

Sample paper 7

**Question: 1**

**A defective segment of DNA that resembles a gene but cannot produce functional protein is called**

- A. Exon
- B. Pseudogenes
- C. Regulatory sequence
- D. Homeotic gene
- E. Lethal gene

**Correct Answer: B. Pseudogenes**

**Explanation:**

Pseudogenes are genomic DNA sequence that resemble a gene but are non-functional. They cannot produce functional protein. Exon is the coding region of the gene. Regulatory sequence is the sequence of DNA that regulates the expression of genes. Homeotic genes are the genes that are involved in early development that control the pattern of body formation. Lethal gene is a gene whose effect causes death of organism.

**Question: 2**

**The process by which immature cells develop into matured cells of a specific lineage is**

- A. Organogenesis
- B. Differentiation
- C. Growth
- D. Pattern formation
- E. Morphogenesis

**Correct Answer: B. Differentiation**

**Explanation:**

Differentiation is the process by which an immature cell develops into a mature cell type. Example: Formation of RBC from an erythroblast. A fully differentiated cell is generally not capable of undergoing division.

**Question: 3**

**In humans, the part of the large intestine that opens into rectum is called**

- A. Caecum
- B. Colon
- C. Ileum
- D. Anus
- E. Jejunum

**Correct Answer: B. Colon**

**Explanation:**

The large intestine is composed of caecum, colon and rectum. Caecum is a small sac containing some microbes into which the ileum of small intestine opens. Following caecum is the colon that has an ascending, a transverse and a descending portion. The descending part of the colon opens into the rectum which opens out through anus. Jejunum is a part of small intestine.

**Question: 4**

**Which of the following occurs as a result of accumulation of fertilizers in a pond?**

- A. Biodegradation
- B. Biomagnification
- C. Bioaccumulation
- D. Eutrophication
- E. Spontaneous combustion

**Correct Answer: D. Eutrophication**

**Explanation:**

Eutrophication is the ecosystem change that occurs in a water body as a result of accumulation of fertilizers or nutrients or other natural products in an aquatic environment. Example: Algal bloom in ponds occurs as a result of increased nutrient availability.

**Question: 5**

**In humans, an extra X chromosome causes**

- A. Klinefelter syndrome
- B. Down syndrome
- C. Hemophilia
- D. Porphyria
- E. Autism

**Correct Answer: A. Klinefelter syndrome**

**Explanation:**

Klinefelter syndrome (XXY) occurs in men as a result of an extra X chromosome. Infertility is the main symptom of this disease.

**Question: 6**

**The rumen of cattle contains \_\_\_\_\_**

- A. Methanobacterium
- B. Acetobacterium
- C. Corynebacterium
- D. Halobacterium
- E. Mycobacterium

**Correct Answer: A. Methanobacterium**

**Explanation:**

The rumen, a part of stomach in cattle is found to contain Methanobacterium, methane-producing bacteria. The cellulose in the feed of the cattle is broken down by these bacteria and methane is produced as one of the products. These bacteria are also found in ruminants other than cattle.

**Question: 7****Altruism is**

- A. A behaviour by an animal that benefits other members of its species
- B. A behaviour by an animal that troubles other members of its species
- C. A behaviour by an animal that troubles members of other species
- D. A behaviour by an animal that hides food from its fellow beings
- E. None of the above

**Correct Answer: A. A behaviour by an animal that benefits other members of its species**

**Explanation:**

Altruism is a behaviour exhibited by an organism for the welfare of its fellow members. The behaviour might be a disadvantage to it but it benefits the others of its kind, for instance a warning that reveals the location of caller to predator.

**Question: 8****The state in which viral genome gets integrated with the host genome is**

- A. Provirus
- B. Absorption
- C. Prophase
- D. Lytic cycle
- E. None of these

**Correct Answer: A. Provirus**

**Explanation:**

A virus, after infecting the target cell, either enters the lytic cycle (involving multiplication of virus and breakage of cell) or gets its genome integrated with the host genome. The integrated state is called a provirus.

**Question: 9****Breakdown of fat into fatty acid and glycerol is**

- A. Anabolism
- B. Catabolism
- C.  $\beta$ -oxidation
- D.  $\alpha$ -oxidation
- E. Both A and C

**Correct Answer: B. Catabolism**

**Explanation:**

Catabolism refers to the metabolic breakdown of complex molecules into simpler molecules whereas anabolism refers to the synthesis of complex molecules from simpler molecules. Breakdown of fats, proteins and carbohydrates into their simpler forms are catabolic processes.  $\beta$ -oxidation and  $\alpha$ -oxidation are the types of fatty acid breakdown reactions.

**Question: 10**

**Duplication of chromosomes takes place in**

- A. S phase
- B. G1 phase
- C. G2 phase
- D. Prophase
- E. Anaphase

**Correct Answer: A. S phase**

**Explanation:**

In S phase, duplication but not separation of chromosomes takes place. Protein and RNA synthesis occurs in G1 and G2 phases. Condensation of chromosomes and disappearance of nuclear membrane takes place in prophase. Separation of chromosomes to the opposite poles occurs in anaphase.

**Question: 11**

**The enzyme involved in the synthesis of mRNA is**

- A. RNA polymerase I
- B. RNA polymerase II
- C. RNA polymerase III
- D. Ribonuclease
- E. Hexokinase

**Correct Answer: B. RNA polymerase II**

**Explanation:**

RNA polymerase II is involved in the synthesis of mRNA. RNA polymerase I and III are involved in the synthesis of rRNA and tRNA respectively. Ribonuclease cleaves the RNA molecule. Hexokinase phosphorylates a hexose sugar.

**Question: 12**

**Cleptobiosis is an ecological relationship that can be seen in**

- A. Ants
- B. Cockroaches
- C. Tiger
- D. Deer
- E. None of the above

**Correct Answer: A. Ants**

**Explanation:**

Cleptobiosis is an association in which a species forages the food stores or nesting materials of other species. This can be seen commonly among ants and some other social insects.

**Question: 13**

**Which cell organelle has a role in transporting materials to other parts of a cell?**

- A. Golgi complex
- B. Lysosome
- C. Chloroplast
- D. Mitochondria
- E. Nucleus

**Correct Answer: A. Golgi complex**

**Explanation:**

Golgi complex is a stack of flattened membrane bound sacs that are called as cisternae. Golgi complex acts as a transport system in a cell. They transport materials like proteins to other part of the cell or to the cell surface membrane for secretion.

**Question: 14**

**In an ecosystem, keystone species are those**

- A. Contributing to ecosystem properties
- B. That are most frequent
- C. Present in minimum number
- D. Attaining large biomass
- E. Having high competency

**Correct Answer: A. Contributing to ecosystem properties**

**Explanation:**

A keystone species is one which has a large effect on the environment and is necessary to maintain the structure of an ecosystem. They affect the growth of other species.

**Question: 15**

**The role of cardinal genes in Drosophila is**

- A. Pattern formation
- B. Sex determination
- C. Metamorphosis
- D. Cephalic furrow formation
- E. Germ band extension

**Correct Answer: A. Pattern formation**

**Explanation:**

The cardinal genes in drosophila are responsible for coordinating the segmentation process. They are the pattern forming genes that give signal for anterior- posterior and dorsal- ventral segmentation

during the development. Cephalic furrow formation and germ band extension are the processes that take place before segmentation.