Australian and New Zealand College of Veterinary Scientists

Membership Examination

June 2021

Veterinary Pathology

Paper 1

Perusal time: **Fifteen (15)** minutes

Time allowed: **Two (2)** hours after perusal

Answer **ALL** <u>**FOUR (4)**</u> questions

For question 3, please answer two of three parts

Answer <u>**FOUR (4)**</u> questions, each worth 30 marks....................................total 120 marks

Paper 1: Veterinary Pathology

Answer all four (4) questions

1.	The leukocyte adhesion cascade is essential for the movement of leukocytes from capillary lumens to the interstitial connective tissue. Outline the **four (4)** stages of this cascade, including the cell mediators that are important at each stage of this process *(25 marks)*. Briefly describe a disease in which this adhesion cascade is defective *(5 marks)*.

2.	Describe the function and the components of adaptive (specific) immunity.
	(30 marks)

3.	Answer **two (2)** of the following **three (3)** sub-questions (a, b, and c):
	(for a total of 30 marks)

	a) Describe why mutations accumulate quickly within a neoplastic cell and explain how these mutations allow progression of neoplasia. *(15 marks)*

	b) Coagulation testing is important in veterinary pathology. List **five (5)** commonly used laboratory tests that can be performed to investigate coagulation. State the components of the coagulation cascade tested by each of these coagulation tests. For each laboratory test, name an example of a disease that may result in an abnormal result. *(15 marks)*

	c) Briefly describe, using relevant examples, the causes, cells involved and the morphological subtypes of granulomatous inflammation. *(15 marks)*

4.	Answer **both** of the following:

	a) Discuss the mechanisms that result in the development of oedema. Use appropriate disease examples in your discussion. *(15 marks)*

	b) Define the terms: atrophy, hypoplasia, hyperplasia, metaplasia and hypertrophy. Provide an example of a specific disease which results in each of these processes. *(15 marks)*

End of paper

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Veterinary Pathology

Paper 2

Perusal time: **Fifteen (15)** minutes

Time allowed: **Two (2)** hours after perusal

Answer **ALL** <u>**FOUR (4)**</u> questions

Please read all questions carefully, choose question parts and sub-parts, where indicated

Answer <u>**FOUR (4)**</u> questions, each worth 30 marks....................................total 120 marks

Paper 2: Veterinary Pathology

Answer all four (4) questions

1.   Answer **two (2)** of the following **three (3)** sub-questions (a, b, and c):

(for a total of 30 marks)

a) For all **three (3)** diseases below, describe the typical distribution of lesions on the body and the histological appearance of the skin of a dog with:

i.   hepatocutaneous syndrome (superficial necrolytic dermatitis)

(5 marks)

ii.   sarcoptic mange   *(5 marks)*

iii.   hyperadrenocortisism (Cushing's disease).   *(5 marks)*

Question 1 continued over page

b) Below and on following page are the haematology and biochemistry results from a six-month-old, male, Burmese kitten that was anorexic and lethargic for several days. The kitten was mildly dehydrated and organomegally within the cranial abdomen was suspected on clinical examination. No other significant abnormalities were found.

Haemotology

Parameter	Abbreviation	Units	Result	Reference range
Haematocrit	HCT	L/L	0.24	0.25–0.48
Red blood cells	RBC	x 10^{12}/L	**4.4**	4.9–10
Reticulocyte %	Retic %	%	**7.3**	0–0.4
Reticulocytes ABs	Retic	x 10^9/L	**321**	3–50
Haemoglobin	Hb	g/L	**75**	77–156
Mean corpuscular volume	MCV	fL	55	43–55
Mean corpuscular haemoglobin	MCH	pg	17	13–17
Mean corpuscular haemoglobin concentration	MCHC	g/L	313	282–333
White blood cells	WBC	x 10^9/L	15.8	5.5–19
Neutrophils		x 10^9/L	**14.2**	2–13
Lymphocytes		x 10^9/L	0.9	0.9–7
Monocytes		x 10^9/L	0.5	0–0.6
Eosinophils		x 10^9/L	0.2	0–1
Basophils		x 10^9/L	0.0	0–0.01
Platelet count	PLT	x 10^9/L	**174**	300–800

