CANDIDATE'S NAME:.....CO-ORDINATED MARKING GUIDE.....

INDEX No:.....

P530/1
BIOLOGY
Paper 1
JULY/AUG. 2024
$2^1/_2$ Hours

WENSSEC
Regional Mock Examination

Uganda Advanced Certificate of Education

BIOLOGY (Theory)

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

The paper consists of two sections A and B. Answer all the questions in both sections. No additional sheets of paper should be inserted into this booklet.

FOR EXAMINER'S USE ONLY

SSECTION		MARKS	SIGNATURE
A (1-40)		40	
B	41	10	
	42	10	
	43	10	
	44	10	
	45	10	
	46	10	
TOTAL		100	

SECTION A (40 Marks)

Write letter of the correct response in the box provided to the right hand side of the question.

1. Which one of the following is not a sex-linked trait?
   A. Hemophilia
   B. Premature balding
   C. Albinism
   D. Red-green colorblindness

   C

2. Which one of the following brings about Bohr effect?
   A. Increased partial pressure of oxygen in the blood
   B. Increased partial pressure of carbon dioxide in the blood
   C. Increased partial pressure of oxygen in the air
   D. Increased partial pressure of carbon dioxide in the air

   B

3. When an action potential is produced, the axon membrane suddenly becomes.....
   A. More permeable to potassium ions
   B. More permeable to sodium ions
   C. Permeable to both sodium and potassium ions
   D. Permeable to none except electrons

   B

4. The following are the properties of skeletal muscles except.....
   A. Compressibility
   B. Excitability
   C. Elasticity
   D. Extensibility

   A

5. Which one of the following is a success of animals to terrestrial life?
   A. Oviparity
   B. Ovoviviparity
   C. Viviparity
   D. Production of cleidioc eggs

   D

6. Figure 1 below shows changes in oxygen concentration down the stream.

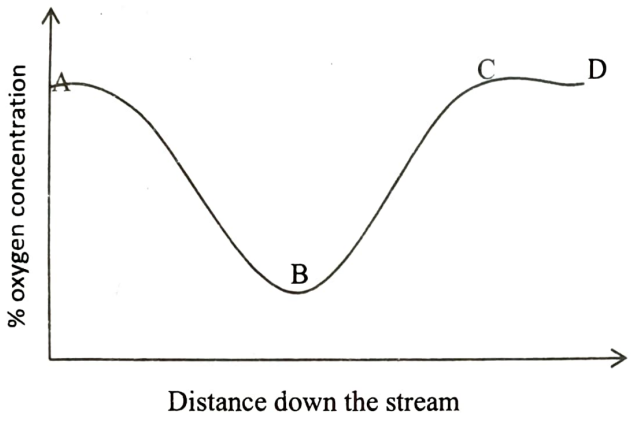


Fig.1

At what point of the curve is the biochemical oxygen demand (BOD) highest?

