

EXAMINATION FOR QUALIFIED MEDICAL LABORATORY TECHNICIAN



Subject: Anatomical Pathology

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.

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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. Work place 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 The ideal temperature of a water bath used for sectioning should be:
- a. 5°C below the melting point of wax
 - b. 20°C below the melting point of wax
 - c. 10°C below the melting point of wax
 - d. 15°C below the melting point of wax
- D.14 A commonly used fixative for immunohistochemistry is?
- a. Glutaraldehyde
 - b. Neutral buffered formalin
 - c. Ethanol
 - d. Bouin's

D.15 What colour do Gram negative bacteria stain in a Gram stain?

- a. Red/Pink
- b. Blue/Black
- c. Blue/Green
- d. Yellow/Green

D.16 Identify the stains used for demonstrating mycobacteria?

- a. Gram-Twort Stain, Gram Stain
- b. Ziehl-Neelsen Stain, Modified Fites Method
- c. Warthin-Starry Method, Gimenez Method
- d. Giemsa Stain, Cresyl Violet Acetate Method

D.17 What is an appropriate control for Masson-Fontana?

- a. Skin
- b. Liver
- c. Cervix
- d. Brain

D.18 Perls' Prussian Blue is used to demonstrate?

- a. Elastic Fibres
- b. Amyloid
- c. Haemosiderin
- d. Melanin

D.19 The reagent commonly used for dehydration during tissue processing?

- a. Xylene
- b. Paraffin wax
- c. Ethanol
- d. Hydrochloric acid

D.20 Define serial sections:

- a. Sections cut out of sequence
- b. Sections cut in sequence
- c. Sections cut using a stepwise method
- d. Sections cut at deeper intervals through the block

D.21 Thioflavine T is used to demonstrate:

- a. Melanin
- b. Mucins
- c. Collagen
- d. Amyloid

D.22 Identify the reagents used in Perls' Prussian Blue:

- a. aqueous potassium ferrocyanide, aqueous hydrochloric acid
- b. aqueous periodic acid, alcian blue solution
- c. aqueous potassium ferrocyanide, aqueous silver nitrate
- d. aqueous potassium permanganate, aqueous oxalic acid

D.23 Identify the special stain for fungi:

- a. Grocott Methenamine – Silver
- b. Ziehl-Neelsen
- c. Warthin – Starry
- d. Masson – Fontana

D.24 What is the composition of Gill's haematoxylin?

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

D.25 Identify a fixation artefact:

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

D.26 Identify the type of microtome used in the cryostat:

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

D.27 What causes expansion of tissue sections?

- a. A damaged knife
- b. Debris in the water bath
- c. Bubbles in the water bath
- d. Water bath too hot

D.28 Identify the technique for demonstrating alopecia specimens:

- a. Two 4mm punch biopsies both embedded vertical
- b. Two 4mm punch biopsies both embedded transverse
- c. Two 4mm punch biopsies, one embedded transverse, the other vertical
- d. One 4mm punch biopsy embedded vertical

D.29 Define embedding for Formalin Fixed Paraffin Embedded (FFPE) tissue:

- a. Tissue is embedded in paraffin wax to provide an internal support media for microtomy
- b. Tissue is orientated in paraffin wax which provides an external support media for microtomy
- c. Tissue is embedded into moulds using paraffin wax for protection
- d. Tissue is embedded using paraffin wax for tissue conservation

D.30 In special staining methods, what is the purpose of diastase?

- a. The digestion of mucosubstances
- b. The digestion of glycogen
- c. The differentiation of glycogen
- d. The digestion of collagen

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 = 5 marks

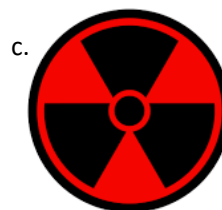
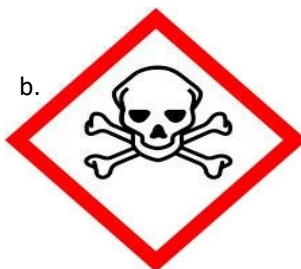
(Answer all questions)

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. _____

C.32 Name the equipment pictured below.

