Name:……**Signature**:……

School:…….

P530/1
BIOLOGY
(Theory)
July/Aug. 2024
2 ½ hours

MOCK EXAMINATIONS

Uganda Advanced Certificate of Education

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*
*Write answers to section **A** in the boxes provided and answers to section **B** in the spaces provided*
***No** additional sheets of paper should be inserted in this booklet*

For Examiners' Use Only			
Section		**Marks**	**Examiner's Signature & No.**
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. In ruminants, bacterial function takes place in the

A. rumen B. omasum

C. caecum D. abomasum

2. What is the effect of high levels of carbon dioxide in the body tissues? Leads to

A. lowering of hemoglobin's affinity for oxygen.

B. increase in the affinity for oxygen by hemoglobin

C. shifting of the dissociation curve to the left

D. increase in the loading tension of hemoglobin in lungs

3. Which one of the following hormones suppresses immune response to combat stress

A. Adrenaline B. Calcitonin

C. Aldosterone D. Cortisol

4. In Xerophytes, cuticular transpiration is reduced by having

A. succulent leaves B. reversed stomatal rhythm

C. small sized leaves D. waxy stomata

5. What is the cardiac output of an individual who has a stroke volume of $70cm^3$ and a heart rate of 70 beats per minute?

A. $4900cm^3\ min^{-1}$ B. $490cm^3\ min^{-1}$

C. $140cm^3\ min^{-1}$ D. $0cm^3\ min^{-1}$

6. High levels of Oestrogen and Progesterone in blood may cause

A. healing and repair of the uterine wall

B. increase in concentration of luteinizing hormone

C. inhibition of release of gonadotrophic hormones

D. onset of the menopause

7. Sodium hydrogen carbonate and mucus contained in the intestinal juice are synthesized by the

A. cells at the tips of the villi
B. Brunners glands
C. lining of intestinal wall
D. lining of stomach wall

8. Which of the following molecules has a structural similarity with cellulose?

A. Chitin
B. Amylopectin
C. Glycogen
D. Amylose

9. Which of the following forms of behavior conserves energy for reproduction in animals?

A. Territoriality
B. Conditioning
C. Habituation
D. Imprinting

10. In short day plants, flowering may be induced by

A. Ethene
B. Abscisic acid
C. Auxins
D. Gibberellins

11. Figure 1 shows the population growth curve of fruit flies over time

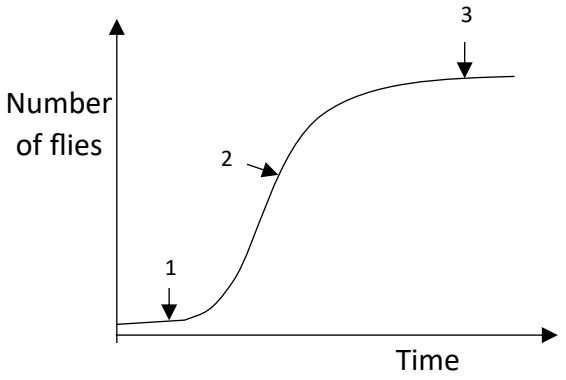

Fig. 1

At what point would a density dependent factor have a greater impact on the population?

A. 1
B. 2
C. 3
D. Both 1 and 3

12. Which one of the following types of white blood cells engulfs the malaria parasite?

A. Neutrophils
B. Basophils
C. Monocytes
D. Lymphocytes

13. Which of the following is not a role of amniotic fluid during foetal development?

A. Movement
B. Heat buffer
C. Protection
D. Nourishment

14. Which one of the following is true about competitive enzyme inhibitors?

A. Bind permanently to the active site
B. Alter the shape of the active site
C. Limit formation of enzyme substrate complexes
D. Lower the activation energy of the reaction

15. Which one of the following cells contains highest proportion of single membrane bound structures?

A. Smooth muscle cell
B. Ciliated epithelial cell
C. Red blood cell
D. Goblet cell

16. In the nephron, acid excretion takes place in the

A. glomerulus
B. collecting duct
C. proximal tubule
D. distal tubule

17. Carbon dioxide and Nitrogen dioxide are greenhouse gasses because they

A. produce acid rain when dissolved in rain water
B. prevent short wave radiation from reaching the earth's surface
C. trap long wave radiation emitted from the earth's surface
D. cause depletion of the ozone layer

