MAGANBHAI G. PATEL (ADENWALA) INSTITUTE OF MEDICAL TECHNOLOGY

Post Graduate Diploma in Medical Laboratory Technology- PGDMLT

RATIONAL

The institute of Medical Technology under the Faculty of Paramedical Science of MAM university has been named as MAGANBHAI G. PATEL (ADENWALA) INSTITUTE OF MEDICAL TECHNOLOGY. It is princely managed by Mahagujarat Medical Society, Nadiad and had been established at Sheth H. J. Mahagujarat Hospital Nadiad to provide training to candidates desiring to work as medical technicians in hospitals, medical laboratories and medical centers. Role of laboratory in saving lives in undoubted. Laboratory diagnosis is helpful in differentiating functional from organic and idiopathic from non-idiopathic medical disorders.

The institute provides unique opportunity to candidates desirous to get trained in medical laboratory techniques. It is expected that the person who has undergone this training course in this institute would be able to work as an efficient technician in a laboratory. Urban as well as rural population in India is health conscious now a day. The techniques of research and analysis in various medical branches are developing very rapidly, hence scope for a well-trained medical technician is very bright.

ABOUT THE COURSE

The institute runs two types of MLT courses:

(A) Post Graduate Diploma in Medical Laboratory Technology- PGDMLT course with 40 seats intake.

(B) Diploma in Medical Laboratory Technology - DMLT course with 20 seats intake

ELIGIBILITY FOR ADMISSION

A candidate must have passed B.Sc. (Chemistry, Biotechnology, Biology, Botany, Microbiology, and Biochemistry, Zoology or any of the stream of the biological sciences (B-group) from an accredited institution/university with minimum 40% or above.

Admissions would generally be on merits as evidenced by marks obtained in the qualifying examination or as per the merit list prepared by the institute.

Preference shall be given to those who have microbiology or Biochemistry as the main subject in the degree examination.

APPLICATION FORMS

Application forms can be obtained from the Office of MAM University or at the Maganbhai G. Patel (Adenwala) Institute of Medical Technology, Mahagujarat Hospital campus, Nadiad, personally between 10-00 A.M. to 5-00 P.M. on week days. Application form is also available on the website of our university (https://mamuni.edu.in)

FEES

(A) PGDMLT course – 25000 Rs. /course. (One year and three months course)

(B) DMLT course – 40,000/- Rs. / course (Two year course)

MEDIUM OF INSTRUCTION

The medium of instruction in the Institute shall be English.

COURSE DURATION

One Year Three Months (Full Time) including three months internship in any reputed medical pathology lab/blood bank

Course comprises of regular lectures, practicals and demonstrations including internship.

Seminars will be arranged periodically where students will be encouraged to participate. Arrangement will be made to invite visiting faculty members to deliver talks from time to time on various subjects.

WORKING HOURS

Working hours of the Institute are form 8-00 morning to 12-00 noon and from 2-00 P.M. to 5-00 P.M.

STRUCTURE OF THE COURSE

Total number of papers: 06

THEORY: 3 papers

PRACTICAL: 3 papers

EVALUATION

Internal Examination and Final External Examination for all the papers shall be considered as the base of evaluation.

- Compulsory internal examination will be conducted every six months.
- The Two internal theory examinations shall be of 50 marks for all three papers with duration of TWO hours
- Internal component of 30 marks derived from the sum of two internal examinations [100], attendance & assignment in the class [10] and Seminar [10].
  [Formula: 100+10+10=120/4=30]
- Internal Practical examination shall be of 50 marks for all subjects.
- Final External Theory Examination shall be of 70 marks for all three papers will be held at the end of the course by MAM University.
- Final External Practical examination shall be of 50 marks for all subjects.
- Final class shall be awarded on the basis of Total 600 marks comprising of 300 marks of Final Theory External Examination and 300 marks of Final practical exam marks.
- Final Theory External Examination marks comprising 70 marks + 30 marks of internal component means 100 theory marks per subject. For 3 subjects it makes 300 marks.
- Internal practical examination 50 + External Practical examination marks 50 per subject means 100 marks of practical exam per subject. For 3 subjects it makes 300 marks.

