UNEB UACE BIOLOGY 2005

PAPER ONE

Write the letter corresponding to the best answer in the box provided.

1. Which one of the following is not a reason for classifying a mouse and a frog in one phylum? Presence of
a. Pharungeal grill slits
b. Post-anal trail
c. Notochord
d. Endoskeleton

2. In photosynthesis, the major advantage of the C4 pathway is to
a. Fix carbondioxide in the calvin cycle
b. Concentrate carbondioxide in the cells of leaves
c. Fix carbondioxide from the atmosphere into the leaves
d. Store carbondioxide in form of organic acids

3. An atheletics competition organized on high lands required participants from lowlands to report three months before the competition in order to enable them
a. Get familiar with the place
b. Develop strong muscles
c. Acquire high red blood cell count
d. Have extensive deposition of fat under their skins

4. The main distinguishing character of a eukaryotic cell is
a. Membraned orbanelles
b. Lack of nuclear membrane
c. Presence of nucleus
d. Presence of DNA double strands

5. Starch, glycogen and cellulose are all composed of
a. A-glucose
b. B-glucose
c. Monosaccharides
d. Polysaccharides

6. Which of the following organelles would most likely be abundant in the tail of a tadpole at a time of its reabsorption during metamorsphosis?
a. Centrioles
b. Lysosomes
c. Golgi apparatus
d. Endoplasmic reticulum

7. If the rate of transpiration legs behind that of absorption, movement of water up the plant is mainly by
a. Root pressure
b. Capillarity
c. Mass flow
d. Transpiration pull

8. An impulse crosses a synapse by means of
a. Sodium ions
b. Potassium ions
c. Calcium ions
d. Neurotransmitter chemical

9. Which of the following increases the rate of phosphorylation of hexose sugar during the normal respiration process?
a. An increase in ADP concentration
b. An increase in ATP concentration
c. An increase in concentration of hexose sugar
d. A decrease in concentration of phosphorylated sugar

10. Which of the following factors would contribute least to the development of new species?
a. Gene mutation

b. Chromosomal mutation
c. Geographical isolation
d. Environmental stability

11. Which one of the following explains why digestion of fats does not occur in the human stomach?
a. Absence of fat-digesting enzymes
b. Low pH for the fat-digesting enzymes
c. High pH for the fat-digesting enzymes
d. Absence of bile salts that emulsify the fats

12. Which one of the following would contribute to the green house effect
a. Use of nuclear power
b. Use of fossil fuels
c. Excessive use of fertilizers
d. Accumulation of sewage in water bodies

13. The increase in supply of blood to heavily respiring tissues, is caused by high
a. Ventilation rate
b. Concentration of oxygen in the inhaled air
c. Carbon dioxide concentration in the blood
d. Carbon dioxide concentration in the tissues

14. Impulse transmission in mammals is usually faster than it is in amphibians because
a. Axons in amphibians lack myelin sheath
b. Mammals have axons with large diameter
c. Mammals usually have higher body temperature
d. The distance between the nodes of ranvier in mammals is horter

15. Which one of the following would occur at the onset of an action potential in a neurone?
a. Potassium ions enter
b. Sodium ions leave
c. Potassium ions leave
d. Sodium ions enter

16. Which 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

17. The flagellum and skeletal muscle are structurally similar in that they both have
a. Microtubules
b. Actin and myosin tubules
c. A pattern of 9+2 microtubes
d. Light and dark bands

18. During the light stage of photosynthesis, water is an important raw material in that it
a. Gives off oxygen
b. Provides hydrogen that reduces NAD
c. Reduces carbon dioxide to carbohydrates
d. Provides electrons

19. Which one of the following activities in living organisms can result in a respiratory quotient of less than 1.0?
a. When carbohydrates are respired
b. During extensive laying down of fat in livestock
c. At compensation point, during photosynthesis
d. When the rate of exhalation equals that of inhalation

20. Which of the following is a difference between flowers of dicotyledonous plants and those of monocotyledonous plants? Flowers of dicotyledonous plant usually
a. Lack sepals
b. Posses superior ovaries
c. Bear floral parts in groups of 4s and 5s
d. Posses fused petals

21. Deciduous plants in temperate zones shade off their leaves during winter

a. Because of water shortage
b. To cut down the process of guttation
c. Because of too much water availability
d. To avoid freezing temperatures

