EXAMINATION FOR QUALIFIED MEDICAL LABORATORY TECHNICIAN

Subject:	**General**
Examination Date:	**Saturday 6 November 2021**
Time Allowed:	**3 hours – 9.30am – 12.40pm** **10 minutes extra time for reading the paper**

Candidate Number: «Member_No»
Name: «First_Name» «Surname»

General Instructions	
1.	Total marks for paper = 100.
2.	Marks for each question are as indicated.
3.	The paper consists of common syllabus and discipline specific questions. The relevant breakdown of marks is indicated under each Section Heading.
	To pass the QMLT examination, candidates must gain a minimum of a C grade (50%) in the common syllabus examination component and a minimum of a C grade (50%) in the discipline specific component of the written examination.
4.	All questions to be attempted.
5.	Use of a calculator is permitted.
6.	Write all answers into this examination booklet. Extra pages are provided at the back of this examination paper booklet if you require more space to write answers. Ensure you indicate the answer is continued on an additional page and label these additional pages clearly with your candidate number and the number of the question you are answering.

WORD DEFINITIONS	
Calculate	Perform a mathematical process to get the answer
Classify	Be able to designate to a group
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
Differentiate	Briefly and concisely state the main differences
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
Label	Give a name to
List	Headings only
Match	Find one that closely resembles another
Outline	Write brief notes incorporating the essential facts
Recognise	Be able to identify the main points

SECTION A

Multi Choice Questions - choose one answer for each question

Common Curriculum Questions C.1 - C.12 = 6 marks
Discipline Specific Questions D.13 - D.30 = 9 marks

(0.5 marks per correct answer)
Total Marks = 15 marks

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 Agreeing to something once provided with all the facts is an example of:

a. Confidential information
b. Workplace ethics
c. Informed consent
d. Human resource management

C.2 Which organisation is responsible for issuing an Annual Practising Certificate?

a. Medical Sciences Council of New Zealand
b. New Zealand Institute of Medical Laboratory Science
c. New Zealand Ministry of Health
d. New Zealand Qualification Authority

C.3 Harmonisation is:

a. The process leading to the uniformity of test results from different methods
b. Where staff are encouraged to work happily together
c. The process of taking tests out of one laboratory and sending to another to save money
d. The process of review of laboratory procedure to make things run smoothly

C.4 Alveoli are found in which organ?

a. Heart
b. Brain
c. Lung
d. Kidney

C.5 Specimens transported throughout New Zealand must adhere to which industry standard?

a. IANZ guideline

b. NATA guidelines

c. CDC guidelines

d. IATA guidelines

C.6 Standard precautions refers to:

a. Treating all body fluids including blood as potentially infectious

b. Wearing gloves at all times when handling patient samples

c. Ensuring all staff are aware of all laboratory hazards and have read the Health and Safety manual

d. Keeping all samples in appropriate leak proof containers.

C.7 What is the UN number for labelling packages containing Diagnostic Specimens Category A for air transport?

a. UN 3373

b. UN 1845

c. UN 2814

d. UN 2900

C.8 A Class 2 biosafety cabinet offers protection to:

a. Personnel only

b. Personnel and products

c. Products only

d. Personnel and environment

C.9 What laboratory department is generally responsible for the diagnosis of diabetes?

a. Microbiology

b. Histology

c. Blood Transfusion

d. Biochemistry

C.10 Where on the body is the antecubital fossa?

a. The leg

b. The arm

c. The waist

d. The neck

C.11 Why is it important to use personalised logons when using laboratory computer systems?

a. So management know which staff has achieved their KPIs.

b. So all entries in the computer are appropriately tracked in accordance with Total Quality Management

c. So HR know when staff are working and they can be paid the correct amount.

d. So you don't get the blame for other people's errors

C.12 Belonging to and achieving appropriate Continuing Professional Development is a legal requirement from which Government Act?

a. Health Practitioners Competency Assurance Act (2003)

b. Health and Disability Commissioner Act (1994)

c. Health and Safety at Work Act (2015)

d. Employment Relations Act (2000)

D.13 Which major blood vessel carries blood back to the heart from the body?

a. The vena cava

b. The pulmonary artery

c. The aorta

d. The iliac artery

D.14 Where is the thyroid gland located?

a. On top of the kidneys

b. In the neck

c. Above the stomach

d. In the pelvic region

D.15 Which of the following analytes can show falsely decreased results if the sample has been contaminated with EDTA anticoagulant?

a. Calcium

b. Sodium

c. Potassium

d. Glucose

D.16 Centrifugation of an anticoagulated blood sample results in the separation into which fractions?

