

MEDICAL DIAGNOSTICS (CODE NO. 828)

Job Role: Medical: Assistant Lab Technical / Assistant Life Sciences

CLASS XI- XII (SESSION 2019-2020)

1. 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.

2. 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.

3. 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.

4. 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 Skill subject along with general education subjects.

Theory	60 marks
Practical	40 marks
Total Marks	100 marks

The unit-wise distribution of periods and marks for Class XI is as follows:

	Units	No. of Periods for Theory and Practical 220		Max. Marks for Theory and Practical 100
Part A	Employability Skills			
	Unit 1: Communication Skills-III		13	10
	Unit 2: Self-Management Skills-III		09	
	Unit 3: Information and Communication Technology Skills-III		06	
	Unit 4: Entrepreneurial Skills-III		16	
	Unit 5: Green Skills-III		06	
	Total		50	10
Part B	Vocational Skills			
	Unit 1: Investigation Urine & Faces Analysis	40	30	50
	Unit 2: Body Fluids	40	15	
	Unit 3: Lab Process	30	15	
	Total	110	60	50
		170		
Part C	Practical Work			
	Project			05
	Viva based on Project			05
	Demonstration of skill competency on Lab Activities		60	30
	Total			40
	Grand Total		220	100

CLASS XI
MEDICAL DIAGNOSTICS (828)

Part A - Employability Skills - 10 marks

Part B– Skills

Unit–1: Investigation Urine & Faces Analysis 20 marks

- Introduction.
- Maintenance & Equipments of Pathology Lab.
- Preparation of Reagents.
- Urine.
- Formation and composition.
- Collection Preservation Gravity & PH.
- Examination–Physical.
- Examination– Chemical.
- Sugar.
- Ketone Bodies, Bile.
- Blood, Crystals.
- Parasites & Abnormal Cells.
- Feces–Formation, Physical & Chemical Examination.
- Preparation of stool sample for microscopic examination.
- Sputum Examination.
- Assessment.

Unit–2: Body Fluids 15 marks

- Body Fluids.
- Cerebro spinal fluid. Synovial fluid and Pleural fluid Pericardial fluids Peritoneal fluids.
- Other fluids collected transudate or exudates.
- Semen Analysis–Collection, Physical & Chemical examination.
- Sperm count – Microscopic examination & Motility.
- Assessment.

Unit–3: Lab Process 15 marks

- Materials, Equipment & Techniques.
- Biopsy, Autopsy.
- Collection, Preservation & Labeling of Slides, Blocks, Specimens.
- Techniques.
- Grossing Methods.
- Fixatives.

- Processing of the tissues including Bone.
- Embedding Section Cutting Staining & Mounting Special Stains.
- Preservation of reports & records.
- Assessment.

CLASS XII

The unit-wise distribution of periods and marks for Class XII is as follows:

	Units	No. of Periods for Theory and Practical 220		Max. Marks for Theory and Practical 100	
Part A	Employability Skills				
	Unit 1: Communication Skills-III	13		10	
	Unit 2: Self-Management Skills-III	09			
	Unit 3: Information and Communication Technology Skills-III	06			
	Unit 4: Entrepreneurial Skills-III	16			
	Unit 5: Green Skills-III	06			
	Total	50			10
Part B	Vocational Skills				
	Unit 1: Process & Investigations	40	30	50	
	Unit 2: Blood Bank & Transfusion	40	15		
	Unit 3: Cytopathology	30	15		
	Total	110	60		50
		170			
Part C	Practical Work				
	Project	60		15	
	Viva based on Project			10	40
	Demonstration of skill competency on Lab Activities			15	
	Total				
	Grand Total	220		100	

MEDICAL DIAGNOSTICS (828)

Part A - Employability Skills - 10 marks

Part B-Vocational Skills

Unit-1: Process & Investigations

20 marks

- Reagents – Preparation and their uses.
- Personnel care and protection Disposal of Bio-Medical waste Smear Making.
- Staining Methods.
- Osmotic fragility test.
- Differential Counts.
- Cellcounts – RBC, WBC, and Platelets Eosinophil & Reticulocyte count ESR.
- LE Cell.
- Haemopoeisis– Erythrocytes Hemoglobin – Estimation Packed Cell Volume, Indices Hematocrit and Red cellindices Anemia.
- Leukocytes.
- Coagulation Factors.
- Coagulation disorders – Bleeding & Clotting Time.
- Bone marrow study.
- Assessment.

