EXAMINATION FOR QUALIFIED MEDICAL LABORATORY TECHNICIAN

Subject:	**Anatomical Pathology**
Examination Date:	**7 October 2023**
Time Allowed:	**3 hours – 9.30am – 12.40pm** **10 minutes extra time for reading the Paper**
Candidate Name:	_____
Candidate No.:	_____

General Instructions

1. Total marks for paper = 100.

2. Marks for each question are as indicated,

3. The paper consists of:

	Common	*Discipline Specific*
Section A, questions 1-30 = Total Marks 15	*6 Marks*	*9 Marks*
Section B, questions 31-34 = Total Marks 10	*5 Marks*	*5 Marks*
Section C, questions 35-38 = Total Marks 10	*4 Marks*	*6 Marks*
Section D, questions 39-42 = Total Marks 05	*5 Marks*	*0*
Section E, questions 43-62 = Total Marks 40	*10 Marks*	*30 Marks*
Section F, questions 63-64 = Total Marks 20	*0*	*20 Marks*

4. All questions are to be attempted.

5. Use of calculator is permitted.

6. Put all answers into the examination booklet provided.

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 A synovial fluid is taken from:

a. The eye
b. A vein
c. A joint
d. An artery

C.2 The cardiovascular system is also referred to as the:

a. Circulatory system
b. Endocrine system
c. Respiratory system
d. Lymphatic system

C.3 The Medical Sciences Council is responsible for:

a. Offering a CPD programme
b. Issuing an Annual Practicing Certificate
c. Providing QMLT examinations
d. Laboratory auditing

C.4 Leukemia is primarily diagnosed in which department in the laboratory?

a. Haematology
b. Histology
c. Microbiology
d. Biochemistry

C.5 The prefix “hypo” refers to:

a. Inflammation

b. Excessive

c. Increased

d. Decreased

C.6 Standard precautions refers to:

a. Cleaning the laboratory regularly with an appropriate disinfectant

b. Treating all blood and body fluids as potentially infectious

c. Following the rules set by the Health and Safety Officer

d. Compulsory use of Personal Protective Equipment

C.7 Which best describes confidential information?

a. Information given on the understanding that it will not be passed on to others.

b. Information that is stamped or marked as “Confidential”

c. Information that can only be passed on to a doctor or family member.

d. Clinical details written on a form

C.8 A pathologist is a:

a. Registered Medical Practitioner

b. An advanced Medical Laboratory Scientist

c. A specialised Scientific Officer

d. Registered Clinical Scientist

C.9 Within the complaints process of The Code of Health & Disability Services and Consumer Rights, the complaint must be acknowledged in writing within how many working days?

a. 7 days

b. 10 days

c. 5 days

d. 20 days

C.10 A method of representing data in a visual, machine-readable form *describes*:

a. A histogram

b. A cell scanner

c. A flow chart

d. A barcode

C.11 "It is the duty of Members to uphold the dignity and honour of the profession, to accept its ethical principles and not engage in any activity that would discredit the profession" is part of:

a. HPCA Act 2003

b. Health and Disabilities requirement of all staff

c. NZIMLS code of ethics

d. Medical Sciences Council of New Zealand practitioner requirement

C.12 Venesection, venipuncture, phlebotomy and blood collection all come under what scope of practice?

a. Medical Laboratory Scientist

b. Medical Laboratory Technician

c. Pre analytical Technician

d. Health Care Assistant

D.13 Identify a common fixative for post-mortem specimens:

a. Glutaraldehyde

b. Picric acid

c. Formalin

d. Formic acid

D.14 Identify the chemical composition of Bouin's solution:

a. Picric acid, formaldehyde, glacial acetic acid

b. Ethanol, formaldehyde, glacial acetic acid,

c. Deionised water, formaldehyde, ethanol, chloroform

d. Chloroform, formaldehyde, glacial acetic acid

D.15 Adipose tissue, ducts, lobules, and connective tissue are histological features of:

a. Thyroid
b. Kidney
c. Breast
d. Brain

D.16 Identify reagents used for the ABPASD stain:

a. Alcian blue, periodic acid, Schiff's reagent, α-amylase
b. Alcian blue, acetic acid, Schiff's reagent, α-amylase
c. Alcian blue, formic acid, Schiff's reagent, haematoxylin
d. Alcian blue, periodic acid, Carbol fuchsin, α-amylase

