JSS MAHAVIDYAPEETA

JSS COLLEGE FOR WOMEN (Autonomous)

Saraswathipuram, Mysuru-570009

(Affiliated to **University of Mysore:** Reaccrediated by **NAAC** with **A** Grade)

Career Oriented Programme (COP)

in

CLINICAL LABORATORY TECHNIQUES

SYLLABUS

2023-24 onwards

JSS College for Women(Autonoumous), Mysore-9

COP- Clinical Laboratory Techniques

Structure & Scheme of Examination

Course	Sem	Paper	Title of the Paper	Instruction Hours Per week	Exam Duration in Hours	Theory Exam Marks	IA Theory Marks	Pract. Exam Marks	IA Pract. Record Marks	Total Marks
Certificate	I	Theory I	Basics & Introduction to Clinical Laboratory	03	02	50	20	-	-	100
		Practical I	Basics & Introduction to Clinical Laboratory	02	02	-	-	20	10	
	II	Theory II	Clinical Microbiology	03	02	50	20	-	-	100
		Practical II	Clinical Microbiology	02	02	-	-	20	10	
Diploma	III	Theory III	Clinical Haematology	03	02	50	20	-	-	100
		Practical III	Clinical Haematology	02	02	-	-	20	10	
	IV	Theory IV	Immunology and Serology	03	02	50	20	-	-	100
		Practical IV	Immunology and Serology	02	02	-	-	20	10	
Advanced Diploma	V	Theory V	Clinical Pathology	03	02	50	20	-	-	100
		Practical V	Clinical Pathology	02	02	-	-	20	10	
	VI	Theory VI	Clinical Biochemistry	03	02	50	20	-	-	100
		Practical VI	Clinical Biochemistry	02	02	-	-	20	10	

COP – CERTIFICATE

I SEMESTER

THEORY PAPER I : BASICS AND INTRODUCTION TO CLINICAL LABORATORY

35 Hours **03 Hours/week**

UNIT 1: Introduction to Clinical laboratory **05 Hours**

a. Classification of clinical laboratory and Laboratory set-up
b. Code of conduct of medical laboratory personnel
c. UWP for lab personnel
d. Medico-legal aspects of clinical practice.

UNIT 2: Laboratory Safety and First-aid **05 Hours**

a. Safety measures in the laboratory
b. Accidents in the laboratory and First-Aid in laboratory accidents
c. Biohazard and safety precautions
d. Waste disposal

UNIT 3: Introduction to Laboratory Equipment & Culture techniques: **10 Hours**

a. Microscopy - Phase contrast microscope, Fluorescence microscope, Transmission Electron Microscope and Scanning Electron Microscope.
b. Special laboratory equipment- Centrifuge, Serological Water bath, Incubator
c. Culture techniques - Serial dilution, Pour plate, Spread plate, Streak plate, Point inoculation and Stab inoculation techniques

UNIT 4: Laboratory reagents, Lab Report & Laboratory Records **05 Hours**

a. Laboratory reagents preparation
b. Reporting laboratory tests
c. Keeping Clinical laboratory records

UNIT 5: Sterilization techniques: **10 Hours**

a. Sterilization by dry heat- Hot Air Oven, Hospital Incinerator,
b. Sterilization by moist heat- Autoclave, Tyndallization
c. Sterilization by filtration- Laminar air flow system
d. Sterilization by chemicals- Disinfectants, Antiseptics, Sanitizers, Microbistatics, Microbicides. Alcohols, Aldehydes, Halogens, Phenols, Peroxides, Heavy metals, Soaps and Detergents, Gaseous Sterilants- Ethylene oxide, β-Propiolactone.

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II SEMESTER
THEORY PAPER II : CLINICAL MICROBIOLOGY

35 Hours **03 Hours/week**

UNIT 1: Introduction to Diagnostic Microbiology **05 Hours**

a. Role of Microbiology laboratory
b. Quality control in Microbiology
c. Preservation of stock cultures

UNIT 2: Identification of Bacterial Infections **10 Hours**

a. Collection on Blood, Sputum, Throat swab, Vaginal swab, CSF and Urine specimen
b. Laboratory culture of pathogenic bacteria
c. Identifying characteristics of common pathogenic bacteria

UNIT 3: Laboratory Diagnosis of Mycotic infections **08 Hours**

a. Classification of pathogenic mycotic agents
b. Laboratory culture of pathogenic fungi and Laboratory procedures – Direct Microscopic examination
c. Diagnosis of Dermatomycosis, Subcutaneous mycosis, Systemic mycosis

UNIT 4: Laboratory Diagnosis of Parasitic Infections **07 Hours**

a. Classification parasitic protozoans
b. Laboratory procedures: Collection and processing of faecal specimens
c. Laboratory diagnosis of parasitic protozoans

