

EXAMINATION FOR QUALIFIED MEDICAL LABORATORY TECHNICIAN

Candidate Name:

Candidate Number:

Subject: ANATOMICAL PATHOLOGY

Examination Date: 8 October 2022

Time Allowed: 3 hours – 9.30am – 12.40pm
10 minutes extra time for reading the paper

General Instructions

1. Total marks for paper = 100.
2. Marks for each question are as indicated,
3. The paper consists of:

	<i>Common</i>	<i>Discipline Specific</i>
Section A, questions 1-30 = Total Marks 15	<i>6 Marks</i>	<i>9 Marks</i>
Section B, questions 31-36 = Total Marks 10	<i>5 Marks</i>	<i>5 Marks</i>
Section C, questions 37-40 = Total Marks 10	<i>4 Marks</i>	<i>6 Marks</i>
Section D, questions 41-44 = Total Marks 05	<i>5 Marks</i>	<i>0</i>
Section E, questions 45-63 = Total Marks 40	<i>10 Marks</i>	<i>30 Marks</i>
Section F, questions 64-65 = Total Marks 20	<i>0</i>	<i>20 Marks</i>
4. All questions are to be attempted.
5. Use of calculator is permitted.
6. Write all answers into this booklet.

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WORD DEFINITIONS	
Calculate	Perform a mathematical process to get the answer
Classify	Be able to designate to a group
Compare	Detail both the differences and the similarities
Complete	Finish, have all the necessary parts
Convert	Express in alternative units
Define	State meaning clearly and concisely
Describe	Give a complete account demonstrating a thorough practical knowledge
Discuss	Give details, explaining both the positives and negatives
Distinguish	To briefly point out the main differences
Expand	To express at length or in a greater detail
Identify	Recognise according to established criteria
Indicate	Briefly point out
Interpret	Express the results of a test or series of tests in a meaningful format
Label	Give a name to
List	Headings only
Match	Find one that closely resembles another
Name	A word or group of words used to describe or evaluate
Outline	Write brief notes incorporating the essential facts
State	Give the relevant points briefly

SECTION A

Section A – Question 1 to Question 30 = Total Marks: 15

Multi choice questions

Multi choice questions – choose one answer for each question

(0.5mark per correct answer)

Circle the letter for the correct answer

Example. Which of the below is a primary colour?

- a. Green
- b. Purple
- ☒ c. Red
- d. Orange

C.1 Approximately what percent alcohol is in a standard use hand sanitiser?

- a. 95%
- b. 75%
- c. 30%
- d. 10%

C.2 The patella is part of which human joint?

- a. Shoulder
- b. Elbow
- c. Knee
- d. Wrist

C.3 An anticoagulant is used to:

- a. stop blood clotting
- b. stop blood haemolysing
- c. help blood separating
- d. separate red cells and plasma

- C.4 Which of the following is **NOT** listed in the Health and Safety at Work Act 2015 as “Duties of Workers”?
- a. take reasonable care for his or her own health and safety
 - b. take reasonable care that his or her acts or omissions do not adversely affect the health and safety of other persons
 - c. co-operate with any reasonable policy or procedure of the PCBU relating to Health and Safety at the workplace that has been notified to workers
 - d. issue provisional improvement notices
- C.5 Which of the following statements is true of an acidic solution?
- a. has a pH less than 7
 - b. is caustic
 - c. has a pH greater than 7
 - d. is Isotonic
- C.6 The reference interval for a given test is based on the results that are seen in what percent of the healthy population?
- a. 5%
 - b. 10%
 - c. 90%
 - d. 95%
- C.7 Treating all blood and body fluids as potentially infectious is an example of:
- a. Laboratory standard operating procedures
 - b. CDC guidelines
 - c. Standard precautions
 - d. Health and safety requirements
- C.8 Which laboratory department is primarily responsible for the diagnosis of leukaemia?
- a. Haematology
 - b. Histology
 - c. Blood Transfusion
 - d. Biochemistry

C.9 Hormones are produced by which bodily system?

