



**SIR PADAMPAT SINGHANIA UNIVERSITY
UDAIPUR**

**Sample Question Paper for Ph.D. (Biotechnology)
SPSAT'18**

INSTRUCTIONS

The test is 60 minutes long and consists of 40 multiple choice questions (MCQ) adding up to 40 marks.

- Which of the following is M13 based vector?
(a) pBR322 (b) pT7blue (c) pUC18 (d) Cosmid
- What size DNA fragment is suitable for cloning in lambda replacement vector?
(a) 30kb (b) 35kb (c) 18kb (d) 53kb
- How many extra base pairs are present in Z-DNA as compared to A-DNA?
(a) 1 (b) 2 (c) 3 (d) 4
- Each exonuclease exhibit specificity for removing nucleotides only from
(a) 5' end of the strand (b) 3' end of the strand
(c) 5' as well as 3' end of strand (d) Either 5' or 3' end of the strand
- Which of the following hormone is a peptide of less than 10 amino acids?
(a) Insulin (b) Growth hormone
(c) Oxytocin (d) Parathyroid hormone
- Which one of the following is not a nucleoside
(a) Adenosine (b) Guanosine (c) Cytosine (d) Uridine
- Addition of an inhibitor does not change K_m/V_{max} value, if the mechanism of inhibition is
(a) Competitive (b) Uncompetitive (c) Noncompetitive (d) All the above
- Denaturation of protein involves
(a) Partial loss of amino acid sequence (b) Loss of α -helices
(c) Loss of β -sheets (d) Loss of 3-D shape and catalytic activity
- DNA
(a) Is more susceptible than RNA to denaturation at high pH
(b) Can hybridize with other DNA molecules but not with RNA
(c) Has fewer hydroxyl groups than RNA
(d) Has catalytic activity

10. Enzyme which incorporate oxygen into a substrate are called
- (a) Oxidase
 - (b) Dehydrogenase
 - (c) Oxygenases
 - (d) Hydroperoxidases
11. By adding SDS during the electrophoresis of proteins, it is possible to:
- (a) Determine an enzyme's specific activity
 - (b) Determine the amino acid composition of the protein
 - (c) Preserve a protein's native structure and biological activity
 - (d) Separate proteins exclusively on the basis of molecular weight
12. The primary activities of complement system DO NOT include
- (a) Opsonization
 - (b) Cell lysis
 - (c) Clearance of immune complexes
 - (d) Tissue regeneration
13. Which of the following is used to search protein database using a translated nucleotide query?
- (a) BLASTp
 - (b) BLASTx
 - (c) tBLASTn
 - (d) tBLASTx
14. BLOSUM is an acronym for
- (a) Basic substitution matrix
 - (b) Basic local summation matrix
 - (c) Blocks substitution matrix
 - (d) Blocks substituted mutation
15. Which one of the following techniques is useful in determining the movement of proteins within a nucleus?
- (a) Electron microscopy
 - (b) Fluorescence recovery after photobleaching (FRAP)
 - (c) Fluorescent in situ hybridization (FISH)
 - (d) Confocal light microscopy
16. Mitochondria is involved in all the following cellular processes, except
- (a) ATP-production
 - (b) Apoptosis
 - (c) TCA cycle
 - (d) Fatty acid biosynthesis
17. Which of the following can function as energy sensor and regulator of lipid metabolism?
- (a) AMP
 - (b) ATP
 - (c) GMP
 - (d) GTP
18. Cellulose is a polymer of
- (a) $\text{-Glu-}\alpha\text{ 1, 4 Glu-}$
 - (b) $\text{-Glu-}\alpha\text{ 1, 4 Gal-}$
 - (c) $\text{-Glu-}\beta\text{ 1, 4 Glu-}$
 - (d) $\text{-Glu-}\beta\text{ 1, 4 Gal-}$
19. An allele can be considered dominant if it
- (a) Determines the phenotype in a homozygous condition
 - (b) Determines the phenotype in a heterozygous condition

