

# CSIR Integrated Skill Initiative



## Certificate course on Skill Development in Pathological Tools & Techniques for biomedical applications



This program is aimed at training candidates for the job of a “Medical Laboratory Technician” in the “Health care” Sector/ Industry/ Diagnostic Technician and aims at building the following key competencies amongst the learner.

<b>Program Name</b>	<b>&lt; Pathological Tools &amp; Techniques for biomedical applications &gt;</b>
<b>Duration</b>	6 weeks
<b>Pre-requisites to Training</b>	Class XII in Science Or Level 3 , B. Pharm+, B.Sc.+ , B.V.Sc. & A.H.+ , M.B.B.S.+
<b>Course Fee</b>	10,000/-
<b>Nodal Officer</b>	Dr. Madhav Nilakanth Mugale; Mobile No.: 9849607144
<b>Training Outcomes</b>	<b>After completing this programme, participants will be able to:</b> <ul style="list-style-type: none"><li>• Describe the health care sector and diagnostic services</li><li>• Perform clinical skills essential in providing basic diagnostic services such as Correctly collect, transport, receive, accept or reject and store blood / urine/ stool and tissue samples, etc.; Conduct analysis of body fluids / samples; Maintain, operate and clean laboratory equipment; Provide technical information about test results; Prepare and document medical tests and clinical results; etc.</li><li>• Explain quality assurance in Laboratory works</li><li>• Histopathology slide preparation</li><li>• Blood analysis</li><li>• Urine analysis</li><li>• Haemato- biochemistry</li><li>• Special staining of histopathology slides</li><li>• Post mortem technique</li><li>• Microbiology agar preparation and plating</li><li>• Practice infection control measures</li><li>• Ensure readily availability of medical and diagnostic supplies</li><li>• Demonstrate techniques to maintain the personal hygiene needs</li><li>• Demonstrate actions in the event of medical and facility emergencies</li><li>• Exhibit professional behavior, personal qualities and characteristics of a Medical Laboratory Technician</li><li>• Understanding the pathogenesis, data interpretation in research work</li><li>• Demonstrate good communication, communicate accurately and appropriately in the role of Medical laboratory Technician</li></ul>

### Guidelines for Assessment

1. Criteria for assessment for Each Performance Criteria (PC) will be assigned marks proportional to its importance.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC
3. Individual assessment will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)
4. Individual assessment will create unique evaluations for skill practical for every student at each Examination based on training criteria
5. To pass the Qualification Pack, every trainee should score as per assessment grid.
6. Passing % will be 60% for each (theory and practical).