Comments:

RBC morphology: mild polychromasia, mild rouleaux

WBC morphology: mild toxic change and band neutrophils occasionally seen

PLT: many large platelet clumps

Biochemistry

Parameter	Abbreviation	Units	Result	Reference range
Alkaline phosphatase	ALP	U/L	**67**	5–50
Alanine transaminase	ALT	U/L	**157**	19–100
Gamma-glutamyltransferase	GGT	U/L	**8**	0–5
Aspartate aminotransferase	AST	U/L	55	2–62
Total bilirubin	TBIL	μmol/L	**15**	0–7
Cholesterol	CHOL	mmol/L	3.1	2.2–5.5
Urea	UREA	mmol/L	**16.2**	5–15
Creatinine	CREA	μmol/L	0.18	0.08–0.20
Calcium	CA	mmol/L	2.2	2.1–2.8
Phosphorus	PHOS	mmol/L	**2.5**	0–2.3
Total protein	TP	g/L	**100**	60–84
Albumin	ALB	g/L	**23**	25–38
Globulin	GLOB	g/L	**77**	31–52
Albumin:globulin ratio	A:G Ratio		**0.3**	0.5–1.1
Glucose	GLU	mmol/L	6.9	3.2–7.5
Creatine kinase	CK	U/L	146	64–400
Sodium	Na	mmol/L	145	144–158
Potassium	K	mmol/L	5	3.7–5.4
Chloride	Cl	mmol/L	116	0.6–123
Sodium:potassium ratio	Na:K Ratio		**24**	29–40
Symmetric dimethylarginine	SDMA	μg/dL	14	0–14

Comments: mild icterus

Answer **all** sub-parts of question 1 b):

    i.   Interpret these results and explain the pathological findings.

(10 marks)

    ii.   List **four (4)** other diagnostic tests that could be of value in this case.

(4 marks)

    iii.   State the most likely diagnosis in this case. *(1 mark)*

c) Below and on the following page are the biochemistry and urinalysis results from a 10-year-old, female pony with a three-week history of increasing lethargy, inappetence and loss of body condition.

Biochemistry

Parameter	Abbreviation	Units	Result	Reference range
Glutamate dehydrogenase	GLDH	U/L	8	0–20
Gamma-glutamyltransferase	GGT	U/L	25	20–38
Aspartate aminotrasnferase	AST	U/L	233	150–400
Total bilirubin	TBIL	µmol/L	12	4–100
Triglyceride	TRIG	mmol/L	**1.97**	0.00–1.32
Urea	UREA	mmol/L	**31.0**	3.6–8.9
Creatinine	CREA	µmol/L	**486**	81–164
Calcium	CA	mmol/L	3.60	2.50–3.60
Phosphorus	PHOS	mmol/L	**0.41**	0.8–1.70
Total Protein	TP	g/L	70	58–76
Albumin	ALB	g/L	30	28–38
Globulin	GLOB	g/L	40	26–40
Albumin:globulin ratio	A:G Ratio		**0.75**	0.8–1.9
Glucose	GLU	mmol/L	3.9	3.5–6.5
Creatine kinase	CK	U/L	164	50–400
Sodium	Na	mmol/L	**110**	123–152
Potassium	K	mmol/L	**2.2**	2.8–5.0
Chloride	Cl	mmol/L	**85**	92–102
Serum amyloid A	SAA	mg/L	**668**	< 7
Fibrinogen		g/L	**7.0**	1.0–4.0

Comments:

1+ lipaemia

Nil haemolysis

Nil icterus

Question 1. c) continued over page

Urinalysis

Parameter	Result	Reference range
Collection Method	catheter	
USG	1.012	
Colour	Straw-coloured	
Clarity or Turbidity	Turbid	
pH	9	
Glucose	2+	Negative
Ketones	Negative	Negative
Protein	1+	
Bilirubin	Negative	
RBCs	Nil	<5/HPF
WBCs	20	<5/HPF
Crystals	Numerous calcium carbonate	
Casts	Numerous course and fine granular	
Epithelial Cells	Moderate numbers	
Bacteria	Not detected	

Answer **both** sub-parts of question 1 c):

    i.   Interpret these results and explain the pathological findings.

