UNIVERSITY OF ESWATINI

SUPPLEMENTARY EXAMINATION PAPER

PROGRAMME	:	**BACHELOR OF SCIENCE IN CONSUMER SCIENCE EDUCATION YEAR III**
COURSE CODE	:	**CED303**
TITLE OF PAPER	:	**TEACHING AND LEARNING**
TIME ALLOWED	:	**TWO (2) HOURS**
INSTRUCTIONS	:	**ANSWER QUESTION ONE (1) AND ANY OTHER (2) QUESTIONS**

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QUESTION 1 COMPULSORY

a) Describe the following terms briefly as they are used in determining the extent to which educational and behavioral objectives are met:

i. Test
ii. Assessment
iii. Measurement
iv. Evaluation

[8 Marks]

b) Differentiate between norm-referenced and criterion-referenced measurement. [6 Marks]

c) The table below displays the results of three (3) True/False questions on a test. Note that the students are arranged with the top overall scorers at the top of the table. The cross (X) indicate that a student got the question wrong while the tick (√) indicates that a student got a question correct.

i. Calculate and interpret the difficulty index of each question of the test. [9 Marks]
ii. Determine if each question effectively differentiates between students who do well on the overall test and those who do not. [9 Marks]
iii. Identify the best question. Justify your choice and suggest what should be done with the other questions. [8 Marks]

Student	Total Score (%)	Questions		
		1	2	3
Tom	90		X	
Dennis	90		X	
Jill	80	X	X	
Charlie	80		X	
Sonny	70		X	
Ruben	60		X	X
Clay	60		X	
Kelley	50			X
Justin	50			X
Dudu	40	X		X

[TOTAL MARKS = 40]

QUESTION 2

a. Identify and explain **seven (7)** ethical principles that guide instruction and professional/interpersonal relationships in the classroom. [21 Marks]

b. Discuss the learning theories in the scholarship of: [9 Marks]

i. Confucius (3 Marks)

ii. Socrates (3 Marks)

iii. John Locke (3 Marks)

[TOTAL = 30]

QUESTION 3

a. Most psychologists see motivation as a process or a factor that initiates, energizes, directs and sustains behaviour towards a certain goal. Discuss **five (5)** conceptual approaches to student motivation.

[20 Marks]

b. Explain the following strategies for improving student motivation to learn

i. Classroom atmosphere. [5 Marks]

ii. Teacher expectations. [5 Marks]

[TOTAL = 30]

QUESTION 4

a. Using the subject matter attached on Human Digestion and the lesson plan template provided, write a 40 minutes lesson plan for Form 2 Consumer Science pupils.

[TOTAL = 30]

13

NUTRITION AND DIGESTION

Plants manufacture their own food by photosynthesis, but all animals including humans have to take in ready made food. Most part of such food consists of complex organic molecules (carbohydrates, proteins and fats) which have to be broken down into simpler forms before they can be absorbed into the body. Such breaking down of the food and subsequent absorption of food constituents occur inside the digestive tract (alimentary canal). The digestive tract together with the associated glands constitute the digestive system.

OBJECTIVES

After studying this lesson, you will be able to :

- *define the term nutrition and give its types;*
- *draw a labelled diagram of the alimentary canal of cockroach and humans;*
- *describe the steps involved in the nutrition of humans viz., ingestion, digestion, absorption, assimilation and egestion;*
- *differentiate between intracellular and intercellular digestion;*
- *tabulate the organs of digestion, the enzymes they secrete, the substances acted upon by enzymes and the end products formed.*
- *explain the process of food absorption in various regions of digestive tract;*
- *explain briefly the role of hormones in digestion.*

13.1 NUTRITION AND DIGESTION

Our food contains a number of food constituents to meet the requirements of our body. These food constituents must be digested to be utilized by our body. The process by which organisms obtain and utilize food for their growth, development and maintenance is called **nutrition** and the chemicals present in the food are called **nutrients**. On the other hand, **digestion** is the breaking down of complex constituents of food by enzymes into simpler soluble forms that can be absorbed and utilised by the cells of the body.

13.2.3 Joint Intracellular and Extracellular digestion

In Hydra and other Cnidarians, the food (tiny prey) is caught by the tentacles and ingested through the mouth into the single large digestive cavity, the gastro-vascular cavity (Fig. 13.3). Enzymes are secreted from the cells bordering this cavity and poured on the food for extracellular digestion. Small particles of the partially digested food are engulfed into the vacuoles of the digestive cells for intracellular digestion. Any undigested and unabsorbed food is finally thrown out of the mouth.

