of slide and spreader and preparation of blood film,Characteristics of good film preparation.

MODULE 4- Haemoglobinometery

1.Types of Hemoglobin and its function, Various methods of estimation, Formation of Hemoglobin and its breakdown

2.Differential Leucocyte Counting: Blood Cell Morphology in Health and Disease

MODULE 5- Preparation of Blood Smear

For malarial parasite (thick and thin smear), Study of life cycle of malarial parasite and its laboratory diagnosis

MODULE 6- Haemo-cytometery

1.Various counting chambers (Neubaeur, Burker, Fuch-Rosenthal)

2.Methods of counting of RBC, WBC and platelets, Errors involved

3.Physiological Variation in the Normal Values of Tests (HB, TLC, DLC, PCV/ESR, Platelets Etc.)

4.Routine Examination of Urine (Microscopic, Macroscopic and Chemical)

Suggested reading:

1. Text book of Medical Laboratory Technology by Paraful B. Godkar
2. Medical laboratory Technology by K.L. Mukherjee Volume-I

3. Haematology for students Practitioners by RamnikSood
4. Handbook of Medical Laboratory Technology (IInd edition) by V.H. Talib
5. Haematology (International edition) Emmanuel C. BesaHarwal Publisher
6. Practical Haematology by J.B. Dacie
7. Practical Haematology (8th edition) by Sir John
8. Clinical Haematology by Christopher A. Ludlam
9. Clinical Diagnosis & Management by Laboratory methods (20th edition) by John Bernard Henary
10. Medical Laboratory Technology Methods & Interpretation (5th edition) by RamnikSood
11. Atlas of Haematology (5th edition) by G.A. McDonald
12. A Manual of Laboratory & Diagnostic Tests (6th edition) by Frances Fischbach
13. Haematology (Patho-physiological basis for clinical practice) by Stephen M. Robinson

	University College of Paramedical Sciences **DMLT**		
Course Title: Clinical Biochemistry			
Semester: IV	**Course code: A803404**	**Credits:3**	**Core**
No of sessions Lectures / Tutorial: 3/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1- Introduction to Biochemistry

Definition, Importance of bio-chemistry, SI units and their use, Volumetric apparatus and their calibration

MODULE 2- Cleaning of Laboratory Glass Ware

Cleaning and care of glass-ware, Different cleaning agents (soaps detergents, chromic acid), Methods of cleaning

MODULE 3- Important Instruments: Principle working and care of:

Balance (Analytical, electrical/electronic), Centrifuge

Colorimeter, Spectrophotometer, Flame photometer

MODULE 4- Blood Chemistry

Composition of blood and its functions, Use of various anticoagulants, Separation of serum and plasma, Process of sterilizing blood collecting equipment, Different protein precipitation agents,

Preparation of Protein Free Filtrate (PFF) and uses

MODULE 5- Collection and Preservation of Biological Specimens:

Blood – Sputum, Body fluids - Stool

Suggested readings:

1. Text book of Medical Laboratory Technology by P. B. Godker
2. Medical Laboratory Technology by KL Mukherjee volume III
3. Practical Clinical Biochemistry by Harold Varley
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by Chaterjee Shinde

	University College of Paramedical Sciences **DMLT**		
Course Title: Histopathology			
Semester: IV	**Course code: A803405**	**Credits:03**	**Core**
No of sessions Lectures / Tutorial:2/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

Module 1 – 1. Definitions, sources and types of histological specimen (Biopsy), histological preservations.
2.Labeling, fixation, properties, classification and composition of fixatives
3.Paraffin embedding, dehydration, clearing, impregnation and casting

Module 2- Cutting of Tissue Sections Care and use of microtomes, microtome knives: honing and stropping techniques, attachment of block to block holder, trimming, section cutting, errors in sectioning and remedies, collection of sections to slide from tissue floatation bath

Module 3- Principles and staining techniques of ;
Routine - Haemotoxylin and Eosin
Special, Reticulin, PAS, Iron, PTAH, AFB, Calcium, Fat (Lipid)

Module 4- Decalcification of bones
Process of decalcification and methods, Reagents used for decalcification, Bone cutting without decalcification

MODULE 5- Frozen sections
1. Freezing microtome and cryostat- its care and uses, Technique of cutting frozen section
2.Principles of special stains used and their preparation
3. Preparation of museum specimen, Care of Museum specimen
4.Preparation of fixatives and mounting solutions, Mounting and after care of mounted specimen
Cataloguing of museum specimen, Cataloguing of slides and blocks, dispatch of reports, maintenance of records.

