QB365

Model Question Paper 2

11th Standard CBSE

Biology

Reg.No. : | | | | | | |

Time : 02:00:00 Hrs

Total Marks : 100

Section-A

1) Where are extrinsic proteins found in the cell membrane? **1**

2) Which layer is referred to as cementing layer and why? **1**

3) Mension a single membrane bound organelle, which is rich in hydrolytic enzymes. **1**

4) Name two type of cells which lack a nucleus. **1**

5) What is the term to ribonucleic acid with catalytic power? **1**

6) What is the name given to that part of the enzyme where catalytic work is carried out? **1**

7) Name one homopolysaccharide and one heteropolysaccharide. **1**

8) Name a drug that has an inhibitory effect on cell cycle in mitotic stage. **1**

9) Does mitosis occur before or after the interphase? **1**

10) Enumerate the effect of increased and decreased solute concentration on water potential inside the cells **1**

11) Osmosis is a special kind of diffusion, in which water diffuses across the cell membrane. The rate and direction of osmosis depends upon both **1**

12) When does wilting occur? **1**

13) The pathway taken by water or ions in which they are transported through the free or outer space without entering into cellular membranes and cytoplasm. Identify the pathway. **1**

14) Name the amino acid which sulphur is present. **1**

15) Why is proton gradient important in photosynthesis? **1**

16) How many molecules of carbon dioxide, ATP and NADPH are required to make one molecule of glucose? **1**

17) Photosynthesis pigments are located in which part of the chloroplast? **1**

18) Mention the step of citric acid cycle, which is not mediated by dehydrogeneous enzyme. **1**

19) Name the haem protein present in the ETC. **1**

20) What is the respiratory quotient when fats are used in respiration? **1**

Section-C

21) How do neutral solutes move across the plasma membrane? Can the polar molecules also move across it in the same way? If not, then how are these transported across the membrane? **2**

22) Give significance of glycocalyx. **2**

23) Give the role of DNA **2**

24) Give the basic representation $\frac{dP}{dt}$ of rate of a chemical reaction.Also define the same **2**

25) Discuss about competitive inhibition of enzymes?How is it different from non-competitive inhibition? **2**

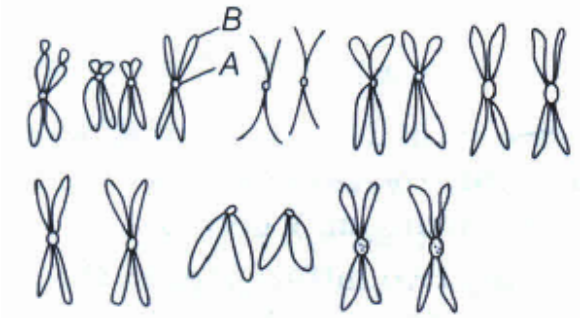
26) Mention the significance of meiosis. **2**

27) A cell having 32 chromosomes, undergoes mitotic divisions. What will be the chromosome number (n) during metaphase? What would be the DNA content (C) during anaphase? **2**

28) Answer the following questions based upon the given figure. **2**

(i) What type of division is this?Whether meiotic or/and miotic and which stage?

(ii) What is A and B?



29) Explain why pure water has the maximum water potential **2**

30) Draw a diagram of a stomatal apparatus. **2**

31) What role does copper play in maintaning life of a plant? **2**

32) What are the conditions necessary for fixation of atmospheric nitrogen by Rhizobium. What is their role in nitrogen-fixation? **2**

33) Complete the equation for reductive amination **2**

$$\ldots\ldots\ldots + NH_4^+ + NADPH \xrightarrow{\ldots\ldots\ldots} Glutamatic\quad acid + H_2O + NADP$$

34) Prior to sowing rice, a legume crop is cultivated and ploughed back in the field, why? **2**

35) How is sulphur important for plants?Name the amino acid in which it is present. **2**

36) Mention the four basic requirements for chemiosmosis to occur. **2**

37) What is the basis for designating C_3 and C_4 pathways of photosynthesis? **2**

38) Expand RuBP and also mention the role of RuBP in photosynthesis. **2**

39) Differences between stroma and grana of chloroplasts. **2**

40) When is RQ slightly moe than unity? **2**

Section-C

41) What is the concept of metabolism? What are the metabolic basis for living? **5**

