CBSE | DEPARTMENT OF SKILL EDUCATION CURRICULUM FOR SESSION 2022-2023

MEDICAL DIAGNOSTICS (SUBJECT CODE 828)

JOB ROLE: Medical Lab Technician

Total Marks: 100 (Theory-60 + Practical-40)

Class XI & XII

COURSE OVERVIEW:

The course is designed to facilitate learning the essentials of Medical Diagnostics. Design of the course shall aid in developing skills required in planning and executing Laboratory process. Laboratory techniques along with fundamentals of laboratory management shall direct the learning process and will ensure efficient and effective understanding and performance in all spheres of laboratory works.

OBJECTIVES OF THE COURSE:

In this course, the students will be introduced to the fundamental concepts of medical technology and the career opportunities available in this field. This course provides an insight to the students regarding various issues associated with laboratory works like Investigation of Bio-fluids, Analysis of blood smear, and Works in blood bank etc. and building up goodwill and reputation of Laboratory or Hospitals with the essential concepts of Medical diagnostics. Class participation would be fundamental for the development of transferrable skills.

Followings are the main objectives of this course.

- To familiarize the students regarding various dimensions of Medical lab technology and career opportunities available in these fields.
- To develop practical understanding among the students associated with Medical lab through classroom discussion/ participation and projects.
- To develop transferrable skills among the students for managing Laboratory works efficiently so that they could be ready to join the Laboratory functions in any organization.
- To provide knowledge to students in concise and understandable format so that students could learn and apply these concepts in their career for the growth.
- To provide brief insight about personal grooming and its stages, meaning and importance of knowledge of Laboratory base works and other key dimensions of laboratory management in Hospitals.

SALIENT FEATURES:

- Medical diagnostics is originally an important part of promotion in Lab technology.
- Medical diagnostics has existed for ages and is time format of Lab works.
- Medical diagnostics provides an opportunity to the technicians to become well equipped in their area.
- It involves departmental interaction with the patients and attendants to ensure a quality service.
- It ensures identification of diseases facilitates treatment procedures and ensures recovery by maintaining good relations between Health care professionals and patients.
- Medical diagnostics bridges the knowledge gap between the Health care professionals and Patients and makes information available to the Patients and enhances their understanding about the disease and treatment procedures.

LIST OF EQUIPMENT AND MATERIALS:

The list given below is suggestive and an exhaustive list should be prepared by the skill teacher. Only basic tools, equipment and accessories should be procured by the Institution so that the routine tasks can be performed by the students regularly for practice and acquiring adequate practical experience.

Laboratory should contain the following: -

- Leishman's Stain
- Slide and coverslip
- Rubbing alcohol
- Lancet
- Cotton wool
- Piece of cotton clothe
- Staining rack
- Blood Grouping Reagents
- Centrifuge
- Artificial urine prepared by teacher (with the help of chemical salts according to composition of urine)
- Glacial acetic acid
- Sodium nitroprusside
- Liquor ammonia
- Benedict's reagent
- Sulphur powder

- Benzidine powder
- Hematoxylin and Eosin stain
- Pipette
- Burning mixture
- Lamp
- Test tubes
- Test tube holders
- Apron for students
- Histopathological slides

CAREER OPPORTUNITIES:

Medical diagnostics as a functional domain offers immense career opportunities to all age group of people irrespective of qualification, gender, race and religion. Following career opportunities are available in this field. Students can make their career in any field based on their interest and suitability in

- Forensic Science
- Medical lab technology
- Pathology
- Biotechnology
- Cytology
- Pharmacy

VERTICAL MOBILITY:

At Bachelor level, students may start their career as an assistant lab technician and they can reach at managerial level over the period of time. For the career progression, following career options are available in Medical diagnostics field.

- Assistant Medical lab technicians
- Blood Collectors for Lab purpose
- Lab receptionist
- Medical representative
- Medical transcriptionist

CURRICULUM:

This course is a planned sequence of instructions consisting of Units meant for developing employability and Skills competencies of students of Class XI and XII opting for Skills subject along with other subjects.

MEDICAL DIAGNOSTICS (Subject Code - 828)

CLASS –XI

Total Marks: 100 (Theory-60 + Practical-40)

	UNITS	NO. OF HOURS for Theory and Practical	MAX. MARKS for Theory and Practical
Part A	**Employability Skills**		
	Unit 1 : Communication Skills-III	13	2
	Unit 2 : Self-Management Skills-III	07	2
	Unit 3 : ICT Skills-III	13	2
	Unit 4 : Entrepreneurial Skills-III	10	2
	Unit 5 : Green Skills-III	07	2
	Total	**50**	**10**
Part B	**Subject Specific Skills**		
	Unit 1: Investigation- Urine and feces Analysis	40	15
	Unit 2: Body Fluids	40	15
	Unit 3: Histopathology (Lab Process)	40	20
	Total	**120**	**50**
Part C	**Practical**		
	Project	50	10
	Viva based on Project		05
	Practical File/ Report / Portfolio / PowerPoint presentation		15
	Demonstration of skill competency via LabActivities		10
	Total	**50**	**40**
	GRAND TOTAL	**220**	**100**

NOTE: Detailed Curriculum/ Topics to be covered under Part A: Employability Skills can be downloaded from CBSE website.

