



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

[DEEMED TO BE UNIVERSITY]

Accredited A++ Grade by NAAC | 12B Status by UGC | Approved by AICTE

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School of Allied Health Sciences

Department of Medical Laboratory Technology

1.1.2 Revised Courses & New courses Introduced in 2022 -2023

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Accredited with "A" Grade by NAAC

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ISO 9001:2015

SCHOOL OF ALLIED HEALTH SCIENCES
DEPARTMENT OF MEDICAL LABORATORY TECHNOLOGY
BOARD OF STUDIES (2022-2023)

Minutes of the Meeting

08-06-2022

1. As per the discussion made with the BOS members the following changes have been made from the Academic year 2022 - 2023 onwards. The members suggested that few lecture topics can be revised based on the need of industrial and medical field.

2. THEORY OF QUALITY MANAGEMENT & AUTOMATION

UNIT V

Introduction to Quality control, Total quality management framework, Quality laboratory processes, Quality assurance, Quality assessment, Quality control programme External quality control, Internal Quality control, Proficiency testing

UNIT VI

Current trends in laboratory accreditation, ISO certificate, Quality planning and Quality improvement

3. QUALITY LABORATORY MANAGEMENT & AUTOMATION LAB

- i. Centrifugation techniques Basic principles, procedure and working mechanism of centrifugation- different methods of centrifugation techniques (zonal, differential, density gradient and isopycnic centrifugation)- Separation of blood WBC using ficoll reagent
- ii. Chromatographic techniques- Principles and working procedures and advantages of various (Column, ion exchange, Gas -liquid, affinity, molecular- exclusion, thin layer and HPLC) chromatographic techniques

- (Adsorption and partition)– Demonstration of Paper chromatography
- iii. Electrophoretic techniques- Principles and working procedures and advantages of various electrophoresis (Gel electrophoresis (vertical, horizontal)- polyacrylamide gel electrophoresis (PAGE)-SDS and isoelectric focusing)- Demonstration of gel electrophoresis
 - iv. Molecular techniques Isolation of DNA, RNA, Plasmids, and protoplast- Demonstration of DNA extraction and quality check.
 - v. Laboratory Instruments- parts, principle, maintenance, and care of microscope, incubator, Hot air oven, Autoclave, Centrifuge, Colorimeter, Spectrophotometer, Flame photometer, Refrigerator, pH meter.
4. The above suggestions were made by the BOS members during the meeting and this come to existence from Academic year 2022 – 2023 onwards.

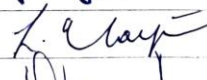
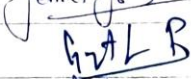
Members of Board of studies – MEDICAL LABORATORY

TECHNOLOGY

EXTERNAL MEMBERS


 a. Dr. **S. KANNAN** M.D., D.Diab.,
 Medical Superintendent,
 Sathyabama Dental College & General Hospital,
 Chennai.

INTERNAL MEMBERS

S. No	Name of the Internal Member	Signature
1	Dr. J. Premkumar, HoD	
2	Dr. L. Inbathamizh	
3	Dr. Danial Alex Anand	
4	Dr. James John	
5	Dr. Gayathri. P	
6	Ms. D. Jasmine Priya	

SAMA1504 (Revised)	THEORY OF QUALITY MANAGEMENT & AUTOMATION	L	T		P	Credits	Total Marks
		4	0		0	4	100

Course Objectives:

- To introduce the concept of quality management
- To apply the significances of analysers in automation

UNIT I

Automation - Introduction, meaning, advantages, history

UNIT II

Continuous flow analysers, Single channel continuous flow analysers-advantages, disadvantages

UNIT III

Multi-channel flow analysers, discrete auto analysers - basic features, types, semi-automated, fully automated Batch analysers

UNIT IV

Random access analysers (RAA), Component steps in fully automated analysers, Auto analysers based on immunoassay techniques

UNIT V

Introduction to Quality control, Total quality management framework, Quality laboratory processes, Quality assurance, Quality assessment, Quality control programme External quality control, Internal Quality control, Proficiency testing

UNIT VI

Centrifugal analysers, ASCA, Dry chemistry analysers, Dimension RxL clinical chemistry system, The Heterogeneous Immunoassay module components, Beckman Array 360system, Mini Vidas analysers

UNIT VII

Current trends in laboratory accreditation, ISO certificate, Quality planning and Quality improvement

UNIT VIII

Biochips, Lab on a chip (LoC), Nano sensors - advantages and disadvantages, PCR & its applications.

