



Department of **M.Sc. Medical Laboratory Technology**

4th Board of Studies Meeting-Minutes

Venue

Vel Nursing College,
Velan Nagar,
Manjankaranai, Thiruvallur Dt

Date & Time

31.05.2024 & 11.00 am

MINUTES OF BOARD OF STUDIES

The meeting of the Board of Studies in School of Allied Health Sciences , VISTAS held on **31-05-2024 at 11am** to discuss the Rules and Regulations, **Framework of PG Program, Curriculum & Syllabus** of the following **newly introduced Program –M.Sc. Medical Lab Technology** which to be followed from academic year 2024– 2025.

The following members were present for the BOS meeting

S. No	Name of the Board Member	Designation	Institute / Industry	Role
Internal Members				
1	Mr.K.Kishore Kanna M.Sc(Radiology)	Vice Principal	Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai	Chairperson
2	Mrs.Jebaseeli V M.Sc(Biochemistry)	Assistant Coordinator	Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai	Member
3	Mrs. Bhavani. S M.Sc(Medical Lab Technology)	Assistant Professor	Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai	Member
External Expert Members				
1	Dr.Yamini.B M.Sc.Echocardiography Ph.D. (Cardiology)	Assistant Professor &Clinical Coordinator	Faculty of Allied Health Sciences, KM Cherian Heart Foundation- Frontier Life Line Hospitals.	Member
2	Dr.M.RadhikaM.Sc MLT, PhD(Biochemistry)	Assistant Professor	Sri Ramachandra Institute of Higher Education & Research, Porur,Chennai-116	Member
3	Dr.A Mani,M.Sc,Ph.D (Ophthalmology)	AssociateProfessor	Chettinad Academy of Research and Education Kelambakkam.	Member
4	Mr.Vyshak M.Sc.Radiology	Assistant Professor	ACS Medical College & Hospital,Velapanchavadi	Member

AGENDA OF THE MEETING

Item No.	Particulars
BoS / 2024 /MLT / PG / 1.1	Develop curriculum based on Learning Outcome Based Curriculum Framework (LOCF) /Choice Based Credit System(CBCS)
BoS / 2024 /MLT / PG / 1.2	Objective of New Program
BoS / 2024 /MLT / PG / 1.3	Feedback from Stakeholders to ensure that the syllabus of the courses include the state-of-the-art technologies focusing on skill development, employability, and entrepreneurship
BoS / 2024 /MLT / PG / 1.4	To review the UGC policy for CBCS and LOCF curriculum

Item No:1 BOS / 2024 /MLT / PG / 1.1

Develop curriculum based on Learning Outcome Based Curriculum Framework (LOCF) /Choice Based Credit System(CBCS)

- To develop the curriculum and syllabi based on the guidelines of UGC and the principles of Outcome Based Education (OBE)/Learning Outcome Based Curriculum Framework (LOCF).
- To implement the guidelines and suggestions of the new education policy.
- To consider the Competencies and Performance Indicators of the M.Sc Medical Laboratory Technology program defined as per the recommendations of the National Model Curriculum.
- To enhance the Course Outcomes (CO) of all the courses by focusing on skill development, employability, and entrepreneurship.
- To consider the mapping of CO to the Program Outcomes (PO) and Programme Specific Outcomes (PSO) of all the courses using the defined Competencies and Performance Indicators.

Minutes are Reviewed and Confirmed

Item No : 2 BOS / 2024 /MLT / PG / 1.2

Objective of New Program

- To provide the perfect balance and academic intensity between theoretical and practical learning.
- To design the curriculum focusing on Activities/ Content with direct on Employability/Competency/ Entrepreneurship/ Skill Development / Interdisciplinary
- To demonstrate and adopt technical skill set and in depth of knowledge.
- To aid students to refine their skills.
- To discover various techniques and develop their knowledge through experimental learning.
- To deliver the Program as per UGC norms.

Item No : 3 BOS / 2024 /MLT / PG / 1.3

Feedback from Stakeholders to ensure that the syllabus of the courses include the state-of-the-art technologies focusing on skill development, employability, and entrepreneurship

External Members: The course is well framed and the curriculum is elaborate and focuses on inculcating the skills and knowledge required for students in the medical world..

Academic Experts: The course covers all the basic inputs to provide expertise training in the medical world. The Competencies and Performance Indicators (PI) are well defined for both the programmes. The CO-PO mapping is based on Knowledge Levels and is well justified.

The course explores a wide range of careers in the medical world through internships and enable students to inculcate practical skills for Entrepreneurship.

Minutes are Reviewed and Confirmed

Item No : 4 BOS / 2024 /MLT / PG / 1.4

To review the UGC policy for CBCS and LOCF curriculum

- Resolved that the Curriculum & Syllabus for the M.Sc Medical Laboratory Technology programme (Regulation 2024), designed as per the Learning outcome-based curriculum framework (LOCF) guidelines of UGC, effective from the Academic Year 2024-2025 be approved.

Resolution:

The members of the BOS adopted the following resolutions: Resolved to recommend that the Curriculum and Syllabus developed for M.Sc Medical Laboratory Technology is based on Learning Outcome Based Curriculum Framework (LOCF) and Choice Based Credit System (CBCS). Newly introduced UG Program and courses focused on Activities Content with direct on Employability / Competency/ Entrepreneurship/ Skill Development / Interdisciplinary and new courses introduced during the Academic Year – 2024– 2025 is designed as per the guidelines and Model Curriculum Framework of UGC. The Board of studies approved the UG curriculum for the academic year 2018 – 2019 is enclosed **Annexures** .

New Curriculum and Syllabi of PG Program courses focused on Activities / /Content with direct focus on Employability / Competency/ Entrepreneurship / Skill development/ Interdisciplinary/ Cross Cutting Issues enclosed in Annexures

S. No	Name of the Board Member	Designation	Institute / Industry	Signature
Internal Members				
1	Mr.Kishore Kanna.K M.Sc.(Radiology)	Vice Principal	Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai	K.K.K
2	Mrs.Jebaseeli V M.Sc.(Biochemistry)	Assistant Coordinator	Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai	Jeb
3	Mrs.Bhavani.S M.Sc(Medical Lab Technology)	Assistant Professor	Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai	Bhavani
External Expert Members				
1	Dr.Yamini.B M.Sc.Echocardiography Ph.D. (Cardiology)	Asst.Professor &Clinical Coordinator	Faculty of Allied Health Sciences, KM Cherian Heart Foundation-Frontier Life Line Hospitals.	Yamini
2	Dr.M.Radhika M.Sc MLT, PhD (Biochemistry)	Assistant Professor	Sri Ramachandra Institute of Higher Education & Research, Porur, Chennai-116	Radhika
3	Dr.A Mani, M.(Optometry),Ph.D (Ophthalmology)	Associate Professor	Chettinad Academy of Research and Education Kelambakkam.	A. Mani
4	Mr.Vyshak M.Sc(Radiology)	Associate Professor	ACS Medical College & Hospital, Velapanchavadi	Vyshak



Vels Institute of Science, Technology and Advanced Studies (VISTAS)

**School of Allied Health Sciences
Manjankaranai, Thiruvallur Dist.**



**SPECIFIC REGULATIONS FOR
M.Sc. MEDICAL LABORATORY TECHNOLOGY PROGRAMME-2024**

1. SHORT TITLE AND COMMENCEMENT:

These regulations shall be called “Specific Regulations for the M.Sc. Medical Laboratory Technology Program of Vels Institute of Science Technology and Advanced Studies, Deemed to be University u/s3 of UGC act 1956. These Regulations are applicable to the students who are admitted to the M.Sc. Medical Laboratory Technology in this University.