PRACTICAL GUIDELINES FOR CLASS XI

Assessment of performance:

In class XI– Two examiners (internal examiner) assigned for the conduct and assessment of Practical Examinations each in Senior Secondary School Curriculum Question for the viva examinations should be conducted by the internal examiners. Question to be more of General nature, project work or the curriculum. Investigatory Project especially those that show considerable amount of effort and originality, on the part of the student, should get suitable high marks, while project of a routine or stereotyped nature should only receive MEDIOCRE marks.

Procedure for Assessment of practical project work: (Total 40 marks)

For students of Class XI projects has been emerging as a very interesting but sometimes challenging. It enhances understandability, creativity and innovativeness. It also improves presentation and communication skills. Keeping this in mind following guidelines have been framed to bring about uniformity and reward creative skills among students. Students can prepare a Project Report on activities performed in Medical room of school on the basis of their understandability and class room knowledge. They may get the guidance from their respective teacher in order to boost their skill and knowledge. The Project should be the sole work of student.

Viva based on Project -10 marks

The teacher conducting the final practical examination should ask verbal questions related to the project. If no project has been assigned /made by the students, viva must be based on subject as per the Curriculum only.

Project Report– 10 marks:

List of Projects:-

1. The students will find out the presence of Glucose in urine by Benedict Reagent's test in the Laboratory.
2. Students will find out the presence of Protein in given urine sample by Heat test.
3. The students will find out the presence of Ketone Bodies in Laboratory by Legal test.
4. The students will find out the presence of Ketone Bodies in Laboratory by Rothera's test.
5. The students will find out the presence of Bile salt in given urine sample with the help of sulphur powder test
6. The students will find out the presence of blood in given urine sample by Benzidine test.
7. The students will prepare charts and present the functions of body fluids.
8. The students will draw the diagram of circulation of CSF in human body.
9. The students will draw the diagram of normal and abnormal sperms.
10. The students will decorate the board about prevention of Male infertility to create awareness.
11. The students will arrange seminar about prevention of infectious diseases to create awareness among students.

12. The students will present their concepts about lung diseases that can be diagnosed by sputum analysis.
13. Students will prepare charts about Manual methods of Histopathological techniques in groups.
14. Students will identify following microscopic slides:
    a. Cerebellum
    b. Tongue
    c. Esophagus
    d. Stomach
    e. Duodenum
    f. Jejunum
    g. Ileum
    h. Large intestine
    i. Lungs
    j. Muscles (Skeletal, Cardiac and Smooth)
    k. Kidneys
    l. Ureters
    m. Skin
    n. Testis
    o. Ovary
    p. Uterus
15. The students will draw the structure of Microscope in file and they will describe the functions of different parts of Microscope.
16. The students will draw the diagrams of all histopathological tissues in their file with their characteristic features.
17. The students will stain any given histopathological tissue slide by using hematoxylin and eosin stain.
18. The students will present their views about their career scopes and interests by presentation.

PARAMETERS	**MARKS**
I) Relevance and Efficiency II) Effectiveness III) Impact IV) Sustainability V) Team Work VI) Regularity	35
Viva (Based on Curriculum)	05
TOTAL	**40**

MEDICAL DIAGNOSTICS (SUBJECT CODE 828)

CLASS–XII FOR SESSION 2022-23

Total Marks: 100 (Theory-60 + Practical-40)

	UNITS	NO. OF HOURS for Theory and Practical	MAX. MARKS for Theory and Practical
Part A	**Employability Skills**		
	Unit 1 : Communication Skills-IV*	13	-
	Unit 2 : Self-Management Skills- IV	07	3
	Unit 3 : ICT Skills- IV	13	3
	Unit 4 : Entrepreneurial Skills- IV	10	4
	Unit 5 : Green Skills- IV*	07	-
	Total	**50**	**10**
Part B	**Subject Specific Skills**		
	Unit 1: Hematology	40	20
	Unit 2: Blood bank	40	20
	Unit 3: Cytology	40	10
	Total	**120**	**50**
Part C	**Practical**		
	Project	50	10
	Viva based on Project		10
	Practical File/ Report / Portfolio / Power Point presentation		10
	Demonstration of skill competency via Lab Activities		10
	Total	**50**	**40**
	GRAND TOTAL	**220**	**100**

Note: *** marked units are to be assessed through Internal Assessment/ Student Activities. They are not to be assessed in Theory Exams**

DETAILED CURRICULUM/TOPICS:

Part-A: EMPLOYABILITY SKILLS

S. No.	Units	Duration in Hours
1.	Unit 1: Communication Skills-IV*	13
2.	Unit 2: Self-management Skills-IV	07
3.	Unit 3: Information and Communication Technology Skills-IV	13
4.	Unit 4: Entrepreneurial Skills-IV	10
5.	Unit 5: Green Skills-IV*	07
	TOTAL DURATION	**50**

Note: *** marked units are to be assessed through Internal Assessment/ Student Activities. They are not to be assessed in Theory Exams**

Detailed curriculum/ topics to be covered under Part A: Employability Skills can be downloaded from CBSE website

Part-B – SUBJECT SPECIFIC SKILLS

S. No.	Units	Duration in Hours
1.	Unit 1: Haematology	40
2.	Unit 2: Blood bank	40
3.	Unit 3: Cytology	40
	TOTAL DURATION	**120**

UNIT	SUB-UNIT	SESSION/ ACTIVITY/ PRACTICAL
1. HEMATOLOGY LAB	**1.1** Introduction	**Session:** Idea about Haematology laboratory
	1.2 Haematology lab instruments	**Session:** Understanding about • Centrifuge • Microscope • Automated Cell Counter • Coagulation Analyser
	1.3 Collection of blood sample	**Session:** Understanding about • Anticoagulants • Specimen collection
		Activity: Collection of blood by venepuncture method
	1.4 Preparation of blood smear*	**Practical:** • **Preparations of Blood smear*.**
	1.5 Reagents-preparation and their uses	**Session:** Understanding about • Different kinds of stains and reagents that are used in laboratory. • Diluting fluids for cell counting process.
	1.6 Staining methods*	**Practical:** • **Staining of Blood Smear by using Leishman's stain*.**
	1.7 Measurements and Quantitative analysis	**Session:** Understanding about • PCV and Erythrocyte Indices • ESR • LE cell • Osmotic fragility
		Activity – • **Blood cell counting(R.B.C, W.B.C, Platelets*** Reticulocytes and Absolute Eosinophil) • **Haemoglobin estimation***
		Performing the following experiments in laboratory • Overview of Haemocytometer • Osmotic Fragility test • Blood counting by Neuberger's Chamber(Demonstration) • Identification of different blood cells under microscope. • Estimation of the haemoglobin concentration

***Note: - To be assessed in practical only. No question shall be asked from this portion in Theory Exams.**

UNIT	SUB-UNIT	SESSION/ ACTIVITY/ PRACTICAL
	1.8 Anaemia	**Session:** Understanding the concepts of: • Hemopoiesis • Classification of Anaemia
	1.9 Hemopoiesis	**Session:** Mechanisms of Process Different tests involved in this process
	1.10 Bone marrow aspiration/Biopsy	**Session:** Understanding about the concepts of • Site for aspiration Procedure • Procedure
	1.11 Lab Safety*	**Activity:** • **Preparation of project by students in following topic:*** • **Biomedical waste management*** • **Personnel Protection*** • **Hand Hygien*** • **Management of spills***
2. BLOOD BANK AND TRANSFUSION	**2.1** Material and Equipment	**Session:** Understanding about the concepts of materials and equipment needed for Blood bank
		Activity: Preparation of charts based on the materials and equipment needed for blood bank
	2.2 Records in Blood Bank	**Session:** Understanding about different kinds of records that are kept in blood bank. **Session:** Understanding the concepts of ABO blood grouping.
	2.3 ABO blood group system	
	2.4 Practical importance of other blood groups	**Practical:** Determination of Blood group in given sample. **Session:** Understanding the concepts of different blood group system other than ABO grouping system.

***Note: - To be assessed in practical only. No question shall be asked from this portion in Theory Exams.**

UNIT	SUB-UNIT	SESSION/ ACTIVITY/ PRACTICAL
3. CYTOPATH - OLOGY	**3.1** Introduction	**Session:** • Definition of cytopathology • Materials and equipment
	3.2 Exfoliated cytology	**Session:** Understanding the concept of common sites for exfoliate cytology.
	3.3 FNAC	**Session:** Understanding the following concepts ofFNAC • Equipment • Technique • Preparation of smear Preparation of cell blocks **Activity:** The students will prepare chart or flash card oftechnique of FNAC.
	3.4 Cytological Fixatives	**Session:** Understanding the following concepts of • Properties • Classification
	3.5 Cytopsin	**Session:** Understanding the concepts of using cytopsin for CSF.
	3.6 Staining procedures in cytology*	**Activity: *** • **Description about PAP staining and* Haematoxylin and Eosin stain in theirfile*.**
	3.7 Maintenance of stains and solutions and general precautions	**Session:** Understanding the concepts of maintenance ofstains and solutions and general precautions
	3.8 Storage and archiving of specimens	**Session:** Understanding the general guidelines for storage and archival in a pathology laboratory.
	3.9 Safety in laboratory	**Session:** Understanding the concepts of safety in laboratoryand self-assessment.

***Note:- To be assessed in practical only. No question shall be asked from this portion inTheory Exams.**