

**S.6 BIOLOGY PAPER 1**

**TIME:2<sup>1</sup>/<sub>2</sub>HOURS**

NAME..... STREAM.....

**Instructions:**

- Answer all questions in section A and B
- Put the alternative showing the most correct answer in the box on the right of each question

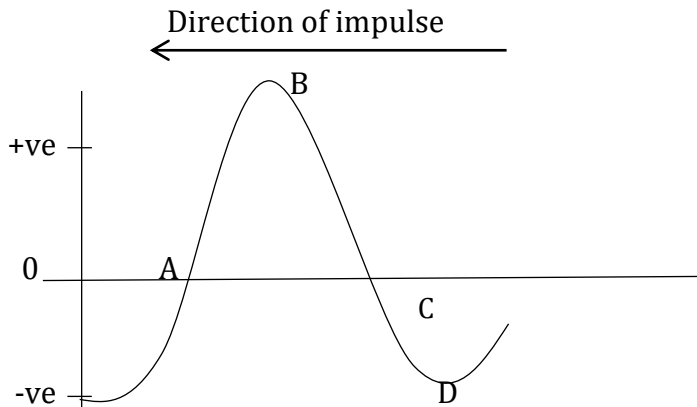
**SECTION A (40 MARKS)**

1. Which of the following statements concerning human red blood corpuscles is false?  
A. Contain the red pigment hemoglobin  
B. Are destroyed by the liver  
C. Lack a nucleus when mature  
D. Are spherical in shape
2. A trio –ventricular and semi lunar valves  
A. Ensure supply of blood to the heart muscle cells  
B. Keep blood moving in one direction in the heart  
C. Separate the left from the right ventricles and atria  
D. Ensure supply of blood to skeletal muscle
3. The more variation in a population, the greater its potential to  
A. Give rise to gene flow  
B. Adapt to new changes in its environment  
C. Produce more males  
D. Be wiped away by an epidemic
4. In phototropism  
A. Auxin is inactivated on the lightened side  
B. More auxin is synthesized on the darkened side  
C. Light initiates a redistribution of auxin in the zone of elongation  
D. Light initiates a redistribution of auxin in the apical meristem
5. Which of the following is an adaptation to aquatic environment?  
A. Long roots  
B. Lack of stomata  
C. Large cortex with closely packed cells  
D. Well-developed xylem
6. In photosynthesizing plant cells, the light dependent and the light-independent reactions take place in the .....respectively.

- A. Nucleoplasm and cytoplasm
  - B. Cytoplasm and stroma
  - C. Plasma membrane and grana
  - D. Grana and stomata
7. Most mutations in organisms are;
- A. Recessive and advantageous
  - B. Recessive and of no advantage
  - C. Dominant and advantageous
  - D. Dominant and of no advantage
8. Control of breathing rate in mammals
- A. Largely according to the level of carbon dioxide in the blood
  - B. Under entirely voluntary control
  - C. According to the blood pressure in the arteries
  - D. Largely according to the level of the oxygen in the blood
9. Which series of steps best describes the path of a reflex arc?
- A. Sensory neurone, stimulus, synapse, motor neurone
  - B. Stimulus, receptor, sensory neuron, synapse, motor neuron, effector
  - C. Stimulus, receptor, sensory neurone, motor neurone, synapse, effector,
  - D. Stimulus, receptor, sensory neurone, synapse, effector, motor neurone
10. Plant cells which are thin-walled, can photosynthesis, store food and secrete substances belong to
- A. Parenchyma
  - B. Collenchyma
  - C. Cambium
  - D. Xylem
11. The change of colours in a chameleon is an example of
- A. Cryptic coloration
  - B. Mimetic coloration
  - C. Flash coloration
  - D. Warning coloration
12. Which of the following play no defense roles in mammals?
- A. Lymph nodes
  - B. T cells(lymphocytes)
  - C. Platelets
  - D. Erythrocytes
13. The primary connection between the nervous system and the endocrine system is
- A. The hypothalamus
  - B. The brain
  - C. Adrenal gland

