

**MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI-51**

1	Name of Course	<b>C. C. IN PATHOLOGY TECHNICIAN (W.E.F. 2015-16)</b>																																																													
2	Course Code	<b>201230</b>																																																													
3	Max.No.of Students Per Batch	25 Students																																																													
4	Duration	1 year																																																													
5	Type	Full Time																																																													
6	No.Of Days / Week	6 Days																																																													
7	No.Of Hours /Days	7 hrs.																																																													
8	Space Required	1) Workshop = 200 sq.foot 2) Class Room = 200 sq.foot TOTAL = 400 sq.foot 1) MOU with Pathology Lab with All facilities is required. 2) Distance between Hospital and Institute Should not be more than 10 Km.																																																													
9	Minimum Entry Qualification	S.S.C.																																																													
10	Objective Of Course	To train the students to carry out medical laboratory technical work in various departments in medical and pharmacy colleges, peripheral laboratories. Research and diagnostic centers.																																																													
11	Employment Opportunity	This course for Assisting Qualified person.																																																													
12	Teacher's Qualification	B.Sc., D.M.L.T.																																																													
13	Training System	<b>Training System Per Week</b> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Theory</td> <td>Practical</td> <td>Total</td> </tr> <tr> <td align="center">12 hrs</td> <td align="center">30 hrs</td> <td align="center">42 hrs</td> </tr> </table>						Theory	Practical	Total	12 hrs	30 hrs	42 hrs																																																		
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## **THEORY - I - MICROBIOLOGY AND SEROLOGY**

### **MICROBIOLOGY**

1. The microbial world and the structure of microbes
2. Morphological variation and classification
3. Bacterial Anatomy
4. Physiology and growth requirements of bacteria
5. Sterilization and Disinfection - Classification and different methods of sterilization
6. Culture media – Requirements, preparation and classification.
7. Methods of inoculation of culture media
8. Anaerobic culture methods
9. Morphological identification of bacteria by colony characteristic, staining and motility test.
10. Biochemical tests and their interpretation
11. Identifying characteristics of common pathogenic bacteria – Staphylococci, Streptococci, Pneumococcal, C. Diphtheria, TB bacilli, Salmonella typhi, Vibrio cholera
12. Antibiotic sensitivity test

### **SEROLOGY**

1. Antigen and Antibody – Definition, different types, preparation and preservation of antigens and antisera.
2. Types of Antigen-Antibody reactions.
3. Diagnostic serology – Methods and interpretation of Widal, Brucella agglutination test, Weil-Felix test, Kahn and VDRL Test, Wasserman reaction, Aldehyde test, ASO titre, ELISA.

## **THEORY - II - HAEMATOLOGY, BLOOD BANKING AND PATHOLOGY**

### **HAEMATOLOGY**

1. Composition of blood and their functions.
2. Haemopoietic system of the body - Origin and development of blood cells.
3. Collection of blood for haematological studies
4. Anticoagulants – Composition, amount, mechanism of action.
5. Determination of Total RBC, WBC and Platelet count, Differential WBC count, Hb Estimation, examination of peripheral blood smear, ESR, PCV, calculation of erythrocyte indices.
6. Anaemia – Classification and identification of types of anaemia.
7. Mechanism of coagulation and BT, CT and PT
8. Reticulocyte count
9. Absolute eosinophil count
10. Bone marrow – types, preparation and staining of smear.
11. Automation in haematology – Introduction and basic principle. Cell counting by impedance method and advantages Coulter counter
12. Study of complete of complete Histogram and lab diagnosis of Diseases.

### **BLOOD BANKING**

1. Blood groups – ABO and Rh Blood grouping – procedure and Clinical significance
2. Collection and processing of blood from the donor in blood bank
3. Compatibility testing (Cross matching)

### **CLINICAL PATHOLOGY**

1. Urine Analysis – physical, chemical and microscopic examination
2. Stool examination
3. Semen Analysis
4. Examination of CSF

### **HISTOPATHOLOGY**

1. Structure of an animal cell
2. Different types of body tissues
3. Collection and processing of the tissue – Autopsy and biopsy, Fixation, dehydration, clearing, embedding, decalcification
4. Different types of microtomes and microtome knives
5. Staining of the tissues – Simple and special stains, types of staining , H and E staining .