(12 marks)

    ii.   Discuss **three (3)** other laboratory diagnostic tests that could be of value in this case.   *(3 marks)*

Continued over page

2. Answer **three (3)** of the following **four (4)** sub-questions (a, b, c, and d):

(for a total of 30 marks)

a) Describe the cause and pathogenesis of enterotoxaemia (pulpy kidney disease) in sheep. Describe the characteristic gross and histological lesions that can be present in sheep that have died as a result of this disease. *(10 marks)*

b) Answer **both** of the following sub-parts:

    i. Briefly describe the pathogenesis of blackhead in turkeys. Describe the expected gross lesions in a turkey that has died of this disease.
(5 marks)

    ii. Briefly describe how vitamin C deficiency causes disease in guinea pigs. Describe the gross lesions that you would expect to see in a guinea pig deficient in vitamin C (scurvy). *(5 marks)*

c) List the gross and histological lesions likely to be present in a pig that has died of an acute form of African swine fever. *(10 marks)*

d) Answer **both** of the following sub-parts:

    i. Detail the expected findings observed in a routine haematology and biochemistry panel from a dairy cow with right abomasal displacement. *(5 marks)*

    ii. Name a plant that is hepatotoxic to cattle. State the expected findings in routine biochemistry from a bovine that has ingested this plant.
(5 marks)

Continued over page

3.   Answer **three (3)** of the following **four (4)** sub-questions (from a, b, c, or d)

(for a total of 30 marks)

a) List the expected findings in **both** of the following sub-parts:

   i.   Haematology and biochemistry findings from a 12-year-old cat with hyperthyroidism.   *(5 marks)*

   ii.   The gross appearance, fluid analysis and cytology findings of abdominal fluid from an alpaca with an intestinal rupture.   *(5 marks)*

b) Regenerative anaemia can be caused by either haemorrhage or haemolysis. List **three (3)** possible causes for haemorrhage and **three (3)** possible causes for haemolysis in dogs. Briefly discuss the differentiation of haemorrhage and haemolysis using blood film examination and haematology.   *(10 marks)*

c) Describe the gross lesions, the expected histological findings and any additional tests recommended for each of the following:

   i.   bovine fungal abortion   *(5 marks)*

   ii.   bovine abortion due to neospora.   *(5 marks)*

d) Four horses ingested cattle feed containing ionophors (for example, monensin). The horses only had access to the cattle feed for one hour. Following ingestion, two of the horses died within two days, while the other two horses died three weeks later.
   Describe the expected serum biochemical changes, and gross and histological lesions expected in the horses that died acutely **and** in the horses that died after three weeks.   *(10 marks)*

Continued over page

4.   Answer **five (5)** of the following **six (6)** questions (a, b, c, d, e and f):

(for a total of 30 marks)

a) Describe the gross and histologic features of *cyprinid herpesvirus-2* infection in goldfish.   *(6 marks)*

b) Describe the expected findings on serum biochemistry and in a urine sample obtained from a goat with urethral obstruction caused by urinary calculi.

(6 marks)

c) Compare and contrast the cytological features of a fine needle aspirate (FNA) sample from a canine cutaneous histiocytoma with the cytological features of a FNA from a cutaneous plasmacytoma.   *(6 marks)*

d) Using a species of your choice, describe the pathogenesis, gross lesions and histological changes that would allow a diagnosis of fibrous osteodystrophy.

(6 marks)

e) Discuss the clinical pathology tests available to differentiate between pars pituitary intermedia dysfunction and equine metabolic syndrome in horses. Include in your answer the results that you would expect to find with each condition.   *(6 marks)*

f) Describe the gross appearance of the lungs and the defining histological features that would allow a diagnosis of bovine atypical interstitial pneumonia (fog fever). Briefly outline the cause and the pathogenesis of this disease.   *(6 marks)*

End of paper