

Sample paper 10

Question: 1

Proteins having a polyhistidine tail can be separated by affinity chromatography using

- A. Cadmium
- B. Silver
- C. Iron
- D. Lead
- E. Nickel

Correct Answer: E. Nickel

Explanation:

Nickel has a high affinity towards histidine residues. So, a column with nickel attached to it can be used to perform affinity chromatography for proteins with polyhistidine tails.

Question: 2

The metal ion present at the centre of porphyrin ring of chlorophyll is

- A. Fe
- B. Mg
- C. Co
- D. Cu
- E. Mn

Correct Answer: B. Mg

Explanation:

Magnesium is the metal ion present at the centre of porphyrin ring of chlorophyll. The structure is very similar to that of haemoglobin which contains iron at the centre of porphyrin ring.

Question: 3

Which of the following protects membrane lipids from free radicals?

- A. Vitamin A
- B. Vitamin B1
- C. Vitamin D
- D. Vitamin E
- E. Vitamin K

Correct Answer: D. Vitamin E

Explanation:

Vitamin E is a fat-soluble vitamin composed of isoprene units. It protects membrane lipids from free radicals and reactive oxygen species. Absence of vitamin E causes fragility of membranes.

Question: 4

Proteins are transported from endoplasmic reticulum to golgi complex by

- A. Ribosomes
- B. Lysosomes
- C. Vesicles
- D. Mitochondria
- E. Microtubules

Correct Answer: C. Vesicles

Explanation:

Vesicles are bubble-like membranous structures that store and transport cellular products. Proteins that are produced by ribosomes in rough endoplasmic reticulum are transported to golgi complex by means of vesicles. These transport vesicles bud from specialized regions of ER called as ER exit sites.

Question: 5

Synthesis of ATP takes place in

I. Chloroplast

II. Mitochondria

III. Golgi apparatus

IV. Endoplasmic reticulum

V. Ribosome

- A. Both I and II
- B. Both II and III
- C. II, III and IV
- D. I, III and V
- E. Only II

Correct Answer: A. Both I and II

Explanation:

The ATP synthesis in plants takes place in chloroplast as in mitochondria of animals. In plants the process is termed as photophosphorylation. The mechanism of ATP synthesis in both the organelles is very similar. ATP synthase is the enzyme that is involved in this process.

Question: 6

Presence of pentamerous radial symmetry is a characteristic feature of

- A. Phylum Chordata
- B. Phylum Annelida
- C. Phylum Echinodermata
- D. Phylum Mollusca
- E. Phylum Arthropoda

Correct Answer: C. Phylum Echinodermata

Explanation:

Echinoderms possess a body symmetry that can be divided into five parts as in star fish. This is called as pentamerous radial symmetry. Phylum Chordata, Annelida, Mollusca and Arthropoda possess bilateral symmetry.

Question: 7

Climax community is

- A. A stable mature ecological community
- B. An unstable ecological community
- C. A community with endangered species
- D. A community with extinct species
- E. A community with vulnerable species

Correct Answer: A. A stable mature ecological community

Explanation:

The final stage in ecological succession, which contains stable population until and unless any disturbance is made is called a climax community. This stable equilibrium stage is obtained through many evolutionary stages and environmental adaptations. Biome is a climax community.

Question: 8

Haversian canal is present in

- A. Eyes
- B. Lungs
- C. Heart
- D. Cartilage tissue
- E. Bone

Correct Answer: E. Bone

Explanation:

Haversian canal is the canal which runs parallel to the long axis of the bone. It is surrounded by concentric rings of lamellar bone where the osteocytes are present. It contains blood vessels, nerves and lymph vessels. Haversian canals are interconnected by Volkmann's canals.

Question: 9

The genes that are not present in the nucleus are called

- A. Extranuclear genes
- B. Suppressor genes
- C. Multiple genes
- D. Transgenes
- E. Internuclear genes

Correct Answer: A. Extranuclear genes

Explanation:

The genes that are not present within the nucleus are called as extranuclear genes. A gene that suppresses the expression of another gene is said to be a suppressor gene. Multiple genes refer to polygenes that are responsible for a particular phenotype. Transgenes are the genes used in transgenic technology.

Question: 10

Vitellogenesis is the

- A. Process of formation of gametes
- B. Process of formation of placenta
- C. Process of storage of food in growing oocytes of oviparous animals
- D. Process of shedding of endometrial wall
- E. Process of hatching of egg

Correct Answer: C. Process of storage of food in growing oocytes of oviparous animals

Explanation:

Vitellogenesis is the process of storage of food in growing oocytes of oviparous animals. Yolk formation takes place through vitellogenesis. The egg yolk serves as food for developing embryo.

Question: 11

Morphogens are the substances that_____

- A. Regulate cell fate during embryogenesis
- B. Cause damage to the developing embryo
- C. Provide nutrition to the fetus
- D. Suppress the growth of embryo
- E. Produce hormones for embryogenesis

Correct Answer: A. Regulate cell fate during embryogenesis

Explanation:

Morphogens are the regulatory chemicals which influence the morphogenesis during embryo development by creating concentration gradient. FGF, Wnt, Notch, Hedgehog and TGF- β families of proteins are some identified morphogens. The substances that cause damage to the developing embryo are termed as teratogens.

Question: 12

Which of the following enzymes is responsible for removing the RNA primer during DNA replication?

- A. RNA polymerase
- B. Helicase
- C. Topoisomerase
- D. RNase H
- E. Primase

Correct Answer: D. RNase H

Explanation:

RNase H is an endonuclease responsible for degrading RNA of DNA-RNA hybrids of lagging strand during replication. It does not degrade DNA or unhybridised RNA. It cleaves the 3'-O-P bond of RNA.

Question: 13

The liquid that is present in the space between the cornea and lens of eyes is

- A. Aqueous humor
- B. Vitreous humor
- C. Cerebrospinal fluid (CSF)
- D. Synovial fluid
- E. Interstitial fluid

Correct Answer: A. Aqueous humor

Explanation:

The space between the cornea and the lens of the eye is called the aqueous chamber and it contains a watery fluid called aqueous humor. Vitreous humor, a transparent gel fills the vitreous chamber, the space between the lens and the retina. CSF is the fluid that protects the brain and spinal cord. Synovial fluid is present in the synovial membrane of joints. The fluid that is present in between the cells is called interstitial fluid.

Question: 14

Ozone in the atmosphere is formed by chemical reactions involving

- A. Water and oxygen
- B. Ultraviolet radiation and oxygen
- C. Hydrogen and oxygen
- D. Infrared radiation and oxygen
- E. Nitrogen and oxygen

Correct Answer: B. Ultraviolet radiation and oxygen

Explanation:

Ozone in atmosphere is formed due to the action of ultraviolet radiation on the O₂ molecules. The UV breaks O₂ to give 2 O molecules. This highly reactive O molecule reacts with O₂ to give ozone molecule (O₃).

Question: 15

The given diseases are caused due to bacteria except

- A. Chicken pox
- B. Botulism
- C. Anthrax
- D. Syphilis
- E. Tuberculosis

Correct Answer: A. Chicken pox

Explanation:

There are several human diseases that are caused due to microbial infections such as bacterial, viral and fungal. Botulism, anthrax, syphilis and tuberculosis are the bacterial diseases which are caused by *Clostridium botulinum*, *Bacillus anthracis*, *Treponema pallidum* and *Mycobacterium tuberculosis* respectively. Chicken pox is a contagious viral infection caused by varicella-zoster virus.