

SECTION A: (40 MARKS)

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

1. Which of the following does not contribute to the selective permeability of a biological membrane?
 - A. Specificity of the carrier proteins in the membrane
 - B. Selectivity of the channel proteins in the membranes
 - C. Hydrogen bond formation between water and phosphate groups
 - D. Hydrophobic barrier of the phospholipids bilayer.

2. Which one of the following is an adaptation to terrestrial life in plants?
 - A. Production of the pollen grain
 - B. Antheridia and archegonia
 - C. Meiosis at gamete formation
 - D. Alternation of generations

3. The electron transport system cannot work in absence of oxygen because
 - A. There will be no ATP for electron transport
 - B. Reduced NAD and FAD cannot be oxidized
 - C. Hydrogen cannot be split to release electrons
 - D. Oxidized NAD and FAD cannot be reduced

4. Which of these statements is not true about the muscular system?
 - A. It consists of smooth, skeletal and heart muscles
 - B. Muscles work in antagonistic pairs across a joint
 - C. Muscle tension increases with its relaxation
 - D. Muscles are attached to bones by tendons

5. One advantage of the multi cellular state is that the individual cells
 - A. Lose independence
 - B. Are always small in size
 - C. Becomes less functional
 - D. Becomes less specialized

6. Which of these does not contribute to the process of filtration in the kidney?

- A. High hydrostatic blood pressure in glomerular capillaries
- B. Large surface area for filtration
- C. Permeability of glomerular capillaries
- D. Active transport by epithelial cells lining renal tubules

7. In a mammalian endotherm body temperature is maintained constant

- A. At the skin surface
- B. Inside the internal organs
- C. At the extremities
- D. Between the hairs

8. Which one of the following mechanisms is not likely to disperse seeds at a greater distance from the parental plant

- A. Explosive
- B. Wind
- C. Animals
- D. Water

9. Table 1 shows changes in the heart rate and in volume of blood pumped per beat, of an adult man while resting and during vigorous exercise

Adult man	Heart beat/beats per minute	Volume of blood pumped per beat / cm ³
Resting	50	50
Exercising	200	75

By how many times was the volume of blood passing through the heart /min increased during exercise?

- A. 1.5 times
- B. 3 times
- C. 6 times
- D. 4 times

10. In the alternation of generation life cycle, the

- A. Sporophyte generation is always dominant
- B. Gametophyte generation produces the spores
- C. Spores develop into sporophyte generation
- D. Gametophyte generation is haploid
11. Which of the following occurs first when a stimulus reaches the threshold level?
- A. Gates of certain voltage activate ion channels open
- B. Potassium ion channels close
- C. Membrane is hyper polarized
- D. Neurotransmitter is released
12. In the earth worm, blood is propelled forward by contraction of the
- A. Aortic loops only
- B. Dorsal blood vessels
- C. Both aortic loops and dorsal blood vessels
- D. Aortic loops and ventral blood vessels
13. Which of the following is typical of omnivore gut?
- A. Stomach very large and divided, very long ileum, medium sized caecum, medium length of colon
- B. Colon poorly developed or absent, large stomach, short ileum and colon
- C. Appendix and caecum poorly developed, medium length of ileum, long colon and small stomach
- D. Small stomach, very large caecum, short ileum, very long coon that is pouched
14. The genetic code being degenerate is probably a protective device that
- A. increáses its variability
- B. Reduces the potential harmful effects of mutations
- C. Increases the number of codons
- D. Reduces the number of codons

15. The most efficient group of organisms in body water conservation is;

- A. Amphibians
- B. Birds
- C. Reptiles
- D. Mammals

16. Which one of the following activities would not help to prevent aggression among animals living in a group?

- A. performing appeasement display
- B. assuming a submissive posture
- C. respecting the peck order hierarchy
- D. keeping with in territory boundaries in territorial species

16.

17. Chemicals signals that convey information between members of a species are

- A. Impulses
- B. Stimuli
- C. Pheromones
- D. Neurotransmitters

18. Excessive alcohol consumption causes dehydration and thirst because

- A. Anti diuretic hormone release is inhibited so urine out put decreases
- B. Anti diuretic hormone release is promoted so urine output increases
- C. Aldosterone increases, so sodium absorption increases raising blood osmotic pressure
- D. Anti diuretic hormone release is inhibited so urine output increases.

