

P530/1
Biology (Theory)
Paper 1
July/August 2022
2½ hours

BUGANDA EXAMINATIONS COUNCIL MOCKS

Uganda Advanced Certificate of Education

BIOLOGY
(THEORY)

PAPER 1

2HOURS 30 MINUTES

INSTRUCTIONS

- *Paper consists of **two** sections **A** and **B**.*
- *Section **A** consists of 40 objective type questions.*
- *Circle the option of your choice.*
- *Answers to questions in section **B** should be filled in the spaces provided.*

FOR OFFICIAL USE	
NO	MARKS
1-40	
41	
42	
43	
44	
45	
46	
TOTAL	

SECTION A

1. Which of the following process is exclusively physical?
 - A. Root pressure
 - B. Capillarity'
 - C. Transpiration
 - D. guttation
2. Which of the following is true of a rapidly growing population?
 - A. Equal proportions of all age groups
 - B. Has more members of the reproductive age groups
 - C. More members of the pre- reproductive age groups
 - D. Senescence occurs more slowly
3. Which of the following is not a major function of lipids in the body?
 - A. Short term energy store
 - B. Synthesis of hormones
 - C. Long term energy store
 - D. Insulation
4. Rapid transport of materials within the cytoplasm is associated with the presence of;
 - A. Spindle fibres
 - B. Endoplasmic reticulum
 - C. Plasma membrane pores
 - D. Golgi apparatus
5. The property of water that enables homoitherns to adapt to range of environment is;
 - A. High heat of vapourisation
 - B. Low viscosity
 - C. Maximum density at 4°C
 - D. High surface tension
6. Which-of the following tissues is the most highly specialized?
 - A. Nervous
 - B. Epithelial
 - C. Blood
 - D. bone

7. Desert lizards tend to be most active in the early morning and evening. This is an example of;
- Temperature tolerance
 - Behavioral thermos regulations
 - Biurnal hibernation
 - Thermal gaping
8. In a unit membrane cholesterol is found ;
- Attached to glycol - protein
 - Between the lipid molecules
 - Attached to the glycolipids
 - Bound to membrane proteins
9. The biological role of a protein depends on ;
- The sequence of amino acids
 - Pattern of folding of amino acids
 - Other protein molecules with which is associated
 - Its three dimensional shape
10. The most important factor determining how much oxygen is carried by haemoglobin is the;
- Level of oxygen in blood
 - Level of carbon dioxide in the blood
 - Temperature of the blood
 - Level of Ca^{2+} ions in the blood
11. The total amount of energy available to a second class consumer will change if;
- Second order consumers are removed
 - Higher light intensity is provided
 - All third order consumers are removed
 - A constant biomass of producers is maintained
12. Uniform dispersion patterns in plants are most often associated with ;
- Chance
 - Patterns of high humidity
 - Random distribution of seeds
 - Competitive interaction between individuals of some species
13. The length of a cell structure on a drawing is 6mm under magnification of X 600. Its actual length is ;
- | | |
|-----------------------------------|--------------------------------|
| A. $1 \times 10^{-1} \mu\text{m}$ | B. $1 \times 10^0 \mu\text{m}$ |
| C. $1 \times 10^1 \mu\text{m}$ | D. $1 \times 10^2 \mu\text{m}$ |

14. In a DMA molecule, the base AGT codes for the amino acid serine. The basesequence of the anti- cordon on the tRNA to which serine becomes attached is?
- | | |
|--------|--------|
| A. AGU | B. GAU |
| C. TCA | D. UCA |
15. The effect a hormone in a plant depends on;
- Its concentration in a plant
 - Its relative concentration with other molecules
 - Its presence or absence.
 - Presence or absence of other molecules
16. Water stress in plants induce secretion of
- | | |
|----------------|--------------|
| A. Ethylene | C. auxins |
| B. Gibberellin | D. Cytokimin |
17. Long day plant only flowers if
- Darkness period does not exceed maximum critical period
 - Darkness period exceeds maximum critical period
 - Day time exceeds its maximum critical period
 - Day time does not exceed its maximum critical period
18. Which one of the following conditions favour low photosynthetic yield
- | | |
|------------------|-------------------|
| A. Hot humid day | C. Hot dry day |
| B. Cold dry day | D. cold humid day |
19. Opening of potassium voltage gated channels of a resting nerve cells leads to
- Increase of its membrane potential
 - Decrease of its membrane potential
 - Increase of its action potential
 - Decreases of its action potentials
20. Strength of stimulus does not affect
- | | |
|-----------------------|---------------------|
| A. motor potential | B. Depolarisation |
| C. Membrane potential | D. Action potential |
21. Photorespiration in bundle sheath cells of C4 plants is prevented by absence of
- | | |
|--------------------|---------------------|
| A. PS II | C. PS I |
| B. PEP carboxylase | D. RUBP carboxylase |

