

SECTION A: (40 MARKS)

1. Which **one** of the following processes below is exergonic?

- A. Protein synthesis
- B. Respiration
- C. Muscle contraction
- D. Active transport

2. A period of light shorter than a critical length will;

- A. Inhibit flowering in long day plants
- B. Induce flowering in long day plants
- C. Inhibit flowering in short day plants
- D. Have effect on flowering in short day and long day plants.

3. The genetic condition of the structure resulting when the second male nucleus fuses with the two secondary nuclei in higher plants is;

- A. Polyploidy
- B. Diploid
- C. Haploid
- D. Triploid

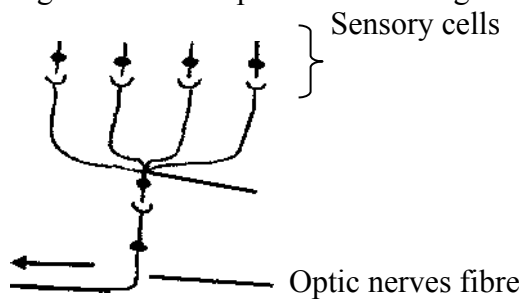
4. Which one of the following forms of reproduction can promote survival of a species in a changing environment?

- A. Multiple fission
- B. Budding
- C. Conjugation
- D. Fragmentation

5. Which one of the following characteristics of ecological succession is not true about a climax community?

- A. Numerous microhabitats
- B. Broad niche specialization
- C. Low net community production
- D. Food chains are mainly detritus feeding

6. Figure 1 below represents an arrangement of a sensory cell in the mammalian eye.



What is the effect of the arrangement towards the eye response? It;

- A. Increases precision
- B. Decreases visual acuity
- C. Increases resolving power
- D. Decreases sensitivity

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7. Which type of natural selection does the artificial selection resemble?

- A. Disruptive selection
- B. Kin selection
- C. Progressive selection
- D. Stabilizing selection

8. In periods of cold weather, control of body temperature is achieved through;

- A. Vasodilation of superficial blood vessels
- B. Decrease in metabolic rate
- C. Increasing on panting in certain mammals
- D. Constriction of erector pilli muscle

9. Which one of the following epithelium tissue lines body cavities and tubes that are subject to stretching?

- A. Cuboidal epithelium
- B. Squamous epithelium
- C. Transitional epithelium
- D. Glandular epithelium

10. Bryophytes are more vulnerable to air pollution than pteridophytes because bryophytes

- A. Are mainly distributed in industrial areas
- B. Lack special cells for storing pollutants
- C. Can't tolerate higher concentration of pollutants
- D. Lack a waxy covered leaf cuticle

11. Which **one** of the following is the principle function of gibberellins?

- A. Allow bending of plant shoots
- B. Causes elongation of the main plant stem
- C. Enhances leaf abscission
- D. Promotes cell division in presence of auxins

12. A prolonged deficiency of Vitamin A in the diet may result into;

- A. Muscle weakness

- B. Gastrointestinal disturbance
- C. Increased risk of infections
- D. Nervous irritability

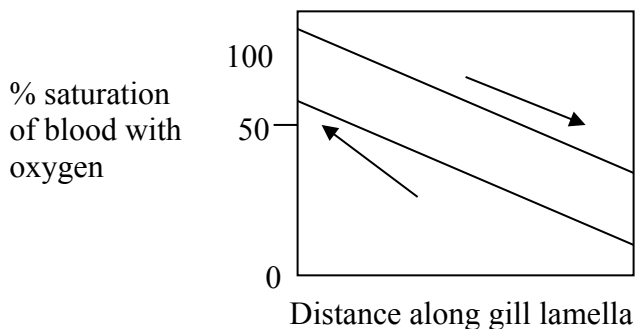
13. Which **one** of the following is a compound plant tissue?

- A. Epidermis
- B. Parenchyma
- C. Phloem
- D. Collenchyma

14. The actual diameter in a certain unicellular plant species is 40um but when viewed under the high power of microscope is 20mm. the total magnification of the specimen is equivalent to;

- A. 800 times
- B. 500 times
- C. 40 times
- D. 0.5 times

15. Figure 2, illustrates a mechanism of gaseous exchange in fish



The best conclusion from the figure is that

- A. Oxygen concentration gradient is generally maintained
- B. Equilibrium between water and blood is attained at the same point
- C. Blood is less saturated with oxygen
- D. The fish has inefficient system of gaseous exchange

16. Which one of the following may encourage cross pollination in dioecious plants

- A. Close spacing of the plants
- B. Transfer of pollen grains by insects
- C. Female and male flowers maturing at different times
- D. Female and male flowers being borne on different plants

17. During alcoholic fermentation in plants, pyruvate is first converted to ethanal through

- A. Substrate level phosphorylation
- B. Oxidative decarboxylation
- C. Decarboxylation reaction
- D. Oxidative phosphorylation

