EXAMINATION FOR QUALIFIED MEDICAL LABORATORY TECHNICIAN

Candidate Name:

Candidate Number:

Subject: **TRANSFUSION SCIENCE**

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:

	Common	*Discipline Specific*
Section A, questions 1-30 = Total Marks 15	*6 Marks*	*9 Marks*
Section B, questions 31-37 = Total Marks 10	*5 Marks*	*5 Marks*
Section C, questions 38-41 = Total Marks 10	*4 Marks*	*6 Marks*
Section D, questions 42-45 = Total Marks 05	*5 Marks*	*0*
Section E, questions 46-64 = Total Marks 40	*10 Marks*	*30 Marks*
Section F, questions 65-66 = 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 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 PCBU (person conducting a business or undertaking) 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 Polyspecific AHG reagent contains:

a. Anti-IgG and anti-IgA
b. Anti-IgG and anti-IgM
c. Anti-IgG and anti-C3d
d. Anti-IGA and anti-C3d

D.14 Rh antibodies have been associated with which clinical condition?

a. Haemolytic disease of the Fetus and newborn (HDFN)

b. Thrombocytopenia

c. Haemophilia A

d. Stomatocytosis

D.15 A pre-transfusion sample for a pregnant patient, recently transfused in the last 3 months.

a. 72 hours

b. 7 days

c. 21 days

d. For the current admission

D.16 Which ABO/D antibodies would you typically find in the plasma of a group B RhD Positive Male who has never received a blood transfusion?

a. Anti-A

b. Anti-B

c. Anti-A And Anti-D

d. Anti-B and Anti-D

D.17 Solid-phase antibody screening is based on:

a. Adherence

b. Agglutination

c. Haemolysis

d. Precipitation

D.18 Rh antibodies react best at what temperature?

a. 15°C

b. 18°C

c. 22°C

d. 37°C

D.19 There is a patient in ED urgently requiring a red cell transfusion due to an active bleed, no pre-transfusion testing has been completed for this patient. What units would you select if red cell units are required before testing can be completed?

a. Emergency O RhD negative blood (uncrossmatched)

b. ABO/RhD group specific blood (uncrossmatched)

c. ABO/RhD group specific and compatible blood

d. any ABO group that is RhD negative

D.20 A patient is group B and requires a transfusion of Fresh Frozen Plasma (FFP), what can the ABO group of the plasma components be?

a. AB

b. A or B or AB

c. B or AB

d. A or AB

D.21 Red cell antibodies are typically excluded using RBCs that are homozygous for the corresponding antigen because:

a. Antibodies show dosage

b. Multiple antibodies may be present

c. It results in a P value of 0.05 for proper identification of the antibody

d. The antibody are reactive at 37 °C

D.22 Which of the following alloantibodies is commonly associated with a severe haemolytic transfusion reaction?

a. Anti-Le^{a}

b. Anti-M

c. Anti-Ch/Rg

d. Anti-K

D.23 Which of the following methods may be employed to remove the bound IgG antibodies for testing for a patient with a positive DAT?

a. Adsorption

b. Elution

c. Neutralisation

d. Titration

D.24 Anti-D immunoglobulin should be transfused to:

a. Rh(D) negative mother who has given birth to an Rh(D) negative baby

b. Rh(D) negative mother who has given birth to an Rh(D) positive baby

c. Rh(D) positive mother who has given birth to an Rh(D) negative baby

d. Rh(D) positive mother who has given birth to an Rh(D)positive baby

D.25 Which of the following procedures does **NOT** form part of a routine "Group and Screen"?

a. ABO and RhD group

b. Antibody Screen

c. Checking for previous or duplicate records for the patient and comparing current results with historical findings?

d. Antibody identification

D.26 What is the maximum shelf life for a unit of platelets stored at room temperature with constant agitation?

a. 3 days

b. 7 days

c. 35 days

d. 1 day (24 hours)

