Certificate Course in Medical Laboratory Technician

Objectives

1. To fulfill the manpower need of pathological laboratories and blood bank
2. To carry out routine laboratory tests such as blood count, stool, sputum examination, bacteriological, serological and biochemical tests.
3. To carry out medical laboratory work in various Departments of medical and sciences colleges.

Course Duration: - 1 Year Teaching, 6 Months Training.

Eligibility for Admissions: - 10th Standard pass

Course fees per Student: - Rs.5000 /-

Job opportunities

1. Blood Bank Assistant
2. Laboratory assistant in pathological Laboratory

Medium Of Instruction – English

ANY SCIENCE COLLEGE CAN APPLY FOR THE AFFILIATION OF THIS COURSE; ANY OTHER INSTITUTIONS WITH NO HOSPITAL FACILITIES NEED NOT APPLY.

Essential Requirement

1. Lecture hall with all essential facilities.
2. Biochemical OR Microbiology Laboratory in undergraduate or Pharmacy College.
3. Collaboration with minimum 5 Pathological laboratories for practical experience.
   (**At Least one of them should be computerized pathological laboratory)**

Staff Qualifications:
One Lecture with M. Sc. Biochemistry/Microbiology with D.M.L.T. visiting Lecturer with MBBS, DCP or MD Pathology.
Non – teaching Staff: Demonstrator: B.Sc. with DMLT or CMLT.

Course Evaluation

Theory (80 Marks and 20 Internal Marks)	400 Marks
Practical (One experiment per paper each with 20 Marks, Journal each with 10 marks, Viva 10 Mark)	100 Marks
Total	500 Marks

Paper – 1 – Microbiology & Serology:

1. Types of Micro-Organisms, general characteristics of Bacteria, Fungi and Viruses. Sterilization and disinfection procedures. Types of stains and staining procedures. Study of some common pathogens like mycobacteria, Pseudomonas, Study of some common pathogens like mycobacteria, Pseudomonas, Salmonella, Shiigella, vibrio, etc.

2. Diagnostic bacteriology – culture media, systematic grouping of pathogenic bacteria, identification of infections agents, diagnosis of anaerobic infections, identifying racteristics of common pathogenic bacteria Specimen collection, handing, transport, labeling and identification. Aseptic transfer and disposal.
3. Introduction to parasitic fungi, specimen collection, lab diagnosis of mycotic infections, identification of parasites from blood and stool.
4. Immunity, antigen-antibody reactions, allergy and autoimmunity.
5. Serodiagnosis – collection and preparation of sample, Vidal test, VDRL, VRP,ASO,RA, eilfelix, pregnancy and HIV tests.
6. Culture and sensitivity testing – Types of antibiotics, general mechanism of action, Preparation of antibiotic discs, minimum inhibiting concentrations, media and methods for CST.
7. Blood collection, use of anticoagulants, transportation, of blood after collection, hem agglutination reactions, ABO and RH blood grouping Coombs test, cross matching, Preparation of lab reagents in blood banks. Safety regulations in blood banks.
8. Blood transfusion methods, transfusion reactions, hemolytic diseases of newborn.

Paper – II – Clinical Pathology and Histology:

1. Components of blood and their functions hematopoietic system of body, specimen collection for hematological studies.
2. Determination of hemoglobin content, Total RBC, WBC and platelet count, ESR, calculation of red blood cell indices, MCV, MCH etc. Examination of blood for parasites. Peripheral Blood Smear examination, identification of anemia's.
3. Fibrinolysis, bleeding time, clotting time, PT, etc.
4. Routine examination of urine, physical, chemical and microscopic examination of urine, rapid chemical tests for urine.
5. Microscopic examination of semen, specimen collection, lab investigations, examination for presence of semen, sperm motility and sperm count.
6. Collection of faecal specimen physical, chemical and microscopic examination of stool.
7. CSF examination, serous fluid, gastric juice, etc.
8. Clinical significance of histo-pathology, study of common instruments in histology and their operation, tissue processing, staining and fundamentals of microscopy.

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Paper – III – Clinical Biochemistry:

1. **Carbohydrates:** Properties and general classification. Test for glucose and other reducing sugar from urine and blood Interpretation of results with general idea of causative factors. Glucose tolerance test and diabetes mellitus.

