



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

SCHOOL OF HEALTH SCIENCES

DEPARTMENT OF CLINICAL HEALTH SCIENCES

QUALIFICATION: BACHELOR OF MEDICAL LABORATORY SCIENCES	
QUALIFICATION CODE: BMLS	LEVEL: 6
COURSE CODE: HIS521S	COURSE NAME: HISTOLOGY
SESSION: OCTOBER 2025	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
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INSTRUCTIONS	
1. Answer all the questions. 2. Read all questions carefully before answering. 3. Write clearly and neatly 4. Number the answers clearly	

PERMISSIBLE MATERIALS

1. Examination Question Paper
2. Answering book
3. Non programmable calculator is allowed

THIS QUESTION PAPER CONSISTS OF 11 PAGES (Including this front page)

SECTION A [27 Marks]

Multiple Choice Questions

Evaluate each numbered question and select the best option as your answer. Write the correct letter next to each corresponding question.

QUESTION 1 (27)

- 1.1 What is histology? (1)
- A. The laboratory methods used to prepare tissue samples for microscopic examination
 - B. The study of organs as a whole
 - C. The study of diseased tissues under the microscope
 - D. The study of the tissue structures and their functions
- 1.2 The tissue responsible for covering body surfaces and lining cavities is: (1)
- A. Connective tissue
 - B. Muscle tissue
 - C. Epithelial tissue
 - D. Stratified squamous epithelium
- 1.3 The histological preparation process usually involves the following steps, in correct order: (1)
- A. Fixation → Mounting → Grossing → Sectioning → Staining
 - B. Grossing → Fixation → Sectioning → Staining → Mounting
 - C. Fixation → Sampling → Sectioning → Mounting → Issuing
 - D. Staining → Sectioning → Fixation → Mounting → issuing
- 1.4 Internal Quality Control (IQC) in histology mainly ensures: (1)
- A. Internal checks on reagents and equipment for accuracy of results
 - B. Use of control tissue on each slide
 - C. Day-to-day reliability of staining and sectioning within the lab
 - D. Comparison of results between laboratories using the same protocols
- 1.5 Poor performance in an EQA scheme usually requires: (1)
- A. Use of automated equipment
 - B. Inter-laboratory comparability and diagnostic confidence
 - C. Replacement of all reagents immediately
 - D. Immediate retraining, root cause analysis, and corrective actions

- 1.6 A limitation of IQC compared to EQA is that: (1)
- A. IQC detects only long-term errors
 - B. IQC may not detect systematic bias affecting all results
 - C. IQC cannot be performed daily
 - D. IQC is more expensive than EQA
- 1.7 In case of a chemical spill (e.g., formalin), the FIRST step should be to: (1)
- A. Immediately wipe it with tissue paper
 - B. Notify colleagues and follow the lab's spill response protocol
 - C. Ignore small spills to avoid workflow disruption
 - D. Dilute with water and continue with wiping it
- 1.8 If a person's clothing catches fire in the laboratory, the correct action is to: (1)
- A. Run quickly to the nearest exit
 - B. Use the "stop, drop, and roll" technique
 - C. Pour xylene to put out the fire
 - D. Remove clothing immediately
- 1.9 Which cell type primary produces collagen fibers in connective tissue? (1)
- A. Macrophage
 - B. Plasma cell
 - C. Mast cell
 - D. Fibroblast
- 1.10 Which epithelial types is found lining the urinary bladder? (1)
- A. Simple squamous epithelium
 - B. Transitional epithelium
 - C. Stratified squamous epithelium (keratinized)
 - D. Simple columnar epithelium
- 1.11 Periodic acid–Schiff (PAS) stain is used to demonstrate: (1)
- A. Collagen fibers
 - B. Elastic fibers
 - C. Glycogen and mucopolysaccharides
 - D. Nissl substance