Unit-2 : Blood Bank & Transfusion

15 marks

- Blood Bank.
- Material & equipment Reagents – preparation Protocols.
- Storage & Preservation.
- Records in Blood bank.
- ABO System.
- Subgroups in ABO System.
- Practical importance of Other blood groups.
- Rh System.
- Antibody titers.
- Blood grouping techniques Problems in blood grouping Donor Motivation.
- Donors election & Registration.
- Blood Collection.
- Storage, Preservation & Processing of blood.
- Quality control.
- Investigation of transfusion, reactions.
- Grouping & cross matching Direct and Indirect Coombs test Mandatory Test.
- Assessment.

Unit-3: Cytopathology

15 marks

- Techniques Equipment & Procedures – FNAC, Imprints smear
- Vaginal & Buccalsmear, Swabs.
- Staining procedure and Mounting.
- Preparation of fluids for Cytological Examination.
- Immunohisto chemistry.
- Assessment.

5. LIST OF EQUIPMENT AND MATERIALS

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

1. Slides
2. Test Tubes
3. Cover Slips
4. Leishman's stain
5. Blood Grouping Reagents
6. Lancets
7. Benedict's solution
8. Sulfo salicylic acid
9. Glacial acetic acid
10. Liquor Ammonia
11. Sahli's Hemoglobinometer
12. Alcohol rub
13. Colorimeter
14. Swab
15. Hemocytometer
16. R.B.C, WBC & Platelet diluting fluids
17. Microscopes
18. Cotton Wool
19. Iodine Solution
20. Test tube Holder
21. Burner

Teacher Qualification should be as follows:

S.No.	Qualification	Minimum Competencies	Age Limit
1.	MSC- Life Science Or MSC – Bio technology Or BMLT (Bachelor in Medical Laboratory Technology)	<ul style="list-style-type: none">• Effective communication skills (oral and written)• Basic computing skills.• Technical competencies (e.g., Should be able to perform and train the patient related skills• Coordination with local health care facilities for organizing field visits	Less than 65 years

Practical Examination CLASS XI

Practical Examination	40 marks
-----------------------	----------

1. MINIMUM PASS MARKS

The Minimum number of marks required to pass as per the **Examination Cell Guidelines**.

2. Marks for record, Viva Project etc., in respect of Secondary School Curriculum of School Certificate Examination:

Marks allotted for laboratory Record, Viva Voice etc., should be separately stated in the answer book (if answer-Books are used) and added to the marks given for other items. The projects and the practical records, duly punched should be returned to the students concerned immediately after evaluation.

3. Assessment of performance.

- An examiner will be assigned for the conduct and assessment of Practical Examination by the school. Question to be more of general nature, based on project work and as per the curriculum.
- In the assessment and award of marks, follow strictly the marking Scheme which is given in the list of practical i.e. provided to the Examiners/Schools at the time of Examination.
- Marks awarded for Project / Practical activities, for viva, for project and for Practical files must be separately shown on the answer-book as the total.
- If irregularities are perceived by the examiner in the conduct of the Practical Examination these should be included in the examiner's report and should be sent to the Asstt. Secretary (A.B. Cell) within three days after the end of practical examination.
- Award lists should be signed by the examiner and should be sent separately through messenger/personally in a double sealed cover and not mixed with the Answer-books. The answer-books can be delivered personally in the Board's office.