22. Unlike C₄ plants, C₄ and C₃ pathways in plants occur
- In different cells
 - At different times
 - At the same time
 - In same bundle sheath cells
23. The receptor molecule of testosterone hormone is intracellular because of being with
- Small molecular mass
 - Large molecular mass
 - Hydrophobic properties
 - Hydrophilic properties
24. Normal parents produced two girls one of whom is normal and the other is albino. What is the probability that the normal girl is a carrier
- | | |
|--------|--------|
| A. 50% | B. 25% |
| C. 67% | D. 75% |
25. The energy emitted by electron along electron carrier system during photosynthesis is directly used for pumping of hydrogen ions
- Out of intermembrane space
 - Into intermembrane space
 - Into thylakoid space
 - Out of thylakoid space
26. The importance of delaying electric impulse from sinoatrial node by atrioventricular node is not to
- Empty the atria
 - Fill the ventricle
 - Maintain unidirectional blood flow
 - Prevent back flow of blood
27. Which one of the following properties enables a red blood cell to maintain the same amount of oxygen carriers
- Lack of nucleus
 - Lack of mitochondria
 - Possession of much haemoglobin
 - Possession of a disc shape.
28. Which one of the following cells is likely to increase in number in a person who has just cured from an infection?
- | | |
|-----------------------|-------------------|
| A. Plasma cells | C. killer T cells |
| B. Suppressor T cells | D. helper T cells |

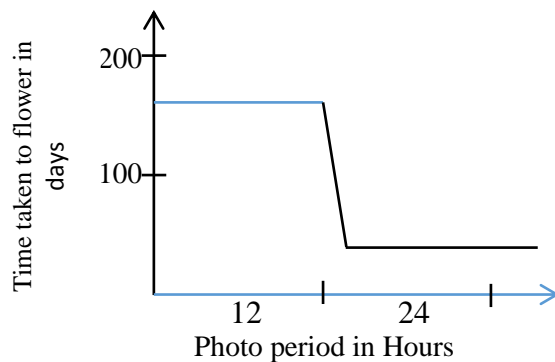
29. Which one of the following conditions causes an increase in levels of ADH and aldosterone in human blood

- A. Low concentration of blood
- B. High concentration of blood
- C. High blood pressure
- D. Low blood pressure

30. The following account for different oxygen dissociation curves except difference in

- A. Respiratory pigments
- B. forms as hemoglobin
- C. Behavior of a pigment in different conditions
- D. Shape as hemoglobin binds with oxygen.

31. The graph below shows the response of a plant to day length



The plant flowers very fast when light exposure is

- A. Between 13 to 24 hours
- B. Below 12 hours
- C. Above 12 hours
- D. At 12 hours

32. In which one of the following is the expected frequency of genotype MN in an isolated human population whose blood groups are controlled by genes M and N with the number of people of MN blood grouping being M= 82, MN= 47 and N=09. Assuming frequency of M is p

- | | |
|-------|---------|
| A) 47 | C) 50 |
| B) 18 | D) 0.34 |

33. The plants X and Y of same species with variegated leaves were supplied with radioactive carbon dioxide ($^{14}\text{CO}_2$). Plant Y was kept in dark and X was illuminated. The amount of radioactivity found in yellow patches of plant X was 40 times more than that of Y. The explanation for high radioactivity in plant X is
- A. Photosynthesis products diffuse into yellow zone
 - B. Photosynthesis occurs in yellow zone but no starch stored.
 - C. Some small amount of photosynthesis occurs in yellow zone
 - D. Radioactive carbon dioxide diffuse into yellow zone
34. The advantage of a polysome is to form
- A. Different protein molecules
 - B. Identical protein molecules
 - C. One long protein molecule
 - D. Many long protein molecules
35. Poor supply of oxygen greatly affects rapid absorption of;
- A. Chloride ions into red blood cells
 - B. Glucose molecules into hepatocytes
 - C. Hydrolysed acetylcholine back into presynaptic anode
 - D. Calcium ions back into sarcoplasmic reticulum
36. During optimal foraging, the predator opt for;
- A. Group hunting to kill a small prey
 - B. Group hunting to kill a large prey
 - C. Solitary hunting to kill a large prey
 - D. Prolonged solitary hunting for a small prey
37. What would occur if an enzyme is added to a reaction where its substrate and product are in equilibrium
- A. More products would be formed
 - B. The rate of reaction would increase
 - C. The rate of reaction would remain the same
 - D. The equilibrium of the reaction would be raised
38. Which of the following statements is true of fishes that live in fresh water
- A. They lose water through gills and replace lost water by drinking
 - B. Water osmotically enter its cells via gills and salts lost by diffusion
 - C. They pump salts from blood into epithelial cells, so that ions can be excreted
 - D. By osmosis salts are lost and water enters the body cells through gills,
39. The information of action potential of a given neurons is contained in its
- A. Magnitude
 - B. Frequency
 - C. speed of propagation
 - D. duration

