

National Curriculum of Pakistan
2022-23

TECHNICAL EDUCATION

MEDICAL SCIENCE

Clinical Pathology and Serology (Theory)
Grades 12



NATIONAL CURRICULUM COUNCIL SECRETARIAT
MINISTRY OF FEDERAL EDUCATION AND
PROFESSIONAL TRAINING, ISLAMABAD
GOVERNMENT OF PAKISTAN

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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It is with great pride that we, at the National Curriculum Council Secretariat, present the first core curriculum in Pakistan's 75-year history. Consistent with the right to education guaranteed by Article 25-A of our Constitution, the National Curriculum of Pakistan (2022-23) aspires to equip every child with the necessary tools required to thrive in and adapt to an ever-evolving globalized world.

The National Curriculum is in line with international benchmarks, yet sensitive to the economic, religious, and social needs of young scholars across Pakistan. As such, the National Curriculum aims to shift classroom instruction from rote learning to concept-based learning.

Concept-based learning permeates all aspects of the National Curriculum, aligning textbooks, teaching, classroom practice, and assessments to ensure compliance with contemplated student learning outcomes. Drawing on a rich tapestry of critical thinking exercises, students will acquire the confidence to embark on a journey of lifelong learning. They will further be able to acknowledge their weaknesses and develop an eagerness to build upon their strengths.

The National Curriculum was developed through a nationwide consultative process involving a wide range of stakeholders, including curriculum experts from the public, private, and non-governmental sectors. Representatives from provincial education departments, textbook boards, assessment departments, teacher training departments, *deeni madaris*, public and private publishers, private schools, and private school associations all contributed their expertise to ensure that the National Curriculum could meet the needs of all Pakistani students.

The experiences and collective wisdom of these diverse stakeholders enrich the National Curriculum, fostering the core, nation-building values of inclusion, harmony, and peace, making the National Curriculum truly representative of our nation's educational aspirations and diversity.

I take this opportunity to thank all stakeholders, including students, teachers, and parents who contributed to developing the National Curriculum of Pakistan (2022-23)

Dr. Mariam Chughtai

Director

National Curriculum Council Secretariat

Ministry of Federal Education and Professional Training

Clinical Pathology and Serology Progression Grid (Theory)

Domain A: Introduction to Medical Technology

Standard: The study of Introduction to Medical Technology facilitates students in acquiring and applying scientific knowledge and skills related to medical technology.

Grade 12

Benchmark I: Student will be able to

- Explain the roles of lab technicians, ethical considerations, record-keeping, and organization in lab
- Describe Quality Control (QC) methods in various pathology branches.
- Explain the types, uses, and cleaning procedures of laboratory glassware.

[SLO: CPS-12-A-01]:

Describe sampling procedures, collection, storage, and preparation of samples.

[SLO: CPS-12-A-02]:

Explain the roles of lab technicians, ethical considerations, record-keeping, and organization in lab management.

[SLO: CPS-12-A-03]:

Describe Quality Control (QC) methods in various pathology branches, their importance and applications.

[SLO: CPS-12-A-04]:

Explain the types, uses, and cleaning procedures of laboratory glassware and their relevance to lab work.

Domain B: Urine Analysis

Standard: urine examination facilitates students in acquiring and applying scientific knowledge and skills essential for medical diagnostics.

Grade 12

Benchmark I: Student will be able to

- Describe the key components and procedures involved in the analysis of a urine sample.
- Explain the qualitative examination of urine
- Define the parameters involved in the physical examination of a urine sample

[SLO: CPS-12-B-01]:

Describe the key components and procedures involved in the analysis of urine sample (composition, function, methods of collection, and transportation).

[SLO: CPS-12-B-02]:

Define the parameters involved in the physical examination of a urine sample (volume, odor, color, appearance, and specific gravity)

[SLO: CPS-12-B-03]:

Explain the qualitative examination of urine (presence of protein, glucose, ketone bodies, bile salts, and hemoglobin).

[SLO: CPS-12-B-04]:

Identify and interpret urine sediments, their significance, methods of calculation, and understanding of normal values.

Domain C: C.S.F Examination

Standard: The study of CSF examination facilitates students in acquiring and applying scientific knowledge and skills pertaining to Cerebrospinal fluid.

Grade 12

Benchmark I: Student will be able to

- Identify the components of normal CSF
- Describe normal cellular elements present in CSF
- Explain the importance of CSF examination in the diagnosis of various disorders.