Course Structure & PATTERN OF FINAL EXAMINATION: PGDMLT

Sr.no.	Course code / no.	Subject title	Theory/ Practical	Annual exam duration in Int /Ext exam in hrs.	Marking Scheme		
					Int. Total/ Mini	Ext. Total/ Mini	Total Total/ Mini
1.	MLT-101	Blood Banking, Hematology, serology and Instrumentation	Theory	1.5/ 3	30/12	70/28	100/40
2.	MLT-102	Clinical Biochemistry and Instrumentation	Theory	1.5/ 3	30/12	70/28	100/40
3.	MLT-103	Medical microbiology, Histopathology and instrumentation	Theory	1.5/ 3	30/12	70/28	100/40
4.	MLT-101	Blood Banking, Hematology, Serology and Instrumentation	Practical	3 hrs	50/20	50/20	100/40
5.	MLT-102	Clinical Biochemistry and Instrumentation	Practical	3 hrs	50/20	50/20	100/40
6.	MLT-103	Medical microbiology, Histopathology and instrumentation	Practical	3 hrs	50/20	50/20	100/40

NATURE OF QUESTION PAPER (THEORY)

- The External theory examination shall have the question paper of 70 marks and of 03 hours duration, for each subject.
- Theory examination for three subjects shall be conducted on three separate days.
- The question paper shall be of following nature /format

Sr. No	Type of question	Marks
1	Objective type question Multiple Choice Type-10 True / False Type – 10 or Fill up the blanks	20
2	Descriptive Questions (1 out of 2)	15
3	Descriptive Questions (1 out of 2)	15
4	Short Notes (5 out of 6)	20

- The External Practical Examination shall have the question paper of 50 marks and of 03 hours duration, for each subject.
- The External Practical Examination paper shall be of following nature /format
- The External Practical Examination shall be conducted by External & Internal examiner appointed by the University. of following nature /format
- Practical examination for three subjects will be conducted on three different days.

Sr. No	Type of question	Marks
1	Practical protocol writing	15
2	Performance of given Practical	15
3	Spotting of Scientific Specimen	10
4	Viva	10

PASSING CRITERIA

Students getting more than 40% marks separately in each theory and practical will be declared to have passed the examination.

Class shall be awarded as follows

- First class with Distinction - 75% & above
- First class - 60% to 74.9%
- Second Class - 50% to 59.9%

SUPPLEMENTARY EXAMINATION

Candidate failing may appear in supplementary examination to be held after 6 months. Candidates appearing in supplementary examination will have to pay examination fee.

GENERAL RULES

Students will have to follow the rules framed by the institute/university from time to time. They will have to be punctual in their attendance and will have to maintain a Journal for keeping record of the practicals performed. Minimum 75% attendance will be necessary for appearing in final examination.

LABORATORY RULES

All students will be required to wear a white apron of their own (Lab-coat) during the practicals. All breakage/damages must be reported immediately to the Director of the Institute and the cost will have to be paid for within 15 days.

HOSTEL

Presently the Institute has hostel facilities for boys and girls separately with all kind of amenities.

Post Graduate Diploma in Medical Laboratory Technology- PGDMLT course

SYLLABUS

MLT – 101 Blood Banking, Hematology, Serology and Instrumentation

A: Outline of course

Sr. No.	Title of Unit	Hours
1.	**Unit-A** Blood Banking	50
2.	**Unit-B** Hematology	60
3.	**Unit-C** Serology	60
4.	**Unit-D** Instrumentation	40

B. Detailed syllabus

Sr. No.	Detailed syllabus	Total hrs. 210
	Unit-A	**Hours**
	ABO System, antigens, sub-groups of A, Bombay-O, Antibodies of ABO System. Nature of antibodies, Anti A, Anti B and Anti H, ABO testing, slide and tube test. Reverse grouping, Discrepancies between cell and serum result, sources of error, Rouleaux formation and methods of checking this.	50

Rh system Nomenclature, D" system and its significance. Nature of Rh antibodies. Clinical significance, phenotype and genotype. Rh grouping tests. Slide or rapid tube test. False positive and false negative results.