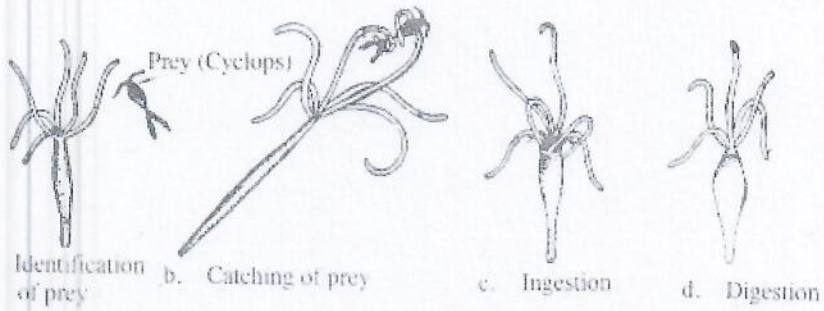

Fig. 13.3 Hydra catching its prey

INTEXT QUESTIONS 13.1

1. List the five major steps in animal nutrition
   (i) .....
   (ii) .....
   (iii) .....
   (iv) .....
2. What is intracellular digestion? Give example of an organism showing intracellular digestion.

   .....

13.5 THE HUMAN DIGESTIVE SYSTEM

The digestive system in human consists of an alimentary canal and associated digestive glands. The human alimentary canal (aliment: nourish) is a continuous muscular digestive tube that runs through the body. It digests the food, breaks it down into smaller substances, and absorbs the digested food. The alimentary canal has the following parts (Fig. 13.4).

1. **Mouth** and associated organs (teeth, tongue)
2. **Pharynx (or throat) :** A cavity at the back of the mouth. It is a common passage for the inhaled air and the swallowed food.
3. **Oesophagus :** A narrow tube arising from pharynx, continuing through the thorax and ending in the stomach.

4. **Stomach :** An elastic bag with highly muscular walls, located below the diaphragm.
5. **Small intestine :** A tube about 7 meters long and about 2.5 cm wide. Much coiled and folded, it is contained in the abdomen. Its three subdivisions are:
   (i) **Duodenum**–Short upper part, next to stomach
   (ii) **Jejunum**–Slightly longer part, about 2 meters long.
   (iii) **Ileum**–Longest, about 4 meters long, coiled and twisted.

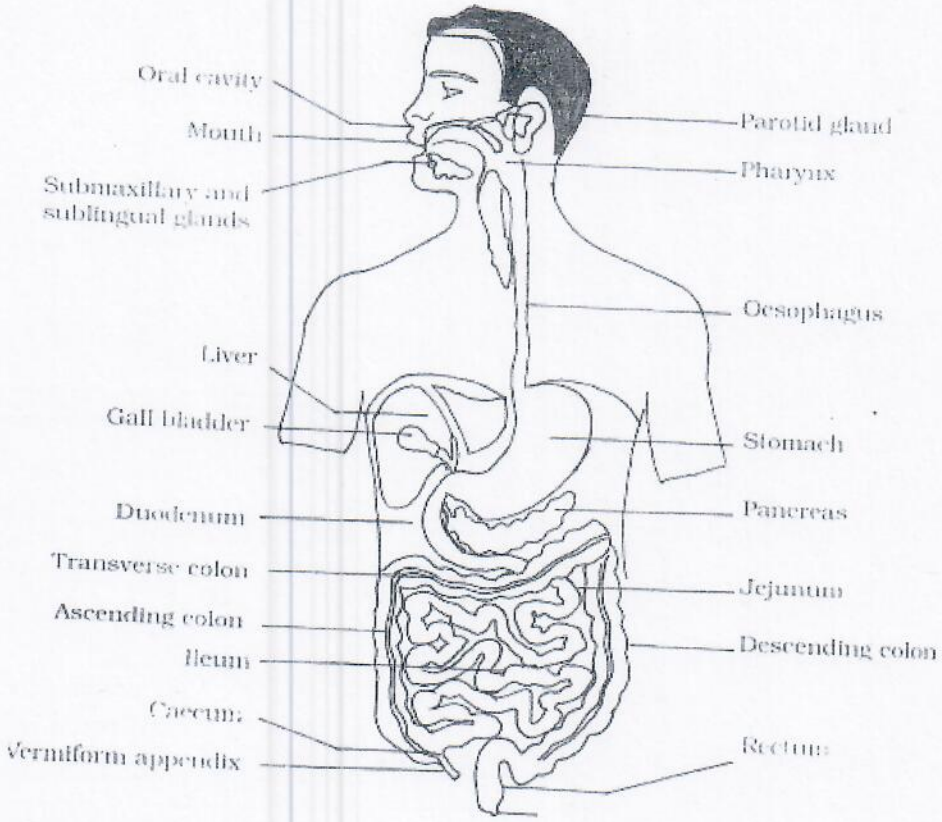

Fig. 13.4 Human Alimentary canal and the associated glands.

