मौलाना आज़ाद नेशनल उर्दू यूनिवर्सिटी مولانا آزاد نیشنل اُردو یونیورسٹی

MAULANA AZAD NATIONAL URDU UNIVERSITY

(A Central University Under Ministry of Education, Government of India)

Accredited 'A+' grade by NAAC

SCHOOL OF SCIENCES

B.Voc. & M.Voc. Program (MIT & MLT)

Master of Medical Laboratory Technology (M. Voc. - MLT)

SEMESTER - III

Component	Title of The Paper	Credits
	Theory	
Paper - 1	Blood Banking & Transfusion Technology (Theory)	06
Paper - 2	Automation & Quality Assurance in Medical Laboratory (Theory)	06
Paper - 3	Immunology and Molecular Biology (Theory)	06
	Practical	
Paper - 1	Blood Banking & Transfusion Technology(Practical)	04
Paper - 2	Automation & Quality Assurance in Medical Laboratory (Practical)	04
Paper - 3	Immunology and Molecular Biology (Practical)	04
	Total Credit	**30**

Master of Medical Laboratory Technology (M. Voc. - MLT)

SEMESTER-III

(Paper - 1) Blood Banking & Transfusion Technology (Theory)

Credits – 06

Unit 1.

Recent advances in Blood banking , Amniocentesis,Transplantation science, Flow cytometry, Blood components- Indications preparation of b1ood components, Autologous transfusion, Transfusion transmitted disease, Haemolytic disease of the new born and exchange transfusion, Transfusion Therapy, Transfusion in special situations-Auto immune haemolytic anaemia, Transfusion reactions and investigations of transfusion reaction, Transfusion transmitted infections, Immuno modulation and graft versus host reactions, Haemapheresis-Definition, types of Pheresis, Machines and Techniques

Unit 2.

Tissue banking, Cord blood banking, Stem cell processing storage and transplantation, Disposal of wastes and biologically hazardous substance in the blood bank, Medico legal aspects of blood transfusion, Technical advances and future trends in blood banking, Paternity testing, Orientation of a routine blood bank, Quality Assurance- General condition Equipment Reagents Donor processing, Drugs control regulation and Blood Bank, Laboratory control of anticoagulant, thrombotic and platelet therapy,Immuno phenotyping.

Unit 3.

History of Transfusion Medicine, Blood groups and genetics ABO System- ABO sub groups Bombay group, secretors, non secretors. Rh system - Importance of Rh system Du red cells (A variant of Rh system) MNS system - clininca1 significance, Blood transfusion- indications for blood transfusion, Blood donation, Donor registration,Donor selection, Blood collection. Adverse donor reaction, Anticoagulants used to store blood Changes occurring in the stored blood.

Unit 4.

Blood group systems-antigen-antibody reaction, ABO system-forward grouping reverse grouping, Rh system inheritance&nomenclature Rh grouping- Rh antigen and antibodies, Du Variant Anti D type of reagents and their application, Coomb's test- Application- DCT, ICT Rh antibody titre, Compatibility testing- Major Minor Coomb' s cross match ,Computer crossmatch, Antibody titration, Preparation and quality control of antiserum

Master of Medical Laboratory Technology (M. Voc. - MLT)

SEMESTER-III

(Paper - 1) Blood Banking & Transfusion Technology (practical)

Credits – 04

1. Blood grouping- ABO gouping, forward grouping (slide&tube method)
2. Reverse grouping - preparation of pooled A,B & 0 cells
3. Grading of Reaction. Other methods of grouping
4. ABO antibody titration, Cold antibody titration.
5. Rh grouping & Rh typing (slide & tube method)
6. Du Testing
7. Rh-antibody titration
8. Antiglobulin Testing- Direct and Indirect
9. Preperation of Coomb' s Control Cells.
10. Compatibility Testing
11. Selection of blood, Crossmatching Technique- Major, Minor, Saline, Albumin, Coomb's, Emergency - Cross matches, Donor selection, Blood collection [Phlebotomy], Post donation Care
12. Preservation and Storage of blood,Preparation and Storage of blood Components,Packed cells, Fresh Frozen plasma [FFP], Platelet Concentrate, Cryoprecipitate, Component tansfusion - selection of blood group, Crossmatching in Special Situations, Exchange transfusion- selection of blood group, Autoimmune haemolytic anaemia, Investigation of Blood Transfusion reaction, Testing for transfusion Transmitted Diseases, ELISA-HIV, HBsAg, HCV,VDRL Test,Malaria, Quality control-Methods,Reagents,Test methods,Products,Documents,Equipment, Apheresis procedures- Types of pheresis, Machines and Techniques

Master of Medical Laboratory Technology (M. Voc. - MLT)

SEMESTER-III

(Paper - 2) Automation & Quality Assurance in Medical Laboratory (Theory)

Credits – 06

Unit 1.

Analytical techniques: principle and applications of Photometry, Colorimetry, Spectrophotometry, RIA, CLIA 2. Principle and applications of Recombinant DNA technology, Polymerase Chain Reaction(PCR)/RTPCR, Various types of Auto analyzers: Semi-automated, Fully-automated analyzers 2. Reagents and Kits for Auto analyzers 3. Colorimeter and Spectrophotometer 4. Flowcytometer: use in cancer marker detection 5. Vaccitainers 6. Cold chain refrigeration 7. Use of Laboratory centrifuges in clinical biochemistry lab 8. Chemiluminiscence 9. Validation of the Machine 10. Sources of Error 11. Tumor markers : CEA, AFP (α-β proteins), hormonal assays, 12. Serum and Hb electrophoresis.

Unit 2.