MODULE 6- Autopsy
Care of instruments, Preparation and performance of autopsy in brief

Suggested reading:

1. An introduction to Med. Lab. Technology by F.J. Baker & R.E. Silverton, Pb. London Butterworth and Co. Ltd.
2. Handbook of Histopathological Techniques by C.F.A Culling
3. Medical Lab. Technology by Lynch
4. Theory & Practice of Histological Techniques by Johan D Bancroft & Gamble
Handbook of Histopathological & Histochemical Techniques by CFA Culling

	University College of Paramedical Sciences **DMLT**		
Course Title: Human Anatomy & physiology-II (Practical)			
Semester: IV	**Course code: A803406**	**Credits:01**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours:2**	
Course Pre-requisites:		**Number of sessions:**	

ANATOMY PRACTICAL

Identification and description of all anatomical structures.

Demonstration of dissected parts

Demonstration of skeleton-articulated and disarticulated.

Surface anatomy: Surface land mark-bony, muscular and ligamentous. Surface anatomy of major nerves, arteries of the limbs.

Physiology Practical

Enumerate Physiology of kidney

Explain Physiology of lower Urinary tract

Label Physiology of the endocrine glands

Enumerate Physiology of reproductive system

	University College of Paramedical Sciences **DMLT**		
Course Title: Medical Microbiology (Practical)			
Semester: IV	**Course code: A803407**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours:3**	
Course Pre-requisites:		**Number of sessions:**	

PRACTICAL

1. Demonstration of safety rules in a microbiology laboratory
2. Preparation of cleaning agents and techniques of cleaning glassware
3. Preparation of material for sterilization in an autoclave and hot air oven
4. Sterilization by an autoclave and hot air oven
5. Sterilization by filtration
6. In-use test
7. Handling and care of different types of microscopes
8. Staining techniques: Gram's stain, Z.N stain, Albert's stain, Spore and capsule staining
9. To demonstrate the instruments used to seed culture media
10. To learn techniques for Inoculation of bacteria on culture media
11. Demonstration of motility
12. Preparation of culture media
13. Aerobic and anaerobic culture methods
14. To isolate specific bacteria from a mixture of organisms.
    Preparing media for different biochemical and
    Inoculations and incubation biochemical,
    Reporting bio-chemicals
15. Testing antimicrobial susceptibility of bacteria by Stoke's disc diffusion method
16. To prepare the reagent and demonstrate following biochemical tests with positive and negative control bacteria:
    Catalase, Coagulase, Indole, Methyl Red (MR), Voges Proskauer (VP), Urease, Citrate, Oxidase, TSIA, Nitrate reduction, Carbohydrate fermentation, Demonstration and motility
17. Demonstration of Morphological and Biochemical identification of bacteria
    Staphylococcus, Streptococcus & Pneumococcus, Corynebacterium, Escherichia coli, Klebsiella, Citrobacter, Enterobacter, Proteus, Salmonella, Shigella, Vibrio cholera, Pseudomonas

	University College of Paramedical Sciences **DMLT**		
Course Title: Haematology (Practical)			
Semester: IV	**Course code: A803408**	**Credits:2**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours:4**	
Course Pre-requisites:		**Number of sessions:**	

PRACTICAL

1. Parts of microscope; its functioning and care
2. Parts of centrifuge; its functioning and care
3. Cleaning and drying of glassware
4. Preparation of various anticoagulants
5. Collection of venous and capillary blood
6. Cleaning of glass-syringes and its sterilization
7. Preparation of the stains and other reagents
8. Preparation of peripheral blood film (PBF)
9. Staining of PBF
10. Hemoglobin estimation methods (Sahli's, Oxyhaemoglobin, and Cyanmethaemoglobin)
11. Differential leukocyte count (DLC)
12. Recognition and staining of various types of blood cells (normal and abnormal)
13. Preparation of thick and thin blood smear for malarial parasite (Leishman/Giemsa/JSB)
14. RBC counting
15. WBC counting
16. Platelet counting
17. Routine Examination of urine

