

D 102516

(Pages : 8)

Name.....

Reg. No.....

P.G. ENTRANCE EXAMINATION, APRIL 2024

BIOTECHNOLOGY

Time : Two Hours

Maximum : 200 Marks

Each question carries 4 marks.

1 mark will be deducted for each wrong answer.

1. Which of the following is a transition metal ?
 - (a) Calcium.
 - (b) Iron.
 - (c) Sodium.
 - (d) Potassium.
2. Which of the following is NOT a function of the pentose phosphate pathway ?
 - (a) Production of ribose-5-phosphate for nucleotide synthesis.
 - (b) Generation of NADPH for biosynthetic reactions.
 - (c) Production of ATP via substrate-level phosphorylation.
 - (d) Detoxification of reactive oxygen species.
3. What is the primary function of the citric acid cycle in cellular respiration ?
 - (a) Production of ATP.
 - (b) Oxidation of glucose.
 - (c) Reduction of NAD⁺ to NADH.
 - (d) Generation of electron carriers.
4. Which amino acid is commonly found in plant proteins ?
 - (a) Lysine.
 - (b) Cysteine.
 - (c) Methionine.
 - (d) Glycine.
5. Which of the following is not an essential amino acid ?
 - (a) Lysine.
 - (b) Valine.
 - (c) Glycine.
 - (d) Tryptophan.

Turn over

6. Disulfide bonds are often important for the structure of which class of proteins ?
- (a) Intracellular proteins.
 - (b) Extracellular proteins.
 - (c) Nuclear proteins.
 - (d) Lipid-bound proteins.
7. Which of the following is NOT considered a property of water ?
- (a) High surface tension.
 - (b) Low heat capacity.
 - (c) Universal solvent ability.
 - (d) High specific heat.
8. The carbon cycle involves the movement of carbon between :
- (a) Atmosphere, lithosphere, and hydrosphere.
 - (b) Atmosphere, biosphere, and lithosphere.
 - (c) Hydrosphere, biosphere, and lithosphere.
 - (d) Atmosphere, biosphere, and hydrosphere.
9. What is the role of calcitonin in calcium regulation ?
- (a) Increases calcium reabsorption in the kidneys.
 - (b) Decreases calcium absorption in the intestines.
 - (c) Increases calcium resorption from bones .
 - (d) Decreases calcium levels in the blood.
10. Which of the following is NOT a type of membrane lipid ?
- (a) Phospholipid.
 - (b) Steroid.
 - (c) Triglyceride.
 - (d) Glycolipid.
11. Which part of the chlorophyll molecule is responsible for absorbing light energy ?
- (a) Chlorin ring.
 - (b) Phytol tail.
 - (c) Magnesium ion.
 - (d) Hydrocarbon side chain.
12. Which of the following is NOT a function of the pentose phosphate pathway ?
- (a) Nucleotide synthesis.
 - (b) Ribose production.
 - (c) ATP production.
 - (d) NADPH generation.

13. Which of the following factors is involved in the regulation of RNA polymerase activity through phosphorylation ?
- (a) Sigma factor.
 - (b) Transcription factor IIB (TFIIB).
 - (c) Cyclin-dependent kinase (CDK).
 - (d) DNA polymerase.
14. Which of the following factors is not involved in transcriptional regulation through chromatin remodeling ?
- (a) Histone acetyltransferases (HATs).
 - (b) DNA methyltransferases.
 - (c) Histone deacetylases (HDACs).
 - (d) SWI/SNF complexes.
15. Which structural feature of B DNA facilitates its recognition by regulatory proteins ?
- (a) Major groove.
 - (b) Minor groove.
 - (c) Sugar-phosphate backbone.
 - (d) Hydrogen bonds between base pairs.
16. Which subunit of RNA polymerase II contains the catalytic activity responsible for RNA synthesis ?
- (a) Rpb1.
 - (b) Rpb2.
 - (c) Rpb3.
 - (d) Rpb4.
17. What is the approximate rise per base pair in B DNA ?
- (a) 2 Ångstroms.
 - (b) 3 Ångstroms.
 - (c) 5 Ångstroms.
 - (d) 7 Ångstroms.

18. In what type of sequence is Z DNA commonly found ?
- (a) AT-rich sequences.
 - (b) GC-rich sequences.
 - (c) TA-rich sequences.
 - (d) CG-rich sequences.
19. Which of the following is an example of epigenetic inheritance ?
- (a) Inheritance of DNA sequence mutations.
 - (b) Inheritance of DNA methylation patterns.
 - (c) Inheritance of chromosomal rearrangements.
 - (d) Inheritance of mitochondrial DNA.
20. What is the name of the photoreceptor responsible for perceiving blue light ?
- (a) Phytochrome.
 - (b) Cryptochrome.
 - (c) Phototropin.
 - (d) Chlorotropin.
21. The classification of organisms based on evolutionary history is called :
- (a) Phenetics.
 - (b) Cladistics.
 - (c) Systematics.
 - (d) Taxonomy.
22. What is the correct order of taxonomic categories from broadest to most specific ?
- (a) Kingdom, Phylum, Class, Order, Family, Genus, Species.
 - (b) Kingdom, Class, Phylum, Order, Family, Genus, Species.
 - (c) Phylum, Kingdom, Order, Class, Family, Genus, Species.
 - (d) Kingdom, Phylum, Order, Class, Family, Species, Genus.
23. Which factor is least likely to influence the composition of a climax community ?
- (a) Climate.
 - (b) Soil type.
 - (c) Human activity.
 - (d) Predation pressure.
24. In which layer of a pond ecosystem would you find rooted aquatic plants ?
- (a) Profundal zone.
 - (b) Littoral zone.
 - (c) Limnetic zone.
 - (d) Benthic zone.