6. **Large Intestine :** About 15 meters long and has three parts.
   (i) **Caecum**–Small blind pouch at the junction of small and large intestine. A narrow worm-shaped tube (vermiform appendix) projects from the caecum.
   (ii) **Colon :** A little over 1 meter long, it has three parts termed ascending, transverse and descending limbs.
   (iii) **Rectum :** Last part, about 15 cm. long. It has two parts, the rectum proper and anal canal. Anus is the external opening surrounded by circular muscles (sphincters).

INTEXT QUESTIONS 13.2

1. Match the characteristics in column A with the parts of digestive system given in column B

Column A Characteristics	Column B Part
(1) Common passage for air breathed and the food swallowed.	(a) Small intestine
(2) Elastic bag	(b) Pancreas
(3) Has three limbs-ascending, transverse and descending	(c) Duodenum
(4) Largest part of the food canal	(d) Pharynx
(5) Receives bile and pancreatic juice	(e) Appendix
(6) Narrow worm-shaped projection	(f) Stomach
(7) Largest gland in body	(g) Colon
(8) Gland located in the bend of duodenum	(h) Liver

2. Name the **three** salivary glands and mention their location.

.....

13.6 THE DIGESTIVE PROCESS

Digestion involves two kinds of processes :

(a) ***Mechanical process*** that includes cutting, grinding and swallowing the food thus broken into small particles and then pushing the food along the food canal. **Smaller particles expose greater surface area for action by enzymes.**

(b) ***Chemical process*** which includes the enzymatic breakdown of complex food into simpler absorbable form.

Digestion involves hydrolysis, i.e. spliting by addition of water (H^+ and OH^- ions) to a molecule resulting in its break down into two or more simpler molecules. The enzymes only act as catalysts to accelerate the reaction.

For example $\underset{\text{(sucrose)}}{C_{12}H_{22}O_{11}} + H_2O \xrightarrow{\text{Sucrase}} \underset{\text{(glucose)}}{C_6H_{12}O_6} + \underset{\text{(fructose)}}{C_6H_{12}O_6}$

(a) Mechanical Process in Digestion

- The lips hold the food within mouth and help in sucking and sipping of liquids.
- The teeth cut, tear and grind the food.

- The tongue manipulates food while chewing, mixes saliva in it, rolls it into a ball termed **bolus** and helps in swallowing.
- The oesophagus conducts the food (bolus) down into the stomach by a wave of constriction of the circular muscles (Fig. 13.5). This wave of constriction is called peristalsis.

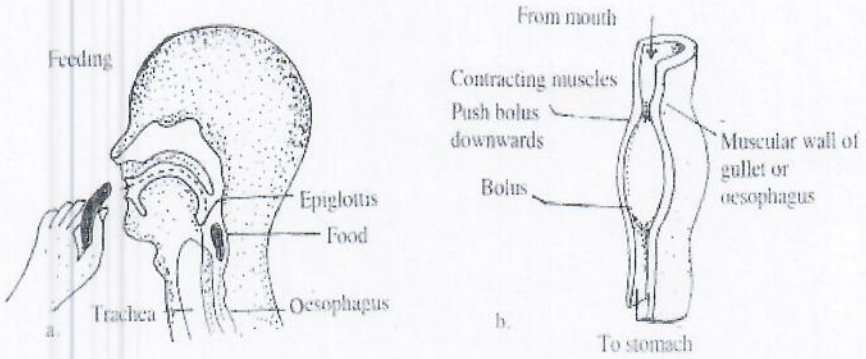

Fig. 13.5 A-During swallowing, the epiglottis closes the opening of the trachea, momentary stoppage of breathing, and the food is pushed down the oesophagus, **B**-Peristalsis is a wave of contraction of muscles of alimentary canal which pushes food down through the alimentary canal.

- The stomach churns the food mixing it with gastric juice and thus produces a creamy **chyme** (partially digested food).
- The peristaltic movements keep pushing the food from stomach to the intestine and finally upto the rectum.