A. Point A
B. Point B
C. Point C
D. Point D

B

7. Which one of the following shows the correct coding sequence during enzyme synthesis?

A. DNA ⟶ mRNA ⟶ tRNA ⟶ rRNA
B. DNA ⟶ mRNA ⟶ rRNA ⟶ tRNA
C. rRNA ⟶ DNA ⟶ tRNA ⟶ mRNA
D. DNA ⟶ tRNA ⟶ rRNA ⟶ mRNA

A

8. Which one of the following is not part of the areola tissue?

A. Matrix
B. Osteoblast
C. Fat cell
D. Histeocyte

B

9. One of the following chlorophyll components protects chlorophyll from oxidation by oxygen during photosynthesis.

A. Chlorophyll molecule a
B. Carotenoids
C. Chlorophyll molecule b
D. Chlorophyll molecule c

B

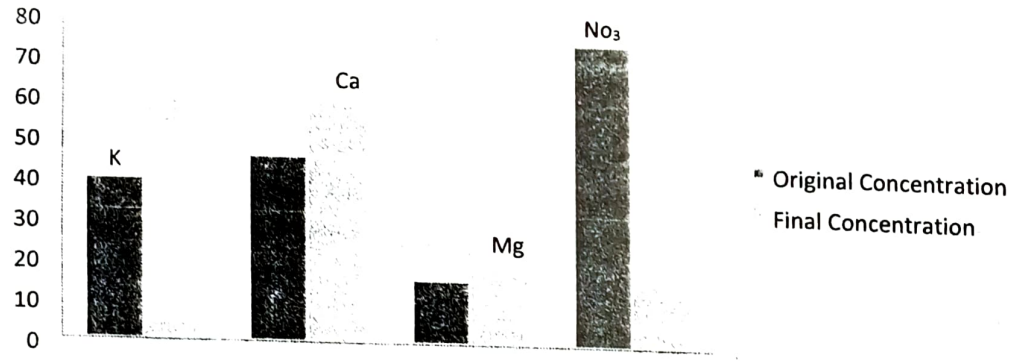
10. Which one of the following nitrogenous wastes is common to vertebrates?
    A. Ammonia
    B. Trimethylamine oxide
    C. Uric acid
    D. Urea

D

11. Which one of the following types of cells bring about gradual immune response to antigens in the body except.....?
    A. T-Cells
    B. B-Cells
    C. Plasma clone cells
    D. Antibodies

A

12. The figure 2 below is a histogram showing changes in concentration of ions in culture solutions in which barley seedlings have been grown for 24 hours.



Which one of the processes contributed to the highest variation in concentration of the ions in the culture solutions?
    A. Diffusion
    B. Active transport
    C. Osmosis
    D. Facilitated diffusion

B

13. Which of the following is not caused by Brassiosteroids (BRs) in plants?
    A. Root spiraling
    B. Stem elongation
    C. Cell division
    D. Alleviation of oxidative stress

C

14. One of the following is not true about bacterial DNA.
    A. Single strandedness
    B. Nonlinear
    C. Has both introns and extrons
    D. Haploid

C

15. In alteration of generations in fern;
    A. Spores are produced from haploid cells
    B. Gametes are produced by mitosis
    C. Gametophyte is independent
    D. Spores are produced by mitosis

B

16. The equation below shows photosynthesis in bacteria living in the bottom of a sea.

$$6CO_2 + 12H_2S \xrightarrow[\text{Bacteriochlorophyll}]{\text{Light}} C_6H_{12}O_6 + 12S + 6H_2O$$

Which one of the following is the characteristic of the bacteria for the type of nutrition?
    A. The presence of bacteriochlorophyll a and b
    B. The inability to properly utilize sunlight
    C. The inability to absorb water as a raw material
    D. The inability to absorb hydrogen peroxide from water body

A

17. Which of the following extra embryonic membranes is used for both excretion and gaseous exchange in the embryos of reptiles and birds?
    A. Chorion
    B. Yolk sac
    C. Allantois
    D. Amnion

C

18. Which one of the following intermediate compounds is a link for lipids, carbohydrates and proteins during aerobic respiration?
    A. Oxaloacetate
    B. Alpha-ketoglutarate
    C. Acetyl-coA
    D. Acetyl

D

19. The existence within a population of disadvantageous alleles in heterozygous genotypes is known as.....
    A. Genetic drift
    B. Genetic load
    C. Genome
    D. Gene pool

B

20. Which pair of chemical processes produces ethanol in plants during anaerobic respiration?
A. Phosphorylation and decarboxylation
B. Phosphorylation and dehydrogenation
C. Dehydrogenation and decarboxylation
D. Dehydrogenation and oxidation

C

21. Amino acids which lack DNA code are called……
A. Natural amino acids
B. Rare amino acids
C. Non-essential amino acids
D. Essential amino acids

B

22. The eventual variations in the pentadactyl limb in vertebrates is attributed to…
A. Adaptation
B. Evolution
C. Use and dis-use
D. Competition

A

23. Which one of the following membrane-bound organelles may have suicide effect on the cell?
A. Glycosome
B. Lysosome
C. Peroxisome
D. Glyoxysome

B

24. Which one of the following is a method of detoxifying polluted ecosystems through human activities?
A. Biological augmentation
B. Habitat restoration
C. Bioremediation
D. Establishing botanical gardens

C

25. Which one of the following does not enable frogs to live successfully on land?
A. Storage of water in its bladder
B. Having a less permeable skin to water
C. Active secretion of urea into kidney tubules
D. Higher rate of glomerular filtrate