## **THEORY - III - BIOCHEMISTRY AND LABORATORY MANAGEMENT**

### **BIOCHEMISTRY**

1. Basic chemistry- matter, substance, atom and molecules element, compound
2. Carbohydrates – General properties, classification and functions
3. Lipids – General properties, classification and functions
4. Proteins - General properties, classification and functions
5. Principles of Analytical biochemistry – Colorimetry, Spectrophotometry, Flame photometry, Fluorimetry, Semiautoanalyzer, ELISA, RIA
6. Physical Chemistry – Ph and buffers, Radioactivity, Electrophoresis, Chromatography
7. Clinical Biochemistry – Specimen processing for biochemical analysis – Estimation of Blood sugar, Urea, NPN, Cholesterol, Triglycerides, Creatinine, Total proteins, Bilirubin, Alkaline phosphatase, Acid phosphatase.

### **LABORATORY MANAGEMENT**

1. Organization of clinical laboratory and role of medical laboratory technician
2. Safety regulation
3. Quality control in laboratory
4. First aid measures
5. Laboratory records
6. Introduction to laboratory equipments
7. Specimen handling

## **PRACTICAL - I - MICROBIOLOGY AND SEROLOGY**

1. The Microscope – Its different parts and uses
2. Sterilization and Disinfection – Operation of Autoclave, Hot air oven, incubator and water bath. Various types of filters, chemical agents of disinfection
3. Preparation of culture media
4. Preparation of stains and biochemical reagents
5. Monochrome staining
6. Gram's staining
7. Acid fast staining
8. Biochemical reactions
9. Culture and antibiotic sensitivity test of pus, urine and stool.
10. Sero-diagnostic tests – (to be demonstrated) – Widal, VDRL, RA test, UPT, HIV test, ASO test, CRP test, Australia antigen test and Mantoux test

## **PRACTICAL - II - HAEMATOLOGY, BLOOD BANKING AND PATHOLOGY**

1. Collection of blood – Venipuncture and skin puncture method
2. Haemocytometry – Counting of blood cells – Total RBC count, Total WBC count and Platelet count
3. Differential WBC count
4. Examination of peripheral blood smear and malarial parasite smears.
5. Estimation of Haemoglobin – various methods
6. Estimation of ESR – Westergren's and wintrobe's method
7. Estimation of PCV – Wintrobe's and Micro-Haematocrit method
8. Osmotic fragility test

## **PRACTICAL - III - BIOCHEMISTRY AND LABORATORY MANAGEMENT**

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### **LABORATORY MANAGEMENT**

7. Organization of clinical laboratory and role of medical laboratory technician
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## List of Equipments Required to available in Institute

### **Biochemistry 1**

1. Hot Plate 1
2. Gas Cylinder with Burner 1
3. Spirit lamps 15
4. Hand Centrifuges 5
5. Electrical Centrifuges 1
6. Refrigerator 165 lit. 1
7. Colorimeter 1
8. Hot air oven 1
9. Water bath 1
10. Analytical Balance 5
11. Physical Balance 2
12. Typewriter
13. Flame photometer 1
14. Spectro Photometer
15. Flourimeter 1
17. PH Meter
18. Incubator 1
19. Electrophoresis apparatus 1
20. Computer 1
21. Semi auto analyser 1

### **Glassware**

1. Test tubes  
18 x 150 mm - 100  
15 x 150 mm - 100  
15 x 125 mm - 100
2. Centrifuge tubes 36  
16 x 100 mm - 200
3. Fol in sugar tube 30
4. Beaker-glass and polypropylene 250 ml 5

5. Pipettes

a) Volumetric-capacity

2 ml - 6 Nos

5 ml - 5 Nos

10 ml - 6 Nos

20 ml - 5 Nos

25 ml - 5 Nos

b) Serological blow out type

1 ml 1/100 - 10 nos.

2 ml 1/100 - 10 nos.

5 ml 1/100 - 10 nos.

1.10 ml 1/10ml - 5 nos.

2 ml 1/10 ml - 5 nos.

0.1 ml 1/100 ml - 5 nos.

