SECTION A.

1. The 9 + 2 basic arrangement can be realised in the following except
   A. stomach lining
   B. spermatozoon
   C. spindle fibre
   D. surface of the fallopian tubes

2. A good example of a prokaryote is
   A. entamoeba
   B. plasmodium
   C. trypanosoma
   D. blue-green alga

3. Which of the following is **not** a function of the cell membrane?
   A. Binding cytoplasm to stop it oozing out of the cell
   B. Allowing selective absorption and discharge of material.
   C. Forming pinocytic vesicles
   D. Manufacturing lipids and lipoproteins

4. Which one of the following vitamins is water soluble?
   A. A
   B. E
   C. D
   D. C

5. During what stage of prophase I of meiosis are homologous chromosomes attracted to each other and come together?
   A. Leptotene
   B. Zygotene
   C. Pachytene
   D. Diplotene

6. Which one of the following events occurs during telophase of mitosis in the meristematic cells of a root tip?
   A. Cleavage of the cytoplasm
   B. Replication of the centrioles
   C. Replication of the chromosomes
   D. Formation of the cell plate

7. In a living cell, the lysosome organelle contains a number of enzymes. What would be the effect on the cell of puncturing the organelle? The cell would undergo
   A. plasmolysis
   B. autolysis
   C. crenation
   D. haemolysis

8. Plants growing in humid habitats lose excess water by
   A. transpiration
   B. guttation
   C. cuticular transpiration
   D. forming large numbers of lenticels

9. One important advantage of a light microscope over an electron microscope in biological studies is that
   A. it is portable
   B. it can be used for examining living specimens
   C. its source of radiation is light while that of electron microscope is electrons
   D. it has a set of quartz or glass lenses while the electron microscope has electromagnets for its lenses.

10. Cells with uniformly thickened and lignified walls are likely to be
   A. sclerenchyma
   B. collenchyma
   C. parenchyma
   D. phloem

11. Which one of the following substances consists of globular proteins?
   A. Enzymes
   B. Keratin
   C. Elastin
   D. Collagen

12. In which one of the following is ciliated epithelium found?
   A. Kidney tubules
   B. Small intestines
   C. Lining of capillaries
   D. Lining of alveoli

13. In the upward movement of water in the xylem vessels, the water molecules do not easily pull apart because of
   A. its high viscosity
   B. cohesive force
   C. dissolved mineral salts
   D. its adhesive property

14. The artery is adapted to withstand high pressure resulting from the pumping of the heart by having a
   A. wide lumen to accommodate the pressure
   B. thick tough wall to accommodate the pressure
   C. system of valves that prevent backflow of blood
   D. superficial location on the body to allow distention.

15. Which one of the following blood cells is likely to be attacked first by AIDS virus?
A. Erythrocytes
B. Polymorphs
C. Lymphocytes
D. Thrombocytes

16. Which one of the following terms refers to the site of crossing over during meiosis?
A. Synapsis
B. Diakinesis
C. Centromere
D. Chiasma

17. The process which occurs in living cells is summarized by the equation

$$\underset{\text{glucose}}{C_6H_{12}O_6} + \underset{\text{fructose}}{C_6H_{12}O_6} \xrightarrow[\text{enzyme}]{\text{energy from ATP}} \underset{\text{sucrose}}{C_{12}H_{22}O_{11}} + H_2O$$

is called
A. dehydration synthesis
B. hydrolysis reaction
C. condensation reaction
D. dehydrogenation synthesis

18. Which of the following is not an adaptation for photosynthesis in a leaf? It
A. is broad and thin
B. has a thick cuticle
C. has stomata and air spaces inside
D. has numerous chloroplasts in the palisade cells.

19. What is **not** true of smooth muscle?
A. It can remain contracted for a long time
B. The cells usually have only one nucleus
C. Its action does not depend on the will
D. It is confined to the alimentary canal system

20. Which of the following normally live on land but have aquatic larval stages?
A. Mosquito, praying mantis and snail
B. Snake, mosquito, toad
C. Mosquito, butterfly and toad
D. Mosquito, toad, dragonfly

21. Which one of the following cell organelles is associated with the final stage of most cell secretions?
A. Smooth endoplasmic reticulum
B. Rough endoplasmic reticulum
C. Ribosome
D. Golgi apparatus

22. Which one of the following cell types are unlikely to be found in the mammalian intestine?
A. Columnar
B. Ciliated
C. Stratified
D. Squamous

23. Which one of the following blood pigments contain copper?
A. Haemocyanin
B. Myoglobin
C. Haemoerythrin
D. Haemoglobin

24. The matrix in cartilage is secreted by
A. fibroblasts
B. chondroblasts
C. osteoblasts
D. osteoclasts

The following are some of the features of mitosis and meiosis; use them to answer questions 25 and 26.