18. Which one of the following functions of membranes is only carried out by intracellular membranes?
- A. Facilitate transmission of nerve impulses
 - B. Allows cells to recognize others.
 - C. Control of material entry and exit
 - D. Provide separate compartments, isolating different chemical reaction
19. A physiological adaptation of terrestrial plants to minimize water loss is;
- A. Leaf orientation in plants
 - B. Change of stomatal rhythm
 - C. Periodic shading of leaves
 - D. Folding of plant leaves.
20. Which **one** of the following is the correct order of propagation of vibrations through the middle ear?
- A. Ear drum, malleus, incus, stapes, round window
 - B. Ear drum, malleus, incus, stapes, oval window
 - C. Ear drum, incus, malleus, stapes, oval window
 - D. Ear drum, incus, stapes, malleus, round window
21. In relation to animal behaviour, the position of an animal within a pecking order depends on the following **except**.
- A. Size of the animal
 - B. Genetic vigour of the animal
 - C. Aggressiveness of the animal
 - D. Fitness of the animal
22. Which one of the following blood vessels is functionally similar to most arteries?
- A. Pulmonary artery
 - B. Dorsal aorta
 - C. Pulmonary vein
 - D. Anterior vena cava
23. Individuals with blood group **AB** are called universal recipients because
- A. Their red cells can't easily clump together
 - B. Lack antigens on their red blood cells
 - C. Have antibodies **a** and **b** in their serum
 - D. Allele **A** and **B** of blood group AB are codominant.
24. Which one of the following may not increase the chances of survival of young mammals?
- A. Greater parental care
 - B. Large foetal size
 - C. Smaller litter size

D. Longer gestation period.

25. Interphase is often regarded as the resting phase in mitotic cell division because

- A. Of the considerable metabolic activity
- B. DNA content of the cell doubles
- C. The chromosomes are not visible
- D. Duplication of all organelles occurs.

26. Which one of the following parts of a flower protects it during the bud stage?

- A. Stigma
- B. Sepals
- C. Ovary
- D. Petals

27. During the upward movement of water in the xylem vessels, the water molecules do not easily pull apart because of high.

- A. Cohesive forces
- B. Viscosity
- C. Surface tension
- D. Adhesive forces

28. Which one of the following structures is not diploid?

- A. Sertoli cells
- B. Germ cells
- C. Spermatids
- D. Oogonia

29. The deposition of starch in pollen grains in maize is controlled by the presence of one allele of a certain gene. The other allele of that gene results in no starch being deposited.

Which one of the following explains why half of pollen grains produced by a given maize plant contain starch?

- A. Mutation occurs in the pollen grains
- B. Crossing over occurs between the two alleles
- C. The two alleles segregate in meiosis
- D. The two alleles are located on the same homologous chromosome

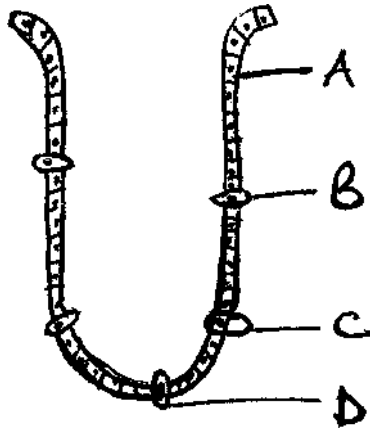
30. Which one of the following is true about cellulose and starch? Both

- A. Have beta glucose molecules
- B. Are straight chained molecules
- C. Are composed of monosaccharide units
- D. Form cross- links between neighbouring chains

31. Which one of the following hormones will decrease in level in the blood stream at the onset of ovulation.
- A. Oestrogen
 - B. Follicle- stimulating hormone
 - C. Progesterone
 - D. Human placental hormone
32. Compared with a mammal, a lizard requires greater muscular effort to keep its body raised above the ground because;
- A. It seldom uses its limbs
 - B. Its body load rests equally on all limbs
 - C. Its limbs splay away from the trunk
 - D. It descended from snakes
33. Which one of the following statements about movement of material is true?
- A. Active transport involves movement of molecules along a concentration gradient
 - B. Endocytosis and exocytosis occurs only in eukaryotic cells
 - C. Water potential of a solution increases with increased solute potential
 - D. Facilitated diffusion moves substances like glucose that are soluble in the non polar part of the cell membrane.
34. In teleost fishes, water is drawn into and pumped out of the pharynx mainly by;
- A. Counter flow of water between the gills
 - B. Branchial valves which prevent back flow of water
 - C. Movements of the operculum
 - D. Contraction of the opercular cavities
35. Which of the following classes does a millipede belong to?
- A. Insecta
 - B. Diplopoda
 - C. Arachnida
 - D. Chilopoda
36. Which hormone helps a plant to respond to water stress during drought?
- A. Auxin
 - B. Gibberelin
 - C. Cytokinin
 - D. Abscissic acid

