Syllabus

For the trade of

MEDICAL LAB. TECHNICIAN
(PATHOLOGY)

Under
Apprenticeship Training Scheme
In the Informal Sector

Designed in
2002

Government of India
Ministry of Labour (D.G.E.&T.)
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
EN – Block, Sector – V, Salt Lake
Kolkata -700 091
List of the Trade Committee members approved the syllabus for the trade of
“MEDICAL LABORATORY TECHNICIAN (PATHOLOGY)”
under A.T.S. in the Informal Sector

1. Shri H. Somasundaram, Director CSTARI, Kolkata Chairman
2. Dr. K. L. Mukherjee, Professor R. K. Mission & W.B.V.H.A., Kolkata Member
4. Dr.(Mrs.) Uma Ghosh Jay Prakash Institute of Social Change, Salt Lake Member
5. Dr. C. R. Ghose Jay Prakash Institute of Social Change, Salt Lake Member
6. Dr. S. K. Halder, Dy. Director Regional Labour Instute, Kolkata Member
7. Dr. A. C. De, C.M.O. Advanced Trg. Institute, Dasnagar, Howrah Member
8. Shri Basudev Dalal, Res. Officer Regl. Occupational Health Centre (E), ICMR, Kolkata Member
9. Shri S. P. Bera, Bio-medical Engineer Health & Family Welfare Deptt., Govt. of W.B. Member
10. Shri Tarak Banerjee W.B.V.H.A. Member
11. Shri A. K. Pal, D.D.T. RDAT, Kolkata Member
12. Shri Tapas Kr. Modak, Asstt. Director Dte. of Indl. Trg., Govt. of West Bengal Member
13. Shri T. Mukhopadhyay, D.D.T. CSTARI, Kolkata Member
14. Shri S. Kant, D.D.T. CSTARI, Kolkata Member
15. Shri S. Kumar, D.D.T. CSTARI, Kolkata Member
16. Shri A. K. Samaddar, JTA CSTARI, Kolkata Member
### GENERAL INFORMATION

1. Name of the Trade : MEDICAL LABORATORY TECHNICIAN (PATHOLOGY)

2. N. C. O. Code No. : 060.10

3. Duration of Apprenticeship Training : 6 Months  
   (Including one week Basic Training)

4. Entry Qualification : Passed 12th Class Examination under 
   (10+2) System of Education with Physics, Chemistry & Biology.

5. Rebate to Ex-Craftsmen Trainees : NIL

6. Ratio of Apprentice to Worker : 1 : 3

7. Examination : Practical & Viva voce at the end of the training.
SYLLABUS FOR THE TRADE OF
“MEDICAL LABORATORY TECHNICIAN (PATHOLOGY)”
UNDER APPRENTICESHIP TRAINING SCHEME

**DURATION:** 6 MONTHS

**BASIC TRAINING (ONE WEEK):**

Familiarisation of safety appliances, Laboratory works, solutions, storage of chemicals and Laboratory hazards.

**TRADE PRACTICAL:**

**Clinical Pathology**

Reception and labelling of Samples, record keeping, cleaning, Preparation of various stains and reagents.

**Examination of Blood** :- Blood cell formation and function, normal count of blood cells & their variations, Total count of RBC (ESR), WBC (TC, DC), Platelet, Hb estimation, Foetal Hb estimation, Hb electrophoresis, Serum electrophoresis, Complete hemogram, Clotting time & bleeding time, anaemia – investigation of anaemia, leukaemia – investigations, Blood picture, purpura, Bleeding disorders – investigation. Coagulation disorders Causes (implication of CT), Sugar, proteins (TP & albumin), lipid & LD bodies, Bile salts & pigments. Detection & analysis of stone, ketone bodies.

**Examination of Stool** :- Routine & Microscopic, Occult blood test, reducing substances, cyst, parasites.

**Examination of Urine** :- Routine & Microscopic, Occult blood test, 24 hours urinary protein & creatinine, Bence Jones protein and Specific gravity.

**Examination of Sputum** :- Routine & Microscopic, Examination of Ascetic fluid, pleural fluid gastric juice.

**Examination of Semen** :- Routine physical test; volume of ejaculate, viscosity, appearance, pH, liquification time. Routine Microscopic tests; Total sperm count (million/ml), motility grading (WHO grading), morphological abnormality, other cellular elements. Routine biochemical tests; seminal fructose, acid phosphates.