As per the decision of the Academic Council of this University, these regulations have been prepared by adopting the regulations of the VISTAS.

2. AIMS

The aim of the postgraduate Medical Laboratory Technology is to:

To provide holistic knowledge about clinical care, communication, membership of a multidisciplinary health care team, which is committed to professional excellence, social accountability, leadership quality about lifelong learning.

3. OBJECTIVES

On completion of the two years M.Sc. Medical Laboratory Technology course the graduates will be able to:

- Provide the clinical expertise necessary to acquire knowledge in clinical laboratory science and general education subjects.
- Ensure upon completion that the graduated students have the ability not only to perform all the laboratory testing procedures proficiently but also have technical expertise in evaluation of the reagents and kits for diagnostic suitability

- Make the students competent in the analysis and interpretation of various laboratory tests and also maintaining the quality control for reliability of laboratory reports.
- Produce an understanding in the student about the importance of continuing education and professional awareness.
- Provide a sense of responsibility and professionalism when interacting with patients, peers, fellow employees and other health care provider.
- Instill the importance of honesty, work ethics and professionalism in the work place

4. ELIGIBILITY FOR ADMISSION

- A Candidate desiring to join the M.Sc. Medical laboratory Technology should have completed B.Sc medical laboratory technology / biochemistry /microbiology /pathology / Allied Health Sciences from any recognized university.
- No upper age limit for Admission
 - Selection of the candidates would be based on the merit of the entrance examination held by VISTAS.

5. DURATION OF THE COURSE:

The duration of the M.Sc. Medical Laboratory Technology Degree course shall be 2 Years full-time programme comprising 4 Semesters under Choice based Credit System.

6. MEDIUM OF INSTRUCTION:

English shall be the medium of instruction for all subjects of study and examinations will be conducted only in English.

7. COMMENCEMENT OF THE COURSE:

The course shall commence from October of the academic year.

8. WORKING DAYS IN A SEMESTER:

Each semester shall consist of not less than 100 working days and each academic year shall have a total of 200 working days

9. REGISTRATION

A Candidate admitted to the course shall be registered by remitting the prescribed fees along with the Application form for registration duly filled within the stipulated dates.

10. COMMENCEMENT OF THE EXAMINATIONS:

Regular Semester Examinations will commence from last week of November and last week of April.

If the date of commencement of the examination falls on Saturday, Sunday or declared Public Holidays, the examination shall begin on the next working day.

11. SUBMISSION OF LABORATORY RECORD NOTE BOOKS:

At the time of practical examination, each candidate shall submit to the examiners his / her laboratory note books duly certified by the Head of the Department as a bonafide record of the work done by the candidate.

12. INTERNAL ASSESSMENT:

- a) A minimum of two written internal assessment examinations shall be conducted in each subject during a semester and the Best / Average marks of two examinations shall be taken into consideration for the award of internal marks.
- b) A model practical examinations shall be conducted in each subject (wherever practical have been included in the curriculum) shall be taken into consideration for award of internal marks in practical.
- c) Tests will be conducted giving sufficient time for preparation.
- d) No repeat, reschedule and postponement of the assessment date are permitted. Students shall compulsorily attend any two continuous assessments

13. ATTENDANCE REQUIRED FOR ADMISSION TO EXAMINATIONS:

- a) No candidate shall be permitted to appear for the University examinations, unless he/she attends the course for the prescribed period.
- b) Every candidate is required to put in a minimum of 80% of attendance both in theory and practical separately in each subject for admission to the examination.
- c) A candidate lacking in the prescribed attendance in any subject in theory and/or practical shall not be admitted to the entire examination.

14. CONDONING LACK OF ATTENDANCE:

Condoning of shortage of attendance up to a maximum of 10% in the prescribed eligible attendance for admission to year end examination rests with the discretionary power of the Vice Chancellor. A Candidate lacking in attendance should submit an application in the prescribed form and remit the stipulated fee, 15days prior to the commencement of the theory examination, The Head of the Department should satisfy himself on the reasonableness of the candidate's request while forwarding the application of the candidate to the Controller of Examinations, who would obtain the Vice-Chancellor's approval for admission to the examination. No application would be accepted if it is not forwarded through proper channel.

Condoning lack of attendance should be taken up for consideration under the following circumstances:-

- a. Any illness affecting the candidate Candidates should submit a medical certificate from registered medical practitioners.
- b. Any unforeseen tragedy in the family. The parents/guardian should give in writing about

what had happened.

- c. Participation in National Service Scheme and other co-curricular activities representing the University.

15. RE-ADMISSION AFTER BREAK OF STUDY:

A separate regulation is available for all the UG/PG courses of this university for the readmission of candidates after a break of study.

16. YEAR END EXAMINATIONS:

1. Commencement of the Examination will be in November /April
2. If the date of commencement falls on Saturdays, Sundays or declared public holidays, the examination shall begin on the next working day.
3. The duration of the examination of each subject is 3hours.
4. Minimum pass marks shall be 50 % in each of the theory and practical papers separately except in Internal papers.
5. Minimum Pass marks in Internal papers shall be 50%.
6. Carryover of failed subjects.
 - a. A candidate has to pass in theory and practical examinations separately in each of the subject.
 - b. If a candidate fails in either theory or practical of the subjects, he/she has to reappear for both the Theory and Practical.
 - c. The candidate if fails can be permitted for admission to next year.

17. REVALUATION/RETOTALLING OF ANSWER PAPERS:

There is provision for revaluation of the answer papers of failed candidates in any examination. However, the failed candidates cannot apply for retotaling.

18. CREDITS:

Credits will be assigned on the basis of the lectures (L) /tutorials (T) Clinical Training (CR) laboratory work (P) /Research Project (RP) and other form of learning in a 15- 20 week schedule.

- L- One credit for one hour lecture per week (1 credit = 15 hours)
- P/T – One credit for every two hours of laboratory or practical (1 credit = 30 hours)
 - CR – One credit for every two hours of Clinical Training/Clinical Rotation/Posing (1credit = 30 hours)
 - RP – One credit for every two hours of Research Project per week – Max Credit20-25 (1 credit =30 hours)

19. GRADING SYSTEM:

Based on the performance, each student shall be awarded a final grade at the end of the

semester for each course. Absolute grading is used by converting the marks to grade, based on pre-determined class intervals.

UGC 10-point grading system is used with pass grade modified.

Letter Grade	Grade Point	Range of Marks*
O (Outstanding)	10	85% & above
A+ (Excellent)	9	80-84.99%
A (Very Good)	8	75-79.99%
B+ (Good)	7	65-74.99%
B (Above Average)	6	60-64.99%
C (Average)	5	50-59.99%
P(Pass)	-	>50%
F (Fail) / RA (Reappear)	0	<50%
AB (Absent)	0	0

1. A candidate is declared to have pass in a course if he /she secures a minimum 50% marks the university theory & practical Examinations separately & 50% in aggregate of university theory/practical & Internal assessment put together

Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

SPGA is the weighted average of the grade points obtained in all courses by the student during thesemester

SGPA Computation:

$$SGPA = \frac{\sum_i^n (C_i \times GP_i)}{\sum_i^n C_i}$$

Where C_i - credits for the course, $(GP)_i$ - the grade point obtained for the i^{th} course , n - total number of courses and the sum is over all the courses taken in that semester, including those in which the students has secured "F" and "Ab" grades.

CGPA Computation:

Computation of CGPA:

CGPA is calculated with SGPA of all semesters to two decimal points and is indicated in final grade in mark card/transcript showing grades of all 8 semesters and their courses/subjects.

$$\text{CGPA} = \frac{\sum_i S_i \times (\text{SGPA})_i}{\sum_i S_i}$$

where:- S_i - sum of credits in i^{th} semester , $(\text{SGPA})_i$ - semester grade point average earned in i^{th} semester and r - number of semester and the sum is over all the semesters under consideration.