(i) Involves two successive nuclear divisions
(ii) Involves the formation of chiasmata
(iii) Involves separation of sister chromatids
(iv) Occurs during gamete formation
(v) Splitting of centromeres followed by anaphase.

25. Which of the features are limited to mitosis only?
A. (i), (ii) and (iii)
B. (i), (iv) and (v)
C. (ii) and (iv)
D. (iii) and (v)

26. Which of the features are limited to meiosis only?
A. (i), (ii) and (iv)
B. (i), (iv) and (v)
C. (iii) and (v)
D. (ii) and (iv)

27. Enzymes that catalyse the removal of water molecules from a substrate are known as
A. reductases
B. dehydrogenases
C. dehydrases
D. hydrases

28. Which organ in the body contains cardiac muscle?
A. Gizzard
B. Diaphragm
C. Oesophagus
D. Heart

29. The pressure which tends to force water out of a cell is called
A. osmotic potential
B. water potential
C. pressure potential
D. turgor pressure

30. Which of the statements below best explains why there are more Uganda Kobs than Lions in Queen Elizabeth National Park?
(i) Lions have a lower reproductive rate
(ii) Lion numbers are kept down by competition for food with other carnivores
(iii) Uganda Kobs are primary consumers while lions are tertiary consumers
(iv) Lions have suffered more from poaching.
A. (i) and (iii)
B. (ii) and (iv)
C. (iii) and (iv)
D. (i) and (ii)

31. In most mammals a high sperm count is maintained by
A. subjecting the animals to high temperatures
B. maintaining the testis in the abdominal cavity
C. insulating the testes
D. having the scrotal sacs outside the abdominal cavity

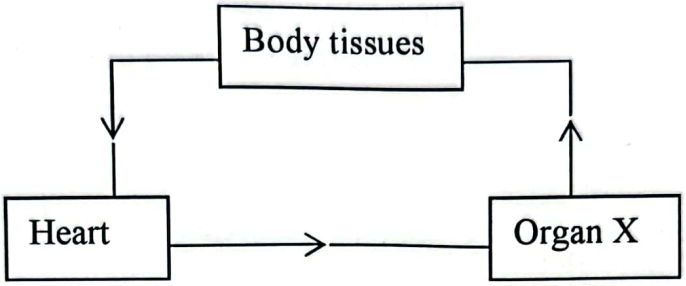
32. The existence of ringworm on human skin is an example of
A. parasitism
B. mutualism
C. commensalism
D. symbiosis

33. The organism that requires only inorganic raw materials from the environment is
A. virus
B. amoeba
C. plasma
D. euglena

34. Which one of the following statements is true of essential fatty acids.They
A. are the most required lipids in the body
B. cannot be synthesized in the body
C. are required in the body in large quantities
D. are most abundant in animal tissues

Fig. 1 below represents the blood circulation in a fish. Use it to answer questions 35 and 36.

Fig.1



35. Which organ(s) is labeled X?
A. Gills
B. Brain
C. Liver
D. Gut

36. Which one of the following shows the correct route taken by blood during circulation?
A. Heart → Body tissues → Organ X
B. Organ X → Heart → Body tissues
C. Heart → Organ X → Body tissues
D. Body tissues → Organ X → Heart

37. A young herbaceous stem maintains an erect position mainly due to
A. lignified tissue in the stem.
B. water pressure in xylem tissues
C. high turgor pressure in the parenchyma cells
D. low osmotic pressure in the parenchyma cells

38. Which one of the following glands has a compound tubular structure?
A. Mucus glands in the skin of the frog and other amphibians
B. Salivary glands in the mouth of a mammal
C. Brunner's glands in the wall of a mammalian small intestine
D. Sweat glands in the skin

39. For diffusion to occur
A. the diffusing particles should all be of uniform size.
B. the diffusion medium should be of uniform density
C. there must be uniform distribution of the diffusing particles
D. a free energy gradient must exist

40. Chromatophores are

A. reproductive cells
B. fat-containing cells
C. carotenoid containing cells
D. pigment-containing cells in certain vertebrates.