18. Which one of the following would always show a normal phenotype for a sex-linked disorder?

A. Homozygote male
B. Homozygote female
C. Heterozygote male
D. Heterozygote female

19. Which one of the following is correct about the extra-cellular matrix of cells? It is made up of

A. Polysaccharides only
B. Phospholipids only
C. Polysaccharides and glycoprotein
D. Phospholipids and glycoprotein

20. The minimum number of base substitutions required to change the nucleotide sequence of the HbA (normal) alleles to the Hbs (sickle cell) allele is

A. 1 B. 2

C. 3 D. 4

21. Which one of the following processes does not increase the availability of nitrogen for plant uptake?

A. Denitrification B. Ammonification

C. Nitrification D. Nitrogen fixation

22. Figure 2 shows the variation in the rate of photosynthesis of an aquatic plant at 35^0C.

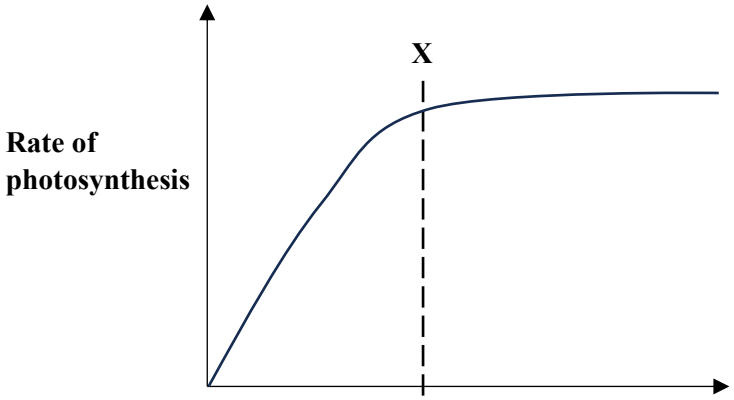

Fig.2

In regio**n** X, the factor limiting the rate of photosynthesis is

A. Chlorophyll concentration B. Carbon dioxide concentration

C. light intensity D. Temperature

23. Which of the following nitrogenous wastes is excreted by lung fishes during aestivation?

A. Urea B. Ammonia

C. Guanine D. Trimethyl amine oxide

24. Which of the following animal tissues is the most highly specialized?

A. Blood B. Bone

C. Epithelial D. Nervous

25. The metabolic process that produces the most ATP molecules is

A. glycolysis B. citric acid cycle

C. fermentation D. electron transport system

26. At inhibitory synapse, the release of transmitter substance increases the permeability of postsynaptic membrane to inward diffusion of

A. both chloride and potassium ion
B. both chloride and sodium ions
C. chloride ions only
D. potassium ions only

27. Which one of the following is not a role of the circulatory system in mammals?

A. Transmission of respiratory gasses
B. Production of red blood cells
C. Buffering PH changes
D. Temperature regulation

28. What is the major fate of net primary productivity in a primary consumer? used in

A. respiration B. locomotion
C. growth D. digestion

29. A high respiratory quotient in germinating seeds maybe caused by

A. presence of inhibitors B. shortage of oxygen
C. presence of large food stores D. high soil temperatures

30. Which one of the following is not a method used by antibodies to combat ntigens?

A. Opsonisation B. Agglutination
C. Neutralization D. Diapedesis

31. Which one of the following is correct about translation? One tRNA molecule

A. Pairs with one mRNA molecule
B. Pairs with more than one codon
C. Codes with only one codon
D. Binds with more than one amino acid

32. Which one of the following effects of etiolation occurs only in dicotyledonous plants?

A. Leaves remain small

B. Leaves may remain rolled-up

C. Internodes become elongated

D. Chloroplasts fail to develop normal membrane systems.

33. Table **1** shows the pulse rate of four individuals A, B, C and D of the same age, sex and mass during rest and when exercising. Which of these individuals would have the lowest risk of developing a cardiovascular disease.