- a. Lymphatic
- b. Cardiovascular
- c. Endocrine
- d. Digestive

C.10 Formalin is a laboratory fluid used to

- a. Preserve tissue samples
- b. Wash histology cutting knives
- c. Clean benches
- d. Decontaminate centrifuges

C.11 A chemical that is described as a carcinogen poses what specific risk?

- a. It may burn the skin
- b. It may cause cancer
- c. It may poison the liver
- d. It may cause loss of vision.

C.12 The practice of enforcing document management standards within the workplace is referred to as:

- a. Quality management
- b. Quality control
- c. IANZ requirements
- d. Document control

D.13 Identify the fixative commonly used for electron microscopy

- a. Formaldehyde
- b. Acetic acid
- c. Glutaraldehyde
- d. Picric acid

D.14 Identify the rate of fixation using neutral buffered formalin

- a. 1mm per hour up to 5mm thickness
- b. 1mm per hour up to 10mm thickness
- c. 10mm per hour up to 50 mm thickness
- d. 10mm per hour up to 100mm thickness

D.15 Identify a fixation artefact

- a. Formalin pigment
- b. Melanin
- c. Calcium
- d. Endogenous enzymes

D.16 Define decalcification

- a. The removal of fat from tissue
- b. The removal of calcium from tissue
- c. The removal of potassium from tissue
- d. The removal of sodium from tissue

D.17 Ziehl-Neelson is used to demonstrate

- a. Fungi
- b. Gram negative bacteria
- c. Acid fast bacilli
- d. Gram positive bacteria

D.18 Identify a counterstain used for the Masson-Fontana special stain

- a. 0.5% neutral red
- b. 0.5% safranin
- c. 0.5% methylene blue
- d. 0.5% eosin

D.19 What is the composition of alcoholic eosin?

- a. 1% Eosin Y in acetic acid
- b. 1% Eosin Y in methanol
- c. 1% Eosin Y in ethanol
- d. 1% Eosin Y in deionised water

D.20 What is a common antigen retrieval method used in automated immunohistochemistry?

- a. De-paraffinization of sections
- b. Primary antibody application
- c. Horseradish peroxidase
- d. Heat induced epitope retrieval

D.21 Identify the reagents used in the special stain Verhoef's stain for elastin fibres

- a. Aqueous haematoxylin, iodine, ferric chloride
- b. Alcoholic haematoxylin, iodine, ferric chloride
- c. Glacial acetic acid, haematoxylin, ferric chloride
- d. Haematoxylin, carbol fuchsin, ferric chloride

D.22 Define MOHs technique

- a. A precise surgical technique used to treat breast cancer
- b. A precise surgical technique used to treat skin cancer
- c. A precise surgical technique used to treat bowel cancer
- d. A precise surgical technique used to treat prostate cancer

D.23 What colour does haemosiderin stain with the Perls' special staining technique?

- a. Blue
- b. Green
- c. Red
- d. Black

D.24 Identify the staining protocol for frozen sections

- a. Modified ABPASD stain
- b. Routine H&E stain
- c. Modified H&E stain
- d. Modified PAS stain

D.25 Periodic Acid Schiff stain can be used to demonstrate

- a. Melanin
- b. Fungi
- c. Fat
- d. Amyloid

- D.26 What is an advantage of a frozen section in routine histology?
- a. Rapid results for the patient about to go on holiday
 - b. Superior morphological tissue structure observed
 - c. Rapid results for the patient waiting in the clinic rooms
 - d. Rapid results for the patient on the operating table
- D.27 Germinal centres, cortex, and medulla are histological features of:
- a. Liver
 - b. Kidney
 - c. Lymph node
 - d. Thyroid
- D.28 Identify the reagent used in the differentiation step of the Gram stain
- a. Ethanol
 - b. Scott's tap water
 - c. Xylene
 - d. Acetone
- D.29 Identify a nuclear stain commonly used in routine H&E staining
- a. Gill's haematoxylin
 - b. Mayer's haematoxylin
 - c. Weigert's haematoxylin
 - d. Alcoholic eosin
- D.30 What is the optimal thickness of tissue section for routine processing?
- a. 6mm is optimal
 - b. Thicker than 5mm
 - c. Not thicker than 5mm
 - d. Thicker than 6mm