19. Which of the following is not a function of larval forms during animal development?

- A. Distrfbution of the species
- B. Feeding and growth
- C. Asexual reproduction
- D. Sexual reproduction

20. During periods of stable environmental conditions, it is expected that the rate of evolutionary change

- A. Slows down
- B. Remains constant
- C. Increases rapidly
- D. Increases slowly

21. Which of these is not phytochrome controlled physiological response in plants?

- A. Germination
- B. Root branching
- C. Onset of senescence
- C. Flowering

22. Which of these is a function of calcium ions during muscle contraction?

- A. Bind to actin molecules in a way that prevents myosin heads from forming a cross bridge
- B. Supply energy for the flexing of the myosin head in the power stroke
- C. Untwist the helix shape so as to expose the myosin binding sites
- D. Bind to the blocking molecules causing them to move and expose the myosin binding site

23. Which of these organelles 'tags' proteins so that they can go to their correct destination during development?

- A. Ribosome
- B. Endoplasmic reticulum
- C. Golgi body
- D. Nuclēus

24. Sometimes during agonistic conflict situations the weaker animals backs down by displaying an appeasement ^{behaviour.} ~~dis~~

Which of these is not a typical appeasement display in dogs?

- A. Lying on its back
- B. Barking loudly at another male
- C. Baring its throat to a victorious male
- D. Bend the tail between the hind legs



25. Which of the following phyla consists of organisms that are entirely marine?

- A. Echinodermata
- B. Mollusca
- C. Protozoa
- D. Arthropoda

26. Which of these does not explain how hormones influence behaviour? They

- A. Affect the growth of nervous connections in the brain
- B. Directly affect nerve cells and synapses within the C.N.S
- C. Induced RNA changes that cause learning to be faster
- D. Alter the sensitivity of peripheral receptor

27. Which one of the following forces tends to slow down a gliding bird?

- A. Lift force
- B. Drag force
- C. Sinking force
- D. Driving force

28. The changes that take place in the circulatory system of a mammalian foetus at birth are

- A. Foramen ovale closes, ductus arteriosus closes
- B. Foramen ovale opens, ductus arteriosus closes
- C. Foramen ovale closes, ductus arteriosus opens
- D. Foramen ovale opens, ductus arteriosus opens

29. In rabbits the allele for spotted coat **S** is dominant to that for solid coat **s** while that for black coat colour **B** is dominant to that for brown coat colour **b**. A brown spotted rabbit is mated with a solid black one and all the off springs are black spotted. An explanation of these results is that alleles for spotted and black coat.

- A. Are linked
- B. Are not linked
- C. Are codominant
- D. Show interaction.

30. Which of the following best describes homologous structures?
- A. Structures in two or more species that originated as the same structure in a common ancestor
 - B. structures that look the same in different species
 - C. structures that can not serve different functions in different species
 - D. structures that serve different functions in different species.
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31. Which of the following statements is not true about the absorption of light by chlorophyll molecules in intact chloroplasts?
- A. All the visible wave lengths of light can provide energy for photosynthesis
 - B. Absorption of light by a chlorophyll molecule take place at a characteristic wave length called the absorption spectrum
 - C. During photophosphorylation electrons are pumped by an electron transport chain from the stroma into the thylakoid space
 - D. Absorption of light transfers electrons in specific chlorophyll molecules from a ground state to an activated energy state
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32. Water enters capillaries on the venule side as a result of
- A. Active transport from tissue fluid
 - B. An osmotic pressure gradient
 - C. Increased blood pressure on that side
 - D. Higher red blood cell concentration on that side
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33. In order for mimicry to be effective in protecting a species from predation, it must
- A. Occur in a palatable species that looks like a distasteful species
 - B. Have cryptic coloration
 - C. Occur such that mimics look and act like models
 - D. Occur only in poisonous or dangerous species
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34. Given that energy content of nutrients determined by calorimetry is 16 KJg^{-1} for carbohydrates, 37 KJg^{-1} for fat and 17 KJg^{-1} for protein. Calculate the energy content of 30 Kg of potato crisps which contain 6% protein, 36% fat and 50% carbohydrate.