- 1.12 Which of the following features distinguishes cardiac muscle from skeletal muscle under the microscope? (1)
- A. Presence of intercalated discs
 - B. Multinucleation of cells
 - C. Voluntary control
 - D. Striated appearance
- 1.13 Osmium tetroxide is particularly useful for: (1)
- A. Fixing Glycogen
 - B. Preserving Lipids and membranes
 - C. Mask Nucleic acids
 - D. Coagulation of the tissue structures and morphology
- 1.14 Which of the following is a disadvantage of formalin fixation? (1)
- A. Poor nuclear detail in Immunohistochemistry (IHC)
 - B. Forms formalin pigment in acidic conditions
 - C. It leaves big tissue unfixed in the middle
 - D. It eats the gloves, when they are not doubled
- 1.15 In surgical pathology, margins of excision are inked during grossing to: (1)
- A. Differentiate benign from malignant tissue
 - B. Describe color, texture, consistency and selecting representative sections
 - C. Identify tissue orientation and surgical margins
 - D. Enhance microscopic contrast
- 1.16 Which specimens is always entirely submitted for histology? (1)
- A. Colon resection
 - B. Breast lumpectomy
 - C. Endoscopic biopsy
 - D. Nephrectomy
- 1.17 Lymph nodes in a radical surgery specimen are usually: (1)
- A. Ignored during grossing
 - B. Entirely submitted for histology
 - C. Described only macroscopically
 - D. Only largest node sampled

- 1.18 Which organ often requires “bread-loading” during grossing? (1)
A. Kidney
B. Liver
C. Breast
D. Spleen
- 1.19 The temperature for paraffin embedding is usually maintained at: (1)
A. 20–25 °C
B. 37–40 °C
C. 54–65 °C
D. 80–90 °C
- 1.20 If tissue is not properly dehydrated before paraffin embedding, the most likely outcome is: (1)
A. Incomplete infiltration with wax
B. Tissue shrinkage
C. Pale hematoxylin
D. Sections may appear thicker and thinner
- 1.21 Which of the following best describes the principle of histological staining? (1)
A. Selective absorption of stain by the tissue
B. Differential binding of dyes to tissue components
C. Small pores in the tissues allow dye to penetrate hence visualizing tissue structures
D. Amino acids component of the tissue
- 1.22 Hematoxylin stains nuclei blue because: (1)
A. It is an acidic dye that binds to basic structures of the tissue
B. It is a basic dye that binds to basophilic structures
C. It has a –ve charged mordant
D. It reacts with eosin to form a complex hence stains nuclear blue
- 1.23 H&E staining is LEAST useful for identifying: (1)
A. Nuclear detail
B. General architecture
C. Connective tissue fibers
D. Lipids

- 1.24 Silver impregnation methods are used to demonstrate: (1)
- A. Elastic fibers
 - B. DNA double helix strand
 - C. Collagen fibers
 - D. Reticular fibers
- 1.25 Which of the following is a major disadvantage of cryostat sections compared to paraffin sections? (1)
- A. Poor nuclear detail
 - B. Excellent morphological details
 - C. Cannot be stained with routine H&E
 - D. cannot be used for immunohistochemistry
- 1.26 In a kidney biopsy, glomeruli are sectioned obliquely, making mesangial assessment unreliable. This is due to: (1)
- A. Wrong fixation used
 - B. Wrong embedding orientation
 - C. Surgical margins not marked with an ink for proper orientation
 - D. Excessive paraffin temperature
- 1.27 Which type of decalcifying agent is considered the slowest but preserves tissue morphology the best? (1)
- A. Nitric acid
 - B. Formic acid
 - C. EDTA (Ethylenediaminetetraacetic acid)
 - D. Hydrochloric Acid

SECTION B [53 marks]

Short Answer Questions. Answer ALL the questions

QUESTION 2

2.1 ISO standard 15190, provides a framework for laboratory safety management and guides that each laboratory meets accepted safety standards. Briefly discuss any 4 safety guidelines a Histology laboratory should implement to ensure compliance with safety standards of ISO 15190. (8)

QUESTION 3

Discuss how Internal Quality Control (IQC) is ensured in a histology laboratory under the following headings: (4)