Cross matching of Blood, Principles, Reasons for Cross- match. Saline, albumin, coomb's serum in testing. Major and minor cross matching. Labelling of tubes, methodology, and legal implication incompatible cross match. Autoantibodies, plasma expanders, multiple myeloma etc. affecting a cross- match. Difficulties in cross-matching, and methods of investigation.

Anticoagulants for blood preservation - ACD, ACD-A, CPD, Herparin Advantages and Disadvantages. Shelf life of Blood, changes taking place in blood on storage, Na, K etc.

Reception of donors, indirect questioning of eliciting medical history. Types of donors, Rejection of donors in certain diseases and test done on donor's blood for safe transfusion of blood. Technique and importance of sterile technique in drawing blood.

Various donor reactions and their remedies. Facts of blood donation, precautions and care to be taken during and after blood donation. Need of giving refreshments to the donor, Emergency kit.

Demonstration of coombs test direct and indirect. Principle, explanation of procedure and sources of error, control, interpretation and clinical application. Different types of coomb's sera reactions.

Transfusion of blood, handling of transfusion reactions in blood banks.

Hemolytic disease of the new born due to Rh or ABO incompatibility. Mechanism of the disease, blood for exchange transfusion and tests done on cord blood.

Other blood group systems-Kell, Kidd, Lewis, Duffy, MNSs and its importance, H.L.A. system.

Antibody titrations, reasons and methodology.

Blood component therapy.

	Unit-B	
	E.S.R.: Principles-normal range and interpretation, various Methods, Demonstration. . **Hemoglobin**-structure in detail, Hemoglobin-formation, fate and functions; Normal range, physiological and pathological variations formation of normal and abnormal Hemoglobins, Estimation of Hb by various methods. Hb. electrophoresis test. Iron metabolism. Interpretation of **TCL** & **DLC,** Hemocytometer and RBCs, WBCs counting. Leukocytosis; Physiological and Pathological. Arneth and Schilling counts, Leukopenia, eosinophilia, Lymphocytosis. Principle, interpretations and demonstrations of **Reticulocyte** count and Eosinophil count various methods. The **Hematocrit**-macro and micro methods; Hematocrit ratio to Hb. Erythrocytic indices, Interpretation, Demonstration of micro hematocrit. **Hematopoietic system** (Origin, formation and fate of Blood cells. theories of Blood cell formation, Bone Marrow sites). Maturation of Blood cells-myeloid series. Maturation of Blood cells-lymphocyte, monocytic series and megakaryocytic series. Maturation of Erythrocytic series-Normoblastic and megaloblastic maturation. **Theory of Blood coagulation (Cascade Theory)**, Factors involved in Extrinsic and intrinsic pathway, Cascade theory. Various simple tests used in coagulation. a. Bleeding time -Duke and Ivy method b. Coagulation time -Lee and white, Capillary and slide method. c. Prothrombin time -1 stage and 2 stage. d. Clot Retraction e. Platelet Count f. Thrombin time g. Partial Thromboplastin time h. F.D.P. **Anemia,** Classification of anemias, Morphological(microcytic, normocytic, macrocytic) and patho physiological(due to blood loss, due to impaired red cell production, hemolytic anemia) of R.B.C., hypochromia, anisocytosis, polychromasia, Cabot rings, Basophilic Stippling, Reticulocyte, Poikilocytosis, myelofibrosis, Polycythemia, Iron Deficiency anemia, sickle cell anemia, enzyme deficiency anemia	60