SECTION B.

41.a) State **two** important differences which can be recognized under the light microscope between plant and animal cells.

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b)(i) Name the membrane-bounded channels which form a network and almost fill the cytoplasm of most cells and are only recognizable under the electron microscope.

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(ii) What are the "small granules" associated with the channels mentioned in (i) and what is their function?

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(c) Viewed under the electron microscope, the cell membrane has a three-layered structure. What is the chemical nature of each of these layers?

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(d) (i) Give **one** structural difference between the cytoplasm and nucleoplasm of an eukaryotic cell.

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(ii) Mitochondria and plastids are both membranous structures. Name two other structures common to them.

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42.a)i) What characteristics are used to classify viruses as living things?

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(ii) Why are viruses also referred to as non-living things?

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(b) Why is a virus referred to as an obligate parasite?

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(c) State the **two** general components of viruses.

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(d) Name any **two** plant and **two** animal (other than human) diseases caused by viruses.

(i) Plant diseases .....

(ii) Animal diseases .....

43.(a) In which cell organelle is RNA made and where does it perform its function?

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(b) Give the names of the types of RNA known so far.

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(c) Give two structural differences between RNA and DNA.

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(d) During protein biosynthesis, if the nitrogenous base sequence in DNA is –C-T-A-C-G-A-; what will be the complementary sequence on the appropriate RNA strand?

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(e) What is meant by 'transcription' and 'translation' in protein biosynthesis?

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(f) Draw a labeled model of one molecule of the RNA responsible for collecting activated amino acids ready to arrange them in a chain.

44. Fig. 2 shows two cells X and Y from the epidermis of Bryophyllum. One cell has been placed in a concentrated sugar solution and the other in distilled water.

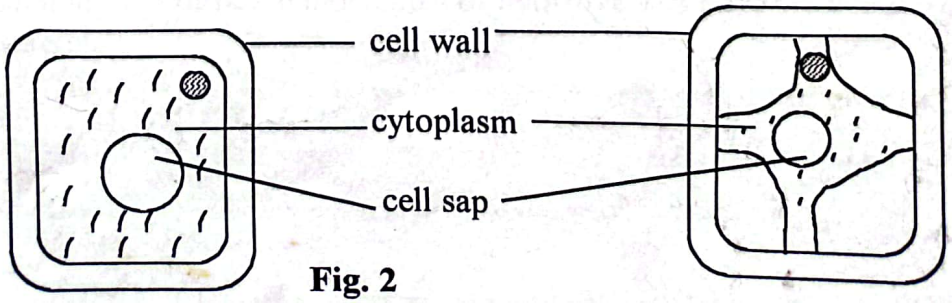

Fig. 2

(a) Which cell is in the sugar solution?

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(b) What prevents the cell in distilled water from bursting?

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(c) Why does the cell sap of Y appear thicker than it normally looks?

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(d) How can you show that the changes in the two cells are not permanent?

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(e) Briefly explain why a red blood cell bursts when put in distilled water but amoeba does not.

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45. Carbohydrates, lipids and proteins are sometimes called chemicals of life.

(a) Where and in what form are carbohydrates and lipids stored in flowering plants and mammals?

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(b) What are the ultimate molecules of hydrolysis of carbohydrates, lipids and proteins?

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(c)(i) Among the three chemicals of life, which one yields the largest amount of energy and which one yields the least amount of energy, per gram of substrate on oxidation?

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(ii) How many kilojoules of energy are produced if 1g of sugar burned in oxygen raise the temperature of 500g of water by 7.2°C? (4.18J raises the temperature of 1g of water through 1°C)

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(d) Give two other functions of chemicals of life in living organisms.

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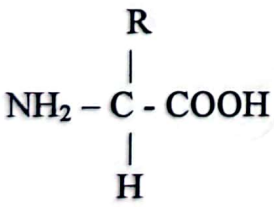
46.



(a) What type of molecule is shown in the diagram above?

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(b) What is the simplest form of R?

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(c)(i) Which part of the structure gives **acidic** properties to the molecule?

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(ii) Which part of the structure gives **basic** properties to the molecule?

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(d) It may be said that because molecules of this type can show polymerization they are important biologically.

(i) What is meant by polymerization?

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(ii) If molecules of this type polymerize, what will be formed?

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(e) With the aid of a diagram, illustrate the product when two of the units have joined.

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