UNIT 5: Laboratory Diagnosis of Viral Infections **05 Hours**

a. Classification of viruses
b. Laboratory culture of viruses
c. Laboratory diagnosis of pathogenic virus

COP – DIPLOMA

III SEMESTER
THEORY PAPER III : CLINICAL HAEMATOLOGY

35 Hours **03 Hours/week**

UNIT 1: Introduction to Haematology: **05 Hours**

a. Components of blood and their functions
b. Haematopoietic system of the body

UNIT 2: Clinical Haematology: **06 Hours**

a. Ways of obtaining blood, Anticoagulants
b. Haemoglobin, Anaemia
c. Blood cell counts Erythrocytes, Leukocytes, Platelets

UNIT 3: Bleeding Disorders: **08 Hours**

a. Bleeding time, Coagulation time, Clot retraction, Heparin therapy
b. Study of Sickle cell anaemia, Malaria, Sleeping sickness, Leishmaniasis

UNIT 4: Haemostasis and Haemostatic disorder: **08 Hours**

a. Haemostasis (*Stoppage of blood*)
b. Mechanism of blood coagulation- Fibrinolysis
c. Disorder of Haemostasis, Laboratory tests for Haemostatic function

UNIT 5: Blood Banking- Collection and Processing of Blood of Transfusion: **08 Hours**

a. Human blood groups: Basic blood group system – ABO, subgroups of ABO, Rh blood group system, Other blood group systems, compatible blood groups
b. Method of blood collection, Transportation of blood
c. Autotransfusion, Plasmapheresis
d. Transportation of blood and its components

COP – DIPLOMA

IV SEMESTER

THEORY PAPER IV : IMMUNOLOGY AND SEROLOGY

35 Hours **03 Hours/week**

UNIT 1: Immune system: **10 Hours**

a. **Types of Immunity –** Innate & Adaptive immunity. Antibody Mediated Immunity (AMI), Cell Mediated Immunity (CMI)
b. **Cells, Tissues and Organs of Immune System –** Lymphatic system, Structure and Role of Primary Lymphoid Organs (Bone Marrow and Thymus), Secondary Lymphoid Organs (Spleen, Lymph nodes, Tonsils and MALT), B & T lymphocytes, Phagocytes, NK cells.

UNIT 2: Antigen and Antibodies: **06 Hours**

a. **Antigens –** Nature and Types
b. **Antibodies –** Classes of Antibodies: Salient features and their functional diversities. Structure of IgG.
c. Complement System (in brief)

UNIT 3: Serology: **07 Hours**

a. Clinical significance of serodiagnostic procedures
b. Common serodiagnostic tests – Precipitation, Flocculation, Agglutination
c. Haemagglutination inhibition, Neutralization reaction
d. Complement fixation test

UNIT 4: Immunotechniques: **07 Hours**

a. Enzyme Linked Immunosorbent Assay (ELISA)
b. Immunofluorescence: Fluorescent Antibody technique(FAT)
c. Radio Immuno Assay (RIA)

UNIT 5: Pregnancy test: **05 Hours**

a. Haemagglutination inhibition test
b. Latex particles agglutination inhibition test

COP – ADVANCED DIPLOMA

V SEMESTER
THEORY PAPER V : CLINICAL PATHOLOGY

35 Hours **03 Hours/week**

UNIT 1: Diagnostic skin tests: **07 Hours**

a. Immunologic basic for skin test, common skin test – Toxin antitoxin neutralization test
b. Immediate reaction type – Direct skin test for allergens
c. Delayed reaction type – tuberculin skin test (Mantoux test), Candida, Filariasis, Brucellergen test

UNIT 2: Urine analysis: **07 Hours**

a. Clinical significance of Urine analysis
b. Laboratory diagnosis of renal function
c. Microscopic examination
d. Rapid chemical tests

UNIT 3: Stool examination: **07 Hours**

a. Introduction, laboratory investigation – Physical examination, Microscopic examination and chemical examination
b. Processing of watery stool specimen during cholera epidemic – clinical significance
c. Specimen collection and processing and laboratory investigation.

UNIT 4: Semen analysis: **05 Hours**

a. Laboratory investigation
b. Forensic investigation for the presence of semen

UNIT 5: Laboratory examination of miscellaneous body fluids: **09 Hours**

a. Body fluids for clinical diagnosis
b. Cerebrospinal fluid
c. Serous fluid
d. Synovial fluid
e. Vaginal discharge
f. Gastric juice

COP – ADVANCED DIPLOMA

VI SEMESTER

THEORY PAPER VI : CLINICAL BIOCHEMISTRY

35 Hours **03 Hours/week**

UNIT 1: Instrumentations: 07 Hours

a. **Photometry-** Laws of photometry and Beer's-lambert's law. Working principle and applications of colorimetry, Spectrophotometry, Flame photometry, Fluorimetry and their applications.
b. **Water metabolism:** Distribution of fluids in the body, factors affecting water balance.