	(G6PD, pyruvate kinase), Thalassemia, sideroblastic anemia, Aplastic anemia, pernicious anemia spherocytic anemia, eliptocytosis, megaloblastic anemia and laboratory findings **Hemolytic anemias** classification, Intra and extra corpuscular, Hereditary hemolytic anemia (Congenital anemias), Acquired hemolytic anemias (PNH, Drug induced, Haemoglobinopathies), **Leukemia**-acute and chronic. Gen lab findings, **Purpuras (**Non thrombopenic and thrombopenic) and Hemorrhagic disease, Hemophilia, osmotic fragility. Demonstration of **Bone marrow** pictures, Bone marrow aspiration, Staining and differential count and reporting.	
	Unit-c	
	Immunity: Definition of Immunity and the immune system of the body, immune responses, Basic structure, types and biological properties of **immunoglobulins**, complement. Basic aspects of the immune response, (a) Humoral division (b) Cellular division. Antigens and haptens, types of antigen. Types of immunization, heterophilic antigens, alloantigen. Methods of detection and measurement of antibody and antigen **(Precipitation, Agglutination).** **Precipitation:-** Types of precipitation reactions (**Precipitation in liquid**, (Ring test, Slide test, Tube test). **Precipitation in gel** Single diffusion in single dimension (oudin test), Single diffusion in double dimension (Immunodiffusion), double diffusion in single dimension (Oakley Fulthrope techniques), double diffusion in double dimension (Ouchterlony technique). **precipitation in agar in electric field** (Immuno electrophoresis, Counter electrophoresis. Rocket electrophoresis) **Agglutination:** - Active or Direct agglutination (Slide, tube, heterophillic, antiglobulin Coomb's agglutination) and Passive or indirect or using RBC as carriers (Coated RBC), Latex coated particles, Bentonite, agglutination (Latex, Hemeagglutination, and Coaggulation), Antigen-antibody titration, prozone reaction, febrile agglutinins. **Complement fixation test** and Wasserman reaction -principle; Immunofluorescence test.	60

	Pregnancy test (including the historical background and Bioassay), ASO, CRP, RF and autoimmune disorder, widal. Syphilitic serology-Kahn, VDRL,(Wassermann's test, TPI, TPHA, FTA, RPR) Immune fluorescence test. Fluorescent labelled antibody, anti-nuclear antibody or immunofluorescence tests for L.E. techniques, **EIISA and RIA-principle**; Auto-Immunity, auto-immune disease, LE cell. Organ transplantation.	
	Unit-D	
	Different microscopy, Centrifuge, Magnetic stirrer, Vortex mixer, Electrophoresis water Bath Colorimeter and Spectrophotometer, Flame Photometer.	40

C. Reference Text Books:

Medical Laboratory Technology Vol 1, 2, 3: K. Mukherjee

Medical Laboratory Technology: Godkar

Pathology: Harsh Mohan

Practical Hematology: Dacie Louis, Elsevier

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MLT- 102 Clinical Biochemistry

A. Outline of course

Sr. No.	Title of the Unit	Hours
	Unit – A	Total 195 hrs.
	Revision of Basic concept in clinical Biochemistry, Bio-molecules and its analytical methods in clinical pathology	05
	(a) Carbohydrate	20
	(b) Protein	20
	(c) Enzymes	20
	(d) Lipid	15
	(e) Nucleic acid	05
	(f) Minerals	03
	(g) Function tests	10
(a)	**Unit-B**	
	Principal in brief of the various methodologies. Spectrophotometry, Chromatography, Electrophoresis, ELISA, RIA, GC, HPLC, POCT	57
(b)	Urine analysis, Function tests, Semen and CSF sample analysis	40

B. Detailed syllabus:

Sr.No.	Detailed syllabus	Hours
	Unit – A	
	Revision of Basic concept in clinical Biochemistry, atomic and molecular symbols and formulae various types of solutions, Molar, Normal definitions and calculations/various types of chemicals, Acid, Base, pH, Indicators, Buffers. Electrolyte. Primary and secondary standards.	05