[SLO: CPS-12-C-01]:

Describe the biochemical composition of CSF.

[SLO: CPS-12-C-02]:

Identify the components of normal CSF.

[SLO: CPS-12-C-03]:

Describe normal cellular elements present in CSF (e.g., lymphocytes, neutrophils) and differentiate them from abnormal cells

[SLO: CPS-12-C-04]:

Explain the importance of CSF examination in the diagnosis, management, and monitoring of various neurological conditions.

Domain D: Gastric Examination

Standard: The content of gastric examination enables students to learn and apply scientific knowledge related to gastric examination.

Grade 12

Benchmark I: Student will be able to

- Describe the formation process of gastric juice
- Identify normal findings in gastric juice analysis
- Explain the abnormal findings in gastric juice analysis for the diagnosis of gastrointestinal disorders

[SLO: CPS-12-D-01]:

Describe the formation process of gastric juice.

[SLO: CPS-12-D-02]:

Explain the physiological functions of gastric juice in the digestive process.

[SLO: CPS-12-D-03]:

Outline the necessary patient preparations for gastric juice (fasting requirements and medication restrictions)

[SLO: CPS-12-D-04]:

Identify normal findings in gastric juice analysis (pH levels, enzyme activity, and mucosal integrity)

[SLO: CPS-12-D-05]:

Explain the abnormal findings in gastric juice analysis for the diagnosis of gastrointestinal disorders.

Domain E: Pregnancy test

Standard: The study of pregnancy tests facilitates students in acquiring and applying scientific knowledge pertaining to reproductive physiology and diagnostic techniques.

Grade 12

Benchmark I: Student will be able to

- Describe general considerations involved in pregnancy test analysis
- Explain the biological precursors of pregnancy tests
- Explain the principles of immunological testing methods used in pregnancy tests

[SLO: CPS-12-E-01]:

Describe general considerations involved in pregnancy test analysis (timing of testing, types of pregnancy tests available, and factors affecting test accuracy).

[SLO: CPS-12-E-02]:

Explain the biological precursors of pregnancy tests (human chorionic gonadotropin (hCG), and their role in indicating pregnancy

[SLO: CPS-12-E-03]:

Explain the principles of immunological testing methods used in pregnancy tests.

[SLO: CPS-12-E-04]:

Describe the procedures involved in conducting immunological pregnancy tests (sample collection, application of the test kit, and interpretation of test results).

[SLO: CPS-12-E-05]:

Discuss the sensitivity, specificity, and limitations of immunological pregnancy tests,

Domain F: Glucose Tolerance Test

Standard: The study of glucose tolerance tests facilitates students in acquiring and applying scientific knowledge pertaining to the regulation of blood sugar levels, metabolic processes, and the diagnosis and management of various conditions.

Grade 12

Benchmark I: *Student will be able to*

- Explain the preparation of the patient for a glucose tolerance test
- Explain the significance of the glucose tolerance test in diagnosing various conditions

[SLO: CPS-12-F-01]:

Explain the preparation of the patient for a glucose tolerance test (dietary instructions, fasting requirements, and potential risks or side effects).

[SLO: CPS-12-F-02]:

Describe the steps involved in preparing for the glucose tolerance test procedure (obtaining fasting blood samples, administering glucose solution, and monitoring blood glucose levels at specific time intervals).

[SLO: CPS-12-F-03]:

Explain the significance of the glucose tolerance test in diagnosing various conditions.

Domain G: Serology

Standard: The study of serology facilitates students in acquiring and applying scientific knowledge and skills pertaining to serology.

Grade 12

Benchmark I: Student will be able to

- Define serological testing, its scope in diagnosing diseases
- Explain the principles of antigen-antibody interactions in serological testing
- learn specific serological tests used in the diagnosis of infectious diseases

[SLO: CPS-12-G-01]:

Define serological testing, its scope in diagnosing diseases, along with its limitations and challenges.

[SLO: CPS-12-G-02]:

Explain the principles of antigen-antibody interactions in serological testing (different types of reactions such as agglutination, precipitation, and immunofluorescence).

[SLO: CPS-12-G-03]:

Describe the practical applications of antigen-antibody reactions in serological assays.

[SLO: CPS-12-G-04]:

learn specific serological tests used in the diagnosis of infectious diseases (widal tests, Anti-Streptolysin O Titer (ASOT) and Venereal Disease Research Laboratory (VDRL).

