THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY
ENTRY EXAMS FOR NON-SCHOOL LEAVERS 2023

BIOLOGY PAPER

TIME ALLOWED: 3 Hours

INSTRUCTIONS TO CANDIDATES:

1. This is a closed book examination. All forms of notes, textbooks and recording devices such as mobile phones are not allowed in the examination rooms.

2. There are 43 questions in this examination question paper. You must answer all the questions.

3. This examination consists of three (3) parts, Part A: True or False, Part B: Multiple Choice, and Part C: Short Answers.

4. Marks are shown for each Part and question. Total marks = 100.

5. All answers must be written in the answer book. No other materials will be accepted for marking.

6. You have 5 minutes to read through the paper. You must not begin writing during this time.

7. Print your name and number clearly on the front page of the answer sheet. Do it now.

Part A: True or False **[1 mark each = 10 marks]**

Instructions: Write down either true or false in the column provided

Question No.	Question	Answer
1	Placentation refers to the arrangement of ovules within the ovary in plants	
2	Endocrine organs secrete hormones directly into blood stream	
3	Leaves of dicots have net venation	
4	Rickets are diseases caused by deficiency of vitamin C	
5	Axons conduct messages towards the cell body or nucleus	
6	The pH of the contents of the stomach is alkaline	
7	Rib bones of man form part of the appendicular skeleton	
8	Bile is a digestive juice produced by the gall bladder	
9	Superior plant ovary is found on top of receptacle	
10	Villi are small projections from the walls of the stomach	

Part B: Multiple Choice **[2 marks each = 40 marks]**

Question 11
A segment of mRNA was found to have the following sequence G-C-U-A. What is the sequence of the DNA from which it was transcribed?

a) C-A-G-T
b) C-G-A-T
c) C-G-A-U
d) C-T-G-U
e) All of the above

Question 12
Which of the following provides the best information to support the theory of evolution?

a) Climate change
b) Plate tectonics
c) Possession of limbs
d) Historical documents
e) Fossil evidence

Question 13
An organism's _____ is determined by its _____.

a) Genotype, phenotype
b) Phenotype, genotype
c) Alleles and phenotype
d) F_1 generation, alleles

Question 14
A population of 100 feral (wild) deer in the Westen Provine has an annual birth rate of 50% and death rate of 20%. The carrying capacity of their range is 200 deer. What is the rate of growth for the deer population

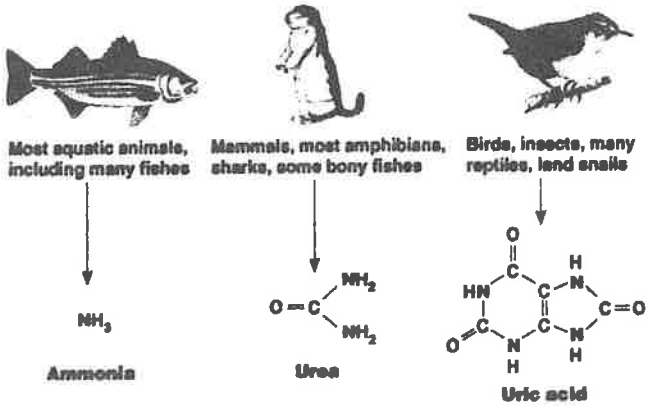
a) 0.7

b) 0.5
c) 0.3
d) 0.2
e) 0.1

Question 15
Of the following, which blood vessel does not carry oxygenated blood?
a) Pulmonary vein
b) Pulmonary artery
c) Renal artery
d) Carotid artery
e) Hepatic artery

Question 16

Nitrogenous waste excretion is an animal's way to remove the breakdown products of which type of food.
a) proteins
b) lipids
c) carbohydrates
d) fats
e) minerals



Question 17
The information below shows characteristics (I – VIII) of roots in plants;