Course Outcomes

On completion of the course, students will be able to

CO1 Understand the principles of automation.

CO2 Identify role of automation in flow analysers.

CO3 Recognise the types of analysers and their significance.

CO4 Apply the theoretical understanding to practical usage.

CO5 Recognise the latest trends and quality practices.

CO6 Bridge the gap between clinical and industry in theory and practice of automation.

Reference Books

1. Laboratory management – Quality in Laboratory diagnosis – Candis A Kinkus, Demos medical publishers, 2011
2. Quality control in Laboratory – Gaffar Sarwar Zamman, Intech open publishers, 2011
3. Clinical Diagnosis and Management by Laboratory Methods, Henry 23rd edition, 2016

Added Content

SAMA2504 (Old)	QUALITY LABORATORY MANAGEMENT & AUTOMATION	L	T	P	Credits	Total Marks
		0	0	3	3	100

Course Objectives:

- To understand the basic quality laboratory processes
- To apply the quality control tools

List of Experiments

1. Introduction to Quality control
2. Total quality management framework
3. Quality laboratory processes, Quality assurance, Quality assessment, Quality control, Quality planning and Quality improvement
4. Costs of conformance and nonconformance, appraisal costs, prevention costs
5. Internal quality control, basic steps, sources of error and their correction methods, CAPA - corrective action & preventive action
6. Sources of variation in laboratory results
7. Quality control charts, Levy- Jennings and Cusum charts
8. External quality control
9. Quality control programme, intrinsic and extrinsic and random errors
10. Current trends in laboratory accreditation, ISO certificate, and West guard Rules
11. Demonstration of various methods of quality control

Course Outcomes

On completion of the course, students will be able to

- CO1 Understand the basics of Quality control.
- CO2 Demonstrate the needs of Quality assurance and Quality management
- CO3 Acquire the knowledge about costs and errors involved
- CO4 Explore internal and external quality control
- CO5 Analyze the current trends in laboratory accreditation
- CO6 Apply the methods and tools of Quality control in laboratory



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SAMA2504 (Revised)	QUALITY LABORATORY MANAGEMENT & AUTOMATION	L	T	P	Credits	Total Marks
		0	0	3	3	100

Course Objectives:

- To understand the basic quality laboratory processes
- To apply the quality control tools

List of Experiments

1. Demonstration of various methods of quality control- Preparation of Quality control charts, Levy- Jennings and Cusum charts and westgard rules Westgard Rules to verify trends, biases, or errors in quality controls
2. Demonstration of various methods of quality control- Westgard Rules to verify trends, biases, or errors in quality controls
3. Sources of error, variation, and their correction methods, CAPA - corrective action & preventive action, Intrinsic and extrinsic and random errors
4. Centrifugation techniques Basic principles, procedure and working mechanism of centrifugation- different methods of centrifugation techniques (zonal, differential, density gradient and isopycnic centrifugation)- Separation of blood WBC using fycoll reagent
5. Chromatographic techniques- Principles and working procedures and advantages of various (Column, ion exchange, Gas-liquid, affinity, molecular- exclusion, thin layer and HPLC) chromatographic techniques (Adsorption and partition)- Demonstration of Paper chromatography
6. Electrophoretic techniques- Principles and working procedures and advantages of various electrophoresis (Gel electrophoresis (vertical, horizontal)- polyacrylamide gel electrophoresis (PAGE)-SDS and isoelectric focussing)- Demonstration of gel electrophoresis
7. Molecular techniques Isolation of DNA, RNA, Plasmids, and protoplast- Demonstration of DNA extraction and quality check.
8. Laboratory Instruments- parts, principle, maintenance, and care of microscope. microscope, incubator, Hot air oven, Autoclave, Centrifuge, Colorimeter, Spectrophotometer, Flame photometer, Refrigerator, pH meter

Course Outcomes

On completion of the course, students will be able to

- CO1 Understand the basics of Quality control.
- CO2 Demonstrate the needs of Quality assurance and Quality management
- CO3 Acquire the knowledge about costs and errors involved
- CO4 Explore internal and external quality control
- CO5 Analyze the current trends in laboratory accreditation
- CO6 Apply the methods and tools of Quality control in laboratory

