



The Royal College of **Pathologists**

Pathology: the science behind the cure

Part 1 examination

Veterinary Clinical Pathology

STRUCTURE AND FORMAT OF THE WRITTEN EXAMINATION

The written component consists of two 3-hour papers, both in three sections:

Paper 1 Patho-physiology and disease

- Section 1: one essay question - choice from three questions.
- Section 2: three short notes questions - choice from four questions
- Section 3: eight short answer questions - choice from ten questions

Paper 2 Laboratory instrumentation and laboratory management

Section 1: Haematology and Cytology:

- Two short note questions - choice from four questions
- Ten short answer questions

Section 2: Biochemistry and Endocrinology:

- Two short note questions - choice from four questions
- Ten short answer questions

Section 3: laboratory management, tests and management:

- Two short note questions - choice from four questions
- Five short answer questions

Short notes questions should have shorter answers than the essay questions. Candidates are advised to allow 15 minutes for each short note answer. Short answer questions must be more concise and be no more than six sentences.

All sections of both papers have equal weight. Paper 2 Section 3 has five questions because the questions in general will take longer to answer than those in the other sections of the paper.



The Royal College of **Pathologists**

Pathology: the science behind the cure

Part 1 examination

Veterinary Clinical Pathology: First paper

SAMPLE PAPER

Candidates must answer ALL questions

Time allowed: 3 hours

Section 1

Write an essay on **ONE** of the following:

1. The role of selectins and integrins in the inflammatory response.
2. Activation of the complement cascade.
3. The 'para-neoplastic syndrome' in domestic animals.

Section 2

Write short notes on **THREE** of the following:

1. The mechanisms of tumour metastasis formation.
2. The mechanisms of the development of primary and secondary hyperadrenocorticism in dogs.
3. Feline blood groups and their importance in clinical blood transfusion in cats.
4. The pathophysiology of vasculitis in the dog and cat.

Section 3

Write short answers (no more than six sentences) for **EIGHT** of the following:

1. Give an account of the underlying cause of FIP (feline infectious peritonitis) in cats.
2. Amyloidosis in Persian cats.
3. Why is there frequently a hyponatraemia with pleural and peritoneal effusions?
4. Explain why cows have paradoxical aciduria with metabolic alkalosis.
5. What is the specific role of apolipoproteins in lipid metabolism?
6. Outline the physiological basis of hyperlipidaemia in diabetes mellitus.
7. List the causes of reactive lymphocytes in peripheral blood.
8. Explain the underlying cause of neutrophil azurophilic granule inclusions in Birman cats.
9. List three common causes of Heinz body formation in cat erythrocytes.
10. What are the underlying physiological **processes** causing **marked** erythrocytosis in horses?



The Royal College of Pathologists

Pathology: the science behind the cure

Part 1 examination

Veterinary Clinical Pathology: Second paper

SAMPLE PAPER

Candidates must answer ALL questions

Time allowed: 3 hours

Section 1: Haematology and Cytology

Write short notes on **TWO** of the following:

1. The difficulties encountered in making a definitive diagnosis of malignant histiocytosis in dogs based on cytology and haematology tests.
2. The diagnostic tests available that can be used for plasma cell tumours in dogs and cats.
3. The tests and criteria used for the clinical pathological staging of lymphoma in dogs.
4. The haematology tests used for classifying the different types of anaemia commonly found in veterinary medicine

Write short answers (no more than six sentences) for **ALL** of the following questions:

1. Malignant tumours are frequently diagnosed based on FNAs (Fine needle aspirates) of masses.
 - a. What is the broad classification of tumours based on cell type?
 - b. Which special stains can be used to aid in distinguishing poorly differentiated mast cells from other cells with similar morphology?