37. Figure 1 represents a section through a gastric gland, in the wall of mammalian stomach.

The letter indicating the Oxyntic cell is



38. Which of the following is true about plants growing in open habitats?

- A. Have higher compensation points
- B. Their leaf epidermis lacks a cuticle
- C. Usually have low mineral demand
- D. They mainly employ the C_4 path way

39. The promotion of flowering by exposing shoot apices to low temperature treatments is called

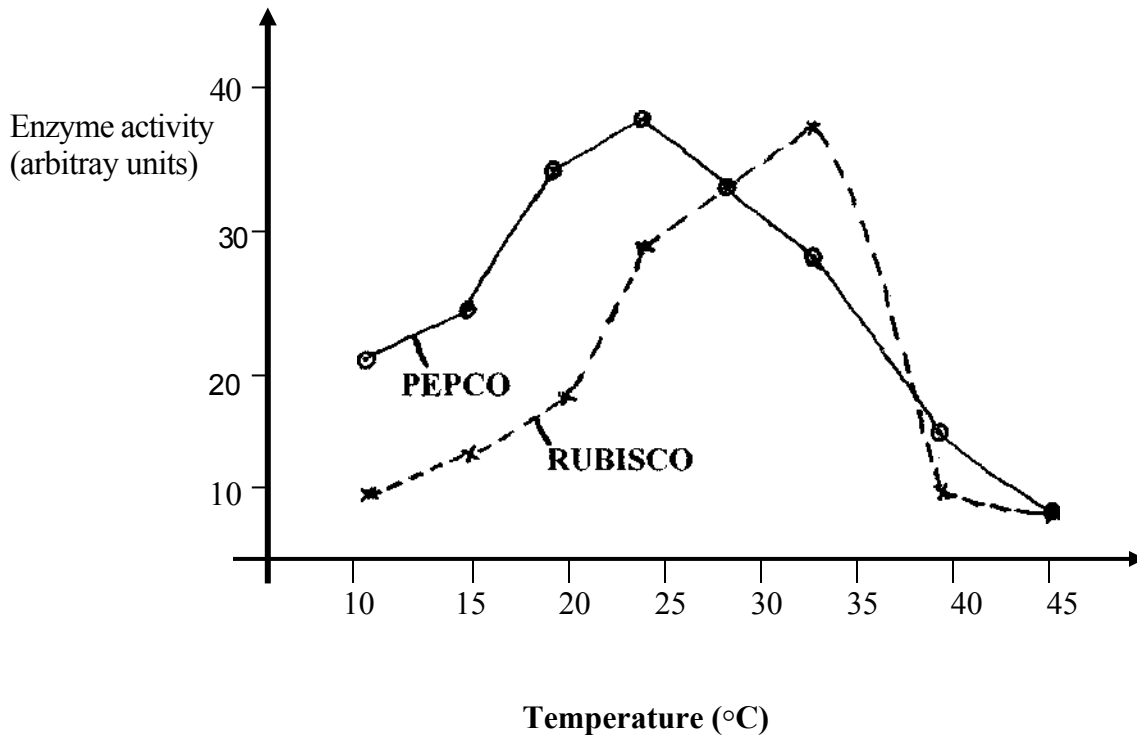
- A. Bolting
- B. Abscission
- C. Vernalisation
- D. Etiolation

40. Which one of the following factors has little effect on blood flow in arteries?

- A. Blood pressure
- B. Skeletal muscle contraction
- C. Heart beat
- D. Total cross sectional area of arteries

SECTION B

41. Figure shows the effect of temperature on the activity of two photosynthetic enzymes ribulose biphosphate carboxylase oxygenase (**RUBISCO**) and phosphoenol pyruvic acid carboxylase (**PEPCO**)



a) Using the above figure, state the differences between the activity of the two enzymes (04 marks)

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b) State the physiological advantages PEP carboxylase has over RUBISCO (03 marks)

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c) C₄ plants have a greater photosynthetic efficiency than C₃ plants. Suggest why all plants do not have C₄ metabolism. (03 marks)

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42. The movement of blood through the vascular systems of mammals is due to pressure gradients

a) Describe how the pressure gradients are maintained in such systems (04 marks)

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b) Explain a physiological advantage to a mammal of having a closed double circulatory system (03 marks)

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c) How is the heart muscle suited to its functions

(03 marks)

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43. Ecologically when a broad spectrum pesticide is used in pest control, pesticide resurgence may arise. The table below shows the changes in number of pests after a period of pesticide application from 1982 up to 1985

Time / Year	Number of pests survived
1982	800
1983	600
1984	500
1985	900

(02 marks)

