Program Curriculum (Syllabus)

Program Name: - Diploma in Advanced Pathology Training

(Semester Pattern)

1	Name of the Program	Diploma in Advanced Pathology Training
2	Program Code	DAPT
3	Program Pattern (Semester/Annual)	Semester
4	Program Duration	One Year
5	Program Level	Diploma
6	Program Type	Full Time / Part time for In service candidates & Part time for In service candidates (with 6 Personal contact program each 10 days)
7	Program Total Credits	18 Credits
8	Program Total Marks	700
9	Program Passing Marks	315 (45% As per Table B)
10	Mode of Learning	Regular / Part time for In service candidates
11	Medium of Instructions	English
12	Medium of Examination	English
13	Eligibility	The students with following educational qualification will be eligible for seeking admission to this course : BAMS, MD (Ayu - Vikrutivigyan), BHMS, MD (Hom - Pathology), MBBS, DCP (Diploma In Clinical Pathology) BSc, MSc (Biochemistry), BSc, MSc (Microbiology), or Virology or Mycology BSc, MSc (Biotechnology), BSc, MSc (Pathology), or Histology or Immunology BSc, MSc (Genetics), or Parasitology BSc, MSc (Molecular biology) or Cell biology, DMLT, PGDMLT, BSc-MLT, BPMT
14	Lecturer/Professor Qualification	The teaching faculties with following educational qualification will be eligible to teach this course : MD (Vikruti Vigyan), MD (Pathology), MSc (Biochemistry), MSc (Microbiology), MSc (Biotechnology), MSc (Pathology)
15	Program Objectives	The Course aims to provide the advanced hands-on training related to pathological investigative procedures in various branches like hematology, biochemistry, microbiology, histopathology, clinical pathology Immunology etc to the graduates, post graduates and diploma holders working in the field of pathology and life sciences.
16	Program Outcome	Student will be up-skilled for each & every pathology related procedure and advanced diagnostic technology
17	No. of Days @ Week	3 Days
18	Internship Duration	One Month

Semester- 1 (6 months = 20 weeks Teaching & Practical + 2 weeks examination)

Sub Code	Subjects	Teaching hours per week (3 Days @ Week)	Tutorial (*T)/ Practical / Activity(*P/*A) per week		Theory		Practical (Practical/ Diss. / Viva/ Oral/ Test/ Sessional etc.)		Subject Total (in case of joint passing)		No. of Credits
					A		B		A + B		
			T	P/A	Max	Passing	Max	Passing	Max	Passing	
DAPT 101	Hematology And Blood Banking	3	1	2	100	45	100	45	200	90	2.6
DAPT 102	Medical Biochemistry	3	1	2	100	45	100	45	200	90	2.6
DAPT 103	Clinical Pathology	3	1	2	100	45	100	45	200	90	2.6
DAPT 104	Laboratory Management & Ethics **(Viva only)**	2	NA	2	NA	NA	100 **VV**	45	100	45	1.3
Total		**11**	**03**	**08**	**300**	**135**	**400**	**180**	**700**	**315**	**9.1**

VV – Viva Voce only

Semester- 2 (6 months = 20 weeks Teaching & Practical + 2 weeks examination)

Sub Code	Subjects	Teaching hours per week (3 Days @ Week)	Tutorial (*T)/ P3actical / Activity(*P/*A) per week		Theory		Practical (Practical/ Diss. / Viva/ Oral/ Test/ Sessional etc.)		Subject Total (in case of joint passing)		No. of Credits
					A		B		A + B		
			T	P/A	Max	Passing	Max	Passing	Max	Passing	
DAPT 105	Histopathology & Cytology	3	1	2	100	45	100	45	200	90	2.6
DAPT 106	Bacteriology, Immunology & Serology	3	1	2	100	45	100	45	200	90	2.6
DAPT 107	Parasitology, Mycology & Virology	3	1	2	100	45	100	45	200	90	2.6
DAPT 108	Advanced Techniques In Pathology **(Viva only)**	2	NA	2	NA	NA	100 **VV**	45	100	45	1.3
Total		**11**	**12**	**08**	**300**	**135**	**400**	**180**	**700**	**315**	**9.1**

The performance of the learners shall be evaluated into two components with 50% marks in the first component by conducting the Semester Examinations with 50% marks in the second component.