END OF SECTION

SECTION B

Labelling of diagrams e.g. anatomy, hazard identification, instrument



Section B – Question 31 to Question 36 = Total Marks: 10

(Answer all questions)

C.31 Name the following hazard symbols

(0.5 marks per correct answer)

(C.31: 1 mark)

a.		b.	
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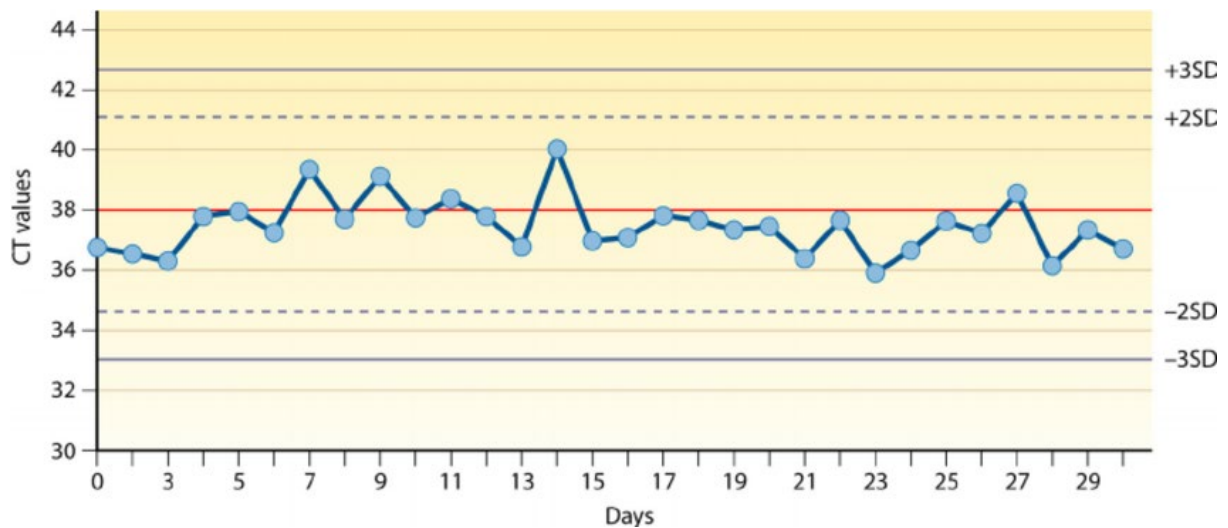
a. _____

b. _____

C.32 Name the type of graph:

(0.5 marks per correct answer)

(C.32: 1.5 marks)



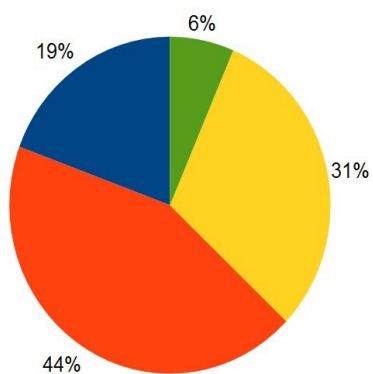
Type of graph: _____

Name the axis: CT values = _____ axis

Days = _____ axis

C.33 Name the type of graph

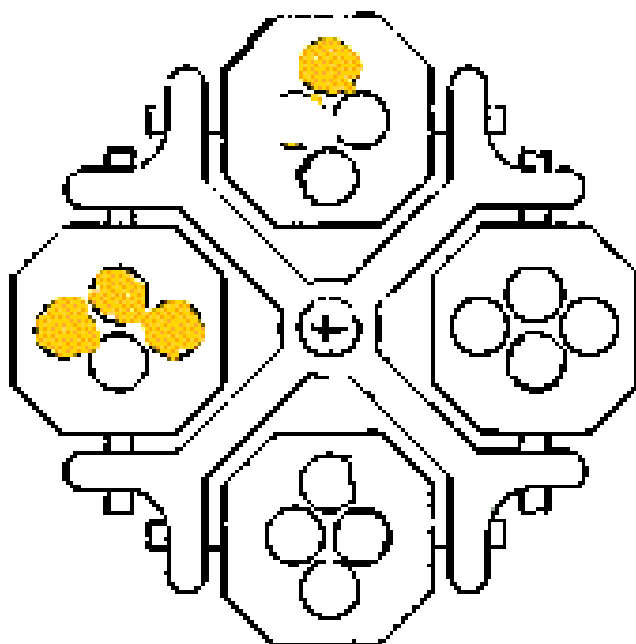
(C.33: 0.5 mark)