- A. 70.0KJ
- B. 1702KJ
- C. 6702KJ
- D. 760.2

35. Which of the following is not true about the nature and action of animal and plant hormones?

- A. Animal hormones are produced in specialized cells, plant hormones in unspecialized cells
- B. Animal hormones are transported to and affect specific target tissues, plant hormones are sometimes formed at the site of action
- C. Effects of animal hormones are specific, those of plants lack specificity
- D. Animal hormones are organic in nature while plant hormones are inorganic

36. An almost universal cost of group living in animals is

- A. Increased risk of predation
- B. Interference with foraging
- C. Higher exposure to diseases and parasites
- D. Poor access to mates

37. A distinguishing feature of fast twitch skeletal muscle fibres from slow twitch fibres is

- A. Few mitochondria
- B. Low glycogen content
- C. Aerobic respiration
- D. Many mitochondria

38. Which one of the following is not a chain terminating codons during protein synthesis?

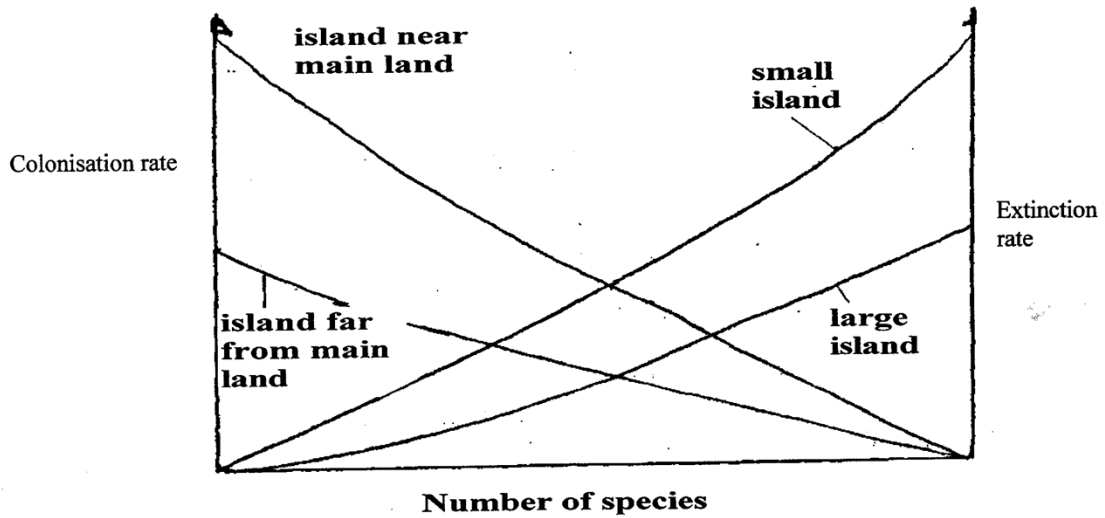
- A. UAA
- B. UAG
- C. UAC
- D. AGA

39. Babies born prematurely are often deficient in surfactant causing **respiratory distress syndrome** a condition where breathing is very difficult. This is because
- A. It lowers the surface tension of allowing the alveoli; to flex as the pressure of the thorax rises and falls
 - B. The reducing surface tension in the lungs; it prevents the tendency to recoil inwards
 - C. The surface tension of the lungs of the alveoli is raised there by preventing the inflation of the lungs and alveoli collapse during expiration
 - D. By raising the surface tension of the lining of the alveoli, it prevents the expansion of the lungs
40. Which of these best explains why a new community is able to replace a resident community during succession?
- A. Species in the resident community die of old age
 - B. Species extinction is inevitable
 - C. Influence of the resident community changes the habitat
 - D. Species in the resident community die of diseases that eventually disappear.

SECTION B

Answers to this section must be written in the spaces provided

41. Figure 3 shows the relationship between the colonization and extinction rates on
- Near and far island
 - Large and small island



(a) What is the relationship between?

(i) Colonization of a near and far island

(01 mark)

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ii) Extinction on a small and large island

(01 marks)

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b) State the effect on equilibrium shown by interaction between colonization and extinction *(04 marks)*

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c) Explain the relation that exists between colonization and extinction on

i) Near and far island

(02 marks)

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ii) Small and large island

(02 marks)