Syllabus & Course Content with Hourly Teaching Plan

Diploma in Advanced Pathology Training		
Semester- 1		
Sr. No.	**SUBJECT CODE**	**SUBJECT TITLE**
1	DAPT 101	Hematology And Blood Banking
2	DAPT 102	Medical Biochemistry
3	DAPT 103	Clinical Pathology
4	DAPT 104	Laboratory Management & Ethics **(Viva only)**
Semester- 2		
1	DAPT 105	Histopathology & Cytology
2	DAPT 106	Bacteriology, Immunology & Serology
3	DAPT107	Parasitology, Mycology & Virology
4	DAPT 108	Advanced Techniques In Pathology **(Viva only)**

Question Paper Pattern

EXAMINATION- Theory (Semester- 01) PROGRAME
NAME- DIPLOMA IN ADVANCE PATHOLOGY TRANING
SUBJECT TITLE_____(Course Code-_____)

[TIME: 3 Hours] **TOTAL: 100 Marks**

Note- 1. Attempt Section A and Section B Only
2. Write answers to each question in proportion to the mark allotted

SECTION – A

Que-1 Explain: Attempt Any one **(20 Marks each)**
1.
2.

Que-2 Explain: Attempt Any Two **(15 Marks each)**
1.
2.
3.

SECTION – B

Que-1 Explain: Attempt Any one **(20 Marks each)**
1.
2.

Que-2 Explain: Attempt Any Two **(15 Marks each)**
1.
2.
3.

PRACTICAL

Practical - 1 **(40 Marks)**
Practical - 2 **(40 Marks)**
Viva Voce **(20 Marks)**

SEMESTER- 1

Hourly Teaching Plan For DAPT Course

Paper 1

Hematology And Blood Banking

(Theory – 100 Marks + Practical Viva – 100 Marks)

Module No.	Sub Topics	Hours	Credit
Module No. 1 (Theory)	**Introduction**:- Composition of blood, its formation and functions	1 hr	
	Anemia – Definition, Classification and study of various types of anemia	1 hr	
	Microcytic Anemia – Iron Deficiency Anemia, Anemia due to chronic diseases, Sideroblastic anemia	1 hr	
	Macrocytic Anemia – B12 Deficiency Anemia, Folate Deficiency Anemia	1 hr	
	Normocytic Anemia – Physiological and endocrinal anemias,	1 hr	
	Hemolytic Anemia – Pathology, complications and alterations in hematological investigations	1 hr	
	Hemolytic Anemia – Red Cell Enzyme defects, G6PD deficiency, Pyruvic Kinase deficiency	1 hr	
	Hemolytic Anemia – Aplastic Anemia	1 hr	
	Hemolytic Anemia – Red cell membrane defects – Hereditary spherocytosis, acanthosis, propoikilocytosis, xerocytosis	1 hr	
	Hemolytic Anemia – Hemoglbinopathies – Sickle cell anemias	1 hr	
	Hemolytic Anemia – Ineffective erythropoiesis – Thalassemia types and pathology	1 hr	
	Hemolytic Anemia – Iso and Allo immune. Rh and ABO incompatibility, Warm and cold antibodies. PNH	1 hr	
	Haemostasis and Coagulation Mechanism Clotting Factors	1 hr	
	Bleeding And Clotting disorders – Von Willibrand and Christmas disease	1 hr	
	Approach to bleeding disorders	1 hr	
	Myeloproliferative Disorders – Polycythemia , Thrombocythemia	1 hr	
	Myelodysplasia	1 hr	
	Disorder of WBC - Lukemia	1 hr	
	Hodgkin’s and Non-Hodgkin’s Lymphoma	1 hr	
	Organization, operation, administration of blood bank and maintenance of records	1 hr	
A	**Total Hours + Credit**	**20 hrs**	1.3
Module No. 2 (Practicals)	**Collection of blood** :- Different routes, difference between capillary and venous sample	1 hr	