- D. Thyroid gland
- 14. The pigment responsible for detecting the present or absence of light in plants
  - A. Photoflorin
  - B. Chlorophyll
  - C. Florigen
  - D. Photochrome
- 15. Stomatal closure is normally caused by.
  - A. Rising turgor of the
  - B. Increasing pH of the guard cell sap
  - C. Conversion of starch to sugar in the guard cells
  - D. Loss of guard cell turgor
- 16. Water flowing over the gills of a bony fish
  - A. Flows in the same direction as blood in the gills
  - B. Flows more slowly than the blood
  - C. Flows in the opposite direction to that of the blood
  - D. Loses only 0.5% of its dissolved oxygen to the blood
- 17. Hormones and enzymes are similar in that both
  - A. Are always secreted directly into the digestive system
  - B. Affect the rate of physiological processes
  - C. Are secreted only by endocrine glands
  - D. Convert carbohydrate to amino acids
- 18. Of the following activities which is the second event to occur in the depolarization of a nerve cell?
  - A.  $\text{Na}^+$  channels open and  $\text{Na}^+$  rushes inside
  - B.  $\text{K}^+$  channels open and  $\text{K}^+$  rushes outside
  - C. Negatively charged ions rush outside
  - D.  $\text{K}^+$  channels open and  $\text{K}^+$  rushes inside
- 19. During flight in big-sized insects, upstroke is brought about by
  - A. Contraction of direct flight muscles
  - B. Relaxation of indirect flight muscles
  - C. Contraction of indirect flight muscles
  - D. Sudden up thrust of the body
- 20. Which one of the following pairs of events occur together to increase the oxygen concentration in the alveoli of the lungs?
  - A. Contraction of diaphragm muscles and internal intercostal muscles
  - B. Relaxation of diaphragm muscles and internal intercostal muscles
  - C. Contraction of diaphragm muscles and external intercostal muscles
  - D. Relaxation of the diaphragm muscles and external intercostal muscles

21. The figure below shows changes in potentials in an axon membrane when an impulse is transmitted.




At which stage of the electrical potential marked, is the axon most permeable to sodium ions?

22. The type of learning that involves the immediate understanding and responding is

- A. Imprinting
- B. Associative learning
- C. Insight learning
- D. Habituation

23. Starch, glycogen and cellulose are all composed of

- A. Alpha- glucose
- B. Beta- glucose
- C. Monosaccharides
- D. Polysaccharides

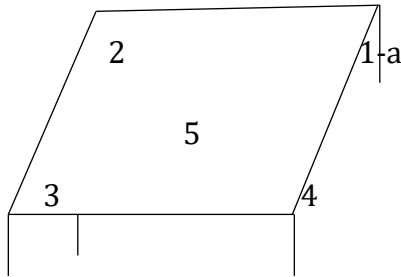
24. Which one of the following applies to the cones of the retina? They

- A. Show visual acuity
- B. Perceive dim light
- C. Show much retinal convergence
- D. Contain rhodopsin pigment

25. Which one of the following parasites is intercellular?

- A. Taenia
- B. Plasmodium

- C. Ascari
  - D. Trypanosome
26. Which one of the following is the correct formula of a polysaccharide?
- A.  $(C_6H_{10}O_5)_n$
  - B.  $(CH_2O)_n$
  - C.  $(C_6H_{12}O_6)_n$
  - D.  $(C_{12}H_{22}O_{11})_n$
27. Myoglobin is more abundant in active muscles because it
- A. Easily give up its oxygen to the muscles
  - B. Gives the colour of the muscles
  - C. Slowly releases oxygen to the muscles
  - D. Has a low affinity for oxygen
28. Which one of the following hereditary characteristics is known to be limited?
- A. Hemophilia
  - B. Albinism
  - C. Baldness
  - D. Colour-blindness
29. In order to survive in the sea, a marine bony fish
- A. Loses water by osmosis and absorbs salts
  - B. Swallows water and absorbs salts
  - C. Swallows water and extracts salts
  - D. Gains water by osmosis and extrudes salts
30. Which one of the following characteristics of a parasite would increase its chances of survival?
- A. Being highly specific
  - B. Inflicting severe effects on the host
  - C. Parasiting more than one type of host
  - D. Employing no vectors
31. Pancreatic juice contains the enzymes;
- A. Lipase, amylase, pepsin
  - B. Lipase, amylase, trypsinogen
  - C. Amylase, pepsin, trypsinogen
  - D. Amylase, pepsin, trypsinogen
32. The end product of glycolysis is
- A. Glucose diphosphate
  - B. Lactic acid
  - C. Citric acid
  - D. Pyruvic acid
33. The figure below represents a tetrapod in motion



If the animal limb a during its movement, in which position would it shift its Centre of gravity in order to remain most stable?