3.1 Tissue Processing (2)

3.2 Sectioning/ Microtomy (2)

QUESTION 4

4.1 Fixation is a key step in histology and histopathology procedure. Each and every fixative has its own advantage and disadvantage. Various different fixatives perform various functions, and various factors direct effects on fixation procedure. Discuss factors affecting quality of fixation. (6)

QUESTION 5

5.1 Define cryostat and describe its principle. (3)

QUESTION 6

6.1 Describe the mechanism of action of formalin fixation. (3)

QUESTION 7

7.1 Discuss 2 methods to assess the completion of decalcification. (4)

QUESTION 8

- 8.1 What is the purpose of Periodic acid–Schiff (PAS) staining? (1)
8.2 Explain the principle of Periodic acid–Schiff (PAS) staining. (2)

QUESTION 9

- 9.1 Explain the macroscopic assessment of the tissue and why inking surgical margins is important during grossing? (5)

QUESTION 10

A biopsy specimen is received in the lab. It was placed in tap water for 6 hours before fixation. On processing, the tissue shows autolysis and poor nuclear detail. (3)

- 10.1 What error occurred in specimen handling? (1)
10.2 What is the consequence of this error? (1)
10.3 How can this be prevented? (1)

QUESTION 11

- 11.1 A pathologist complains of distorted tissue sections. As a histotechnologist, explain how you would troubleshoot the problem. Give any 4 corrective actions you would consider. (4)

QUESTION 12

- 12.1 Explain the principle and uses of Prussian Blue (Perl's reaction). (3)

QUESTION 13

13.1 Explain how false-positive and false-negative results occur in immunohistochemistry (4)

QUESTION 14

A 52-year-old woman undergoes breast-conserving surgery for a lump. The surgeon requests an intraoperative consultation to assess whether the surgical margin is free of tumor. (3)

- 14.1 Which histological technique would you use? (1)
- 14.2 Why is cryostat preferred here instead of paraffin sections? (1)
- 14.3 What is a limitation of this technique in margin assessment? (1)

SECTION C [20 Marks}

ESSAY QUESTION

NB!! Only choose ONE question to answer

QUESTION 15

Routine (H&E) staining is the corner stone of tissue-based diagnosis. The process stains thin tissue sections so that pathologists can visualize tissue morphology. The process uses a haematoxylin dye and an eosin dye to stain tissue structures. Properly applied, this technique provides exceptional detail of tissue structure and the makeup of the cells. Write an essay about routine H&E staining procedure used in Histology. [20]

Your content must:

- 15.1 Describe the principle of Hematoxylin and Eosin (H&E) staining.
- 15.2 Outline the routine steps in H&E staining of paraffin-embedded tissue sections.
- 15.3 What is the diagnostic significance of H&E staining?
- 15.4 What are the advantages and limitations of H&E staining?

OR

QUESTION 16

Case Study: Breast

A 52-year-old woman presents with a painless breast lump. Histology shows malignant epithelial cells arranged in duct-like structures invading the surrounding stroma, with desmoplastic reaction. [20]

Your content must:

- 16.1 Describe the normal histology of the breast.
- 16.2 Explain the histological features of invasive ductal carcinoma.
- 16.3 Correlate the histological findings with possible clinical manifestations.
- 16.4 Discuss the prognostic significance of histological grading in breast cancer.

OR

QUESTION 17

A cryostat in histology is a specialized piece of equipment used for cutting very thin sections of biological tissue that has been rapidly frozen. These frozen sections are then used for microscopic examination, typically in diagnostic pathology, research, and certain surgical settings. Write an essay about cryostat histology. [20]

Your essay content must:

- 17.1 Define cryostat and describe its principle.
- 17.2 State the indications for using cryostat frozen sections.
- 17.3 Describe the advantages and disadvantages of cryostat sections.
- 17.4 Outline the safety precautions while using a cryostat.

END OF EXAM. GOOD LUCK!!!!