	Anticoagulants :- Different types, method of preparation and uses (Oxalate bulb, fluoride bulb, EDTA bulb, Plane bulb etc)	1 hrs	
	Haemoglobin Estimation	1 hr	
	RBC Count	1 hr	
	Total WBC Count	1 hr	
	Differential WBC Count	2 hr	
	Absolute Eosinophill Count	1 hr	
	Reticulocyte count	1 hr	
	Platelet Count	1 hr	
	Bleeding time and clotting time	2 hr	
	Prothrombin time	2 hr	
	Study of Peripheral Smear	2 hrs	
	L. E. Cell Preparation	1 hrs	
	Sickle Cell Preparation	1 hrs	
	Hb electrophoresis	2 hrs	
	Osmotic Fragility Test	1 hrs	
	Bone Marrow Smear Preparation, Staining and Examination	2 hrs	
	ABO Grouping, Rh typing & Cross matching	2 hrs	
	Coombs test - Direct and Indirect coombs	2 hrs	
	Cell counter operation	1 hrs	
	Bood Banking techniques (antigen testing etc)	2 hrs	
B	**Total Hours**	**30 hrs**	**1**
A + B	**Total Hours + credit**	**50 hrs**	**2.3**

Paper 2
Medical Biochemistry
(Theory – 100 Marks + Practical Viva – 100 Marks)

Module No.	Sub Topics	Hours	Credit
Module No. 1 (Theory)	Elementary knowledge of inorganic chemistry	1 hr	
	Acids, bases and salts	1 hr	
	pH indicators - pH meter & measurement	1 hr	
	Different solutions – Molar, Normal, Buffer, Standard, Saturated	1 hr	
	Elementary knowledge of physical chemistry Osmosis, osmotic pressure, diffusion, hypotonic, hypertonic & isotonic solutions Definition and classification of some colloids and crystalloids	1 hr	
	Acid Base Balance: Regulation of blood pH, Henderson Hasselbach equation, renal, respiratory and buffer system importance of arterial blood gases	1 hr	

	Elementary knowledge of analytical chemistry Principles, Instrumentation, working, uses, care, maintenance. (a) Balances : mono-pan, two-pan, top-pan (b) Centrifuges,(c) pH meter (d) Colorimeter,	1 hr	
	(e) Spectrophotometer,(f) Fluorimeter, (g) Flame-photometer,(h) Ion selective electrodes, (i) Urinometer,(j) Chromatograph, (k) Electrophoresis,(l) Densitometer	1 hr	
	Biochemistry **Carbohydrates:** Dietary Sources, digestion, absorption, basic metabolism,	1 hr	
	Lipids: Dietary sources digestion, absorption, basic metabolism,	1 hr	
	lipid profile (cholesterol, triglyceride, lipoproteins, phospholipids) and its significance in various disorders.	1 hr	
	regulation of blood glucose & its importance, glucose tolerance test, glucocylated Hb, other parameters and related disorders.	1 hr	
	Proteins: Dietary sources digestion, absorption, fate of amino acids, nitrogen equilibrium,	1 hr	
	formation and detoxication of ammonia, formation of urea, formation of non protein nitrogenous products e.g. uric acid, creatinine, disorders related to protein and nitrogen metabolism.	1 hr	
	Enzymes: Classification, properties, factors affecting enzyme activity, isoenzymes and coenzymes.	1 hr	
	Clinical enzymology: Therapeutic, diagnostic and analytical uses of enzymes with normal values of serum enzymes	1 hr	
	Hormones: Chemical nature and biochemical functions	1 hr	
	Corticotropins, Thyroid hormones and other	1 hr	
	Minerals and Electrolytes: Na, K, Cl , Ca, Mg,	1 hr	
	I2 P, Fe and iron binding capacity	1 hr	**1.3**
A	**Total Hours + Credit**	**20 hrs**	
Module No. 2 (Practical)	Preparation and standardization of volumetric solutions Basic titration such as acid Vs alkali, Silver Nitrate Vs Sodium Chloride	1 hrs	
	Preparation of buffer solution and measurement of their pH, Verification of Beer-Lambert's Law	1 hrs	
	Estimation of Blood sugar / glucose	1 hr	
	Estimation of serum Bilirubin	1 hrs	