The cumulative grade point average (CGPA) is calculated by consideration all the courses taken from the first semester onwards for regular students and from third semester onwards taken for lateral entry students.

20. CLASSIFICATION OF SUCCESSFUL CANDIDATES

The CGPA arrived at the completion of the course shall be the criteria for the classification of successful candidates as below:

Cumulative Grades and GradePoints

Letter Grade	Grade Point	Range of Marks*
O (Outstanding)	10	85% & above
A+ (Excellent)	9	80-84.99%
A (Very Good)	8	75-79.99%
B+ (Good)	7	65-74.99%
B (Above Average)	6	60-64.99%
C (Average)	5	50-59.99%
P(Pass)	-	>50%
F (Fail) / RA (Reappear)	0	<50%
AB (Absent)	0	0

- a. Successful candidates who secure 75% marks and above as a course aggregate in the first appearance taking University theory, practical, project / dissertation evaluation and viva shall alone be awarded Distinction. This will also apply for award of University rank.
- b. Successful candidates who secure 60% marks and above as a course aggregate in the University theory, practical, project/dissertation evaluation and viva shall be awarded First Class.
- c. All others who secure 50-59% in gross percentage will be classified to have passed in Second Class.

21. PATTERN OF QUESTION PAPER FOR UNIVERSITY EXAMINATION:

EXAMINATION QUESTION PAPER PATTERN

Essay	2 x 15	=30 Marks
Short Notes	7 x 5	=35Marks
ShortAnswers	5 x 2	=10 Marks
Total		75 Marks

Internal Split up – Theory

1. Continuous Assessment: 10 Marks

S.no	Continuous Assessment	Marks
1	Attendance	5
2	Assignment	5

2. Internal Assessment: 15 marks Two Sessional Exams per Course

Internal Split up – Practical

1. Continuous Assessment: 20 Marks

S.no	Continuous Assessment	Marks
1	Seminar	10
2	Record note Book	10

2. Model Practical Examination: 30 Marks

22. GRACE MARKS

Maximum of 8 grace marks for each subject is permitted, and grace marks should not exceed 8 marks in each subjects.

23. MARKS QUALIFYING FOR PASS

A candidate is declared to have passed in a course if he/she secures a minimum of 50% marks in university theory and practical examinations separately and 50% in aggregate of University theory /practical and internal assessment put together.

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VISION OF THE MEDICAL LABORATORY TECHNOLOGY DEPARTMENT:

M.Sc Medical Lab Technology course syllabus offers theoretical, core, elective, and practical aspects of the study. The M.Sc. Medical Laboratory Technology program encompasses a wide array of subjects, each designed to prepare students for the diverse roles they may undertake in their professional careers. The curriculum is meticulously structured to ensure that students not only gain a solid foundation in the fundamental concepts of laboratory medicine but also have the opportunity to develop into specialized areas of study.

Our vision is to empower our students with the knowledge, skills, and ethical grounding needed to excel in their chosen careers and contribute positively to the field of healthcare. We strive to foster an environment of learning and innovation, where students are encouraged to explore, question, and apply their knowledge in practical settings.

MISSION OF THE MEDICAL LABORATORY TECHNOLOGY DEPARTMENT:

1. To establish and maintain high standards of THE MEDICAL LABORATORY TECHNOLOGY education & training.
2. To ensure that the programmes offered produce graduates with knowledge, skills and competencies that are both locally relevant and internationally competitive.
3. To apply the core principles of transformation in discipline activities, programmes and action plans.
4. To engage in strategic community partnerships towards the integration of social accountability into the entire programme.

PROGRAM EDUCATIONAL OBJECTIVES (PEO) :

After the completion of the program, THE MEDICAL LABORATORY TECHNOLOGY graduates will be able to,

1. Conceptualized Learning
2. Practicals & Training
3. Presentations
4. Group Projects
5. Lab Works
6. Research Projects

PROGRAMME OUTCOMES (PO) :

Graduates in **THE MEDICAL LABORATORY TECHNOLOGY** will acquire and possess ability to Working in the nutritional and environmental counselling domain.

- Efficiency in using modern techniques and technologies for providing vision care.
- Demonstrating professional and clinical competence in the practice.

- Strengthening the critical acumen of students to work efficiently in inter-disciplinary and multi-disciplinary health care projects
- Nurturing their skills and preparing them for the optical clinic industry & trade

PROGRAMME SPECIFIC OBJECTIVES (PSO) :

At the completion of programme, THE MEDICAL LABORATORY TECHNOLOGY graduates will

1. A thorough study of Medical Lab Technology
2. Working on laboratory research works
3. Involvement in internships
4. Real-world projects and training
5. Study of Human Anatomy and Physiology

THE MEDICAL LABORATORY TECHNOLOGY CURRICULUM SEMESTER 1

Sl.No	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total	IA		UA		Total
			Hours	Credits	Hours	Credits	Hours	Credits	Credits	Theory	Practical	Theory	Practical	
1.1	Program Core	General Biochemistry I	45	3	30	1	60	2	6	25	50	75	50	200
1.2	Program Core	General Bacteriology and Immunology	45	3	30	1	60	2	6	25	50	75	50	200
1.3	Program Core	Hematology and clinical pathology	45	3	30	1	60	2	6	25	50	75	50	200
1.4	Program Core	Biostatistics and Research Methodology	45	3	30	1	-	-	4	25	-	75	-	100
1.5	Program lab	Clinicals	-	-	-	-	90	3	3	50	50	-	-	100
Total									25	Total				800

SEMESTER 2

Sl.No	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total Credits	IA		UA		Total
			Hours	Credits	Hours	Credits	Hours	Credits		Theory	Practical	Theory	Practical	
2.1	Program Core	General Biochemistry II	45	3	30	1	60	2	6	25	50	75	50	200
2.2	Program Core	Parasitology Theory	45	3	30	1	60	2	6	25		75		200
2.3	Program Core	General Pathology, Blood Banking and Immunonology	45	3	30	1	60	2	6	25	50	75	50	200
2.4	Program Elective	HealthCare management*	30	2	-	-	-	-	2	100	-	-	-	100
2.5	Program lab	Clinicals	-	-	-	-	90	3	3	50	50	-	-	100
Total									23	Total				800

SEMESTER 3

Sl.No.	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total Credits	IA		UA		Total
			Hours	Credits	Hours	Credits	Hours	Credits		Theory	Practical	Theory	Practical	
3.1	ProgramCore	Clinical Biochemistry I	45	3	30	1	60	2	6	25	50	75	50	200
3.2	ProgramCore	Systemic Bacteriology	45	3	30	1	60	2	6	25	50	75	50	200
3.3	ProgramCore	Systemic Pathology and Histopathology Techniques	45	3	30	1	60	2	6	25	50	75	50	200
3.4	Program Elective	Patient Care*	30	2	-	-	-	-	2	100	-	-	-	100
3.5	Program lab	Clinicals	-	-	-	-	90	3	3	50	50	-	-	100
Total									23	Total				800

SEMESTER 4

Sl.No.	Category	Course Titles	Hours/Credits							Maximum Marks				
			Lecture		Tutorial		Practical		Total Credits	IA		UA		Total
			Hours	Credits	Hours	Credits	Hours	Credits		Theory	Practical	Theory	Practical	
4.1	ProgramCore	Clinical Biochemistry II	45	3	30	1	60	2	6	25	50	75	50	200
4.2	ProgramCore	Virology and Mycology	45	3	30	1	60	2	6	25	50	75	50	200
4.3	Program Core	Techniques in Cytology	45	3	30	1	60	2	6	25	50	75	50	200
4.4	Program Core	Dissertation and Project	-	-	-	-	60	2	2	-	50	-	50	100
4.4	Program Elective	Seminars, Journal Clubs and Group Discussions	-	-	-	-	120	4	4	50	50	-	-	100
Total									24	Total				800

General Biochemistry

Objectives: At the end of the semester the student should be able to

1. Understand the importance and metabolism of various biomolecules
2. Understand and interpret the causes behind the occurrence of various metabolic disorders
3. Perform qualitative tests to identify aminoacids and carbohydrates in a given solution.
4. Perform tests to find out the abnormal constituents of the urine.