D.17 Identify the special stain for identifying mucins:

a. Thioflavine T
b. Colloidal iron
c. Wade fite
d. Warthin-Starry

D.18 What is the composition of Gill's haematoxylin?

a. Haematoxylin, absolute ethanol, potassium alum
b. Haematoxylin, distilled water, potassium alum
c. Haematoxylin, glycerol, potassium
d. Haematoxylin, sodium iodate, aluminium sulphate

D.19 Identify appropriate control tissue for elastic fibres:

a. Cervix
b. Artery
c. Brain
d. Liver

D.20 Identify the reagent that acts as a mordant in the Gordon and Sweets' method for reticulum fibre:

a. Neutral red

b. Iron alum

c. Gold chloride

d. Aqueous formalin

D.21 What is the composition of alcoholic eosin?

a. 1% Eosin Y solution in deionised water

b. 1% Eosin Y solution in acetic acid

c. 1% Eosin Y solution in methanol

d. 1% Eosin Y solution in ethanol

D.22 Osteoblasts are a histological feature of which tissue?

a. Skin

b. Breast

c. Bone

d. Lung

D.23 In special staining methods, identify the purpose of diastase:

a. The digestion of glycogen

b. The digestion of collagen

c. The digestion of mucosubstances

d. The digestion of fat

D.24 Define serial sections:

a. Sections cut in sequence

b. Sections cut using a stepwise method

c. Sections cut at deeper intervals through the block

d. Every second section is picked up

D.25 Identify a cause of expansion of tissue sections on the water bath:

a. Debris in the water bath
b. Bubbles in the water bath
c. Temperature of water bath too hot
d. Temperature of water bath too cold

D.26 Identify the reagents used for surface decalcification:

a. 10% formic acid, EDTA
b. 5% hydrochloric acid, EDTA
c. 10% acetic acid, EDTA
d. 20% hydrochloric acid, EDTA

D.27 In order, what are the principle steps in automated tissue processing:

a. Fixation, clearing, dehydration, infiltration
b. Fixation, dehydration, infiltration, clearing
c. Fixation, clearing, infiltration, dehydration
d. Fixation, dehydration, clearing, infiltration

D.28 Identify the type of microtome used in the cryostat:

a. Ultra-microtome
b. Sledge microtome
c. Rotary microtome
d. Sliding microtome

D.29 What colour does 3,3α diaminobenzidine tetrahydrochloride (DAB) stain?

a. Black
b. Brown
c. Red
d. Blue

D.30 Identify the components of 10% neutral buffered formalin:

a. 37% formaldehyde, tap water, picric acid, sodium phosphate monobasic monohydrate, sodium phosphate dibasic anhydrous

b. 37% formaldehyde, tap water, sodium phosphate monobasic monohydrate, sodium phosphate dibasic anhydrous

c. 37% glutaraldehyde, tap water, sodium phosphate monobasic monohydrate, sodium phosphate dibasic anhydrous

d. 100% formaldehyde, tap water, sodium phosphate monobasic monohydrate, sodium phosphate dibasic anhydrous

(Total: 30 marks)

END OF SECTION

SECTION B

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

Section B – Question 31 to Question 34 = Total Marks: 10

(Answer all questions)

C. 31 Name the following hazard symbols **(1 mark**)

(*0.5 marks per correct answer*)

a.		b.	

a. _____ b. _____

C.32 Name the instruments and describe their use **(2 marks)**

(*1 mark per correct answer*)

a.		b.	