I. Outgrowths of root epidermal cells
II. Are approximately 15cm long
III. Help anchor plant in soil
IV. Absorb water from soil
V. Are abundant on very old roots
VI. Limited to the tip of plant roots
VII. Life span is greater than 1 week
VIII. Do not become roots

Which list below has only those characteristics that best describe root hairs?
a) I, III, IV, VI, VIII
b) I, II, IV, V, VI
c) I, III, IV, VI, VII
d) I, II, IV, VI, VII, VIII
e) All the listed characteristics

Question 18
Advantages of internal fertilization over external fertilization include;
I. Ensuring that male gametes come into close proximity to female gametes.
II. Protection of gametes from predation or tother harmful environmental factors.
III. Increased likelihood of desiccation of gametes.

Which if the above are true?

a) I only
b) II only
c) III only
d) I and II only
e) I, II, III

Question 19
In which of the following characteristics are plant and animal cells different?
a) Presence of a cell wall
b) Presence of DNA
c) Presence of vacuoles
d) Presence of mitochondria
e) None of the above

Question 20
All statements below relate to HIV (human immunodefiency virus) and AIDS (acquired immune deficiency syndrome).

Determine the statement that is NOT correct about this important medical disease.
a) AIDS is caused by HIV
b) HIV compromises the host immune system
c) HIV infects immune-system cells
d) HIV is a direct killer by itself
e) HIV treatment is an active field research

Question 21
Air moves into the lung when the air pressure in the lungs is _____ than the air pressure outside of the lungs. This occurs when the muscles of the diaphragm _____.

a) Lower, relax
b) Higher, relax
c) Lower, contract
d) Higher, contract
e) None of the above

Question 22
The basic molecules which combine chemically to make a polypeptide are called;
a) A 5-carbon sugar, a nitrogenous base and a phosphate
b) Amino acids
c) Triacyl glycerols
d) Phosphodiester
e) All of the above

Question 23
Which of the following is an example of ovoviviparity?
a) Honeybees lay soft eggs within the hive
b) Sharks hatch from shells held withing the female's body
c) Birds hatch from eggs laid within a nest
d) Kittens obtain nourishment from the mother through a placenta
e) Eggs are released into the water, where they may be fertilized

Question 24
Which of the following groups can have both decomposers and autotrophic members?
a) Fungi
b) Plants
c) Bacteria
d) Protozoa
e) Phytoplankon

Question 25
Trophic response refers to plants' response towards the direction of the stimuli. The plant response to gravity is called:
a) Hydrotropism
b) Photoperiodism
c) Thigmotropism
d) Geotropism
e) None of the above

Question 26
Mitochondria and chloroplasts share a structural and functional similarities. What of the following do both these organelles have in common?
a) Generate ATP
b) Create complex molecules
c) Contain their own DNA
d) Found inside vacuoles
e) Surrounded by a cell wall

Question 27
Which one of these descriptions best characterizes the biome, Taiga?
a) Occurs along coastlines with temperature climate
b) Northern forests with coniferous trees that retain needle-like leaves all year
c) Open, windswept and boggy landscape
d) Soil ice persist throughout all seasons
e) Mid but seasonal climates with plentiful rain.

Question 28
It is said that the ecosystem in estuaries and coral reefs are relatively high in productivity per unit area compared to the deep seas. Which if the following reasons best explains the high productivity rates?
a) Higher concentrations of phosphate
b) Higher concentrations of nitrite
c) Lower concentrations of ammonia
d) Higher concentrations of nitrate
e) Lower concentrations of chloride

Question 29
In which of the mitosis does crossing over usually occur?
a) Prophase
b) Telophase
c) Metaphase

d) a + c
e) None of the above

Question 30
A simple reflex arc in human is made up of five (5) distinct phases in a sequential order.