	Estimation of serum AST	1 hr	
	Estimation of serum ALT	1 hr	
	Estimation of serum AP	1 hrs	
	Estimation of serum proteins	1 hrs	
	Estimation of serum Uric acid	1 hrs	
	Estimation of Blood Urea	1 hr	
	Estimation of serum Creatinine	1 hr	
	Estimation of serum Amylase	1 hr	
	Estimation of serum Lipase	1 hr	
	Estimation of serum Cholesterol	1 hr	
	Estimation of serum HDL Cholesterol	1 hr	
	Estimation of serum Triglyceride	1 hr	
	Estimation of serum Chloride	1 hr	
	Estimation of serum Calcium	1 hr	
	Estimation of T3T4	1 hr	
	Estimation of TSH	1 hr	
	Estimation of hormones of FSH	1 hrs	
	Estimation of hormones of LH	1 hrs	
	Estimation of hormones of GnRH	2 hrs	
	Estimation of hormones of Cortisol	2 hrs	
	Estimation of hormones of Insulin	2 hrs	
	Operation of biochemistry analyzer	2 hrs	
B	**Total Hours**	**30 hrs**	**1**
A + B	**Total Hours + credit**	**50 hrs**	**2.3**

Paper - 3
Clinical Pathology
(Theory – 100 Marks + Practical Viva – 100 Marks)

Module No.	Sub Topics	Hours	Credit
Module No. 1 (Theory)	**Urine Examination** - Indication, Collection, Container, Transport, Preservation of urine	1 hr	
	Urine Examination – Physical	1 hr	
	Urine Examination – Chemical	1 hr	
	Urine Examination – Microscopic	1 hr	
	Urine Examination – Strip Method	1 hr	
	Stool Examination – Indication, Collection, Container, Transport, Preservation of stool	1 hr	
	Stool Examination – Physical	1 hr	
	Stool Examination – Chemical	1 hr	
	Stool Examination –Microscopic	1 hr	

	Sputum Examination – Indication, Collection, Container, Transport, Preservation of sputum	1 hr	
	Sputum Examination – Physical	1 hr	
	Sputum Examination –Chemical	1 hr	
	Sputum Examination –Microscopic	1 hr	
	Semen Examination – Indication, Collection, Container, Transport, Preservation of semen	1 hr	
	Semen Examination – Physical, Chemical, Microscopic	1 hr	
	Semen Examination – Physical, Chemical, Microscopic	1 hr	
	Semen Examination – Physical, Chemical, Microscopic	1 hr	
	Body Fluid Examination – Indication, Collection, Container, Transport, Preservation of CSF, Pleural, Ascitic & Synovial fluid & Physical examination	1 hr	
	Body Fluid Examination –Chemical	1 hr	
	Body Fluid Examination –Microscopic	1 hr	
A	**Total Hours + Credit**	**20 hrs**	**1.3**
Module No. 2 (Practical)	Routine examination of urine	1 hr	
	Urine for Sugar	1 hr	
	Urine for proteins by different methods	1 hr	
	Urine for ketone bodies	1 hr	
	Urine for Bile salt and bile pigment	1 hr	
	Urine for blood (Benzidine test)	1 hr	
	Urine microscopy	1 hr	
	Routine examination of stool	1 hr	
	Stool microscopy	1 hr	
	Routine examination of sputum	1 hr	
	Slide preparation & Staining by different stains	1 hr	
	Sputum microscopy	1 hr	
	Routine examination of semen	1 hr	
	Semen Microscopy	1 hr	
	Routine examination of CSF	1 hr	
	Chemical examination of CSF for sugar, proteins	2 hr	
	CSF microscopy	1 hr	
	Routine examination of Ascitic fluid	1 hr	
	Chemical examination of Ascitic fluid (proteins, amylase, ADA)	2 hr	
	Microscopic examination of Ascitic fluid	1 hr	
	Routine examination of pleural fluid	1 hr	
	Chemical examination of pleural fluid	2 hr	