(a)	Brief revision of biochemistry Carbohydrate, Classification, properties, biochemical importance, Brief revision of glycolysis, TCA, Regulation of blood sugar, GTT, and diabetes. Benedict's test, Fehling's test, Dipstick method, GOD, POD, Hexokinase method. GTT metabolism and ketosis, glycogen storage disorder, pentose urea, mucopolysaccharide and other carbohydrate metabolic disorders.	20
(b)	Brief revision of biochemistry of Protein, Introduction and definition , importance, structure of protein primary, secondary, tertiary, quaternary. Types of proteins, albumin, globulin, immunoglobulin, lipoproteins, enzymes, acetophase protein, transport protein, coagulation factors. Role of protein in MLT testing Disorders: Amino acid, melanin, Indian PKU, Homogentisic acid. Demonstration of technique for Protein test and assay: Total protein, Albumin test, Globulin test, SGOT, SGPT, Protein Electrophoresis, ELISA. Protein free filtrate. Clinical significance in abnormalities and conclusions.	20
(c)	Brief revision of biochemistry of Lipid , metabolism and estimation, (a) cholesterol, (b) HDL-Cholesterol, (c) Triglycerides, (d) total Lipids. Various estimation, clinical significance of lipid. GPO method, CE/CO method, PTA method, Phosphoveniline method.	20
(d)	Brief revision of biochemistry of Enzyme, types of enzymes, factors affecting enzymes activity, Enzyme Unit of measurement, enzyme regulation, enzyme assay, Amylase caraway's method, ALKP/PNP method and Acid phosphatase method	15
(e)	Brief revision of biochemistry of nucleic acid, Molecular biological concept of DNA and RNA structure	05
(f)	Hormones : Brief Understanding of Thyroid function test T3, T4, TSH, CPK, VMA, Cortisol, Estrogen, Progesterone, other Hormones	03
(g)	Minerals ; Urine Ca+2, Phosphorus and its metabolism Arsenazo method for estimation	10
(a)	**Unit-B** Principal in brief of the various methodologies. Spectrophotometry, Chromatography, Electrophoresis, ELISA, RIA, GC, HPLC, POCT	57

(b)	**Urine Analysis**: Bile pigments and urobilinogen in urine, principle and various methods, demonstration of Harrison's spot test, metabolism of bile pigments, interpretation. Watson's semiquatitative test and tests; for porphobilinogen, demonstration of techniques. Ketone bodies in urine-Principles and interpretation; demonstration of techniques. Porphyrin in urine-various tests, clinical significance, demonstration of techniques. Occult blood in urine-principles, various methods; sources of error; demonstration of technique. Principle of tests for glucose in urine-various methods. Urine calcium, reasons for formation; clinical significance; 24 hours tests for urinary Calcium (Sulkowitch) and chloride (Fantu's); demonstration of technique. Addis count-various preservatives for 24-hour samples of urine, volume of urine in 24 hours, changes in urine on standing. Physical and chemical examination of urine by strip. Appearance, color, Specific gravity, pH, Alb, sugar. Chemical examination of urine by Albumin-sulfosalicylic acid method, glucose-benedict's method and other methods. Principles of Albumin tests with interpretation. 24-hour semiquantitative test for albumin; Bence Jones proteins- methodology. Urinary sediments-method of obtaining sediment, organic and inorganic sediments; normal and abnormal sediments. **Function Test:** Liver function test: (a) Malloy & Evelyn, (b) Jendrassik and groff method, Neonatal jaundice and direct spectrophotometric method of bilirubin estimation, advantages and disadvantages. Renal function tests: Principle of concentration and dilution tests, PSP dye test, Thyroid test. Semen analysis; reasons for it & interpretation. Creatinine and its estimation – Jaffe's method. Calcium. CSF, Physical, chemical and cytological examination, methods and procedures used and clinical interpretation.	40

C. Reference Text Boks:-

Principal of Biochemistry Lehninger (6E), Nelson & Cox

Harpers Collins Illustrated Biochemistry

Text Books of Medical Biochemistry ; Vasudevan

A Text Book of Medical Biochemistry: Chatterjee and Shinde

Clinical Biochemistry and Metabolic Medicine: Crook

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MLT- 103 Medical Microbiology and histopathology

A. Outline of course

Sr. No.	Title of the Unit	Hours
	Unit – A	
	Bacteriology	60
	Unit-B	
	Mycology and Virology	50
	Unit-C	
	Parasitology	60
	Unit-D	
	Histopathology and Instrumentation	40