2. Bone Marrow (BM) aspirate cytology is frequently used for the investigation of cytopenias found on CBC (complete blood cell) counts.
 - a. What is the best way to prepare BM aspirates for cytological evaluation?
 - b. How can BM aspirates be used to differentiate between different types of anaemia?
3. Body cavity fluids (abdominal and thoracic) are frequently collected and analysed as an aid in disease diagnosis.
 - a. What criteria are the three broad classifications of these fluids based on?
 - b. Name one disease condition which would be commonly associated with each of the three categories.
4. Joint fluid analysis is frequently used to investigate lameness.
 - a. Which broad criteria are used to classify a joint fluid as normal?
 - b. What criteria are used to distinguish between immune-mediated and infectious joint disease?
5. FNAs and cytology are frequently used in veterinary medicine to identify causes of enlarged lymph nodes.
 - a. What cytological findings are indicative of a normal lymph node?
 - b. What criteria would you use to make a diagnosis of lymphoma based on lymph node aspirates?
6. High WBC (white blood cell) counts are frequently generated by automated CBC.
 - a. How would you confirm a leukaemoid response?
 - b. How would you distinguish between a leukaemoid response and stress responses based on the CBC?
7. CBCs are usually performed by automated methods.
 - a. What are the basic principles of this methodology?
 - b. What common causes result in false values for red cell MCV (mean cell volume) and MCHC (mean cell haemoglobin concentration)?
8. Newer instruments can perform automated WBC differential counts.
 - a. What are the principles these methods are based on?
 - b. An automated differential may not be adequate for the diagnosis of an inflammatory response. What other steps are required?

9. Inclusion bodies are occasionally seen cytologically in animal blood cells and can indicate disease processes.
 - a. Name three types that can be found in dog neutrophils.
 - b. What type of inclusions would be expected in erythrocytes in anaemic cows and why?
10. Both automated CBC and manual (PCV, plasma protein and film analysis) methods of blood analysis are frequently used in veterinary medicine.
 - a. What are the major advantages and disadvantages for automated versus manual methods for WBC differentials?
 - b. In which disease condition would a manual measurement of PCV be more accurate and more valuable than an automated one?

Section 2: Biochemistry and Endocrinology

Write short notes on **TWO** of the following:

1. The interpretation of:
 - a. Hypocalcaemia and hyperkalaemia in acute rhabdomyolysis in equines.
 - b. Hypochloraemic metabolic alkalosis in dairy cows
2. The interpretation of agarose gel electrophoresis in cats with increased serum globulins
3. The interpretation of increased serum total alkaline phosphatase (ALP/AP) values in serum from dogs, cats, and rats.
4. The endocrine tests you would use to confirm a diagnosis of clinically suspected pituitary disease in an aged horse with a long curly hair coat.

Write short answers (no more than six sentences) for **ALL** of the following:

1. In early renal disease animals frequently have serum creatinine and urea values within the reference interval. Detection of early stages is important for clinical management **since** urea and creatinine values may not change until >50 to 70 % function is lost other more sensitive and specific tests are used.
 - a. What tests would you use to measure changes in GFR (glomerular filtration rate)?
 - b. What tests would you use to detect glomerular disease in cats and dogs?

2. Serum total protein and albumin levels can be either increased or decreased outside the normal reference intervals in animals.
 - a. List the common causes of hypoalbuminaemia.
 - b. Routinely reported levels of globulins are calculated values of the difference between automated measures of total protein and albumin. How would you obtain exact values for these?
3. Increased levels of serum amylase and lipase are not always confirmatory or specific for pancreatitis and are also not always found in this disease in dogs and cats.
 - a. What other more specific tests would you perform?
 - b. List common causes of increased levels of serum amylase and lipase that are of non pancreatitis origin?
4. Serum total bile acids measurement is a frequently used test of hepatic functional capacity. In small animals they are usually measured pre- and post-protein meal feeding.
 - a. Give two reasons for possible false elevations in these values.
 - b. When is measurement of bile acids not useful?
5. Increased levels of serum glucose are common in dogs and cats.
 - a. What other test(s) would you use to distinguish between diabetes mellitus and other conditions as the cause for the increase in cats and dogs?
 - b. Glucose can also be found in urine secondary to hyperglycaemia; what substances can interfere with dipstick measurement of this?
6. Urine S.G. (specific gravity) is easily determined by refractometry and is frequently used in veterinary medicine.
 - a. List the three main categories of change in urine based on S.G.
 - b. What substances in urine can cause inaccurate refractometer measurement of S.G?
7. Different combinations of biochemistry test are used to configure a "liver panel" in domestic animals.
 - a. List the panels that you would use for this in horses.
 - b. How would a canine panel differ?