25. What is the study of fossilized footprints called ?
- (a) Ichnology. (b) Paleobiology.
(c) Taphonomy. (d) Stratigraphy.
26. Which of the following is a greenhouse gas that is naturally present in the atmosphere ?
- (a) Carbon monoxide. (b) Methane.
(c) Sulfur dioxide. (d) Nitrogen oxides.
27. What is the main cause of coral bleaching ?
- (a) Pollution. (b) Overfishing.
(c) Ocean acidification. (d) Global warming.
28. What is the term for a fish that migrates between fresh and saltwater environments ?
- (a) Anadromous. (b) Catadromous.
(c) Diadromous. (d) Amphidromous.
29. Which of the following is a warm-season crop ?
- (a) Wheat. (b) Barley.
(c) Corn. (d) Oats.
30. Which of the following soil horizons contains the highest amount of organic matter ?
- (a) A horizon. (b) B horizon.
(c) C horizon. (d) O horizon.
31. Which of the following is not a macronutrient required by plants ?
- (a) Phosphorus. (b) Potassium.
(c) Iron. (d) Magnesium.
32. What is the maximum resolution limit of a light microscope ?
- (a) 0.1 nanometers. (b) 20 nanometers.
(c) 200 nanometers. (d) 2000 nanometers.

33. Which of the following is an example of a surfactant-enhanced bioremediation technique ?
- (a) Air sparging.
 - (b) Bioslurping.
 - (c) Phytoremediation.
 - (d) Monitored natural attenuation.
34. Which group of herbicides inhibits the enzyme protoporphyrinogen oxidase (PPO) ?
- (a) Group 2.
 - (b) Group 4.
 - (c) Group 9.
 - (d) Group 14.
35. Which type of DNA repair mechanism utilizes DNA ligase to seal the nick left after excision of damaged DNA ?
- (a) Base excision repair.
 - (b) Mismatch repair.
 - (c) Nucleotide excision repair.
 - (d) Homologous recombination.
36. Which disease is characterized by a defect in collagen synthesis, leading to hyperelasticity of the skin and hypermobility of joints ?
- (a) Marfan syndrome.
 - (b) Ehlers-Danlos syndrome.
 - (c) Osteogenesis imperfecta.
 - (d) Scurvy.
37. Which of the following diseases is associated with abnormalities in glycoprotein synthesis and processing ?
- (a) Alzheimer's disease.
 - (b) Cystic fibrosis.
 - (c) Diabetes mellitus.
 - (d) Sickle cell anemia.
38. What does it mean if the K_m value of an enzyme-substrate reaction is very high ?
- (a) The enzyme-substrate complex forms quickly.
 - (b) The enzyme has low affinity for the substrate.
 - (c) The enzyme is highly efficient.
 - (d) The reaction rate is maximum.

39. Which of the following antibiotics inhibits cell wall synthesis by binding to the transpeptidase enzyme ?
- (a) Penicillin. (b) Streptomycin.
(c) Tetracycline. (d) Erythromycin.
40. Which type of bonds primarily contribute to the flexibility of the hinge region ?
- (a) Hydrogen bonds. (b) Disulfide bonds.
(c) Ionic bonds. (d) Van der Waals forces.
41. Which insect order includes insects commonly known as beetles ?
- (a) Coleoptera. (b) Hymenoptera.
(c) Diptera. (d) Orthoptera.
42. What is the ideal temperature range for the anaerobic, digestion process in biogas production ?
- (a) 0°C - 10°C. (b) 20°C - 30°C.
(c) 40°C - 50°C. (d) 60°C - 70°C.
43. Which step of the NGS workflow involves the breaking of DNA into smaller fragments ?
- (a) Denaturation. (b) Amplification.
(c) Library preparation. (d) Sequencing.
44. Which enzyme is responsible for catalyzing the rate-limiting step of glycolysis ?
- (a) Phosphofructokinase-1 (PFK-1). (b) Hexokinase.
(c) Aldolase. (d) Pyruvate kinase.
45. What is the typical duration of ethanol fermentation process ?
- (a) 1-2 hours. (b) 6-12 hours.
(c) 24-48 hours. (d) 5-7 days.
46. What is the correct order of the stages of embryonic development in animals ?
- (a) Blastula, Gastrula, Morula. (b) Morula, Blastula, Gastrula.
(c) Gastrula, Blastula, Morula. (d) Morula, Gastrula, Blastula.

47. Fertilidisc is commonly utilized in which stage of plant growth ?
- (a) Flowering.
 - (b) Vegetative.
 - (c) Maturation.
 - (d) Dormancy.
48. Chimeric antibodies have been particularly successful in treating which type of cancer ?
- (a) Breast cancer.
 - (b) Lung cancer.
 - (c) Leukemia.
 - (d) Prostate cancer.
49. Which condition is associated with Type II hypersensitivity reactions against self-antigens ?
- (a) Rheumatoid arthritis.
 - (b) Myasthenia gravis.
 - (c) Multiple sclerosis.
 - (d) Systemic lupus erythematosus.
50. Which phase of the cell cycle is most susceptible to apoptosis ?
- (a) G1 phase.
 - (b) S phase.
 - (c) G2 phase.
 - (d) M phase.