Theory syllabus

UNIT I

Chemistry, metabolism and disorders of carbohydrate:

Definition& classification of carbohydrates, Outline of Glycolysis, TCA cycle, glycogen metabolism, Gluconeogenesis, importance of HMP pathway, fructose and Galactose metabolism, regulation of blood glucose during fasting and postprandial states.

Disorders: Diabetes mellitus, Hypoglycaemia, Galactosemia, Von Gierke disease, glucose 6-phosphate dehydrogenase deficiency, Lactose intolerance.

UNIT II

Chemistry, metabolism and disorders of lipids:

Definition&classification of lipids, Beta oxidation of fatty acids, ketone bodies ,importance of cholesterol,bileacids, Lipoproteins- types, functions, phospholipids

Disorders: Hypercholesterolemia, Hypertriglyceridemia, mixed disorders, Steatorrhea, ketoacidosis-DKA & instarvation

UNIT III

Chemistry, metabolism and disorders of protein:

Definition&classification of proteins, classification of aminoacids, functions of proteins, Plasma protein.ammonia formation and Urea cycle.

Disorders: Aminoaciduria- phenylketonuria, maple syrup urine disease, alkaptonuria, homocystinuria, cystinuria

UNIT IV

Chemistry, metabolism and disorders of Hemoglobin & Nucleotides :

Outline on the structure and functions of haemoglobin, oxygen dissociation curve, Heme catabolism to bilirubin.Associated Disorders: Jaundice, Porphyria.

Outline on nucleotide structure,Breakdown of Purine to Uric acid. Associated Disorders: Hyperuricemia.

UNIT V

Enzymes:

Definition, classification, factors affecting enzyme activity, Isoenzymes, Clinically important enzymes of Liver,Cardiac muscle, bone and Pancreas.

General Biochemistry –I : Practical Syllabus

1. Qualitative analysis of carbohydrates
2. Qualitative analysis of amino acids
3. Abnormal constituents of urine

Recommended books:

1. Text book of Biochemistry for medical students by DM Vasudevan
2. Tietz Fundamentals of Clinical Biochemistry

General Bacteriology and Immunology

Objective: At the end of the semester the students should

- a) Acquire knowledge about fundamentals and principles of General bacteriology.
- b) Understand the basic principles of Immunology and to perform and interpret the basic serological tests
- c) Acquire good technical skills and knowledge about the application of laboratory techniques in the diagnosis of infectious diseases.

Contents:

- Morphology and physiology of bacteria
- Culture media and methods
- Sterilization and Disinfection
- Specimen collection and transport
- Universal precaution
- Biomedical waste management
- Antibiotic susceptibility testing
- Basic concepts in immunology: structure and function of immune system
- Immunity
- Hypersensitivity
- Antigen and antibody reaction
- Autoimmunity

PRACTICALS:

- Hands on training on the uses of microscopes
- Gram stain & Acid fast staining
- Specimen collection and transport
- Preparation of media
- Antibiotic susceptibility testing
- Hands on training on different serological tests (WIDAL test, RPR test, ASO, CRP, RA)
- Demonstration of ANA & DNA
- Drinking water analysis
- Air sampling and theatre sterility

Recommended books

- a) Prof C P Baveja - Text book of Microbiology for MLT
- b) Prof C P Baveja – Practical Microbiology for MLT

Reference books.

- a) Ananthanarayanan & Paniker's, Text Book of Microbiology.
- b) Mackie & Mc-Cartney Practical medical Microbiology

Hematology and clinical pathology

Objectives:

1. To acquire knowledge in depth on diseases of the blood and diagnosis
2. To acquire knowledge in various clinical Pathology investigations
3. To acquire knowledge in advanced hematology investigations, quality control procedures and management of hematology and clinical pathology laboratory.

Unit – I

Microscopy, Stains, Blood cells

1. Microscopy – compound microscope parts and maintenance, Romanowsky stains – principle and procedure, staining of PS, BM and BM iron.
2. Haemopoiesis, hemoglobin synthesis, composition of blood and functions, morphology and reference range of various parameters, variation in parameters and common conditions, measurement of blood cells by manual and automation,

measurement of hemoglobin, packed cell volume, RBC and platelet indices, nucleated RBCs, reticulocytes, malarial parasites and QBC, ESR-principle, procedure (manual/automated), applications.

Unit – II

RBC disorders

3. Anemia – classifications, etiopathogenesis, blood, bone marrow, biochemical findings, clinical features, and diagnostic measures in all types of anemias and polycythemia.

Unit – III

WBC disorders

4. WBC – Non neoplastic leukocyte disorders, leukemia – molecular basis, classifications, blood and bone marrow pictures, biochemical and genetic alterations, diagnosis of leukemias, platelet – variations in count and morphology, qualitative and quantitative disorders, diagnosis of platelet function disorders, plasma cell – morphology, multiple myeloma.

Unit – IV

Coagulation and disorders

Coagulation – factors and mechanisms, screening tests of coagulation – principle, manual and automated methods, factor assays, proteins, antithrombin III, lupus anticoagulant inherited and acquired coagulation disorders – factor deficiency, Vit. K deficiency, DIC

Unit – V

Urine & Fluids

urine examination, collection, – manual / automated methods, conditions which cause variations, urine microscopy, 24 hrs urine, Bence Jones protein, stool examination - collection, methods of examination, microscopy, occult blood.

Semen analysis, CSF analysis, ascitic and pleural fluid analysis

Unit – VI

Lab management, advanced hematology

Internal quality control, LJ chart, mean, SD and CV, Split sample harmonisation, Inter lab comparison, EQAS, accreditations, laboratory management system, trouble shootings in CBC, coagulation and clinical pathology procedures, hazards in the lab and protective measures HB electrophoresis, HPLC, flow cytometry – immunophenotyping, protein immune electrophoresis and immunofixation.

Seminar: 2; Journal Club: 1; Assessment, Attendance, IA test

Practicals

Objectives:

1. To understand and perform manual hematologic tests and interpret.
2. To understand and perform manual clinical pathology tests and interpret.
3. To observe basis of genetic tests and flow cytometry

Sessions:

1. RBC count
2. WBC count
3. Platelet count
4. Hb estimation – Sahli's / cyanmeth Hb
5. PCV
6. Peripheral smear preparation
7. Interpretation of peripheral smear – normal, anemias, leukemias, toxic, granules, hemoparasites.
8. BM smear preparation – Leishman, MGG, Iron
9. Sickling test
10. Osmotic fragility test
11. ESR
12. QBC
13. Tests for coagulation - PT / INR, APTT, fibrinogen
14. Urine examination – Manual, Microscopy, BJ protein
15. Stool – Occult blood
16. Fluid analysis
17. Specimen – 5
18. Spotters - 20

19. HPLC
20. QC procedures and records
21. Semen analysis (SMART)
22. FISH, Karyotyping PCR (genetics)
23. Flow cytometry and Immunophenotyping (CRF)

Books:

1. Text book of Haematology – Dr. Tejinder Singh 2nd Edition, Arya Publications 2010
2. Medical Laboratory Technology, Vol. 1 and 2 – Dr. Ramnik Sood 6th Edition 2009.