	University College of Paramedical Sciences **DMLT**		
Course Title: Clinical Biochemistry (Practical)			
Semester: IV	**Course code: A803409**	**Credits: 2**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours:4**	
Course Pre-requisites:		**Number of sessions:**	

1. Cleaning of glass ware
2. Sterilization of glass ware
3. Standardization of glass ware
4. Handing and Maintenance of each instrument
5. Preparation of various anticoagulants and specimen collection bottle
6. Collection of blood
7. Separation of serum and plasma
8. Preparation of different protein precipitating gents, PFF preparation

	University College of Paramedical Sciences **DMLT**		
Course Title: Histopathology (Practical)			
Semester: IV	**Course code: A803410**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours:4**	
Course Pre-requisites:		**Number of sessions:**	

1. Receiving specimen, labeling andcataloguing
2. Preparation of fixatives, fixing of specimen
3. Dehydrating, making solution of various reagents, clearing, impregnation and casting
4. Embedding and cutting of sections
5. Preparation of stains
6. Routine (H & E) and special staining
7. Preparation of various reagents
8. Decalcification
9. Demonstrating of cataloguing of slides blocks
10. Demonstration of dispatching reports and maintenance of records
11. Demonstration of freezingmicrotone
12. Examination of stained frozen section slides
13. Preparation of museum fixatives

	University College of Paramedical Sciences **DMLT**		
Course Title: Applied Bacteriology			
Semester: V	**Course code: A803501**	**Credits:3**	**Core**
No of sessions Lectures / Tutorial: 2/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1- Laboratory Diagnosis of Infectious Diseases

Septicemia and bacteremia, Respiratory tract infections, Wound and skin infections, Urinary tract infections, Genital tract infections, Meningitis, Gastro intestinal infections, Enteric fever

MODULE 2- Bacteriological examination of water, milk and air

MODULE 3- Nosocomial Infections

Introduction, Common types of Nosocomial infections, Sources of infections, Surveillance (Bacteriological) and control of Nosocomial infections

MODULE 4- General characteristics of medically important fungi

MODULE 5- Culture media for fungi

SDA (Saboraud's Dextrose Agar), CMA (Corn Meal Agar), RSA (Rice starch Agar)

Suggested Readings:

1. Practical Medical Microbiology by Mackie and MacCartney Volume 1 and 2
2. Text book of Microbiology by Ananthanarayanan
3. Medical Microbiology by Paniker& Satish Gupte
4. Medical laboratory Technology vol. I ,II, III by Mukherjee
5. District Laboratory Practice in tropical countries Vol. II Microbiology by Monica Cheesbrough

	University College of Paramedical Sciences **DMLT**		
Course Title: Applied Haematology			
Semester: V	**Course code: A803502**	**Credits: 03**	**Core**
No of sessions Lectures / Tutorial: 2/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1- Erythrocyte Sedimentation Rate (ESR)

1. Introduction, Various methods of estimation, Factors on which ESR and PCV depends, Interpretation

MODULE 2- Various colour indices; their brief description

1. Absolute eosinophil counting, Introduction, Various methods, Clinical importance
2. Reticulocyte counting, Introduction, Various methods of counting, Clinical importance

MODULE 3- LE cell phenomenon

1. Theory of formation of LE cell, its differentiation from tart cell
2. Preparation and staining of smear and its examination, Clinical importance

MODULE 4- Anaemias

1. Definition and types of anemia; factor causing anemia
Plasma hemoglobin and fetal hemoglobin estimation
2. Laboratory diagnosis of hemolytic anemia
Red cell fragility test, Principle and setting up the test, Clinical importance

MODULE 5 -Coagulation

1. Theories, Coagulation defects
2. Principles and methods of Prothrombin Time (PT), Prothrombin Time Index (PTI), Prothrombin Time with Kaolin (PTTK) – Bleeding Time (BT) Clotting Time (CT), and Clot Retraction Test

