Candidate's Name: ……

School name: ……

BIO P530/1

BIOLOGY

PAPER 1

SET II 2019

2 ½ hours

ASSOCIATION OF BIOLOGY EDUCATORS (ABE)

Uganda Advanced Certificate of Education

Resourceful External Mock Examinations, 2019

BIOLOGY (THEORY)

PAPER 1

2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES

This paper consists of sections A *and* B*. Answer* ***all*** *questions in both sections.*

SECTION A:

Answers to this section must be written in boxes provided.

SECTION B.

Answers to this section should be written in the spaces provided and not anywhere else.

For Examiner's use only	
Section	Marks
A: 1-40	
B: 41	
42	
43	
44	
45	
46	
Total	

SECTION A (40 marks)

Write the letter corresponding to the right answer in the box provided. Each question in this section carries **one** *mark.*

1. Amino acids are described as amphoteric compounds because of having both
   A. R and hydrogen atoms
   B. amino and carboxyl groups
   C. amino group and hydrogen atoms
   D. carboxyl groups and R groups.

2. In which of these organelles are proteins modified to suit different functions?
   A. Smooth endoplasmic reticulum and Golgi apparatus
   B. Mitochondria and chloroplasts
   C. Rough endoplasmic reticulum and Golgi apparatus
   D. Chloroplasts and rough endoplasmic reticulum

3. Which of these constitute irreversible enzyme inhibitors?
   A. Competitive inhibitors
   B. Noncompetitive inhibitors
   C. Allosteric inhibitors
   D. Heavy metals

4. The hydrogen used in the light independent reaction of photosynthesis to manufacture triose phosphate is obtained from
   A. NAD+
   B. NADPH
   C. NADH
   D. NADP+

5. The side of the DNA molecule that stores the information that is transcribed into mRNA is called the
   A. sense strand
   B. coding strand
   C. loading strand
   D. template strand

6. In the genetic code the highest number of codons coding for the same amino acid is
   A. 3
   B. 6
   C. 4
   D. 2

7. Movement of materials into cells that involves a carrier system but without any energy expenditure is
   A. pinocytosis

B. phagocytosis
C. ion pumps
D. facilitated diffusion

8. In which of the following states would a plant not recover even if water is provided?
   A. Incipient plasmolysis
   B. Full plasmolysis
   C. Flaccidity
   D. Wilting

9. Which of the following figures represents the highest water potential?
   A. -240
   B. -200
   C. 0
   D. 1

10. Which of the following forms of transport requires oxygen?
   A. Exocytosis
   B. Osmosis
   C. Pinocytosis
   D. Phagocytosis

11. Evaporation of water is a major cooling mechanism because of water having the property of
   A. high specific heat capacity
   B. high surface tension
   C. latent heat of vaporization
   D. low viscosity

12. Which of the following ions are essential in the transmission of nerve impulses?
   A. Na+
   B. K+
   C. Cl-
   D. Fe2+

13. The disaccharide formed when two β galactose units condense is
   A. maltose
   B. lactose
   C. sucrose
   D. cellobiose

14. A sugar product of photosynthesis containing a carbon skeleton of the type C-C-C is
   A. glycerol
   B. glyceraldehyde
   C. glycerate
   D. glycogen

15. Which of these substances is **not** a steroid?
   A. Adrenaline
   B. Aldosterone
   C. Cortisol
   D. Oestrogen

16. The following are essential amino acids except
    A. isoleucine
    B. leucine
    C. lysine
    D. glycine

17. In the tertiary structure of a protein strong disulphide bridged that stabilize the structure are formed between adjacent amino acids of the type
    A. Histidine
    B. Glycine
    C. Cysteine
    D. Glutamine.

18. The table **1**shows the size of DNA molecules of several organisms

Group	**Organism**	**Base pairs In 1000s**	**length**
Viruses	Polyoma	5.1	1.7µ
	Lambda phage	48.6	17µ
Bacteria	Mycoplasma	760	260µ
Eukaryotes	Yeast	135000	5.6cm

Table 1

From the data one can conclude that
    A. The number of base pairs is not related to the DNA length
    B. The number of base pairs is proportional to the length of DNA
    C. Longer DNA length contains fewer base pairs.
    D. Different organisms with the same length of DNA have different base pairs.