Sr. No.	Title of the Unit	Hours
	Unit – A	**Total 210 hrs.**
	Bacteriology: - Morphology and Physiology of bacteria, Bacterial genetics In brief, Basic constituents of **culture media**, various types of culture media; liquid and solid media; semi solid media, differential, selective, enriched media. **Methods** of inoculation, cultivation, isolation; Cultivation on liquid, semisolid and plates; Aerobic and anaerobic methods of culture. Various **staining** procedures for staining and differentiating bacteria, hanging drop method for motility. **Sterilization** and **disinfection** by various methods. a. Physical, b. Chemical, c. Irradiation, etc. **Antimicrobial agents**, Antibiotic sensitivity. Normal Flora of various areas in the body. **Morphology, Culture Characteristic, Antigenic structure, Pathogenicity, Lab. diagnosis of following bacteria.** *Staphylococcus spp., streptococcus spp., Pneumococcus, Neisseria spp., Mycobacterium spp., Spirochetes, Clostridia, Salmonella spp., Shigella spp., Vibrio spp.* **Enterobacteracae group**. *E. coli, Klebsiella, Enterobactor, Edwardsiella, Serratia and Hafnia, Pseudomonas, Aeromonads, Alcaligenes. Proteus, Providencia. Citrobacter, Arizona.*	60

	Non-intestinal gram negative bacteria; *Haemophilus, Brucella, Pasteurella, Bordetella, Bacteroides*, Gram positive bacteria *Corynebacteria, Listeria coccidian, Bacillus species*	
	Unit-B	
	Mycology and Virology: - Morphological, classification of fungi, Lab. diagnosis of fungal disease. General properties of virus: Morphology, Replication and cultivation of virus. Disease caused, Lab. Diagnosis and prevention of *Adenovirus, Herpes* virus, *Pox* virus, *Hepatitis* virus, *Rabbis* virus, *Rubella* virus, *influenza* virus, and *mumps and measles* virus.	50
	Unit-C	
	Parasitology: - General information of about parasites, Classification of parasites. Protozoa, Nematodes, cestodes, trematodes. **Protozoa:- Amoeba** (*E. histolytica, E.coli, Endolimax nana*), **Flagellates**(*Giardia and Trichonads Spp.*), Hemo Flagellates(*Leishmania Spp., Trypanosoma Spp.*), **Ciliates** (*B. coli*), **Sporozoa** (*Toxoplasma*, Malarial Parasites) **Nematode: - Round warm (***A. lumbricoids***), Intestinal warm** (*Trichinella spiralis*) **Tissue warm** (*Onchocerca volvulus, Dracunculus medinensis, Wuchereria bancrofti, Brugia malayi; Loa loa*)**, Hook warm (***Ancyclostoma duodenal, Strongyloides stercoralis***), Thread warm(***Enterobius vermicularis***) Dog and cat round warm (** *Toxocara canis, Toxocara cati* **).** **Cestoda: - Dog tape warm (***Echinococcus granulosus***), Fish Tape Warm** (D. latum), **Pork Tape warm (***Taenia saginata***), Beef Tape Warm (***Taenia solium***), Intestinal tape warm (***Hemenolepsis nana***).** **Tremetoda: - Blood Fluke (***Schistosoma haemetobium* and other spp**.), Liver Fluke (***Fasciola hepatica***), Lung Fluke (***Paragonimus westermanii***), Whip warm (***Trichuries trichiura***). Intestinal Flukes (***Fasiolopsis buski***)**	60
	Unit-D	
	Histopathology and Instrumentation: - Introduction to histopathology, Sources and types of histological specimens received; records, labelling and general rules when receiving a specimen. Processing of tissue: Grossing, Fixation and fixatives, Decalcification and its agents, Dehydration and its agents, Cleaning and its agents, Impregnation, Embedding with wax, Block making, horning, Storming, trimming, sectioning, knife angle, Errors in sectioning and their remedies. Separating and	40

	identifying sections. Staining and microscopically examination of histopathological samples. Types of stains, mordents and differentiations. H&E staining methods and principals involved in staining. Introduction to cytology; various fluids and methods of making smears for cytology. Papanicolaoustaining. Microtomes, Autoclave, Hot air Oven, pH meter and other tool / accessories.	

C. Reference Text Books:-

Anathanarayana and Panikar - A Text Book of medical Microbiology

Essentials of Medical Microbiology by Apurba Sastry

Scott and Bailey's Diagnostic Microbiology

Text book of Medical Mycology by Jagdish Chander

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