	Microscopic examination of Ascitic fluid	1 hr	
	Routine examination of synovial fluid	1 hr	
	Chemical examination of synovial fluid	2 hr	
	Microscopic examination of synovial fluid	1 hr	
B	**Total Hours**	**30 hrs**	**1**
A + B	**Total Hours + credit**	**50 hrs**	**2.3**

Paper - 4
Laboratory Management & Ethics
(Only Viva Voce – 100 Marks)
[oral Questioning only] *

Module No.	Sub Topics	Hours	Credit
Module No. 1	**Care Of Laboratory Glassware, Chemicals Equipment And Instruments** General Principles	1 hr	
	Care and Cleaning of Glassware	1 hr	
	Care of equipment and apparatus	1 hr	
	Laboratory chemicals – Proper use, care, storage and labelling	1 hr	
	Specimen handling- Using the Appropriate container & Method of collection of sample	1 hr	
	Method of transportation & Method of preservation and disposal of laboratory waste	1 hr	
	Laboratory Safety- General principles of safety programmes Universal safety precautions	1 hr	
	First aid and safety measures for Mechanical Electrical hazards	1 hr	
	Chemical, Radioactive and Biological hazards	1 hr	
	Quality control and quality assurance in following sections of laboratory (a) Biochemistry,	1 hr	
	(b) Microbiology,	1 hr	
	(c) Haematology and Blood Banking	1 hr	
	d) Histopathology and cytology	1 hr	
	e) Clinical Pathology	1 hr	
	Laboratory Planning - General principles, Laboratory goals	1 hr	
	Laboratory Planning - Market potential, Selection of area, Competition	1 hr	
	Laboratory Planning - Space requirements Designing of laboratory sections	1 hr	
	Laboratory Planning - Staff and their duties Work schedule and workload assessment	1 hr	
	Application Of Computers In Laboratory Practice	1 hr	

	Introduction to Computers Input and Output devices Storage devices		
	Introduction to operating systems Windows 2000 – Utilities and basic operations Microsoft office 2000 – MS Word, MS Excel	1 hr	
A	**Total Hours**	20 hrs	
	First aid for chemical burns, poisonous gases, Electrical Shock and Glass injuries	1x2 hr	
	Use of Windows Utilities – Explorer, Setting etc.	1x 2 hr	
	File operation – Copy, Move, Delete, Rename etc.	1x 2 hr	
	Document Creation, editing, printing using MS Word	1x 2 hr	
	Spreadsheets / charts, editing, printing, using MS Excel	1x 2 hr	
B	**Total Hours**	**10 hrs**	
A + B	**Total Hours + credit**	**30 hrs**	1

Paper -5
Histopathology & Cytology
(Theory – 100 Marks + Practical Viva – 100 Marks)

Module No.	Sub Topics	Hours	Credit
Module No. 1 (Theory)	**Histopathology-** Introduction & importance of histopathology, Cell, tissue and their functions.	1 hr	
	Methods of specimen collection (biopsies) and examination of tissues and cells.	1 hr	
	Tissues Fixative- Simple Fixative and their properties	1 hr	
	Micro anatomical and Histochemical fixatives	1 hr	
	Tissue Processing Collection of specimen, Labelling and fixation	1 hr	
	Dehydration, Clearing, Impregnation, Embedding	1 hr	
	Section Cutting- Microtome and knives, sharpening and care, Technique of section cutting	1 hr	
	Mounting of sections, Frozen sections and Cryostat	1 hr	
	Staining - Dyes and their properties,	1 hr	
	Staining - Types of staining, Basic staining – Hematoxylin and Eosin	1 hr	
	Staining - Special stains PAS, Masson trichrome	1 hr	
	Fleugens, Geimsa, PTAH	1 hr	
	Staining - Mounting of sections	1 hr	
	CYTOPATHOLOGY Introduction – cytology and cytopathology Method of specimen collection and transportation	1 hr	

