EXAMINATION FOR QUALIFIED MEDICAL LABORATORY TECHNICIAN

Subject:	**Component Processing**
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 What is the haematocrit specification for Red Cells Resuspended Leucocyte Depleted?

a. 0.45-0.65

b. 0.50-0.70

c. 0.55-0.75

d. 0.60-0.80

D.14 What is the maximum storage period for allogenic femoral head donations at **-40°C or below**?

a. 1 year from date of donation

b. 2 years from date of donation

c. 5 years from date of donation

d. 10 years from date of donation

D.15 What is the minimum irradiation dose required when irradiating blood components?

a. 25Gy
b. 35Gy
c. 45Gy
d. 55Gy

D.16 What is the expiry of Red Cells for Inter-Uterine Transfusion stored at 2-6°C?

a. 1 day
b. 5 days
c. 7 days
d. 28 days

D.17 Why is it important to discard overweight or insufficient donation units?

a. So that the correct amount of blood component is issued to patients
b. So that the donation units will fit in the centrifuge
c. So that there is traceability of donation units throughout component processing
d. So that the correct proportions of anticoagulant are present in the donation units

D.18 What is the maximum storage time for red blood cells in additive solution at +2 to +6°C?

a. 21 days
b. 28 days
c. 35 days
d. 42 days

D.19 What is the maximum amount of residual White Blood Cells (rWBC) allowed in Plasma, Fresh Frozen Leucocyte Depleted as per specification?

a. $<5 \times 10^6$ / unit
b. $<1 \times 10^6$ / unit
c. $<10 \times 10^6$ / unit
d. $<2 \times 10^6$ / unit

D.20 What is the maximum storage time for Red Cells for Intra-Uterine Transfusion at +2°C to +6°C?

a. 1 day
b. 2 days
c. 5 days
d. 7 days

D.21 What are the sample requirements for Albumin in Seven Day Platelet Pool in PAS – Leucocyte Depleted?

a. 1 per day
b. 2 per day
c. 5 per day
d. 10 per day

D.22 What is the specification volume range for Cryoprecipitate Apheresis High Fibrinogen Leucocyte Depleted?

a. 60 – 100mL
b. 70 – 110mL
c. 80 – 120mL
d. 90 – 130mL

D.23 All manufactured platelet components must be tested for what on Day 8?

a. Volume
b. pH
c. % Haemolysis
d. Platelet count

D.24 Why are red cell components tested for haemolysis at expiry?

a. To ensure patient safety when transfusing red cell units that are close to expiry.
b. To measure the amount of red cells left in the unit.
c. To monitor stock usage of red cell components.
d. To determine if the controlled temperature storage units are functioning correctly.

D.25 What are the Quality Monitoring Requirements for Plasma Fresh Frozen Neonatal – Leucocyte Depleted?

a. 100% for residual WBC, Factor VIII and platelet count
b. 100% for residual WBC, volume and platelet count
c. 100% for volume, platelet count and albumin
d. 100% for volume, Factor VIII and platelet count

D.26 Transport time of Red Cells washed should **NOT** exceed what?

a. 6 hours
b. 12 hours
c. 24 hours
d. 36 hours

D.27 Why is it important for whole blood units to have a two hour down time prior to processing?

a. To allow white cells to phagocytose bacteria in the blood prior to removal by leucodepletion
b. To optimise the workflow of whole blood unit processing
c. To ensure that all units are handled in an identical manner
d. To allow time to sort and separate the units in eProgesa

D.28 Which of the following tests is **NOT** a mandatory test requirement in order to accredit a donation of blood?

a. Hepatitis B Surface Antigen (HBsAg)
b. ABO and RhD blood groups
c. Chagas screening
d. Antibody to Hepatitis C virus (HCV)

D.29 What is the volume specification for Platelet Pool, Leucocyte – Depleted in Additive Solution?

a. 180 – 400mL
b. 200 – 375mL
c. 250 – 450mL
d. 200 – 350mL

D.30 When irradiating, transforming and labelling blood components, what is the **maximum time** the units can be out of their controlled temperature storage conditions?

a. 15 minutes

b. 30 minutes

c. 45 minutes

d. 60 minutes

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. 

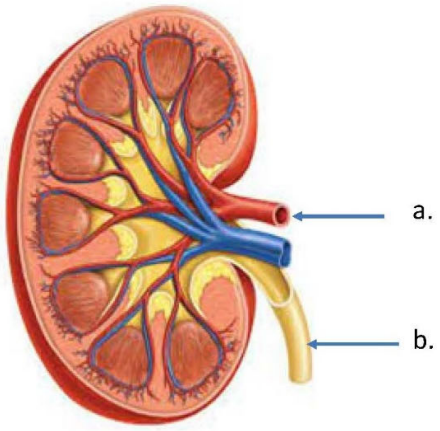
c 

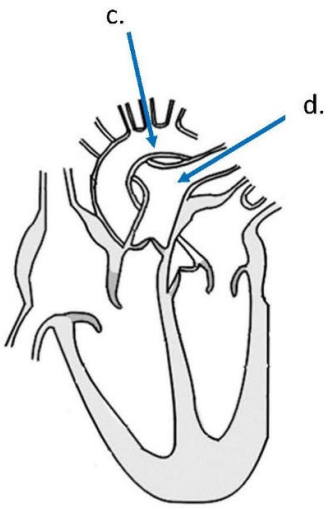
a. _____ b._____ c. _____

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)





