



**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	
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COURSE CODE: HIS521S	COURSE NAME: HISTOLOGY
SESSION: DECEMBER 2025	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	MR JOHANNES ENDJALA
MODERATOR	MS NDESHIPEWA HAMATUI-VALOMBOLA

INSTRUCTIONS	
<ol style="list-style-type: none">1. Answer all the questions.2. Read all questions carefully before answering.3. Write clearly and neatly4. 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 [36 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 (36)

- 1.1 Which of the following statements about epithelial tissue is TRUE? (1)
- A. It is highly vascularized
 - B. It has a rich extracellular matrix and few cells
 - C. It forms a protective barrier and participates in secretion and absorption
 - D. It primarily stores fat
- 1.2 Which type of connective tissue provides the most tensile strength in tendons and ligaments? (1)
- A. Dense regular connective tissue
 - B. Loose connective tissue
 - C. Elastic cartilage
 - D. Bone
- 1.3 The “representative section” taken during grossing means: (1)
- A. A small piece that fits the cassette
 - B. Tissue selected to represent all important features of the lesion
 - C. A sampled section of the specimen to be processed
 - D. Inked surgical margin section of the specimen with malignant features grossly
- 1.4 Which type of decalcifying agent is considered the slowest but preserves tissue morphology the best? (1)
- A. Nitric acid
 - B. Formic acid
 - C. EDTA
 - D. Alkalis
- 1.5 Which of the following steps is performed immediately before embedding? (1)
- A. Fixation
 - B. Clearing
 - C. Dehydration
 - D. Infiltration with paraffin wax

- 1.6 In resin-embedded bone marrow biopsy, very thin sections are obtained for Electron Microscopy. The main advantage of resin is: (1)
- A. Faster processing
 - B. Allows sectioning at $<1 \mu\text{m}$ thickness
 - C. Better hematoxylin staining compare to light microscopy
 - D. Easier orientation of tissue compare to paraffin
- 1.7 A biopsy specimen embedded with poor orientation, where the epithelial surface is cut tangentially, may lead to: (1)
- A. Excellent visualization of epithelial thickness
 - B. Difficulty in assessing dysplasia
 - C. Better preservation of connective tissue
 - D. No significant impact on diagnosis
- 1.8 “Chatter” (venetian blind effect) during microtomy is usually caused by: (1)
- A. Too sharp a knife
 - B. Blunt knife edge or hard tissue
 - C. Too much adhesive on the slide
 - D. Insufficient tissue processing
- 1.9 The typical thickness of paraffin-embedded sections for light microscopy is: (1)
- A. 1-2 nm
 - B. 3-10 nm
 - C. 3-10 μm
 - D. 10-15 μm
- 1.10 Which of these fixatives is best for ultrastructure for electron microscopy? (1)
- A. Bouin’s solution
 - B. Glutaraldehyde
 - C. 10% NBF
 - D. Carnoy’s solution

- 1.11 Which of the following is a major disadvantage of cryostat sections compared to paraffin sections? (1)
- A. Poor nuclear detail
 - B. Excellent tissue morphological presentation
 - C. Cannot be stained with H&E
 - D. Cannot be used for immunohistochemistry
- 1.12 A 45-year-old woman undergoes excision of a breast lump. The specimen was placed in formalin for only 30 minutes before processing. On microscopy, nuclear details are indistinct and tissue appears shrunken. What is the most likely cause of the artifact? (1)
- A. Incomplete dehydration
 - B. Inadequate fixation
 - C. Incomplete clearing
 - D. Improper embedding
- 1.13 What is the role of xylene in tissue processing? (1)
- A. Fixation
 - B. Dehydration
 - C. Clearing agent
 - D. Staining
- 1.14 Inking of specimens during grossing is performed to: (1)
- A. Differentiate benign from malignant tissue
 - B. Identify surgical margins
 - C. Enhance tissue staining
 - D. Visualization of the tissue during embedding
- 1.15 Which biopsy type is usually inked before grossing? (1)
- A. Punch biopsy
 - B. Endoscopic biopsy
 - C. Shave biopsy
 - D. Excision biopsy

- 1.16 The medium commonly used for embedding tissue for light microscopy is: (1)
A. Paraffin wax
B. Resin
C. Liquid nitrogen
D. Cellophane sheets
- 1.17 Orientation of tissue during grossing is important because: (1)
A. It determines the side the tissue must be embedded
B. It ensures correct microscopic sectioning
C. It is essential for IQC checks
D. It helps in troubleshooting microtomy artifacts
- 1.18 A specimen described as “firm, gray-white, $3 \times 2 \times 1$ cm, with irregular borders” refers to: (1)
A. Surgical Appearance
B. Tissue appearance after fixation
C. Gross description
D. Microscopic findings
- 1.19 Dehydration in tissue processing is usually carried out using (1)
A. Formalin
B. Graded alcohol
C. Molten Paraffin wax
D. Xylene
- 1.20 Which of the following is a safety precaution during grossing? (1)
A. Wearing gloves and lab coat
B. Working in a fume hood
C. Avoiding direct contact with formalin
D. All of the above
- 1.21 If tissue is not properly dehydrated before paraffin embedding, the most likely outcome is: (1)
A. Tissue shrinkage
B. Incomplete infiltration with wax
C. Overstaining with hematoxylin
D. Sectioning at thinner than normal thickness