	For gynaecological samples		
	Method of specimen collection, transportation and preservation of non-gynecological samples	1 hr	
	Fixation and fixative - Common fixative, Special purpose fixative	1 hr	
	Fluid specimen	1 hr	
	Preservation prior to processing,	1 hr	
	Preparation for microscopy	1 hr	
	Papanicolaou & other routine and special stains	1 hr	
A	**Total Hours + Credit**	**20 hrs**	**1.3**
Module No. 2 (Practical)	Fixation	1 hr	
	Processing,	1 hr	
	Embedding	1 hr	
	Sharpening of Knives	1 hr	
	Section cutting	1 hr	
	Preparation of slides	1 hr	
	Preparation of fixative	1 hr	
	Decalcification of fluid	1 hr	
	Preparation of adhesives to fix the sections on the slide	1 hr	
	Observation of different pathological sections	1 hr	
	Collection of cell sample	1 hr	
	Preparation of cell sample	1 hr	
	Fixation and staining of cytological smears by papanicolaou's staining method	2 hrs	
	Mounting of cell sample	1 hr	
B	**Total Hours**	**15 hrs**	**0.5**
A + B	**Total Hours + credit**	**35 hrs**	**1.8**

Paper -6
Bacteriology, Immunology & Serology
(Theory – 100 Marks + Practical Viva – 100 Marks)

Module No.	Sub Topics	Hours	Credit
Module No. 1 (Theory)	**BACTERIOLOGY** Introduction to microbiology – Classification, morphology and physiology of bacteria. Normal flora of human body	1 hr	
	Common methods of sterilization and disinfections	1 hr	
	Cultivation of bacteria Bacterial growth requirement – Aerobic and anaerobic and mycobacteria	1 hr	
	Common media - Classification, preparation, sterilization and uses	1 hr	
	Culture methods – sample collection transportation, steps in processing	1 hr	

	Culture methods – choice of medium, methods of plating, and subcultures	1 hr	
	Pyogenic cocci – Morphology, pathogenicity and method of isolation	1 hr	
	Staphyllococci Strepto and pneumococci, gonococci	1 hr	
	Gram Negative Bacilli – Morphology, pathogenicity and method of isolation	1 hr	
	Gram Negative Bacilli – Esch coli, Klebsiella etc.	1 hr	
	Gram Negative Bacilli – Proteus,Pseudomonas etc	1 hr	
	Gram Negative Bacilli – Salmonellae, Shigella, Vibrio etc.	1 hr	
	Gram positive Bacilli and Anaerobes - Morphology, pathogenicity and method of isolation	1 hr	
	Gram positive Bacilli - Corynebacteria & Bacillus spp.	1 hr	
	Gram positive Bacilli - Clostriadial and Non- Clostriadial anaerobes	1 hr	
	Mycobacteria - Morphology, pathogenicity and method of isolation	1 hr	
	Actinomyces, Nocordia, Ricketssia, chlamydia etc.	1 hr	
	Spirochaetes - Treponema, leptospira	1 hr	
	Other miscellaneous microbes of medical importance,	1 hr	
	Antimicrobial susceptibility test	1 hr	
	IMMUNOLOGY AND SEROLOGY **Immunity -** Introduction, types of immunity	1 hr	
	Immunity – Antigen (structure, types etc)	1 hr	
	Immunity – Antibody (structure, class etc)	1 hr	
	Immunity – Compliment (structure, types etc)	1 hr	
	Antigen antibody reaction and common serological reaction (Kahn test, Rose-Waller test)	1 hr	
	Humoral and cell mediated immunity	1 hr	
	Auto immunity	1 hr	
	Auto-immune diseases		
	Immune deficiency diseases and it's investigation	1 hr	
	Common Lab. animals - use, care, different routes & site of injection	1 hr	
A	**Total Hours + Credit**	**30 hrs**	**2**
Module No. 2 (Practical)	**Microscope** - Construction, Care & use	1 hr	
	practice of Gram staining technique	1 hr	
	Morphology of bacteria – Size, Shape, Arrangement, Capsule, Spore, Flagella etc.	1 hr	
	Practice of Z. N. staining and Hanging drop method for motility	1 hr	
	Common Culture media – Liquid and solid :- Preparation, Sterilization, and uses	1hr	
	Biochemical reactions- Commonly used biochemical test	1 hr	
	bacterial agglutination reaction	1 hr	