D.27 In the presence of an antibody, the positive endpoint of a Column Agglutination Test (CAT) is indicated by:

a. Red cell agglutination

b. Unbound red cells

c. Red cell precipitation

d. Attachment of indicator cells

D.28 Which fractionated product is used as a reversal agent for warfarin?

a. Biostate

b. Prothrombinex

c. Albumex

d. Intragram P

D.29 Which of these antigens is destroyed by enzymes?

a. P1

b. Js^a

c. Fy^a

d. Jk^a

D.30 What Blood component is most frequently associated with bacterial sepsis due to transfusion?

a. Fresh Frozen Plasma

b. Red Cells

c. Platelets

d. Fractionated products

END OF SECTION

SECTION B

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

Section B – Question 31 to Question 37 = Total Marks: 10

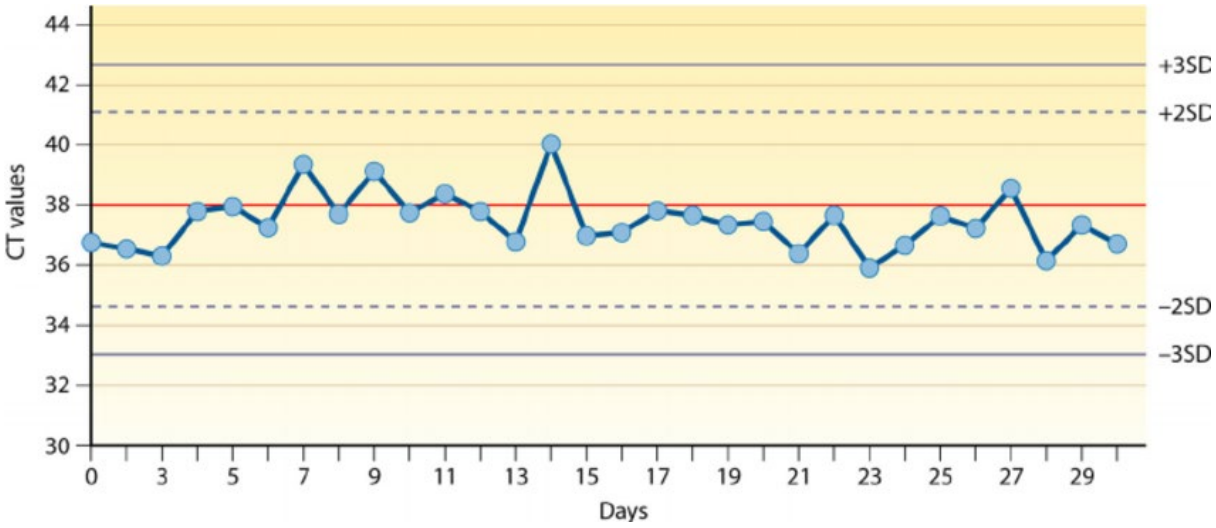
(Answer all questions)

C.31. Name the following hazard symbols *(0.5 marks per correct answer)*
(C31: 1 mark)

a.		b.	

a. _____ b. _____

C.32 Name the type of graph: *(0.5 marks per correct answer)*
(C.32: 1.5 marks)