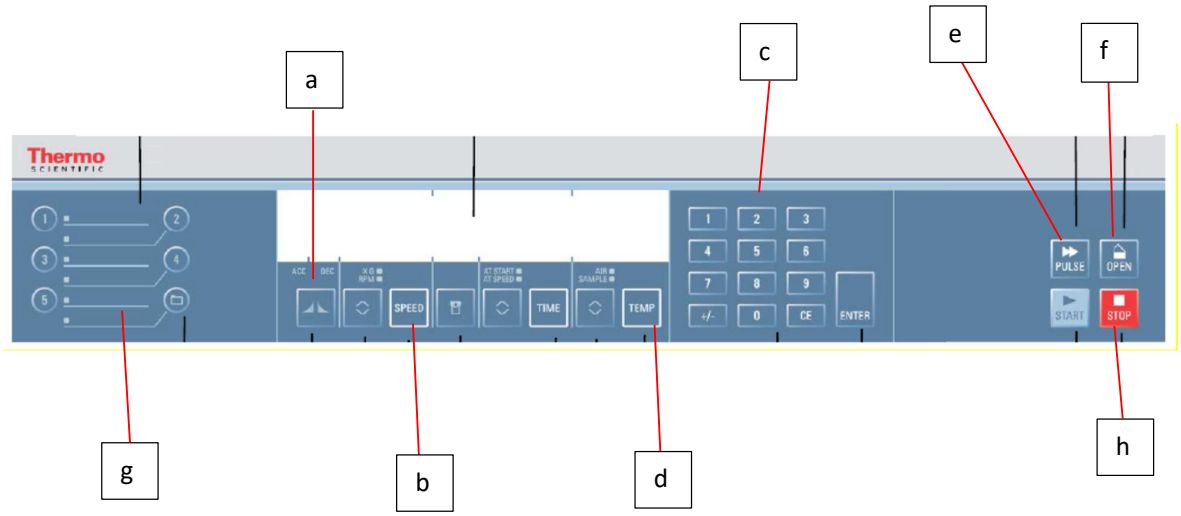
a. _____ c. _____

b. _____ d. _____

D.34 Label the Heraeus Multifuge X3 display panel

(0.5 marks per correct answer)

(D.34: 4 marks)



a. _____ b. _____

c. _____ d. _____

e. _____ f. _____

g. _____ h. _____

D.35 Identify the following laboratory equipment:

(0.5 marks per correct answer)
(D.35: 1 mark)

a.

a. _____

b.

b. _____

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 answer 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 **(D.38: 6 marks)**

a. Match the following words in Column A with the correct definition in Column B
Write your answers in the table below. (Roman numeral only required)
(*0.5 mark per correct answer)*

A	B
Validation	i. A collection of procedures performed in order to minimise contamination of sterile solutions and equipment by unwanted micro-organisms
Quality Control	ii. A foreign substance that induces an immune response inside the body
Aseptic Technique	iii. A process designed to check or verify the accuracy of an equipment or method
Antigen	iv. A system of maintaining standards in a manufacturing process by testing a sample against the specification of the method
Antibody	v. The degree to which an instrument or process will repeat the same value
Precision	vi. A protein produced in response to and counteracting a specific foreign substance

A	B (enter Roman numeral only)
Validation	
Quality Control	
Aseptic Technique	
Antigen	
Antibody	
Precision	

b. Identify the major antibodies and antigens in the ABO blood group system to complete this table. *(0.5 marks per correct answer)*

ABO Blood Group	Antigen(s)	Antibodies
	A	
B	B	Anti-A
		Anti-A, Anti-B
	A, B	

SECTION D

Calculations

Common Curriculum Questions C.39 - C.42 = 5 marks
Discipline Specific Questions D.43 - D.45 = 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.

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

(C.39: 1 mark)

_____

_____

_____

C.40 A department needs to demonstrate an 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:

(0.5 marks per correct answer)
(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 each)
(C.42: 1 mark)

1/3 + 3/8 = _____

Express the above result as a percentage. _____

D.43 A blood bank requires 8 units of Irradiated Resuspended Red Cells. The NZBS Irradiator has a total capacity for 4 units of Resuspended Red Cells and takes 8 minutes and 47 seconds to complete one irradiation cycle.

Calculate how long it will take to provide the necessary irradiated units. Show calculations and units.
(D.43: 1 mark)

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D.44 The formula for calculating the volume of a neonatal plasma pack is as follows:

(1 mark per correct answer)
(D.44: 2 marks)

$$Volume = \frac{weight - 24 \text{ (tare weight of empty paediatric pouch)}}{1.03}$$

Calculate the volume or weight (as appropriate) of each neonatal plasma pack (to the nearest whole number) to complete the table below. Show calculations and units for each pack in the spaces provided in the table.

