



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

DEPARTMENT OF HEALTH SCIENCES

QUALIFICATION : BACHELOR OF HUMAN NUTRITION	
QUALIFICATION CODE: 08BOHN	LEVEL: 5
COURSE NAME: GASTROINTESTINAL AND ENDOCRINE PHYSIOLOGY	COURSE CODE: GEP521S
SESSION: NOVEMBER 2022	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY QUESTION PAPER	
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INSTRUCTIONS	
1. Answer ALL the questions in the answer book provided.	
2. Write clearly and neatly.	
3. Number the answers clearly.	

PERMISSIBLE MATERIALS

NONE

THIS QUESTION PAPER CONSISTS OF 11 PAGES (Including this front page)

SECTION A

QUESTION 1

(20 MARKS)

Evaluate the following statements in each numbered section and select the most appropriate answer from the given possibilities. Write the appropriate letter next to the number of the statement/phase in the ANSWER BOOK. *(Each question carries 1 mark.)*

- 1.1 A 43-year-old man eats a meal consisting of 40 percent protein, 10 percent fat, and 50 percent carbohydrate. Thirty minutes later the man feels the urge to defecate. Which reflex results in the urge to defecate when the duodenum is stretched:
- A) Duodenocolic
 - B) Enterogastric
 - C) Intestino-intestinal
 - D) Rectosphincteric
- 1.2 The proenzyme pepsinogen is secreted mainly from which of the following structures:
- A) Acinar cells of the pancreas
 - B) Ductal cells of the pancreas
 - C) Epithelial cells of the duodenum
 - D) Gastric glands of the stomach
- 1.3 Swallowing is a complex process that involves signaling between the pharynx and swallowing center in the brain stem. Which structure is critical for determining whether a bolus of food is small enough to be swallowed:
- A) Epiglottis
 - B) Larynx
 - C) Palatopharyngeal folds
 - D) Soft palate
 - E) Upper oesophageal sphincter

1.4 A clinical study determined the time of gastric acid secretion and pH in healthy volunteers after a 10% fat, 30% protein, and 60% carbohydrate meal, revealing an increase in the pH of the gastric juice and a secondary increase in the rate of acid secretion. A decrease in which substance is most likely to facilitate the secondary increase in the rate of acid secretion:

- A) Gastrin
- B) Cholecystokinin
- C) Somatostatin
- D) Vasoactive intestinal peptide

1.5 The gastric mucosal barrier serves to prevent back-leak of hydrogen ions into the mucosa. Which group of factors below, strengthen the integrity of the gastric mucosal barrier and also weaken the barrier:

	<u>Bile Salts</u>	<u>Mucous</u>	<u>Aspirin</u>	<u>NSAIDs</u>	<u>Gastrin</u>	<u>Ethanol</u>
A) Strengthen	Strengthen	Weaken	Weaken	Strengthen	Strengthen	
B) Strengthen	Strengthen	Weaken	Weaken	Weaken	Strengthen	
C) Weaken	Strengthen	Strengthen	Weaken	Strengthen	Weaken	
D) Weaken	Strengthen	Weaken	Weaken	Strengthen	Weaken	
E) Weaken	Weaken	Weaken	Strengthen	Strengthen	Weaken	

1.6 The ileum and distal jejunum of a 34-year-old man are ruptured in an automobile accident, necessitating the resection of entire ileum and a portion of the jejunum. What is most likely to occur in this man:

- A) Atrophic gastritis
- B) Constipation
- C) Gastric ulcer
- D) Gastroesophageal reflux disease (GERD)
- E) Vitamin B12 deficiency

1.7 An endoscopy reveals patchy throughout the stomach and a negative biopsy for *Helicobacter pylori*, for an 82-year-old woman with upper abdominal pain and blood in the stool. Pentagastrin administered intravenously would lead to a less than normal increase in which of the following:

- A) Duodenal mucosal growth
- B) Gastric acid secretion
- C) Gastrin secretion
- D) Pancreatic enzyme secretion
- E) Pancreatic growth

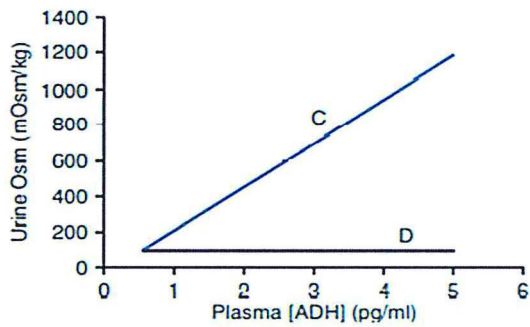
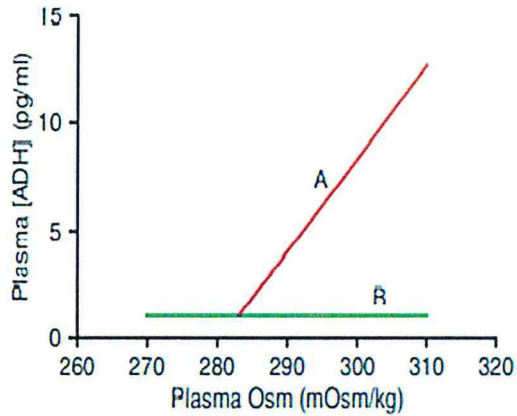
1.8 A 34-year-old woman with a recurrent history of duodenal ulcers shows a fasting gastrin level of 550 pg/ml, and basal acid secretion of 18 mmol/hour. What concentration of serum gastrin (pg/ml) is considered diagnostic, following intravenous administration of human secretin:

- A) 450
- B) 500
- C) 550
- D) 600
- E) 700

1.9 A 71-year-old man with hematemesis and melena with a cresenteric ulcer in the duodenum, reveals an underlying raised blood vessel successfully eradicated via cautery with a bipolar gold probe. Which of the following factors are diagnostic for duodenal ulcer:

	<u>Endoscopy</u>	<u>Plasma Gastrin Levels</u>	<u>Rate of Acid Secretion</u>
A)	No	No	No
B)	Yes	No	No
C)	Yes	No	Yes
D)	Yes	Yes	No
E)	Yes	Yes	Yes

- 1.10 A 71-year-old man with upper abdominal pain and blood in the stool takes NSAIDs for the pain and washes it down with whiskey. Following lower than predicted levels of gastric acid secretion after administration of Pentagastrin, which substance secreted is most likely to be diminished in this patient with gastritis:
- A) Intrinsic factor
 - B) Ptyalin
 - C) Rennin
 - D) Saliva
 - E) Trypsin
- 1.11 An example of hermaphroditism is a baby born with a penis, a scrotum with no testes, no vagina, and XX chromosomes. What could cause this abnormality:
- A) Abnormally high levels of human chorionic gonadotropin (HCG) production by the trophoblast cells
 - B) The presence of a testosterone-secreting tumour in the mother's right adrenal gland
 - C) Abnormally high levels of LH in the maternal blood
 - D) Abnormally low levels of testosterone in the maternal blood
 - E) Abnormally low rates of estrogen production by the placenta
- 1.12 A professional athlete in her mid-20s has not had a menstrual cycle for 5 years, although a bone density scan revealed normal skeletal mineralization. Which fact may explain these observations:
- A) She consumes a high-carbohydrate diet
 - B) Her grandmother sustained a hip fracture at age 79 years
 - C) Her blood pressure is higher than normal
 - D) Her plasma estrogen concentration is very low
 - E) She has been taking anabolic steroid supplements for 5 years



1.13 In the above figures, which lines most likely reflect the responses in a patient with nephrogenic diabetes insipidus:

- A) A and C
- B) A and D
- C) B and C
- D) B and D

1.14 Which of the following would be expected in a child with dwarfism due to pituitary dysfunction:

Plasma [IGF-1]	Growth-Hormone-Releasing-Hormone Secretion	Fasting Plasma [Glucose]
A) Increase	Increase	Decrease
B) Increase	Increase	Increase
C) Increase	Decrease	Decrease
D) Decrease	Decrease	Increase
E) Decrease	Decrease	Decrease
F) Decrease	Increase	Decrease

- 1.15 A patient has a goiter associated with high plasma levels of both TRH and TSH, and her heart rate is elevated. This patient most likely has which condition:
- A) An endemic goiter
 - B) A hypothalamic tumor secreting large amounts of TRH
 - C) A pituitary tumor secreting large amounts of TSH
 - D) Graves' disease
- 1.16 A patient has nephrogenic diabetes insipidus. Of the following options, which outcome would be expected, or which intervention would be suggested:
- A) Expected outcome: decreased plasma sodium concentration
 - B) Expected outcome: increased secretion of ADH from the supraoptic and paraventricular nuclei
 - C) Expected outcome: high urine osmolality
 - D) Suggested intervention: water restriction
 - E) Suggested intervention: ADH antagonists (vaptans)
- 1.17 A patient has an elevated plasma thyroxine (T₄) concentration, a low plasma TSH concentration, and her thyroid gland is smaller than normal. What is the most likely explanation for these findings:
- A) A lesion in the anterior pituitary that prevents TSH secretion
 - B) The patient is taking propylthiouracil
 - C) The patient is taking thyroid extract
 - D) The patient is consuming large amounts of iodine
 - E) Graves' disease

- 1.18 A 30-year-old woman reports to the clinic for a routine physical examination, which reveals a normal total thyroid hormone concentration, high plasma TSH levels, and that she is pregnant. Which of the following best reflects the patient's clinical state:
- A) Graves' disease
 - B) Hashimoto's disease
 - C) A pituitary tumour secreting TSH
 - D) A hypothalamic tumour secreting thyrotropin releasing hormone (TRH)
 - E) The patient is taking thyroid extract
- 1.19 A 46-year-old man has "puffy" skin and is lethargic, with his plasma TSH concentration low and increases markedly when he is given TRH. What is the most likely diagnosis:
- A) Hyperthyroidism due to a thyroid tumour
 - B) Hyperthyroidism due to an abnormality in the hypothalamus
 - C) Hypothyroidism due to an abnormality in the thyroid
 - D) Hypothyroidism due to an abnormality in the hypothalamus
 - E) Hypothyroidism due to an abnormality in the pituitary
- 1.20 If a woman has a tumour that is secreting large amounts of estrogen from the adrenal gland, which of the following will occur:
- A) Progesterone levels in the blood will be very low
 - B) Her LH secretion rate will be totally suppressed
 - C) She will not have normal menstrual cycles
 - D) Her bones will be normally calcified
 - E) All the above