D

26. Which of the following receptors is sensitive to respiration?
    A. Pacinian corpuscle
    B. Meissners corpuscle
    C. Organ of Ruffini
    D. Ossicles

A

27. Which one of the following organelles evolved from the enslavement of the purple-non sulphur bacteria?
    A. Chloroplast
    B. Plastids
    C. Mitochondria
    D. Ribosomes

C

28. Which one of the following is a characteristic of long-day plants? The plants flower when.....
    A. P_{700} accumulates more than P_{600}
    B. P_{660} accumulates more than P_{700}
    C. P_{700} and P_{660} have equal amount
    D. P_{700} is accumulating

A

29. Which one of the following skeletons is found in shelled mulluscs?
    A. Chitinous exoskeleton
    B. Calcified exoskeleton
    C. Silicated exoskeleton
    D. Borne-cartilage-dentine exoskeleton

B

30. Which one of the following is the effect of under production of testosterone in a mammal?
    A. Increased muscle mass
    B. Increased libido
    C. Increased energy and depression
    D. Erectile dysfunction

D

31. The glandular epithelium which has rounded secretory unit of glands with multiple branches is....
    A. Compound tubular
    B. Simple branched
    C. Compound saccular
    D. Simple saccular

C

32. Which one of the following types of cells produces hydrochloric acid in mammalian gut?
    A. Parietal cells
    B. Chief cells
    C. Goblet cells
    D. Gastrin producing cells

A

33. Which one of the following respiratory pigments is only found in insects?
    A. Haemocyanin
    B. Haemoerythrine
    C. Haemoglobin
    D. Chlorocruorin

A

34. Which one of the following body cavity exists in true worms?
    A. Acoelomate
    B. Pseudo-coelomate
    C. Coelomate
    D. Haemocelomate

C

35. Which one of the limb modifications occurs in human, panda, rats, and rabbits for land dwelling?
    A. Plantigrade
    B. Digitigrade
    C. Anguligrade
    D. Pentadasctyly

A

36. During flight in birds, a slight increase in angle of attack results in .....?
    A. Gain of height
    B. Loss of height
    C. Forward drive
    D. Turbulence

A

37. Which one of the following forms of dormancy in animals is brought about by absence of growth hormones?
    A. Aestivation
    B. Hibernation
    C. Diapause
    D. Budding

C

38. Which one of the following hormones has similar effect to antacid used to reduce harm from peptic ulcers?
   A. Enterogastrone
   B. Secretion
   C. Cholecystokinin
   D. Gastrin

A

39. Which one of the following is untrue about mitosis in plants?
   A. Formation of asters
   B. No formation of centrioles
   C. Formation of cell plates
   D. Furrowing of cytoplasm

D

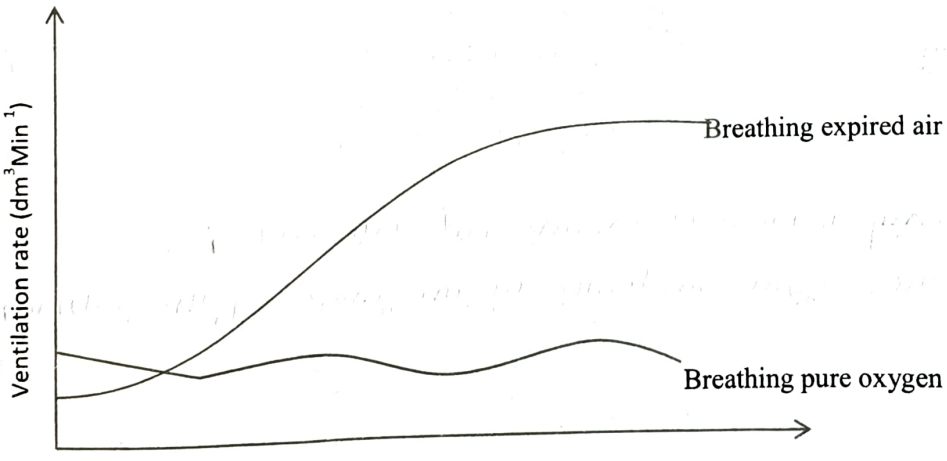
40. Which one of the following secretions is involved in allergic and inflammatory reactions?
   A. Heparin
   B. Serotonin
   C. Histamine
   D. Anticoagulant

C

SECTION B (60 Marks)

Answers to the questions in this section should be written in the spaces provided

41. Fig 3 below shows the effect of increased oxygen on rate of ventilation in human. Answer the question about it.



(a) From the graph, state the effect of:

(i). breathing in expired air (01 mark)

Reject rapid, fast, very rapid.