Added Content

SAMA1501	HISTOPATHOLOGY & CYTOLOGY TECHNIQUES	L	T	P	Credits	Total marks
		4	0	0	5	100

Course Objectives:

- To be able to fix, process, embed tissues and make sections for micro section studies
- To be competent to make routine cytological preparation

UNIT I Introduction to Histopathology and Cytopathology Techniques – Basic concepts and principles. Applications

UNIT II Reception of specimens– Criteria, Requisites, Container, Identity, Labeling, Rejection

UNIT III Tissue processing- Micro techniques I

Basic steps, Fixing – Types of fixatives, Factors, Dehydration, Embedding

UNIT IV Micro techniques II

Microtomy, Staining, Mounting, Methods of decalcifications

UNIT V Equipment

Microscope, Microtome -Types, Uses, Parts, different types of microtome knives, care and maintenance, Automated tissue processor- components, working and precautions during use, Tissue floating bath

UNIT VI Staining

Hematoxylin and Eosin staining, preparation of hematoxylin and eosin stains, Reticulin stain, PAP staining- components and methods.

UNIT VII Cytology

Introduction to FNAC and Exfoliative cytology, Processing of fluids- Sputum, bronchial aspirates, bronchial washings, gastric washings, Urine and other watery fluids, Cerebrospinal fluid

UNIT VIII Museum techniques

The mounting of pathological specimens - Introduction., Preparation of specimen, Fixation of specimen- Kaiserling solution- 1 and Kaiserlingsolution-2, Precaution taken for the Fixation of Specimens, Storage of Specimens, Mounting of MuseumSpecimens, Filling and Scaling

Course Outcomes:

On completion of the course, student will be able to

CO1 Identify the basic structure of cells, tissues and organs and describe their contribution to normal function.

CO2 Interpret light- and electron-microscopic histologic images and identify the tissue source and structures.

CO3 Demonstrate common histology procedures such as embedding tissue in paraffin, tissue sectioning and mounting, or routine staining of tissue sections

CO4 Describe common histology laboratory procedures used to prepare stained slides from tissue samples.

CO5 Outline the principles of histochemistry and types of microscopy utilized in histology

CO6 Understand professional procedures in museum display, collections, care and preservation

Reference books

1. Bancroft's Theory and Practice of Histological Techniques by John D Bancraft /Edition 8 (2018)
2. Handbook of Histopathological and Histochemical Techniques: Including Museum Techniques / edition 3 (1974) by C. F. A. Culling
3. Hand book of Medical laboratory technology, 2nd edition by Robert H Carman, Christian Medical Association of India (publishers)
4. Textbook of Medical Laboratory Technology/ edition 3 (2020) by Godkar P.B

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

SAMA1502	SYSTEMIC BACTERIOLOGY, MYCOLOGY & VIROLOGY	L	T	P	Credits	Total marks
		4	0	0	5	100

Course Objectives:

- To describe about the important medically important bacteria its mode of disease transmission, pathogenesis, diagnosis, prophylaxis and treatment.
- To aims at understanding important medically important virus and fungi its mode of disease transmission, pathogenesis, diagnostic method and treatment.

UNIT I Cocci and Acid fast bacillus

Systematic Bacteriology - Staphylococcus, Streptococci, Neisseria, Corynebacterium and related organisms. Mycobacterium typical and atypical. Aerobic pathogenic Actinomycetes

UNIT II Enterobacteriaceae

Vibrios, Helicobacter Pseudomonas, Brucella, Haemophilus, Bordetella. Enterobacteriaceae, Salmonella, Shigella, Proteus, Escherichia, Klebsiella

UNIT III Bacilli and Spirochetes

Bacillus, B. anthracis Clostridia, Mycoplasma, Rickettsia, Spirochetes, Treponema, Leptospira and Borrelia.

UNIT IV Laboratory diagnosis is bacterial pathogens

Recommendation for collection, transport of specimens, isolation of bacteria from clinical specimens. Primary media for isolation and their quality control - Antibiotic sensitivity discs, testing procedures and their quality control.