Reference Books:

1. Text Book of Pathology – Harsh Mohan 7th Edition, 2015.
2. Essentials in Haematology and Clinical Pathology – Ramadas Nayak, Jaypee Brothers 1st Edition 2012

BIostatistics and Research Methodology

COURSE OBJECTIVES:

Discuss the process of health sciences research.

Differentiate various study designs.

Discuss validity. Discuss descriptive and inferential statistics.

- What is statistics – Importance of statistics in behavioural sciences Descriptive statistics and inferential statistics – Usefulness of quantification in behavioural sciences
- Measurements – Scales of measurements – Nominal, Ordinal, Interval and Ratio scales.
- Data collection – Classification of data – Class intervals – Continuous and discrete measurements – Drawing frequency polygon – types of frequency polygon – Histogram.
- Cumulative frequency curve – Ogives – Drawing inference from graph.
- Measures of central tendency – Need – types: Mean, Median, Mode – Working out these measures with illustrations.
- Measures of variability – Need – Types: Range, Quartile deviation, Average deviation, Standard deviation, Variance – Interpretation.
- Normal distribution – General properties of normal distribution – Theory of probability – Illustration of normal distribution – area under the normal probability curve.
- Variants from the normal distribution – skewness – Quantitative measurement of skewness – kurtosis – measurement of kurtosis – factors contributing for non- normal distribution.
- Correlation – historical contribution – meaning of correlation – types: Product, moment, content correlation, variation of product, movement correlation, rank correlation, Regression analysis. Tests of significance- need for – significance of the mean – sampling error – significance of differences between means – interpretation of probability levels – small samples – large samples.

SEMESTER II

General Biochemistry II Theory

Objectives:

At the end of the semester the student should be able to

1. Understand the importance and metabolism of various micro- and macronutrients
2. Understand the principle, applications and operations of various instrumentation techniques.
3. Prepare buffer and determine its pH
4. Perform paper chromatography of aminoacids and carbohydrates.
5. Perform agarose gel electrophoresis of serum proteins.

UNIT I:

Macronutrients & micronutrients:

Balanced diet, essential amino acids, essential fatty acids, BMR, SDA, dietary fibre, Glycemic index, proteinenergy malnutrition

Vitamins:

Definition, classification, Deficiency manifestations.

Lab Investigations for Vitamin K, Vitamin D, Vitamin A, Folic acid, and Cobalamin.

Minerals:

Outline of metabolism – Calcium, iron, Plasma calcium, Iron deficiency anemia, hypocalcemia and

hypercalcemia.

Investigations- Calcium, Phosphorous, iron, magnesium

UNIT II

Lab safety:

Hazards and safety measures- chemical, biological, electrical, fire

Centrifugation:

Principle, types.

UNIT III

Photometry:

Principle, Components, types, functioning and clinical applications of Spectrophotometer, Atomic absorptionspectrophotometer, Fluorometry, Turbidimetry, Nephelometry, Flow cytometry

UNIT VI

Electrophoresis:

Principle, Types and clinical applications, Agarose, PAGE and Capillary electrophoresis in detail.

UNIT V

Chromatography:

Principle, mechanisms of separation, Classification and clinical applications. Paper chromatography, TLC, HPLC, GC

Mass Spectrometry:

Principle, Instrumentation, Types and clinical applications

General Biochemistry II- Practical Syllabus

1. Chromatographic separation (paper and Thin layer)of amino acids and carbohydrates
2. Agarose gel electrophoresis of plasma protein
3. Centrifugation

Recommended books:

1. Text book of Biochemistry for medical students by DM Vasudevan
2. Tietz Fundamentals of Clinical Biochemistry

Reference book:

1. Tietz Text book of Clinical chemistry and molecular diagnostics
Clinical Chemistry and Metabolic Medicine by Martin Crook

Parasitology Theory

Objective: At the end of the semester the students should

- a) Have acquired Knowledge about the fundamentals and principles of parasitology
- b) Have knowledge of lifecycle, manifestations and laboratory diagnosis of common parasitic infections
- c) Acquire good technical skills and knowledge about the application of laboratory techniques in the diagnosis of parasitic diseases.

Unit I

- Introduction to parasitology
- Diagnostic methods in parasitology

Unit 2

- Protozoa: amoeba, flagellates , sporozoa, ciliates

Unit 3

- Nematodes: introduction to nematodes
- Ancylostoma, Ascaris, Enterobius, Trichinella, Trichuris
- Filarial nematodes

Unit 4

- Cestodes: introduction to cestodes

Unit 5

- Taenia worms, Echinococcus granulosus, Hymenolepis na

PARASITOLOGY PRACTICALS:

- Stool concentration methods
- Stool examination for ova and cysts
- Peripheral blood examination
- Special staining in parasitology

Recommended books

- a) Prof C P Baveja - Text book of Microbiology for MLT
- b) Medical Parasitology – D.R. Arora.B. Arora
- c) Prof C P Baveja – Practical Microbiology for MLT

Reference books.

- a) Ananthanarayanan & Paniker's, Text Book of Microbiology.
- b) Textbook of Medical Parasitology – Subhash Chandra Parija

General pathology, Blood Banking and Immuno haematology Theory

Objectives:

1. To acquire knowledge about basis of tissue injury, inflammation, infectious diseases, immunology and genetics.
2. To acquire knowledge about tumors.
3. To acquire knowledge about blood banking and immunohematology

UNIT I: INJURY, INFLAMMATION, INFECTION, IMMUNOLOGY.

1. Etiopathogenesis and morphology of cell injury, necrosis, apoptosis, gangrene.
2. Inflammation and types, cells of inflammation cytokines, signs of inflammation, systemic effects of inflammation.
3. Tuberculosis, leprosy, HIV –etiopathogenesis, pathology, diagnosis.
4. Hypersensitivity disorders, pathogenesis of autoimmune disorders, SLE, amyloidosis, immune deficiency disorder

UNIT II GENETICS

1. Terminologies in genetics, mutation and mutational diseases, cytogenetic disorders – Down syndrome, Turner Syndrome.
2. Diagnosis of genetic disorders – FISH, karyotyping, CGH, linkage analysis, indications and counseling for prenatal and postnatal testing.
3. Principle and applications of gene therapy.

UNIT III NEOPLASIA

1. Definition and classification of tumours.
2. Differences between benign and malignant tumours.
3. Carcinogenesis –chemical, viral
4. Molecular basis of cancer
5. Grading and staging of tumours
6. Spread of tumours and metastasis
7. Lab diagnosis of cancer-serum marker, cytology, histology, immunohistochemistry
8. Other diagnostic methods

UNIT IV BLOOD DONATION

1. Donor area –donor selection, anticoagulants used in blood banks, donor blood collection, donor adverse reaction and management.

2. Blood components –Components separation, storage, shelf life and utility of different components
3. Apheresis – Methods and application of plateletpheresis, stem cell pheresis and leukopheresis

UNIT V TRANSFUSION, BLOOD BANK MANAGEMENT

1. Transfusion reactions and investigations, Blood bank management system, organization of blood donation camps, donor motivations, hazards and protective measures

UNIT VI EQUIPMENTS

1. Equipments, instruments and reagents, blood bank refrigerator, blood irradiator, ELISA, automation in immunoematology, inverted fluorescent microscope, TACE, gel card

UNIT VII IMMUNOHEMATOLOGY

2. Blood groups, Grouping and typing, Rare blood groups, compatibility testing, Coomb's test, Incomplete antibody testing, HLA, hemolytic disease of newborn, trouble shootings in immunoematology, quality control measures.