(0.5 marks per correct answer)

(C.32: 1.5 marks)



a. _____

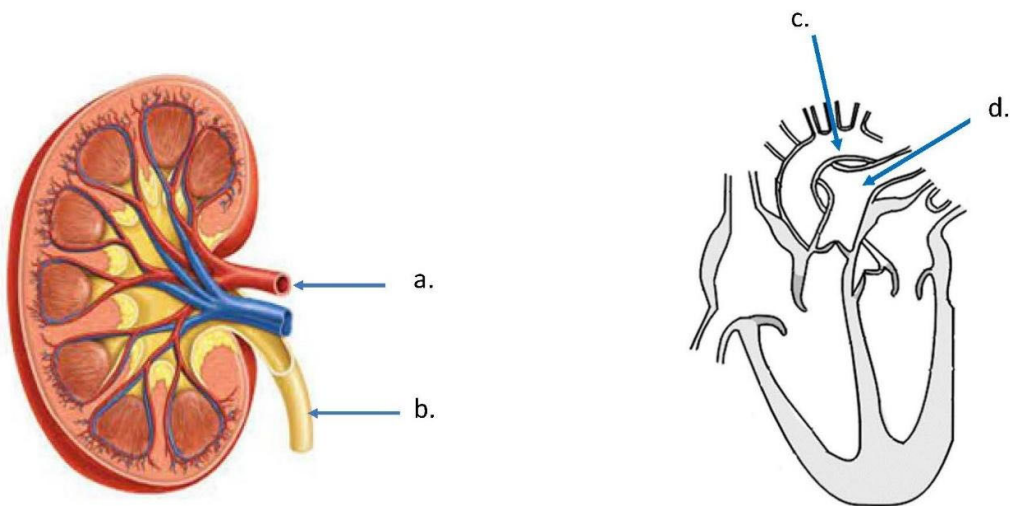
b. _____

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. _____

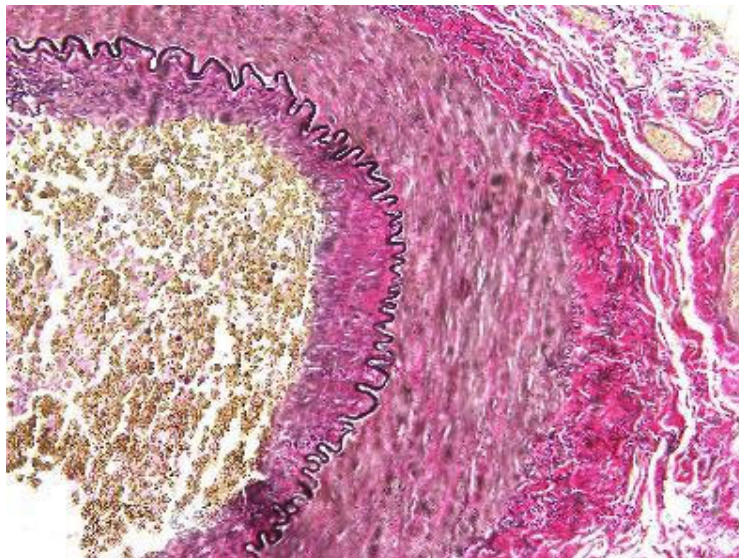
b. _____

d. _____