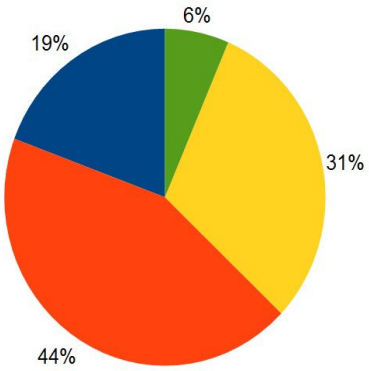


Type of graph: _____

Name the axis: CT values = _____ axis

Days = _____ axis

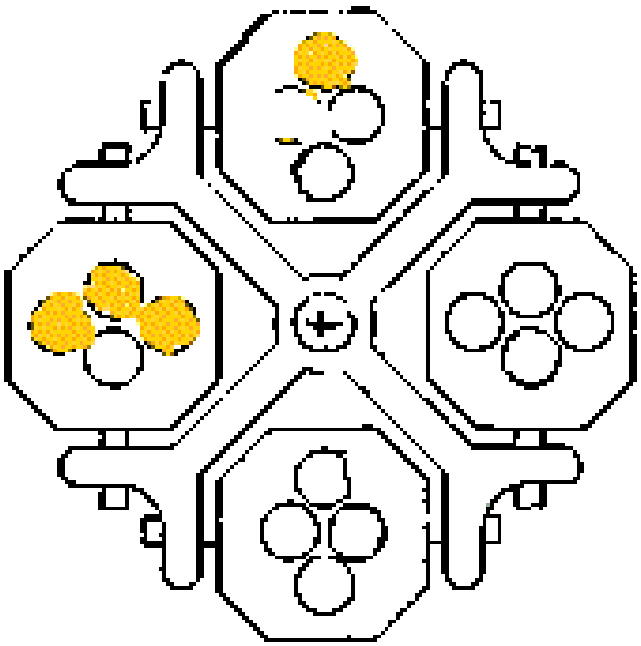
C.33 Name the type of graph **(C.33: 0.5 mark)**



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

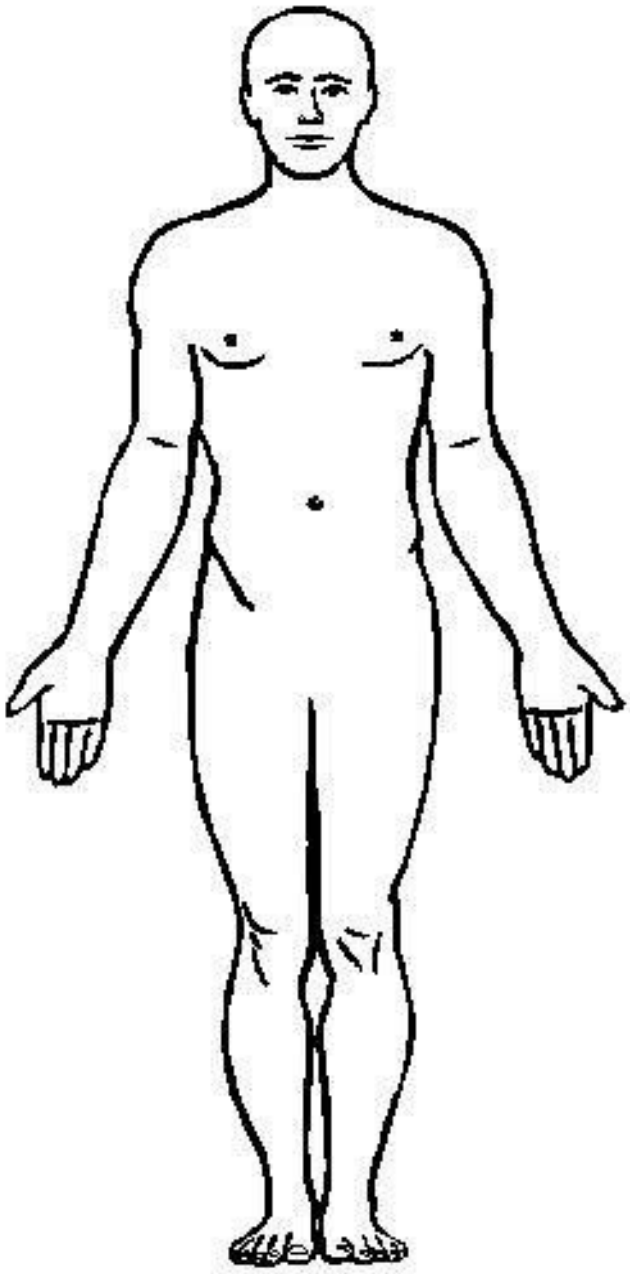
You have 4 more tubes to centrifuge, indicate on the rotor where they need to be positioned.