2. **Proteins :** General properties and functions of proteins. Role of proteins in plasma. Determination of plasma and serum proteins. Determination of proteins in Urine and CSF. Interpretation of results Albumin / globulin ratio.

3. **Enzymes :** Characteristics and functions of enzymes. Clinical significance of enzymes in liver, pancreas, heart, bone and prostrate – SGPT/SGOT ,alkaline and acid phosphates. Lactate dehydrogenises, creative phosphokinase, amylase. Normal values and changes in pathological conditions.

4. **Lipids :** General properties, functions and classification of lipids. Determination of total lipids, phospholipids, triglycerides, and cholesterol in blood. Determination of lip-protein fraction and interpretation of lipid profile.

5. **Organ Functions :**
   a) **Liver** : Evaluation of hepatic function, bile, liver, function tests and interpretation of conjugated and unconjugated bilirubin.
   b) **Kidney** : Evaluation of kidney function tests, determination of glomerular filtration rate, Inulin and creatinine, clearance Interpretation of urea, uric acid and creatinine content in blood and urine.
   C) **Hormones** : General classification, hyper and hypo action Determination of urinary keto steroids, T3 and T4 assay, Glucose tolerance test.

6 **Analytical Biochemistry :** Principles of colourimetry, flame photometry. Chromatography, electrophoresis and immunochemical techniques. Use of microscope, Fundamentals of automation in clinical laboratories.

Paper IV
Laboratory Management

1. Safety regulation.
2. Good Lab Practices
3. Quality control methods and maintenance of laboratory records.
4. First aid.
5. Correct practices for handling and disposal of biological
6. Uequing & Maintaining of Lab material & Insfements.
7. Lab Standard.

Practical – I –Microbiology and Serology :

1. Introduction to common laboratory instruments colorimeter, Spectrophotometer, centrifuge, pH meter, microscope, autoclave, hot air Oven.
2. Preparation of culture media, stains and biochemical reagents.
3. Monochrome staining
4. Gram staining
5. Acid fast staining
6. Albert's staining
7. Culture and sensitivity testing of pus, urine, stool
8. Microscopic examination of stool
9. Isolation of fungi
10. Detection and cross matching of blood groups.
11. Serodiagnositc test –(to be demonstrated) Vidal, VDRL, R.A. test, Pregnancy test, HIV test, Tuberculin test, ASO test, CRP test, Australia antigen test.

Practical –II –Clinical Pathology and histology :

1. Collection of blood.
2. Estimation of Hemoglobin
3. Counting of WBC, RBC, platelets, Differential count
4. Estimation of ESR
5. Peripheral Smear Examination
6. Urine analysis –Physical, chemical and microscopic exam
7. Stool examination
8. Semen analysis
9. Examination of material parasites
10. Detection of bleeding and clotting time
11. Examination of CSF and other body fluids
12. Collection and tissue processing, stain preparation and fixatives
13. Study of frozen section technique

Practical – III –Clinical Biochemistry & Laboratory Management

1. Basic working and maintenance of colorimeter, spectrophotometer, pH mater, disc get and stab gel electrophoresis.
2. Preparation of serum and plasma
3. Methods for preparation of protein free filtrate – use of TCA, denaturating agents.
4. Determination of blood analysts glucose, Cholesterol, lipids, serum Proteins, Albumin / globulin ratio, urea, creatinine, separation of serum Proteins by electrophoresis, Abnormal constituents, bilirubin-conjugated and unconjugated, lipid profile (demonstration).
5. Urine analysis – Sugars, urea, creatinine, proteins, clearance test.
6. Determination of urinary keto steroids, T3 and T4 (Demonstration of RIA)
7. Estimation of serum enzymes Acid and alkaline phosphates, SGPT, SGOT, amylase, lipase, LDH, CPK,
8. Preparation of chromic acid and cleaning of glassware.
9. Record writing and methodology of reporting.