- A. 2
- B. 3
- C. 4
- D. 5

34. The camel family is found only in North Africa, Asia and South America. This is an example of

- A. Adaptive radiation
- B. Convergent radiation
- C. Discontinuous distribution
- D. Divergent distribution

35. Which one of the following structures is responsible for initiating the contractions of the heart?

- A. Purkinje tissue
- B. A trio- ventricular node
- C. Sino atrial node
- D. Heart muscle

36. In which one of the following does anaerobic respiration not occur?

- A. Skeletal muscle
- B. Yeast cell
- C. Bacteria
- D. Smooth muscle

37. Which one of the following is the mRNA strands that corresponds to the DNA strand TAGGCT?

- A. AUCCGU
- B. UUCCGU
- C. CGAAUC
- D. UAGGCU

38. Which one of the following is the correct route taken by blood on leaving the heart, in a single circulatory system?

- A. Body → heart → gills
- B. gills → heart → body
- C. body → gills → heart
- D. gills → body → heart

39. Termites are able to eat wood because they

- A. Contain fungi in the gut
- B. Contain cellulose digesting bacteria in the gut
- C. Possess strong mandibles
- D. Produce cellulose

40. The wave length from the light spectrum is mostly by absorbed by green plants?

- A. Red
- B. Green
- C. Blue
- D. Yellow

### SECTION B

41.(a) Distinguish between anaerobiosis in plants and animals. (02 marks)

.....  
.....  
.....  
.....

b) Describe the fate of lactic acid in respiratory metabolism (02 marks)

.....  
.....  
.....  
.....

c) Explain the advantage of lactic acid accumulation in muscles during exercise. (02 marks)

.....  
.....  
.....  
.....

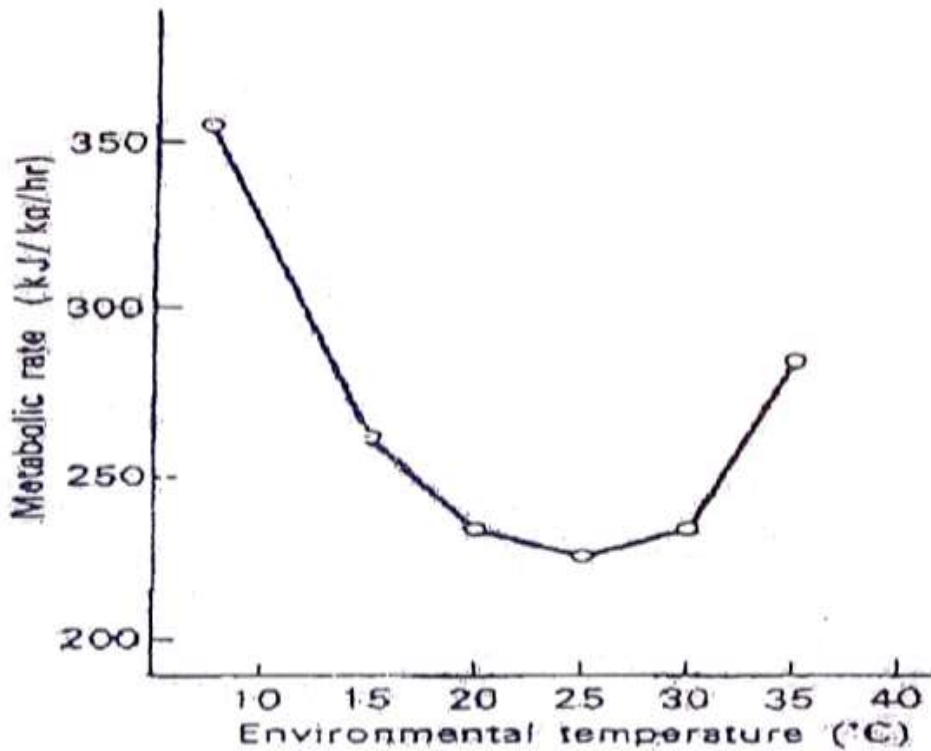
d) (i) Explain why very few plants can be complete anaerobes. (03 marks)

.....  
.....  
.....  
.....

ii) State one situation when plants carry out anaerobiosis. (01 mark)

.....  
.....  
.....  
.....