Individual	Resting pulse rate/beats per minute	Pulse rate immediately after exercise/beats per minute
A	64	82
B	70	102
C	78	135
D	68	98

34. Direct exchange of metabolites can take place among cells through plasmodesmata except in the

A. Xylem B. Cortex

C. mesophyll D. Phloem

35. The frequency and amplitude of an action potential in an axon depends on

A. frequency of stimulation of the membrane

B. concentration of sodium ions inside the membrane

C. concentration of potassium ions inside the membrane

D. the relative refractory period.

36. Which of the following is correct about a plant cell that has been immersed in pure water for several hours?

A. Osmotic potential equals water potential of the cell

B. Wall pressure equals osmotic potential plus turgor pressure

C. Wall pressure equals turgor pressure of the cell

D. Wall pressure becomes zero.

37. Which of the following best describes the evolution of new species from the same ancestor in different environments?

A. Divergent evolution B. Adaptive evolution

C. Convergent evolution D. Directional selection

38. Figure **3** illustrates negative feedback in the control of thyroxine production

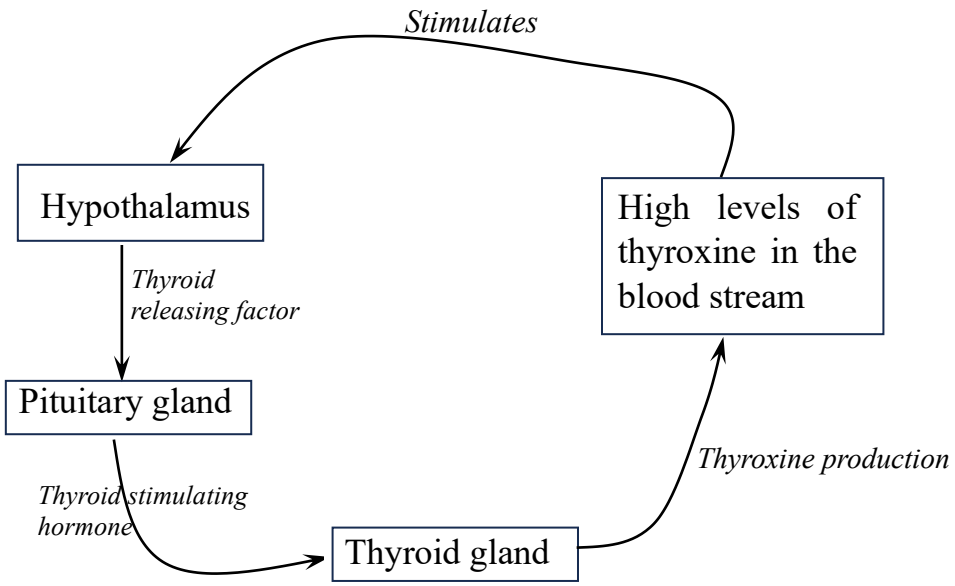

Fig. 3

Which one of the following represents the correct role of each structure?

	Hypothalamus	**Pituitary gland**	**Thyroid gland**
A.	Regulator	detector	effector
B.	Detector	regulator	effector
C.	Detector	effector	regulator
D.	Regulator	effector	detector

39. The forward movement of the fish through water is caused by the

A. Pectoral and pelvic fins B. dorsal and ventral fins

C. median fins only D. caudal fins only

40. Which one of the following is the role of decomposers in the nitrogen cycle?

A. Convert animal proteins to ammonium compounds

B. Fix atmospheric nitrogen into the soil

C. Oxidize ammonium compounds to nitrates

D. Convert nitrates into free nitrogen

SECTION B: (60 MARKS)

Write answers in the spaces provided

41. (a) Name the Source of the

(i). energy required for the synthesis of organic compound in chemosynthentic bacteria. (*01mark*)

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(ii). compound which is a source of hydrogen for Purple-Sulphur bacterial photosynthesis. (*01mark*)

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(b). Give **three** differences between photosynthesis in Purple-Sulphur bacteria and Cyano bacteria. (*03marks*)

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(c) Explain how the chemosynthetic bacteria in the nitrogen cycle are adapted for synthesis of organic compounds. (*04marks*)

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(d) Suggest an ecological importance of chemoheterotrophic bacteria in an ecosystem. (*01mark*)

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42. Figure **4** shows the effect of two stimuli **A** and **B**, on the production of an action potential in a neuron.