42) Describe briefly the phases of meiotic cell division. **5**

43) Explain meiosis-II in an animal cell. **5**

44) Define transpiration pull diagrammatically explain the route of transpiration pull and ascent of sap in plants. **5**

45) Explain with examples macronutrients,micronutrients,beneficial nutrients,toxic elements and essential elements. **5**

46) What are special anatomical features displayed by leaves of C_4 -plants? How do they provide an advantage over the structure of C_3 -plants? **5**

47) Under what condition are C_4-plants superior to C_3? **5**

48) What is the significance of stepwise release of energy in respiration. **5**

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Section-A

1) On the outer and inner surface of phospholipid matrix. **1**

2) **1**

Middle lamellae is referred to as cementing layer because it holds the primary cell wall of adjacent cells together.

3) Lysosome. **1**

4) RBCs of humans and sieve cells of vascular plants. **1**

5) Ribozymes **1**

6) Active or catalytic site is that part of an enzyme where catalytic work is carried out **1**

7) **Homopolysaccharide :** Starch **Heteropolysaccharide :** Chitin **1**

8) Colchicine drug shows inhibitory effect. **1**

9) **1**

Yes, mitosis can occur before or after the interphase, as dividing phase (meiosis or mitosis) and interphase is the only major phase of a cell cycle.

10) **1**

Increased solute concentration decreases water potential, while decreased solute concentration increases water potential

11) Pressure and Concentration gradient **1**

12) **1**

Wilting occurs whenever the turgor pressure in non-lignified plant cells falls towards zero, as a result of diminished water in the cells

13) The pathway taken in this situation is apoplast pathway or passive transport. **1**

14) Cystenine and methionine **1**

15) Proton gradient is important as it makes energy available for ATP synthesis. **1**

16) **1**

6 molecules of carbon dioxide, 18 molecules of ATP, 12 molecules of NADPH are required to make 1 glucose molecule.

17) Photosynthesis pigments are located in the lipid part of thylakoid membrane. **1**

18) Conversion of oxaloacetic acid to citric acid is not mediated by dehydrogenase enzyme. **1**

19) Cytochrome is small protein containing iron atom, so it is called haem protein. **1**

20) **1**

If the respiratory substrate is fat, then RQ of the respiring cells will be less than one because the volume of CO_2 evolved is quite less in comparison to the volume of O_2 being consumed.

Section-C

21) **2**

Neutral solutes may move across the membrane by the process of simple diffusion along the concentration gradient. The polar molecule cannot pass through the non-polar lipid bilayer, they require a carrier protein to the membrane.

22) Glycocalyx is significant in the following ways **2**

(i) It protects the cell from loss of water and nutrients

(ii) Serves as a protective layer against attack by phagocytosis and viruses.

(iii) Helps in attachment to a surface

(iv) Provides virulence.

23) DNA is a genetic material.It transferes hereditary characters from one generation to the next. **2**

24) Rate of a chemical reaction refers to the amount of product formed per unit time **2**

It is represented as Rate $= \frac{dP}{dt}$

25) **2**

When the enzyme inhibitor closely resemble the molecular structure of substract,the enzyme action is inhibited.This is called competitive inhibition.When the active site is blocked by the inhibitor,the inhibition is said to be non-competitive and no enzyme substract complex is formed.

26) **2**

Meiosis is the mechanism by which conservation of specific chromosome number of each species is achieved across generations in sexually reproducing organisms. It also increases the genetic variability in the population of sexually reproducing organisms from one generation to the next. Variations are very important for the process of evolution.

27) **2**

The number of chromosomes during metaphase will be 32. Also the DNA content during anaphase will be same as in the parent cell.

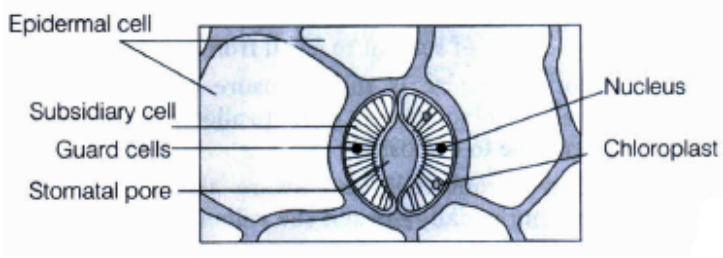
28) (i) It is a meiotic division showing synapsis and it is in the zygotene stage of prophase - I of meiosis-I. **2**

(ii) A-centromere, B-chromatid.