(C.34: 0.5 mark)



C.35 On the diagram, show the location of the following: **(C.35: 1.5 marks)**

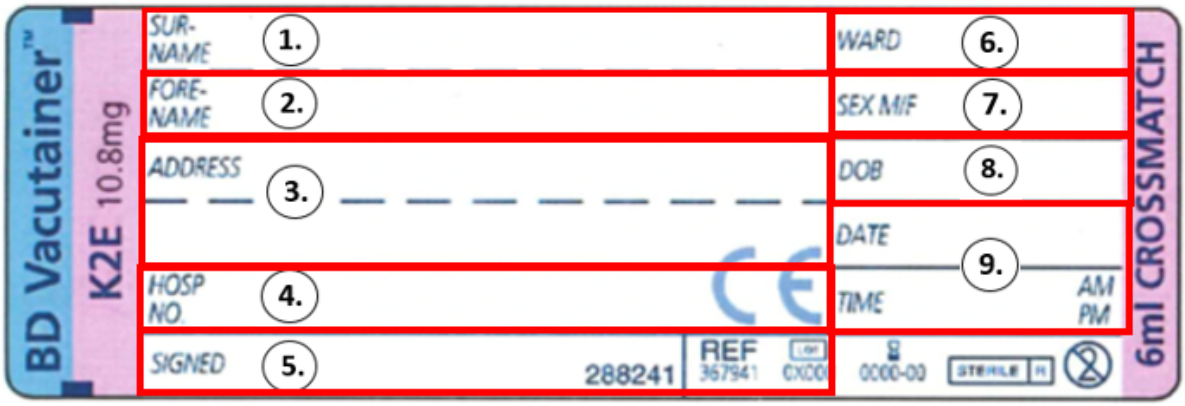
a. Femoral artery
b. Jugular vein
c. Median cubital vein



D.36 Below is an example of a tube label used in the collection of crossmatch sample. Each area/field of the label is numbered 1-9.

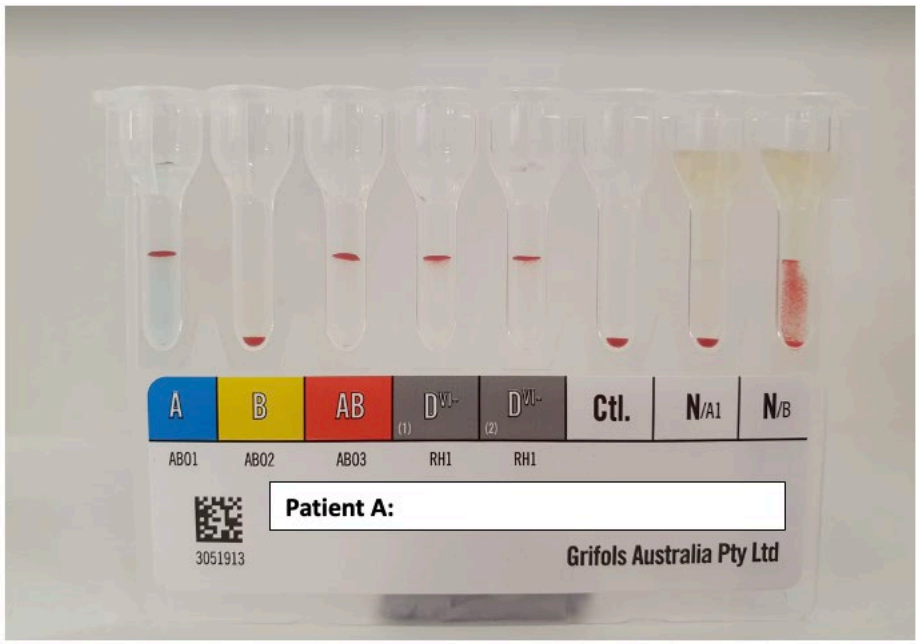
In the table below list the 6 mandatory fields required to be completed for a sample to be accepted for pre-transfusion testing. *(0.5 marks each)*