UNIT V Superficial and opportunistic mycoses

Introduction to Mycology, Dermatophytes and agents of superficial mycoses, Trichophyton, Epidermophyton and Microsporum. Opportunistic mycoses, Candidiasis, Cryptococcosis, Aspergillosis,

UNIT VI Subcutaneous and systemic mycoses

Systemic mycoses Histoplasmosis, Coccidioidomycosis, Blastomycosis. Subcutaneous mycoses, Mycetoma, Morphology, cultural characteristics, pathogenesis/disease caused & lab diagnosis.

UNIT VII Medical importance of DNA Virus

Introduction to Virology General characteristics of virus, Classification of virus, Pox, Herpes, Hepatitis B virus, Adeno virus

UNIT VIII Medical importance of RNA Virus

Orthomyxovirus, paramyxovirus, Adenovirus, Arbovirus, HIV, Rabies, Morphology, cultural characteristics, pathogenesis/disease caused & lab diagnosis.

Course Outcomes:

On completion of the course, students will be able to

- CO1** Understand basic bacterial structure and staining.
- CO2** Learn an overview of medically important bacterial families like Enterobacteriaceae
- CO3** Familiarize with bacilli and spirochetes
- CO4** Understand laboratory diagnosis of bacterial pathogens
- CO5** Learn about superficial, systemic and opportunistic mycoses.
- CO6** Learn and understand diagnosis of medically important viruses

Text / Reference Books

- David Greenwood, Richard CD., Slack, John Forrest Peutherer. (1992). Medical Microbiology. 16th edition. ELBS with Churchill Livingstone.
- Ananthanarayan, R. and JeyaramPaniker, C.K. (1994) Text Book of Microbiology, 6th Edn. Orient Longman, Chennai.
- Alexopoulos CJ and C W. Mims.(1993).Introductory Mycology (3rd edition) Wiley Eastern Ltd, New Delhi.
- Jagdish Chander (1996) A Text Book of Medical Mycology. Interprint, New Delhi.
- Jewetz, E., Melnic, J.L. and Adelberg, E.A. (2000) Review of Medical Microbiology, 19th Edn. Lange Medical Publications, U.S.A
- Topley & Wilson's. (1990) Principles of Bacteriology, Virology and Immunity, VIII edition, Vol. III Bacterial Diseases, Edward Arnold, London.

SAMA1503	COAGULATION STUDIES	L	T	P	Credits	Total marks
		4	0	0	5	100

Course Objectives:

- To understand the mechanism and factors involved in coagulation
- To apply the concepts of coagulation in analyzing the associated disorders

UNIT I

Hemostasis - Definition, Basic concept and principle, Basic steps involved in Hemostasis.

UNIT II

Coagulation - Basic Physiology, coagulation factors, Mechanism of blood coagulation, Extrinsic Pathway, Intrinsic Pathway

UNIT III

Regulators of blood coagulation – Factors, Regulation, Clinical Significance

UNIT IV

Blood coagulation tests I, Bleeding Time, Duke's method, Clotting Time- Capillary tube method & Lee white's method.

UNIT V

Blood coagulation tests II - PT, aPTT, TT, Clot retraction time, Determination of fibrinogen.

UNIT VI

Quality Assurance for routine Hemostasis Laboratory - Introduction, Sample collection technique (Phlebotomy, Sample preparation, Anticoagulant used, Importance of use of Sodium

UNIT VII

Bleeding disorders I: Coagulation factor deficiencies – congenital, acquired Fibrinolytic defects

UNIT VIII

Bleeding disorders II: Vascular disorders, Platelet disorders

Course Outcomes:

On completion of the course, students will be able to

CO1 Understand the physiological and biomechanical aspects of coagulation.

CO2 Identify factors and pathways of blood coagulation.

CO3 Recognize the regulators and clinical significance of coagulation. **CO4** Apply the various coagulation tests in diagnostic and clinical services. **CO5** Appreciate the need of quality practices.

CO6 Understand pathophysiology and management of coagulation disorders.