Automation in Medical Laboratory: Cell counters(3 & 5 parts), coagulation analyzers, ESR by automation, Blood collection and delivery to different laboratories in a hospital Automation in Histopathology – New generation microtomes, tissue processing, paraffin, Embedding, Station, tissue -tek systems, image analysis,. Use of microwave oven Automation and recent advances in different disciplines of pathology.Automation in Cytology- Cytospin. ELISA reader and ELISA washer, different types of autostainers and cover slippers. Imunological analyzers. latest trends in an

Unit 3.

Quality Assurance: 1. Total Quality Management of Laboratories 2. Quality planning and Quality improvement 3.Current trends in laboratory accreditation, ISO certification. Quality Council of India, ISO standards, Accredidation and certification, Root cause analysis, The six sigma process, Quality assessment, NABH, NABL, Clinical and laboratory standard Institute. Five Q framework, financial aspects of lab management, organization and operation of lab. Elements of Quality assurance Programme

1.Types of preanalytical variables

2. Analytical variables- documentation, inventory, competence and various laboratory processes.Use of stable reference materials-calibrators & controls, LJ charts and Westgard rules. .

3. Postanalytical variables

4. Internal QC Procedures , Use of Internal Quality Control material. Properties. Types. Careand procedural steps in reconstitution of commercial controls. Preparation In-housepreparation.

5. Use of computers in quality control and management; use of computers for calculatinganalytical results

• External Quality Assessment Schemes and Proficiency Testing Programmes.

Unit 4.

Basic concept of Quality Control: Internal Quality Control. External Quality Control, SOP. EQAS, Statistical analysis of QC data, Levy-Jennings Chart, Westgard rules. Preparation and quality control of all routine and special stains used in all laboratory departments.Implementation of Internal Quality. Control program: basic steps, sources of error and their correction methods, CAPA - corrective action & preventive action. Sources of variation in laboratory results. Record keeping, documentation,

Quality Control of Culture Media, Quality control in sterilization- autoclave, hot air oven and chemical, filtration & radiation sterilization and disinfection techniques.

Master of Medical Laboratory Technology (M. Voc. - MLT)

SEMESTER-III

(Paper - 2) Automation & Quality Assurance in Medical Laboratory (Practical)

Credits – 04

1. Colorimetric estimation – Glucose, Urea, Creatinine etc.
2. Estimation using semi & fully automated analyzers: a. Glucose b. Components of LFT, RFT, Lipid profile, diabetic profile etc. c. Enzymes of diagnostic importance- amylase, lipase, CPK, CPK-MB, Troponin I, LDH etc.
3. Estimation of hormones, vitamins, tumor markers and other biomarkers by ELISA, RIA, CLIA etc.
4. Biochemical analysis of fluids: CSF, ascitic & pleural fluids etc.
5. Analysis of arterial blood gases & electrolytes
6. Calculation of coefficient of variation, coefficient of correlation, plotting LJ charts
7. Total Quality Management of Laboratory: a. Specimen collection, handling & storage of sample. b. Methods of standardization & calibration. c. Methods of quality control & assessment.

Master of Medical Laboratory Technology (M. Voc. - MLT)

SEMESTER-III

(Paper - 3) Immunology and Molecular Biology (Theory)

Credits – 06

Unit 1.

DNA replication, DNA Polymerase , Cell cycle, DNA repair. Transcription, inhibition of transcription, genetic code, post transcriptional processing, reverse transcriptase. Protein biosynthesis, post translational processing, inhibitors of protein synthesis. Molecular genetics and gene expression, principles of breeding, autosomal, recessive, xlinked recessive, population genetics, gene location on chromosomes, mutations, recombination, mutagens, repression, operon, gene amplification, gene switching, transposition of genes, somatic recombination, enhancer, viruses.

Unit 2.

Recombinant DNA technology. Restriction endonuclease, DNA ligase, vectors, chimeric molecules, cloning, gene library, cloning strategies, insitu hybridization, blot techniques and applications, RFLP, Gene Therapy, Transgenesis, DNA finger printing, DNA sequencing, PCR, DNA probes, hybridoma technology Mab and its applications. Pre-natal diagnosis of genetic disorders.

Unit 3.

Immunology: Principles of immunology, antigen, antibodies and their reactions. Immunoglobulins, MHC, Complement system, Interleukins , Interferons and Cytokines. Antigens: Antigenicity, Factors influencing Immunogenicity, Epitopes, Hapten Antibody classes and their biological role, Antigenic determinants on Igs (allotype, isotype, idiotype), Antibody diversity.Cellular immunity, immune responses and cells involved , autoimmunity, immuno deficiency diseases.

Unit 4.

Immunological Techniques, MIF, TRC, ELISA, Immuno electrophoresis, double diffusion technique , immunofixation, Immunoassay of enzymes, Nephelometric immunoassay, Chemiluminesence immunoassay western blot , Immunofluorescence and Radio immunoassay. Preparation, assessment and storage of antisera (polyclonal and monoclonal). Methods of assessing analytical sensitivity, specificity and standardization.

Master of Medical Laboratory Technology (M. Voc. - MLT)

SEMESTER-III

(Paper - 3) Immunology and Molecular Biology (Practical)

Credits – 04

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1. VDRL Tests
2. Brucella Agglutination test
3. Weil Felix test (Demonstration only)
4. Paul Bunnel test (Demonstration only)
5. RA test
6. CRP test
7. TPHA
8. ELISA
9. ASLO
10. WIDAL
11. Isolation of DNA and RNA from bacterial cells
12. Estimation of DNA and RNA
13. Isolation of plasmids from bacterial cells
14. DNA electrophoresis
15. Mitotic and meiotic stages