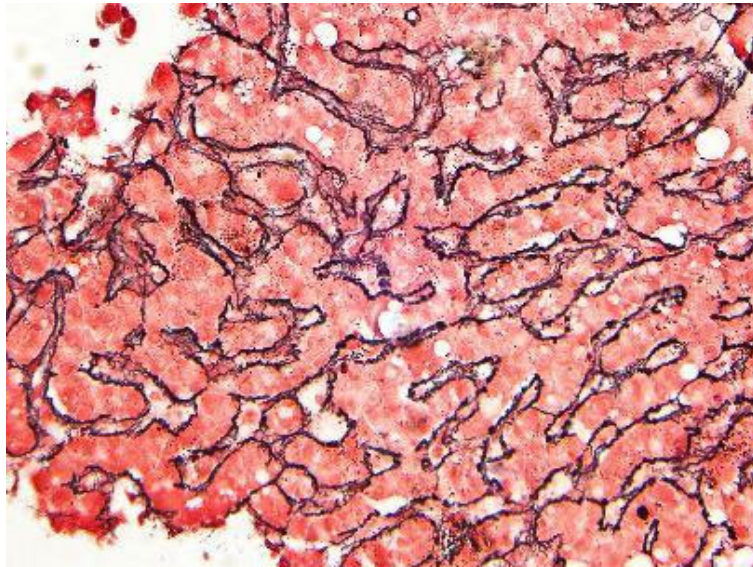
D.34 For each image identify the following stain (0.5 mark) and indicate the target of the stain (0.5 mark).

(D.34: 5 marks)

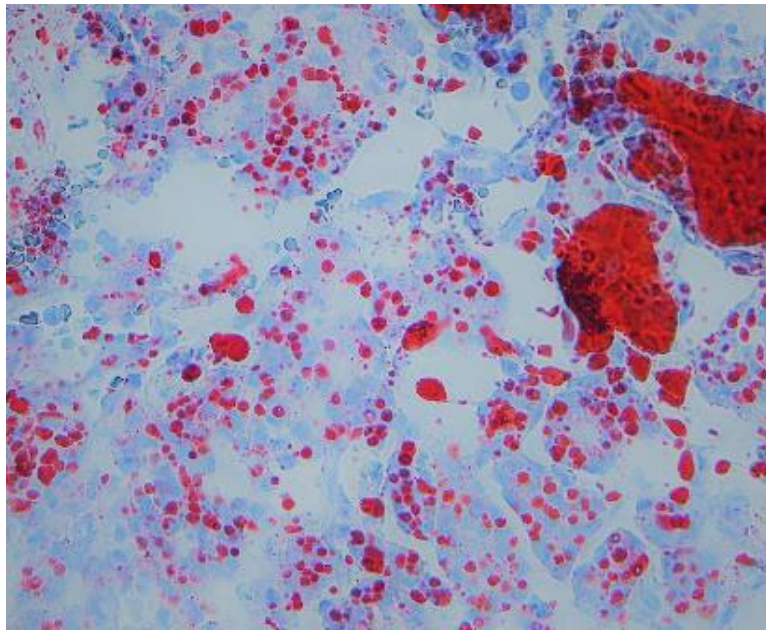
a.



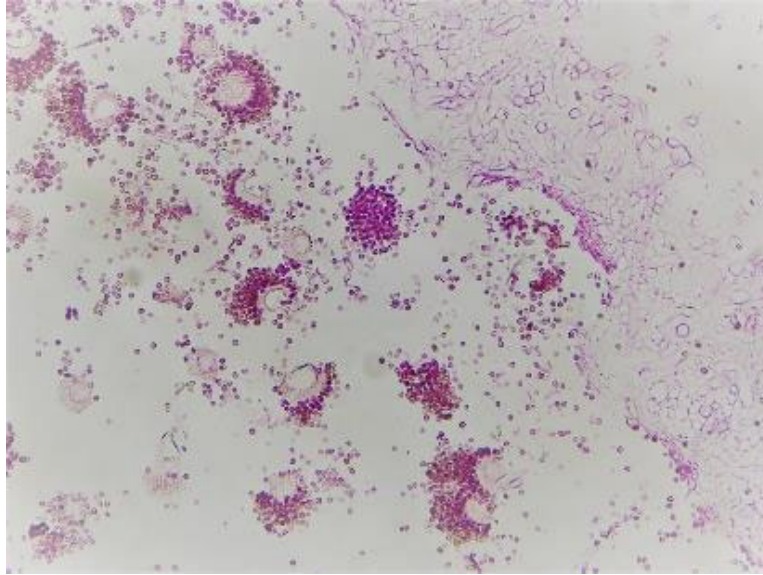
b.