# Curriculum

S.N	Module	Key Learning Topics
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1.	<b>Healthcare Systems, Laboratory &amp; Delivery</b>	<ul style="list-style-type: none"> <li>• Introduction to Pathology</li> <li>• Understanding the basic principles of pathology Functions</li> <li>• Understanding various Diagnostic Centers and medical laboratory facilities</li> </ul>
2.	<b>Role of the Pathology Technician</b>	<ul style="list-style-type: none"> <li>• To develop broad understanding of the Role of diagnostic pathology technician</li> <li>• To identify Laboratory maintenance needs to be taken care by pathology technician</li> <li>• To exhibit Ethical Behavior</li> <li>• Welfare and Ethical consideration during running of laboratory or animal experimentation?</li> </ul>
	<b>Practical</b>	<ul style="list-style-type: none"> <li>• <b>Various types of record/ SOP in the laboratory/ Hospital</b></li> </ul>
3.	<b>Structure and Function of Human Body/ animal body</b>	<ul style="list-style-type: none"> <li>• Basic understanding of organization of body cells, tissues, organs, organ systems, membranes and glands in human body (Human / animal)</li> <li>• Understanding basic unit of body-Cell</li> <li>• Understanding different parts of body</li> </ul>
	<b>Practical</b>	<ul style="list-style-type: none"> <li>• <b>Preparation of various reagent and stain (10% NBF, Leishman stain, Giemsa stain, Hematoxylin &amp; Eosin stain)</b></li> <li>• <b>Principles of NABL and GLP accreditation and visit to lab.</b></li> </ul>
4.	<b>Body Fluids</b>	<ul style="list-style-type: none"> <li>• Elementary knowledge of chemistry</li> <li>• Understand blood cells in detail</li> <li>• Understand Haemostasis &amp; Coagulation Mechanism and testing in detail</li> </ul>
	<b>Practical</b>	<ul style="list-style-type: none"> <li>• <b>Blood sample collection: Human and rats</b></li> <li>• <b>To gain broad understanding of correct procedure of sample transportation</b></li> </ul>
5.	<b>Introduction to Laboratory related Medical Terminology</b>	<ul style="list-style-type: none"> <li>• To gain broad understanding of different types of samples to be taken in medical laboratory</li> <li>• To gain broad understanding about Sample Handling</li> <li>• To gain broad understanding of correct method of blood sample collection.</li> </ul>
	<b>Practical</b>	<ul style="list-style-type: none"> <li>• <b>Hemoglobin and E.S.R. estimation</b></li> </ul>
6.	<b>Personnel Hygiene</b>	<ul style="list-style-type: none"> <li>• To be equipped with Techniques of Use of PPE</li> <li>• To be vaccinated against common infectious diseases</li> </ul>
	<b>Practical</b>	<ul style="list-style-type: none"> <li>• <b>Total WBCs and RBCs counting</b></li> </ul>
7.	<b>Bio Medical Waste Management</b>	<ul style="list-style-type: none"> <li>• To gain understanding of importance of proper and safe disposal of bio-medical waste &amp; treatment</li> <li>• To gain understanding of categories of bio- medical waste</li> <li>• To learn about disposal of bio-medical waste – color coding, types of containers, transportation of waste, etc.</li> </ul>
	<b>Practical</b>	<ul style="list-style-type: none"> <li>• <b>To gain broad understanding of means of bio- medical waste treatment</b></li> <li>• <b>Practical demonstration and classification of biomedical waste</b></li> </ul>
8.	<b>Introduction to Bacteriology, Immunology and Serology</b>	<ul style="list-style-type: none"> <li>• To gain Broad Understanding about Introduction to Microbiology</li> <li>• Understand common methods of sterilization &amp; disinfections</li> <li>• Understand cultivation of bacteria</li> <li>• Basic Immunology and common immune diseases</li> <li>• To gain Broad Understanding about Immunology and Serology</li> </ul>
	<b>Practical</b>	<ul style="list-style-type: none"> <li>• <b>Culturing and plating</b></li> <li>• <b>Gram staining</b></li> </ul>

