Vivekanand Education Society's

College of Arts, Science and Commerce

(Autonomous)

Sindhi Society, Chembur, Mumbai, Maharashtra – 400 071.

Accredited by NAAC "A Grade" in 3rd Cycle - 2017
Best College Award – Urban Area, University of Mumbai (2012-13)
Recipient of FIST Grant (DST) and STAR College Grant (DBT)

Affiliated to the

University of Mumbai

Syllabus for

Program: Post Graduate Diploma in Medical Laboratory Technology

(Program code:)

SEMESTER I

Course code	Title	No. of Hours	Credits
	Hematology & Clinical Biochemistry	30	2
	Diagnostic Microbiology	30	2
	Clinical Pathology	30	2
	Basic Laboratory instruments ,Automation & Rapid Immunology tests	30	2
	Practicals based on all four Papers	270	9
	Total	390	17

Semester II

Course code	Title	No. of Hours	Credits
	Laboratory Management systems & Advanced Microbiology	30	2
	Advanced Hematology & Organ profile tests	30	2
	Body fluid analysis & Histopathology & cytology	30	2
	Automation in Microbiology & Molecular biology techniques	30	2
	Practicals based on all four Papers	270	9
	Total	390	17

Internship of 3 months in a pathology Laboratory/ hospital- 16 Credits
Total Number of Credits= 17+17+16=60

SEMESTER I		
Course Code		

Course objectives:-
The objective of this course is to gain insight into to the Basic Techniques in Pathology
Learning outcomes:-

- By the end of this semester, the student should be familiar with the laboratory setup
- To handle basic instruments
- Understand the significance and concept underlying diagnostics

Paper	Topics	Hours Credits
Paper I Hematology & Clinical Biochemistry	● Structure, function and life span of blood cells; Abnormal forms of RBC; Abnormalities of WBC's; Hemoglobin: types- normal & abnormal, Types of anemia. ● Collection of blood, Anticoagulants ● Coagulation : Mechanism, Coagulation profile tests ● Blood bank: human blood group system, Rhesus blood group system and immune antibodies, clinical significance of blood transfusion,; collection and processing of blood for transfusion. ● Blood sugar level - Glucose tolerance curve and its interpretation. ● Evaluation methods of blood. Diabetes and its types. Enzymes in diagnostics	30 2credits
Paper II Diagnostic Microbiology	● Safety and special precautions in clinical microbiology lab, Legislative and regulatory control, Infectious waste management, Methods of sterilization, Classification of biohazardous agents. ● Antimicrobial susceptibility testing: Selection of antimicrobial agents, Disc diffusion test, Dilution antimicrobial susceptibility test, E test, commercial systems ● Guidelines for collection, transport, processing, analysis and reporting of cultures from specific specimen sources ● Mycology: Laboratory approach for diagnosis of fungal Infections- Specimen collection and transport, processing ● Virology: Introduction to Viruses, Specimen collection , transport and handling	30 2credits
Paper III Clinical Pathology	● Routine urine analysis - composition of normal urine, routine examination of urine. ● Routine stool analysis – Importance of stool examination, collection of fecal specimen, physical examination ● Parasitology-Parasitology: Overview of life cycles of parasites. (*Entoamoeba histolytica, Ascaris, Plasmodium spp, Giardia lamblia)* Collection, transport and processing of specimens.	30 2credits

Paper IV Basic Laboratory Instruments, Automation & Rapid Immunology tests	• Handling of Basic Laboratory instruments- Microscope, Colorimeter, Incubator, Centrifuge • Automation in hematology: Automated full blood count impedance cell counters, optical cell counters, automated blood cell morphology. • Automation in clinical biochemistry - Introduction, classification of automated systems, steps of automation in biochemical analysis. Commonly used automated analyzers of biochemical laboratories • Basis of serological testing ELISA , RIA,VDRL, TPHA, Widal, HBsAg, RA factor, latex agglutination tests, Pregnancy tests, HIV , HCV.	30 2credits

SEMESTER II		
Course objectives: The objective of this course is learning and understanding of automation techniques and The advanced techniques in Diagnostics Learning outcomes: By the end of the course the student will be able to: • Gain an understanding of the basic principles used in disease diagnosis. • Gain critical thinking and analytical skills to understand new diagnostic Methods.		
Paper	Topics	Hours
Paper I Laboratory Management systems & Advanced Microbiology	• .Flow of work in the laboratory • Sample collection, entry and transport • Techniques and Training in a. Stock Maintenance b. Internal Audit c. SOPs d. Test Record and Reporting e. Clinical History recording f. QA & QC – Necessity, Procedures, Record Maintenance • Bacteriology-Infections of the respiratory tract, gastrointestinal tract, Urinary tract, genital tract, bones and joints, CNS, Wounds, abscesses and cellulites, Eye and Infections of the blood. • Mycology-direct examination, preparation of mounts for study, selection and inoculation of culture media, incubation of fungal cultures; Identification of *Candida*.	30 2credits
Paper II Advanced Hematology & Organ profile tests	• Special hematology tests • Thyroid tests : Introduction – determination of T-3, T-4, TSH • Cardiac Profile Test –Ischemic heart diseases and their manifestation; Groups in CPT, Lipid profile tests. • Gastric function Tests – gastric analysis, tests involved • Liver function tests – Types of jaundice; abnormalities of bile pigment and acid, change in enzyme and plasma proteins and their determination • Kidney function test –Groups in KFT; test to determine renal blood flow; clearance test; Diseases of kidney	30 2credits