22. Which of the following is true about non-competitive inhibition in enzyme catalysed reactions?
a. The degree of inhibition decreases with increase in substrate concentration
b. The inhibitor has a similar structure and chemical composition with the substrate
c. The degree of inhibition is independent of the substrate concentration
d. The shape of the enzyme is not affected by the inhibitor

23. Which of the following is not true of conifers?
a. Lack vessels in xylem
b. Bear reproductive structures on leaves
c. Bear sporangia on cones
d. Posses unprotected ovules

24. The lack of a nucleus in the red blood cell enables it to
a. Have a high affinity for oxygen
b. Be more permeable to oxygen
c. Give up oxygen more readily
d. Contain more haemoglobin

25. Which one of the following types of behavior is least learnt?
a. Association
b. Instinct
c. Imprinting
d. Insight

26. The primary meristematic tissue in plants which gives rise to the cortex ismthe
a. Ground meristem
b. Procambium
c. Protoderm
d. Protoxylem

27. Which one of the following organisms does not possess simple eyes?
a. Spider
b. Millipede
c. Butterfly
d. Centipede

28. Contraction of longitudinal muscles in insects during flight, results into
a. Flapping of wings
b. Moving down of wings
c. Holding wings horizontally
d. Moving up of wings

29. During fertilization in plants, the
a. Vegetative nucleus fuses with the pollen nucleus
b. Generative nucleus fuses with the egg nucleus
c. Vegetative nucleus fuses with the egg nucleus
d. Generative nucleus fuses with the antipodal cell nucleus

30. A desert mammal's lower lethal temperature is higher than that of a mammal living in cold regions because a desert mammal has
a. Small extremeties
b. Poor insultation mechanisms
c. Thick fur
d. A small surface area: volume ratio

31. In the energy transfer in an eco system, the greatest loss in energy is between
a. Primary producers and primary consumers
b. Primary consumers and secondary consumers
c. Secondary consumers and tertiary consumers
d. Tertiary consumers and decomposers

32. A rhesus positive foetus whose mother is rhesus negative may not be born alive because the
a. Mother's body produces antigens against foetal antibodies
b. Foetus lacks anti bodies against the mothers antigens
c. Mother's body produces antibodies against the foetal antigens
d. Mother's red blood cells mix with the foetal blood

33. From a bush, 120 beetles were collected, marked and released back into the bush. A few days later, 120 beetles were collected from the same place, and 30 of them carried the mark. The estimated number of beetles in the bush is
a. 240
b. 360
c. 480
d. 560

34. Insects have different mouth parts modified to suit their different modes of feeding. This shows
a. Speciation
b. Convergent evolution
c. Divergent evolution
d. Development of analogous structures.

35. Which one of the following is true of linked characteristics? They
a. Are always transmitted as a single block
b. Are allelic to each other
c. Occur on non-homologous chrosomes
d. Can be transmitted independently

36. Which one of the following may act as a respiratory surface in animals?
a. Spiracle
b. Bronchus
c. Skin
d. Trachea

37. Which one of the following pairs of responses in plants is caused by unequal distribution of auxins?
a. Photoperiodism and phototropism
b. Geotropism and phototropism
c. Nastic movement and geotropism
d. Photoperiodism and abscission

38. The amount of progesterone in the blood increases steadily from ovulation to menstruation, then it begins to decline because
a. Luteinizing hormone inhibits its production
b. It is washed out with blood during menstruation
c. Implantation of a zygot occurs
d. Its work of repairing the uterine wall gets complete