**Haematology and Blood Banking** :- Blood groups, Rh, Coomb's test (direct & indirect)/HbS Ag/HIV/Malaria/Thalassemia/Leptospira, blood collection & labelling, safe transfusion and cross matching, organisation of Blood Donation Camp. Blood components; preparation & storage, aphaeresis, donor motivation and screening, quality control. Lectins, maintenance of blood bank safety.
**Clinical Biochemistry** :-  Cleaning of glassware (Preparation of Reagents and Solutions), Preparation of standard curve of the parameter of interest, Calibration of Pipette including autopipette, Case of Chemical Biology Hazards, Quality Control (Pre analytical / analytical / post analytical), Use of Colorimeter / Spectrophotometer / Lambert Beer’s Law, Carbohydrates, Proteins, Lipids, Enzymes, Minerals, Vitamins, Drugs, Hormone, ELISA, Initial trouble shooting of instruments.

**Microbiology / Serology** :-  Collection of samples, Sterilisation / Heat / Millipore, Preparation of Media Nutrient agar, Blood agar, Mckonky Broth, classification of Bacteria, Identification, Gram Staining, Coagulase, Catalase, Diagnosis of Tuberculosis, Diphtheria, Leprosy, Gram negative Bacilli, Antibiotic sensitivity test, Widal, VDRL, Fungi, Microbiology of food (Toxin).

Hazards of Microbes and safe handling of Microbial organism.

**Histopathology** :-  Selection of tissue and washing specimen, Fixation including cryofixation, clearing & dehydration, Embedding (Vacuum), Processing for section cutting, Microtome operation including Cold Microtome / Cryostat operation, conditioning of specimen for staining, staining-Routine (haematoxylin – eosin / special staining (PAS, Fuelgen, Enzyme activity staining).
TRADE THEORY

Quality control in Laboratory works; Pure water, distilled & deionised water.

**Physical Chemistry**: Properties of matter Solution & Colligative properties (Solute and Solution), acid, alkal, pH and buffer, Ionisation, Electro chemistry, Colloids & surface phenomena, Electrophoresis & chromatography

**Bio-Physics**: Chemical Bonds & Reaction, Photometry, Flame photometry, Colorimetry, Spectrophotometry (Lambert-Beer’s Law), Spectrofluorometry, Biological Membranes. Microscope- working Principles & Use of physical properties of molecules of biological interest and interaction therein. Physical & chemical characterisation of biological macromolecular substances. Molecular spectroscopic techniques such as electronic absorption and emission. Optical rotary power, Magnetic Resonance.


Metabolism of Carbohydrate, Proteins, Lipids, Cholesterol, Amino acids, Haemins, Purines, Pyrimidines and Nucleic Acids.

Definition, nature, properties, Kinetics and mechanism of action of enzymes and co-enzymes, Clinical significance and interpretation of data, Biological oxidation and bio-energetic.

Lever function test, Kidney function test, GTT. Technique in Biomedical Science:-

1. Gel filtrations,
2. Ion Exchange chromatography,
3. Gel Electrophoresis (Native / non-denaturing & denaturing),
4. Ultra filtration,
5. Dialysis,
6. Thin Layer chromatography,
7. High pressure liquid chromatography (H.P.L.C.)

**Clinical Pathology**: Reception & labelling of samples, record keeping, cleaning. Preparation of various Stains & reagents.

Stool Examination :- Routine & Microscopical, Occult blood test, reducing substance.

Urine Examination :- Routine & Microscopical, Occult blood test, 24 hours Urinary protein, Bence-jones protein, Specific gravity.

Sputum Examination :- Routine & Microscopical, Examination of ascetic fluid, pleural fluid, gastric juice.

Blood groups, Rh, coomb’s test, safe transfusion and cross matching, Organisation of blood donation camp, blood component – preparation and storage, aphaeresis, donor motivation and screening, quality control. Lectins, maintenance of blood bank safety.

Microbiology & Serology :- Principle, working method and use of autoclaves, incubators, Hot air oven, Sterilizers. Preparation of Culture media, Isolation of bacteria from various sources, Motility testing and Staining methods.

Steps in bacterial identification including Serological tests.

Bio-chemical reactions, tests and interpretations.

Cocci, Bacilli, Corynebacteria, Mycobacteria, Enterobacteria, Antibiotic Sensitivity test.

Antigen – Antibody - definition, types & reactions.

Diagnostic Serology – Widal test, VDRL, WR, Aldalyde test, CFT etc.

Cytology :- Collection of material, study of cells. Preparation of stain like Pap, Leishman –Giemsa, MGG.