	Antibiotic susceptibility testing - Kirby-Bauer method	1 hr	
	Agglutination, precipitation and complement fixation reaction introduction	1 hr	
	Widal test	1 hr	
	Weil – Felix test	1 hr	
	Bacterial slide Agglutination tests	1 hr	
	VDRL test	1 hr	
	R.A. test, CRP test	1 hr	
	ASO test, Pregnancy test	1 hr	
	Agar gell diffusion test (AGD),	1 hr	
	Counter immuno-Electrophoretic test (CIEP)	1 hr	
	Single Radiolimmuno- diffusion test (SRID)	1 hr	
	Enzyme Linked Immuno Sorbent assay (ELISA)	1 hr	
	Polymerase Chain Reaction	1 hr	
B	**Total Hours**	**20 hrs**	**0.6**
A + B	**Total Hours + credit**	**50 hrs**	**2.6**

Paper - 7

Parasitology, Mycology & Virology

(Theory – 100 Marks + Practical Viva – 100 Marks)

Module No.	Sub Topics	Hours	Credit
Module No. 1 (Theory)	**PARASITOLOGY** Morphology, Life-Cycle, Pathogenicity and Laboratory diagnosis of protozoa such as :- (a) E. histolytica and (b) Giardia,	1 hr	
	(c) E.coli, and Trichomonas	1 hr	
	(d) Toxoplasma,	1 hr	
	(e) Plasmodia and Lieshmania	1 hr	
	Morphology, Life-Cycle, Pathogenicity and Laboratory diagnosis of following helminths and nematodes :- (a) Hook worm, Round worm,	1 hr	
	(b) Whip worm,	1 hr	
	(c) Thread worm, Pin worm.	1 hr	
	(d) Tapeworm	1 hr	
	(e) Echinococcus	1 hr	
	(d) Wucheria bancrofti and B. malayi	1 hr	
	MYCOLOGY Morphology and laboratory diagnosis of fungi causing superficial mycosis	1 hr	
	Morphology and laboratory diagnosis of fungi causing deep mycosis	1 hr	
	Morphology and laboratory diagnosis of fungi causing systemic mycosis	1 hr	
	Morphology and laboratory diagnosis of fungi causing opportunistic	1 hr	

	fungal infections		
	VIROLOGY Classification, general properties of viruses	1 hr	
	Bacteriophage and its significance	1 hr	
	Cultivation and propagation of human viruses	1 hr	
	Morphology, pathogenicity and laboratory diagnosis of hepatitis viruses	1 hr	
	Morphology, pathogenicity and laboratory diagnosis of HIV / AIDS virus.	1 h	
	Oncogenic viruses.	1 hr	
A	**Total Hours + Credit**	**20 hrs**	1.3
Module No. 2 (Practical)	**Parasitology** Collection, Preservation and Transportation of fecal material	1 hr	
	Physical examination of fecal material	1 hr	
	Chemical of fecal material	1 hr	
	Microscopic examination of fecal material	1 hr	
	Preparation of stained and unstained slide for detection of larvae / ova or cysts	1 hr	
	Demonstration of gross specimen of Hookworm,	1 hr	
	Demonstration of gross specimen of Roundworm, Whip worm	1 hr	
	Demonstration of gross specimen of Thread worm, Pin worm	1 hr	
	Demonstration of gross specimen of Tape worm	1 hr	
	Demonstration of following parasites / ova / cyst under microscope : (a) G. lamblia, (b) T. vaganalis	1 hr	
	(c) Malerial parasites, (d) Lieshmania	1 hr	
	(e) Roundworm(f) Whipworm,	1 hr	
	(g) Threadworm, (h) Pin worm	1 hr	
	(i) Tapeworm.	1 hr	
	Mycology Collection and processing of skin scrappings / nail clippings / hair pieces / clinical material for demonstration of fungal elements	1 hr	
	Microscopy for fungal elements : unstained perpetration : Lactophenol cotton blue.	1 hr	
	Microscopy for fungal elements : stained perpetration	1 hr	
	Demonstration of common fungal media with and without growth	1 hr	
	Virology Instruments / Equipments and glassware used in viral diagnostic laboratory	1 hr	
	Inoculation of chick-embryo and other cell / tissue culture media (Both practicals will be performed either by video-aids or by paying visit to virus culture laboratory.)	1 hr	
B	**Total Hours**	**20 hrs**	**0.6**
A + B	**Total Hours + credit**	**40 hrs**	**1.6**