39. Figure 1 shows the relationship between temperature and rate of photosynthesis in two plant species A and B

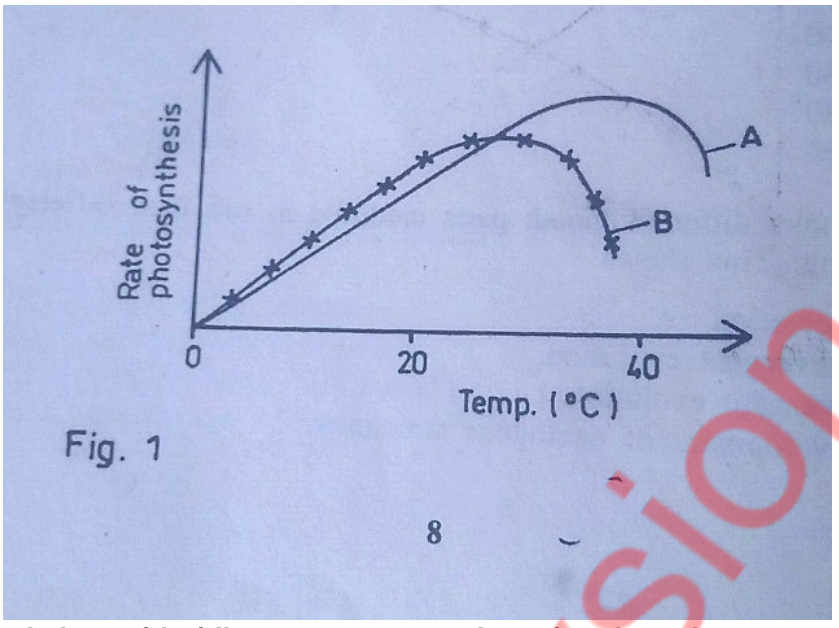

Fig. 1

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Which one of the following is a correct conclusion from the results?
a. B is a shade plant while A is a sun plant
b. A has a lower compensation point than B
c. A has a higher optimum temperature for photosynthesis than B
d. Photorespiration does not occur in A but occurs in B

40. The absorption of amino acids after eating a heavy protenous meal is aided by
a. Diffusion and active transport
b. Osmosi and diffusion
c. Diffusion and pinocytosis
d. Active transport only.

Section B

41. Figure 2 shows the effect of red light and far-red light interruption of night period, on flowering of a plant.

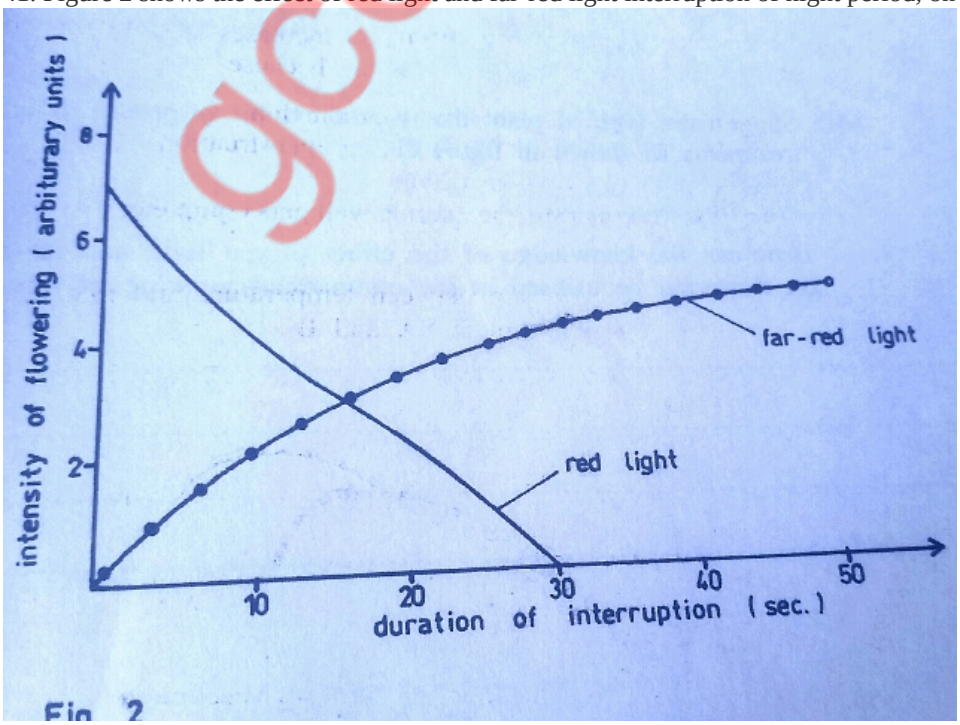


Fig. 2

a. What is the effect of interruption of the night period by each type of light?

(i) Red light

(ii) Far –red light

b. Suggest the type of plant that would exhibit responses to light treatments as shown in figure 2

c. How can the knowledge of the effect of red light and far-red light on flowering be utilized in the commercial growing of flowers?

42. Figure 3 56+shows diagram of two types of blood circulatory systems A and B, in animals. The arrows show the direction of the blood flow.