a. Packed red cells, serum and buffy coat

b. Packed red cells, plasma and buffy coat

c. Packed red cells, serum and plasma

d. Packed red cells, immunoglobulins and buffy coat

D.17 A bronchial lavage sample is collected from the:

a. Heart
b. Eye
c. Lung
d. Stomach

D.18 In the Gram stain, which of the following reagents acts as a mordant?

a. Iodine
b. Crystal Violet
c. Safranin
d. Iron salts

D.19 A deficiency in coagulation factor IX is referred as?

a. von Willebrand disease
b. Haemophilia A
c. Haemophilia B
d. Hageman factor deficiency

D.20 Microcytosis and hypochromia are associated with:

a. Hereditary spherocytosis
b. Iron deficiency anaemia
c. Pyruvate kinase deficiency
d. B12 deficiency

D.21 Which condition below is characterised by a neutrophilia?

a. Bacterial infection
b. Acute leukaemia
c. Infectious mononucleosis
d. Idiopathic thrombocytopenic purpura

D.22 Which coloured tube is the preferred sample for crossmatch?

a. Lavender
b. Yellow.
c. Pink
d. Red.

D.23 What department uses frozen sections?

a. Cytogenetics

b. Cytology

c. Microbiology

d. Histology

D.24 The most common cause of haemolysis in specimens is:

a. Centrifugation at 3000 g

b. Incorrect storage conditions.

c. Poor phlebotomy technique.

d. Auto-immune haemolytic anaemia

D.25 Which process does the additive sodium fluoride inhibit?

a. Oxidation

b. Glycolysis

c. Lipolysis

d. Reduction

D.26 The organ that plays an important role in the haemostatic process by manufacturing coagulation factors is:

a. Kidneys

b. Stomach

c. Lungs

d. Liver

D.27 A common side effect of the drugs used in the treatment of leukaemia can cause?

a. A decrease in ESR.

b. A decrease in liver enzymes.

c. A decrease in WBCs and platelets.

d. An increase in WBCs and platelets.

D.28 Which of these is the most critical error that can occur when taking a blood sample?

a. Not getting any blood.

b. Giving the patient a haematoma.

c. Not collecting the tubes in the correct order of draw.

d. Misidentifying the patient.

D.29 The deficiency of which vitamin can lead to elevated prothrombin time?

a. Vitamin A

b. Vitamin B

c. Vitamin D

d. Vitamin K

D.30 In Blood Bank/Transfusion Medicine the acronym WBIT (wrong blood in tube) refers to?

a. Blood in a tube with errors in patient identity e.g. incorrect NHI number

b. Blood collected into the incorrect type of specimen tube

c. Blood in a tube labelled with another patient's details

d. Blood in a tube that is completely unlabelled

Section A: Total 15 marks

SECTION B

Labelling of Diagrams, e.g., Anatomy, Hazard Identification, Instrument

Common Curriculum Questions C.31 - C.33 = 5 marks
Discipline Specific Questions D.34 – D.35 = 5 marks

(Answer all questions)
Total Marks = 10 marks

C.31 Name the following hazard symbols: *(0.5 marks per correct answer)*
(C.31: 1.5 marks)

a. 

b. 

c. 

a. _____ b._____ c. _____

C.32 Name the equipment pictured below: *(0.5 marks per correct answer)*
(C.32: 1.5 marks)

a. 

b. 

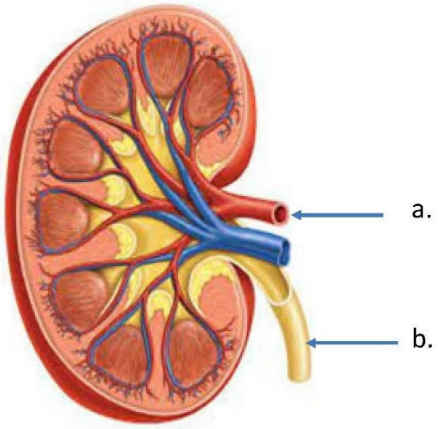
c 

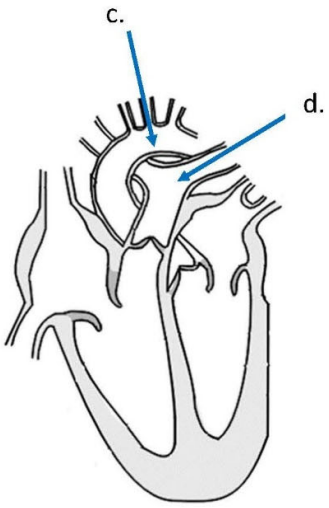
a. _____ b._____ c. _____

C.33 Name the anatomical features pictured below, indicated by a, b, c and d.

(0.5 marks per correct answer)

(C.33: 2 marks)





a. _____ c. _____

b. _____ d. _____

D.34. **(D.34: 4 marks)**

i. Which test is this set of tubes associated with and which disease are they used to test for?