Increases ventilation rate gradually with time; Accept slowly

(ii). breathing in pure oxygen (01 mark)

Breathing in pure oxygen has minimum effect on rate of ventilation; Reject moderate / maximum effect.

(b). Explain the effect of:

(i). breathing in expired air (03 marks)

Increases amount of CO_2 in the lungs; CO_2 acts as a stimulant; and increases rate of ventilation; enabling the body to get rid of excess CO_2; max. 03mks

(ii). breathing pure oxygen (01 mark)

This has stimulatory effect on rate of ventilation / rate of ventilation nearly remains constant / the same; 01mk

(c). How could accumulation of carbon dioxide in active muscles of a sprinter cause adjustment in the cardiovascular system during the race? (04 marks)

This causes local / localised ~~V~~asal dilation of arterioles in the muscles; This increases blood flow through the muscles; carrying ~~amoun~~ increased amount of CO_2 to the lungs; for the process of exhalation; 4mks

Total 10 mks
max 10mks

4 26.(a). Name two features of an enzyme critical in the formation of enzyme-substrate complex (02 marks)

Relative concentration of enzyme and substrate;

shape of the enzyme molecule to the shape of the substrate; 02mks

(b). Explain what is meant by:

(i). biological temperature (01 mark)

Temperature range over which enzyme functions most efficiently / effectively (20-40°c); 1mk

Accept optimum

(ii). Free energy of activation (01 mark)

The energy required by the enzyme/substrate complex in order for the substrate to break and form products; 1mk.

Accept least amount of energy

(c). Explain the role of the following on enzyme:

(i). Acid (02 marks)

H^+ combine with carboxylic group of amino group; breaking ionic bonds of the enzyme; 02mks

(ii). Alkalis (02 marks)

Decrease in H^+ causes loss of H^+ from amino group (NH_3^+); of enzyme this breaks ionic bonds of the enzyme; 02mks

(iii). Inorganic chemicals (02 marks)

Combine with -COOH of enzymes, breaking ionic bonds; 02mks

43. (a). (i). Distinguish between primary growth and secondary growth in plants (04 marks)

Primary growth is increase in length while secondary growth is increase in girth / thickness; 01mks

Primary growth involves apical meristem while secondary growth involves vascular cambium and cork cambium;

Primary growth occurs in monocots while secondary growth in dicots & gymnosperms;

No lignification in primary growth while lignification occurs in secondary growth;

(ii). Describe how cell expansion occurs during the primary growth in a dicotyledonous plant (04 marks)

New cells formed initially absorb water; by osmosis; vacuoles expand and adjacent vacuoles merge to form a single layer of vacuole; the vacuole exerts high pressure potential against the cell wall; which stretches outward; causing cellulose micro fibrils orientation; which enables the cell to change shape and increase in size; @-1 mark- 4mks

(b). Explain why shoots of monocotyledonous plants continue to grow after cutting off the tip (02 marks)

Monocot plants have intercallary meristems at internodes; or between leaf nodes which continuously divide mitotically; giving rise to new shoot;

Accept by mitosis

max 2mks

Total 14 max 10mks

44 (a). What do we mean by biological levels of organization? (01 mark)

Organisation of complex biological structures and systems of an organism from its chemical composition;

@ = 1mk @ 1mk

(b). How does the knowledge of body system illustrate the idea of biological levels of organization? (03 marks)

Body systems are constituted by group of similar organs; formed from aggregation of histologically similar tissues; which are inturn formed from cells of similar structures and functions;

@ = 1mk @3mks

(c). Explain why adaptations may be important in organisms (06 marks)

share and partition of resources in habitat;
minimises open conflicts;
survive predation;
survive harsh environmental / physical conditions;
They survive infections;
Survive competitions;
Efficient physiological functional;
Exploit wide range of environment;