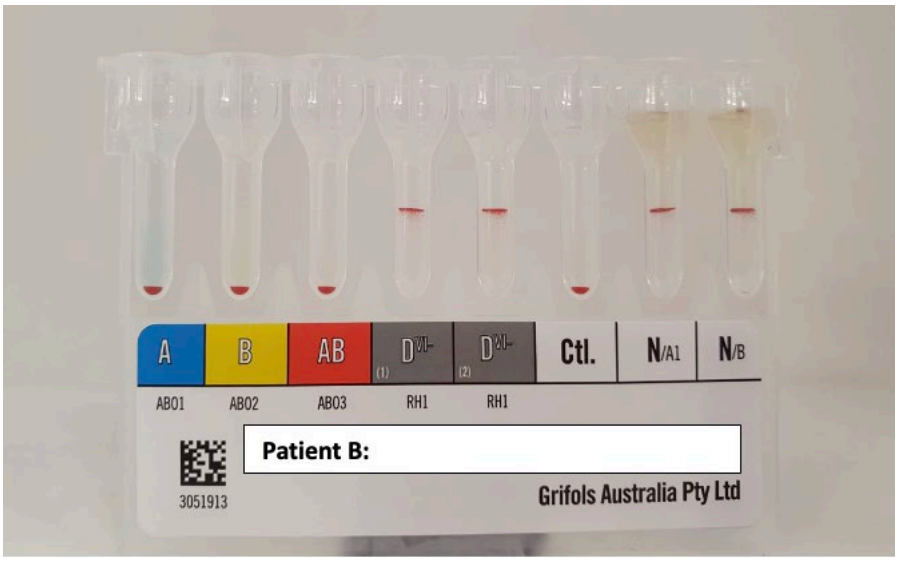
(D.36: 3 marks)