42. Figure 2 shows the metabolic rate of a resting dog at different environmental temperatures.



a) Describe the effect of increasing environmental temperature on metabolic rate. (04 marks)

.....  
.....  
.....



.....  
.....

b) Explain the change in metabolic rate between  
i) 20° c and 30°c (02 marks)

.....  
.....  
.....

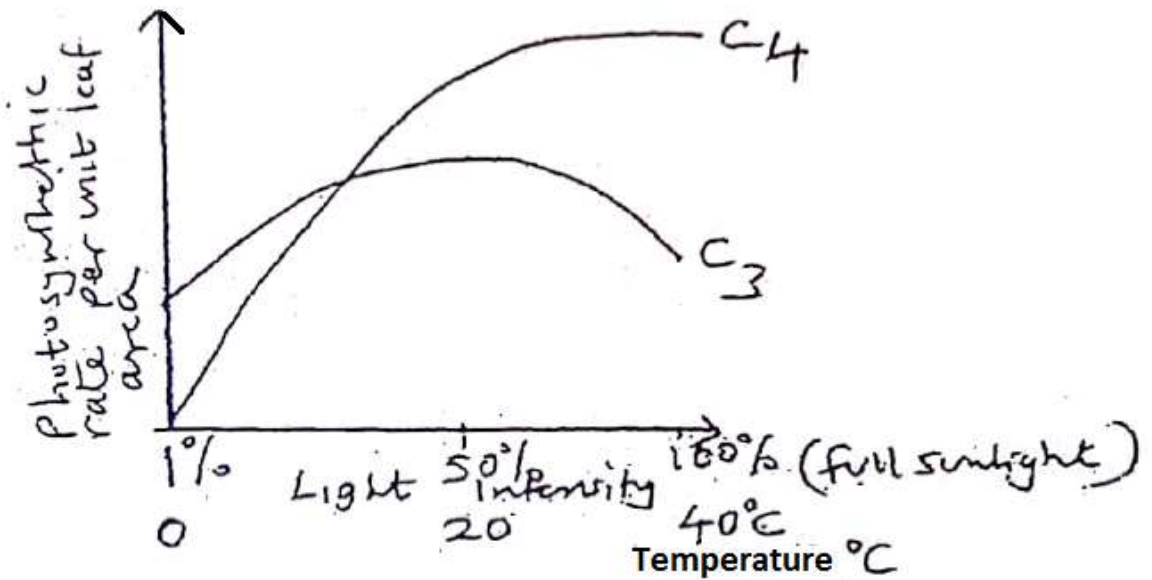
ii) Above 30°c (02 marks)

.....  
.....  
.....  
.....

c) Explain how the Carmel a desert mammal is specialized to meet the problems of  
overheating and water stress in its habitat. (02 marks)

.....  
.....  
.....

43. Figure3 shows the comparative photosynthetic response of  $C_3$  and  $C_4$  plants to increasing light intensity and temperature.



a) Compare the combined effect of light intensity and temperature on the photosynthetic rate. (03 marks)

.....

.....

.....

.....

.....

.....

b) State the advantage of;  
 i) C<sub>4</sub> photosynthesis over C<sub>3</sub> photosynthesis (03 marks)

.....

.....

.....

.....

.....

ii) C<sub>3</sub> photosynthesis over C<sub>4</sub> photosynthesis (02 marks)

.....

.....

.....

.....