Paper III Body Fluids	• Specimen collection, lab examination and clinical significance of CSF and gastric juice • Semen analysis, clinical significance, specimen collection, physical examination, microscopic examination, sperm morphology – normal & abnormal, chemical examination. • Examination of sputum – Collection, examination – physical, chemical and microscopic • Histopathology and Cytology	30 2credits
Paper IV Automation in Microbiology & Molecular biology techniques	• Automation: Semiautomated and automated identification systems for *Enterobacteriaceae*, Non fermenters, *Mycobacteria*, *Staphylococci*, Anaerobes. • Cancer marker - Introduction, clinical application, enzymes as tumor markers ALP, CK, LDH, PAP, prostate specific antigens, hormones, oncofetal antigens, carbohydrates, bladder specific, breast tumor markers. • Signal amplification methods – Nucleic acid probes, in situ hybridization; PCR and modifications of PCR; Post amplification analysis – DNA sequencing, microarray analysis; Strain typing – Pulse field gel electrophoresis, PCR-RFLP	30 2credits

References:

- Text book of medical laboratory technology, 2nd edition, Balani Publishing House. Authors: Praful Godkar and Darshan Godkar.
- Introduction to MLT 6th ed F.J.Baker & R.E.Silverton Butterworths.
- Medical laboratory technology, A procedure manual for routine diagnostic tests, Volume I,II, III. Kanai Mukherjee. Tata McGraw Hill
- Hand book of MLT -Vellore ed-Dr (Mrs) C. Bharucha, Wesley press, Mysore
- A medical lab for developing countries- Maurice King-ELBS & Oxford uni press Bailey & Scott's - Diagnostic microbiology, 11th ed., Betty Forbes, Daniel, Alice Weissfield. Mosby publisher
- Atlas of Medical Helminthology and Protozoology, 4th ed. P. L. Chiodini, A. H. Moody,

SEMESTER I Practicals		
Course Code	Based on Theory papers of Semester I	
	1. Blood collection - Venipuncture, capillary puncture 2. Hemoglobin estimation: acid hematin and drabkin's method. 3. Total RBC & WBC count 4. Differential WBC count 5. ESR and PCV Red cell indices 6. Bleeding time & clotting time 7. Prothrombin time 8. Identification of Malarial parasitic forms in blood smears. 9. Blood grouping ABO and Rh typing 10. Cross matching 11. Estimation of blood glucose and tolerance test 12. Study of media used in identification of pathogenic organisms. Study of transport media. 13. Identification of Candida albicans. 14. Antibiotic sensitivity testing by paper disc 15. VDRL test 16. RA Factor 17. ELISA 18. Detection of hCG in urine. 19. Physical, Chemical, Microscopic examination of Urine 20. Physical, Chemical, Microscopic examination of stool	270hours 9credits

SEMESTER II Practicals		
Course Code	Based On theory papers of Semester II	
	1. Internal quality assurance tests 2. SOP writing 3. Isolation and characterization of bacterial pathogens. S.aureus ,E.coli , K. pneumoniae , Salmonella, Shigella, Proteus, Pseudomonas spp 4. Identification of Fungal wet mounts 5. Reticulocyte count 6. G6PD estimation 7. Routine examination of sputum 8. Routine examination of semen 9. Routine examination of CSF 10. Histopathology & cytology slide preparation(tissue processing & sectioning) 11. Estimation of SGPT	270hours 9credits

	12. Estimation of SGOT 13. Estimation of LDH 14. Estimation of Alkaline phosphatase/Acid Phosphatase 15. Estimation of Urea 16. Estimation of Creatinine 17. Estimation of Uric acid 18. Estimation of creatinine. 19. Estimation of total bilirubin 20. Estimation of serum cholesterol	

Modality of Assessment

A.Theory -Internal assessment 40% 40 marks

Sr No	Evaluation type	Marks
1.	Assignment that can include pathology report writing ,Report on visits to diagnostic laboratory/hospitals	20
2	Submission of Self study topics / One class Test (multiple choice questions / objective)	10
3	**a.** Active participation in routine class instructional deliveries **b** Overall conduct as a responsible student, wrt manners, skill in articulation, leadership qualities demonstrated through organizing co-curricular activities, etc.	05 05

B: External Question Paper Pattern for the End Semester Examination 60%:

No.	Type	Marks
1	Objective Type Questions	10
2	Conceptual / Descriptive Type Questions	14
3	Analytical questions	16
4	Case Study	20

Practical assessment pattern:

No.	Type	Marks
1	Major Practical I	20
2	Major Practical II	20
3	Minor practical I	10
4	Minor practical II	10
5	Viva	20
6	Journal	20
	Total	100

Grading Pattern:

Percentage	Grade	Grade Point	Interpretation	Class
80 and Above	A+	4	Outstanding	First Class with Distinction
73-79	A	3.67	Excellent	First Class
66-72	A-	3.33	Very Good	First Class
60-65	B+	3.00	Good	First Class
55-59	B	2.67	Average	Second Class
50-54	C+	2.33	Satisfactory	Second Class
45-49	C	2.00	Pass	Pass Class
40-44	D	1.00	Pass	Pass Class
39 and Below	F	0	Fail	Fail