PRACTICALS:

Objectives:

1. To understand the organisation, process, equipments of haematology and clinical pathology
2. To understand and have hands on training and perform specimen collection and processing by automation in hematology and clinical pathology
3. To understand blood bank procedures and acquire knowledge and skill to work independently.

Unit I: AUTOMATION, PHLEBOTOMY

1. Orientation to clinical pathology department and reception and sample rejection / acceptance, phlebotomy and bedside, transportation of samples, Needle stick injury protocol.
2. Phlebotomy – Anticoagulants, vacutainers, venipuncture, patient instructions
3. Microscope – parts, handling maintenance, centrifuge, laminar hood, micro slides, cover slips, test tubes, micro pipettes .
4. Hematology analyzer and display analysis for flagging
5. Coagulation analyzer
6. ESR
7. Urine automation
8. Quality control procedures – CBC, coagulation, ESR, urine
Rapid PT / INR, BM smear collection
9. LIS, HIS, interfacing, TAT, record maintenance, storage of specimens / slides, spill management, waste management

Unit II: BLOOD BANKING

1. Blood bank orientation, reception, blood Bank Management system, pre-test counseling
2. Donor selection – acceptance / rejection, Hb estimation.
3. Donor Blood Collection – couch, blood bags, blood collection monitor, labeling, crash cart, venipuncture, donor adverse reaction management.
4. Component separation – equipments, procedure, storage
5. Screening for TTI
6. Blood grouping and Rh typing discrepancies
7. Compatibility testing
8. Antibody testing
9. Coomb's test
10. Transfusion reaction work-up
11. HLA typing and Lymphocytotoxic cross match
12. Apheresis
13. Issue of blood, records and storage of records, QC procedures, licensing procedures, accreditation process,
14. Blood irradiation, leukofilters
15. Blood storage center.
16. Attend – blood donation camps - 1 minimum

Books:

1. Text book of Pathology – Harsh Mohan 7th Edition.2015
2. Basic & Applied concepts of Blood Banking and Transfusion Practices – Kathy D.Blancy 3rd Edition 2013.

Reference Books:

3. Modern Blood Banking and Transfusion Practices – Denise Harmening 6th edn 2012
4. Robbins Basic Pathology – 9th Edition 2013

RESEARCH METHODOLOGY AND BIOSTATISTICS

Learning objectives:

- Understand the relevance, basic concepts of statistics, research project, planning and execution
- Apply the concepts to clinical data in statistics, report submissions and research publications

Learning outcome:

- Understood concepts in statistics.
- Be able to utilize the bio-mathematics and biostatistics tools for applications in human health data
- Learnt how to write a research project, plan and execute a project.
- Be able to utilize the bio-mathematics and biostatistics tools for applications in human health data
- Writing a report and research publications.

UNIT I:

Introduction to Research: The hallmarks of scientific research – Building blocks of science in research – Concept of Applied and Basic research – Quantitative and Qualitative Research Techniques – Need for theoretical frame work – Hypothesis development for Quantitative and Quantitative Data, Research Design –Purpose of the study: Exploratory, Descriptive,Research Ethics, Report Writing.

UNIT II:

Data Collection Methods: Interviewing, Questionnaires, etc. Secondary sources of data collection, Guidelines for Questionnaire Design – Electronic Questionnaire Design and Surveys. Static and Dynamic panels. Measurement of variables – Scales and measurements, Developing scales – Rating scale and attitudinal scales

– Validity testing of scales – Reliability concept being developed in scales, Sampling Techniques – Probabilistic and non-probabilistic samples. Issues of Precision and Confidence in determining Sample Size, Optimal sample size. Statistical Softwares,

UNIT III:

Epidemiological Methods: Definition and scope, Health and Disease, Measures used in Epidemiology, Epidemiological Study Designs, Biases, Uses of Epidemiology, Surveillance

UNIT IV:

Laboratory Experimental Designs:Basic laboratory Designs– Completely Randomized Design, Randomized Block Designs, Latin Square Design, Incomplete Block Designs, Crossover and Factorial Designs (only applications).

UNIT V:

Biostatistical Concepts:Role of Biostatistics in Research, Descriptive Statistics, Random Variable, Expected Value and Variance,Probability Distributions-Discrete and Continuous, Correlation and Regression, Partial and Multiple Correlations, Multiple Linear Regression, Logistic Regression, Poisson Regression (only applications) **UNIT VI:**

Statistical Inference: Estimation and testing of hypothesis, Types of errors, Power, p-value, Confidence Interval, t-test, Z test, ANOVA, Chi-square and other Nonparametric tests, Multivariate methods-Factor Analysis, Principal Component and Partial Least Square, Cluster Analysis – Discriminant Analysis, Canonical correlations (only application).

Text Books:

Research Methodology

1. McBurney, DH: Research Methods, Thomson Asia Pvt. Ltd. Singapore, 2002.
2. Cooper DR and Schindler RS: Research Methods, Tata McGraw- Hill Publishing Company Limited, 2000
3. Ticehurst GW and Veal AJ: Business Research Methods, Longman, 1999.
4. Kothari CR: Research Methods: Methods and Techniques New Age International Publishers- 2004
5. Ranjit Kumar Research Methodology: A step by Step Guide to Beginners. SAGE Publishers-2014.
6. Pannerselvam R : Research Methods by. PHI Learning Pvt Ltd-2013.

Biostatistics

7. Danial WW, Biostatistics: A Foundation for Analysis of Health Sciences, John Wiley Publishers-2009
8. Kirkwood BR and Sterne JAC: Essentials of Medical Statistics , Blackwell Publishers,2003
9. Rosner B & Rosner R: Fundamentals of Biostatistics by. Cengage Learning Inc. 2010
10. Flick U. Introducing Research Methodology- A Beginners Guide to Doing a Project Sage Publishers, 2011.
11. Glantz SA: Primer of Biostatistics, McGraw Hill Publishers, 2011
12. Indrayan A: Medical Biostatistics, Chapman and Hall/CRC, 2012
13. Baldi B and Moore DS: The Practice of Statistics in Life Sciences, W.H. Freeman Publishers, 2014

HEALTHCARE MANAGEMENT

Objectives:

- To familiarise with the healthcare environment
- To understand the concepts of management with relevance to hospitals

UNIT I

Introduction – Theoretical frame work - Environment - Internal and External – Environmental

Scanning – Economic Environment – Competitive Environment – Natural Environment – Politico Legal Environment – Socio Cultural Environment - International and Technological Environment.

UNIT II

A Conceptual Approach to Understanding the Health Care Systems – Evolution – Institutional

Setting - Out Patient services – Medical Services – Surgical Services – Operating department – Pediatric services – Dental services – Psychiatric services – Casualty & Emergency services – Hospital Laboratory services – Anesthesia services – Obstetrics and Gynecology services – Neuro – Surgery service – Neurology services.