.....

c) State the likely location of

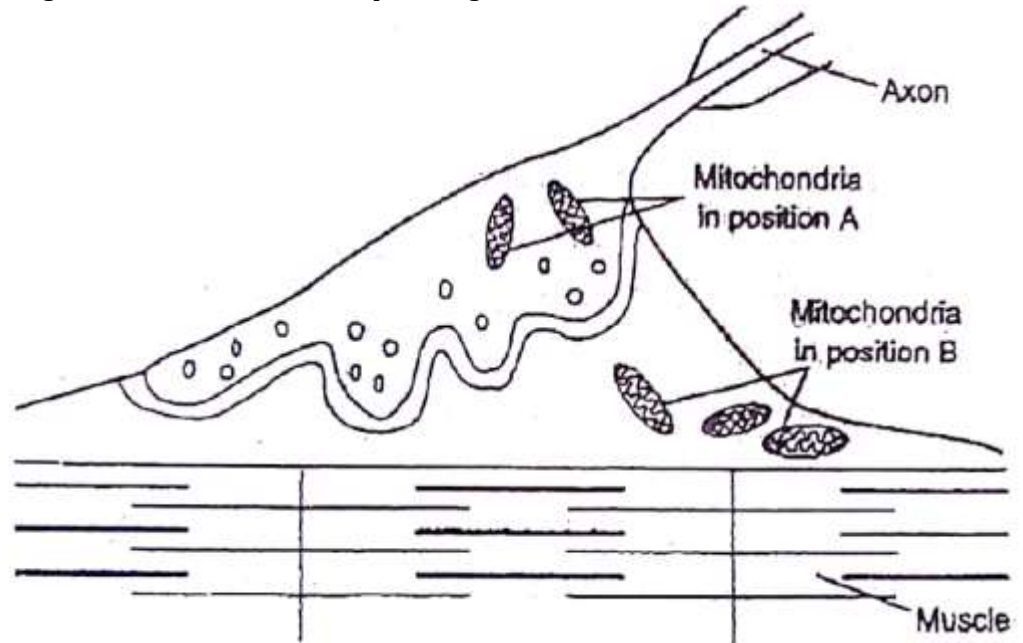
i)  $C_3$  plants (01 mark)

.....  
.....

ii)  $C_4$  plants (01 mark)

.....  
.....

44. Figure 4 shows a motor end plate together with associated muscle.



a) Describe how transmission of information occurs across the nerve muscle junction when an impulse arrives at the pre synaptic membrane (05marks)

.....  
.....  
.....  
.....  
.....

b) (i) What causes the banding pattern seen in the muscle fibril? (02marks)

.....  
.....  
.....  
.....  
.....

(ii) Explain the likely change in the banding pattern when the muscle fibril?  
(03marks)

.....  
.....  
.....  
.....  
.....

45. (a) Explain what is meant by green house effect. (03marks)

.....  
.....  
.....  
.....  
.....

(b) State the harmful consequences of the following

i) Ozone layer depletion (03 marks)

.....  
.....  
.....  
.....  
.....  
.....

ii) Discharge of smoke in air from industries (03marks)

.....  
.....  
.....  
.....  
.....  
.....

(c) Suggest **one** way how ozone layer depletion has been minimized  
(01mark)

.....  
.....

.....  
 .....  
 .....  
 .....

46. (a) What is meant by polymorphism? (01mark)

.....  
 .....  
 .....  
 .....

b) *Biston betularia* the peppered moth is light coloured and mottled. In 1848 a dark (melanic) mutant form was captured in Manchester by 1895 98% of these months in Manchester were melanic forms. The dark two forms are morphs, the normal form being *Biston betularia typica* and the dark form *Biston betularia carbonifera*

**Table 1 shows the observed frequency of the two morphs of *Biston betularia***

Habitat	typica	Carbonifera
Rural woodland	94.6%	9.4%
Industrial woodland	10.1%	89.9%

**Table 2 shows the observed frequency of predation of *Biston betularia* by woodland birds**

Habitat	Typical	Carbonifera
Rural woodland	13.6%	86.3%
Industrial woodland	74.2%	89.9%

i) Comment on the distribution of the two forms of moth as shown in table 1 (03 marks)

.....  
 .....  
 .....  
 .....  
 .....

ii) How does the data in table 2 support the natural selection? (04marks)

.....  
.....  
.....  
.....  
.....

iii) Given that the data shown in table 2 was collected in the 1950s, would you predict similar figures if the investigation was to be repeated this year. (02marks)

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

**END**

*I wish you the best!*