(1 mark)

i. _____

_____

_____

ii. Which test are these tubes associated with? Give your answer as both the common abbreviation and name in full. (*1 mark)*

ii. _____

_____

_____

iii. What is the anticoagulant in these tubes and name one test they are used for? (*1 mark)*

iii. _____

_____

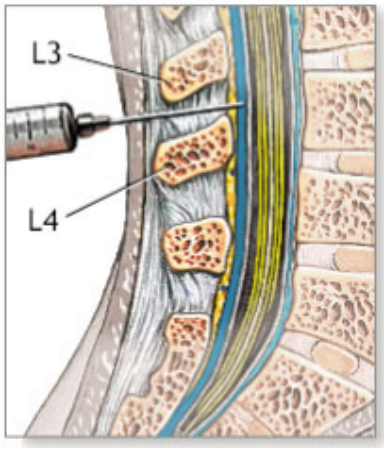
_____

iv. List two viruses this swab can be used for: (*1 mark)*

iv. _____

_____

D35. What is being collected in this image? How many tubes are routinely collected? **(D.35: 1 mark)**



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_____

Section B: Total 10 marks

SECTION C

Tables, Match Column Definition

Common Curriculum Questions C.36 - C.37 = 4 marks
Discipline Specific Questions D.38 = 6 marks

(Answer all questions)
Total Marks = 10 marks

C.36 Match the definition in column (A) with the correct description in column (B).
Write your answers in the table below. (Roman numeral only required.)

(0.5 marks per correct answer)
(C.36: 2 marks)

A	B
Accuracy	(i) Nose bleed
Morphology	(ii) Inflammation of the Kidney
Epistaxis	(iii) The science of organic forms and structure
Nephritis	(iv) The ability of a measurement to match the actual value of the quantity being measured

A	B (enter Roman numeral only)
Accuracy	
Morphology	
Epistaxis	
Nephritis	

C.37 Expand the following commonly used laboratory abbreviations. There are both laboratory tests and clinical conditions/details. *(0.5 marks per correct answer)*
(C.37: 2 marks)

MI _____

UTI _____

PPE _____

PCR _____

D.38 Match the following list of terms in Column A with the associated term in Column B.
Write your answers in the table below. (Roman numeral only required.)

(0.5 marks per correct answer)

(D.38: 6 marks)

A		B	
a.	Total CO2	i.	Diabetes
b.	NZBS	ii.	Pancreatitis
c.	GTT	iii.	Transfusion in New Zealand
d.	INR	iv.	Blood gas analyte
e.	E.coli	v.	Histology specimens
f.	Lipase	vi.	Pandemic
g.	Formalin	vii.	Faeces testing
h.	Surepath/thin prep	viii.	Myocardial Infarction
i.	SARS-CoV-2	ix.	Quality control
j.	Salmonella	x.	Cytology specimen
k.	Troponin	xi.	Urinary Tract Infection
l.	Positive bias	xii.	Anticoagulant therapy

A		B (enter Roman numeral only)
a.	Total CO2	
b.	NZBS	
c.	GTT	
d.	INR	
e.	E.coli	
f.	Lipase	
g.	Formalin	
h.	Surepath/thin prep	
i.	SARS-CoV-2	
j.	Salmonella	
k.	Troponin	
l.	Positive bias	

Section C: Total 10 marks

SECTION D

Calculations

Common Curriculum Questions C.39 - C.42 = 5 marks
Discipline Specific Questions D.43 - D.44 = 5 marks

(Answer all questions)
(Use of a calculator is permitted)

Total Marks = 10 marks

C.39 A patient needs a specimen taken within 36 hours of flying to meet with travel requirements. They fly at 2130 hr on the 10TH of November. **(C.39: 1 mark)**

When is the earliest they can have the specimen collected? Give the date and time.

_____

_____

_____

C.40 A department needs to demonstrate in increase in workload and is asked to calculate the average number of specimens received for the week. **(C.40: 1 mark)**

Day of the week	Monday	Tuesday	Wednesday	Thursday	Friday
Specimens per day	227	243	217	209	186

What is the mean number of samples per day? (*Show calculations)*

_____

_____

_____

_____

_____

C.41 Convert the following: **(C.41: 2 marks)**

0.75 L	to	_____ mL
1/4	to	_____ %
142ug	to	_____ g
185cm	to	_____ mm

C.42 Solve the following equation: *(0.5 marks per answer)*
(C.42: 1 mark)

1/3 + 5/8 = _____

Express the above result as a percentage.