29) **2**

Water molecules possess kinetic energy. In liquid and gaseous form, they are in random motion that is both rapid and constant. The greater the concentration of water in system., the greater is its kinetic energy or water potential. Hence, pure water has the greatest water potential. The water potential is denoted by the Greek symbol psi or Ψ and is expressed in pressure units, Pascal (Pa)

30) **2**



31) **2**

Copper helps the plant in transfer of electrn and in maintanance of carbohydrate / nitrogen balance and synthesis of chlorophyll.

32) **2**

The first essential condition for nitrogen-fixation is legume-bacteria relationship. Rhizobium bacteria cause nodule formation for this association. The enzyme nitrogenase is highly sensitive to the molecular oxygen.They are symbionts, which can fix atmospheric nitrogen for plants

33) $\alpha - ketoglutarate + NH_4^+ + NADPH \longrightarrow {}^{Glutamate}_{Dehydrogenase} Glutamate + H_2O + NADP$ **2**

34) **2**

Leguminous plants possess root nodules in which the symbiotic bacteria, Rhizobium, fix nitrogen. The fixed nitrogen makes the soil rich in nitrogen makes the soil rich in nitrogen when the leguminous crop is ploughed back in the field.

35) **2**

Plants obtain sulphur in the form of sulphate (SO_4^{2-}) and is the main constituent of several coenzymes, vitamines(thiamine,biotin,coenzymeA) and ferredoxin.It plays role in the synthesis of chorophyll.It is essential for nodulation in legumes.It determines the structure of protein.Sulphur is present in two amino acids, i.e cysteine and methionine.

36) Four basic requirements are as follows **2**

(i) A unit membrane

(ii) A proton pump

(iii) A proton gradient

(iv) ATP synthase enzyme

37) **2**

C_3 pathway or Calvin cycle represents phase-II, i.e. dark reaction of photosynthesis.In Calvin cycle, a 5C pentose sugar, Ribulose Bisphosphate (RuBP) acts as the first acceptor of CO_2 whereas, the C_4 pathway is also called Hatch-Slack pathway in which, the first CO_2 acceptor is 3C phosphoenolpyruvate (PEP).

38) **2**

RuBP is known as Ribulose 1,5-Bisphosphate. It is the primary acceptor of carbon dioxide in Calvin cycle of C_3-plants. It forms the first stable compound of photosynthesis known as PGA.

39) Differences between stroma and grana of chloroplasts are **2**

Stroma	**Grana**
It is the jelly-like matrix of the chloroplast.	These are formed of stacks of thylakoids.
Dark reaction takes place here.	Light reaction takes place here.

40) **2**

RQ slightly more than unity is found when organic acids are broken down as respiratory substrates under aerobic conditions, e.g;

$$2(COOH)_{2\,Oxalic\ \ acid} + O_2 \rightarrow 4CO_2 + 2H_2O \quad RQ \frac{4CO_2}{1O_2} = 4.0 \quad C_2H_6O_{5\,Malic\ \ acid} + 3O_2 \rightarrow 4CO_2 + 3H_2O \quad RQ = \frac{4CO_2}{3O_2} = 1.3$$

Section-C

41) **5**

The continuous process of breakdown and synthesis of biomolecules through chemical reactions occurring in the living cells is called metabolism.

(i) Each of the metabolic reaction results in a transformation of biomolecules.

(ii) Most of these metabolic reactions do not occur in isolation but are always linked with some other reactions.

(iii) In these reactions, the metabolisms are converted into another metabolite in a series of linked reactions called metabolic pathways.

(iv) Each metabolite has a define rate and direction during the flow through a metabolic pathways called the dynamic state.

In living systems, metabolism involves two following types of pathways

(i) **The anabolic pathways** is called biosynthetic pathway. It leads to a more complex structure from a simpler structure, e.g., the pathway involving the conversion of acetic acid into cholesterol. These pathways consume energy.