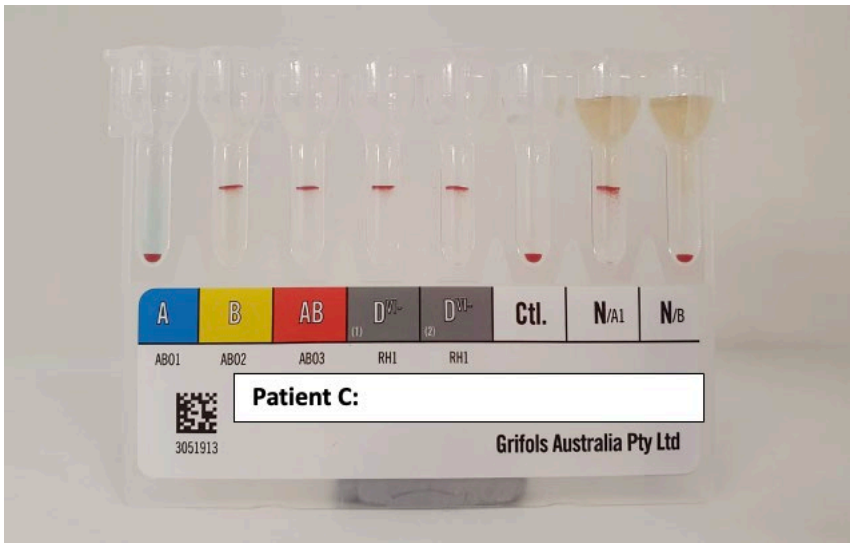


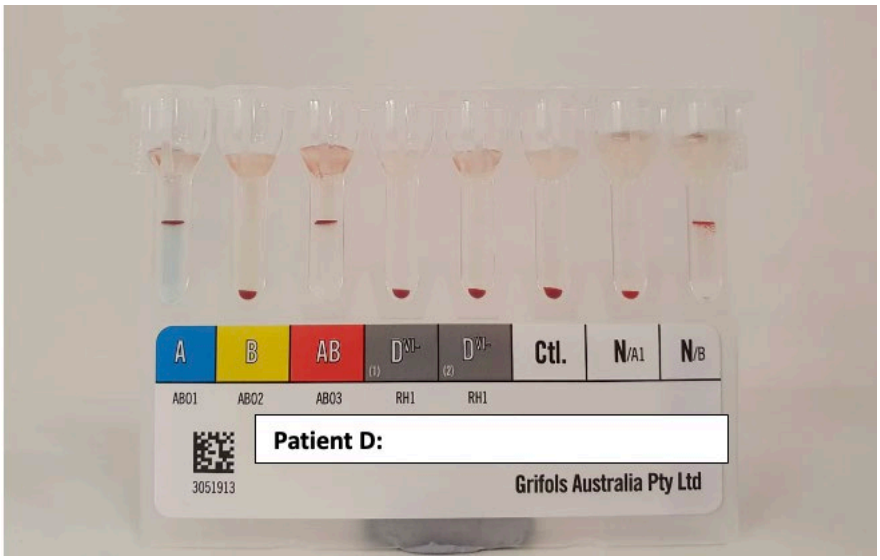
Number	Description

D.37 Using the CAT cards below, interpret the ABO and Rh(D) Blood group for each patient. Write your answer in the box on the card. **(D.37: 2 marks)**









END OF SECTION

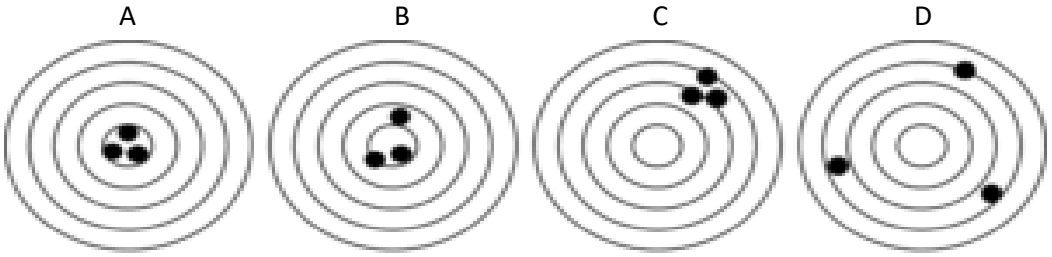
SECTION C

Tables, match column definition

Section C – Question 38 to Question 41 = Total Marks: 10

(Answer all questions)

C.38 Select the correct letter for each description: **(C.38: 2 marks)**



Description Letter

Low Accuracy / High Precision = _____

High Accuracy / Low Precision = _____

Low Accuracy / Low Precision = _____

High Accuracy / High Precision = _____

C.39 Match Column A to Column B, and write your answers in the table below (Roman Numerals only required): **(C.39: 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
Medical Sciences Council	
International Accreditation New Zealand	
New Zealand Institute of Medical Laboratory Science	
Health and disability commission	

D.40 Fill out the table below with the expected reactions (+/0) when using Rh blood typing reagents to determine the probable phenotype based on the Wiener terminology. **(D.40: 3 Marks)**

Probable Phenotype	**Reagent**				
	Anti-D	Anti-C	Anti-E	Anti-c	Anti-e
Example R_1R_1	+	+	0	+	+
$r^{I}r$					
R_2R_2					
rr					
R_1R_2					
$r^{II}r$					

D.41 Fill out Column B of the table below with the missing storage temperature for the Component or Product in Column A. **(D.41: 3 marks)**