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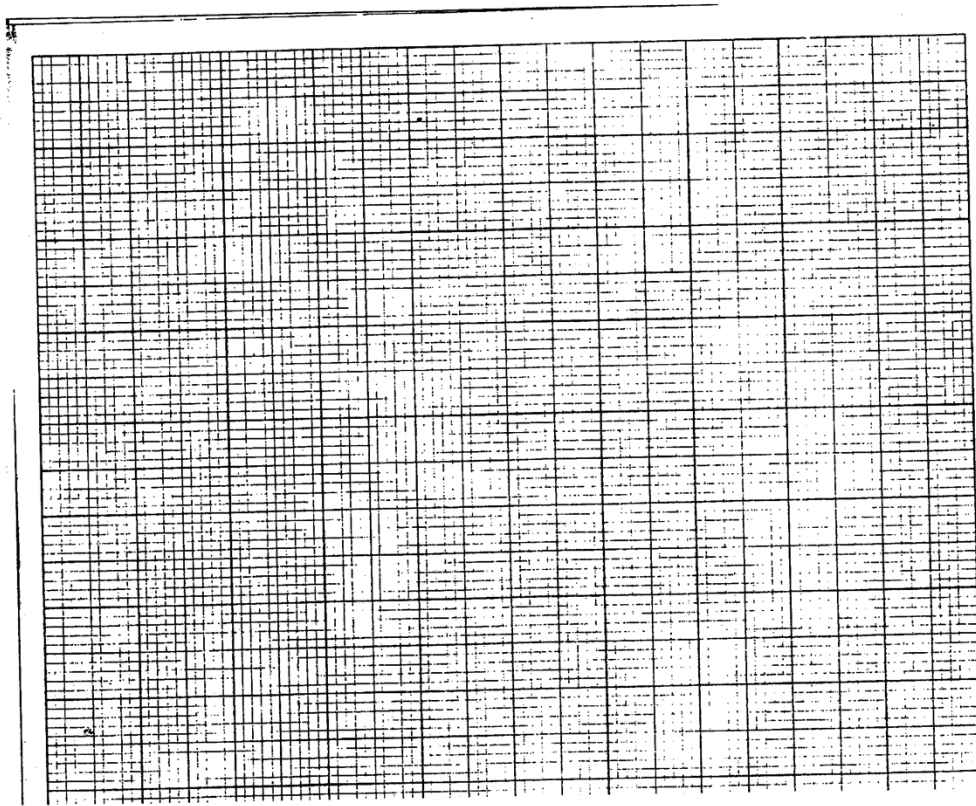
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43. Tortoises when exposed to high temperature salivate over their head. Figure 8 shows the results of an investigation where a tortoise previously kept at 20°C was exposed to a temperature of 55°C for 2 hours.

Time (h)	Body mass (g)	Body temperature (°C)
0	59	20
1/2	58	32
1	51	40
1 1/2	49	41
2	48	41

a) Plot the results on the graph paper provided.

(02 marks)



b) Compare the changes in the body mass with time

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(02 marks)

- c) Explain the changes in
- i) Body temperature with time

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(02 marks)

- ii) Body mass

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(02 marks)

- d) What general conclusions can you draw from this experiment about the way ectotherms control their body temperature?

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(02 marks)

- 44 a) Ecologically lichens are referred to as **indicator species**.

- i) Define the term lichens

(01 mark)

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- ii) What is meant by an indicator species?

(02 marks)

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- b) Explain lichens as an indicator species

(03 marks)

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- c) Lichens form a pioneer community of the primary ecological succession. Explain its suitability for this.

(04 marks)

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45a) How is the structure of the placenta indicative of the different mechanisms of transportation of materials across it from the maternal blood circulation to the foetus? (03 marks)

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b) Explain positive feedback mechanism of birth control in man (03 marks)

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c) Outline any **three** major post-natal circulatory changes in the human embryo. (03 marks)

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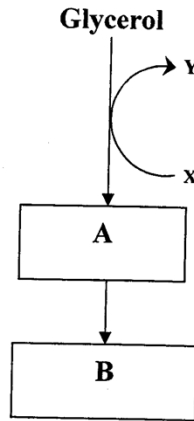
d) Site any **two** significances of post- natal changes in human embryo (01 mark)

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46a) What is meant by oxidative **decarboxylation** (02 marks)

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b) The following indicates the respiratory metabolism of glycerol in living cells. Study it and answer questions that follow below;



i) Name the following substances (02 marks)

X.....

Y.....

A.....

B.....

ii) What is the significance of conversion of glycerol to substance A? (01 mark)

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c) Explain the conversion of A to B (02 marks)

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d) Outline any two significances of the Krebs's cycle (01 mark)

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e) Draw the structure of an ATP molecule (02 marks)