

## SECTION 1: Biological Sciences (40 Questions)

1. Which organelle is responsible for producing ATP through oxidative phosphorylation?
  - A) Ribosome
  - B) Mitochondria
  - C) Golgi apparatus
  - D) Endoplasmic reticulum
2. During which phase of mitosis do chromosomes align along the metaphase plate?
  - A) Prophase
  - B) Anaphase
  - C) Metaphase
  - D) Telophase
3. Which type of RNA carries amino acids to the ribosome during translation?
  - A) mRNA
  - B) rRNA
  - C) tRNA
  - D) snRNA
4. The sodium-potassium pump moves:
  - A) 3 Na<sup>+</sup> out and 2 K<sup>+</sup> in
  - B) 2 Na<sup>+</sup> out and 3 K<sup>+</sup> in
  - C) 3 Na<sup>+</sup> in and 2 K<sup>+</sup> out
  - D) Equal amounts of Na<sup>+</sup> and K<sup>+</sup>
5. Which of the following best describes the role of the smooth endoplasmic reticulum?
  - A) Protein synthesis
  - B) Lipid synthesis and detoxification
  - C) DNA replication
  - D) ATP production
6. Which blood type is considered the universal donor?
  - A) AB+
  - B) O+
  - C) O-
  - D) AB-
7. The process by which a cell engulfs large particles is called:
  - A) Pinocytosis

- B) Exocytosis
  - C) Phagocytosis
  - D) Facilitated diffusion
8. Which of the following is NOT a function of the liver?
- A) Bile production
  - B) Detoxification of blood
  - C) Insulin secretion
  - D) Glycogen storage
9. In Mendelian genetics, two heterozygous parents ( $Aa \times Aa$ ) produce offspring. What percentage are expected to be homozygous dominant?
- A) 25%
  - B) 50%
  - C) 75%
  - D) 100%
10. Which of the following correctly describes the structure of DNA?
- A) Single-stranded helix with ribose sugar
  - B) Double-stranded helix with deoxyribose sugar
  - C) Double-stranded helix with ribose sugar
  - D) Single-stranded with deoxyribose sugar
11. The sinoatrial (SA) node is located in which chamber of the heart?
- A) Left ventricle
  - B) Right atrium
  - C) Left atrium
  - D) Right ventricle
12. Which enzyme is responsible for unwinding the DNA double helix during replication?
- A) DNA polymerase
  - B) Ligase
  - C) Helicase
  - D) Primase
13. Gas exchange in the lungs occurs at which structure?
- A) Bronchi
  - B) Trachea
  - C) Alveoli
  - D) Bronchioles
14. Which phase of the cell cycle involves DNA synthesis?
- A) G1
  - B) S phase
  - C) G2
  - D) M phase

15. Which of the following is a function of the lymphatic system?
- A) Producing red blood cells
  - B) Filtering blood in the kidneys
  - C) Returning interstitial fluid to the bloodstream
  - D) Secreting digestive enzymes
16. Point mutations that result in a codon coding for a different amino acid are called:
- A) Silent mutations
  - B) Nonsense mutations
  - C) Missense mutations
  - D) Frameshift mutations
17. Which hormone is released by the posterior pituitary gland?
- A) Growth hormone
  - B) TSH
  - C) ADH (vasopressin)
  - D) Prolactin
18. Which of the following is a secondary lymphoid organ?
- A) Thymus
  - B) Bone marrow
  - C) Spleen
  - D) Both A and B
19. Okazaki fragments are associated with which process?
- A) Transcription of RNA
  - B) Translation of proteins
  - C) Lagging strand DNA synthesis
  - D) Meiotic crossing over
20. Which of the following accurately describes negative feedback in homeostasis?
- A) A response that amplifies the original stimulus
  - B) A response that reduces deviation from a set point
  - C) A response that causes a cascading hormonal effect
  - D) A mechanism used only in the nervous system
21. The nephron's primary site for reabsorption of glucose and amino acids is the:
- A) Loop of Henle
  - B) Collecting duct
  - C) Proximal convoluted tubule
  - D) Distal convoluted tubule
22. Which of the following is a feature of eukaryotic, but not prokaryotic, cells?
- A) Ribosomes
  - B) Cell membrane
  - C) Nucleus
  - D) DNA