C.34 The yellow dots represent blood tubes in a swing out centrifuge rotor, assume all tubes are filled to the same level.

You have 4 more tubes to centrifuge, indicate on the rotor where they need to be positioned.

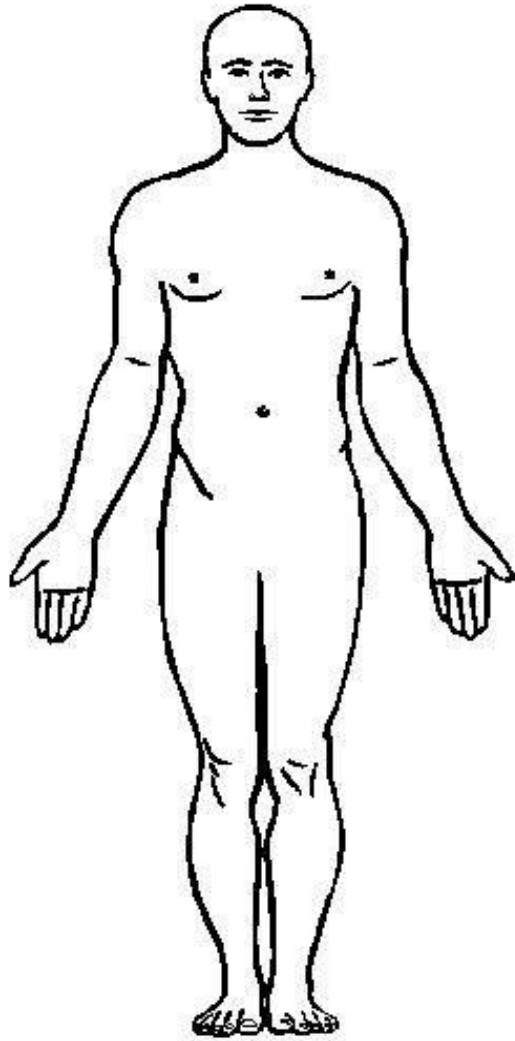
(C.34: 0.5 mark)



C.35 On the diagram, show the location of the following:

(C.35: 1.5 marks)

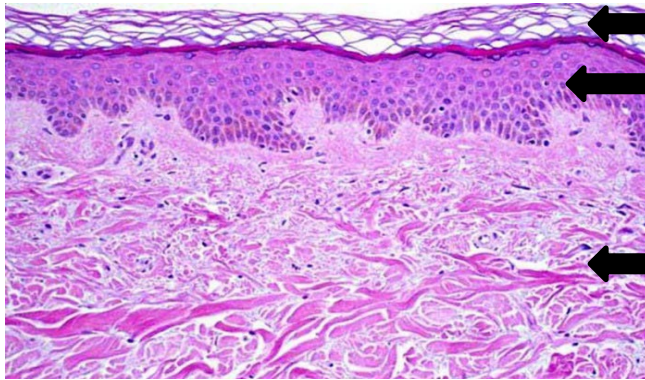
- a. Femoral artery
- b. Jugular vein
- c. Median cubital vein



D.36 Name the histological features as indicated by the arrows.