Colum A (Component or Product)	**Colum B (Storage Temperature)**
Red Cell Components	
Fresh Frozen Plasma (FFP)	
Thawed Cryoprecipitate	
Platelet Components	
Thawed FFP that is not used	
Rh(D) Immunoglobulin	

END OF SECTION

SECTION D

Calculations

Section D – Question 42 to Question 45 = Total Marks: 5

Calculations

C.42 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.42: 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.43 Refer to daily fridge temperature monitoring record below. **(C.43: 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.44 Convert the following: **(C.44: 1.5 marks)**

a) 4.5 mL to _____ µL

b) 1.125kg to _____ g

c) 1500 µmol to _____ mmol

C.45 Calculate how many grams of sodium chloride (NaCl) are required to make 1.0L of a 2 Molar solution?
(Show calculations) **(C.45: 1 mark)**
Atomic Weight of sodium (Na) = 23
Atomic Weight of chlorine (Cl) = 35.5

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END OF SECTION

SECTION E

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

Section E – Question 46 to Question 64 = Total Marks: 40

Short Answer Questions

C.46 List the activities that registered laboratory staff must do to comply with the HPCA act?

(C.46: 1 mark)

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_____

C.47 Outline cultural competency as it relates to medical laboratory science? **(C.47: 2 marks)**

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C.48 Outline Total Quality Management in the medical laboratory setting **(C.48: 2 marks)**

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C.49 Describe the procedures taken when dealing with a blood spill in the laboratory or phlebotomy clinic? **(C.49: 2 marks)**

C.50 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.50: 1.5 marks)**

C.51 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.51: 1.5 marks)**

D.52 Discuss the purpose of the red cell antibody screen as it relates to Pre-Transfusion Testing.
(D.52: 3 marks)

D.53 Discuss the clinical significance and serological characteristics of the antibodies in the Kidd Blood group system. **(D.53: 3 Marks)**

D.54 Describe the principles and applications of the saline tube technique as used in Transfusion Science: **(D.54: 3.5 marks)**

D.55 List 4 acceptance criteria for a new blood donor: **(D.55: 2 marks)**

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D.56 Name four reasons for rejecting samples as unsuitable for testing in the blood bank: **(D.56: 2 marks)**

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D.57 In a patient with a positive DAT, identify whether you would expect that the auto control in the IAT panel to be positive or negative? State a reason for your answer. **(D.57: 1.5 marks)**

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D.58 List all blood components and the number of units contained withing Box 3 of the adult Massive Transfusion Protocol (MTP) or Massive Haemorrhage Pathway (MHP): **(D.58: 3 marks)**

D.59 Describe the differences between a red cell alloantibody and a red cell autoantibody in the context of Blood Banking: **(D.59: 1.5 marks)**

D.60 Describe the principles of Column Agglutination Technology (CAT) for ABO typing of patients. **(D.60: 6 marks)**

D.61 In the following scenario, identify the significant red cell details required for transfusion:
A pregnant O Rh(D) positive woman, with an anti-K detected in her antibody screen and panel.
(D.61: 1 mark)

_____

_____

_____

_____

D.62 Indicate if it is possible for a group A mother and a group B father to produce a group O Baby? Discuss the rationale for your answer. **(D.62: 1.5 marks)**

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D.63 Name **TWO** (2) clinical conditions in which alloantibodies are implicated: **(D.63: 1 mark)**

_____

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_____

D.64 Name **TWO** (2) blood group systems with antibodies associated with delayed haemolytic transfusion reactions: **(D.64: 1 mark)**

_____

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END OF SECTION

ESSAY

Section F – Question 65 to Question 66 = Total Marks: 20

Essay Questions

D.65 In essay format, discuss a WBIT (wrong blood in tube) event, how it is detected and how to minimise the risk of a WBIT? **(D.65: 10 marks)**

D.66 In essay format, outline the principles of an electronic crossmatch. Your essay should focus on the role of the Blood Management System (BMS) and emergency situations. **(D.66: 10 marks)**

EXTRA PAPER