Reference Books:

1. Medical Lab Technology – A procedure manual for routine diagnostic tests. Vol. I, II,III, Kanai L. Mukherjee – Tata Mc Graw – Hill publishing company Ltd. 4/12. Asaf Ail Raod, New Delhi – 110002.
2. Methods and interpretations Medical Lab Technology Dr. Ramnik Sood (MD) jaypee Bemard Hnry (MD)- Published Pvt. Ltd. New Delhi.
3. Clinical Diagnosis and Management : by Laboratory Method. 17th edition, John Bernard Henry (MD) published by Virendra Kumar Arya for All India Traveller Book Seller, Delhi.
4. Practical Clinical Biochemistry – Harold Varley, CBS Publishers and Distributors, New Delhi.
5. Hematology for students and Practitioners, (Including Practical hematology) – Dr. Ramnik Sood, Jaypee Brothers.
6. A Text Book of Biochemistry (for medical students) – A .V.S.S. Rama Rao, L.K.and S. Publishers, Visakhapatnam.
7. A Manual of Laboratory Diagnostic Tests, Frances Fisctibach, Lippincoff.
8. Manual of Laboratory. Tests. June H Cella, Jugnita Watson, Virendra Kumar Arya, New Delhi.
9. Clinical Pathology and Bacteriology, K.N. Sachdev, Jaypee Bors.

UNIVERSITY, SOLAPUR
Janvikas Kendra
CMLT

Day: - Monday | Time: - 02.00 P.M. to 4.30 P.M.
Date: - 02/05/2016 | Marks: - 80
Subject: - Microbiology & Serology | Paper- 1

Instructions: 1) All Questions are compulsory.
2) Numbers to the right side indicate marks.

Q.1. Fill in the blanks: **10**

1. Chocolate agar is a heated_____ agar.
   a) blood b) semen c) pus
2. _____ Medium is used to isolate Mycobacterium Tuberculosis.
   a) Robertson meat broth b) Dorset egg c) Lowenstein Jensen
3. Loffler's serum slope is used to cultivate_____ bacteria.
   a) Diphtheria b) Cholera c) Salmonella
4. Appearance of gas bubbles is indication of positive_____ test.
   a) Catalane b) Coagulate c) Oxidize
5. _____ color ring formation is indicator of positive in dole test.
   a) Red b) Blue c) Pink
6. Agg;itomatopm os an examples of _____ reaction.
   a) Antigen-antibody b) Host-Parasite c) Fermentation
7. Streptomycin O is a _____.
   a) Carbohydrate b) Fat c) Protein
8. All are bacteria except _____.
   a) Toxoplasma b) Staphylococci aurous c) C.Diptheria
9. VDRL test is done to diagnose_____.
   a) AIDS b) Syphilis c) Tuberculosis
10. OPV is given to prevent _____.
    a) Polio b) Mumps c) Measles

Q. 2. Match the following. **10**

1) Tetanus	a. H1N1 Virus
2) Pulmonary TB	b. Clostridium tetany
3) Dengue	c. Tuberculin test
4) Typhoid	d. Mosquito
5) Swine flu	e. House fly

Q. 3. Answer in short. **20**

1) Name tow disinfectants.
2) Name tow agars.
3) Name tow anaerobic bacteria.
4) Name tow gram positive bacteria.
5) Name tow culture media.
6) Name tow protozoa.
7) Name tow parasites.
8) Name tow RNA viruses.
9) What is pasteurization ?
10) What is sterilization?

Q. 4. Write short Notes on any 4 **20**

1) Bacteria Classification
2) Lab diagnosis of Dengue fever
3) Streptococci
4) ELISA test
5) Autoclave

Q. 5. Write in detail on any 2. **20**

1) Methods of obtaining pure cultures
2) Types of Microscopes
3) Methods of Staining

SOLAPUR UNIVERSITY, SOLAPUR
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Day: - Tuesday | Time: - 02.00 P.M. to 4.30 P.M.
Date: - 03/05/2016 | Marks: - 80
Subject: - Clinical Pathology & Histology | Paper- 2

Instructions: 1) All Questions are compulsory.
2) Numbers to the right side indicate marks.