UNIT 2: Mineral metabolism: 07 Hours

a. Macronutrients (Ca, P, Mg, Na, K and Cl) and trace elements (Fe, I, Zn and Cu).
b. **Vitamins**-Sources, requirements, deficiency disorders and biochemical functions of fat soluble and water soluble vitamins.

UNIT 3: Disorders of Liver and Kidney 07 Hours

a. Plasma proteins, A/G ratio, functions of albumin. Jaundice-types.
b. Heme metabolism- synthesis and degradation .
c. Porphyrin and bile pigments.
d. **Disorders of Liver and Kidney:** Jaundice-fatty liver. Normal and abnormal functions of kidney. Insulin and urea clearance test.

UNIT 4: Diagnostic enzymes and Metabolic disorders 07 Hours

a. **Diagnostic enzymes-** Enzymes in health and disease. Biochemical diagnosis of diseases by enzyme assay. SGOT, SGPT, CPK, LDH, Alkaline phosphatase and Acid phosphatase.
b. **Metabolic disorders:**
   Diabetes mellitus (DM), Glucose tolerance test (GTT). Sugar level in blood (FBS PPBS) and RBS(Random Blood Sugar). Renal threshold for glucose. Factors influencing blood glucose level. Glycogen storage diseases

   Plasma lipoproteins, cholesterol, Triglycerides, Phospholipids-in health and disease – Hyperlipidemia and hypolipoproteinemia. Gaucher's disease, Taysach and Niemen pick diseases. Ketone bodies.

UNIT 5: Inborn errors of metabolism 07 Hours

Inborn errors of metabolism: Phenyl ketonuria, Alkaptonuria, Sickel cell anaemia.

a. **Abnormalities in nitrogen metabolism:** Uremia, hyperuricemia, porphyria and factors affecting nitrogen balance.
b. **Blood clotting:** Disturbances in blood clotting mechanism. Haemorrhagic disorders-Haemophilia, thrombocytopenic purpura. Disseminated intravascular coagulation. Circulating anticoagulants.

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I SEMESTER

PRACTICAL PAPER I : BASICS AND INTRODUCTION TO CLINICAL LABORATORY

1. Biohazards and safety precautions
2. Sterilization techniques using moist heat
3. Sterilization techniques using dry heat
4. Sterilization techniques using chemicals and Cleaning and sterilization of glassware
5. Preparation standard solutions of acids and bases
6. Culture techniques

II SEMESTER

PRACTICAL PAPER II : CLINICAL MICROBIOLOGY

1. Protocols for Identification of pathogenic microbes
2. Bacterial Staining techniques
3. Fungal staining techniques
4. Protozoan staining techniques
5. Preparation of culture media
6. Biochemical tests

COP – DIPLOMA

III SEMESTER

PRACTICAL PAPER III: CLINICAL HAEMATOLOGY

1. Collection and processing of blood specimen
2. Total Erythrocyte count by Haemocytometer
3. Total Leucocyte count by Haemocytometer
4. Determination of platelet count
5. Determination of Bleeding time
6. Determination of Clotting time
7. Determination of blood group and Rh factor
8. Determination of ESR

IV SEMESTER

PRACTICAL PAPER IV: IMMUNOLOGY AND SEROLOGY

1. Precipitation reaction – Oudin, Oklay-Fulthorpe, Ouchterlony & Radial Immunodiffusion
2. Agglutination test – Widal test for Salmonella infection (slide agglutination method)
3. Serological test for Syphilis – Non treponemal test (RPR for Syphilis)
4. Serodiagnosis of streptococcal infection
5. Serodiagnostic test for miscellaneous infections AIDS – Rapid HIV test, ELISA & Dip stick
6. Slide test for pregnancy – Direct latex agglutination method, Dip stick, ICT pregnancy test

COP – ADVANCED DIPLOMA

V SEMESTER

PRACTICAL PAPER V: CLINICAL PATHOLOGY

1. Detection of bacteruria by using Urine Dip Slide
2. Examination of sputum for Tuberculosis
3. Delayed reaction type of skin test – Tuberculin test (Mantoux test)
4. Examination of stool for detection of intestinal parasitic infection
5. Sperm motility test
6. Sperm count by using Haemocytometer
7. Antibiotic sensitivity test

VI SEMESTER

PRACTICAL PAPER VI : CLINICAL BIOCHEMISTRY

1. Urine analysis-normal and abnormal constituents of urine.
2. Glucose tolerance test (GTT) and Glycosylated haemoglobin.
3. Blood urea estimation.
4. Serum creatinine estimation.
5. Serum uric acid estimation.
6. Serum albumin estimation.
7. Serum globulin estimation.
8. Serum glucose estimation.
9. Serum GOT (AST) estimation.
10. Serum GPT (ALT) estimation.