19. During DNA replication the enzyme that unwinds and splits the 2 stranded molecule is
    A. DNA polymerase
    B. DNA ligase
    C. Helicase
    D. RNA polymerase

20. The type of growth pattern that occurs in monocotyledonous leaves is
    A. limited
    B. unlimited
    C. allometric
    D. intermittent

21. In a cross between two parents of the genotypes AB, ab x ab,ab
    The offspring were as follows
    AaBb 108, **aabb** 97,**Aabb** 33 and **aaBb** 42
    The cross over value between their genes was:
    A. 75% B. 45% C. 85% D. 26.8%

22. Which of these disorders result from a gene mutation occurring on an autosomal dominant gene
    A. Cystic fibrosis
    B. Huntington's disease
    C. Mongolism
    D. Turner's syndrome

23. Which of the following mutagens can inhibit spindle formation during cell division?
    A. Nitrous acid
    B. Colchicines
    C. Gamma rays
    D. Ultraviolet rays

24. The maintenance of the allele for sickle cell anemia in human populations in malaria endemic regions in Africa is an example of
    A. genetic drift
    B. gene flow
    C. founder effect
    D. heterozygous advantage

25. Exposure of dormant seeds to cold temperature to induce germination is the process of
    A. aestivation
    B. stratification
    C. vernalisation
    D. hibernation

26. An example of a high energy ionizing mutagen is
    A. bromo Uracil
    B. nitrous acid
    C. X rays
    D. ultraviolet rays

27. In ruminants bacterial action takes place in the
    A. rumen
    B. reticulum
    C. omasum
    D. abomasum

28. Which of the following controls he amount of enzymes in pancreatic juice?
    A. Cholecystokinin
    B. Secretin
    C. Pancreozymin
    D. Gastrin

29. Feeding on dead and decaying organisms represent a type of nutrition known as
    A. holistic
    B. parasitic
    C. saprophytic
    D. autotrophic

30. Pepsin differs from trypsin in that it digests protein in
    A. alkaline medium in the stomach
    B. acidic medium in the duodenum
    C. acid medium in the stomach
    D. alkaline medium in the duodenum

31. Which of the following would happen if bile duct is blocked?
    A. Faces would become dry
    B. Acid chyme would be neutralized
    C. Little digestion occurs in the intestines
    D. Little digestion of fat occurs

32. Which of the following is **not** a function of the liver?
    A. Production of bile
    B. Production of insulin
    C. Glycogen storage
    D. Detoxification

33. Patients recovering from carbon monoxide poisoning are first given carbon dioxide before oxygen is administered in order to
    A. stimulate breathing
    B. inhibit breathing
    C. stop breathing
    D. vary the breathing rate

34. The equation for the respiration of a substrate is
    $2C_{51}H_{98}O_6 + 145\ O_2\ (g) \longrightarrow 102CO_2(g)+98H_2O(l)$ the respiratory quotient for this reaction is
    A. 0.70 B. 0.80 C. 0.90 D. 1.0

35. The onset of depolarization of an axon occurs when the axoplasm temporarily becomes
    A. more negative
    B. less negative
    C. more positive
    D. less positive

36. Gaseous exchange in earthworms occurs at the body surface because the body is
    A. moist
    B. elongated
    C. segmented
    D. flattened

37. Which one of the following is the role of the capillary network around the alveoli in mammals?
    A. Makes the alveoli more permeable
    B. Increases the surface area of the alveoli

C. Maintains a steep diffusion gradient
D. Makes the alveoli cell thinner

38. Some animals living in arid habitats excrete uric acid because it is
    A. non toxic
    B. highly soluble in water
    C. highly toxic
    D. insoluble in water

39. Which one of the following is true about the state of the axon membrane during the absolute refractory period? It is
    A. depolarized
    B. unexcitable
    C. polarized
    D. excitable with a stimulus stronger than usual

40. Which one of the following is the major form in which carbon dioxide travel to the lungs from tissues?
    A. Carbonic acid
    B. Sodium bicarbonate
    C. Carboxyhaemoglobin
    D. Bicarbonate ions

SECTION B :(60 MARKS)

41. (a) Name the salts and pigments found in bile (02 marks)

(i) Salts

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(ii) Pigments

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(b) Explain why bile salts are **not** regarded to be enzymes (03 marks)

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(c) Describe the role in mammalian digestion of the following (05 marks)

(i) Bile salts

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(ii) Enterokinase

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42. (a) How does the ionic balance within a resting nerve cell differ from that outside a nerve cell? (04 marks)

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(b) Explain

i) The ionic movements in a neuron during the passage of an impulse (01 marks)

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ii) The ionic movements in a neuron during recovery after an impulse (03 marks)

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iii) Saltatory conduction in a myelinated axon (02 marks)