40. In menstrual cycle, peaks of Luteinizing hormone and Follicle stimulating hormone occur during the period
- | | |
|------------------------|--------------------------|
| A. Of menstrual flow | C. just before ovulation |
| B. Of follicular phase | D. of ovulation |

SECTION B

41. A mutant tobacco plant variety only flowers if the maximum critical day length was 14hours

- (a) With a reason, suggest the type of photoperiodism for the mutant tobacco plant species. (2mks)

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- (b) What happens to the flowering of a mutant tobacco plant when;

- (i) the night length is interrupted with a flash of light. (2mks)

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- (ii) the night length is prolonged to almost 24hours. (2mks)

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- (iii) Briefly describe the effect of flashing far red light in the middle of night length of tobacco mutant plant. (4mks)

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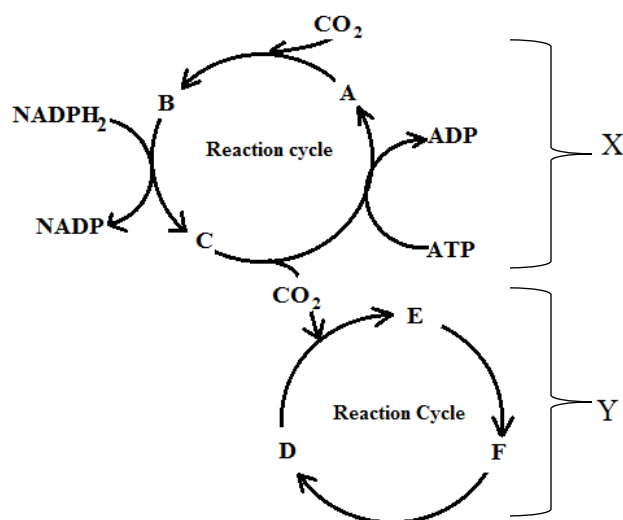
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42. The figure below represents metabolic pathways within a green plant, which is exposed to sun light. Study the figure and answer the questions that follow



- (a) Label the cells labeled **X** and **Y** and compounds **A** and **C** (2mks)

X.....

Y.....

A.....

C.....

- (b) Explain what happens to levels of compounds **A** and **C** when light supply is cut off at the level of compound **A** (2mks)

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- (c) Level of compound **C** (2mks)

- (d) Explain how physiological properties of compound A may lead to high yield of compound **B** (2mks)

- (e) With a reason suggest the type of plat with such metabolic pathways given in diagram above (2mks)

43. A gene of two alleles, the allele for red petals (R) and the one for white petals (W) controls flower colour in plants. The heterozygote plant (RW) is pink flowered. A cross between two pink flowered plants for F₂g , produced 13 white flowered, 195 pink flowered and 292 red flowered plants.
- (a)(i) With help of hardy- Weinberg principle, work out the expected frequencies for white, pink and red flowered plants in f₂g. (5marks)

- (ii) Describe and give the implication of the relationship between expected phenotypic and observed frequencies in F_2 . (2marks)