@ 1mk any six max. 06mks

Total 12 max- 10

45 (a). Define the following terms related to transmission "of impulse"

(i). Summation (01 mark)

Intergration of multiple weak synaptic inputs to produce a strong stimulation that produces action potential in the post synaptic neurone.;

@1mk

(ii). Synaptic facilitation (01 mark)

Effect of successive stimuli on post synaptic membrane resulting in generation of excitatory post synaptic potential (EPSP); 01mk

(b). Figure 4 below shows changes in an axon as an impulse passes along the axon

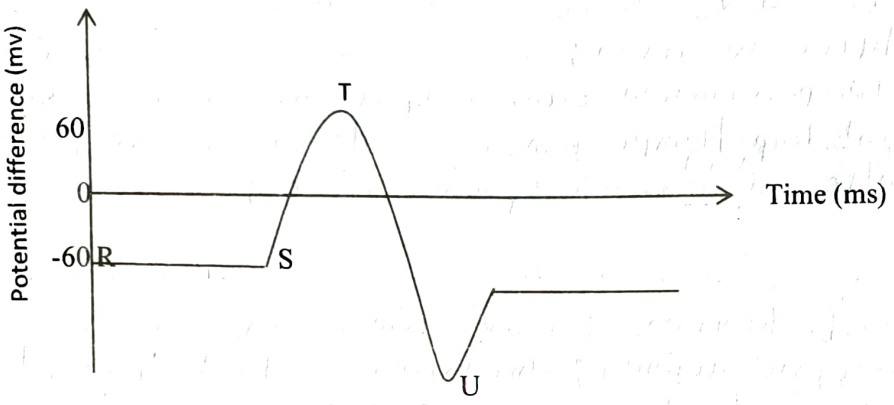


Fig. 4

What is the state of the axon membrane between:

(i). R and S (1/2 mark)

Resting potential; RP ½mk

Reject abbreviation R·P

(ii). S and T (1/2 mark)

Action potential (AP) ½mk

Reject AP

(c). Describe the movement of ions across the membrane between:

(i). R and S (01 mark)

Membrane is positively charged outside and negatively charged inside; 01mk

(ii). T and U (01 mark)

K^+ are concentrated outside while Na^+ are concentrated inside the membrane; 01mk

Reject K^+ & Na^+.

Descriptions are either in words or drawings with labelling.

(iii). S and T (01 mark)

Membrane is positively charged inside and negatively charged outside; 01mk

(d). Explain how the speed of impulse transmission is ensured in nerve cell by:

(i). Myelination (02 marks)

Myelin Covers the axon being absent at nodes of Ranvier; @ = ½
Myelin insulates the axon; as site for exchange of ions / depolarisation / Re-polarisation occurs only at the Nodes of Ranvier; 2½
action potential leaps / jumps from one node to another; Increasing impulse speed of impulse and transmission in the nerve; max 02mks

(ii). Increase in temperature (02 marks)

- Increases rate of diffusion of ions across axon membrane; and increased enzyme activity; This increases local circuits / localised circuits and depolarisation and re-polarisation; hence increase in speed of nerve transmission; @ ½ 2mks

Total 10½ max-10mks

46. (a). What is ozone hole (01 mark)

- This is depleted region of ozone layer due to action of chloro flora carbons CFCs;

(b). How is ozone hole formed? (04 marks)

- chlorine from CFC reacts with ozone in the atmosphere; breaking ozone into oxygen molecule; and chlorine monoxide; chlorine monoxide undergoes further reactions and releases chlorine which reacts with ozone; causing depletion @ 1mk 04 mks

(c). Outline possible human activities which can minimize the consequences of ozone hole.
(05 marks)

- Biological augumentation for ecosystem restoration ;
- Agro forestry ;
- Enrichment of planting of trees of special species ;
- Re-afforestration or Reforestation ;
- Enforcement of relevant laws ;
- selective felling of trees in established forests ;
- control of fires and fire fightings ;
- Establishment of protected areas such as forest reserves ;

@ = 1 any five 05 MKS

Total 13
max - 10 MKS

TOTAL 11½
MAX = 100 MKS
FLOATING = 11½

END