(ii) **The catabolic pathways leads** to simpler structure from a complex structure, e.g., the pathways involving conversion of glucose into lactic acid in our skeletal muscles. This pathway leads to the release of energy, e.g., energy is liberated when glucose is degrated to lactic acid in our skeletal muscles.

42) **5**

Meiotic division takes place in germ cells. The number of chromosomes is reduced to half in daughter cells. Meiotic cell division is divided into twophases, i.e., meiosis-I and II.

In the meiotic-I division, the homologous chromosomes pair to form bivalents. Exchange of genetic material takes place. The chromosomes now separate and get distributed into daughter cells.

43) **5**

All these happen in the two haploid nuclei simultaneously.

(i) Prophase-II, takes short time. Spindle formation begins and the chromosomes become short. Two chromatids are joined to a single centromere. Nuclear membrane and nucleous disintegrate.

(ii) Metaphase-II At the equator, the chromosomes align at the equator and spindle is formed. The centromere of every chromosome is joined to the spindle fibre and centromere also divides.

(iii) Anaphase-II The daughter chromosomes are formed. Chromatids move towards their poles with the spindle fibres.

(iv) Telophase-II Reaching at the poles, chromosomes form nuclei which are haploid(n) daughter nuclei. Again nuclear membrane is constructed. Nucleous now becomes clearly visible.

Cytokinesis Occurs and four daughter cells are formed which are haploid (n). It may occur once or twice or only after the meiosis-II cell division.

44) **5**

Transpiration pull is the phenomenon which takes place when thousands of transpiring mesophyll cells withdraw water from the xylem by generating a negative pressure in the water column and exerting an upward pull over the water column.This pull is further transmitted to the roots in search of more water.

45) **5**

(i)**Macronutrients** These are generally present in plant tissues in large amount(in excess 10m mole Kg^{-1} of dry matter).The macronutrients include carbon,hydrogen, oxygenn,nitrogen,phosphorous,sulphur,potassium,calcium and magnesium.

(ii)**Micronutrients** Micronutrients or trace elements, are needed in very small amount (less than 10m mole g^{-1} of dry matter).These include iron,manganese,copper,molybdenum,zinc,boron,chlorine and nickel.

(iii)**Beneficial nutrients** The elements which are not essential for plants, but their presence are beneficial for the growth and development.Such, elements are called beneficial elements.

Toxic elements Any mineral ion concentration in tissues, that reduces the dry weight of issues by about 10% is considered toxic.e.g., Mn inhibits the absorption of other elements.

(iv)**Essential elements** The macronutrients including carbon,hydrogen ,oxygen,nitrigen,phosphorus,sulphur,potassium,calcium and magnesium, which are required directly for the growth and metabolism of the plants and whose deficiency produces certain symptoms in the plants are known as essential elements.

46) **5**

The particularly large cells around the vascular bundles of the C_4 pathway plants are called bundle sheath cells and the leaves, which have such anatomy are said to have Kranz anatomy.Kranz means wreath and is a reflection of the arrangement of cells.The bundle sheath cells may form several layers around the vascular bundles; they are characterized by having a large number of chloroplasts, thick walls impervious to gaseous exchange and no intercellular spaces.

C_4 -plants can produce more sugar than C_3-plants in conditions of bright light and high temperature.Many important crop plants are C_4-plants, i.e maize, sorghum, sugarcane, and millet.

47) **5**

C_4-plants can produce more suger than C_3-plants in condition of bright light and high tempertaure.It is because of the following reasons.

i)They have a special type of leaf anatomy

ii)They can tolerate higher temperature.

iii)They show response to high light intensities

iv)They lack a process called photorespiration.

v)They have greater productivity of biomass.

Many important crop plants are C_4-plants including maize, sorghum, sugarcane and millet.

48) **5**

Complex organic food molecules such as sugars, fats and proteins ae rich sources of energy for cells. The energy in these food molecules is stored in the form of chemical bonds.

During the oxidation of each of these molecules in the presence of O_2 , these bonds are broken down. It happens in the enzymatically controlled stepwise reactions. So at different steps, slowly energy is released in the form of ATP ,molecules as per the need of cells.