

**W-124****Ph.D. Entrance Examination, 2024****BIOCHEMISTRY****Maximum Marks : 50****Note :** Each question carrying 2 marks.

**Q. 1.** Which of the following Biomolecules simply refers to as "Staff of life" ?

- (a) Lipids
- (b) Proteins
- (c) Vitamins
- (d) Carbohydrates

**Q. 2.** Which enzyme converts Glucose-6-phosphate to fructose-6-phosphate in glycolysis ?

- (a) Hexokinase
- (b) Phosphofructokinase
- (c) Phosphoglucose isomerase
- (d) Pyruvate kinase

**Q. 3.** During oxidative phosphorylation ATP is synthesized through the process of :

- (a) Substrate-level-phosphorylation
- (b) Chemiosmosis
- (c) Photophosphorylation
- (d) Hydrolysis

**Q. 4.** MAP kinase pathway is primarily activated by :

- (a) G-protein
- (b) Receptor tyrosine kinase
- (c) Ligand-gated ion channels
- (d) Nuclear receptors

**Q. 5.** Which protein is involved in the G2-M phase transition of cell cycle ?

- (a) Cyclin D
- (b) Cyclin A
- (c) Cyclin B
- (d) Cyclin E

**Q. 6.** The signal transduction molecules that acts as a second messenger in the MAPK pathway is :

- (a) IP3

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- (b) DAG
- (c) Ras
- (d) cAMP

**Q. 7.** The deficiency of which vitamin lead to Wernicke-Korsakoff syndrome ?

- (a) Vitamin B1
- (b) Vitamin B2
- (c) Vitamin B3
- (d) Vitamin B12

**Q. 8.** The most abundant mineral in the human body is :

- (a) Iron
- (b) Magnesium
- (c) Calcium
- (d) Zinc

**Q. 9.** Which enzyme catalyzes the fixation of carbon dioxide in the calvin cycle ?

- (a) Rubisco
- (b) ATP synthase
- (c) Phosphoglycerate kinase
- (d) Pyruvate dehydrogenase

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**Q. 10.**  $\beta$ -oxidation of very large fatty acid occurs in the :

- (a) Mitochondria
- (b) Cytoplasm
- (c) Endoplasmic reticulum
- (d) Peroxisome

**Q. 11.** Which enzyme is responsible for relieving super coils during DNA replication :

- (a) Helicase
- (b) Topoisomerase
- (c) DNA polymerase
- (d) Ligase

**Q. 12.** The TATA Box is typically found in the :

- (a) 5' UTR
- (b) Promoter region
- (c) Coding region
- (d) 3' UTR

**Q. 13.** Splicing of introns from pre-mRNA is carried out by :

- (a) Ribosomes
- (b) tRNA

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- (c) snRNPs
- (d) DNA Polymerase

**Q. 14.** The major histocompatibility complex (MHC) molecules are involved in :

- (a) Antigen presentation
- (b) Cytokine production
- (c) Phagocytosis
- (d) Opsonization

**Q. 15.** Anaphylaxis is primarily mediated by which immunoglobulin :

- (a) IgG
- (b) IgA
- (c) IgE
- (d) IgM

**Q. 16.** Which of the following is not part of the lac operon :

- (a) Operator
- (b) Promoter
- (c) Terminator
- (d) Regulator

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**Q. 17.** Which of the following is a key component of the complement system ?

- (a) C3
- (b) IL-2
- (c) TNF-alpha
- (d) MHC II

**Q. 18.** Which method is used to separate proteins based on size ?

- (a) Ion-exchange chromatography
- (b) Gel-electrophoresis
- (c) Affinity chromatography
- (d) Ultracentrifugation

**Q. 19.** Which of the following is the correct sequence of electron acceptors in ETS for production of ATP ?

- (a) Cyt b, c, a, a<sub>3</sub>
- (b) Cyt a, a, b, c
- (c) Cyt c, b, a, a<sub>3</sub>
- (d) Cyt b, c, a<sub>3</sub>, a

**Q. 20.** The reduction of nitrogen to ammonia carried out by the enzyme nitrogenase, needs :

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- (a) 2 electrons
- (b) 4 electrons
- (c) 6 electrons
- (d) 8 electrons

**Q. 21.** Superoxide dismutase contains the metal ions :

- (a) Zn (II) and Ni (II)
- (b) Cu (II) and Zn (II)
- (c) Ni (II) and CO (III)
- (d) Cu (II) and Fe (III)

**Q. 22.** The concentration of calcium in a resting cell is :

- (a) 10 M
- (b)  $10^{-2}$  M
- (c)  $10^{-5}$  M
- (d)  $10^{-7}$  M

**Q. 23.** Which of the four restriction enzymes given below cut the following DNA sequence ?

5'-CCGATATCTCGAGGGC-3'

P. BamHI (3'-CCTAG|G-5')

Q. XhoI (3'-GAGCT|C-5')

S. EcoRV (3'-CTA|TAG-5')

R. EcoRI (3'-CTTAA|G-5')

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- (a) P and Q
- (b) P, R and S
- (c) Q and S
- (d) P and R

**Q. 24.** If the calculated value of Chi-square lies in the region of acceptance, then we :

- (a) Accept  $H_0$
- (b) Reject  $H_0$
- (c) Both (a) and (b)
- (d) None of these

**Q. 25.** If random sample size 4 taken from a population whose variance is 16. When sampling is done with replacement than variances of the sample mean is :

- (a) 2
- (b) 4
- (c) 16
- (d) 48