MOUDULE 6- Bone-marrow examination

1. Structure and function of bone-marrow, Collection of bone-marrow, Preparation, staining and examination of bone-marrow smears, Significance of bone-marrow examination
2. Leukemia's- Classification (FAB), Automation in haematology, Quality control in haematology

Suggested reading:

1. Text book of Medical Laboratory Technology by Paraful B. Godkar
2. Medical laboratory Technology by KL Mukherjee Volume-I
3. Haematology for students Practitioners by RamnikSood
4. Hand book of Medical Laboratory Technology (IInd edition) by V.H. Talib
5. Haematology (International edition) Emmanuel C. BesaHarwal Publisher
6. Practical Haematology by J.B. Dacie
7. Practical Haematology (8th edition) by Sir John
8. Clinical Haematology by Christopher A. Ludlam
9. Clinical Diagnosis & Management by Laboratory methods (20th edition) by John Bernard Henary
10. Medical Laboratory Technology Methods & Interpretation (5th edition) by RamnikSood
11. Atlas of Haematology (5th edition) by G.A. McDonald

	University College of Paramedical Sciences **DMLT**		
Course Title: Applied Clinical Biochemistry			
Semester: V	**Course code: A803503**	**Credits:03**	**Core**
No of sessions Lectures / Tutorial:2/1		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1- Blood sugar estimation and G.T.T

1. Principle and methods of estimation, Normal and abnormal values, True and apparent sugar, Metabolism of sugar, Precautionary measures, Renal threshold
2. Importance and performance of GTT, Clinical importance of blood sugar and GTT
3. Serum urea, Formation and excretion of urea, Principles and procedures of different methods of urea estimation, Normal and abnormal levels, Clinical importance

MODULE 2- Plasma and serum proteins

1. Definition, Formation of plasma proteins, Different methods of estimation including principles and procedures, Normal and abnormal values, Clinical importance

2.Serum cholesterol

Formation and estimation of cholesterol, Various methods of estimation including principles and procedures, Normal and abnormal values, Clinical importance

MODULE 3- Serum bilirubin

Formation and excretion of bilirubin, Metabolism of bile pigments, Conjugated and unconjugated bilirubin, Principles and procedures of serum bilirubin estimation, Normal and abnormal values, Clinical importance

MODULE 4- 1. Inorganic phosphorus

Principles and procedures of estimation, Normal and abnormal values, Clinical importance

2. Creatinine estimation

Principles and procedures of estimation, Normal and abnormal/values, Clinical importance

MODULE 5- 1. Serum calcium

Principles and procedures estimation, Normal and abnormal values, Clinical importance

2.Uric acid estimation

Principles and procedures estimation, Normal and abnormal values, Clinical importance

MODULE 6- 1.Electrolytes and trace elements

Functions of electrolytes like Na+, K+ and CI. Other essential trace elements like Ca2+, Fe+2 etc.

2.Metabolism of these ions, Principles and procedures of estimation, Normal and abnormal

values

3. Clinical importance of radioisotopes. Their brief description and use.
4. Quality control in clinical bio-chemistry

Suggested readings:

1. Text book of Medical Laboratory Technology by P. B. Godker
2. Medical Laboratory Technology by K.L. Mukherjee volume III
3. Practical Clinical Biochemistry by Harold Varley
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by ChatwalAnand
6. Text book of Medical Biochemistry by ChaterjeeShinde

	University College of Paramedical Sciences **DMLT**		
Course Title: Medical Parasitology & Virology			
Semester: V	**Course code: A803504**	**Credits:02**	**Core**
No of sessions Lectures / Tutorial:2		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1- Introduction to Medical Parasitology
General characteristics of protozoa and helminthes

MODULE 2- Collection, transport, processing and preservation of samples for routine parasitological investigations

MODULE 3- 1. Morphology, life cycle and lab-diagnosis of Giardia and Entamoeba
2.Morphology, Life cycle and lab-diagnosis of Roundworms and Hookworms
3.Morphology, life cycle and lab-diagnosis of T. solium and T. saginata
4.Morphology, life cycle and lab-diagnosis of malarial parasite with special reference to P.vivax and P. falciparum