Q.1. Fill in the blanks: **10**

11. Microscopic study of cells is called as _____.

a) Parasitology b) Cytology c) Oncology

12. Lipochrome is _____ in color.

a) Blue b) red c) yellow

13. _____ is brown black in color.

a) Melanin b) Formalin c) Hemosiderin

14. Frozen section is needed for _____ surgical biopsies.

a) Urgent b) routine c) Delayed

15. Congo red is a stain for _____.

a) Amyloid b) fibroid c) ethmoid

16. Replacement of dead cells is called as _____.

a) Necrosis b) Inflammation c) Repair

17. All are bone is a tumor except _____.

a) Fibro adenoma b) Osteosasroma c) Ewing's sarcoma

18. In jaundice _____ is increased.

a) Hemoglobin b) Insulin c) Bilirubin

19. Wintrobe's Method is used to determine _____.

a) ESR b) White blood cells c) Hemoglobin

20. In allergic cases _____ cell count is raised.

a) Platelet b) RBCs c) Eosinophils

Q. 2. Match the following. **10**

Indices	**Normal Values**
6) Monocytes	a. 0-1%
7) Eosionophils	b. 40-60%
8) Basophils	c. 1-6%
9) Neutrophils	d. 2-10%

10) Lymphocytes e. 20-45%

Q. 3. Write short Notes on any 4 **20**

11) Inflammation
12) Necrosis
13) Fixation techniques
14) Body pigments
15) Benign tumors

Q. 4. Write in short **20**

6) Define neutrophilia
7) What do you mean by gangrene?
8) What is lymphocytosis?
9) What is normal absolute eosinophil count?
10) What is leucocytosis?
11) What do you mean by hemolytic anemia?
12) Name two amyloid stains
13) What is malignant tumor?
14) What is emphysema?
10) What is megaloblastic anemia?

Q. 5. Write in detail on any 2. **20**

4) Steps in slide prepatation for histological examination.
5) Microscope Structure, types & uses.
6) Tissue necrosis.

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Day: -Wednesday | Time: - 02.00 P.M. to 4.30 P.M.
Date: - 04/05/2016 | Marks: - 80
Subject: - Clinical Biochemistry | Paper- 3

Instructions: 1) All Questions are compulsory.
2) Numbers to the right side indicate marks.

Q.1. Fill in the blanks: **10**

21. All are disaccharides except_____.

a) Maltose b) Sucrose c) Aldose

22. Proteins are made up of _____.

a) Amino acids b) Faty acids c) Alkalis

23. _____ level in blood is increased in renal failure.

a) Creatinine b) Sugar c) Cholesterol

24. In rickets, _____ level is serum is decreased..

a) lron b) Zinc c) Calcium

25. Gomori's test is done to detect _____.

a) Phosphates b) Sulfates c) Mercury

26. Starch is _____.

a) Monosaccharide b) Disaccharide c) Polysaccharide

27. In diabetes mellitus_____ level in blood is increased.

a) Sugar b) Creatinine c) urea

28. Lipid profile is done to determine_____ level.

a) Cholesterol b) Sugar c) Urea

29. Normal fasting blood Glucose level is up to _____ mg%.

a) 100 b) 140 c) 200

30. Biuret method is used to determine total_____.

a) Fats b) Carbohydrates c) Protein

Q. 2. Match the following. **10**

Level	**Normal Values**
11) Serum Calcium	a. 60-180 Units/100ml
12) Serum Sodium	b. 3.5-5.5 mEq/L
13) Serum Potassium	c. 130-145 mEq/L
14) Serum Uric acid	d. 9-11.5 mg/dl

15) Serum Amylase e. 2-7 mg/dl

Q. 3. Write in one sentence. **20**

16) Name 2 essential amino acids.

17) Name 2 disaccharides.

18) State normal blood urea level.

19) What is normal total cholesterol level in blood?

20) What do you mean by SGOT and SGPT?

21) Uric acid is increased in which condition?

22) What is significance of Troponin T?

23) What do you mean by conjugated proteins?

24) What are fat soluble vitamins?

25) What is significance of homocystein in blood?

Q. 4. Write short Notes on any 4. **20**

15) Blood Sugar estimation method.