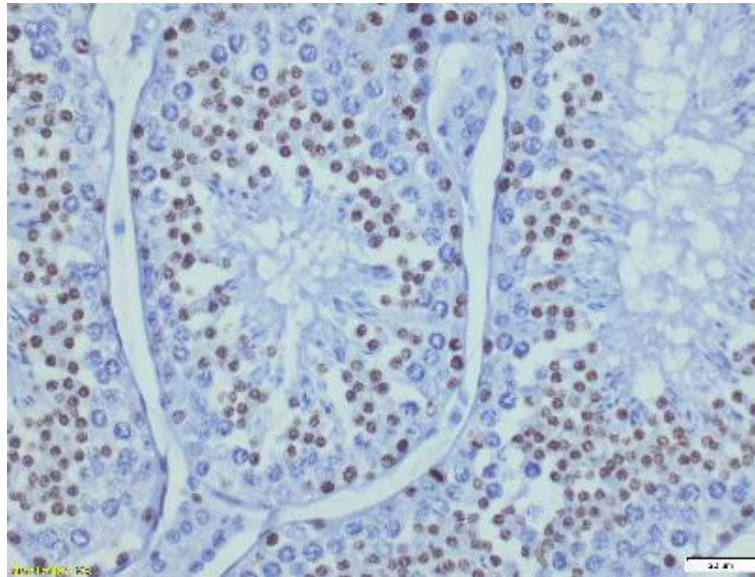
c.



d.



e. NB: Specific stain not required for this image.



SECTION C**Tables, Match Column Definition****Common Curriculum Questions C.35 - C.36 = 4 marks****Discipline Specific Questions D.37 = 6 marks****(Answer all questions)****Total Marks = 10 marks**

C.35 Match the definition in column (A) with the correct description in column (B)

Write your answers in the table below. (Roman numeral only required.)

(C.35: 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.36 Expand the following commonly used laboratory abbreviations. There are both laboratory tests and clinical conditions/details **(C.36: 2 marks)**

MI _____

UTI _____

PPE _____

PCR _____

D.37 Match the histological features in Column B with the major organ in Column A.

Write your answers in the table below. (Roman numeral only required.)

(0.5 marks per correct answer)

(D37: 6 marks)

A	B
Brain	(i) striated, non-striated, skeletal muscle fibres, multinucleated
Kidney	(ii) adipose tissue, ducts, lobules, connective tissue
Skin	(iii) follicular cells, colloid follicle, non-striated cuboidal epithelium
Breast	(iv) germinal centres, cortex, medulla, encapsulated
Lung	(v) sinusoids, hepatocytes, prominent nuclei, round centrally placed nuclei
Thyroid	(vi) gastric glands, gastric pits, mucosa, submucosa
Prostate	(vii) glomeruli, nephrons, tubules, cortex, medulla
Lymph node	(viii) epidermis, dermis, adipose, hair
Liver	(ix) alveolar sac, alveoli, bronchioles, alveolar duct
Stomach	(x) columnar epithelium, simple tubular granules, compact stroma, short, straight narrow glands
Muscle	(xi) white matter, grey matter, neurons, glia, astrocytes
Endometrium	(xii) simple glandular epithelium, lumen, acinus, smooth muscle fibres

A	B (enter Roman numeral only)
Brain	
Kidney	
Skin	
Breast	
Lung	
Thyroid	
Prostate	
Lymph node	
Liver	
Stomach	
Muscle	
Endometrium	

Section C: Total 10 marks

SECTION D

Calculations

Common Curriculum Questions C.38 - C.41 = 5 marks

Discipline Specific Questions D.42 - D.46 = 5 marks

(Answer all questions)

(Use of a calculator is permitted)

Total Marks = 10 marks

- C.38 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.38: 1 mark)

- C.39 A department needs to demonstrate an increase in workload and is asked to calculate the average number of specimens received for the week. **(C.39: 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.40 Convert the following:

(C.40: 2 marks)

(0.5 marks per correct answer)

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

(0.5 mark per correct answer)
(C.41: 1 mark)

Express the above result as a percentage.