UNIT III

Overview of Health Care Sector in India – Primary care – Secondary care – Tertiary care – Rural

Medical care – urban medical care – curative care – Preventive care – General & special

Hospitals-Understanding the Hospital Management – Role of Medical, Nursing Staff, Paramedical and Supporting Staff - Health Policy - Population Policy - Drug Policy – Medical Education Policy

UNIT IV

Health Care Regulation – WHO, International Health regulations, IMA, MCI, State Medical

Council Bodies, Health universities and Teaching Hospitals and other Health care Delivery Systems

UNIT V

Epidemiology – Aims – Principles – Descriptive, Analytical and Experimental Epidemiology - Methods - Uses

REFERENCES

Seth,M.L. MACROECONOMICS, Laksminarayana Agrawal, Edu, Pub. Agra. 1996

Peter,Z & Fredrick, B. HEALTH ECONOMICS, Oxford Pub., New York, 1997

Shanmugansundaram, Y., HEALTH ECONOMICS, Oxford Pub. New York, 1997

SEMESTER III

CLINICAL BIOCHEMISTRY-I

Objectives: At the end of the semester the student should be able to

1. Acquire knowledge and perform the techniques used in clinical biochemistry
2. Acquire knowledge of the investigations done in clinical biochemistry
3. Acquire knowledge about the working of clinical biochemistry lab and quality management.

- To understand the basic concepts of molecular biology techniques

Theory syllabus

UNIT I: Sample collection:

Specimens, collection procedures, preservatives, separation, storage and transport.

Preanalytical variable and biological variations: Controllable and noncontrollable variables, biological variability.

UNIT II: Reference interval:

Terminology, Selection of reference individuals, Sampling, specimen collection, analysis, statistical analysis of data, multivariate concept.

Laboratory Information system.

UNIT III: Electrochemistry:

Principles of estimation of pH, pO₂, pCO₂, and electrolytes (Na⁺, K⁺, Cl⁻ and HCO₃⁻)

Immunoassays:

Antigen Antibody binding, types of reaction, Qualitative and quantitative immunoassays

UNIT IV: Automation:

Steps of an analytical process and their automation.

Point Of Care Testing:

Concept-analytical principle, advantages and disadvantages, clinical applications

UNIT V: Evaluation of a method:

Method selection, parametric and nonparametric statistics, basic concepts in analytical methods, analytical goals, method comparison statistics, traceability, measurement of uncertainty concept.

UNIT VI: Quality management:

Definition of quality, TQM concept, Establishment of quality goals and analytical performance limits, control of preanalytical and analytical variables, control materials, control charts- LJ chart, westgard rules, External quality assessment.

UNIT VII: Molecular biology:

Structure and functions of DNA and RNA, Outline of DNA replication, Techniques- western blot, PCR -principle and types, recombinant DNA, RFLP, FISH.

Tumor Markers:

Definition, Classification with examples, Clinical applications and lab methods for estimation of AFP, CEA, PSA, CA 125,

CLINICAL BIOCHEMISTRY-I (PRACTICAL)

Practical Syllabus:

- Standardization of Plasma Glucose, Serum urea, serum creatinine and serum protein
- Lipid profile
- S. Uric acid
- S. Calcium, phosphorous

Observation:

Functioning of automated analysers in Clinical Biochemistry lab

Recommended books:

- Text book of Biochemistry for medical students by DM Vasudevan
- Tietz Fundamentals of Clinical Biochemistry

Reference books:

- Tietz Text book of Clinical chemistry and molecular diagnostics
- Clinical Chemistry and Metabolic Medicine by Martin Crook

SYSTEMIC BACTERIOLOGY THEORY

Objective: At the end of the semester the students should

- a) Acquire knowledge about various infectious diseases and different bacteria associated with them.
- b) Have basic training to handle all clinical specimens for routine laboratory examination.

Unit I

- Pyogenic cocci (Staphylococcus, Streptococcus, pneumococcus , Neisseria)

Unit 2

- Bacteria causing respiratory infections (Corynebacterium, Bordetella, Haemophilus, mycobacterium tuberculosis)

Unit 3

- Bacteria causing Urinary tract infection (Enterobacteriaceae)
- Bacteria causing Gastroenteritis (Vibrio, shigella)

Unit 4

- Bacteria causing Sexually transmitted diseases (Treponema, chlamydiae)
- Bacteria causing Anaerobic infections (Actinomycetes, Clostridium)

Unit 5

- Bacteria causing other infections (Leptrae, Spirochetes, Rickettsiaceae, Bacillus, Brucella)

PRACTICALS:

Introduction of clinical specimen processing and Isolation and Identification of bacteria by performing staining methods, biochemical tests and antibiogram

- Dark ground microscopy

Recommended books

- a) Prof C P Baveja - Text book of Microbiology for MLT
- b) Prof C P Baveja – Practical Microbiology for MLT
- c) Satish Gupte- Text Book of Microbiology

Reference books.

- a) Ananthanarayanan & Paniker's, Text Book of Microbiology
- b) Color atlas and textbook of microbiology - Koneman
- c) Mackie & Mc-Cartney Practical medical Microbiology

SYSTEMIC PATHOLOGY AND HISTOPATHOLOGY TECHNIQUES

Objectives:

1. To acquire knowledge about relevant diseases of various systems.
2. To acquire knowledge about histopathology techniques
3. To acquire knowledge about special equipments and procedures and quality control in histopathology.

Unit I: Systemic Pathology

1. CVS – Atherosclerosis
2. RS – Pneumonia, Bronchial asthma
3. GIT, Liver – Peptic ulcer, Viral hepatitis
4. GUS – Glomerulonephritis, pyelonephritis, nephrotic syndrome
5. CNS – Meningitis
6. Endocrine – Diabetes mellitus
7. Tumours – Names of lung tumours, carcinoma stomach, CIN and carcinoma cervix, lymphoma.

Unit – II: Specimen reception & equipment

Types of specimen, specimen reception, grossing, fixation, various fixatives, tissue processing, decalcification, embedding, automated tissue processor, microtomes - types and maintenance, types of knives and blades, section cutting, mounting of labeling.

Unit – III: Stains in histopathology

Basic staining principle, H & E, stain – Manual / Automatic, PAS stain, mucin stains – Mucicarmine, alcian blue, reticulin stains, trichrome stains, stains for micro organisms – AFB, Wade Fite Faraco, GMS, stains for amyloid, stains for iron – Pearls stains, van kossa, stains for lipid, melanin bleac

Unit – IV: Special techniques

muscle biopsy, handling of hard tissue, special tissues – nervous tissue, testicular biopsy, lymph node.

Unit – V: Advanced techniques in histopathology

Microwave processing, cryostat, immunohistochemistry – Manual / Automation, museum technique, autoradiography, specimen photography, micro photography, enzyme histochemistry, immunohistochemistry – Manual / Automation and histochemistry

Seminar: 2; Journal Club: 1; Assessment: Attendance, IA tests

SYSTEMIC PATHOLOGY AND HISTOPATHOLOGY TECHNIQUES PRACTICALS

Objectives:

1. To gain knowledge and hands on training to prepare histopathology slides
2. To gain knowledge and hands on training to perform special stains in histopathology
3. To gain knowledge and hands on training to perform advanced techniques in histopathology

Sessions:

1. Specimen reception, recording, numbering, grossing
2. Preparation of fixatives, decalcification
3. Tissue processing, embedding and section cutting
4. Staining H & E, mounting
5. Special stains – PAS, Reticulin, Mucin stains, Congo red, AFB Wade Fite Faraco, GMS trichrome, Pearl's, Vonkossa, Melanin
6. Frozen sections
7. Immunofluorescence microscope and preparation of slides
8. Immunohistochemistry
9. Museum techniques – to mount 5 specimens minimum
10. Specimen photography / microphotography, molecular pathology / tissue banking

Recommended Books:

1. Text book of Pathology, Harsh Mohan, 7th Edition (2015).
2. Manual of Histological techniques and their diagnostic application – John D. Bancroft 2nd edn 2009

Reference books:

1. Robbins Basic Pathology, 9th Edition, Elsevier Publications (2013)
2. Medical Laboratory Technology, Vol. 1, and II, 6th Edition, (2009)

PATIENT CARE

Patient vital signs - temperature, pulse, respiration and blood pressure - normal values and methods of taking and recording them. Development of communication skills with patient- general comfort and reassurance to the patient-patient education and explaining about the study drugs used in the preparation of the patient. Handling of an unconscious patient shifting of patients - hazards of lifting and maneuvering patients - rules for correct lifting- transfer from chair/wheel chair or trolley to couch and vice-versa - safety of patient and worker while lifting & shifting of patients- handling of geriatric, pediatric and trauma patients - handling female patients-pregnant women. Communicable diseases - hygiene in the department-cross infection and prevention-handling of infectious patients in the department -application of asepsis.