16) Structure of Proteins

17) Classification of Carbohydrates

18) Water Soluble Vitamins

19) Benedicts test

Q. 5. Write in detail on any 2. **20**

7) Auto analyzer

8) Tests for unknown Proteins

9) Liver Function Tests

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Day: - Thursday | Time: - 02.00 P.M. to 4.30 P.M.
Date: - 05/05/2016 | Marks: - 80
Subject: - Lab Management | Paper- 4

Instructions: 1) All Questions are compulsory.
2) Numbers to the right side indicate marks.

Q.1. Fill in the blanks: **10**

31. Blood is generally collected from_____ vein for examination.
    a) Axillary b) Cubital c) Radial
32. _____ Puncture is done to collect CSF.
    a) Sternal b) Lumbar c) Venous
33. Temperature is not measured in_____.
    a) Celsius b) Fahrenheit c) Meter
34. To obtain_____ plane bulb is used.
    a) Serum b) platelets c) Semen
35. Solutions whose concentration is known are called as_____ solutions.
    a) Standard b) Pure c) Quality
36. _____system is used to find out error in procedure.
    a) Control b) Closed c) Duplicate
37. Swine flu is caused due to_____ virus.
    a) HIV b) H1N1 c) Hepatitis B
38. To collect urine of bed ridden patients_____ is used.
    a) Foleys catheter b) Ryles tube c) ET tube
39. Virology is study of_____.
    a) Fungus b) Bacteria c) Virus
10. Peripheral smear is done to diagnose_____.
    a) Typhoid b) malaria c) AIDS

Q. 2. Match the following. **10**

Disease	**Examination**
16) Tuberculosis	a. CSF
17) Enteric Fever	b. Stool
18) Cholera	c. Semen
19) Infertility	d. Blood

20) Meningitis e. Sputum

Q. 3. Write in one sentence. **20**

26) What is long form o ELISA?

27) What is EDTA?

28) What is venipuncture?

29) What is sterilization?

30) What is disinfection?

31) What is indication of sterna puncture?

32) How sputum is collected?

33) What is Lugol's lodine?

34) What is peripheral smear?

35) What do you mean by lmmunology?

Q. 4. Write short Notes on any 4. **20**

20) Lab register]

21) Stock Maintenance in Lab]

22) Blood collection Method

23) Stool examination

24) EDTA bulb

Q. 5. Write in detail on any 2. **20**

10) Quality Control in Lab

11) Safety measures in Labs

12) Histopathology specimen preparation

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Day: - Friday | Time: - 10.30 to Onwards
Date: - 06/05/2016 | Marks: - 200
Subject: - Practical Exam | Paper- 5

Instructions: 1) All Questions are compulsory.
2) Numbers to the right side indicate marks.

Part 1: Pathology

Q.1. Describe the following in brief. **25**

40. Chemical examination of urine
41. WBC measurement
42. Semen analysis
43. CSF examination
44. Loading of Neubar chamber

Q. 2. Write the following. **25**

21) Normal CBC parameters- Hb, WBC, RBC, Platelet, DC
22) Normal LFT test parameters- Sr.Bilirubin, SGOT, SGPT
23) Normal KFT test parameters- Blood urea & Sr. Creatinine
24) Normal Semen report
25) Normal Urine report

Part 2: Biochemistry

Q. 3. Describe in brief. **50**

36) Blood sugar estimation
37) Serum creatinine estimation
38) Lipid profile
39) ELISA for HIV
40) Electrolyte measurement

Part 3: Microbiology

Q. 4. Describe in brief. **25**

25) Fram staining
26) ZN staining
27) Antibiotic Sensitivity Test
28) Urine Culture

29) Culture media preparation

Part 4: Spotting **25**

13) Centrifuge
14) EDTA bulb
15) Plane Bulb
16) Urine Bulb
17) Pippetes
18) Cover slips
19) Microscope
20) Filter papers
21) Spirit lamp
22) Auto analyzers
23) Test tubes
24) Brush
25) Beaker
26) Funnel
27) Dispo moddle
28) Dispo syringe
29) Tourniquete
30) BT set
31) Slide
32) Slide stand
33) Incubatior
34) Petridish
35) Culture disk
36) Catheters
37) Urine bulbs
38) Timer
39) Reagents
40) Blood group kit
41) Nubar chamber
42) Lancets

Part 5

Journal **25**

Viva **25**