(0.5 mark per correct answer)

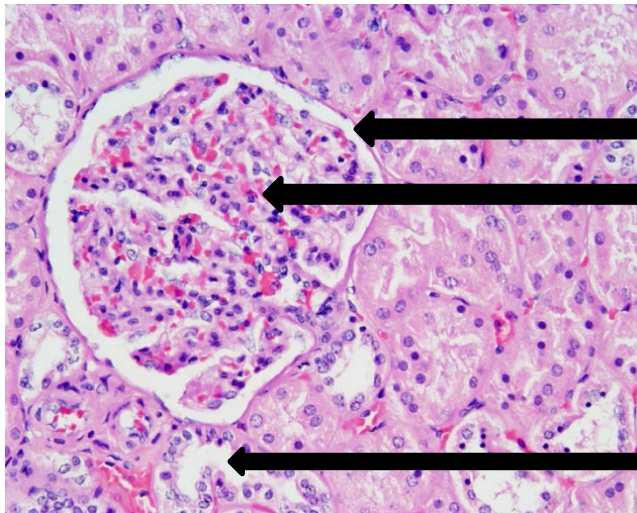
(D.36: 5 marks)



a. _____

b. _____

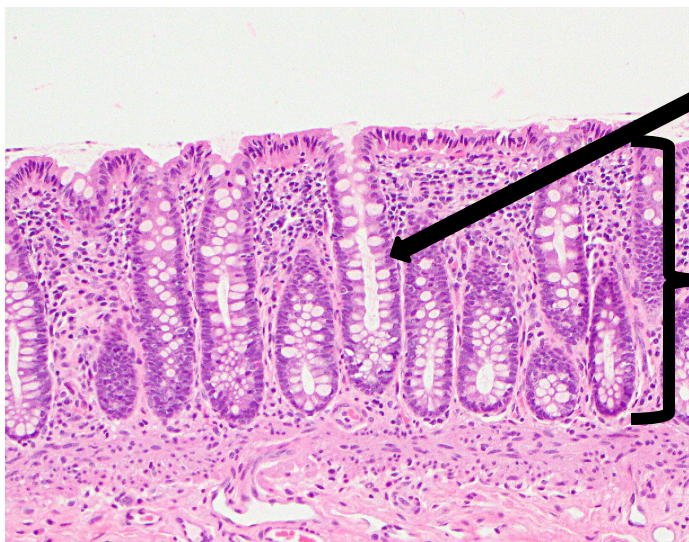
c. _____



d. _____

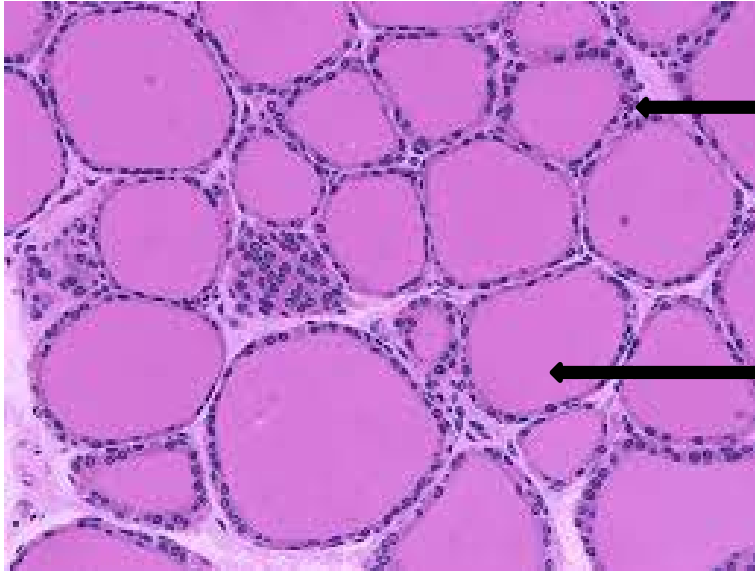
e. _____

f. _____



g. _____

h. _____



i. _____

j. _____

END OF SECTION

SECTION C

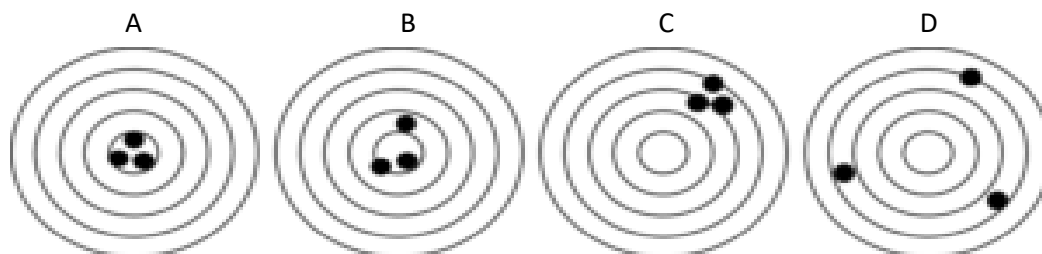
Tables, match column definition

Section C – Question 37 to Question 40 = Total Marks: 10

(Answer all questions)