SEMESTER IV

Clinical Biochemistry-II

Objectives: At the end of the semester the student should be able to

1. Acquire knowledge about the techniques used in clinical biochemistry
2. Acquire knowledge about the investigations done and the methods in clinical biochemistry
3. Acquire knowledge about the working of clinical biochemistry lab and quality management.

UNIT I:

Endocrinology introduction, classification, outlines of mechanism of hormone action
Methods of hormone estimation

UNIT II:

Pituitary- Introduction, hormones secreted, Investigations for dwarfism, gigantism, Pituitary adenoma, Hyperprolactemia, Diabetes insipidus

UNIT III:

Thyroid- outline of thyroid hormone synthesis, transport, regulation, investigations for hypothyroidism and hyperthyroidism.

Pancreas- outline of Insulin synthesis, Investigations for Insulinoma, diabetes mellitus, hypoglycemia

UNIT IV:

Adrenal- outline of adrenal cortical hormones synthesis and functions, Investigations for Cushing's disease, Addison's disease, Adrenal hyperplasia.

UNIT V:

Gonads-hormones secreted, functions, regulation, Investigations for amenorrhea, PCOS, male and female infertility

Pregnancy- prenatal screening for Down's syndrome, trisomy-21 and neural tube defects

UNIT VI:

Lipid profile: Lab investigations of dyslipidemia

Function tests: Liver function tests, Renal function tests

UNIT VII:

Acid base balance: Outline of pH homeostasis, classification of acid base disorders and their investigations.

Fluid analysis- cerebrospinal fluid, ascetic fluid, pleural fluid

Practical Syllabus:

1. Serum Total protein, Serum Albumin
2. Serum total bilirubin, Direct bilirubin
3. Serum enzymes- ALT, AST, ALP
4. Biological fluid- protein, glucose
5. Renal and Gall stones.
6. ELISA
7. Observation: functioning automated instruments in Clinical biochemistry lab

Dissertation work

Recommended

books:

1. Text book of Biochemistry for medical students by DM Vasudevan
2. Tietz Fundamentals of Clinical Biochemistry

Reference book:

1. Tietz Text book of Clinical chemistry and molecular diagnostics
2. Clinical Chemistry and Metabolic Medicine by Martin Crook

VIROLOGY AND MYCOLOGY

Objective: At the end of the semester the students should

- a) Have basic understanding about different medically important viruses
- b) Have theoretical and practical knowledge on fungal infections.
- c) Have basic training to handle all clinical specimens for routine laboratory examination.

Unit I

- General properties of viruses
- Laboratory diagnosis of viruses.

Unit 2

- Sexually transmitted infections(HIV, Herpes virus)
- Exanthematous infections (poxvirus, varicella zoster, Measles(rubeola), rubella)
- Zoonotic infections (Rhabdovirus, Arbovirus)
- Viral gastroenteritis (Enteroviruses, Adenovirus, Hepatitis)

Unit 3

- Viral Haemorrhagic fever (Dengue virus, Chikungunya virus)

Unit 4

- Introduction to mycology
- Laboratory diagnosis of fungi
- Dermatophytes

Unit 5

- Subcutaneous and deep mycosis

PRACTICALS:

- Virology (ELISA, PCR (demonstration), viral culture)
- mycology (KOH, LPCB, germ tube test, slide culture, media preparation)

Recommended books

- a) Prof C P Baveja - Text book of Microbiology for MLT
- b) Prof C P Baveja – Practical Microbiology for MLT
- c) Satish Gupte- Text Book of Microbiology

Reference books.

- a) Ananthanarayanan & Paniker's, Text Book of Microbiology
- b) Color atlas and textbook of microbiology - Koneman

TECHNIQUES IN CYTOLOGY

Objectives:

1. To design a project, apply for Institutional Ethics Committee, carry out the project and submit thesis.
2. To understand the Cytologic techniques and screening
3. To understand the advanced histological techniques and organisation of the lab.

nit I

Research methodology

Research methodology – Basics, institutional ethics committee, publication of article.

Unit II

Exfoliative cytology

Basis of Cytology, Exfoliative cytology – Pap smear – preparation of pap fixative, stain, staining and screening, FNAC – techniques, preparation of slides, cell block preparation, microincineration, Millipore technique

Unit – III

Advanced techniques in histology/cytology

Electron microscopy – microscope, principle, types and preparation of tissues for Electron Microscopy, Ultramicrotomy, Immunofluorescent microscopy, principle, types and preparation of tissue for Immunofluorescence, enzyme histochemistry principle and preparation of tissues.

Unit – IV

Histopathology lab management

Organisation of histopathology and cytology laboratory, Quality control measures in histopathology and cytology, storage of specimens and slides, record maintenance and softwares, trouble shootings in histopathology / cytology / Immunofluorescence / Immunohistochemistry. hazards and preventive measures.

Seminar : 1: Journal Club: 1: Assessment: Attendance, IA unit tests

PRACTICALS

Objectives:

1. To understand and have hands on experience to develop skills in performing processing of samples for cytologic examination and to perform screening of pap smears
2. To understand the procedures of FNAC to assist the procedure and perform processing
3. To carry out the thesis work, analyse the results and submit for exam.

Sessions:

Unit – I:

1. Cytologic specimens, procedures, Informed consent
2. Cytologic fixatives, stains
3. Pap smear preparation and screening
4. Fluid cytology, Cell block preparation, Millipore technique.
5. Liquid bases cytology
6. FNAC specimen processing
7. Quality control procedures and record maintenance

Unit – II:

Thesis work

Books:

1. Cytopathology Shambayati Behard, Oxford University Press, 1st Edition, 2011.

Reference Books:

1. Demay Principles and Practice of Cytopathology, edition,

DISSERTATION AND PROJECT

Learning Objectives:

- ✓ Conduct intensive search of primary and secondary sources of literature,
- ✓ Demonstrate an ability to critically evaluate the literature,
- ✓ Engage in critical thinking to advance practice thus becoming familiar with the theory and practice of initiating, undertaking and evaluating research design in areas relating to human nutrition
- ✓ Carry out research and create an information from the existing information

DISSERTATION & VIVA-VOCE

All candidates registered to undergo Medical Laboratory Technology Degree Program shall have to submit a dissertation as part of the programme. The student is required to carry out research under supervision in the chosen area, calculate sample size, collect relevant data, analyze and prepare the research report in the scientific format and present it for evaluation. Each candidate would be assigned a recognized guide at the beginning of fourth semester and the topics assigned to the candidates will be intimated to the Controller of Examinations of this university.

- Obtaining ethics clearance for the proposal is compulsory.
- The dissertation will consist of experimental work and data collection.
- The dissertation shall be in a bound volume not exceeding 150 pages (double line spacing and on oneside of A4 size paper only) excluding references.
- The dissertation should contain five chapters (Introduction, Review of Literature, Materials & Methods, Results with Discussion and Summary).
- Four hard copies and one electronic copy of dissertation shall be submitted one month prior to the commencement of the University examination to the Controller of Examination of the University.