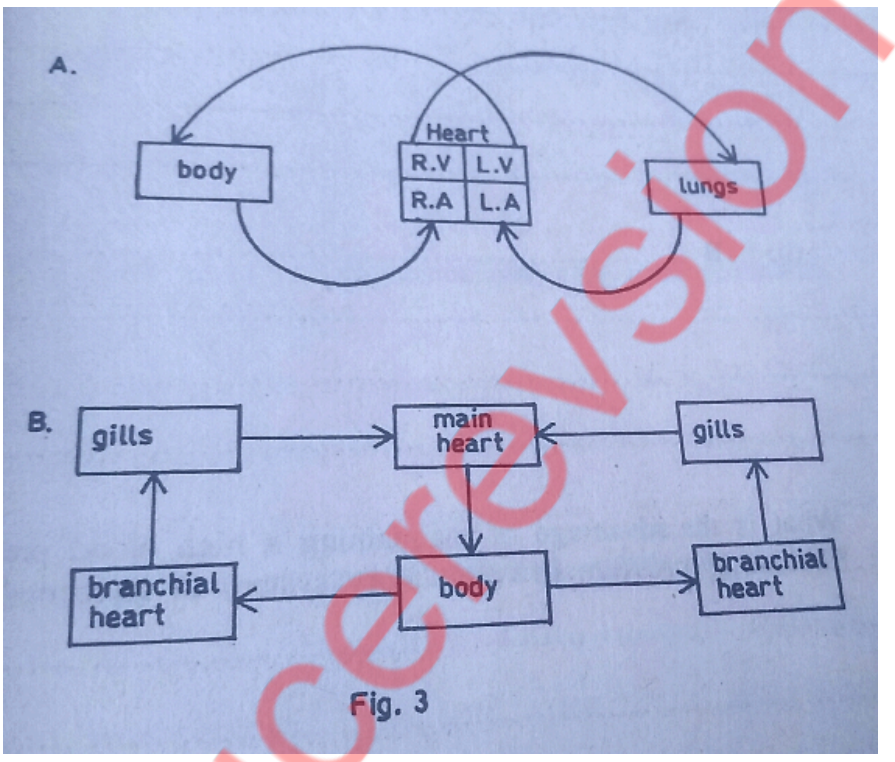


Fig. 3

a. Describe each circulatory system

(i) A

(ii) B

b. How does each system maintain a high blood pressure?

(i) A

(ii) B

c. What is the advantage of maintaining a high blood pressure over a fluctuating pressure in a circulatory system of an animal?

43. Give one ecological importance of each of the following structural arrangements in plants.
(i) Monoecious

(ii) Dioecious

a. Explain why
(i) In dioecious, male plants are usually associated with dry soils while female plants are associated with moist soil.

(ii) Nearly all dioecious plants are wind pollinated.

b. Give one reason why dioecious plants are rarer than monoecious plants

44. State the importance of the following elements in plant metabolism
(i) Calcium
(ii) Magnesium

a. How does water logging of soil affect it's nitrate content?

b. Describe three special ways of obtaining essential elements by some plants growing in soil deficient of those elements.

(i)

(ii)

(iii)

45. State two human activities that increase the levels of carbon dioxide in the atmosphere

a. What is the effect of high levels of each of the following gases in the atmosphere?
(i) Carbon dioxide
(ii) Sulphur dioxide

b. State one indicator in the environment where there is prevalence of high levels of sulphur dioxide in the atmosphere.

46. In drosophila, the genes for broad abdomen and long wing are dominant over the genes for narrow abdomen and vestigial wing. Pure breeding strains of the double dominant variety were crossed with a double recessive variety and a test cross was carried out on the F1 generation.

a. Using suitable symbols, work out the expected phenotypic ratio of the test cross of the F1 generation, if the genes for abdomen width and length of wing are linked.

b. It was however observed that when the test cross of the FI generation was carried out, the following results were obtained.
Broad abdomen, long wing 380
Narrow abdomen, vestigial wing 396
Broad abdomen, vestigial wing 14
Narrow abdomen, long wing 10

Calculate the distance in units, between the genes for abdomen width and length of wing.

PAPER TWO

1. Table 1 shows the number of individuals with a given length of fur in population of a terrestrial mammalian species for two different generations. The prevailing climatic temperature during the two generations changed from 15oC to 10oC.