Text / Reference Books

1. RamnikSood, Concise Book of Medical Laboratory Technology (Methods and interpretation), 2nd Ed., N.A.Publishers, 2015
2. Satish Gupta Short text book of Medical Laboratory for technician J.P. Bros, New Delhi, 2014
3. Shirley Mitchell Lewis, Barbara J. Bain , Imelda Bates (2006) Dacie And Lewis Practical Haematology, 10th Ed, Churchill Livingstone/Elsevier.
4. Barbara A. Brown (2008) Hematology: principles and procedures 6th Ed Lea & Febiger.
5. Bernadette F. Rodak , George A. Fritsma , Kathryn Doig (2007) Hematology: Clinical Principles and Applications 3rd Ed, Elsevier Health Sciences.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

PART A: 10 Questions – 2 marks each – No choice

PART B: Short Answers – 5 Questions 8 marks each – 5 out of 8

PART C: Long Answers – 2 Questions 20 marks each – 2 out 3

Exam Duration: 3Hrs

20 Marks

40 Marks

40 Marks

SAMA2501	HISTOPATHOLOGY & CYTOLOGY LAB	L	T	P	Credits	Total marks
		0	0	3	3	100

Course Objectives:

- To learn the basic histological and cytological procedures
- To understand the diagnostic applications of histological and cytological methods

List of Experiments

1. Hematoxylin and Eosin staining
2. PAP staining
3. Embedding
4. Microtome: Uses, care and parts
5. PAS stain
6. Pearls stain
7. Reticulin stain
8. Giemsa stain

Course Outcomes

On completion of the course, students will be able to

- C01** Demonstrate proficiency and expertise in the proper use of the light microscope in examining histological specimens on glass slides
- C02** Understand the basic concepts of tissue fixation, dehydration, embedding, sectioning, staining and mounting of slides for histological examination, immunofluorescent staining and electron microscopy
- C03** Differentiate the characteristics of tissues of the body (epithelium, connective, muscle, nerve) and their relationships in the various organ systems of the human body
- C04** Identify the histological features of selected tissues/organ systems resulting from disease processes
- C05** Examine how certain diseases can be diagnosed using histological and cytological methods
- C06** Demonstrate common histology procedures such as embedding tissue in paraffin, tissue sectioning and mounting, or routine staining of tissue sections

SAMA2502	MEDICAL MICROBIOLOGY LAB	L	T	P	Credits	Total marks
		0	0	3	3	100

Course Objectives:

- To learn the basic procedures in handling clinical specimens
- To apply microbial techniques in the identification of pathogens

List of Experiments

1. General requirements of collections, transport of clinical Specimens
2. Methods of enriched, selective and enrichment culture techniques used to isolate organisms from clinical materials.
3. Simple, differential and special staining of clinical materials viz: Throat swab, Pus, Urine, Sputum, Stool etc.
4. Enumeration of Bacteria in Urine, Quantitative Urine Culture.
5. Isolation and identification of bacterial pathogens from clinical specimens their biochemical reactions.
6. Antimicrobial Sensitivity testing by disc-diffusion technique
7. KOH and Lacto phenol preparations for skin scrapings for dermatophytes.
8. Microscopic identification and cultural characteristics of medically important fungi, Candida, germ tube test
9. Identification of pathogenic viruses in Slides/ Smears / Spotters

Course Outcomes

On completion of the course, students will be able to

- C01** Analyze fundamental approaches for processing of clinical specimens
C02 Demonstrate about the techniques employed for enrichment of microbes
C03 Describe about the various staining procedures adopted to differentiate various group of microbes
C04 Enumerate the technique to isolate and estimate the microbes in urine sample
C05 Explore the identification of medically important fungi
C06 Acquire the knowledge about different morphology of bacteria, fungi and parasites

SAMA2503	COAGULATION STUDIES LAB	L	T	P	Credits	Total marks
		0	0	3	3	100

Course Objectives:

- To learn the basic procedures in coagulation studies
- To apply techniques in the storage and handling of blood specimens

List of Experiments

1. Precautions to prevent hemolysis
2. Storage of blood specimens
3. Bleeding time & clotting time estimation
4. Prothrombin time estimation
5. A PTT (activated partial thromboplastin time) estimation.
6. Clot retraction time.

Course Outcomes

On completion of the course, students will be able to

CO1 Enumerate the precautions during the coagulation procedures

CO2 Demonstrate about the techniques employed for storage of blood specimens

CO3 Estimate different time required for coagulation studies **CO4** Analyze fundamental approaches in coagulation studies **CO5**

Explore the role of clotting factors

CO6 Acquire the knowledge about application of coagulation studies

S737AIT	INTERNSHIP	L	T	P	Credits	Total marks
		0	0	8	16	100

A candidate has to undergo a stipulated period of internship in a hospital attached with medical laboratory.