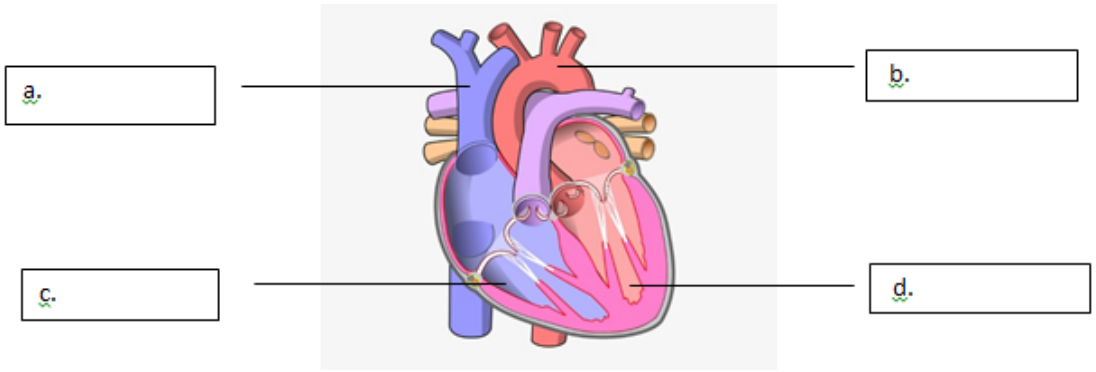
a. _____

_____

b. _____

_____

C.33 Label the following diagram: **(2 marks)**



a. _____

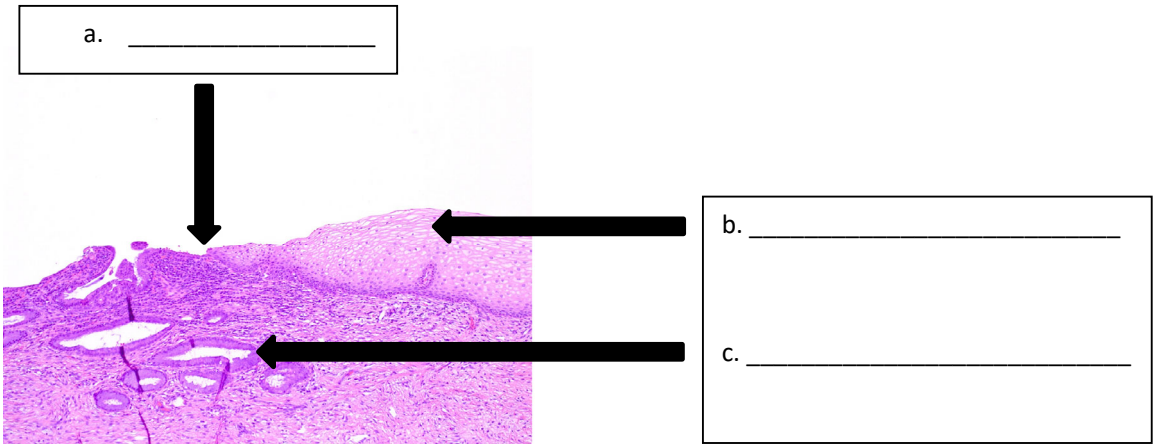
b. _____

c. _____

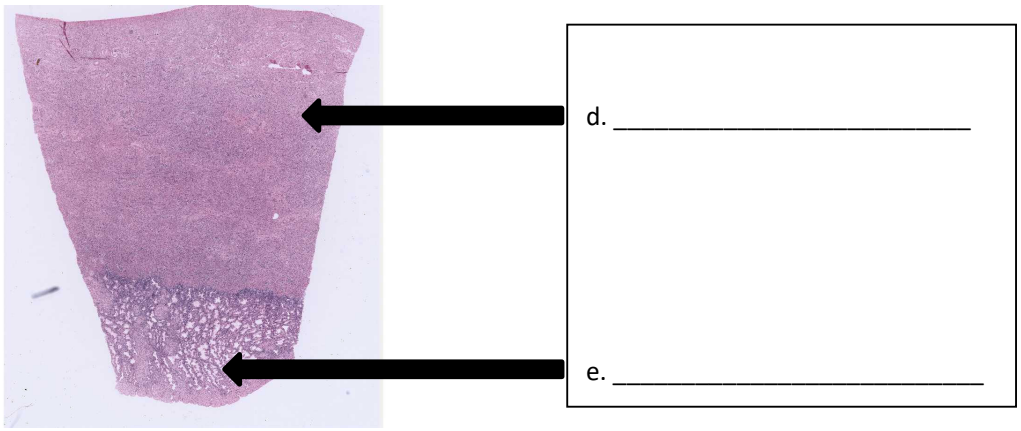
d. _____