8. Measurement of serum/plasma T4, T3, fT4, fT3, and endogenous TSH levels can be used for the diagnosis of thyroid disease in cats and dogs.
 - a. Which tests would you use to confirm hyperthyroidism in a cat with clinical signs consistent with this disease but a serum T4 level within the reference interval?
 - b. In a dog with a low serum T4 level, explain the rationale for the further testing using combined f T4 levels and endogenous TSH.

9. Hypoadrenocorticism (Addison's disease) can occur in dogs and can be acute and life threatening.
 - a. What changes would you expect in the CBC and chemistry profile in this condition and why?
 - b. What other hormone test could you use in the diagnosis of atypical cases of this disease?

10. Hypercalcaemia (both total and ionized) is often found in veterinary medicine.
 - a. List three common causes of this in dogs and horses.
 - b. Which hormone assays would you use to identify the possible cause of hypercalcaemia in these species?

Section 3 laboratory instrumentation, tests and management

Write short notes on **TWO** of the following

1. The SOPs (Standard Operating Procedures) that you would write to ensure compliance of the laboratory with Health and Safety Regulations for laboratories.
2. How you would ensure that there is documentation of the quality process from the receipt of the samples in the laboratory to the reporting of the results.
3. Outline the steps you would follow before you reported the results from a new chemistry analyzer following replacement of a previous older analyzer in your laboratory.
4. The advantages and disadvantages of measurement of serum/plasma hormone levels by RIA (radioimmunoassay) and automated immunochemiluminescent methods.

Write short answers (no more than six sentences) for **ALL** of the following

1. Immunology based tests (automated immunoturbidimetry and ELISA) are increasingly used in veterinary medicine. The majority of these are based on the adaptation of tests previously developed and validated with human blood.
 - a. What is the most essential requirement for these tests to be adaptable for veterinary use?
 - b. Which are the types of tests most readily adapted to veterinary use, monoclonal or polyclonal antibody based tests? Give the reasons why one type is preferred over the other.
2. Part of the complete urine analysis is the dipstick assessment. These dipsticks have been developed for use with human urine.
 - a. Which test pads on the sticks are of no value in animals and why?
 - b. The detection of low amounts of bilirubin is significant in cats but not in dogs; explain why?
 - c. List some components that can be found in urine samples that may interfere with stick pad results.
3. Common causes of interference with biochemistry analyte measurement in animals are lipaemia and haemolysis.
 - a. What would you do to determine the effect of different levels of severity of haemolysis on any particular analyte?
 - b. Describe a method for determining the effects of different levels of lipaemia on a specific analyte?
4. In recent years more sophisticated haematology analyzers using combinations of impedance counts, **laser** technologies and dye binding have become available. Although these were developed for human blood testing the manufacturers have adapted them for use with a variety of animal species.
 - a. What is the major component that has made this possible?
 - b. What are the causes of the frequent inaccurate automated platelet counts in Cavalier King Charles spaniel dogs and cats?
5. The development of reference intervals for all laboratory tests for all species is essential for good laboratory practice. In the domestic animal species this is difficult to do for a variety of reasons.
 - a. It is possible to use normal "healthy animals" to do this; briefly state how you would do this?
 - b. Briefly explain whether or not transference methods could be used in developing reference intervals.