Paper - 8

Advanced Techniques & Future Trends In Laboratory

(Only Viva Voce – 100 Marks)

[oral Questioning only] *

Module No.	Sub Topics	Hours	Credit
Module No. 1 (Theory)	**HAEMATOLOGY AND BLOOD BANKING** Automatic venipuncture and evacuated tubes Automation in haematology (Cell counter and coagulometer)	1hr	
	Cell separation and cell component Plasmapheresis	1hr	
	BIOCHEMISTRY Electrophoretic techniques	1hr	
	Immunological Methods	1hr	
	Chromatographic technique	1hr	
	Radio-isotopic Technique	1hr	
	Automation in Bio-chemistry – wet and dry chemistry	1hr	
	Rapid diagnostic technique - Glucometer, Cholesterol strip	1hr	
	MICROBIOLOGY Rapid diagnostic Technique	1hr	
	ELISA and its modification	1hr	
	Gel immuno electrophoretic technique	1hr	
	Electron-microscopy :- Transmission & Scanning	1hr	
	Fluorescence microscopy and its modification	1hr	
	Phase contrast microscopy and its modification	1hr	
	Laboratory investigation of immunocompromised host and HIV Patient	1hr	
	Hospital infection and it's laboratory investigation	1hr	
	CLINICAL PATHOLOGY Rapid test in urine analysis – Dip stick / Multi stick / Rapid test of urine culture – Dip slide culture etc.	1hr	
	Rapid test for stool analysis – Occult blood etc. Rapid test for stool culture – Rota virus etc.	1hr	
	Rapid test for semen analysis – Total count etc.	1hr	
	Other resent advances in clinical pathology	1hr	
	HISTOPATHOLOGY AND CYTOLOGY Automatic Tissue Processor,	1hr	
	Automatic Stainer and Screener	1hr	
	Flow Cytometry,	1hr	
	Immuno Chemistry Technique	1hr	
	Chemiluminescent assay	1hr	
	Rate Nephelometry	1hr	

	MOLECULAR DIAGNOSTIC TECHNIQUE & TELE PATHOLOGY -Polymerase Chain Reaction (PCR)	1hr	
	Southern hybridisation analysis	1hr	
	Dot blot hybridisation analysis	1hr	
	Computerized medical application for data and image acquisition : Future of laboratory medicine	1hr	
A	**Total Hours**	**30 hrs**	
	Visits to Hi-tech diagnostic laboratories to see the working of latest equipment	1x5 hrs	
	Participation in workshops, Seminar, Current updates, Training and Retraining Programmes, Conferences and Guest lecture series	1x5 hrs	
B	**Total Hours**		
	Total Hours + Credit	**40 hrs**	**1.3**

Hours And Credits Summary of The Course

Sr.	Course Details	Hours	Credits
1	Theory	130	8.5
2	Practical	200	7.0
3	Internship	125	2
	Total	**450**	**17.5**

Examination Pattern

Semester - 1

Sr.	Course Details	Papers	Marks
1	Theory	3	100 (per paper) x 3 = 300
2	Practical	4	100 (per paper) x 4 = 400
	Total	**7**	**700**

Semester – 2

Sr.	Course Details	Papers	Marks
1	Theory	3	100 (per paper) x 3 = 300
2	Practical	4	100 (per paper) x 4 = 400
	Total	**7**	**700**

Passing Criteria

Sr.	Course Details	Total Marks	Minimum Passing Criteria
1	Theory	100 each paper	45
2	Practical	100 each paper	45
	Total	**200**	**90**