MODULE 4- Laboratory diagnosis of hydated cyst and cysti-cercosis
Concentration techniques for demonstration of Ova and cysts (principles and applications)

MODULE 5- Introduction to medical virology

1. Classification of viruses
2. Classification of medically important viruses (Rabies, Polio, HIV, Influenza)
3. Collection, transportation and storage of samples for viral diagnosis
4. Processing of samples for viral diagnosis (Egg inoculation and tissue culture)

Suggested Readings:

1. Practical Medical Microbiology by Mackie and MacCartney Volume 1 and 2
2. Text book of Microbiology by Ananthanarayanan
3. Medical Microbiology by Paniker& Satish Gupte
4. Medical laboratory Technology vol.I ,II, III by Mukherjee
5. District Laboratory Practice in tropical countries Vol II Microbiology by Monica Cheesbrough
6. Parasitology in relation to Clinical Medicine by K.D. Chhatterjee
7. Medical Entomology by A.K. Hati Pub. Allied Book Agency

	University College of Paramedical Sciences **DMLT**		
Course Title: Immuno-Haematology/Blood Banking			
Semester: V	**Course code: A803505**	**Credits: 2**	**Core**
No of sessions Lectures / Tutorial:2		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1- Historical introduction to blood grouping
Antigen and antibodies – role in blood grouping

MODULE 2- Blood collection, preservation of blood in blood bank, anticoagulants used in blood banking, Preparation of donor, criteria of an ideal blood donor, history of donor.

MODULE 3- ABO grouping and its subgroups
Rh grouping, Cleaning and care of glassware in blood banking

MODULE 4- Cross matching - major and minor cross matching, preparation of working antiglobulin, serum, principle and importance of cross matching, Preparation and preservation of various blood components for transfusion

MODULE 5- Coomb's test - preparation of antisera, principle, types and importance of Coomb's test
Transfusion reactions - brief introduction
Screening of blood for- AIDS, Hepatitis, Syphilis

Suggested readings:

1. Introduction to Medical Laboratory Technology – FJ Baker
2. Medical Laboratory Technology (Volume I & II) by Kanai, L Mukherjee, Swarajit Ghosh
3. Lynch's Medical Lab. Technology by Stanley S. Raphael
4. Practical Haematology by JB Dacie
5. Transfusion Science by Overfield, Hamer
6. Mollison's Blood Transfusion in Clinical Medicine, 12th Edition by Harvey G. Klein

	University College of Paramedical Sciences **DMLT**		
Course Title: Immunopathology & cytopathology			
Semester: V	**Course code: A803506**	**Credits: 03**	**Core**
No of sessions Lectures / Tutorial:3		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

MODULE 1-Immunopathology

1. Cells and organs of the immune system.
2. Antigens, antibodies and humeral immune response.

MODULE 2- Allergy

1. Rheumatological diseases andinvestigations.
2. Infection and the immunesystem.
3. Cancer Immunology.
4. Tissue typing for kidneytransplant.

MODULE 3- Cytopathology

1. Exfoliative cytology

Preparation of vaginal and cervical smears

PAP smears and its fixation, Preparation of PAP stains, cellblocks, Staining techniques (PAP, H&E and Giemsa), Interpretation of results

2.Various body fluid processing like Urine, Sputum, Fluids (Pleural, Pericardial and Peritoneal), CSF etc.

MODULE 4- Aspiration Cytology principles, indications & utility of the technique with special emphasis on role of cytotechnologist in FNAC clinics, Barr body analysis

Suggested Readings:

1. Immunology by Ivan Roitt, JonathanBrostoff and David Male
2. Medical Immunology by Daniel P Stites
3. Basic & Clinical Immunology by P. Daniel Fudenberg. H. Hugh and Stites

4. Introduction to Medical Laboratory Technology – F.J. Baker
5. Medical Laboratory Technology (Volume I & II) by Kanai, L. Mukherjee, Swarajit Ghosh
6. Lynch's Medical Lab. Technology by Stanley S. Raphael

	University College of Paramedical Sciences **DMLT**		
Course Title: Applied Haematology (Practical)			
Semester: V	**Course code: A803507**	**Credits: 02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 3**	
Course Pre-requisites:		**Number of sessions:**	