D.34 Identify the histological features as indicated by the arrows. **(5 marks)**

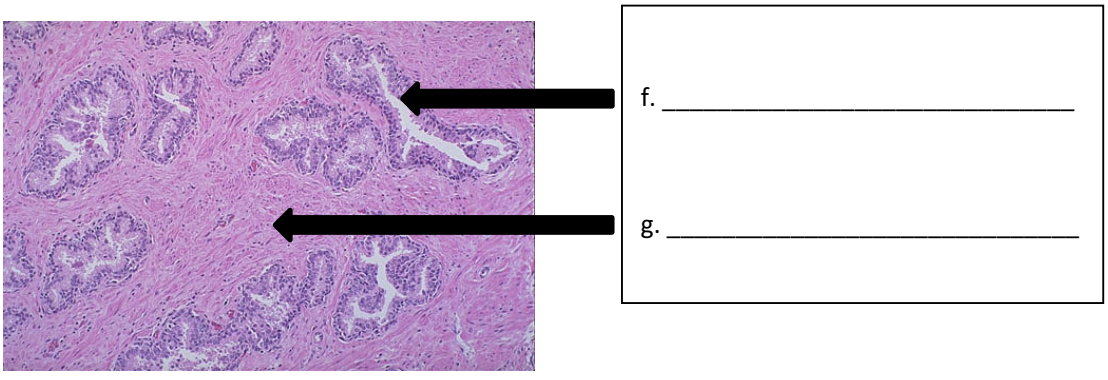
(0.5 mark per correct answer)



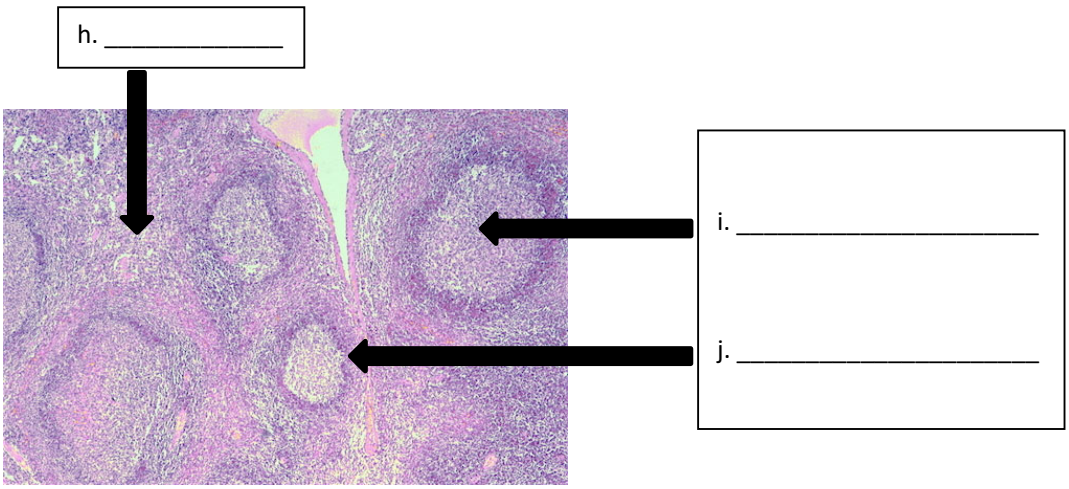
CERVIX



UTERUS



PROSTATE



LYMPH NODE

(Total 10 marks)