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a) What is meant by **pesticide resurgence**?

b) Explain the effect of using a broad spectrum pesticide in managing population of pests

(03 marks)

c) State two ways pesticides can affect organisms in the environment (02 marks)

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d) Under what circumstance can pest resurgence arise in biological pest control? (03 marks)

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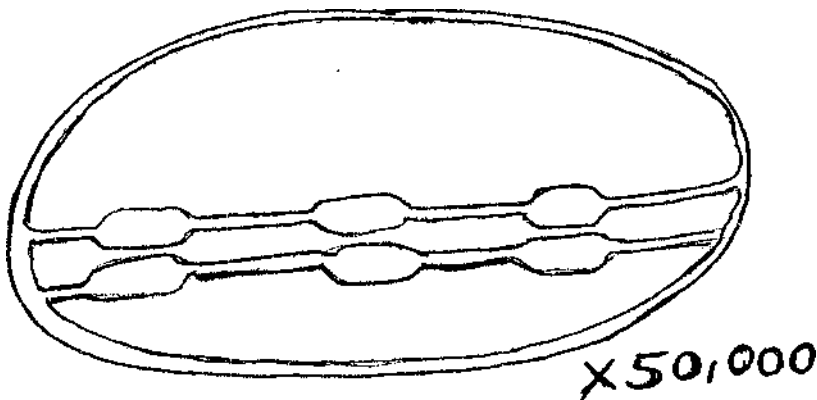
44.a) i) What are **carotenoids**? (01 mark)

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ii) Give two functions of carotenoids (02 marks)

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b) The diagram below shows a cell organelle as seen using an electron microscope



i) Name the regions labeled **X** and **Y** and the major processes which occur there.

(02 marks)

Region	Process
X
Y

ii) Calculate the actual length of the organelle in micrometers. Show your working

(04 marks)

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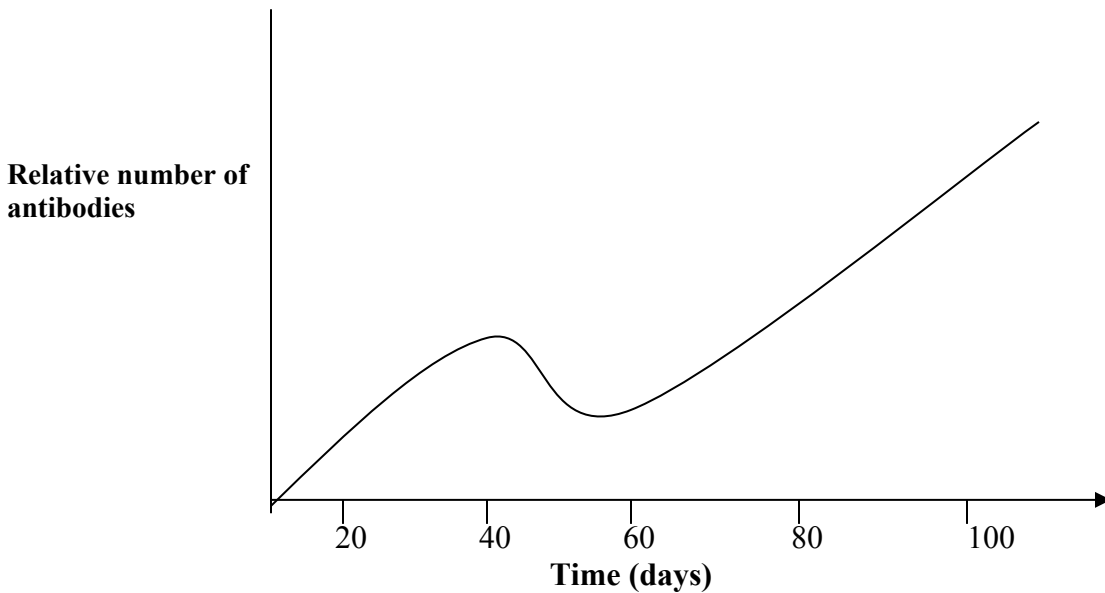
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45. The fig. below shows the immune response of a person's blood after vaccinations are given on day one and 60 days later.



a) What is the effect of giving immunization to the individual?

(01 marks)

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b) From the graph, state the type of immunity acquired by the individual giving a reason
(01 marks)

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c) Explain the shape of the graph (05 marks)

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d) Describe three ways in which antibodies combat antigens (03 marks)

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46. a) Outline the three types of stimuli (1½ marks)

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b) State one example for each of the stimuli given in 46 (a) above (1½ marks)

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c) Mention any three ways by which learned behavior can be modified (03 marks)

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d) Outline any two significance of **imprinting**

(01 mark)

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e) What is meant by **pheromones**?

(03 marks)

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END