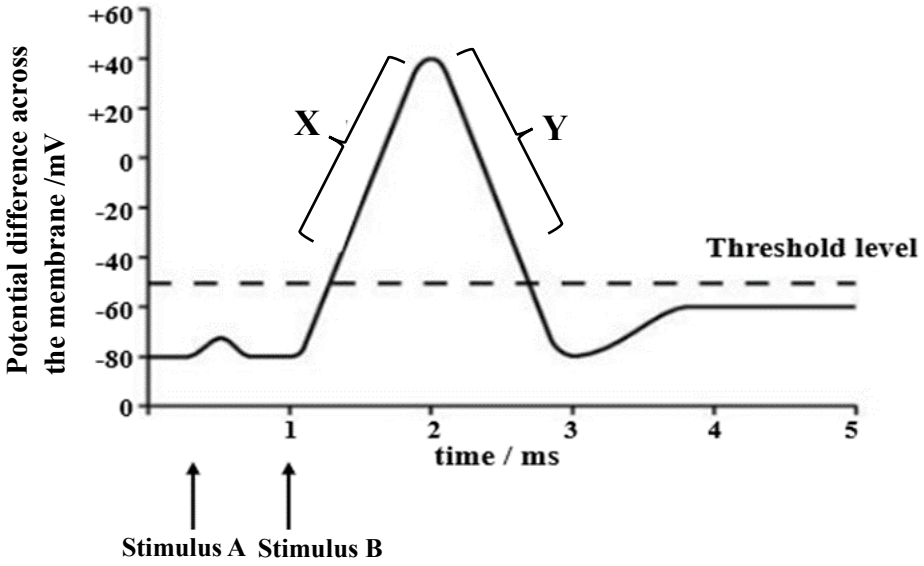

Fig.4

(a) Explain the effect of each stimulus on the generation of an action potential.

(i) stimulus **A**. (*03marks*)

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(ii) stimulus **B**. (*03marks*)

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(b) Explain the significance of the ionic movements that take place at point marked **X**. (*03marks*)

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(c) Why is difficult to stimulate an axon at point marked **Y**. (*01mark*)

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43. (a) State **two** major pathways through which microbes enter the body. (*02marks*)

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(b) Explain the role of nasal secretions in providing natural defense to the body. (*03marks*)

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(c) Explain how the human body is protected from the actions of its own immune system. (*04mark*)

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(d) Suggest one way helper cells improve the efficiency of the immune system. (*01mark*)

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44. (a) State **two** ways a dicotyledonous leaf and the alveolus are similarly adapted for gaseous exchange. (*02marks*)

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(b) How is gaseous exchange achieved in the stem of woody plants? (*02marks*)

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(c) Explain the effect of decreasing environmental temperature on gaseous exchange in the following;

(i) well illuminated foliage. (*03marks*)

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(ii) small mammal. (*03marks*)

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45. (a) What is the role of the functional units of the kidney. (*02marks*)

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(b) Why is the counter current exchange mechanism in the loop of Henle described as a multiplier system? (*03marks*)

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(c) Table **2** shows the relationship between the relative thickness of the medulla and urine concentration in the kidneys of different mammals.

Mammals	Relative thickness	Maximum urine Concentration/arbitrary units
Beaver	1.0	52
Pig	1.3	110
Human	2.6	140
Rat	5.2	300
Kangaroo rat	7.8	550

(i) Explain the relationship between relative medulla thickness and urine concentration. (*03marks*)

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(ii) Giving a reason, suggest the likely natural habitat of the beaver. (*02marks*)

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46. (a) What problems are faced by fish during locomotion in water? (*03marks*)

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(b) How do each of the following features contribute to efficient locomotion in fish?

(i) Pectoral and Pelvic fins. (*03marks*)

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(ii) Streamlined body shape. (*01mark*)

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(c) Outline three differences between locomotion in fish and birds.
(*03marks*)

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END