END OF SECTION

SECTION C

Tables, match column definition

Section C – Question C.35 to Question D.38 = Total Marks: 10

(Answer all questions)

C.35 Match the columns by **writing the Roman numeral from list B** against the correct match in Column A. **(2 marks)**

Column A	Column B
A. Hepatic	i. Knee
B. Nephritis	ii. Liver
C. Patella	iii. Molecular
D. PCR	iv. Kidney

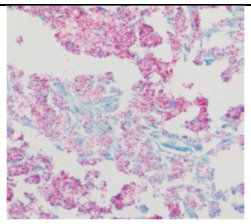
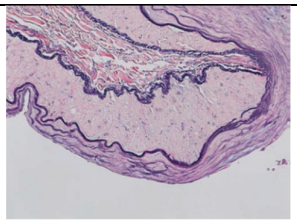
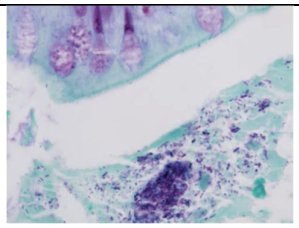
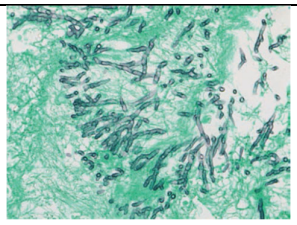
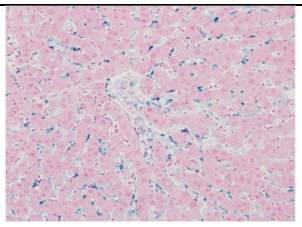
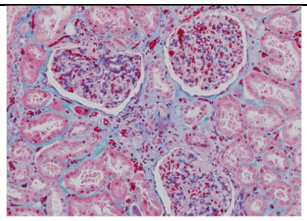
Column A	Column B
A. Hepatic	
B. Nephritis	
C. Patella	
D. PCR	

C.36 Expand the common abbreviations: **(2 marks)**

A.	B.
a. ACF	
b. CML	
c. COPD	
d. NAAT	

D.37 Match the images below with the special stains in Column A by writing the Roman numeral from the corresponding image. **(3 marks)**

(0.5 mark per correct answer)

(i) 	**(ii)** 	**(iii)** 
(iv) 	**(v)** 	**(vi)** 

Column A (Special Stains)	Column B (Image)
a. Gram Stain	
b. Grocott Methenamine Silver for fungi	
c. Perl's Prussian Blue	
d. Ziehl Neelsen	
e. Masson's Trichrome	
f. Verhoef's Method for elastic fibres	

D.38 Match the target tissue in Column B with the Special Stain in Column A by **writing the Roman numeral from list B** against the correct match in Column A. **(3 marks)**

(0.5 mark per correct answer)

Column A	Column B
a. Congo red	i. Fat
b. Masson's Trichrome	ii. Melanin
c. Wade Fite	iii. Amyloid
d. Oil Red O	iv. Mucins
e. Masson Fontana	v. TB bacilli
f. Mucicarmine	vi. Collagen and muscle

Column A	Column B
a. Congo red	
b. Masson's Trichrome	
c. Wade Fite	
d. Oil Red O	
e. Masson Fontana	
f. Mucicarmine	

(Total 10 marks)

END OF SECTION

SECTION D

Calculations

Section D – Question C.39 to Question C.42 = Total Marks: 5

Calculations

C.39 A patient has had daily Sodium and Potassium tests done for one week, the results are as follows:

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Sodium	135.7	135.9	136.3	136.9	137.2	136.5	135.4
Potassium	3.9	4.2	4.8	4.1	3.8	4.0	3.6

Calculate the mean Sodium and Potassium for the week. (Show all workings.) **(2 marks)**

_____

_____

_____

_____

_____

_____

C.40 Convert **(1.5 marks)**

32.7 mg to _____ kg

$^{5}/_{8}$ to _____ %

200 uL to _____ mL

C.41 A test has been set up at 1730hrs and has an incubation time of 18 hours, the requester is asking what time they could expect the result (assume the result can be given as soon as the incubation period is complete). **(0.5 marks)**

_____

C.42 A colleague accidentally made one litre of 20% solution of Trigene, you have been asked to use that solution and make one litre of 2% Trigene.