0.2 ml 1/100 - 5 nos.

c) Ostwald pipettes

0.1 ml - 4 Nos.

0.2 ml - 4 nos.

0.5 ml - 4

6. Burettes

25 ml - 4

50 ml - 4

7. Reagent Bottles

60 ml - 10 nos.

120 ml - 10 nos.

250 ml - 20 nos.

500 ml - 5 nos.

100 ml - 5

8. Dropper bottles 30 ml 5 nos.

9. Watch glass (Assorted sizes) - 6 Nos
10. Volumetric Flasks
  - 25 ml - 6 nos.
  - 50 ml - 6 nos.
  - 100 ml - 10 nos.
  - 250 ml - 10 nos.
  - 500 ml - 10 nos.
  - 1000 ml - 5 nos.
11. Stoppered graduated Test Tubes
  - 15 ml - 10 nos.
  - 40 ml - 10 nos.
  - 50 ml - 10 nos.
12. Distillation assembly (glass)
  - Complete set 1
13. Condensor 1
14. Round Bottom
  - flask 500 ml - 1 no.
  - 1000 ml - 1 no.
15. Filter Paper - Ordinary - 1 Ream
16. Whatman Filter Paper 46x57 cm No 1 - 20 sheet
  - No 2 - 10 sheets
17. Cotton (absorbant) 5 Rolls
18. Glass slides 5 boxes
19. Plastic Wash bottles 50 ml. 10 nos.
20. Mortar/Pestle - 2 nos.

### **Microbiology**

1. Student Microscope - 5
2. Centrifuge - 2
3. Refrigerator - 1
4. Autoclave - 1
5. Hot air oven - 1
6. Incubator - 1
7. Inspissator - 1
8. Deioniser - 1
9. Distil water plant - 1
10. Pipette washer - 1
11. Anaerobic Jar - 1
12. Vaccum Pump - 1
13. Analytical Balance - 1
14. Water Bath - 1
15. VDRL Rotator - 1
16. Electrophoresis apparatus - 1
17. Petri dishes - 100 x 17 - 100 nos
18. Test Tubers - 150 x 19 -100  
100 x 12 -100
19. Pipettes  
10 ml - 10 nos.  
5 ml - 10 nos.  
1 ml - 10 nos.
20. Wash bottles - 5
21. Spatulas - 12
22. Reagent bottles - 10
23. Measuring Cylinders 50 ml - 5

**Pathology**

1. Microscope 1
2. Hot air oven 1
3. Incubator 1
4. Centrifuge 1
5. Blood cell counter 2
6. Water Bath 1
7. Chemical Balance 1
8. Hot plate 1
9. Stopwatch 1
10. Haemometer 5
11. Haemocytometer 5
12. ESR stand 5
13. ESR Tubes 5
14. Mortor and Pestle 2
15. Urinometer 2
16. Spiritlamp 2
17. Syringe
  - 20 ml - 10
  - 10 ml - 10
  - 5 ml - 5
  - 2 ml - 2
18. Beaker
  - 100 ml - 5
  - 250 ml - 5

**A. Collaborating Institutions for Curriculum transaction**

1. All Hospitals
2. All Medical Colleges
3. All the national laboratories
4. Regional Research Laboratories
5. University Departments
6. Pharmaceutical Companies and Education Institutes

**B. On the Job Training Centres**

1. Government Head Quarters Hospital
2. PHCs
3. Dispensaries
4. Medical colleges
5. Private Hospitals
6. Private labs

## REFERENCE BOOKS

1. Praful-Godkar - Text Book of Medical Lab Technology
2. Ramnik Sood - Text Book of Medical Lab Technology
3. K.M. Samuel - Manual for Medical Lab Technology
4. Harold Varley - Practical Clinical Biochemistry
5. Lehninger - Textbook of Biochemistry
6. Rama Rao - Textbook of Biochemistry
7. C.C. Chatterjee - Human Physiology
8. Chowrasia - Human Anatomy
9. Anantha Narayan - Text Book of Microbiology
10. Toratora - Anatomy & Physiology
11. Indesten Singh - Histology
12. Chaurasia - Gross Anatomy
13. WHO Lab Manual

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