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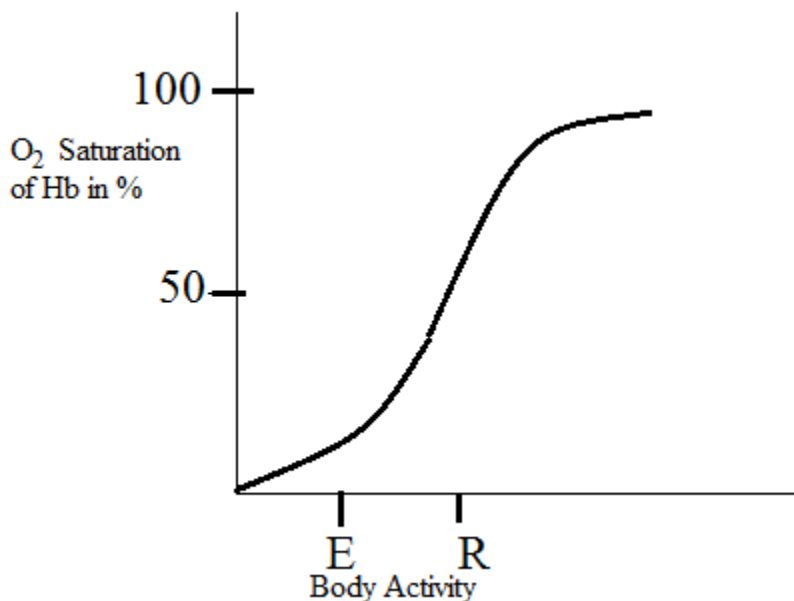
- (iii) Give three factors that could have caused the relation described in a (ii) above. (2 marks)

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44. The graph below shows percentage saturation of human haemoglobin with oxygen at 37°C and same oxygen partial pressure (PO_2 in mmHg) during exercise (E) and at rest (R)



- (a) Explain the difference in percentage oxygen saturation of haemoglobin at rest and during exercise. (4marks)

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- (b) (i) On the same graph sketch a line graph showing the percentage saturation of haemoglobin with oxygen if temperature is raised to 39°C (1 marks)

- (ii) Explain the shape of the graph sketched in (b) (i) above (3 marks)

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- (c) Describe how haemoglobin buffers blood PH during strenuous exercise (2marks)

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- 45(i) What is oestrous. (2marks)

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- (ii) Give three differences between oestrous and menstrual cycles. (3marks)

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- (c)(i) What is the role of secreting pheromones as a mechanism of reproduction in animals? (3 marks)

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- (ii) other than reproduction outline any two other importance of pheromones in animals. (2marks)

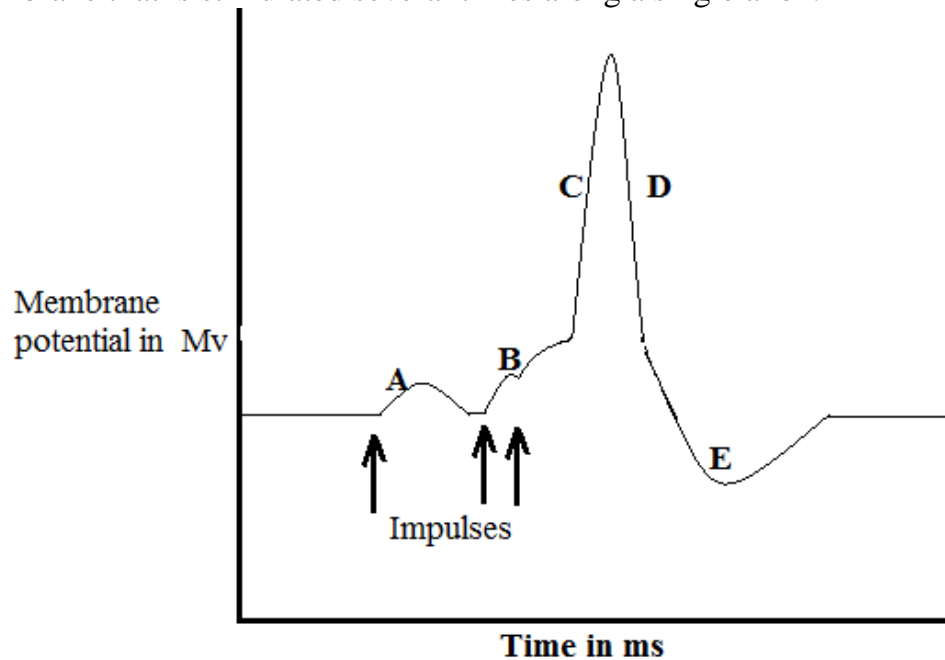
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46. The graph below shows changes in membrane potential of a postsynaptic membrane that is stimulated several times along a single axon.



- (a) (i) Draw a dotted line to mark the threshold value of the postsynaptic membrane. (1 mark)
- (ii) Explain changes in membrane potential at points **A** and **B** (4marks)

At point **A**

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At point **B**

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- (b) State two differences between membrane potential at point **A** and that of point **B**.
(2marks)

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- (c) Explain how;

- i). A synapse is adapted to unidirectional flow of impulse. (2marks)

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- ii) Membrane potential at point **E** limits the frequency of action potential. (1mark)

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END