4. Procedure for Assessment of practical project work in (Total 40 marks)

The examiner will indicate separately marks of practical examination on the title page of the answer-books under the following heads: -

- Skill demonstration – (Practical in class Practical Lab) : 15
- Viva: 20
- Project work/ Power point Presentation : 15

Skill demonstration:

- Urine Analysis – (Artificial specimen of Urine is to be prepared by Teacher)
 - Routine Exemptions
 - Chemical analysis of Reducing substances (Glucose)
 - Portion is ketene Bodies and Blood present in Urine.
 - Microscopic analysis (RBC, WBC, Parasites etc)
- Demonstration of various HNE stained body tissue sections.
- Students should be able to identify various human tissues under micro scope.

Project Work: Students should make a project file. The marks can be allocated based on the quality of work done by the students as per the Curriculum

Individual / Group project to assess the practical skills on a certain time period or timeline. Project work should be given on the basis of the capability of the individual to perform the tasks or activities involved in the project. Projects should be discussed in the class and the teacher should periodically monitor the progress of the project and provide feedback for improvement and innovation. Field visits should be organized as part of the project work. Small-group discussions may be organized to prepare presentations or reports of the observations. Project work should be assessed on the basis of practical file or student portfolio.

Viva - 20 marks

The teacher conducting the final practical examination may ask verbal questions related to the curriculum. **Viva voce** allows student to demonstrate communication skills and content knowledge. Audio or video recording can be done at the time of viva voce. Viva voce should also be conducted to obtain feedback on the student's experiences and learning during the project work/field visits.

Practical Examination CLASS XII

Practical Examination	40 marks
-----------------------	----------

1. MINIMUM PASS MARKS

The Minimum number of marks required to pass as per the **Examination Cell Guidelines**.

2. Marks for record, Viva Project etc., in respect of Secondary School Curriculum of School Certificate Examination:

Marks allotted for laboratory Record, Viva Voice etc., should be separately stated in the answer book (if answer-Books are used) and added to the marks given for other items. The projects and the practical records, duly punched should be returned to the students concerned immediately after evaluation.

3. Assessment of performance.

- (f) An examiner will be assigned for the conduct and assessment of Practical Examination by the school. Question to be more of general nature, based on project work and as per the curriculum.
- (g) In the assessment and award of marks, follow strictly the marking Scheme which is given in the list of practical i.e. provided to the Examiners/Schools at the time of Examination.
- (h) Marks awarded for Project / Practical activities, for viva, for project and for Practical files must be separately shown on the answer-book as the total.
- (i) If irregularities are perceived by the examiner in the conduct of the Practical Examination these should be included in the examiner's report and should be sent to the Asstt. Secretary (A.B. Cell) within three days after the end of practical examination.
- (j) Award lists should be signed by the examiner and should be sent separately through messenger/personally in a double sealed cover and not mixed with the Answer-books. The answer-books can be delivered personally in the Board's office.

5. Procedure for Assessment of practical project work in (Total 40 marks)

The examiner will indicate separately marks of practical examination on the title page of the answer-books under the following heads: -

- Skill demonstration – (Practical in class Practical Lab) : 15
- Viva: 20
- Project work/ Power point Presentation : 15

Skill demonstration:

- Blood smear preparation and staining by Leishman's stain & examination under microscope
- Blood Grouping
- Buccal smear preparation
- Teacher will demonstrate Use of Neubauer's chamber for blood cell counting.

Project Work: Students should make a project file. The marks can be allocated based on the quality of work done by the students as per the Curriculum

Individual / Group project to assess the practical skills on a certain time period or timeline. Project work should be given on the basis of the capability of the individual to perform the tasks or activities involved in the project. Projects should be discussed in the class and the teacher should periodically monitor the progress of the project and provide feedback for improvement and innovation. Field visits should be organized as part of the project work. Small-group discussions may be organized to prepare presentations or reports of the observations. Project work should be assessed on the basis of practical file or student portfolio.

Viva - 20 marks

The teacher conducting the final practical examination may ask verbal questions related to the curriculum. **Viva voce** allows student to demonstrate communication skills and content knowledge. Audio or video recording can be done at the time of viva voce. Viva voce should also be conducted to obtain feedback on the student's experiences and learning during the project work/field visits.

7. 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

8. VERTICAL MOBILITY for B.Sc/ BMLT/B.Pharm/B.Tech in Universities

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