(b) Chemical Processes in Digestion

1. In Mouth

Saliva contains only a single enzyme Amylase (old name Ptyalin) which acts on starch in two ways :

(i) Raw *uncooked* starch $\xrightarrow{\text{Amylase}}$ Dextrins
(soluble, partially hydrolysed starch)

(ii) Cooked starch $\xrightarrow{\text{Amylase}}$ Maltose
(a sweet-tasting disaccharide)

2. In Oesophagus

Food as bolus moves into the stomach through peristalsis. Salivary amylase continues digesting starch.

3. In Stomach

Initial digestion of starch by salivary amylase continues till the contents of stomach becomes acidic. The gastric juice produced from the epithelial lining of the stomach is a colourless highly acidic liquid (pH 1-2). It contains *Water* (98%), some salts, ***hydrochloric acid*** (0.5%), the lubricant mucin and two enzymes ***pepsin*** and ***lipase***.

Hydrochloric acid is secreted by ***Oxyntic (parietal)*** cells in the stomach wall. It performs following function :

(i) kills bacteria entering along with food,

(ii) loosens fibrous material in food,

(iii) activates the inactive pepsinogen to its active form pepsin,

(iv) maintains acidic medium for action by pepsin,

(v) curdles milk so that it does not flow out and stays for action by pepsin.

Pepsin is secreted in its inactive form or the proenzyme called pepsinogen secreted from the chief cells of the stomach wall. In the presence of HCl it turns into the active pepsin which acts on proteins and breaks them down into proteoses and peptones.

$$\text{Protein} \xrightarrow{\text{Pepsin}} \text{Proteoses and peptones}$$

4. Small Intestine

In the small intestine the food which is partially digested in the stomach and called **chyme** is acted upon by three main digestive juices.

(i) Bile juice from the liver

(ii) Pancreatic juice from the pancreas

(iii) Intestinal juice secreted from special cells in the intestinal epithelium at the base of intestinal villi. (Fig. 13.6)

The bile juice and pancreatic juice are poured into the duodenum by their respective ducts which join together to form a common hepato pancreatic duct. The intestinal juice directly mixes with the food.

(i) Bile Juice

Bile is a yellowish, green, alkaline liquid (pH about 8). It consists of (i) *water* (98%), (ii) *sodium carbonate* in large quantity which neutralizes the acid of the **chyme** (semi digested food) received from stomach; makes it alkaline, and (iii) *bile salts* (sodium glycocholate and sodium taurocholate) which emulsify fats.

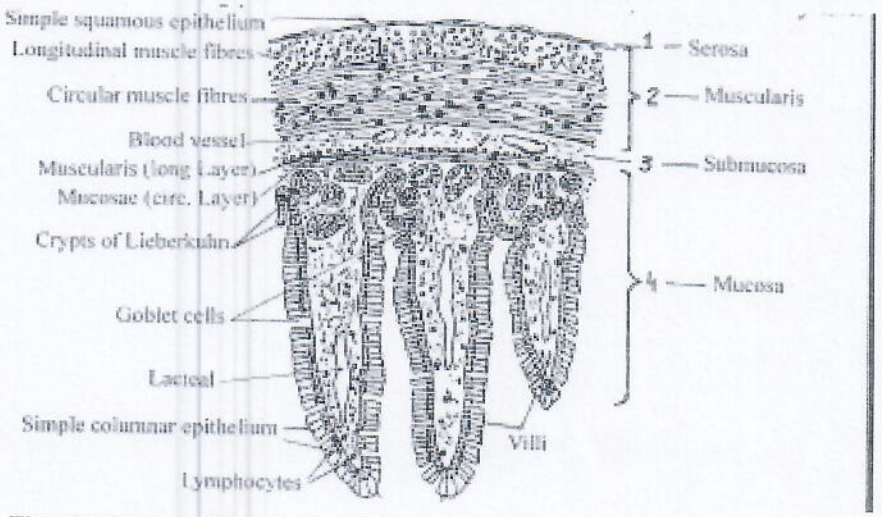

Fig. 13.6 Portion of intestinal wall showing villi and the associated structures.

Emulsification is the breaking up of large lipid (fat) droplets into small droplets, which provides greater surface for enzyme action.

The yellowish green colour of the bile is due to the pigments ***biliverdin*** and ***bilirubin*** produced by the breakdown of the dead and worn out RBCs (Red Blood corpuscles). These pigments are excreted in faeces. (solid or semi-solid waste and undigested food).

Bile has no digestive enzymes. It simply emulsifies fats.

(ii) Pancreatic Juice

The pancreatic juice contains *six* major categories of enzymes, which act in an **alkaline medium**.