C.37 Select the correct letter for each description:

(C.37: 2 marks)



Description Letter

Low Accuracy / High Precision = _____

High Accuracy / Low Precision = _____

Low Accuracy / Low Precision = _____

High Accuracy / High Precision = _____

C.38 Match Column A to Column B, and write your answers in the table below:

(Roman Numerals only required):

(C.38: 2 marks)

Column A	Column B
Medical Sciences Council	i. Certifies laboratory quality systems
International Accreditation New Zealand	ii. Issues Annual Practising Certificate
New Zealand Institute of Medical Laboratory Science	iii. Patients' rights for service
Health and disability commission	iv. Professional affairs and education

Column A	Column B (Roman numerals only required)
Medical Sciences Council	
International Accreditation New Zealand	
New Zealand Institute of Medical Laboratory Science	
Health and disability commission	

D.39 Match the correct control material in Column B to the special stain in Column A, and write your answers in the table below: (Roman Numerals only required)

(0.5 mark per correct answer)

(D.39: 3 marks)

Column A	Column B
a. Alcian Blue – Periodic Acid Schiff's (ABPAS)	i. Skin
b. Masson Fontana	ii. Small bowel
c. Thioflavine T	iii. Stomach, colon, cervix
d. Gordon and Sweets' Method for reticulin fibres	iv. Amyloid positive tissue
e. Verhoef's method for elastic fibres	v. Normal liver
f. Masson's Trichrome	vi. Fallopian tube

Column A	Column B (Roman numerals only required)
a. Alcian Blue – Periodic Acid Schiff's (ABPAS)	
b. Masson Fontana	
c. Thioflavine T	
d. Gordon and Sweets' Method for reticulin fibres	
e. Verhoef's method for elastic fibres	
f. Masson's Trichrome	

D.40 Match the description in Column B with the microtomy fault in Column A, and write your answers in the table below: (Roman Numerals only required)

(0.5 mark per correct answer)

(D.40: 3 marks)

Column A	Column B
a. Excessively compressed section	i. Damaged knife
b. Score through section	ii. Block not cold enough
c. Sections expand in water bath	iii. Blade or block loose in holders
d. 'Moth hole' artefact	iv. Debris in water bath
e. Thick and thin sections	v. Water bath temperature too hot
f. Contaminated section	vi. Aggressive trimming in

Column A	Column B (Roman numerals only required)
a. Excessively compressed section	
b. Score through section	
c. Sections expand in water bath	
d. 'Moth hole' artefact	
e. Thick and thin sections	
f. Contaminated section	

END OF SECTION

SECTION D

Calculations

Section D – Question 41 to Question 44 = Total Marks: 5

Calculations

C.41 A Glucose Tolerance Test dose is 75g glucose in 350mL water. This test requires the patient to fast for 12 hours before drinking the solution. A blood test is then collected 120 minutes after the drinking the solution. **(C.41: 1.5 marks)**

a. Calculate the percentage glucose in solution. (*Show working*) (0.5 mark)

a. _____

b. If the patient finished their evening meal at 2115 hrs, state the earliest time they can present for the test the following day. (0.5 mark)

b. _____

c. If the patient drinks the solution at 1010 hrs, state the time the blood test is required. (0.5 mark)

c. _____

C.42 Refer to daily fridge temperature monitoring record below. **(C.42: 1 mark)**

Day of the week	Monday	Tuesday	Wednesday	Thursday	Friday
Daily Fridge temperature.	4.6	3.8	3.1	9.3	5.1

a. Calculate the mean recorded temperature for the week. (*Show calculations*)

a. _____

C.43 Convert the following:

(C.43: 1.5 marks)

- a) 4.5 mL to _____ μL
b) 1.125kg to _____ g
c) 1500 μmol to _____ mmol

C.44 Calculate how many grams of sodium chloride (NaCl) are required to make 1.0L of a 2 Molar solution?