1. ESR estimations (Wintrobe andWestergreen)
2. PCV (Wintrobe andcapillary)
3. Absolute Eosinophil counting
4. Reticulocyte counting
5. Red cell fragility test
6. Plasma haemoglobin estimation
7. Fetal haemoglobin test
8. Examination of colorindices
9. Bleeding time and clotting time, PT, PTI, PTTK
10. Clot retraction test
11. Examination of Bone-marrow (from stained slide)
12. Demonstration of LE Cell Smear and its examination (from stained slide)
13. Recognition of various types of blast cells and leukemia (from stained slide)

	University College of Paramedical Sciences **DMLT**		
Course Title: Applied Clinical Biochemistry (Practical)			
Semester: V	**Course code: A803508**	**Credits: 02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 4**	
Course Pre-requisites:		**Number of sessions:**	

1. Estimation of blood Sugar (Folin-Wu method, enzyme methods etc.)
2. Performance of GTT
3. Serum Urea estimation
4. Plasma and serum protein estimation
5. Serum cholesterol estimation
6. Estimation of electrolyte level (Na+, K+ and CI by flame photometer and kit methods)
7. Preparation all types of reagents
8. Estimation of Serum bilirubin
9. Estimation of Phosphorous
10. Estimation of Serum calcium
11. Estimation of Serum creatinine
12. Estimation of Serum uric acid

	University College of Paramedical Sciences **DMLT**		
Course Title: Medical Parasitology & Virology (Practical)			
Semester: V	**Course code: A803509**	**Credits: 02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 4**	
Course Pre-requisites:		**Number of sessions:**	

1. Routine stool examination for detection of intestinal parasites with concentration methods:
   - Saline preparation
   - Iodine preparation
   - Floatation method
   - Centrifugation method
   - Formal ether method
   - Zinc sulphate method
2. Identification of adult worms from models/slides
   - Tapeworm segments
   - Ascaris
   - Hookworms
   - Pinworms
3. Malarial parasite:
   - Preparation of thin and thick blood smears
   - Staining of smears
   - Examination of smears for malarial parasites (P. vivax and P.falciparum)
   - Demonstration of various stages of life cycle of malarial parasites from stained slides
4. To demonstrate structure of viruses and their multiplication from charts etc.
5. To perform Giemsa‘s stain, Seller‘s stain.
6. Demonstration of fertilized hen egg
7. Demonstration of various inoculation routes in fertilized hen egg

	University College of Paramedical Sciences **DMLT**		
Course Title: Immuno-Haematology & Blood Banking (Practical)			
Semester: V	**Course code: A803510**	**Credits: 02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 4**	
Course Pre-requisites:		**Number of sessions:**	

1. Demonstration of equipment/material for blood collection
2. Cleaning of glassware
3. ABO and Rh grouping
4. Cross match - Major and Minor
5. Preparation of ACD and CPO anticoagulants

	University College of Paramedical Sciences **DMLT**		
Course Title: Immuno-Pathology & Cytopathology (Practical)			
Semester: V	**Course code: A803511**	**Credits: 02**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours: 4**	
Course Pre-requisites:		**Number of sessions:**	

1. Cell separation by density gradient
2. ELISA
3. Serum electrophoresis
4. Immuno-electrophoresis
5. Pregnancy test for HCGH
6. PAP staining and interpretation of results
7. To perform Papnicolaou's stain on cervical smear
8. To process samples using cytospin
9. To perform Guard's staining for demonstration sex chromatin (Barr bodies on a buccal smear)
10. Liquid based Cytology : Principle and Preparation

	University College of Paramedical Sciences **DMLT**		
Course Title: Professional Training/ Internship			
Semester: VI	**Course code: A803601**	**Credits:20**	**Core**
No of sessions Lectures / Tutorial:		**No of practical hours:**	
Course Pre-requisites:		**Number of sessions:**	

PROJECT REPORT

Students have to carry out a research project (on any topic related to laboratory) under the supervision of a faculty. The project report has to be prepared on the basis of the research work carried out. The assessment is done on the basis of the work done and the presentation and viva.