23. In incomplete dominance, crossing two red-flowered plants ( $RR \times RR$ ) always produces:
- A) Pink flowers
  - B) Red flowers
  - C) White flowers
  - D) A mix of red and white
24. Which type of immunity is provided by vaccines?
- A) Passive natural immunity
  - B) Active artificial immunity
  - C) Passive artificial immunity
  - D) Innate immunity
25. Which neurotransmitter is primarily associated with the reward pathway in the brain?
- A) Serotonin
  - B) GABA
  - C) Dopamine
  - D) Acetylcholine
26. The process of meiosis results in:
- A) Two diploid daughter cells
  - B) Four diploid daughter cells
  - C) Four haploid daughter cells
  - D) Two haploid daughter cells
27. Which of the following best describes apoptosis?
- A) Uncontrolled cell division
  - B) Programmed cell death
  - C) Cell necrosis due to injury
  - D) Phagocytosis of bacteria
28. Which cranial nerve is responsible for vision?
- A) Cranial nerve I
  - B) Cranial nerve II
  - C) Cranial nerve III
  - D) Cranial nerve VII
29. Which part of the brain regulates body temperature and hunger?
- A) Cerebellum
  - B) Medulla oblongata
  - C) Hypothalamus
  - D) Hippocampus
30. The type of muscle found in the walls of blood vessels is:
- A) Skeletal muscle
  - B) Cardiac muscle
  - C) Smooth muscle
  - D) Striated muscle

31. Which of the following is an example of a codominant trait?
- A) ABO blood type
  - B) Height
  - C) Widow's peak
  - D) Attached earlobes
32. Which enzyme catalyzes the first step of glycolysis?
- A) Phosphofructokinase
  - B) Pyruvate kinase
  - C) Hexokinase
  - D) Aldolase
33. Antibodies are produced by which type of cell?
- A) T lymphocytes
  - B) Natural killer cells
  - C) Plasma cells (B lymphocytes)
  - D) Macrophages
34. The resting membrane potential of a neuron is approximately:
- A) +35 mV
  - B) 0 mV
  - C) -70 mV
  - D) -120 mV
35. Which vitamin is essential for blood clotting?
- A) Vitamin A
  - B) Vitamin C
  - C) Vitamin D
  - D) Vitamin K
36. Which of the following describes the function of the corpus callosum?
- A) Regulating balance and coordination
  - B) Connecting the two cerebral hemispheres
  - C) Controlling autonomic functions
  - D) Processing visual information
37. A sex-linked recessive trait is carried on the X chromosome. A carrier mother ( $X^A X^a$ ) and unaffected father ( $X^A Y$ ) have children. What is the probability their son is affected?
- A) 0%
  - B) 25%
  - C) 50%
  - D) 100%
38. Which of the following is the correct order of the digestive system?
- A) Mouth → Esophagus → Small intestine → Stomach → Large intestine
  - B) Mouth → Esophagus → Stomach → Small intestine → Large intestine

- C) Mouth → Stomach → Esophagus → Small intestine → Large intestine  
D) Mouth → Small intestine → Stomach → Large intestine → Esophagus
39. Which process produces the most ATP per glucose molecule?
- A) Glycolysis
  - B) Fermentation
  - C) Oxidative phosphorylation
  - D) Substrate-level phosphorylation
40. Which of the following best describes the function of telomeres?
- A) Initiating transcription
  - B) Protecting chromosome ends from degradation
  - C) Joining Okazaki fragments
  - D) Regulating gene expression via methylation

## Answer Key

1. B
2. C
3. C
4. A
5. B
6. C
7. C
8. C
9. A
10. B
11. B
12. C
13. C
14. B
15. C
16. C
17. C
18. C
19. C
20. B
21. C
22. C
23. B
24. B
25. C
26. C

- 27. B
- 28. B
- 29. C
- 30. C
- 31. A
- 32. C
- 33. C
- 34. C
- 35. D
- 36. B
- 37. C
- 38. B
- 39. C
- 40. B