(Show calculations)

(C.44: 1 mark)

Atomic Weight of sodium (Na) = 23

Atomic Weight of chlorine (Cl) = 35.5

END OF SECTION

SECTION E

Short answer questions (answers = one or more words, short sentences)

Section E – Question 45 to Question 63 = Total Marks: 40

Short Answer Questions

C.45 List the activities that registered laboratory staff must do to comply with the HPCA act?

(C.45: 1 mark)

C.46 Outline cultural competency as it relates to medical laboratory science?

(C.46: 2 marks)

C.47 Outline Total Quality Management in the medical laboratory setting

(C.47: 2 marks)

C.48 Describe the procedures taken when dealing with a blood spill in the laboratory or phlebotomy clinic? **(C.48: 2 marks)**

C.49 Define Occupational Overuse Syndrome in a medical laboratory workplace. Name a common cause and who should you speak to if you suffer from it? **(C.49: 1.5 marks)**

C.50 On removing a reagent or product from a laboratory fridge, it is found to be a room temperature. What is the correct process to follow? **(C.50: 1.5 marks)**

D.51 Describe TWO (2) advantages of automation in special staining and the reason each is an advantage. **(D.51: 2 marks)**

D.52 a) Outline the safety precautions taken when using the cryostat. *(0.5 marks per point)*
(D.52a: 2 marks)

b) Name TWO (2) applications for the use of frozen sections. **(D.52b: 1 mark)**

D.53 Describe potential sources of cross contamination from paraffin embedding equipment.

(0.5 marks per point)

(D.53: 2 marks)

D.54 a) Outline FOUR (4) advantages of tracking systems in histology.

(D.54a: 2 marks)

b) Identify an additional check required by a laboratory without tracking systems.

(D.54b: 0.5 mark)

D.55 Outline the protocol for surface decalcification.

(D.55: 2 marks)

D.56 a) Describe the reason for fixation of tissue.

(0.5 marks per point)

(D.56a: 2 marks)

b) Name TWO (2) components of neutral buffered formalin.

(D.56b: 1 mark)

D.57 Outline the pre-processing protocol of a femoral head.

(D.57: 2 marks)

D.58 Outline the purpose of wax impregnation during tissue processing.

(D.58: 1 mark)

D.59 Discuss the purpose of the dehydration steps during processing of formalin fixed tissue.

(0.5 marks per point)

(D.59: 3 marks)

D.60 a) List FOUR (4) reagents used for the ABPASD special stain.

(D.60a: 2 marks)

b) Identify TWO (2) alternate special stains for identifying mucins. **(D.60b: 1 mark)**

D.61 Describe the process of preparing slides for immunohistochemistry. **(D.61: 2 marks)**

D.62 Differentiate between serial sections and levels. **(D.62: 2 marks)**

D.63 a) Describe freeze artefact

(D.63a: 2 marks)

b) Identify the temperature range of the cryostat.

(D.63b: 0.5 mark)

c) Name TWO freezing methods

(D.63c: 1 mark)

END OF SECTION

ESSAY

Section F – Question 64 to Question 65 = Total Marks: 20

Essay Questions

ESSAY

Section F – Question 64 to Question 65 = Total Marks: 20

Essay Questions

ESSAY

Section F – Question 64 to Question 65 = Total Marks: 20

Essay Questions

D.64 In essay format, compare the processing of an urgent breast core biopsy to a routine mastectomy specimen. (D.64: 10 marks)

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

D.65 In essay format, discuss the importance of tissue orientation during the embedding of core biopsies, punch biopsies, and vas deferens. **(D.65: 10 marks)**

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

This image shows a full page of blank handwriting practice paper. It features approximately 28 evenly spaced horizontal blue lines across the entire page, providing a guide for letter height and placement. The lines are consistent in color and thickness throughout.