QUESTION 2

(20 MARKS)

Assess the following statements and decide whether they are **true or false**. Write only the number of the question and next to it indicate your answer as **true or false** in the ANSWER BOOK. *(Each question carries 1 mark)*

- 2.1 The segments of the small intestine encompass the duodenum, ileum and colon
- 2.2 Bile is produced by hepatocytes via active transport in the liver
- 2.3 The main function of bile is to break down sugars
- 2.4 The uvula prevents food and liquid from entering the nasal cavity upon swallowing
- 2.5 When food does not go down the correct tube (oesophagus), it can result in aspiration pneumonia
- 2.6 Sodium bicarbonate causes ulcers to form in the gut
- 2.7 Villi decreases surface area to increase rate of absorption
- 2.8 Chemical digestion is the only type of digestion occurring in the human digestive system
- 2.9 The main structural layers of the stomach encompass the lumen, submucosa, and externa
- 2.10 Role of the submucosal plexus in the gut is gastric secretion and control of local circulation
- 2.11 Denaturation occurs when hydrochloric acid acts on protein in the gut
- 2.12 Swelling of the thyroid glands due to a lack of iodine is referred to as "goitre."
- 2.13 Insufficient secretion of thyroxin in adults may result in a condition called "myxoedema."
- 2.14 The "anterior" pituitary gland receives and stores hormones from the hypothalamus.
- 2.15 The hormone aldosterone is an example of the "glucocorticoids."
- 2.16 Two important catecholamine hormones are epinephrine and "insulin."
- 2.17 Many of the tissue cells of the body produce lipid hormones called "prostaglandins."
- 2.18 An inadequate secretion of hormones from the adrenal cortex can result in "Cushing's" disease.
- 2.19 Many of the tissue cells of the body produce lipid hormones called "prostaglandins."
- 2.20 The maturation of red blood cells is controlled by the hormone "melatonin."

SECTION B

QUESTION 3

(30 MARKS)

3.1 Explain the following concepts:

3.1.1 Primary function of the gastrointestinal system (2)

3.1.2 Functions of the endocrine system (5)

3.1.3 Role of saliva (5)

3.2 Gastrointestinal hormones are released from various enteroendocrine cells distributed throughout the gastrointestinal tract, each hormone with a specific function. Complete the table below by indicating the respective gastrointestinal hormone for A and F, source of enteroendocrine cells for C and E, and the function of the gastrointestinal hormone for B, D, and G, based on the information already provided.

(10)

GI hormone	Source of cells	Function
A	G-cells of gastric antrum and duodenum	Stimulate: HCl secretion from parietal cells Histamine from enterochromaffin-like cells Promotes proliferation of gastric mucosa
Ghrelin (Aka Motilin)	A-cells of gastric fundus, other segments of the GI tract, hypothalamus	B
Cholecystokin in (CCK)	C	Stimulates gallbladder and pancreatic enzymes secretions, decreases appetite
Glucose-dependent insulinotropic peptide (GIP)	K-cells of the small intestine	D
Secretin	E	Stimulates secretion of HCO ₃ ⁻ -rich fluids from the duct cells and biliary tract Augments the action of CCK & decreases gastric acid secretion
F	L-cells of the distal small and large intestine	Inhibits food intake
Somatostatin	D-cells of the GI tract and accessory organ, hypothalamus	G

3.3 Compare the signs of pituitary hyperfunction in children and adults (8)

QUESTION 4 (20 MARKS)

4.1 What are the clinical features of hyperthyroidism? (5)

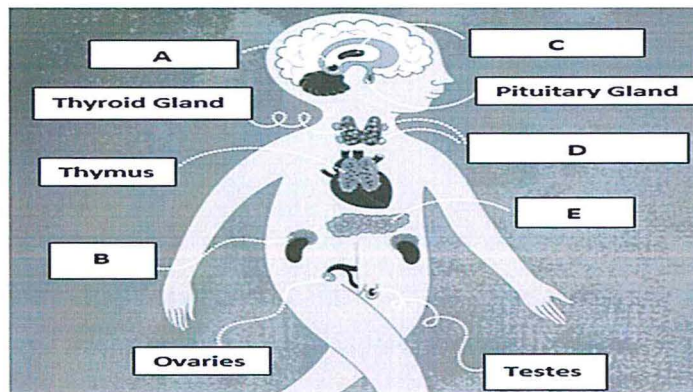
4.2 Describe the clinical features of the three most important syndromes caused by adrenocortical hyperfunction (9)

4.3 What are the metabolic consequences of hyperparathyroidism? (6)

SECTION C

QUESTION 5 (10 MARKS)

5.1 The anatomical diagram below represents the Endocrine System. State the name and one function of glands A – E (10)



GOOD LUCK!!!