Explain your process and show any calculations or workings. **(1 mark)**

_____

_____

(Total 5 marks)

END OF SECTION

SECTION E

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

Section E – Question C.43 to Question D.62 = Total Marks: 40

Short Answer Questions

C.43 Define document control. **(2 marks)**

_____

_____

_____

_____

C.44 Outline the First Aid and Treatment for fainting or unconscious episode of a staff member or patient you are working with. **(1.5 marks)**

_____

_____

_____

C.45 When referring to laboratory results the term “accuracy” is best described as: **(0.5 marks)**

_____

C.46 Outline the principle purpose of the Health Practitioners Competency Assurance Act 2003. **(1.5 marks)**

_____

_____

_____

C.47 Describe why user specific passwords are important when using a Laboratory Information System (Computer System) **(1.5 marks)**

_____

_____

_____

C.48 Describe why it is important for the laboratory to have a robust specimen labelling policy. **(1.5 marks)**

_____

_____

_____

C.49 Define Patient/Donor confidentiality: **(1.5 marks)**

_____

_____

_____

D.50 Outline the safety precautions required for the use of chemicals in an Anatomical Pathology laboratory. **(2 marks)**

_____

_____

_____

_____

D.51 a. Outline the daily routine maintenance of paraffin embedding equipment. **(2.5 marks)**

a. *(2 marks)*

_____

_____

_____

_____

b. Name **ONE** (1) advantage of a rotary microtome.

b. *(0.5 marks)*

_____

D.52 List **FOUR** (4) additional checks that may take place in a laboratory without a tracking system. **(2 marks)**

_____

_____

_____

_____

D.53 Define MOHs techniques. **(1 mark)**

_____

D.54 a. Define decalcification. **(2.5 marks)**

a. *(0.5 marks)*

_____

b. Compare **TWO** (2) methods for determining the endpoint of decalcification.

b. *(2 marks)*

_____

_____

_____

_____

D.55 Distinguish between the processing of a renal biopsy and a complete nephrectomy. **(2.5 marks)**

_____

_____

_____

_____

_____

_____

D.56 a. Describe the reason for fixation of tissue. **(2.5 marks)**

a. *(2 marks)*

_____

_____

_____

_____

_____

_____

b. What is fixation artefact?

b. *(0.5 marks)*

_____

D.57 a. Discuss the purpose of the wax impregnation step during the processing formalin fixed tissue. **(5.5 marks)**

a. *(3 marks)*

_____

_____

_____

_____

_____

_____

_____

_____

b. Describe an effect of incomplete dehydration during tissue processing.

b. *(2 marks)*

_____

_____

_____

_____

c. Name a reagent commonly used for clearing.

c. *(0.5 marks)*

_____

D.58 Describe the importance of tissue orientation during embedding. **(2 marks)**

_____

_____

_____

_____

D.59 List **FOUR** (4) technical faults during microtomy that produce suboptimal results. **(2 marks)**

_____

_____

_____

_____

D.60 Distinguish between a progressive and regressive H&E stain. **(2 marks)**

_____

_____

_____

_____

D.61 Describe the staining method for a routine automated H&E stain. **(2.5 marks)**

_____

_____

_____

_____

_____

_____

D.62 List **TWO** (2) situations where an adhesive slide would be used. **(1 mark)**

_____

_____

(Total 40 marks)

END OF SECTION

ESSAY

Section F – Question D.63 to Question D.64 = Total Marks: 20

Essay Questions

D.63 In essay format, discuss the use of tracking systems in histology. **(10 marks)**

D.64 In essay format, discuss specimen fixation and antigen retrieval methods for immunohistochemistry. **(10 marks)**

END OF SECTION