_____

D.43 Cerebrospinal fluid was sent to the laboratory to exclude meningitis. The specimen was heavily blood stained. **(D.43: 2 marks)**

Use the formula given below to calculate the number of white cells (WBC) and red cells (RBC)

$$\text{Cells/}\mu\text{L} = \frac{\text{number of cells counted} \times \text{dilution factor}}{\text{number of large squares counted x 0.1}}$$

i. Calculate the total WBC count if 15 WBC were counted in 3 large squares.
The specimen was diluted 1:2 with acetic acid. *(1 mark)*

_____

_____

ii. Calculate the total RBC count if 200 RBC were counted in 2 large squares.

The specimen was diluted 1:10 with normal saline. *(1 mark)*

_____

_____

D.44 Full blood count results from a patient with pneumonia are shown below: **(D.44: 3 marks)**

Hb: 140 g/L

HCT: 0.43

RBC: 4.22 x 10^{12}/L

WBC: 23.5 x 10^{9}/L

Neutrophils: 88%

For each of the following, state the formula used and calculate the results showing full workings:
(0.5 marks for correct formula and 0.5 marks for correct calculation)

a. MCH in pg *(1 mark)*

_____

_____

b. MCHC in g/L *(1 mark)*

_____

_____

c. Absolute neutrophil count to one decimal place *(1 mark)*

_____

_____

Section D: Total 10 marks

SECTION E

Short Answer Questions

Common Curriculum Questions C.45 - C.49 = 10 marks
Discipline Specific Questions D.50 - D.57 = 25 marks

(Answer all questions)
Total Marks = 35 marks

C.45 Define Quality Assurance: **(C.45: 1.5 marks)**

_____

_____

_____

_____

_____

_____

C.46 Describe the "Duty of Care" in relation to patient samples. *(0.5 marks per point. Max. 2 marks)*
(C.46: 2 marks)

_____

_____

_____

_____

_____

_____

C.47 List 3 routes of infection from biological material. *(0.5 marks per point. Max. 1.5 marks)*
(C.47: 1.5 marks)

_____

_____

_____

_____

_____

_____

C.48 Outline the prevention of a sharps injury. *(0.5 marks per point. Max. 2 marks*)

(C.48: 2 marks)

C.49 Describe Cultural Competence: **(C.49: 3 marks)**

D.50 Outline the procedure to take when a tube breaks in the centrifuge? **(D.50: 3 marks)**

D.51 **(D.51: 5 marks)**

i. Outline the ABO blood group system include in your answer, the blood groups, antigens and antibodies. *(3 marks)*

ii. Outline the term Universal donor in relation to both red cell and plasma donors.

(2 marks)

D.52 Outline rheumatic fever including in your answer the causative bacteria, the organ most affected and which ethnic groups are most at risk in New Zealand. **(D.52: 2 marks)**

D.53 Outline type 2 diabetes including organs affected when the disease is poorly controlled and commonly requested biochemical tests to monitor this disease. **(D.53: 2 marks)**

D.54 **(D.54:4 marks)**

i. Outline Hepatitis B and Hepatitis C including tests used to detect infection and immunity (if available). *(2 marks)*

ii. List four tests that may be used to monitor liver function.

Panel includes tests for proteins and enzymes that are either produced by liver cells or released into the blood when liver cells are damaged. *(2 marks)*

_____

_____

_____

D.55 List the samples and order of draw required if requested to collect blood for the following tests? **(D.55: 2 marks)**

- Full Blood count
- INR
- Renal function tests

_____

_____

_____

_____

D.56 Blood cultures are an important tool in detection of sepsis. **(D.56: 4.5 marks)**

i. Outline their collection, include in your answer timing of collection, steps to avoid contamination and what a standard set consists of. *(2.5 marks)*

_____

_____

_____

_____

_____

_____

_____

_____

ii. List 2 common pathogens detected in Blood cultures and describe their appearance in a gram stain. *(2 marks)*

_____

_____

_____

_____

_____

D.57 **(D.57:2.5 marks)**

i. Indicate the primary function of the following cells.

- Red cells *(1 mark)*

_____

_____

_____

- Platelets *(0.5 mark)*

_____

_____

ii. Which white blood cell is associated with:

- Phagocytosis *(0.5 mark)*

_____

- Parasitic infections *(0.5 mark)*

_____

Section E: Total 35 marks

SECTION F

Essay Questions

Discipline Specific Questions D.58 - D.59 = 20 marks

(Answer all questions)

Total Marks = 20 marks

D.58 In essay format describe *in vitro* causes of haemolysis and the consequent effects on assays in your laboratory. Include specific analytes from more than one department in your discussion.
(D.58: 10 marks)

D.59 In essay format discuss the procedure for making a good quality Romanowsky stained blood film. Include in your answer the principles of the Romanowsky stain and the reasons to perform blood film assessment. **(D.59: 10 marks)**

Section F: Total 20 marks

Candidate No.: _____

Question No:	

Candidate No.: _____

Question No:	

Candidate No.: _____

Question No:	

Candidate No.: _____

Question No:	