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43. (a) List **three** differences in the methods used by humans and fish to obtain oxygen (03 marks)

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(b) Figure 1 shows the changes in pressure in the buccal cavity and in the opercula cavity during a ventilation cycle

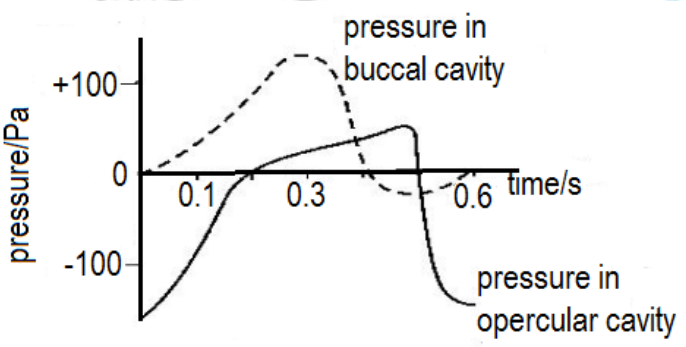

Fig.1

i) Use the graph to calculate the rate of ventilation in cycles per minute (02 marks)

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ii) For most of the ventilation cycle water will be flowing in one direction. Explain the evidence from the graph that supports this (02 marks)

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(c) Explain how efficient uptake of oxygen by gills is achieved in a fish such as Tilapia (03 marks).

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44. Figure **2** shows changes in dry mass, sugar and lipids content in Castor seeds during germination in the dark

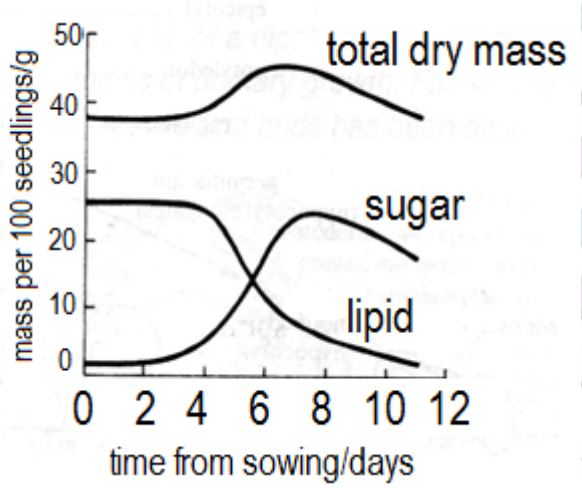

Fig.2

a) Explain the relationship between the sugar and lipid content in the first seven days (03 marks)

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b) The respiratory quotient (**RQ**) of the seedling was measured at day 5 and the embryo was found to have an **RQ** of about 1.0 while the **RQ** of the storage centers was about 0.4 to 0.5**.** Suggest a possible reason for this difference (03 marks)

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c) If the testa of the seed is not removed, its **RQ** is about 4.0, but it's around 1.5 if the testa is removed. Account for these observations (04 marks)

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45. Two pairs of genes are known to determine certain basic coat colours in dogs.
BB or **Bb** results in black coat when allele **E** is also present in the genotype**.**
BB or **Bb** result in red coat when alleles **ee** are present in the genotype.
bb results in brown coat when allele **E** is present in the genotype**.**
bb results in yellow coat when alleles **ee** are present in the genotype.
Alleles **B** and **E** are both necessary for black coat colour in the genotype.
Due to the interactions of these two pairs of genes, the colours to be expected in a litter of puppies will depend not on the colour of the parents' coats but on their genotypes.

a) Show by means of a cross how black parents can produce only black puppies (07 marks)

b) State the genotypes of black parents that would result into yellow puppies among the offspring (03 marks)

Genotypes of

(i) Parents: .....

(ii) Offspring: .....

46. Experimental work on the blood sucking bug *Rhodinus* has shown the following results

Treatment I:

If the head is cut off 2 days after the blood meal, the bug survives for a short time but does not moult.

Treatment II:

If the head is cut off 7 days after the blood meal, moulting takes place

Treatment III:

If the brain from a moulted larva of *Rhodinus* is transplanted on to another larva of the same age, the larva moults but does not develop into a pupa

Taking into account the details given above. What deductions can be made about the control of moulting stating clearly the role of the determining factors involved.

a) (i) Between treatments **I** and **II** (03 marks)

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(ii) After **7** days (03 marks)

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b) Basing on the result in treatment **III** indicate the role of the brain during moulting (03 marks)

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c) Suggest how it may be possible to produce an adult from a larva. (01 mark)

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THE END