Component Code	Weight (g)	Volume (mL)
Pack 1		61
Pack 2	85	
Pack 3		56
Pack 4	80	

Pack 1 _____

_____

_____

Pack 2 _____

_____

_____

Pack 3 _____

_____

_____

Pack 4 _____

_____

_____

D.45 Calculate the following TRIMA Platelet yield (to one decimal place) and decide the split for the following platelet split(s) to complete the table. Show calculations and units in the spaces provided in the table.

(0.5 mark per correct answer)

(D.45: 2 marks)

Platelet Yield	Volume	Split Decision	Outcome
≥4.8x10^{11} and <7.2x10^{11}/donation	>360mL	YES	DOUBLE DOSE (TRIMA ONLY) (D)
≥7.2x10^{11} and <15x10^{11}/donation	>540mL	YES	TRIPLE DOSE (TRIMA ONLY) (T)
≥15x10^{11} /donation	>540mL	YES	TMS Decision (TRIMA ONLY)

Donation Number	Platelet Count (x10^{9}/L)	Final Volume (mL)	Platelet Yield (x10^{11} Plts/Donation)	Single (S), Double (D) or Triple (T)
3115789	1201	612		
3552664	1071	479		

Donation Number: 3115789

_____

_____

_____

Donation Number: 3552664

_____

_____

_____

Section D: Total 10 marks

SECTION E

Short Answer Questions

Common Curriculum Questions C.46 - C.50 = 10 marks
Discipline Specific Questions D.51 - D.62 = 25 marks

(Answer all questions)
Total Marks = 35 marks

C.46 Define Quality Assurance. **(C.46: 1.5 marks)**

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C.47 Describe the "Duty of Care" in relation to patient samples.

(0.5 marks per point. Max. 2 marks)
(C.47: 2 marks)

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C.48 List 3 routes of infection from biological material. *(0.5 marks per point. Max. 1.5 marks)*
(C.48: 1.5 marks)

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_____

C.49 Outline the prevention of a sharps injury.

(0.5 marks per point. Max 2 marks)

(C.49: 2 marks)

C.50 Describe Cultural Competence.

(C.50: 3 marks)

D.51 List **SIX** of the mandatory tests required for accreditation of a **first time** blood donation in accordance with NZBS Manufacturing Standards. *(0.5 marks per point. Max. 3 marks*)

(D.51: 3 marks)

D.52 Describe what Therapeutic Venesection is and why it is performed. Name one condition where Therapeutic Venesection could be applied. **(D.52: 2.5 marks)**

D.53 Define and distinguish between “discard limit” and “specification”. **(D.53: 2.5 marks)**

D.54 Describe **TWO** clinical uses of the following fractionated products:

(0.5 marks per correct answer)

(D.54: 4 marks)

a. RhD Immunoglobulin

b. Prothrombinex

c. Albumex

d. Hepatitis B Immunoglobulin

D.55 Distinguish between Open and Closed System Processing in terms of manufacturing blood components and products. **(D.55: 2 marks)**

D.56 Describe what Statistical Process Control software is used for and why it is important to enter the data correctly. **(D.56: 2 marks)**

D.57 State **FOUR** causes of Haemolytic Disease of the Newborn. *(0.5 marks per correct answer)* **(D.57: 2 marks)**

D.58 Outline the clinical uses of femoral head bone. *(0.5 marks per correct answer)* **(D.58: 1 mark)**

D.59 State the checks that must be conducted **BEFORE** irradiation can occur of a resuspended red cell unit. *(0.5 per correct answer)*

(D.59: 1 mark)

BEFORE IRRADIATION:

D.60 State the transport timeframes and packaging requirements for the dispatch of platelets and outline the reasons for the difference in platelet transport timeframe compared to those of red cells resuspended. **(D.60: 2 marks)**

D.61 List **FOUR** benefits of leucodepletion of blood components in terms of risk reduction.

(0.5 marks per correct answer)

(D.61: 2 marks)

D.62 Define “concatenation” and the reason why it is important to concatenate properly.

(D.62: 1 marks)

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_____

Section E: Total 35 marks

SECTION F

Essay Questions

Discipline Specific Questions D.63 - D.64 = 20 marks
(Answer all questions)
Total Marks = 20 marks

D.63 In essay format, compare the principles and importance of line segregation and line clearance in the manufacture of blood component/products. Include **TWO** examples of line segregation and **TWO** examples of line clearance in your answer. **(D.63: 10 marks)**

D.64 In essay format, describe the principles and practices of Good Manufacturing Practice (GMP) within New Zealand Blood Service, including the potential consequences of failure to adhere to GMP. **(D.64: 10 marks)**

Section F: Total 20 marks

Candidate No.: _____

Question No:	

Candidate No.: _____

Question No:	

Candidate No.: _____

Question No:	

Candidate No.: _____

Question No:	