Clinical Pathology and Serology (Practical)

Domain H: Clinical Pathology and Serology (Practical)

Standard: The content of the Clinical Pathology and Serology facilitates students in acquiring and applying scientific knowledge and skills related to clinical pathology and serology.

Grade 12

Benchmark I: Students will demonstrate proficiency in essential clinical pathology and serology skills, including:

- Demonstrate the collection and methods of sample for analysis
- Demonstrate how to clean glassware for different purposes
- Demonstrate how to collect sample of urine for analysis
- Explain the physical examination of urine (color, volume, and odor).
- Demonstrate the pregnancy and immunochemical testing
- Demonstrate 24 hours urine estimation (Eshback's method)
- Explain the basics of C.S.F sampling
- Describe the gastric juice examination and collection of samples

[SLO: CPS-12-H-01]:

Demonstrate the collection and methods of sample for analysis.

[SLO: CPS-12-H-02]:

Explain the basics of organization and management in laboratory

[SLO: CPS-12-H-03]:

Demonstrate the storage of reagent and operation of equipment.

[SLO: CPS-12-H-04]:

Demonstrate how to clean glassware for different purposes

[SLO: CPS-12-H-05]:

Explain the distillation and deionization process.

[SLO: CPS-12-H-06]:

Demonstrate how to collect sample of urine for analysis.

[SLO: CPS-12-H-07]:

Explain the physical examination of urine (color, volume, and odor).

[SLO: CPS-12-H-08]:

Describe the proteinuria general information.

[SLO: CPS-12-H-09]:

Demonstrate 24 hours urine estimation (Esback's method)

[SLO: CPS-12-H-10]:

Explain the basics of bence jones proteins detection in urine sample.

[SLO: CPS-12-H-11]:

Describe the basics of reduction substance testing in urine sample

[SLO: CPS-12-H-12]:

Explain the basics of ketones bodies testing in urine sample

[SLO: CPS-12-H-13]:

Demonstrate the basics of Bile salts testing in urine sample.

[SLO: CPS-12-H-14]:

Demonstrate the basics of Hemoglobin testing in urine sample.

[SLO: CPS-12-H-15]:

Explain the basics of urobilinogen testing in urine sample.

[SLO: CPS-12-H-16]:

Demonstrate the urinary sediments through microscopic examination

[SLO: CPS-12-H-17]:

Describe the examination of RBC's, WBC's and epithelial cells in urine.

[SLO: CPS-12-H-18]:

Describe the different types of cast in urine sample

[SLO: CPS-12-H-19]:

Explain the various types of urinary crystals and their importance

[SLO: CPS-12-H-20]:

Explain the basics of C.S.F sampling.

[SLO: CPS-12-H-21]:

Demonstrate the physical examination of C.S.F sample

[SLO: CPS-12-H-22]:

Demonstrate the total cell count in C.S.F sample

[SLO: CPS-12-H-23]:

Explain the chemical examination for glucose, proteins, globulin and chloride

[SLO: CPS-12-H-24]:

Explain the cytological examination in C.S.F sample

[SLO: CPS-12-H-25]:

Explain the bacterial examination in C.S.F sample

[SLO: CPS-12-H-26]:

Describe the gastric juice examination and collection of samples

[SLO: CPS-12-H-27]:

Demonstrate the pregnancy and immunochemical testing

[SLO: CPS-12-H-28]:

Explain the basics of semen analysis.

[SLO: CPS-12-H-29]:

Demonstrate glucose tolerance test considerations and preparation of patient

[SLO: CPS-12-H-30]:

Describe the glucose tolerance curve and its importance

[SLO: CPS-12-H-31]:

Demonstrate the widal testing and reagent requirements with interpretation

[SLO: CPS-12-H-32]:

Describe the mechanism and apparatus requirement of Kahn test

[SLO: CPS-12-H-33]:

Explain the Wassermann test procedure and interpretation.

[SLO: CPS-12-H-34]:

Demonstrate the interpretation and procedure of A.S.O.T

[SLO: CPS-12-H-35]:

Demonstrate the interpretation and procedure of R.A

[SLO: CPS-12-H-36]:

Demonstrate the interpretation and procedure of V.D.R.L

[SLO: CPS-12-H-37]:

Demonstrate the interpretation and procedure of Pregnancy test.



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