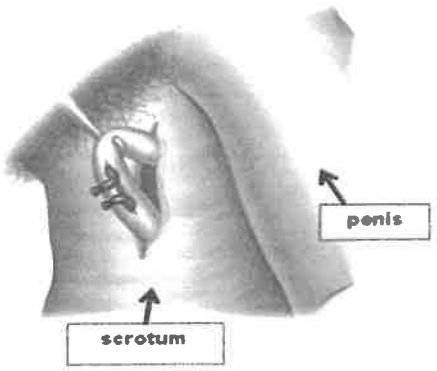
I. effort organ response
II. Intermediate nerve fibre transmission
III. sensory nerve fibre transmission
IV. Motor nerve fibre transmission
V. sensory receptor receiving stimulus

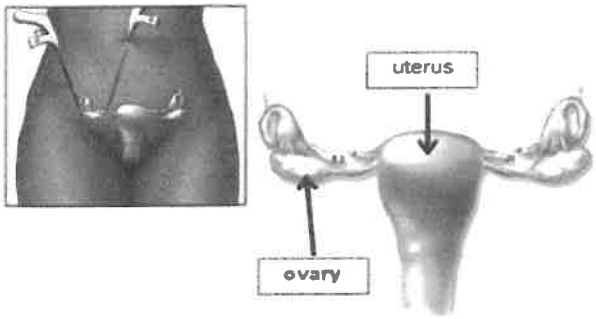
The correct sequence of events when a person responds to the stimulus of touching a hot metal object is:
a) V-II-II-IV-I
b) I-II-III-IV-V
c) III-V-IV-II-1
d) V-II-III-IV-I
e) V-III-IV-II-I

Part C: Short Answers **[marks are given for each question = 50 marks]**

Question 31

Figures **A** and **B** illustrates birth control through sterilization procedure as performed in human males and females, respectively.





A. Male sterilization procedure B. Female sterilization procedure

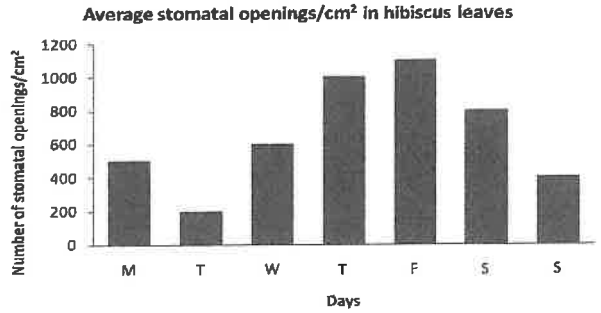
a) (i) Tubal ligation is the removal of female reproductive portions. Name the comparable procedure in males. (1)

(ii) Name the respective reproductive tubes operated on in each sex, and describe what actually is done to effect reproductive sterilizations. (4)

b) Explain the difference between self-fertilization and asexual reproduction in plants, in relation to genetic variability. (2)

C) Name a field where asexual reproduction of plants is utilised for human commercial purposes. (1)

Question 32

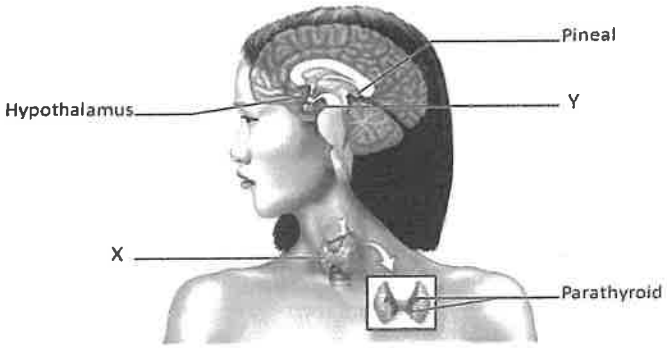


The graph shows the number of open stomata on various days of the week.

a) On average, how many stomatal openings were there in a 15 cm^2 area of leaf on
Thursday?
(1)

b) Name three climatic factors that may have contributed to the lowest reading on Tuesday? (3)

Question 33



a) Name a hormone produced by the gland labelled X in the diagram below? (1)

b) What is the name of the gland marked Y? (1)

c) To what body system do all the glands in the above diagram belong? (1)

d) The Central Nervous System is made up of the brain and the _____. (1)