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| 9.  | <b>Clinical Pathology: Blood group</b>                                     | <ul style="list-style-type: none"> <li>• Understand ABO blood group system in detail</li> <li>• Understand Rh blood group system in detail</li> <li>• Understand other blood group systems in brief</li> <li>• Understand methodology to identify blood groups</li> </ul>  |
|     | <b>Practical</b>   | <ul style="list-style-type: none"> <li>• <b>Hematology analysis: By running the QC &amp; test sample</b></li> <li>• <b>Blood group: Interpretation</b></li> </ul>  |
| 10. | <b>Introduction to Clinical Pathology</b>                                  | <ul style="list-style-type: none"> <li>• Erythroid series cell formation, Function and their normal cell count &amp; their variation?</li> <li>• Reticulocyte count? Different stain preparation</li> </ul>  |
|     | <b>Practical</b>   | <ul style="list-style-type: none"> <li>• <b>Introduction to analyzer: Clinical pathology</b></li> <li>• <b>Serum and plasma separation</b></li> <li>• <b>Liver function test and Kidney function test</b></li> </ul>   |
| 11. | <b>Post mortem Observing &amp; Reporting</b>                               | <ul style="list-style-type: none"> <li>• Dummy necropsy and sample collection for histopathology</li> </ul>  |
|     | <b>Practical</b>   | <ul style="list-style-type: none"> <li>• <b>Postmortem examination</b></li> <li>• <b>Post mortem report preparation</b></li> </ul>   |
| 12. | <b>Introduction to Histopathology</b>                                      | <ul style="list-style-type: none"> <li>• Preservation and fixation</li> <li>• Histopathology process and its principles</li> </ul>   |
|     | <b>Practical</b>   | <ul style="list-style-type: none"> <li>• <b>Histopathology techniques</b></li> </ul>   |
| 13. | <b>Infection control and prevention</b>                                    | <ul style="list-style-type: none"> <li>• Preparation of block &amp; rough trimming</li> </ul>  |
|     | <b>Practical</b>   | <ul style="list-style-type: none"> <li>• <b>Preparation of Histopathological slide (S)</b></li> <li>• <b>H and E staining</b></li> </ul>   |
| 14. | <b>Special Staining</b>  | <ul style="list-style-type: none"> <li>• Safe and comfortable sample collection</li> <li>• Describe importance and methodology of cleanliness, and hygiene environment in collection space</li> </ul>  |
|     | <b>Practical</b>   | <ul style="list-style-type: none"> <li>• <b>Special staining: Masson trichrome for collagen, staining for fat, PAS</b></li> </ul>  |
| 15. | <b>Introduction to Cytopathology</b>                                       | <ul style="list-style-type: none"> <li>• Explain basics of cytology / cytopathology</li> <li>• Basics of staining and its requirement during diagnosis</li> </ul>  |
|     | <b>Practical</b>   | <ul style="list-style-type: none"> <li>• <b>Blood smear preparation</b></li> <li>• <b>Staining of blood smear</b></li> </ul>   |
| 16. | <b>Practical</b>   | <ul style="list-style-type: none"> <li>• <b>Use and demonstration of diagnostic kits</b></li> <li>• <b>Biopsy or cytology staining</b></li> </ul>  |
| 17. | <b>Fine needle aspiration</b>  | <ul style="list-style-type: none"> <li>• Understand the purpose of fine needle aspiration</li> </ul>   |
|     | <b>Practical</b>   | <ul style="list-style-type: none"> <li>• <b>Understand about HP section cutting and staining</b></li> <li>• <b>Hand on practice</b></li> </ul>   |
| 18. | <b>Introduction to Parasitology, Mycology and Virology</b>                 | <ul style="list-style-type: none"> <li>• Describe the in brief various pathogenic organism</li> <li>• Bacteria, Virus, parasite and fungi</li> </ul>   |
|     | <b>Practical</b>   | <ul style="list-style-type: none"> <li>• <b>Identification of various blood cells?</b></li> <li>• <b>Clinical importance of blood cells?</b></li> </ul>  |
| 19. | <b>Stool examination</b>   | <ul style="list-style-type: none"> <li>• Importance of stool examination</li> <li>• <b>Describe source of error/interference /quality of work and initiate corrective action as applicable</b></li> <li>• <b>Describe assessment of results to initiate follow-up testing</b></li> <li>• <b>Differentiation between clinically significant and insignificant findings</b></li> </ul> |
|     | <b>Practical</b>   | <ul style="list-style-type: none"> <li>• <b>Preparation of stool sample</b></li> <li>• <b>Identification of pathological cause</b></li> </ul>  |
| 20. | <b>Introduction to Advanced techniques and future trends in laboratory</b> | <ul style="list-style-type: none"> <li>• Updated on advanced techniques and future trends in field of diagnostic microbiology</li> <li>• Updated on advanced techniques and future trends in field of molecular diagnostic technique</li> </ul>  |

	<b>Practical</b>	<ul style="list-style-type: none"><li>• <b>Molecular diagnostic techniques practical</b></li><li>• <b>Immunohistochemistry</b></li></ul>
21.	<b>Introduction to Advanced techniques and future trends in laboratory science-II</b>	<ul style="list-style-type: none"><li>• Principles of PCR</li></ul>
	<b>Practical</b>	<ul style="list-style-type: none"><li>• <b>RT-PCR</b></li></ul>
22.	<b>Urology</b>	<ul style="list-style-type: none"><li>• Importance of urine examination</li><li>• Preservation of Urine</li></ul>
	<b>Practical</b>	<ul style="list-style-type: none"><li>• <b>Analysis of urine, &amp; report preparation</b></li><li>• <b>Macroscopic and microscopic</b></li></ul>
23.	<b>Soft Skills and Communications</b>	<ul style="list-style-type: none"><li>• Able to handle effective Communication with Peers/colleagues using medical terminology in communication</li><li>• Learn problem solving</li></ul>
	<b>Practical</b>	<ul style="list-style-type: none"><li>• <b>Opportunity of pathological skill</b></li></ul>