- (c) Determines the genotype in a homozygous condition
 (d) Determines the genotype in a heterozygous condition
20. Which of the following processes cannot be used as an immobilization technique
- (a) Adsorption (b) Entrapping
 (c) Microencapsulation (d) Absorption
21. Transcriptomics can be defined as the study of
- (a) A particular gene product (b) All the mRNAs in the cell
 (c) All RNAs in the cell (d) Differential gene expression
22. Which of the following is the live attenuated vaccine?
- (a) Diphtheria (b) Oral polio (c) Tetanus toxoid (d) Pertussis
23. Which unit is used for the molecular weight of proteins?
- (a) kDa (b) μg (c) kb (d) bp
24. Genomic analysis of unculturable organisms in a habitat within an ecosystem is called
- (a) Metagenomics (b) Microbiome analysis
 (c) Phylogenomics (d) Epigenomics
25. Which of the following immunoglobulin can readily cross placenta
- (a) IgM (b) IgG (c) IgA (d) IgE
26. HEPA in HEPA filters stands for
- (a) High efficiency particulate air (b) High eluting particulate air
 (c) High efficiency purified air (d) High efficiency performing air
27. Zymogens are
- (a) Enzymes (b) Inactive enzyme precursors
 (c) Enzyme precursors (d) Lipids
28. In glycolysis, ATP synthesis is catalyzed by
- (a) Hexokinase (b) 6phosphofructokinase
 (c) Phosphoglycerate kinase (d) Glyceraldehyde 3 phosphate dehydrogenase
29. cDNA can be defined as
- (a) Complementary DNA strand made against DNA
 (b) A conformation of DNA (c) Complementary DNA made against mrna
 (d) Complementary DNA made against trna
30. The genome of cauliflower mosaic virus is
- (a) +RNA (b) ss DNA (c) ds DNA (d) ds RNA

31. The first ribozyme was found in
- (a) A nuclear gene for a DNA replicating enzyme
 - (b) A mitochondrial gene for a respiratory enzyme
 - (c) mRNA for a mitochondrial enzyme
 - (d) An intron within a pre-rRNA molecule
32. In bacteria which of the following is not an inducer of an operon
- (a) Tryptophan
 - (b) Allolactose
 - (c) IPTG
 - (d) L-arabinose
33. Which of the following is a principle buffer in interstitial fluid
- (a) Hemoglobin
 - (b) Albumin
 - (c) Carbonic acid
 - (d) H₂PO₄
34. The antigen specificity of a particular B cell
- (a) Is induced by interaction with antigen
 - (b) Is determined only by the L-chain sequence
 - (c) Is determined by H+ L-chain variable region sequences
 - (d) Changes after isotype switching
35. Which dietary fat is typically nonesterified?
- (a) Cholesterol
 - (b) Glycerophospholipid
 - (c) Triacylglycerols
 - (d) Fatty acids
36. Diphtheria toxin inhibits protein synthesis by
- (a) Causing formation of ADP-EF2 complex
 - (b) Release of peptidyl-t-RNA from the p-site
 - (c) Binding to factor eEF2
 - (d) Inhibiting peptide bond formation
37. In prokaryotes the lagging strand primers are removed by
- (a) 3' to 5' exonuclease
 - (b) DNA ligase
 - (c) DNA polymerase I
 - (d) DNA polymerase III
38. T4 DNA ligase
- (a) Requires ATP
 - (b) Joins ds DNA fragment with an adjacent 3'-phosphate and 5'-OH
 - (c) Requires NADH
 - (d) Joins ss DNA
39. Any DNA molecule that has the ability to replicate autonomously is called
- (a) Plasmid
 - (b) Chromosome
 - (c) Genome
 - (d) Replicon
40. Which of the following is the function of plasma membrane
- (a) Structural barrier and cell communication
 - (b) Metabolic activities and cell adhesion
 - (c) Mass flow regulation, active transport, diffusion, endocytosis and exocytosis
 - (d) All of the above