Question 34

List any four modifications of stems and roots. (8)

Question 35

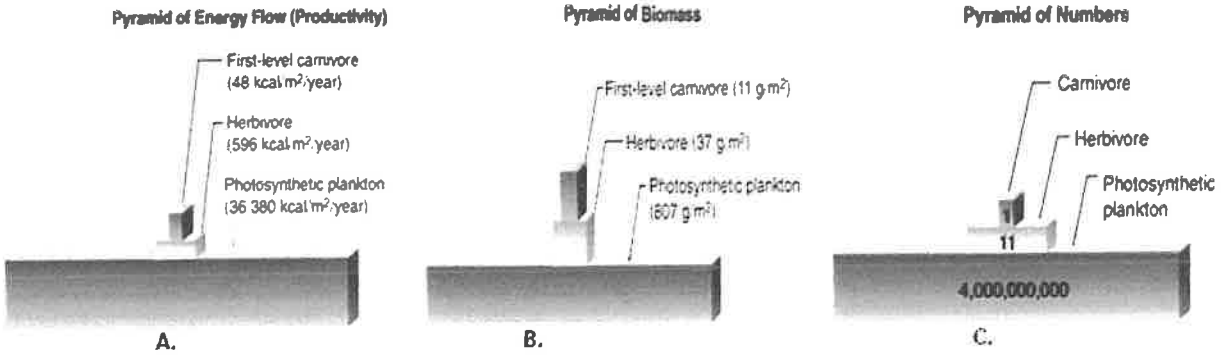
Compare primary ecological succession to secondary ecological succession (8)

Question 36

Compare monocots and dicots. (8)

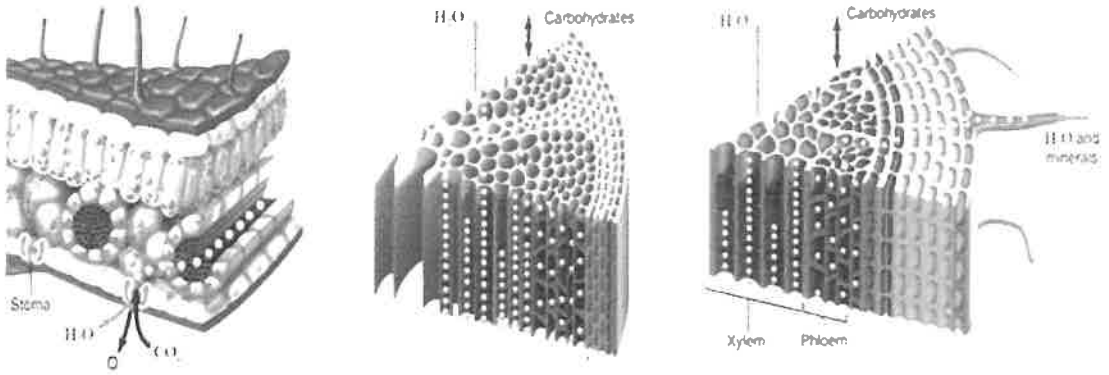
Question 37

This diagram shows the trophic levels in Lake Kopiago, in three different types of pyramids.



a) What makes the photosynthetic plankton important at the bottom of all the pyramids? (1)
b) Why does the bottom trophic level in A have the greatest energy levels? (1)
c) What does the pyramid of biomass represent? (2)
d) Why does the energy decrease towards the top of the pyramid? (2)

Question 38



A, Cross section of a leaf B. Cross section of a trunk C. Cross section of a root

a) Name the cells that control the opening and closing of stomata. (1)
b) What process allows the water to enter the roots? (1)
c) Name the process by which water is evaporated from the leaves of plants? (1)
d) A water potential gradient from the roots to the shoots enables the movement of water from the bottom of the plant to the top. What type of water potential gradient is created by evaporation in the leaves? (1)