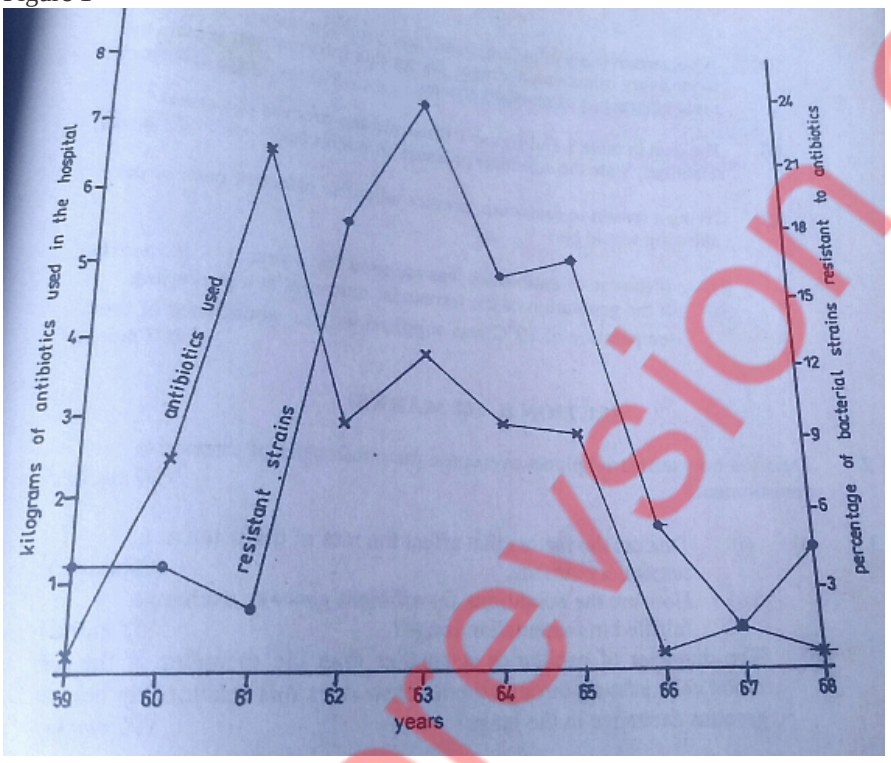
Table 1

Length of fur (cm)	Number of Individuals	
	At 15^0C	At 10^oC
	0	0
	25	0
	60	0
	120	20
	155	60
	120	130
	60	155
	25	130
	0	60
	0	60

	0	20
	0	0

Figure 1 shows the variation of resistant strains of bacteria in relation to the amount of antibiotics given during a period of several years in one hospital.

Figure 1



a. Draw a graph of the relationship between fur length and number of individuals to the two temperatures.

b. What is the optimum length of fur at each temperature?

c. What is the effect of temperature on fur temperature among the individuals?
(i) Suggest an explanation for the effect of temperature on fur length.

d. From figure 1, describe the trend of resistant strains with amount of antibiotics used.
(i) Suggest an explanation for the observed trend of resistant strains with the amount of antibiotics used.

e. A bacterium is a haploid organism that produces asexually by fission, twice every minute on average. Using this information, explain the rapid emergence of resistant strains.

f. The data in table 1 and figure 1 illustrate the process of natural seletion. state the selection pressure in each case.

g. Giving a reason in each case, predict what the effect of each of the following would be.

(i) If the use of antibiotics was stopped for a year

(ii) If the generation of the terrestrial mammal at a prevailing temperature of 10oC was supplied with an abundance of food.

Section b

2. Describe how terrestrial plants overcome the challenges of terrestrial environment.

3. Discuss the factors that affect the rate of diffusion at a respiratory surface.

(i) How are the conditions for efficient gaseous exchange fulfilled in mammalian lungs?

(ii) The diameter of capillaries is smaller than the diameter of the red blood cells passing through them. How does this relationship help in gaseous exchange in the lungs?

4. Both haemophilia and colour blindness are transmitted in the same way.

a. What are the effects of each disease?

b. Describe the transmission of the disease

c. Explain why there are more colourblind individuals than haemophiliacs among the human population inspite of the similar way of transmission.

5. Describe the working of an enzyme using the lock and key hypothesis.

a. Explain the
(i) Effect of excessive heat on enzyme action

(ii) Non-competitive inhibition in an enzyme controlled reaction.

6. What is the effect of inbreeding in a population?

a. Describe the mechanisms which limit breeding in plants

b. How does meiosis contribute to variation?