D.45 Calculate the volumes of neutral red and water required to make 100mL of 0.1% neutral red from 1% neutral red stock solution. **(D.45: 1 mark)**

D.46 **(D.46: 1 mark)**

(i) Convert 0.02mL to μL *(0.5 mark)*

(ii) Convert 3.5mL to μL *(0.5 mark)*

Section D: Total 10 marks

SECTION E

Short Answer Questions

Common Curriculum Questions C.47 - C.51 = 10 marks

Discipline Specific Questions D.52 - D.63 = 25 marks

(Answer all questions)

Total Marks = 35 marks

C.47 Define Quality Assurance:

(C.47: 1.5 marks)

C.48 Describe the “Duty of Care” in relation to patient samples: *(0.5 mark per point. Max. 2 marks)*

(C.48: 2 marks)

C.49 List 3 routes of infection from biological material:

(0.5 marks per point. Max. 1.5 marks)

(C.49: 1.5 marks)

C.50 Outline the prevention of a sharps injury:

(0.5 marks per point. Max. 2 marks)

(C.50: 2 marks)

C.51 Describe Cultural Competence:

(C.51: 3 marks)

D.52 Describe a feature of rough trim and indicate the cause of this feature:

(D.52: 1 mark)

D.53 Define MOH's technique:

(D.53: 1 mark)

D.54 Describe the practical aspects of fixation required for optimal tissue processing:

(D.54: 3 marks)

D.55 List the components of Bouin's fixative:

(D.55: 1.5 marks)

D.56 Describe the importance of tissue orientation during embedding:

(D.56: 2 marks)

D.57

(D.57: 2.5 marks)

a. Distinguish between progressive and regressive nuclear staining:

(2 marks)

b. Name a haematoxylin used as a regressive stain:

(0.5 marks)

D.58 List FOUR (4) technical faults during microtomy that produce suboptimal sections:

(D.58: 2 marks)

D.59

(D.59: 2.5 marks)

a. Describe the preparation of the silver solution for the Masson-Fontana stain:

(2 marks)

b. Name a counterstain used for the Masson-Fontana stain:

(0.5 marks)

D.60 Outline the principle steps in automated tissue processing:

(D.60: 2 marks)

D.61 Describe antigen retrieval methods for automated immunohistochemical staining:
(D.61: 2 marks)

D.62 Describe the purpose of controls in immunohistochemistry, and outline the appropriate control material used in immunohistochemical staining:
(D.62: 2.5 marks)

D.63 Distinguish between the processing of an urgent colon biopsy and a routine hemicolectomy specimen:
(D.63: 3 marks)

Section E: Total 35 marks

SECTION F

Essay Questions

Discipline Specific Questions D.64 - D.65 = 20 marks

(Answer all questions)

Total Marks = 20 marks

SECTION F

Essay Questions

Discipline Specific Questions D.64 - D.65 = 20 marks

(Answer all questions)

Total Marks = 20 marks

SECTION F

Essay Questions

Discipline Specific Questions D.64 - D.65 = 20 marks

(Answer all questions)

Total Marks = 20 marks

SECTION F

Essay Questions

Discipline Specific Questions D.64 - D.65 = 20 marks

(Answer all questions)

Total Marks = 20 marks

SECTION F

Essay Questions

Discipline Specific Questions D.64 - D.65 = 20 marks

(Answer all questions)

Total Marks = 20 marks

D.64 In essay format, discuss the principle of decalcification including the practical aspects involved in routine laboratory. **(D.64: 10 marks)**

[illegible]

[illegible]

D.65 In essay format, discuss the preparation and staining of frozen sections for rapid diagnosis.
(D.65: 10 marks)

[illegible]