(a) **Amylase** – completes conversion of starch into maltose.

(b) **Lipase** – also called *steapsin*. Acts on emulsified fats to produce *fatty acids* and *glycerol*.

(c) **Nucleases** – digest nucleic acids, i.e. DNA and RNA content of the food.

(d) **Trypsinogen** – the inactive precursor (proenzyme) of trypsin. It is activated into *trypsin* by the enzyme *enterokinase* secreted by the lining of duodenum. Trypsin acts on remaining proteins (not digested by pepsin) and the proteoses and peptones to produce *peptides* and *amino acids*.

(e) **Chymotrypsin** – acts on milk protein casein to produce *paracasein* (curd), and also converts other proteins into *peptides*.

(f) **Carboxypeptidases** – act on peptides to produce small *peptides* and *amino acids*.

(iii) Intestinal Juice or Succus Entericus

It contains the following categories of enzymes :

(i) **Glycosidases** (including maltase, sucrase and lactase). These hydrolyse the disaccharide maltose (malt sugar), sucrose (cane sugar) and lactose (milk sugar) into the simpler absorbable monosaccharides (glucose, fructose and galactose).

Disaccharides ($C_{12}H_{22}O_{11}$)

1. Maltose $\xrightarrow{\text{Maltase}}$ gluscose + glucose
2. Sucrose $\xrightarrow{\text{Sucrase}}$ gluscose + Fructose
3. Lactose $\xrightarrow{\text{Lactase}}$ gluscose + galactose

Monosaccharides ($C_6H_{12}O_6$)

(ii) **Lipase** completes the digestion of any lipid (fat) not digested by pancreatic juice.

(ii) **Peptidases** (aminopeptidase and dipeptidase) act on peptides and dipeptides to produce smaller peptides and amino acids.

(iii) **Nucleases** breakdown nucleotides into phosphate, sugar and different nitrogenous bases.

Summary of digestion in various parts of human alimentary canal is shown in table 13.1

Table 13.1 : Various digestive enzymes secreted and their role in the digestion of food in humans

Site of Secretion	Digestive juice	Enzyme	Mode of action
Mouth	Saliva	Salivary amylase (ptyalin)	Converts starch into maltose
Stomach	Gastric juice	Pepsin	Converts proteins into peptones and proteoses
Duodenum	Bile juice	No Enzyme	Emulsification of fats
	Pancreatic juice	Trypsin	Converts peptones and small peptides into amino acids.
Small intestine	Intestinal juice	Erepsin	Converts peptones and small peptides into amino acids.
		Sucrase	Converts sucrose into glucose and frutose.
		Maltase	Converts maltose into glucose
		Lactase	Converts lactose into glucose and galactose.
		Lipase	Converts fats into fatty acids and glycerols.

INTEXT QUESTIONS 13.3

1. How is grinding of food in the mouth helpful in digestion?

   .....

2. Name the source gland for following enzymes.

   (i) amylase .....

   (ii) pepsin .....

   (iii) lipase .....

3. List at least **four** enzymes that contribute towards digesting proteins.

   (i) ..... (ii) ..... (iii) ..... (iii) .....

13.7 ABSORPTION OF NUTRIENTS

Some absorption occurs in the mouth itself, some in the stomach but most absorption occurs in the intestine. The summary of absorption of nutrients is given below.

Teacher's Name: _____

Teaching Practice

CED306

Date: _____

Class: _____

Time: _____

❖ Lesson Topic: _____

❖ General Objective:

At the end of the unit/theme, students will be able to _____

_____

❖ Specific Objective:

At the end of the lesson, students will be able to _____

_____

❖ Task Analysis

Itemized subject matter or content relevant to the topic	Does the student know this information, maybe because it was taught in previous Lesson YES/NO

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Itemized subject matter or content relevant to the topic	Does the student know this information, maybe because it was taught in previous Lesson YES/NO

❖ Enabling Objectives

✓ During the lesson the student will be enabled to:

1. _____
2. _____
3. _____
4. _____
5. _____

❖ Lesson Delivery

Time	Content to be taught	Teaching Techniques

Time	Content to be taught	Teaching Techniques

	SUMMARY:

❖ **Lesson Evaluation Technique:**

_____

_____

_____

_____

_____

❖ **Instructional Materials:**

Quantity	Ingredients/Materials	Quantity	Equipment/Tools

❖ **Resource Materials/References**

_____

_____

_____

❖ **Date of Submission to Supervisor:** _____

❖ **Supervisor's Comments:**

_____

_____

Signature: _____ **Date:** _____