- 1.22 Plastic (resin) embedding is mainly used for: (1)
A. Routine H&E staining
B. Ultrastructural studies
C. Immunohistochemistry only
D. Frozen section preparation
- 1.23 The main mordant used with hematoxylin is: (1)
A. Ferric chloride
B. Ammonium hydroxide
C. Alcohol
D. Glycerin
- 1.24 Which step is performed immediately before eosin application? (1)
A. Mounting
B. Differentiation
C. Washing in water
D. Dehydration
- 1.25 What is a primary limitation of H&E staining in pathology practice? (1)
A. Cannot differentiate DNA from RNA
B. Cannot demonstrate connective tissue
C. Cannot highlight lipids, carbohydrates, and specific antigens
D. Cannot show nuclei
- 1.26 The functional unit of the nervous system is the: (1)
A. Axon
B. Neuron
C. Dendrite
D. Neuroglia
- 1.27 Which neuroglial cells form myelin in the central nervous system (CNS)? (1)
A. Schwann cells
B. Oligodendrocytes
C. Astrocytes
D. Microglia

- 1.28 The main advantage of frozen sectioning is: (1)
- A. Better nuclear detail than paraffin
 - B. Faster diagnosis during surgery
 - C. Permanent preservation of sections
 - D. Ease of storage of section
- 1.29 Which disinfectant is recommended for decontaminating a cryostat (especially to prevent cross-infection from frozen tissues)? (1)
- A. Absolute 100% alcohol
 - B. 70% Alcohol
 - C. Formaldehyde vapor
 - D. Ultraviolet light only
- 1.30 Which of the following special stains is most suitable for demonstrating fibrosis and collagen fibers? (1)
- A. Giemsa stain
 - B. Oil Red O
 - C. Masson's trichrome
 - D. PAS stain
- 1.31 Which of the following stains demonstrate amyloid deposits in tissues? (1)
- A. Periodic acid–Schiff (PAS)
 - B. Congo red
 - C. Alcian blue
 - D. Masson's trichrome
- 1.32 “Ribbons” are formed during sectioning because of: (1)
- A. The adhesive used on slides
 - B. The compression and expansion of paraffin
 - C. Improper fixation of tissue
 - D. The sharpness of the blade only
- 1.33 Which stain is used for demonstrating iron deposits (hemosiderin) in tissues? (1)
- A. Van Gieson's stain
 - B. Prussian Blue (Perl's) reaction
 - C. Sudan Black B
 - D. Silver stain

- 1.34 What is the role of the secondary antibody in a typical indirect IHC technique (1)
- A. It binds to the antigen directly.
 - B. It catalyzes a color change in the chromogen.
 - C. It acts as a blocking solution to prevent non-specific binding.
 - D. It binds to the primary antibody and carries a label to amplify the signal
- 1.35 A pathologist uses Gomori's Methenamine Silver (GMS) stain to diagnose a fungal infection. What is the primary color of the fungal elements after this stain? (1)
- A. Pink
 - B. Blue
 - C. Black
 - D. Red
- 1.36 All of the following substances would be expected to stain positive with the Periodic Acid Schiff (PAS) stain, except: (1)
- A. Glycogen
 - B. Basement membrane components
 - C. Lipids
 - D. Fungal organisms

SECTION B [44 Marks]

Short Answer Questions. Answer ALL the questions

QUESTION 2

Explain the role of fixation in histology. Mention at least 2 commonly used fixatives and their applications. (7)

QUESTION 3

Explain the principle of tissue decalcification in histology. (4)

QUESTION 4

List at least 3 the ideal properties of a good fixative. (3)

QUESTION 5

State 3 different common artifacts or faults encountered during microtomy and explain how can each be prevented? (6)

QUESTION 6

Compare paraffin sectioning with frozen sectioning in terms of: (12)

6.1 Technique (2)

6.2 Applications (2)

6.3 Advantages and disadvantages (8)

QUESTION 7

What is the role of differentiation in regressive hematoxylin staining? (1)

QUESTION 8

Why must sections be counterstained after hematoxylin? (2)

QUESTION 9

Discuss the role of mordants in histological staining with suitable examples. (6)

QUESTION 10

Connective tissue is one of the four basic types of body tissues, and it provides support, binding, protection, transport, and storage. State 3 main components of connective tissue. (3)

SECTION C [20 Marks]

ESSAY QUESTIONS

NB!! Only choose ONE question to answer

QUESTION 11

11.1 Describe the principles of immunohistochemistry and discuss how antigen–antibody interactions are visualized in tissue sections. (20)

OR

QUESTION 12

12.1 Define tissue processing and discuss and explain the significance of each sequential step involved in routine paraffin wax tissue processing. The steps must be discussed in its chronological order (20)

OR

QUESTION 13

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:

- 13.1 Define cryostat and describe its principle.
- 13.2 State the indications for using cryostat frozen sections.
- 13.3 Describe the advantages and disadvantages of cryostat sections.
- 13.4 Outline the safety precautions while using a cryostat.

END OF EXAM. GOOD LUCK!!!!